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Report of Geotechnical Investigation

Proposed Ludlow Substation SC5 Site

Eldorado Lugo-Mohave Series Capacitor Upgrade Project
East of Pisgah Substation
San Bernardino County, California

Prepared for:

Beta Engineering
Pineville, Louisiana 71360

Project 4953-18-0131.01

July 27, 2018

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July 27, 2018
Wood Project 4953-18-0131.01

Mr. Nicholas Mulheim
Beta Engineering
4725 Highway 28 East
Pineville, Louisiana 71360

Subject: **Letter of Transmittal**
Report of Geotechnical Investigation
Proposed Ludlow Substation SC5 Site
Eldorado Lugo-Mohave Series Capacitor Upgrade Project
East of Pisgah Substation
San Bernardino County, California

Dear Mr. Mulheim:

We, Wood Environment & Infrastructure Solutions, Inc. (Wood – formerly Amec Foster Wheeler), are pleased to submit this report presenting the results of our geotechnical investigation for the Eldorado-Lugo-Mohave Capacitor Upgrade – Ludlow Substation SC5 site, east of Pisgah Substation in San Bernardino County, California.

The scope of our services was based on our agreement dated January 31, 2018 with revision 1 dated April 15, 2018, and our telecon of June 26, 2018.

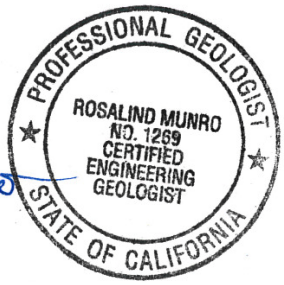
The results of our investigation, including our prior subsurface explorations and laboratory testing, and design recommendations are presented in this report. Please note that you or your representative should submit copies of this report to the appropriate governmental agencies.

It has been a pleasure to be of professional service to you. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,

Wood Environment & Infrastructure Solutions, Inc.

Eung Jin Jung, Ph.D.
Associate Engineer



Rosalind Munro
Principal Engineering Geologist

Reviewed by:

Marshall Lew, Ph.D.
Principal Engineer

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(Electronic copies submitted)

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1.0 Scope

This report provides the results of our geotechnical investigation for the Eldorado-Lugo-Mohave Capacitor Upgrade – Ludlow Substation SC5 site, east of Pisgah Substation in San Bernardino County, California. The location of the site is illustrated on Figure 1, Site Vicinity Map.

We previously explored the original Ludlow site in 2017 and presented the boring logs and results of our laboratory testing in a data report for Southern California Edison dated November 29, 2017 (Wood predecessor company Amec Foster Wheeler Project No. 4953-17-0231). The geologic and geotechnical conditions at the original Ludlow site are considered representative of the current site. We also prepared a geotechnical foundation design parameters report for the site dated May 22, 2018 (Wood Project No. 4953-18-0131.01.) This report supersedes the May 22, 2018 report.

The recommendations presented in this report were developed using the geotechnical information from that investigation. We acknowledge that we have reviewed the field data and the results of the laboratory tests from the previous investigation and we concur with the data findings.

The scope of this investigation did not include the assessment of general site environmental conditions for the presence of contaminants in the soils and groundwater of the site.

Our recommendations are based on the results of our previous field exploration, laboratory tests, and field permeability tests. The results of our previous field explorations and laboratory tests, which form the basis of our recommendations, are presented in Appendices A, B, and C.

Our professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No other warranty, express or implied, is made as to the professional advice included in this report. This report has been prepared for Beta Engineering and their design consultants to be used solely in the proposed Ludlow Substation. This report has not been prepared for use by other parties, and may not contain sufficient information for purpose of other parties or other uses.

2.0 Site Conditions and Project Description

The project site is unimproved land with unpaved roads and has sparse vegetation and scattered cobbles and boulders up to one foot in diameter.

It is currently planned to construct series capacitor platform structures, typical equipment supporting structures (bus supports, switch stands, etc.), deadend structures, circuit breakers, buildings, and other miscellaneous equipment at the Newberry Springs site at the location shown on Figure 1. We understand that series capacitor platform structures are planned to be supported on mat foundations, typical equipment support structures are planned to be supported on drilled shafts, the deadend structures are planned to be supported on 5- to 6-foot diameter drilled shafts, and the circuit breakers, buildings and other miscellaneous equipment is planned to be supported on spread footings.

As indicated in your RFQ dated January 2, 2018, the series capacitor platform structures (Foundation Type 1) will be supported on mat (slab) foundations. The dead load bearing pressure at the bottom of the foundation is expected to be less than 500 pounds per square foot (psf). Under short term loading conditions, such as wind and seismic loads, the maximum bearing pressure is expected to be less than 2,000 psf.

Typical equipment support structures such as bus supports, switch stands, etc. (Foundation Type 2) will be supported on drilled shafts with diameters ranging from 2½ to 4 feet and lengths ranging from 8 to 15 feet. This foundation type will have very small applied axial dead loads (ranging from 2 to 4 kips). The lateral loads and moments applied to the top of the drilled shaft will be short term loads resulting from wind or seismic forces. Lateral loads will range from 1 kip to 5 kips. Moments will range from 20 to 60 ft-kips.

The deadend structures (Foundation Type 3) may be supported on drilled shafts with diameters ranging from 5 to 6 feet and lengths ranging from 15 to 20 feet. Axial loads applied to the top of the foundation will be approximately 200 kips (tension or compression). Lateral loads applied to the top of the drilled shafts will range from 20 to 40 kips and applied moments will range from 500 to 1,000 ft-kips.

The circuit breakers, buildings, and other miscellaneous equipment (Foundation Type 4) may be supported on spread footings (slabs). The dead load bearing pressure at the bottom of the foundations are expected to be less than 500 psf. Under short term loading conditions such as wind or seismic loads, the maximum bearing pressures are expected to be less than 1,500 psf.

3.0 Field Explorations and Laboratory Tests

The geotechnical conditions at the site were explored by excavation of twelve hollow-stem auger borings at the locations shown on Figure 2, Boring Location Map. The number, depths, and locations of the borings were provided by SCE. The explorations were performed on September 25, 2017 and on October 23 through October 27, 2017 by our predecessor company Amec Foster Wheeler.

The hollow-stem auger borings (designated BLMP-1 through BLMP-12) were drilled with a track-mounted hollow-stem auger rig to depths of 16½, and 50½ to 51½ feet. The borings were sampled with a standard penetration test (SPT) sampler and California Modified ring sampler at approximately 5-foot intervals, generally alternating between the sampler types. The number, depths, and locations of the borings were provided by SCE. A summary of the methodology of the exploratory borings drilled for the project and the logs of the borings are presented in Appendix A.

Soil samples collected from the borings were transported to the Amec Foster Wheeler laboratory, and were reviewed by Amec Foster Wheeler staff. The laboratory testing program was developed by SCE based on review of the field boring logs. Laboratory testing was performed by Amec Foster Wheeler, LaBelle Marvin, Inc., and HDR. The types of tests performed are listed below:

- Moisture and density
- Direct shear
- Grain size distribution
- Collapse
- Compaction
- R-value (performed by LaBelle Marvin, Inc.)
- Corrosion (performed by HDR)

All testing was performed in general accordance with applicable ASTM specifications at the time of testing. Details of the laboratory testing program and the test results are presented in Appendix B.

The field permeability tests were performed on October 25, 2017 at the two locations shown on Figure 2, Boring Location Map. The borings for the permeability tests, designated PT-1 and PT-2, were drilled to a depth of 5 feet below ground surface (bgs) using 8-inch diameter hollow-stem auger drilling equipment. The soils encountered in the two borings were poorly graded sand.

A summary of the methodology and the calculations for the field permeability tests are presented in Appendix C. The calculated infiltration rates from the two field permeability tests are 7.6 and 21.1 inch/hour. No safety factor has been applied.

4.0 Geology

4.1 Geologic Setting

The site is located in the Mojave Desert Geomorphic Province, a broad interior region of isolated mountain ranges separated by expanses of desert plains [California Geological Survey (CGS), 2002.]

4.2 Geologic Materials

The site is mapped as young mixed eolian sand and alluvial deposits (Holocene and latest Pleistocene)/older intermediate alluvial fan deposits of late and middle Pleistocene age (Phelps et al., 2012.) The alluvial deposits underlying the site consist predominantly of poorly graded sand with variable amounts of gravel and cobbles. Cobbles are anticipated to be more abundant in the subsurface than identified in the borings and boulders may be present as well.

4.3 Groundwater

Groundwater was not encountered to the maximum depth drilled of 51½ feet bgs.

4.4 Geologic-Seismic Hazards

Surface Fault Rupture

The site is not within a currently established Alquist-Priolo Earthquake Fault Zone (A-P Zone) for surface fault rupture hazard (CGS, 2003a and 2003b). An A-P Zone is an area which requires geologic investigation to evaluate whether the potential for surface fault rupture is present near an active fault (CGS, 2018b). As defined by the A-P Zone Act, an active fault is defined as a fault with surface displacement within the last 11,700 years (Holocene age). The closest established A-P Zone is located approximately 2.4 miles west of the site for a section of the Lavic Lake fault zone (CGS, 2003a and 2003b). There are no known active faults with the potential for surface fault rupture located directly beneath or projecting toward the site. Therefore, the potential for surface rupture due to fault plane displacement propagating to the surface at the site during the design life of the proposed development is considered low.

Seismicity

The site could be subjected to strong ground shaking in the event of an earthquake, this hazard is common in Southern California and the effects of ground shaking can be mitigated by proper engineering design and construction in conformance with current building codes and engineering practices.

Liquefaction and Seismically-Induced Settlement

Liquefaction potential is greatest where the groundwater level is shallow, and submerged loose, fine sands occur within a depth of about 50 feet or less. Liquefaction potential decreases as grain size and clay and gravel content increase. As ground acceleration and shaking duration increase during an earthquake, liquefaction potential increases. Groundwater was not encountered to the maximum depth drilled of 51½ feet below the existing grade. Therefore, the potential for liquefaction of the subsurface materials is considered to be low.

Seismically-induced settlement is often caused by loose to medium-dense granular soils densified during ground shaking. Uniform settlement beneath a given structure would cause minimal damage; however, because of variations in distribution, density, and confining conditions of the soils, seismically-induced settlement is generally non-uniform and can cause serious structural damage. Dry and partially saturated soils as well as

saturated granular soils are subject to seismically-induced settlement. There is a potential for seismically induced settlement in the upper 3 to 5 feet, however, the potential can be mitigated by following the recommendations of Section 5.7.

Collapsible Soils

Conditions in arid and semi-arid climates favor the formation of collapsible soils. Collapsible soils are soils susceptible to large volumetric stains when they become saturated. The soils underneath the project site possess moderate to high collapse potential based on the laboratory test results. There is a potential for collapsible soils, however, the potential can be mitigated by following the recommendations of Section 5.7.

Slope Stability

The relatively flat-lying topography at the site precludes both stability problems and the potential for lurching (earth movement at right angles to a cliff or steep slope during ground shaking).

Expansive and Corrosive Soils

The alluvial soils at the site are non-expansive.

The corrosion test results performed for us by HDR presented in our 2017 Amec Foster Wheeler report indicate that the on-site soils range from mildly corrosive to ferrous metals at present moisture content, non-aggressive to copper, and that the potential for sulfate attack on portland cement concrete is considered severe. We understand that an additional separate soil corrosivity study for the site has been prepared by HDR for SCE.

Tsunamis, Inundation, Seiches, and Flooding

The site is not located near the coast. Therefore, tsunamis (seismic sea waves) are not considered a hazard at the site.

The site is not located within a potential inundation area for an earthquake-induced dam failure. The site is not located downslope of any large bodies of water that could adversely affect the site in the event of earthquake-induced seiches (wave oscillations in an enclosed or semi-enclosed body of water.)

The site is in the vicinity of active washes and there is the potential for flooding. The potential for flooding can be mitigated by proper civil design.

Subsidence

The site is not within an area of known subsidence associated with fluid withdrawal (groundwater or petroleum) or peat oxidation. The potential for subsidence due to fluid withdrawal or peat oxidation to adversely impact the site is considered low.

Oil Wells and Methane Gas

The site is not located within the limits of an oil field. There are no known oil wells on the site. Plugged and abandoned oil exploration holes are not known to be located near the site. Therefore, the potential for methane and other volatile gases to occur beneath the site is low.

Volcanic Eruption

The site is within one mile of the lava flows from the young volcanic Pisgah Crater so the potential exists for the site being impacted by cinders or lava flow if an eruption occurred. However, there was no evidence of that occurring in the Holocene and latest Pleistocene as no cinders or lava was encountered in the Holocene and latest Pleistocene-age eolian and alluvial deposits within the 50 feet depth of our recent borings. According to the USGS, the last lava flow was approximately 18,000 to 22,000 years ago.

5.0 Recommendations

Because of the presence of collapsible soils underneath the project site, settlement from wetting should be considered in the foundation design. With the possible introduction of additional moisture into the subsurface, which can occur due to water impoundment from improper drainage, rainfall, pipe leaks, or irrigation, significant settlement may occur if foundations are placed directly on the existing site soils.

To mitigate the potential for unacceptable settlement, we recommend that remedial grading be performed to install at least 3 feet of properly compacted fill below footings. The upper 5 feet of the existing site soils (or 3 feet below bottom of footings, whichever is deeper) should be removed and replaced with properly compacted fill. The lateral extent of removal and replacement should be equal to the removal depth below footings.

5.1 Foundation Design Parameters

Foundation design parameters for the site are presented in the following table. The design parameters were estimated based on field data and laboratory test results.

Foundation Design Parameters

Soil Condition	Total Unit weight, pcf	Moisture Content (%)	Friction Angle, ϕ (degree)	Cohesion, c (psf)	Vertical Subgrade Modulus (pci)	Lateral Subgrade Modulus (pci)
Well Graded Sand/ Poorly Graded Sand/Poorly Graded Sand with Silt	115	4	33	0	200	150

By: EJJ 2/6/18
Checked by: LT 2/7/18

5.2 Drilled Cast-In-Place Concrete Piles

Downdrag loads may develop in drilled cast-in-place concrete piles due to settlement of hydro-collapsible soils. However, if the upper 5 feet of the existing soils, measured from the design grade, are replaced as properly compacted fill, downdrag loads should be negligible.

Axial Capacities

We have estimated the axial capacities of drilled cast-in-place concrete piles based on the strength characteristics of the on-site soils. The ultimate downward and upward friction capacities of 30-, 36-, and 48-inch diameter drilled piles for typical equipment support structures and 60- and 72-inch diameter drilled piles for the deadend structures are presented on Figure 3. We recommend the piles be designed for skin friction only. It may be prudent to neglect the upper one foot of pile embedment.

The capacities are dead-plus-live load capacities; a one-third increase to the allowable values may be used when considering wind or seismic loads.

Settlement

We estimate the static settlement of the proposed structure supported on conventional drilled cast-in-place concrete piles in the manner recommended to be less than ½ inch with a differential settlement of ¼ inch or less between adjacent supports.

Lateral Loads

Lateral loads may be resisted by the piles and by the passive resistance of the soils against pile caps. The resistance of the piles and the passive resistance of the soils against pile caps may be combined without reduction in determining the total lateral resistance.

We have computed the lateral capacities of the drilled piles using the computer program LPILE Plus by ENSOFT, Inc. Resistance of the soils adjacent to 30-, 36-, 48-, 60-, and 72-inch-diameter drilled piles are shown in the following tables for top of pile deflections of ¼, ½, ¾, and 1 inches. These resistances have been calculated assuming free-head pile conditions. The minimum pile length may be taken as the length required to reach the depth of zero moment given in the following tables. Lateral loads provided below are ultimate values.

Lateral Load Design Data
30-inch diameter Drilled Concrete Pile

	Pile Head Deflection (inches)			
	¼	**½**	**¾**	**1**
Pile Head Condition	**Free**			
Lateral Load (kips)	42	64	82	98
Maximum Moment (inch-kips)	2,470	4,119	5,611	7,025
Depth to Maximum Moment (ft)	8	8½	9½	9½
Depth to Zero Moment (ft)	22½	23½	24½	25

Lateral Load Design Data
36-inch diameter Drilled Concrete Pile

	Pile Head Deflection (inches)			
	¼	**½**	**¾**	**1**
Pile Head Condition	**Free**			
Lateral Load (kips)	62	93	118	141
Maximum Moment (inch-kips)	4,084	6,748	9,136	11,400
Depth to Maximum Moment (ft)	9	9.5	10½	11
Depth to Zero Moment (ft)	25	27	28	28½

Lateral Load Design Data
48-inch diameter Drilled Concrete Pile

	Pile Head Deflection (inches)			
	¼	**½**	**¾**	**1**
Pile Head Condition	**Free**			
Lateral Load (kips)	110	168	213	253
Maximum Moment (inch-kips)	8,732	14,800	19,900	24,600
Depth to Maximum Moment (ft)	10½	11½	12½	13
Depth to Zero Moment (ft)	31	32½	34	35

Lateral Load Design Data
60-inch diameter Drilled Concrete Pile

	Pile Head Deflection (inches)			
	¼	½	¾	1
Pile Head Condition	**Free**			
Lateral Load (kips)	168	267	338	399
Maximum Moment (inch-kips)	15,200	27,500	36,700	45,c00
Depth to Maximum Moment (ft)	12	14	14½	15
Depth to Zero Moment (ft)	36½	38	39½	41

Lateral Load Design Data
72-inch diameter Drilled Concrete Pile

	Pile Head Deflection (inches)			
	¼	½	¾	1
Pile Head Condition	**Free**			
Lateral Load (kips)	233	386	492	581
Maximum Moment (inch-kips)	23,700	44,500	60,500	74,400
Depth to Maximum Moment (ft)	14	15	16	17
Depth to Zero Moment (ft)	43	44	45½	47½

By: EJJ 2/5/2018
Checked by: LT 2/7/2018

Drilled Pile Installation

Observations of caving potential could not be made during our field explorations due to the hollow-stem auger drilling method used. However, due to the non-cohesive nature of the subsurface soils, caving should be anticipated during pile excavation. Therefore, provisions to reduce the potential for caving, such as the use of casing and/or drilling mud, may be necessary when drilling the piles and placing concrete.

Although it is not anticipated, piles spaced less than five diameters on center should be drilled and filled alternately, with the concrete permitted to set at least 8 hours before drilling an adjacent hole. The pile installation should be completed the same day that the drilling is performed. A collar should be placed around the mouth of the shaft after drilling to prevent soils from entering the excavation, and the pile shafts should be covered until concrete is placed.

Concrete should be pumped from the bottom up through a rigid pipe extending to the bottom of the drilled excavation, with the pipe being slowly withdrawn as the concrete level rises. The discharge end of the pipe should be at least 5 feet below the surface of the concrete at all times during placement. The concrete pump pressure should be at least 200 pounds per square inch. The discharge pipe should be kept full of concrete during the entire placement operation and should not be removed from the concrete until all of the concrete is placed and fresh concrete appears at the top of the pile. The volume of concrete pumped into the hole should be recorded and compared to design volume.

Only competent drilling contractors with experience in the installation of drilled cast-in-place piles in similar soil conditions should be considered for the pile construction. The drilling of the pile excavations and the placing of

the concrete should be observed continuously by personnel of our firm to verify that the desired diameter and depth of piles are achieved.

5.3 Shallow Foundations

As indicated, the maximum loading on the mat to support series capacitor platform structures will be less than 2,000 pounds per square foot when considering wind or seismic loading. The maximum loading on the spread footing to support the circuit breakers, buildings and other miscellaneous equipment will be less than 1,500 pounds per square foot when considering wind or seismic loading. Accordingly, the mat foundations and spread footings, underlain by compacted fill after recommended over-excavation described in Section 5.7 and established at least 1½ feet below the lowest adjacent grade or floor level, may be designed to impose an allowable net dead-plus-live load bearing pressure of up to 2,500 pounds per square foot. Since this allowable bearing value is governed by settlement considerations and the minimum mat foundation size would be governed by the size of the foundation, no increase in the above bearing value is allowed for additional mat/footing width or depth unless additional settlement can be tolerated.

The bearing value is a net value, and the weight of concrete in the foundation may be taken as 50 pounds per cubic foot. A one-third increase in the bearing value may be used when considering wind or seismic loads.

Lateral Loads

Lateral loads may be resisted by friction of the soil acting against the mat foundations and spread footings and by the passive resistance of the soils.

A coefficient of friction of 0.4 may be used between the mat foundation and the supporting soils. The passive resistance of soils can be assumed to be equal to the pressure developed by a fluid with a density of 250 pounds per cubic foot.

A one-third increase in the passive value may be used for wind or seismic loads. The frictional resistance and the passive resistance of the soils may be combined without reduction in determining the total lateral resistance.

Settlement

Based on the expected loads provided to us, we estimate the static settlement of the proposed structures supported on mat foundations and spread footings in the manner recommended to be less than ½ and ¾ inches, respectively. Differential settlement is expected to be about ½ inch or less. Due to wetting of the upper 10 feet of soils, which is unlikely to happen, we estimate the additional settlement to be up to 1½ to 1¾ inches.

5.4 Ultimate Values

The allowable values in the preceding sections are for use with loadings determined by a conventional working stress design. When considering an ultimate design approach, the allowable values may be multiplied by the following factors:

Design Item	Ultimate Design Factor*
Bearing Value	3.0
Lateral Pile Capacity	1.0
Passive Pressure	1.5
Coefficient of Friction	1.5

*Ultimate axial pile capacities are presented in Figure 3.

In no event, however, should pile lengths be less than those required to support dead-plus-live loads when using the working stress design method.

5.5 Modulus of Subgrade Reaction

The modulus of subgrade reaction presented in the Foundation Design Parameters table on page 7 may be assumed for the onsite soils for both gravity and seismic analysis of the foundations. These values are a unit value for use with a 1-foot-square area. The modulus should be reduced in accordance with the following equation when used with larger mat foundations:

$$K_R = K\left[\frac{B+1}{2B}\right]^2$$

where:

K	=	unit subgrade modulus
K_R	=	reduced subgrade modulus
B	=	spread foundation/mat width

5.6 Seismic Design Parameters

We have determined the seismic design parameters in accordance with the provisions of the 2016 California Building Code and ASCE 7-10 Standard (ASCE, 2010) using the United States Geological Survey (USGS) Seismic Design Maps Web Application. The CBC Site Class was determined to be Site Class "C" based on the results of our explorations and a review of the local soil and geologic conditions. The mapped seismic parameters are presented in the following table:

Parameter	Mapped Value
S_S (0.2 second period, Site Class B)	1.198g
S_1 (1.0 second period, Site Class B)	0.431g
Site Class	C
F_a	1.0
F_v	1.369
$S_{MS} = F_a S_S$ (0.2 second period)	1.198g
$S_{M1} = F_v S_1$ (1.0 second period)	0.590g
S_{DS} = 2/3 x S_{MS} (0.2 second period)	0.798g
S_{D1} = 2/3 x S_{M1} (1.0 second period)	0.393g

By: GA 7/6/18 Checked: EJJ 7/9/18

5.7 Grading

Site Preparation/Removals

The top 2 feet below existing grade shall be removed and stockpiled for all graded areas. In structural areas, over-excavation of a minimum of 5 feet below finish grade and a minimum of 2 feet below finish grade in nonstructural areas is recommended for the site. In structural areas, additional over-excavation and stockpiling should be performed, if needed, to ensure that a minimum of 3 feet of compacted fill is present beneath spread or mat foundations.

During over-excavation, the exposed soils should be carefully observed for the removal of all loose and unsuitable deposits, including cobbles and rock fragments greater than 3 inches in diameter.

After removals/over-excavation, the exposed soils should be scarified to a depth of 6 inches, brought to near-optimum moisture content, and rolled with heavy compaction equipment. The removed/over-excavated soils used for fill should be compacted to at least 90% of the maximum dry density obtainable by the ASTM Designation D1557 method of compaction. In areas to support structures the upper 12 inches should be compacted to a minimum of 95% relative compaction.

Good drainage of surface water should be provided by adequately sloping all surfaces. Such drainage will be important to minimize infiltration of water beneath foundations and pavement.

Excavation and Temporary Slopes

Where excavations are deeper than about 4 feet, the sides of the excavations should be sloped back at 1:1 (horizontal to vertical) or shored for safety. Unshored excavations should not extend below a plane drawn at 1½:1 (horizontal to vertical) extending downward from adjacent existing footings. We would be pleased to present data for design of shoring if required.

Excavations should be observed by personnel of our firm so that any necessary modifications based on variations in the soil conditions can be made. All applicable safety requirements and regulations, including OSHA regulations, should be met.

Compaction

Any required fill should be placed in loose lifts not more than 8-inches-thick and compacted. The fill should be compacted to at least 90% of the maximum density obtainable by the ASTM D1557-12 test method. In areas to support structures the upper 12 inches should be compacted to a minimum of 95% relative compaction. The moisture content of the on-site soils at the time of compaction should vary no more than 2% below or above optimum moisture content.

Material for Fill

The on-site soils, less any debris or organic matter, can be used in required fills. Rock fragments and cobbles larger than 3 inches in diameter should not be used in the fill unless site specific criteria are developed and implemented. Rock fragments and cobbles greater than 3 inches in diameter should only be allowed in nonstructural areas where future piles and other foundation excavation would not be performed. They should need special placement and compaction procedures.

5.8 Paved, Gravel, and Dirt Road Construction

For asphalt paving, the required paving and base thicknesses will depend on the expected wheel loads and volume of traffic (Traffic Index or TI). Assuming that the paving subgrade is prepared as recommended in the grading section, the minimum recommended paving thicknesses are presented in the following table.

Assumed Traffic Index	Asphalt Concrete (Inches)	Base Course (Inches)
4 (Automobile Parking)	3	4
5 (Driveways with Light Truck Traffic)	3	4
6 (Driveways with Heavy Truck Traffic)	4	4

The asphalt paving sections were determined using the Caltrans design method assuming R-value of 63 obtained from our laboratory test results. We can determine the recommended paving and base course thicknesses for other Traffic Indices if required. Careful inspection is recommended to verify that the recommended thicknesses or greater are achieved, and that proper construction procedures are followed.

For gravel and dirt roads, the areas should be prepared in accordance with Site Preparation/Removals (Section 5.7). The roadways should be over-excavated a minimum of 12 inches below subgrade or to competent native materials, whichever is greater, and replaced with 12 inches of compacted fill compacted to a minimum of 95% of the maximum density obtainable by the ASTM D1557-12 test method. For gravel roads, the roadways should be underlain by 6 inches of Class 2 base compacted to 95% relative compaction. 6 inches of Class 2 base layer is not required for dirt roads.

5.9 Infiltration

The results of our field permeability tests indicate that infiltration is feasible within the soil layers tested. The infiltration system should be designed by the project civil engineer depending on the volume of water expected to be discharged into the infiltration system. This procedure is described under the Percolation Test Procedure Section VII.3.8 in the Orange County Technical Guidance Document Appendices, which is used by San Bernardino County as their Infiltration Rate Evaluation Protocol (OC TGD).

The infiltration rates were calculated according to the procedure described in Appendix VII (OC TGD). A summary of the methodology and the calculations are presented in Appendix C. The calculated infiltration rates from the two field permeability tests are 7.6 and 21.1 inch/hour. No safety factor has been applied.

5.10 Geotechnical Observation

The reworking of the upper soils and the compaction of all required fill should be observed and tested by the geotechnical consultant. The observation and testing should include:

- Observe the clearing and grubbing operations for proper removal of unsuitable materials.
- Observe pile excavations prior to placement of reinforcement.
- Observe the fill and backfill for uniformity during placement.
- Test backfill for field density and compaction to determine the percentage of compaction achieved during backfill placement.

- Observe and probe foundation materials to confirm that suitable bearing materials are present at the design foundation depths.

The governmental agencies having jurisdiction over the project should be notified prior to commencement of grading so that the necessary grading permits may be obtained and arrangements may be made for the required inspection(s).

Our professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No other warranty, express or implied, is made as to the professional advice included in this report.

The recommendations provided in this report are based upon our understanding of the described project information and on our interpretation of the data collected during our prior subsurface explorations. We have made our recommendations based upon experience with similar subsurface conditions under similar loading conditions. The recommendations apply to the specific project discussed in this report; therefore, any change in the structure configuration, loads, location, or the site grades should be provided to us so that we can review our conclusions and recommendations and make any necessary modifications.

The recommendations provided in this report are also based upon the assumption that the necessary geotechnical observations and testing during construction will be performed by representatives of our firm. The field observation services are considered a continuation of the geotechnical investigation and essential to verify that the actual soil conditions are as expected. This also provides for the procedure whereby the client can be advised of unexpected or changed conditions that would require modifications of our original recommendations. If another firm is retained for the geotechnical observation services, our professional responsibility and liability would be limited to the extent that we would not be the geotechnical engineer of record.

6.0 References

Amec Foster Wheeler, 2017, Geotechnical Data Report, Proposed Ludlow Site 4 500kV Midline Capacitor Project, Part of Eldorado-Lugo-Mohave Series Capacitor Project, East of Pisgah Substation, San Bernardino County, California, Project No. 4953-17-0231, dated November 29, 2018.

California Geological Survey, 2002, California Geomorphic Provinces, Note 36.

California Geological Survey, 2003a, State of California Earthquake Fault Zones, Hector Quadrangle, Revised Official Map Effective: May 1, 2003.

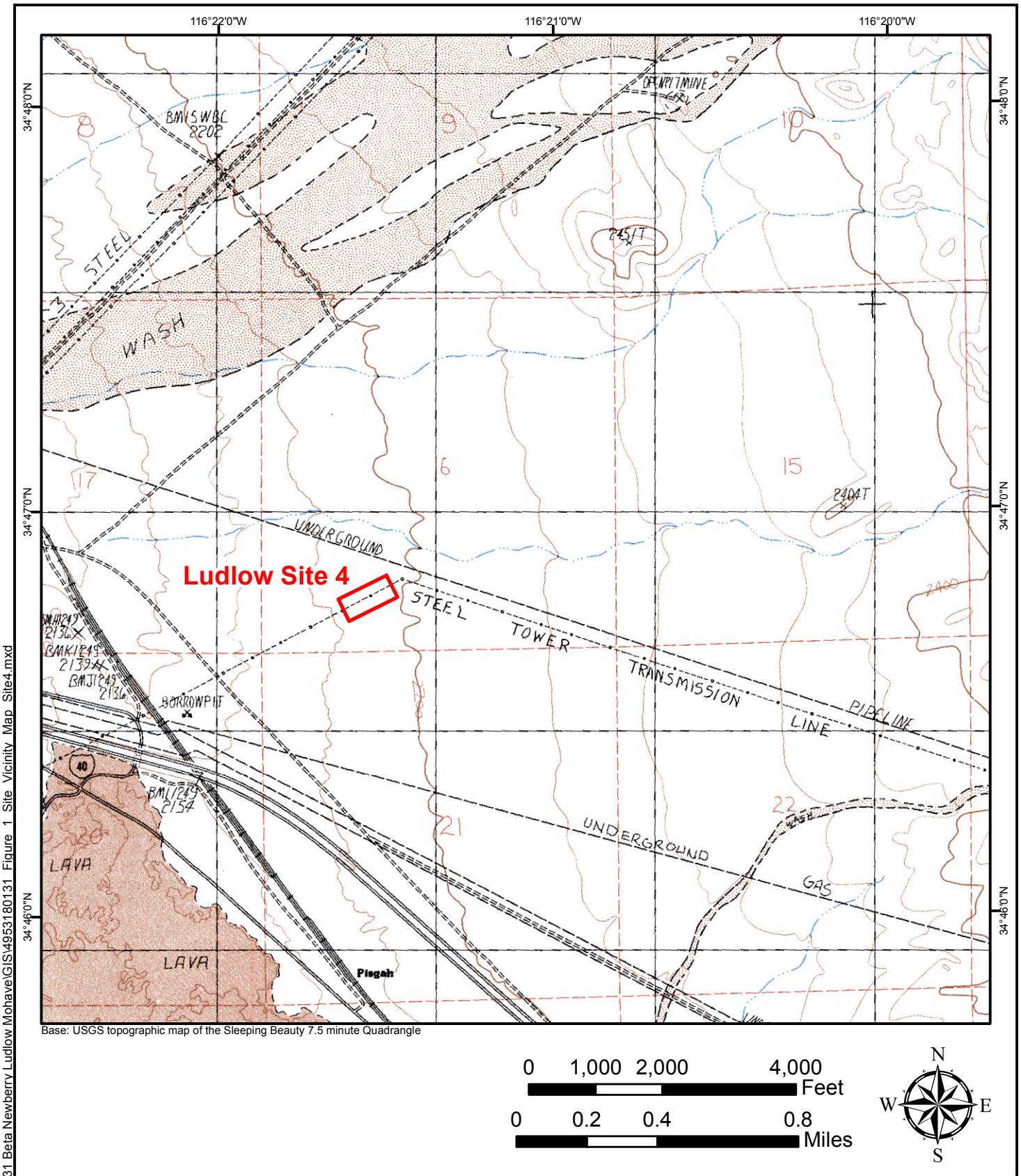
California Geological Survey, 2003b, State of California Earthquake Fault Zones, Sleeping Beauty Quadrangle, Official Map Effective: May 1, 2003.

Phelps, G.A., Bedford, D.R., Lidke, D.J., Miller, D.M., and Schmidt, K.M., 2012, Preliminary Surficial Geologic Map of the Newberry Springs 30′ x 60′ Quadrangle, U.S. Geological Survey Open File Report 2011-1044, scale 1:100,000.

Wood, 2018, Geotechnical Foundation Design Parameters, Eldorado Lugo-Mohave Series Capacitor Upgrade Project, Ludlow Substation SC5 Site, East of Pisgah Substation, San Bernardino County, California, Project No. 4953-18-0131.01.

Figure 1

Site Vicinity Map



Base: USGS topographic map of the Sleeping Beauty 7.5 minute Quadrangle

0 1,000 2,000 4,000 Feet

0 0.2 0.4 0.8 Miles

N W E S

wood.

Wood
Environment & Infrastructure Solutions, Inc.
6001 Rickenbacker Road
Los Angeles, California 90040
T 323.889.5300 F 323.721.6700

Proposed Ludlow Site 4 500 kV Midline Capcitor Project
Part of the Eldorado-Lugo-Mohave Series Capacitor Project
Near Pisgah, San Bernardino County, California

LAT:	34.7798
LON:	-116.3599
SCALE:	1:24,000
DRAWN:	PER
CHECK:	XXX
DATE:	7/6/2018

SITE VICINITY MAP

FIGURE: 1

PROJECT: 4953-18-0131

G:\4953 Geotech\2018\180131 Beta Newberry Ludlow Mohave\GIS\4953180131 Figure 1 Site Vicinity Map Site4.mxd

Figure 2

Boring Location Map

LEGEND

PT-2 Permeability Test Locations
BLMP-12 Soil Boring Locations

Reference:
ESRI Orthoimagery, 2018

0 75' 150' 300'
SCALE: 1" = 150'

Wood
Environment & Infrastructure Solutions, Inc.,
6001 Rickenbacker Rd, Los Angeles, CA 90040
Phone (323) 889-5300 Fax (323) 721-6700

Ludlow 500 kV Midline Capacitor Construction Project
Part of the Eldorado-Mohave Series Capacitor Project
Near Pisgah , San Bernardino County, California

LT,LNG:	
SCALE:	1" = 150'
DRAWN:	VMN
CHKD:	RM
DATE:	05/21/2018

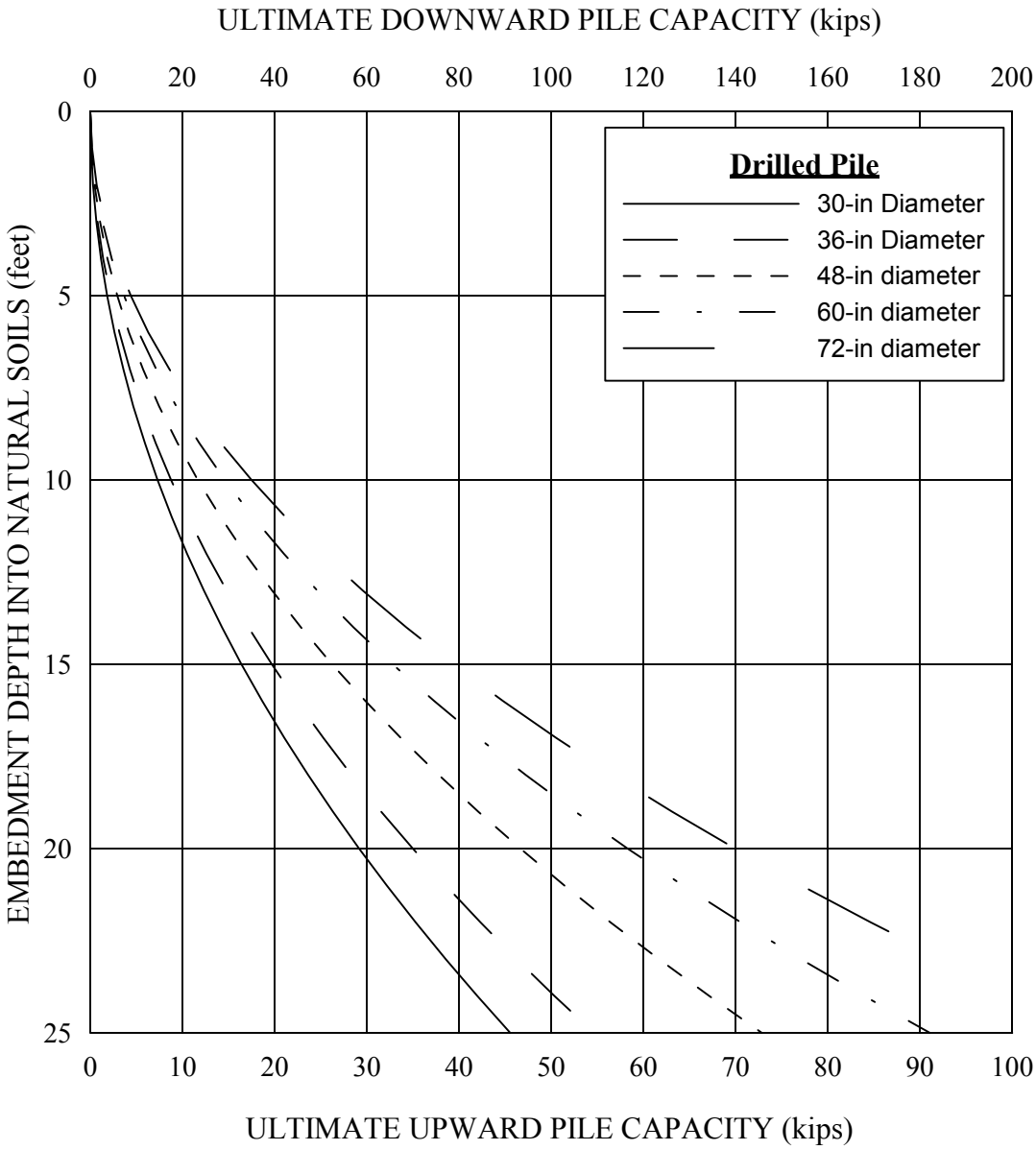
Boring Location Map
Ludlow Site 4

FIGURE NO. 2
PROJECT NO. 4953-18-0131

Path: G:\4953_Geotech\2018\180131 Beta Newberry Ludlow Mohave\CAD\DWG\4953-18-0131_Fig-1_Boring-Location-Map.dwg [8-17x11]
Date: May 22, 2018 - 1:54am By: vcnguyen

Figure 3

Drilled Pile Capacities



NOTES: (1) The allowable capacities can be obtained by dividing the indicated value by 2.

(2) The indicated values refer to the total of dead plus live loads; a one-third increase may be used when considering wind or seismic loads analyses.

(3) The indicated values are based on the strength of the soils; the actual pile capacities may be limited to lesser values by the strength of the existing piles.

(4) The capacities shown are based on skin friction only.

(5) It may be prudent to neglect the upper one foot of pile embedment.

Prepared/Date: EJJ 2/6/2018
Checked/Date: LT 2/7/2018

SCE Capacitor Upgrade Project Ludlow Site San Bernardino County, California	wood.	DRILLED PILE CAPACITIES Project No. 4953-18-0131 Figure 3

Appendix A

Boring Logs

APPENDIX A
FIELD EXPLORATIONS

Site conditions were explored by the excavation of twelve borings at the locations shown on Figure 2. The logs of the borings are presented in Figures A-1.1 through A-1.12. Prior to drilling, the boring locations were marked in the field and Underground Services Alert was notified to mark the location of known utilities. A geophysical survey of each of the proposed boring locations was performed by our subcontractor GEOVision to identify possible buried utilities in the vicinity. As an added precaution, the upper five feet of the borings was hand augered.

The borings were drilled using track-mounted hollow-stem auger drilling equipment. The hollow stem borings were drilled to depths of 16½ and 50½ to 51½ feet below the existing grade. The diameter of the borings was 8 inches. Groundwater was not encountered to the maximum depth drilled of 51½ feet below the existing grade.

The soils encountered were logged in the field by our technician and relatively undisturbed and bulk samples were obtained for laboratory inspection and testing. The depths at which samples were obtained are indicated on the left side of the boring logs. Relatively undisturbed samples were obtained using California Modified ring samplers. The number of blows required to drive the samplers 12 inches using a 140 pound hammer falling 30 inches is indicated on the boring logs. In addition to obtaining undisturbed samples, standard penetration tests (SPT) were performed. The number of blows required to drive the samplers 18 inches using a 140 pound hammer falling 30 inches is indicated on the boring logs. The soils are classified in the accordance with the Unified Soil Classification System described on Figure A-2.

BORING BLMP-1

DATE DRILLED: October 24, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,178**

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT** (blows/ft)	SAMPLE LOC.		
2175	0						SM	SILTY SAND - dense, moist, light brown, fine to medium grained, some coarse, 5% gravel (21% Passing No. 200 Sieve) Bulk sample from 0 to 5-feet
			3.7	105	34			Light pinkish brown, fine grained, few medium to coarse sand, less than 5% fine gravel, uncemented
	5		4.5	106	60			Very dense, little medium to coarse sand
2170			3.1	109	58		SM	SILTY SAND with GRAVEL - very dense, moist, whitish light brown, fine grained, little medium to coarse sand, 16% gravel, little silt (18.3% Passing No. 200 Sieve) 6 to 8-inch cobble
	10	58						
2165								
	15							Small bag sample from 15 to 20-feet
			2.3	113	85		SP	POORLY GRADED SAND with GRAVEL - very dense, mosit, light brown, fine grained, little medium to coarse sand, no silt, up to 40% fine to medium gravel
2160	20	50/4"					SP-SM	POORLY GRADED SAND with SILT and GRAVEL - very dense, moist, whitish light brown, up to 30% fine gravel
2155								
	25		2.4	117	50/4"			
2150								
	30	53/6"						33% gravel (6.7% Passing No. 200 Sieve)
2145								6 to 8-inch cobble
	35		3.0	118	67/6"			30 to 45% fine to coarse gravel
2140								
	40							

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
Prepared By: KSH
Checked By: RM

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Proposed Ludlow Site 4 500kV Midline Capacitor Project

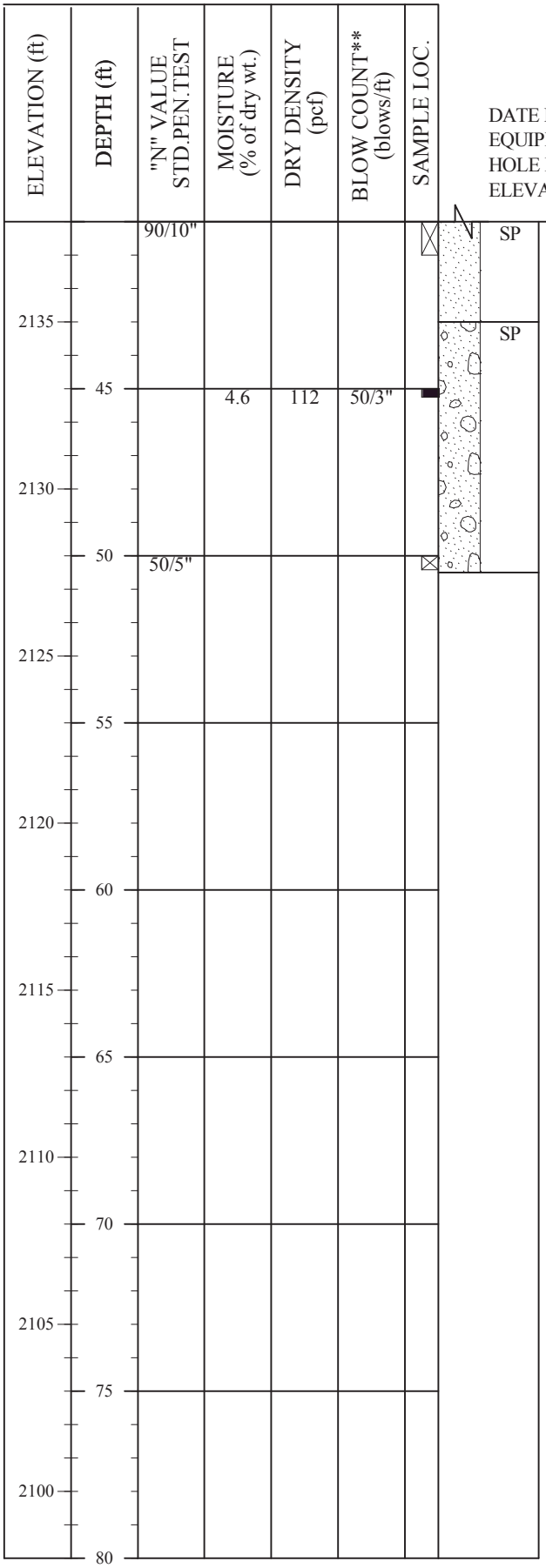
amec foster wheeler

LOG OF BORING

Project: 4953-17-0231 Figure: A-1.1a

BORING BLMP-1 (Continued)

DATE DRILLED: October 24, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,178**



POORLY GRADED SAND - very dense, moist, whitish light brown, fine grained, few medium to coarse sand, 5% fine to medium gravel

POORLY GRADED SAND with GRAVEL - very dense, moist, whitish light brown, fine grained, few medium to coarse sand, up to 20% fine to medium gravel

END OF BORING AT 50½ FEET

NOTES:
Hand augered upper 5 feet. Groundwater was not encountered. Boring was backfilled with soil cuttings, and tamped.

*Number of blows required to drive the Modified California Sampler 12-inches using a 140-pound automatic hammer falling 30-inches.
**Approximate elevations were based on topographic map from SCE.

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Field Tech: AR
Prepared By: KSH
Checked By: RM

Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

LOG OF BORING
Project: 4953-17-0231 Figure: A-1.1b

BORING BLMP-2

DATE DRILLED: October 24, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,181**

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT** (blows/ft)	SAMPLE LOC.		
2180	0						SM	SILTY SAND - very dense, moist, light brown, some silt, fine to medium grained, some carbonate stringers, 1% gravel (18% Passing No. 200 Sieve) Bulk sample from 0 to 5-feet
			4.8	108	58	■		Orange brown, fine grained, little medium to coarse sand, trace silt, trace fine gravel, uncemented
2175	5		2.4	114	78/11"	■		Some medium to coarse sand
			3.0	104	54	■		Whitish light brown, little medium to coarse sand, less silt at bottom of sample, 10% gravel
2170	10		3.1	110	50/5"	■	SP-SM	POORLY GRADED SAND with SILT - very dense, moist, light orangish brown, fine grained, little medium to coarse sand, few silt, 5% gravel (6.5% Passing No. 200 Sieve)
							SP-SM	POORLY GRADED SAND with SILT and GRAVEL - very dense, moist, light orange brown, fine to medium grained, little coarse sand, few silt, 15 to 20% gravel
2165	15	60				⊠		Small bag sample from 15 to 20-feet Fine to medium grained, 20% gravel
2160	20				50/5"	○		15 to 20% gravel, 5% 3 to 5-inch cobbles No recovery
2155	25	77/11"				⊠	SM	SILTY SAND with GRAVEL - very dense, moist, light orange brown, fine to medium grained, little coarse sand, 18% gravel, little silt (12.1% Passing No. 200 Sieve)
							GP	Coarse gravel layer, 4 to 6-inch cobble
							SP-SM	POORLY GRADED SAND with SILT and GRAVEL - very dense, moist, light orange brown, fine to medium grained, little coarse sand
							GP	Coarse gravel layer
2150	30		2.8	116	50/4"	■	SP-SM	POORLY GRADED SAND with SILT and GRAVEL - very dense, moist, light orange brown, fine to medium grained, little coarse sand Light brown, 15 to 20% fine gravel, 3-inch cobble
2145	35	50/5"				⊠	GP	Coarse gravel to small cobble layer, 12-inch cobble
	40						SP-SM	POORLY GRADED SAND with SILT and GRAVEL - very dense, moist, light orange brown, fine to medium grained, little coarse sand

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
Prepared By: KSH
Checked By: RM

Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

LOG OF BORING
Project: 4953-17-0231 Figure: A-1.2a

BORING BLMP-2 (Continued)

DATE DRILLED: October 24, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,181**

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT** (blows/ft)	SAMPLE LOC.	
2140					50/3"		Up to 25% gravel Increase gravel, no recovery
	45						
2135		58/4"				SP-SM	POORLY GRADED SAND with SILT - very dense, moist, light orange brown, fine to medium grained, little coarse sand, 13% gravel (6.4% Passing No. 200 Sieve)
	50						
2130			4.1	120	50	SP-SM	POORLY GRADED SAND with SILT and GRAVEL - Up to 35% fine to coarse gravel, less gravel at bottom. END OF BORING AT 51 FEET
	55						
2125							
	60						
2120							
	65						
2115							
	70						
2110							
	75						
2105							
	80						

NOTES:
Groundwater was not encountered. Boring was backfilled with soil cuttings, and tamped.

Field Tech: AR
Prepared By: KSH
Checked By: RM

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

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Proposed Ludlow Site 4 500kV Midline Capacitor Project

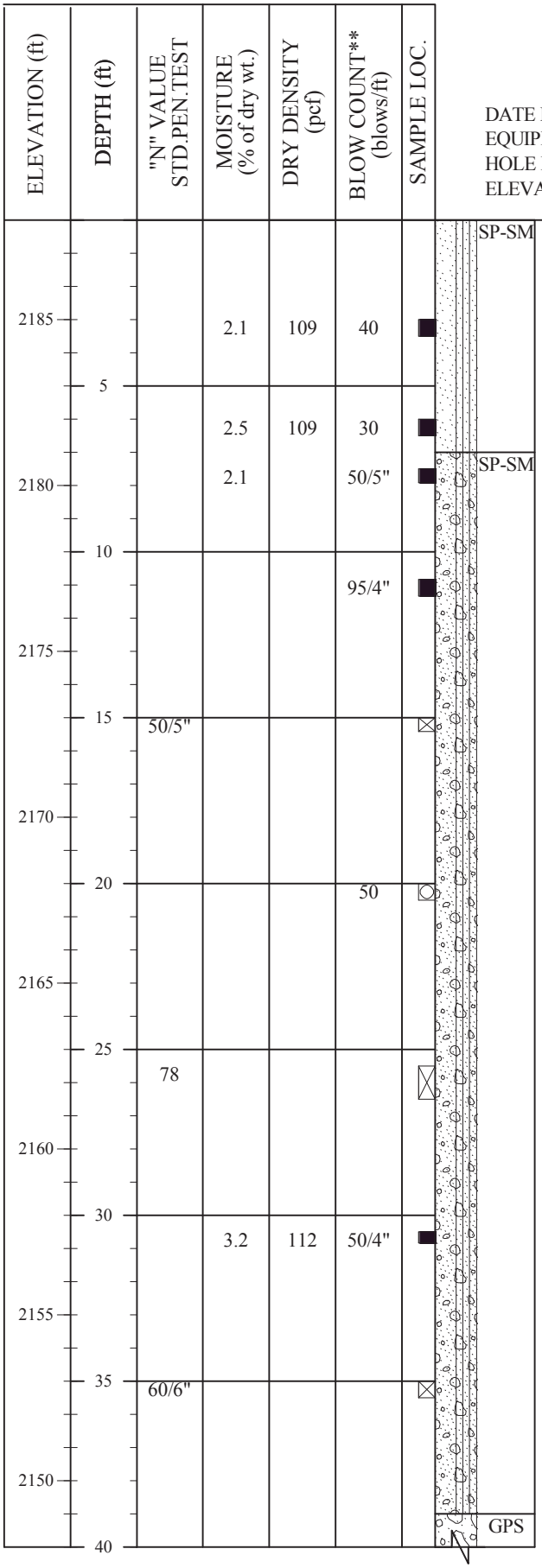
amec foster wheeler

LOG OF BORING

Project: 4953-17-0231 Figure: A-1.2b

BORING BLMP-3

DATE DRILLED: October 25, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,188**



POORLY GRADED SAND with SILT - dense, moist, light orange brown, fine to medium grained, some coarse sand, 1% fine gravel, uncemented (5% Passing No. 200 Sieve)
Bulk sample from 0 to 5-feet

POORLY GRADED SAND with SILT and GRAVEL - very dense, moist, light pinkish brown, fine grained, 45% fine to coarse gravel (3.9% Passing No. 200 Sieve)
Up to 30% gravel

Small bag sample from 15 to 20-feet

No recovery
25 to 30% gravel

18% gravel (7.2% Passing No. 200 Sieve)

Few medium to coarse sand, few fine to medium gravel
10-inch cobble

POORLY GRADED GRAVEL with SAND

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
Prepared By: KSH
Checked By: RM

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

BORING BLMP-3 (Continued)

DATE DRILLED: October 25, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,188**

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT** (blows/ft)	SAMPLE LOC.
2145	45	55/6"			50/2.5"	SP
2140	50	50/2"				
2135	55					
2130	60					
2125	65					
2120	70					
2115	75					
2110	80					

No recovery
POORLY GRADED SAND with GRAVEL - very dense, moist, light pinkish brown, fine grained, few medium to coarse sand, 30 to 40% fine to medium gravel

No recovery, 2-inch gravel in bit
END OF BORING AT 50½ FEET

NOTES:
Groundwater was not encountered. Boring was backfilled with soil cuttings, and tamped.

Field Tech: AR
Prepared By: KSH
Checked By: RM

Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

LOG OF BORING
Project: 4953-17-0231 Figure: A-1.3b

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BORING BLMP-4

DATE DRILLED: October 26, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,192**

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT** (blows/ft)	SAMPLE LOC.		
2190	0						SP-SM	POORLY GRADED SAND with SILT - dense, moist, light brown, fine to medium grained, some coarse sand, 1% gravel, uncemented (8.3% Passing No. 200 Sieve) Bulk sample from 0 to 5-feet
			1.7	107	34	■		
	5							
2185			3.5	109	51	■		Very dense, orange brown, fine grained, some medium to coarse sand, less than 5% fine gravel Some white carbonate stringers, light brown sand
			3.9	112	76	■		
	10	30				⊠	SM	SILTY SAND - very dense, moist, orange brown, fine grained, some medium to coarse sand, 4% gravel (16.6% Passing No. 200 Sieve)
2180								
	15		3.0	109	50/5"	■		Small bag sample from 15 to 20-feet 5 to 10% fine to medium gravel Some gravel in bit
2175								
	20	72				⊠	GP	POORLY GRADED GRAVEL - very dense, moist, light gray, 50% fine to coarse gravel, some fine to coarse sand
2170							SM	SILTY SAND with GRAVEL - very dense, moist, light brown, fine grained, some medium to coarse sand, 20 to 30% fine gravel
	25		2.5		50/5"	■		
2165								
	30	68				⊠	SM	SILTY SAND - 14% gravel (14.3% Passing No. 200 Sieve)
2160								
	35		3.1	116	50/3"	■		Whitish brown, fine grained, little medium to coarse sand, 5 to 15% fine gravel
2155								
	40							

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
Prepared By: KSH
Checked By: RM

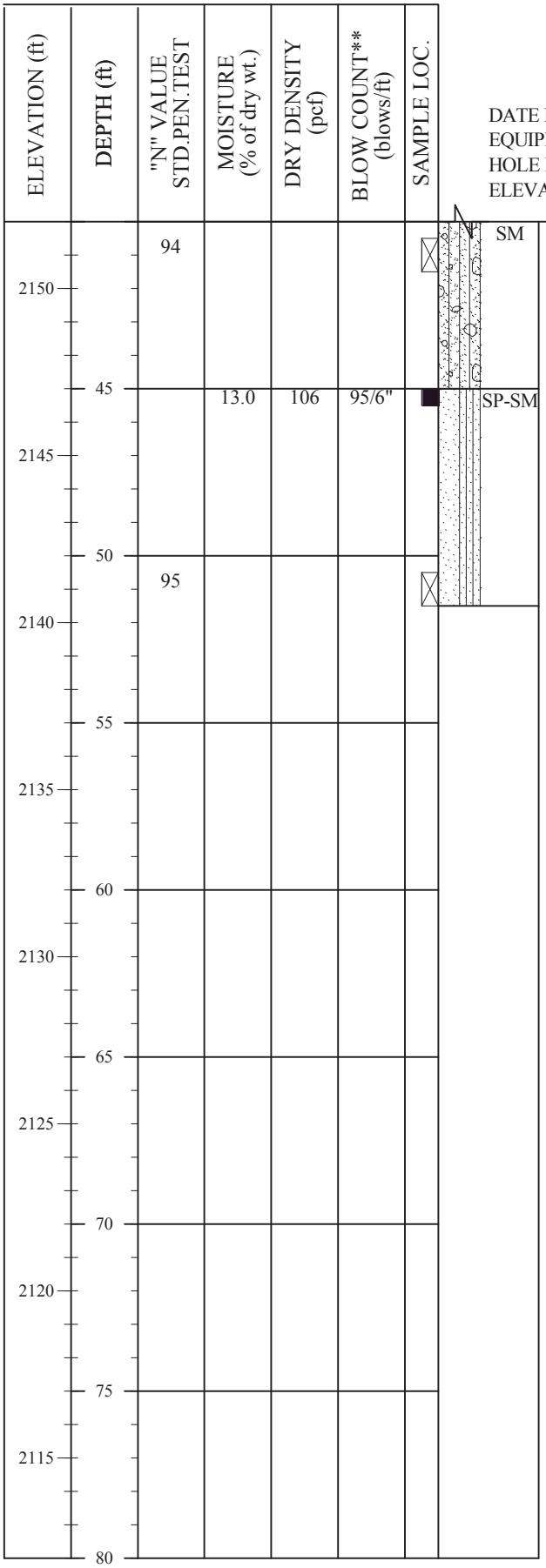
Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

LOG OF BORING
Project: 4953-17-0231 Figure: A-1.4a

BORING BLMP-4 (Continued)

DATE DRILLED: October 26, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,192**



SILT SAND with GRAVEL - Up to 35% gravel

POORLY GRADED SAND with SILT - very dense, moist, whitish brown, fine to coarse grained, 5 to 10% fine gravel

END OF BORING AT 51½ FEET

NOTES:
Groundwater was not encountered. Boring was backfilled with soil cuttings, and tamped.

Field Tech: AR
Prepared By: KSH
Checked By: RM

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Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

LOG OF BORING

Project: 4953-17-0231 Figure: A-1.4b

BORING BLMP-5

DATE DRILLED: September 25, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,182**

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT** (blows/ft)	SAMPLE LOC.		
2180	0						SW-SM	WELL GRADED SAND with SILT - Very dense, moist, light orange brown, 5% fine gravel, uncemented (9.4% Passing No. 200 Sieve) Bulk sample from 0 to 5-feet
			2.5	106	55		SW-SM	WELL GRADED SAND with SILT and GRAVEL - Up to 25% fine gravel 4 to 5-inch cobble 3 to 4-inch cobble
	5							
			2.0	103	36		SW-SM	WELL GRADED SAND with SILT - dense, 2 to 5% fine gravel
2175								Very dense, some 1-inch diameter white carbonate nodules
			4.2	106	55			Fine grained, little medium to coarse sand
	10							Light brown, some medium to coarse sand, less than 5% fine gravel
			2.1	115	59		SW-SM	WELL GRADED SAND with SILT and GRAVEL - Up to 40% gravel
2170								5 to 6-inch cobble
	15	56					SW-SM	WELL GRADED SAND with SILT - 3% gravel (7.1% Passing No. 200 Sieve)
2165								
	20		2.0	119	50/3"		SW-SM	WELL GRADED SAND with SILT and GRAVEL - up to 30% gravel
2160								Up to 40% gravel
	25	86					GP	POORLY GRADED GRAVEL with SAND - Very dense, moist, light brown, greater than 50% fine to coarse grained, some fine sand, few medium to coarse sand, uncemented
2155								
	30				50/4"			No recovery
2150								4 to 6-inch cobble
	35	97					SM	SILTY SAND with GRAVEL - Very dense, moist, light brown, fine to medium grained, some coarse sand, 39% gravel (13.1% Passing No. 200 Sieve)
2145								4 to 5-inch cobble
	40							

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
Prepared By: KSH
Checked By: RM

Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

LOG OF BORING
Project: 4953-17-0231 Figure: A-1.5a

BORING BLMP-5 (Continued)

DATE DRILLED: September 25, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,182**

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT** (blows/ft)	SAMPLE LOC.	
2140	45				50/2"		No recovery Up to 15% gravel 3 to 4-inch cobble
							3 to 5-inch cobble
2135		50/5"					Up to 25% gravel
	50						
2130		50/6"					No recovery END OF BORING AT 51 FEET
2125	55						
2120	60						
2115	65						
2110	70						
2105	75						
	80						

NOTES:
Groundwater was not encountered. Boring was backfilled with soil cuttings, and tamped.

Field Tech: AR
Prepared By: KSH
Checked By: RM

Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

LOG OF BORING
Project: 4953-17-0231 Figure: A-1.5b

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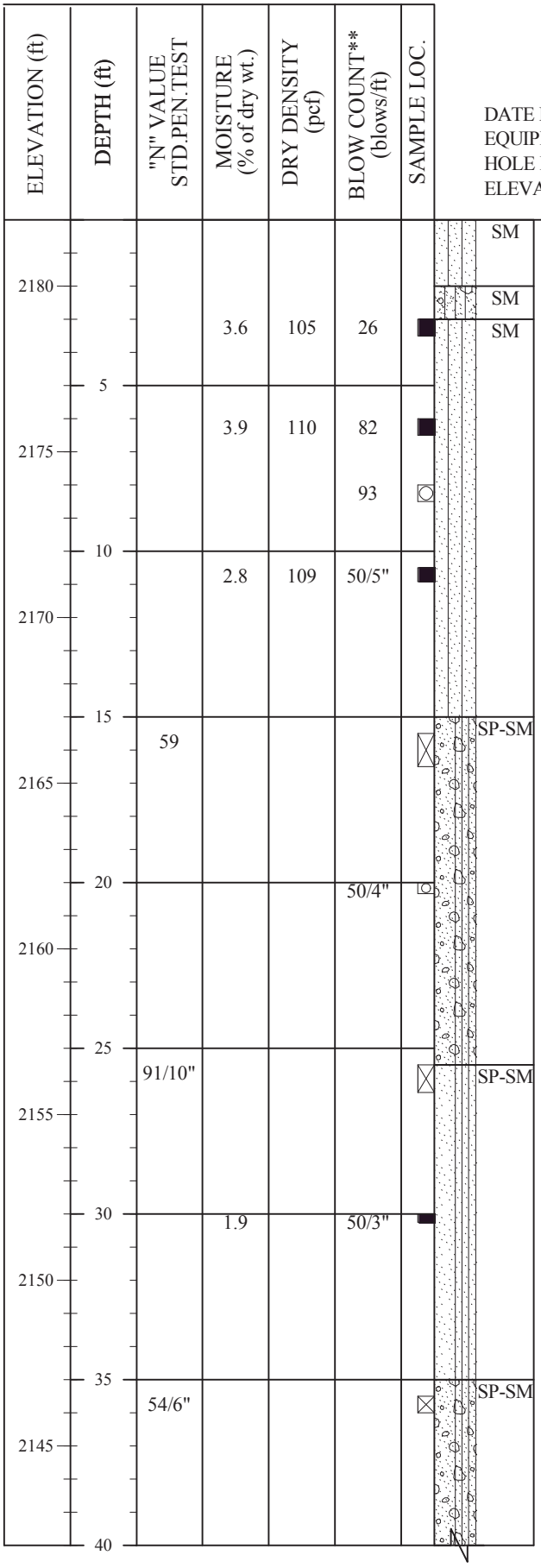
BORING BLMP-6

DATE DRILLED: October 23, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,182**



SILTY SAND - medium dense, moist, light brown, fine grained, trace medium to coarse sand, 4% gravel, uncemented (20% Passing No. 200 Sieve)
Bulk sample from 0 to 5-feet
SILT SAND with GRAVEL - up to 20% gravel
SILTY SAND - less than 5% gravel

Very dense, light pinkish brown, few medium sand, 5 to 15% fine gravel

No recovery

5 to 10% fine gravel

coarse gravel/3 to 5-inch cobble layer

6 to 8-inch Cobble

Small bag sample from 15 to 20-feet
POORLY GRADED SAND with SILT and GRAVEL - very dense, moist, light pinkish brown, fine to medium grained, some coarse sand, 39% gravel (7.7% Passing No. 200 Sieve)

No recovery
Fine to medium sand, few coarse, up to 20% gravel

POORLY GRADED SAND with SILT - 5 to 10% gravel

Less than 5% fine gravel

POORLY GRADED SAND with SILT and GRAVEL - 29% gravel (9.3% Passing No. 200 Sieve)

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(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
Prepared By: KSH
Checked By: RM

Proposed Ludlow Site 4 500kV Midline Capacitor Project

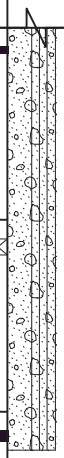
amec foster wheeler

LOG OF BORING
Project: 4953-17-0231 Figure: A-1.6a

BORING BLMP-6 (Continued)

DATE DRILLED: October 23, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,182**

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT** (blows/ft)	SAMPLE LOC.
2140	45	50/5"			50/2"	
2135	50		2.6	116	50/3"	
2130	55					
2125	60					
2120	65					
2115	70					
2110	75					
2105	80					



10 to 15% gravel

Fine grained, few medium sand, 5 to 15% fine gravel

END OF BORING AT 51 FEET

NOTES:
Groundwater was not encountered. Boring was backfilled with soil cuttings, and tamped.

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Field Tech: AR
Prepared By: KSH
Checked By: RM

Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

LOG OF BORING

Project: 4953-17-0231 Figure: A-1.6b

BORING BLMP-7

DATE DRILLED: October 24, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,186**

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT** (blows/ft)	SAMPLE LOC.		
2185	0						SP	POORLY GRADED SAND - dense, moist, light brown, fine grained, little medium to coarse sand, less than 1% fine gravel, uncemented (4.5% Passing No. 200 Sieve) Bulk sample from 0 to 5-feet
			2.0	109	37	■		
	5							Coarse gravel layer, 3 to 5-inch cobbles
2180			7.2	101	50/3"	■		Very dense, some light gray carbonate stringers
							SP	POORLY GRADED SAND with GRAVEL - Up to 20% gravel
			1.8	113	65	■		White to light brown
	10							
2175			2.1	128	50/5"	■		Light brown, some medium and coarse sand
								Coarse gravel/small cobble layer
	15							
2170		50				⊠	SM	Small bag sample from 15 to 20-feet SILTY SAND WITH GRAVEL - 19% gravel, little silt (12.5% Passing No. 200 Sieve)
	20							
2165			2.7	120	50/4"	■		Light pinkish brown, fine grained, some medium to coarse sand, 10 to 20% fine to medium gravel
	25							
2160		53/6"				⊠		2-inch gravel in bit
	30							
2155					98/11"	○		No recovery
							GP	POORLY GRADED GRAVEL with SAND - very dense, moist, light brown, coarse grained, some small to large cobbles up to 6-inch
							SP-SM	POORLY GRADED SAND with SILT and GRAVEL - very dense, moist, light pinkish brown, fine grained, some medium to coarse sand, 10 to 20% fine to medium gravel, few silt
	35							
2150		50/5"				○		No recovery
							GP	POORLY GRADED GRAVEL with SAND - very dense, moist, light brown, coarse gravel, some 6-inch cobbles
	40							

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
Prepared By: KSH
Checked By: RM

Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

LOG OF BORING
Project: 4953-17-0231 Figure: A-1.7a

BORING BLMP-7 (Continued)

DATE DRILLED: October 24, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,186**

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT** (blows/ft)	SAMPLE LOC.
2145			2.4	126	50/5"	SP-SM
	45					
2140		50/5"				
	50					
2135					50/2"	
	55					
2130						
	60					
2125						
	65					
2120						
	70					
2115						
	75					
2110						
	80					

POORLY GRADED SAND with SILT and GRAVEL - very dense, moist, light pinkish brown, fine grained, little medium to coarse sand, 15 to 25% medium to coarse gravel, few silt

No recovery
END OF BORING AT 51 FEET

NOTES:
Groundwater was not encountered. Boring was backfilled with soil cuttings, and tamped.

Field Tech: AR
Prepared By: KSH
Checked By: RM

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

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Proposed Ludlow Site 4 500kV Midline Capacitor Project

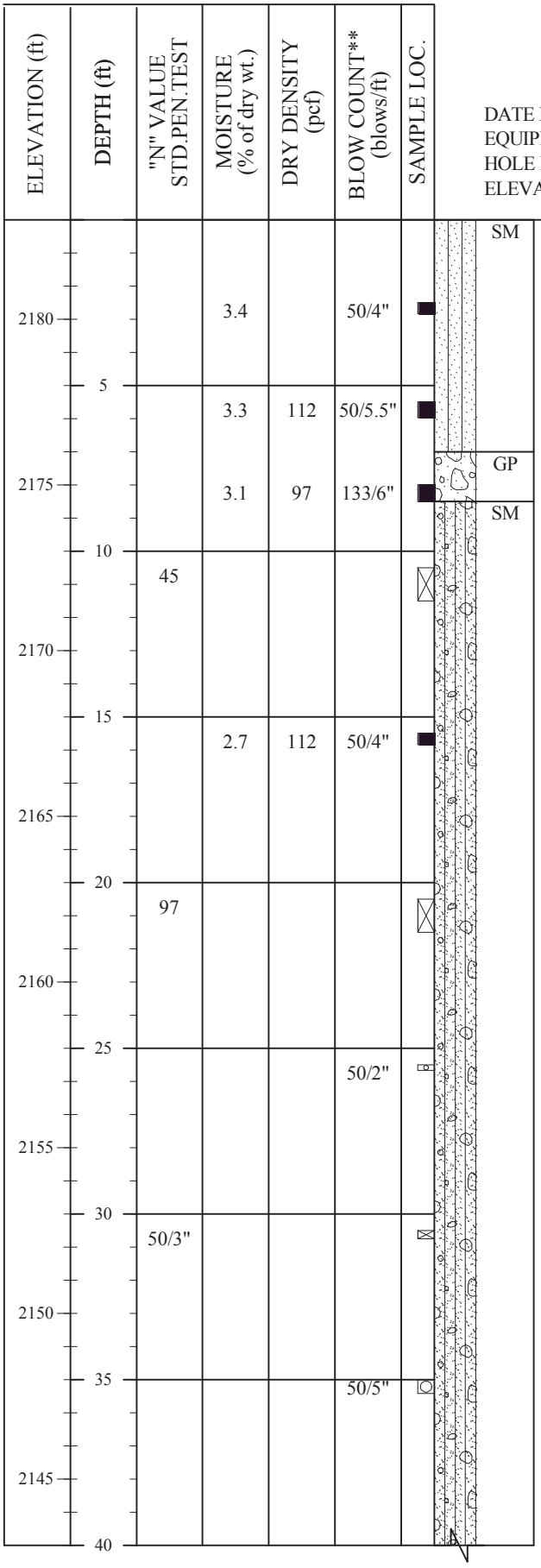
amec foster wheeler

LOG OF BORING

Project: 4953-17-0231 Figure: A-1.7b

BORING BLMP-8

DATE DRILLED: October 25, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,183**



SILTY SAND - very dense, moist, light orange brown, fine to medium grained, little coarse sand, 14% fine to medium gravel, uncemented (16.8% Passing No. 200 Sieve)
Bulk sample from 0 to 5-feet

Light pinkish brown, fine grained, few medium to coarse sand, 5% fine gravel, 3 to 4-inch cobble

POORLY GRADED GRAVEL with SAND - very dense, light brown, coarse gravel, small cobbles

Carbonate layer, very hard

SILTY SAND with GRAVEL - very dense, moist, light pinkish brown, fine grained, trace medium to coarse sand, 25 to 35% fine to coarse gravel, little silt
21% gravel (12.6% Passing No. 200 Sieve)

Small bag sample from 15 to 20-feet
Few medium to coarse sand, disturbed sample

Up to 25% gravel, 2 to 5% 3 to 6-inch cobbles

No recovery

No recovery

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
Prepared By: KSH
Checked By: RM

Proposed Ludlow Site 4 500kV Midline Capacitor Project

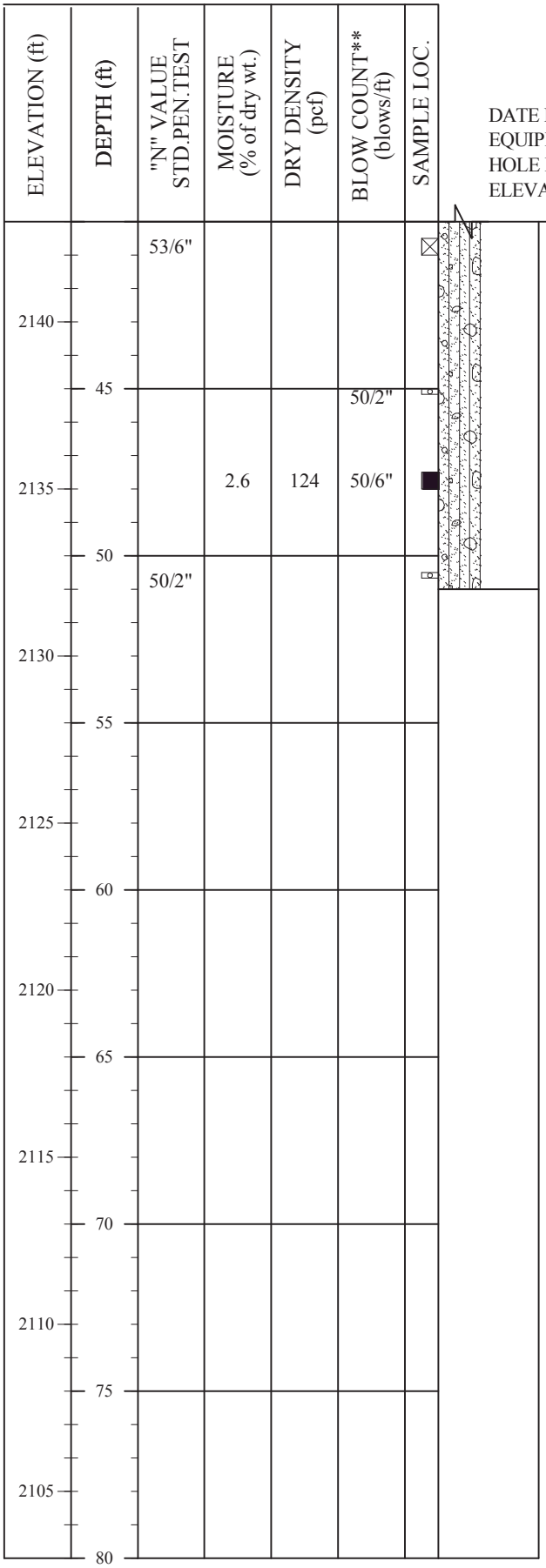
amec foster wheeler

LOG OF BORING

Project: 4953-17-0231 Figure: A-1.8a

BORING BLMP-8 (Continued)

DATE DRILLED: October 25, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,183**



Fine to medium sand, few coarse, up to 30% gravel

No recovery

15 to 25% fine to medium gravel

No recovery
END OF BORING AT 51 FEET

NOTES:
Groundwater was not encountered. Boring was backfilled with soil cuttings, and tamped.

Field Tech: AR
Prepared By: KSH
Checked By: RM

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

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Proposed Ludlow Site 4 500kV Midline Capacitor Project

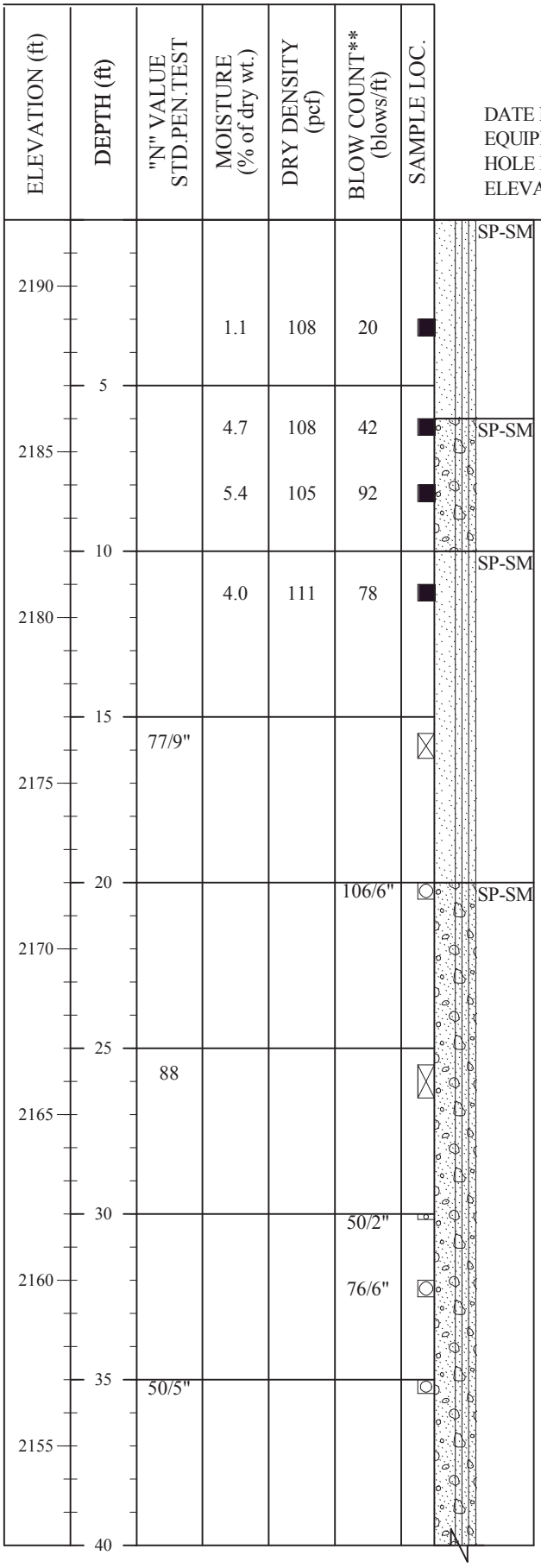
amec foster wheeler

LOG OF BORING

Project: 4953-17-0231 Figure: A-1.8b

BORING BLMP-9

DATE DRILLED: October 26, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,192**



POORLY GRADED SAND with SILT - medium dense, moist, orange brown, fine to coarse grained, less than 1% gravel, uncemented (6.1% Passing No. 200 Sieve)
Bulk sample from 0 to 5-feet

POORLY GRADED SAND with SILT and GRAVEL - dense, white carbonate stringers, fine to medium grained, 15 to 20% gravel

Very dense, 30 to 45% fine to medium gravel

POORLY GRADED SAND with SILT - 10% fine gravel

Small bag sample from 15 to 20-feet
14% gravel (8.5% Passing No. 200 Sieve)

Coarse gravel layer

No recovery
POORLY GRADED SAND WITH SILT AND GRAVEL - up to 20% gravel, 4-inch cobble

No recovery

No recovery

No recovery
34% gravel (8.8% Passing No. 200 Sieve)

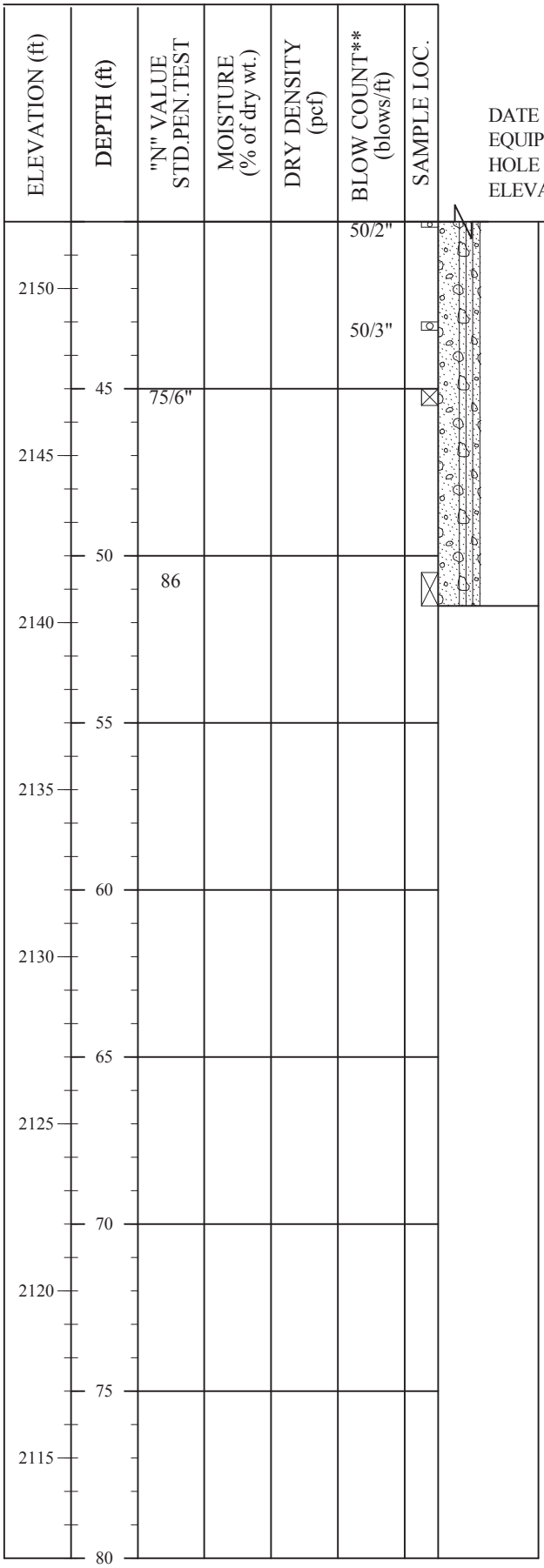
(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
Prepared By: KSH
Checked By: RM

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

BORING BLMP-9 (Continued)

DATE DRILLED: October 26, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,192**



BLOW COUNT** (blows/ft)	
50/2"	No recovery up to 25% gravel
50/3"	No recovery

END OF BORING AT 51½ FEET

NOTES:
Groundwater was not encountered. Boring was backfilled with soil cuttings, and tamped.

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Field Tech: AR
Prepared By: KSH
Checked By: RM

Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

LOG OF BORING
Project: 4953-17-0231 Figure: A-1.9b

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BORING BLMP-10

DATE DRILLED: October 27, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,186**

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT** (blows/ft)	SAMPLE LOC.		
2185	0		2.6	109	39	■	SM	SILTY SAND - dense, moist, orange brown, fine to medium grained, little coarse sand, uncemented (16.6% Passing No. 200 Sieve) Bulk sample from 0 to 5-feet
	5		2.8	109	55/6"	■		Very dense, 5 to 10% fine gravel
2180			2.2	92	89/9"	■		Up to 40% coarse gravel in bit, carbonate Light orange brown, fine grained, little medium to coarse sand, few fine gravel 6-inch thick layer of coarse gravel with carbonate
	10		2.4	123	50/5"	■		5 to 15% fine to coarse gravel
2175	15	89/9"				⊠	SP-SM	Small bag sample from 15 to 20-feet POORLY GRADED SAND WITH SILT AND GRAVEL - 22% gravel, sand slightly coarser (6.8% Passing No. 200 Sieve)
2170	20		2.4	117	50/4"	■		Up to 50% fine to medium gravel
2165	25	55/6"				⊠		30 to 40% gravel
2160	30				50/5"	○		No recovery
2155							GP	POORLY GRADED GRAVEL with SAND - very dense, coarse gravel, small cobbles
	35	78				○	SP	POORLY GRADED SAND - very dense, moist, light orange brown, fine grained, little medium to coarse sand, 5 to 10% fine gravel No recovery
2150	40							

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
Prepared By: KSH
Checked By: RM

Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

LOG OF BORING
Project: 4953-17-0231 Figure: A-1.10a

BORING BLMP-10 (Continued)

DATE DRILLED: October 27, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,186**

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT** (blows/ft)	SAMPLE LOC.
2145					89/6"	
			2.9	117	52/5"	
	45					
2140		52/6"				
	50					
2135		50/3"				
	55					
2130						
	60					
2125						
	65					
2120						
	70					
2115						
	75					
2110						
	80					

SP

No recovery
POORLY GRADED SAND WITH GRAVEL - very dense, moist, light gray, fine to coarse grained, up to 40% fine to coarse gravel

15 to 25% fine to coarse gravel

END OF BORING AT 51 FEET

NOTES:
Groundwater was not encountered. Boring was backfilled with soil cuttings, and tamped.

Field Tech: AR
Prepared By: KSH
Checked By: RM

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

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Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

LOG OF BORING
Project: 4953-17-0231 Figure: A-1.10b

BORING BLMP-11

DATE DRILLED: October 26, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,190**

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT** (blows/ft)	SAMPLE LOC.		
							SP	POORLY GRADED SAND - dense, moist, light orange brown, fine to coarse grained, less than 1% fine gravel, trace silt, uncemented (4.9% Passing No. 200 Sieve) Bulk sample from 0 to 5-feet
			1.5	107	36	■		
2185	5				59/6"	○		Coarse gravel layer No recovery Very dense, 10% gravel
			5.9	101	92	■		Fine grained, little medium to coarse sand, 2 to 5% fine gravel, white carbonate stringers
2180	10				59/6"	○		No recovery
								10% gravel
2175	15	31				⊠	SW-SM	WELL GRADED SAND with SILT - dense, 7% gravel (10.7% Passing No. 200 Sieve)
								END OF BORING AT 16½ FEET
2170	20							NOTES: Groundwater was not encountered. Boring was backfilled with soil cuttings, and tamped.
2165	25							
2160	30							
2155	35							
	40							

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Field Tech: AR
Prepared By: KSH
Checked By: RM

Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

LOG OF BORING
Project: 4953-17-0231 Figure: A-1.11

BORING BLMP-12

DATE DRILLED: October 24, 2017
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION (ft.): 2,182**

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT** (blows/ft)	SAMPLE LOC.		
2180	0		2.8	106	55	■	SP	POORLY GRADED SAND - dense, moist, light pinkish brown, fine to medium grained, little coarse sand, 2% fine gravel, gray carbonate stringers, uncemented (0.3% Passing No. 200 Sieve) Bulk sample from 0 to 5-feet
	5							8 to 10-inch cobble
			3.0	110	82	■	SP	POORLY GRADED SAND with GRAVEL - Very dense, light brown, 30% fine gravel
2175			2.5	107	50/2"	■		Pinkish light brown, fine grained, little medium to coarse sand, 15 to 25% fine to medium gravel
	10		2.7	113	65/6"	■		15% fine gravel
2170								
	15	71				⊠	SP-SM	POORLY GRADED SAND with SILT and GRAVEL - 32% gravel (11.9% Passing No. 200 Sieve)
2165								END OF BORING AT 16.5 FEET
	20							NOTES: Groundwater was not encountered. Boring was backfilled with soil cuttings, and tamped.
2160								
	25							
2155								
	30							
2150								
	35							
2145								
	40							

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Field Tech: AR
Prepared By: KSH
Checked By: RM

Proposed Ludlow Site 4 500kV Midline Capacitor Project

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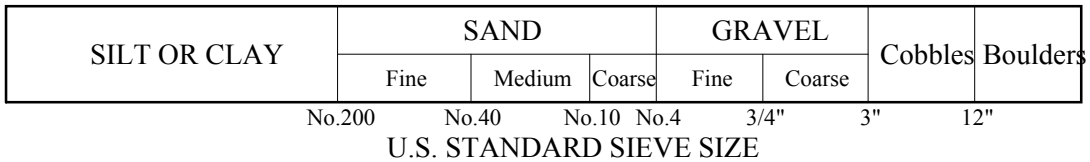
LOG OF BORING
Project: 4953-17-0231 Figure: A-1.12

MAJOR DIVISIONS			GROUP SYMBOLS		TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size)	CLEAN GRAVELS (Little or no fines)		GW	Well graded gravels, gravel - sand mixtures, little or no fines.
				GP	Poorly graded gravels or grave - sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amount of fines)		GM	Silty gravels, gravel - sand - silt mixtures.
				GC	Clayey gravels, gravel - sand - clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 Sieve Size)	CLEAN SANDS (Little or no fines)		SW	Well graded sands, gravelly sands, little or no fines.
				SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)		SM	Silty sands, sand - silt mixtures
				SC	Clayey sands, sand - clay mixtures.
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)			ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts and with slight plasticity.
				CL	Inorganic lays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
				OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)			MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
				CH	Inorganic clays of high plasticity, fat clays
				OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS				PT	Peat and other highly organic soils.

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.



Reference: The Unified Soil Classification System, Corps of Engineers, U.S. Army Technical Memorandum No. 3-357, Vol. 1, March, 1953 (Revised April, 1960)

Undisturbed Sample		Auger Cuttings	
Split Spoon Sample		Bulk Sample	
Rock Core		Crandall Sampler	
Dilatometer		Modified California Sampler	
Packer		No Recovery	
Water Table at time of drilling		Water Table after drilling	

Correlation of Penetration Resistance with Relative Density and Consistency

SAND & GRAVEL		SILT & CLAY	
No. of Blows	Relative Density	No. of Blows	Consistency
0 - 4	Very Loose	0 - 1	Very Soft
5 - 10	Loose	2 - 4	Soft
11 - 30	Medium Dense	5 - 8	Medium Stiff
31 - 50	Dense	9 - 15	Stiff
Over 50	Very Dense	16 - 30	Very Stiff
		Over 30	Hard

KEY TO SYMBOLS AND DESCRIPTIONS

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Figure A-2

Appendix B

Laboratory Test Results

APPENDIX B
LABORATORY TESTING

Soil samples collected from the borings were transported to the Amec Foster Wheeler laboratory and were reviewed by our staff. The laboratory testing program was developed by SCE based on review of the field boring logs. Laboratory testing was performed by us, HDR, and LaBelle Marvin, Inc. under the direction of SCE.

The field moisture content and dry density of the soils encountered were determined by performing tests on the undisturbed samples. The results of the tests are shown on the left side of the boring logs in Appendix A.

Direct shear tests were performed on seventeen selected undisturbed samples to determine the strength of the soils in accordance with ASTM D 3080 test method. The tests were performed after soaking the samples to near-saturated moisture content and at various surcharge pressures. The peak and ultimate strength values obtained from the direct shear tests, along with associated friction angles and cohesions are presented on Figures B-1.1 through B-1.17.

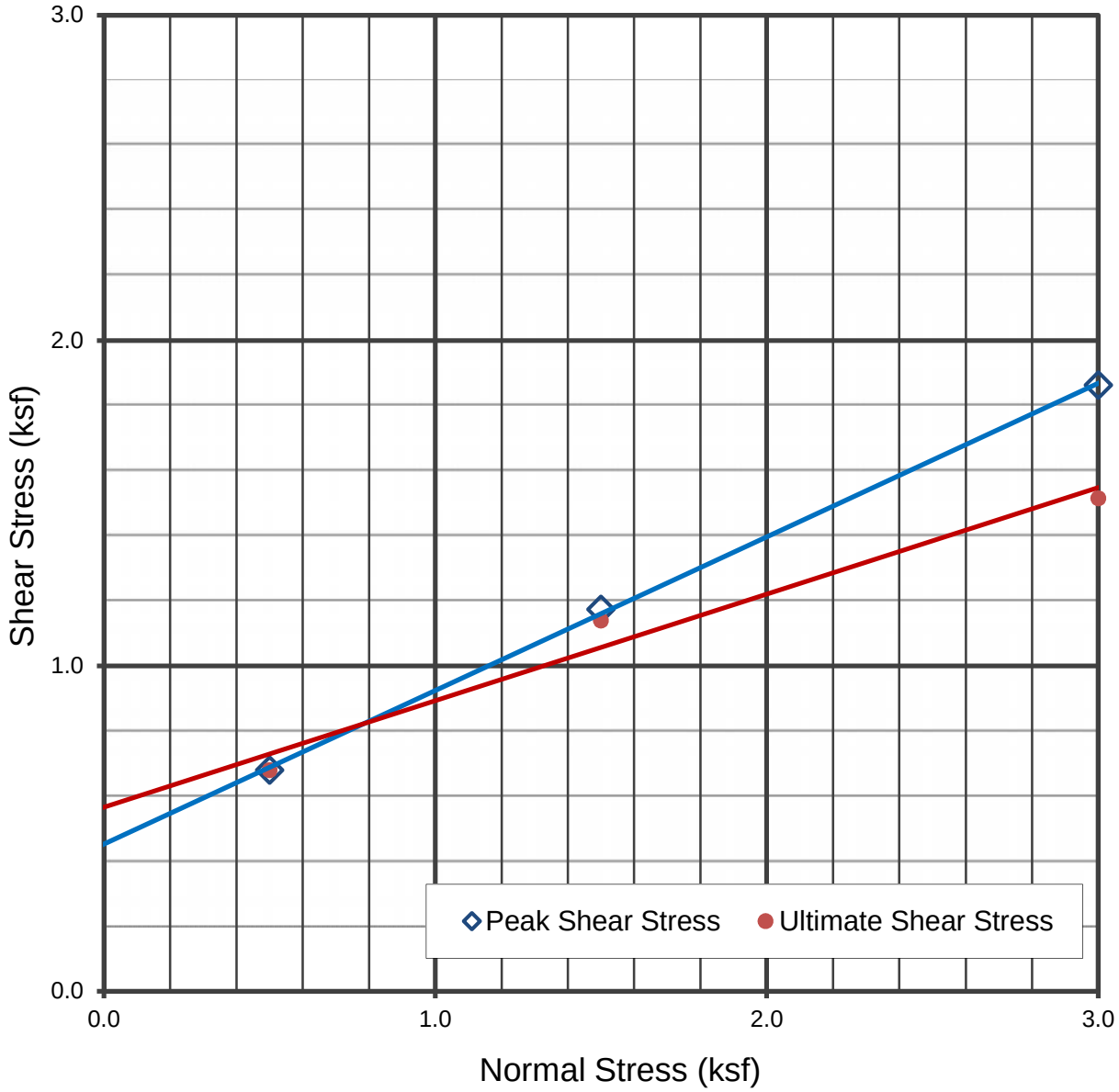
To determine the particle size distribution of the soils and to aid in classifying the soils, mechanical analyses were performed on thirty-two selected samples in accordance with the ASTM D 6913 test method. The results of the mechanical analyses are presented on the boring logs and Figures B-2.1 through B-2.8.

The optimum moisture content and maximum dry density of the near-surface soils were determined by performing compaction tests on twelve bulk samples obtained in the field. The tests were performed in accordance with the ASTM Designation D 1557 test method. The results of the tests are presented on Figures B-3.1 and B-3.4.

Consolidation testing was performed on six selected samples in accordance with the ASTM D 5333 test method. The results of the tests are presented on Figures B-4.1 and B-4.2.

R-value testing was performed on two selected samples to determine R-value of site soils by LaBelle and Marvin, Inc. The results of the test are shown on Figures B-5.1 through B-5.4.

Chemical testing was performed on thirteen selected samples to determine corrosivity of site soils by HDR. The results are presented on Figures B-6.1, B-6.2 and B-6.3.



Boring No.:	BLMP-1
Sample No.:	n/a
Sample Depth (feet) :	6
Soil Type:	Poorly Graded Sand (SP)
Sample Conditions:	Intact; Soaked
In-Place Dry Density (PCF):	106
In-Place Moisture Content (%):	4.5

	◇	●
Cohesion (PSF):	0	0
Friction Angle (Degrees):	25	18

Prepared: KSH
Checked: GA

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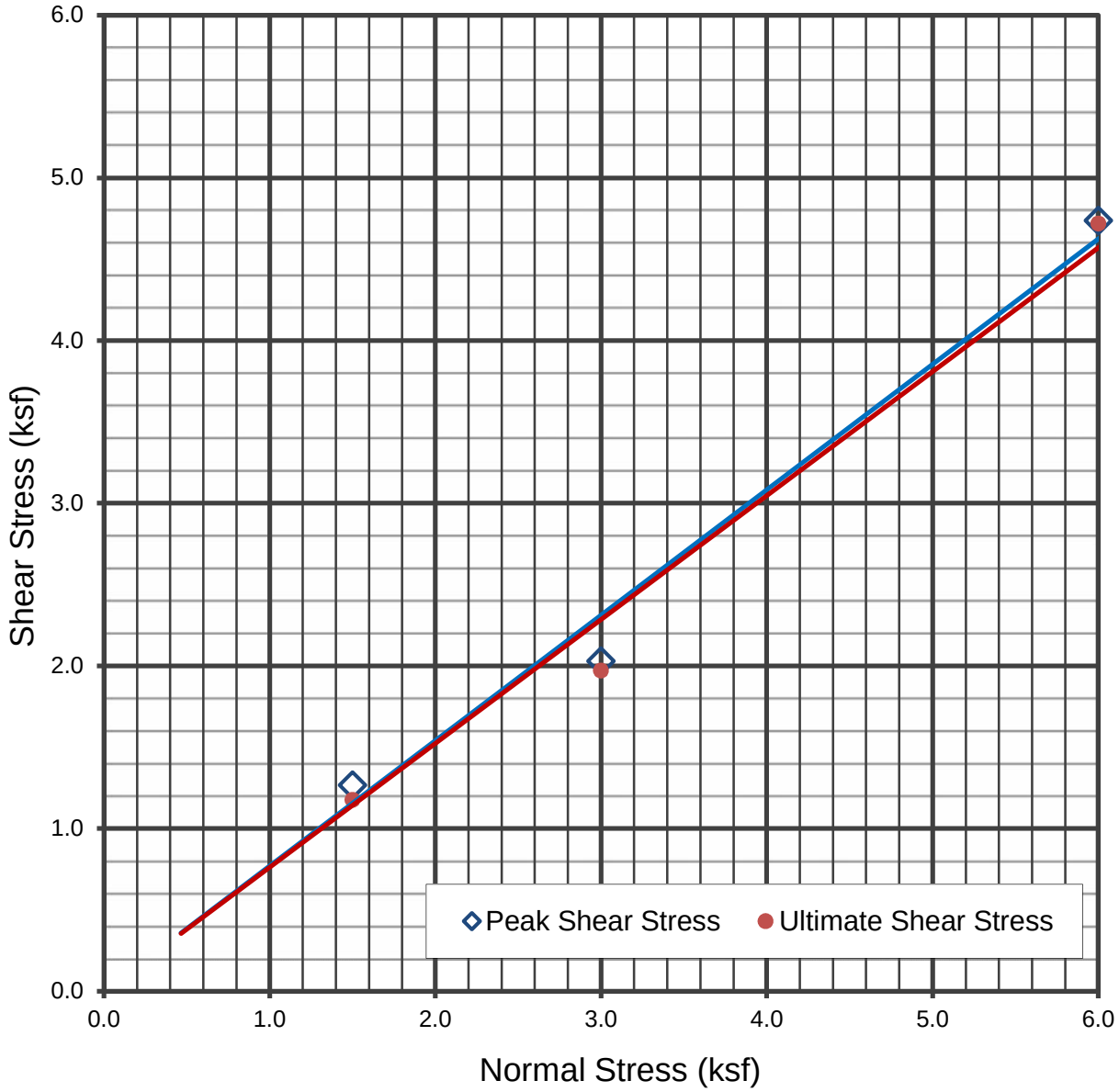
DIRECT SHEAR TEST

Southern California Edison
Ludlow Site 4 500kV Midline Capacitor Construction
Pisgah, San Bernardino County, California

Project No.
4953-17-0231

Figure
B-1.1



Boring No.:	BLMP-1
Sample No.:	n/a
Sample Depth (feet) :	25½
Soil Type:	Poorly/Well Graded Sand (SP/SW)
Sample Conditions:	Intact; Soaked
In-Place Dry Density (PCF):	116
In-Place Moisture Content (%):	2.4

	◇	●
Cohesion (PSF):	0	0
Friction Angle (Degrees):	44	44

Prepared: KSH
Checked: GA

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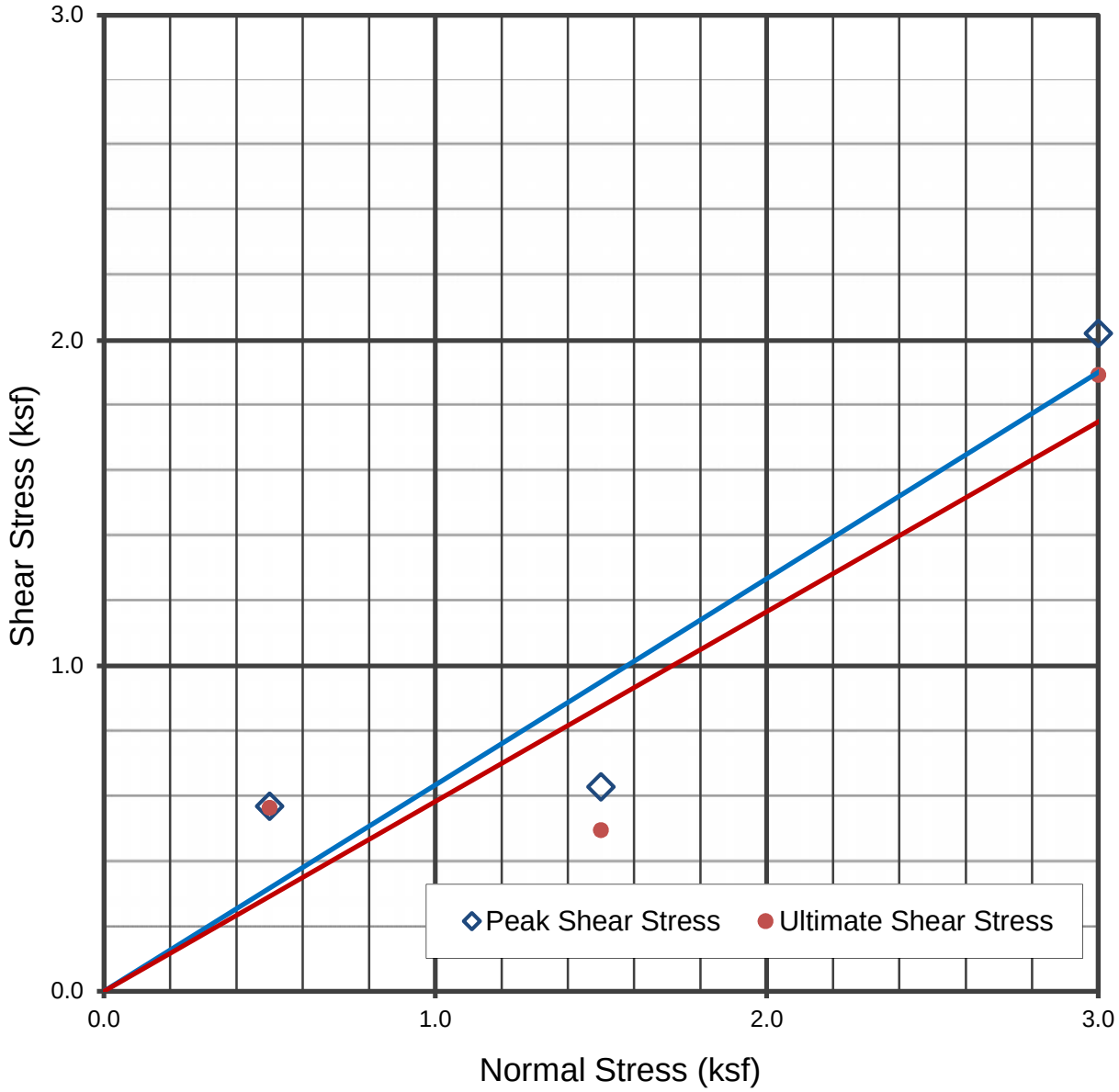
Figure
B-1.2



Boring No.:	BLMP-2
Sample No.:	n/a
Sample Depth (feet) :	0-5
Soil Type:	Poorly Graded Sand (SP)
Sample Conditions:	Remolded to 90%; Soaked
Remolded Dry Density (PCF):	108
Remolded Moisture Content (%):	12.8

	◇	●
Cohesion (PSF):	0	0
Friction Angle (Degrees):	32	30

Prepared: KSH
Checked:GA

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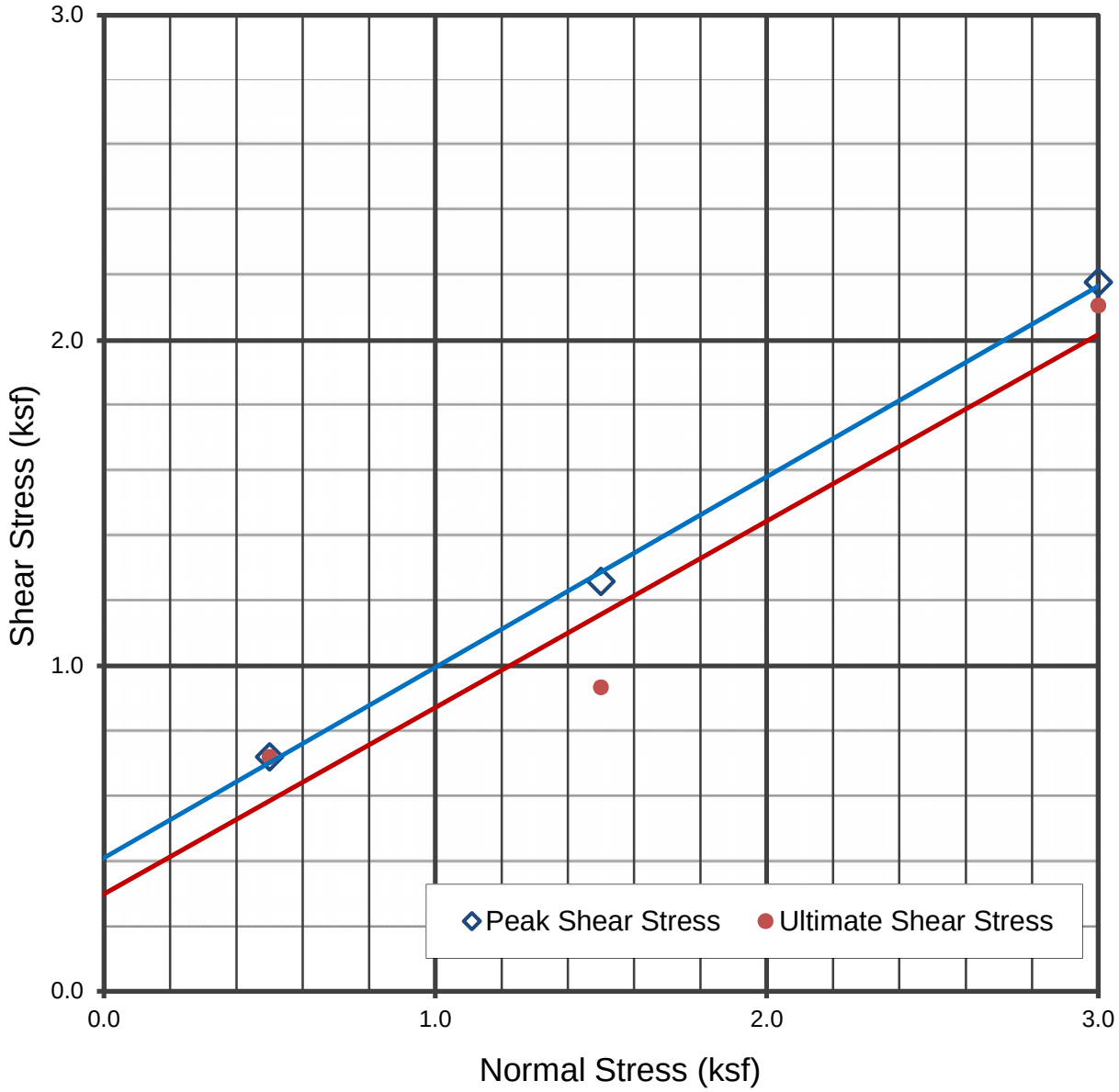
Figure
B-1.3



Boring No.:	BLMP-2
Sample No.:	n/a
Sample Depth (feet) :	8
Soil Type:	Poorly/Well Graded Sand (SP/SW)
Sample Conditions:	Intact; Soaked
In-Place Dry Density (PCF):	104
In-Place Moisture Content (%):	3.0

	◇	●
Cohesion (PSF):	0	0
Friction Angle (Degrees):	29	29

Prepared: KSH
Checked:GA

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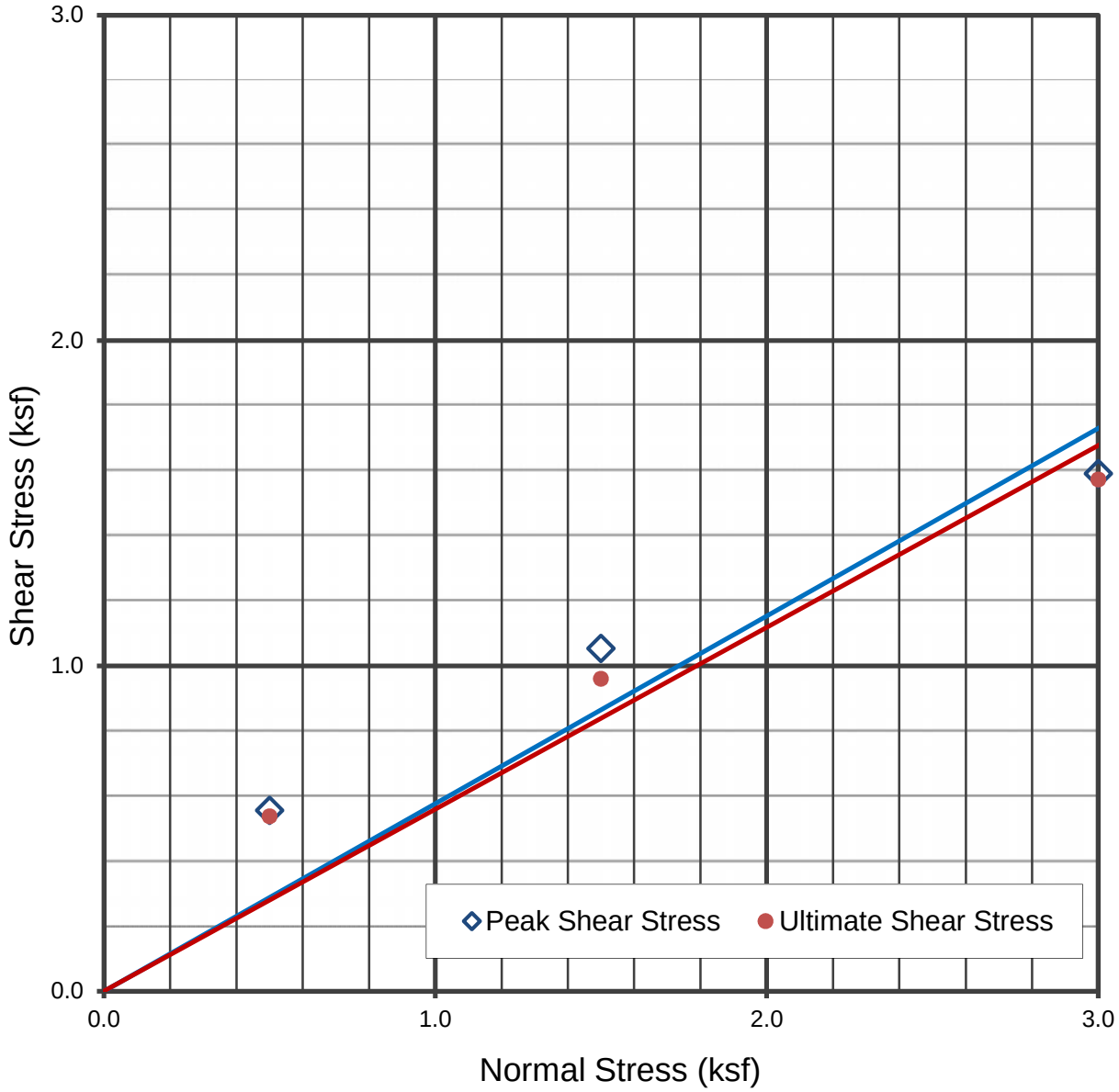
Figure
B-1.4



Boring No.:	BLMP-3
Sample No.:	n/a
Sample Depth (feet) :	0-5
Soil Type:	Poorly Graded Sand (SP)
Sample Conditions:	Remolded to 90%; Soaked
Remolded Dry Density (PCF):	100
Remolded Moisture Content (%):	16.4

	◇	●
Cohesion (PSF):	0	0
Friction Angle (Degrees):	30	29

Prepared: KSH
Checked:GA

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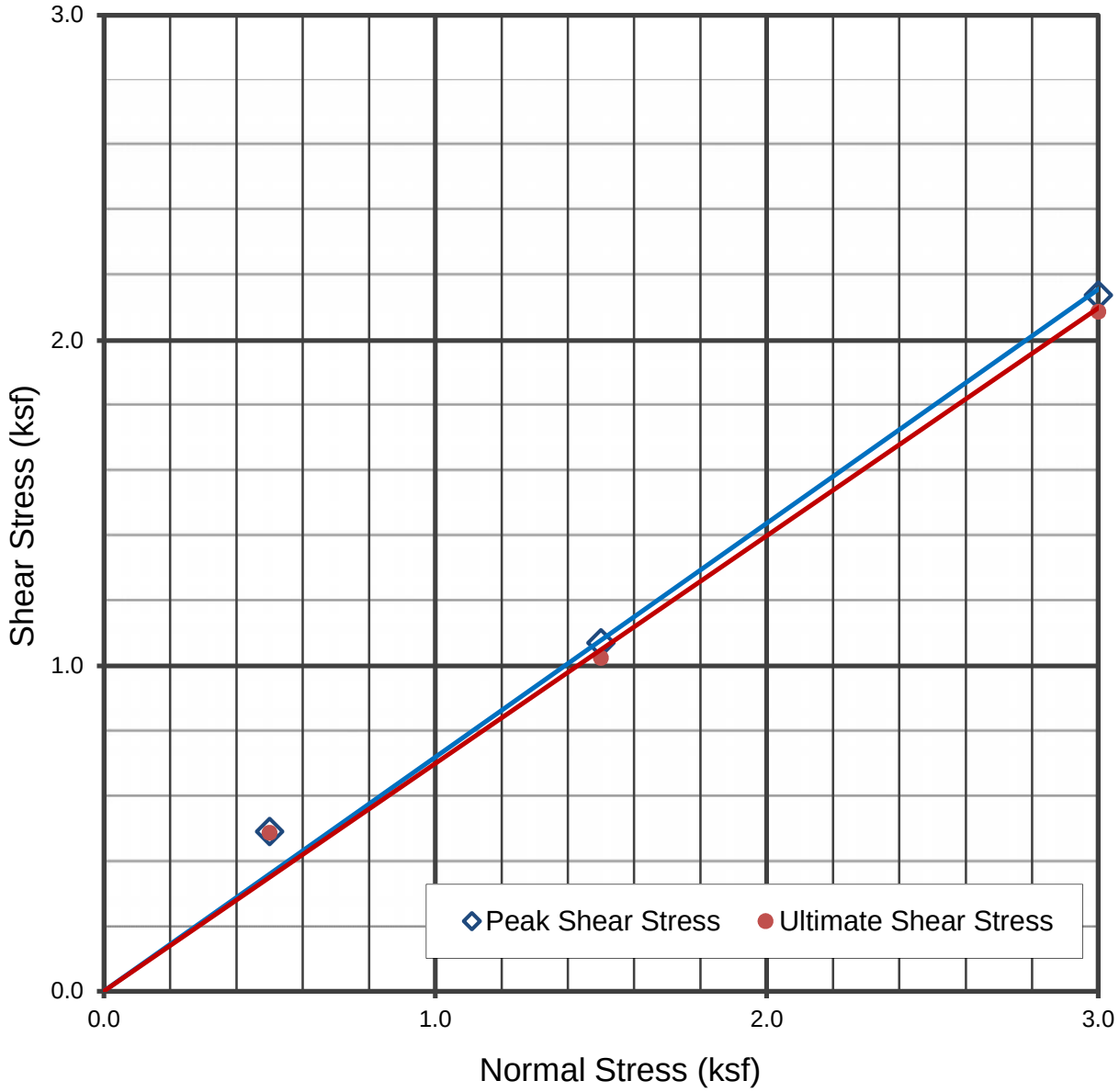
Figure
B-1.5



Boring No.:	BLMP-3
Sample No.:	n/a
Sample Depth (feet) :	6
Soil Type:	Poorly Graded Sand (SP)
Sample Conditions:	Intact; Soaked
In-Place Dry Density (PCF):	109
In-Place Moisture Content (%):	2.5

	◇	●
Cohesion (PSF):	0	0
Friction Angle (Degrees):	36	35

Prepared: KSH
Checked:GA

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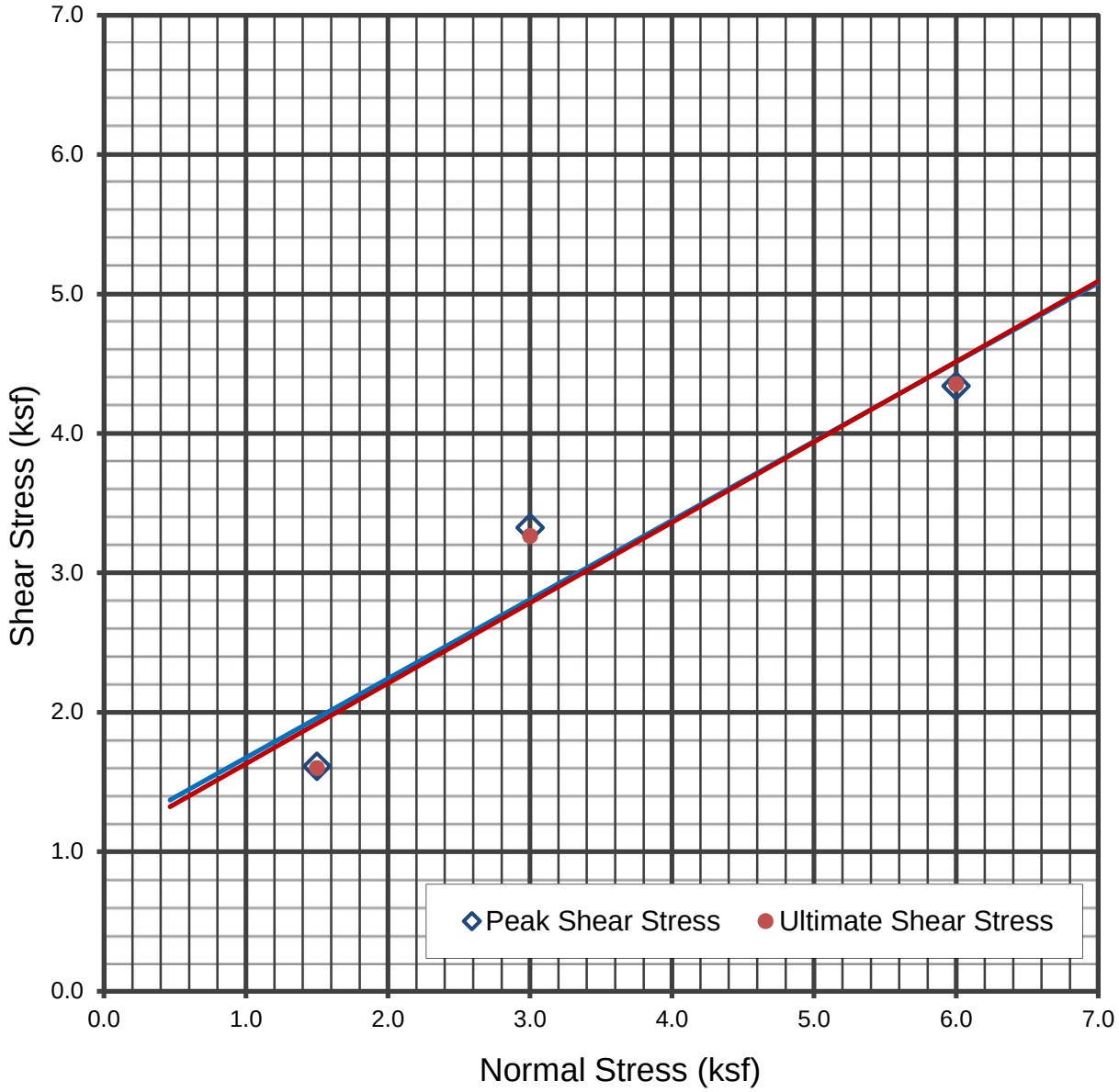
Figure
B-1.6



Boring No.:	BLMP-3
Sample No.:	n/a
Sample Depth (feet) :	30
Soil Type:	Poorly Graded Sand (SP)
Sample Conditions:	Intact; Soaked
In-Place Dry Density (PCF):	112
In-Place Moisture Content (%):	3.2

	◇	●
Cohesion (PSF):	0	0
Friction Angle (Degrees):	30	30

Prepared: KSH
Checked:GA

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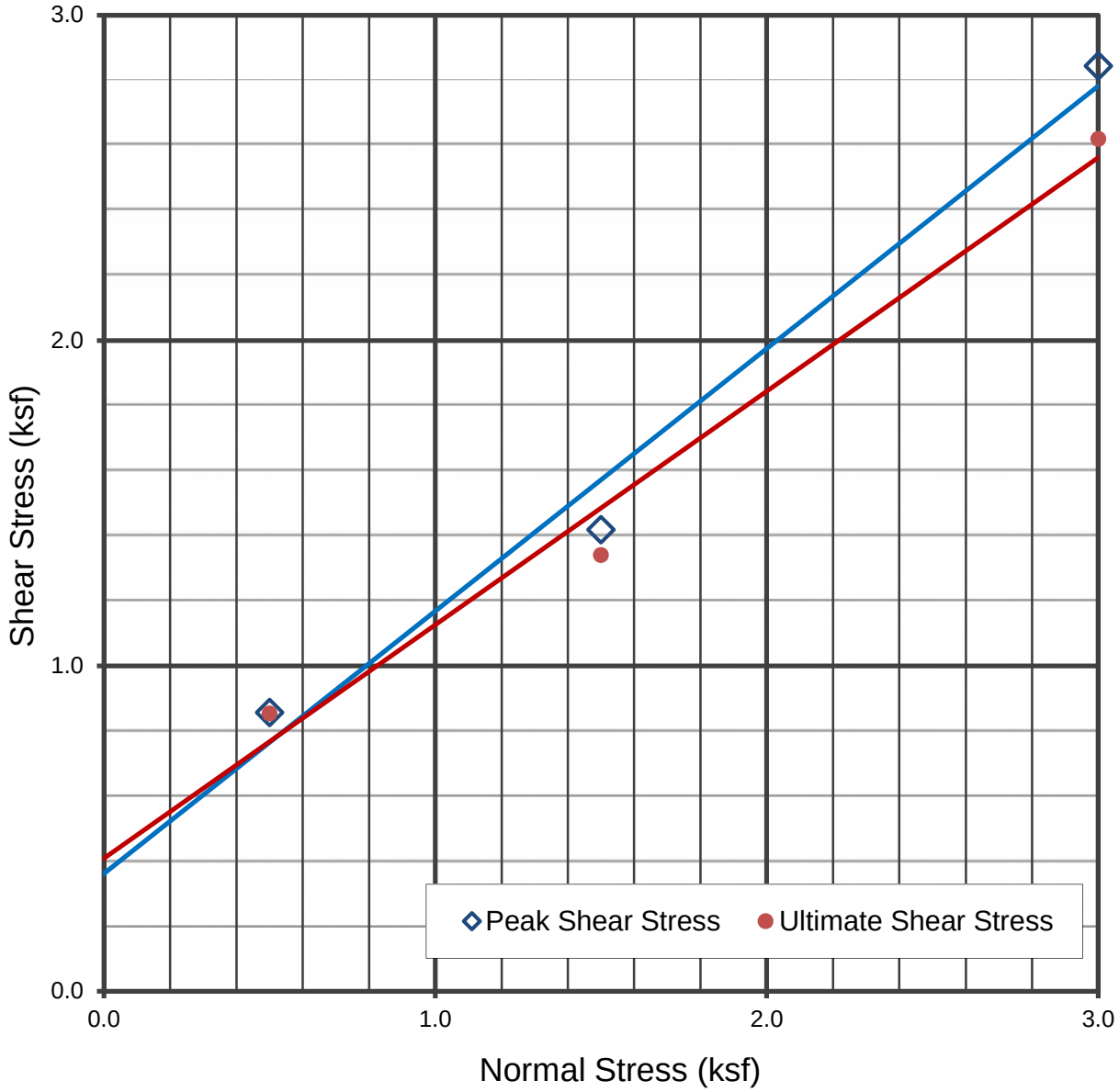
Figure
B-1.7



Boring No.:	BLMP-4
Sample No.:	n/a
Sample Depth (feet) :	7½
Soil Type:	Poorly Graded Sand (SP)
Sample Conditions:	Intact; Soaked
In-Place Dry Density (PCF):	112
In-Place Moisture Content (%):	3.9

	◇	●
Cohesion (PSF):	0	0
Friction Angle (Degrees):	38	36

Prepared: KSH
Checked:GA

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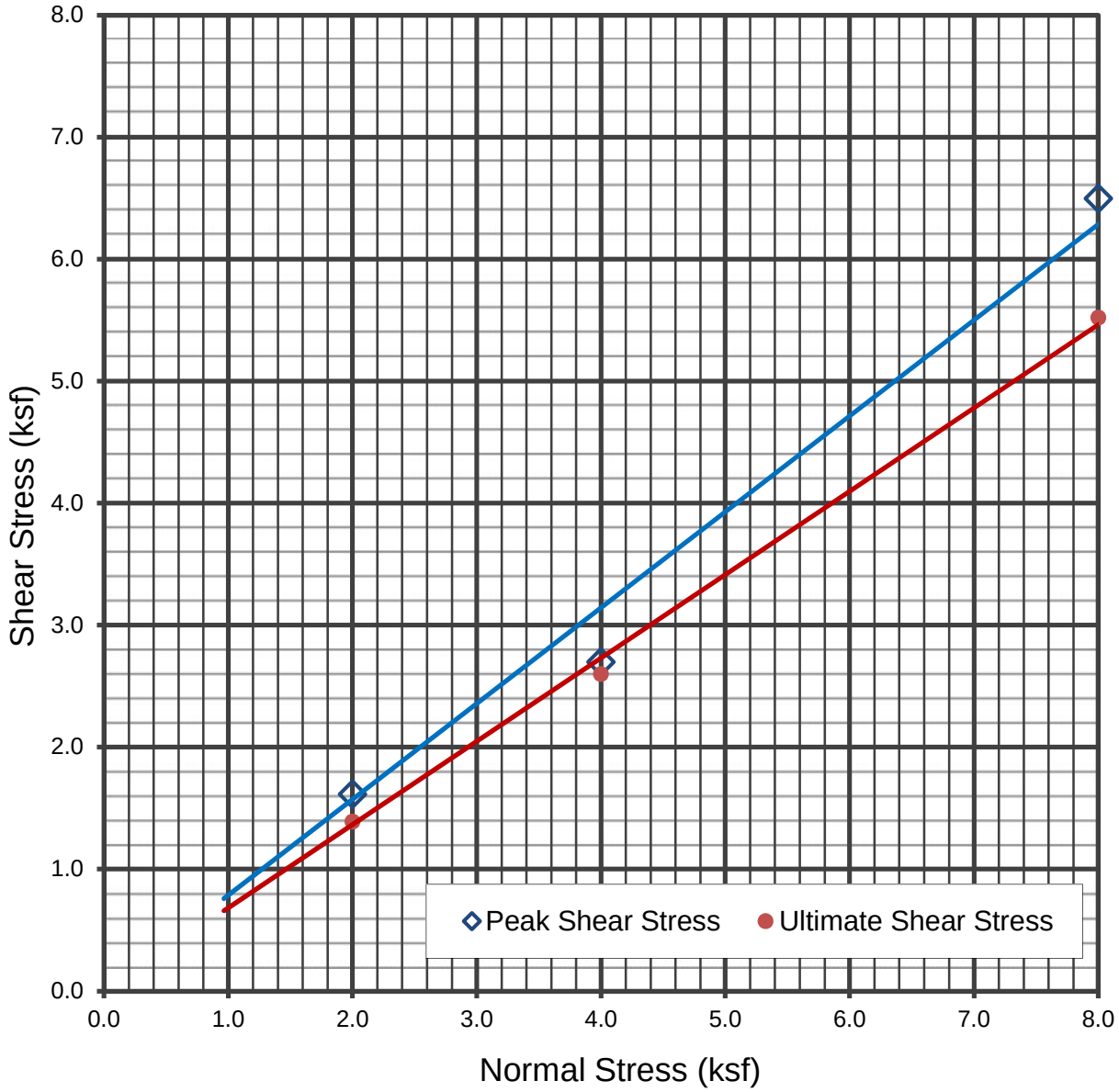
Figure
B-1.8



Boring No.:	BLMP-4
Sample No.:	n/a
Sample Depth (feet) :	35
Soil Type:	Well Graded Sand/Gravel (SW/GW)
Sample Conditions:	Intact; Soaked
In-Place Dry Density (PCF):	116
In-Place Moisture Content (%):	3.1

	◇	●
Cohesion (PSF):	0	0
Friction Angle (Degrees):	38	35

Prepared: KSH
Checked:GA

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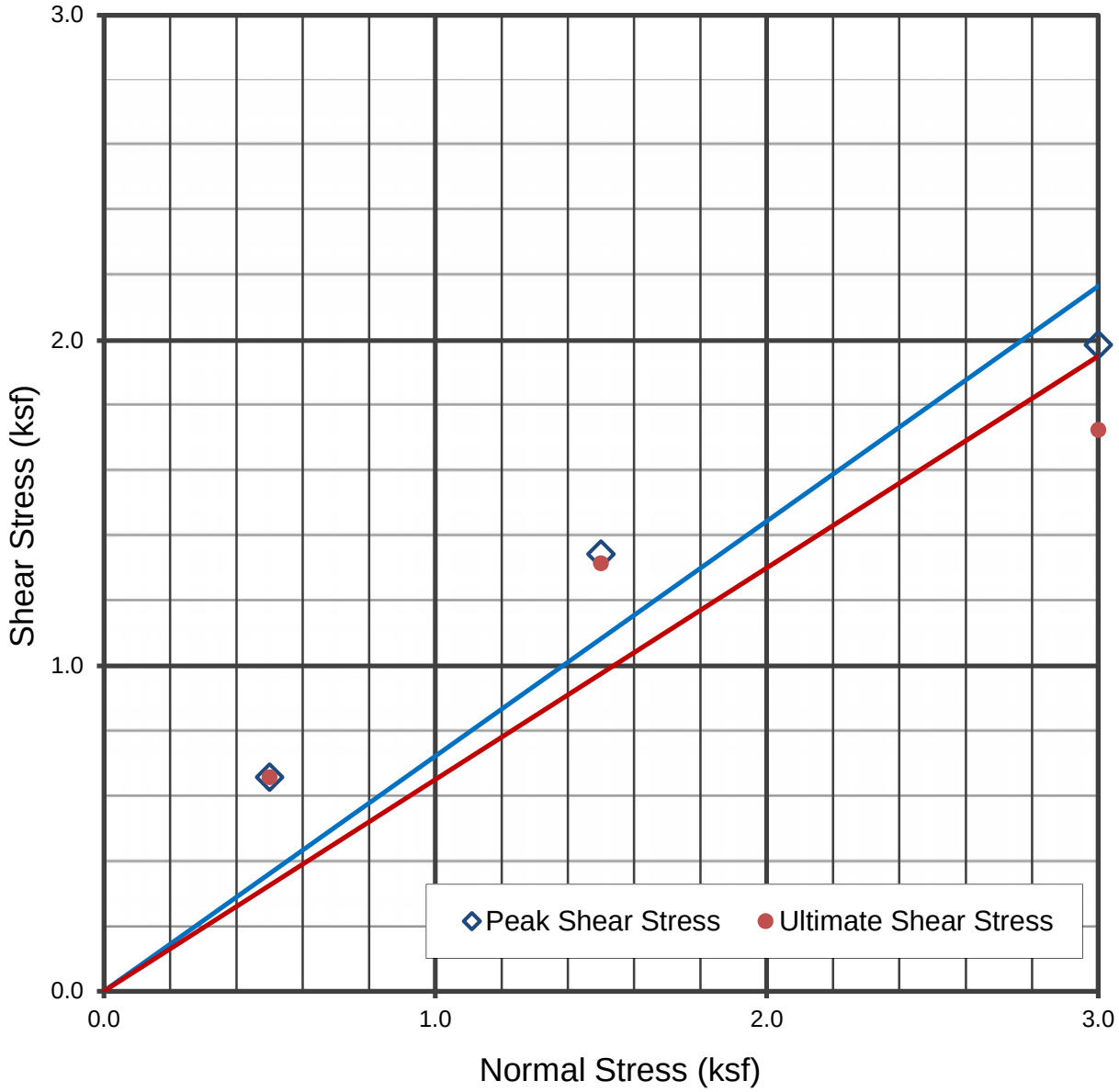
Figure
B-1.9



Boring No.:	BLMP-5
Sample No.:	n/a
Sample Depth (feet) :	8
Soil Type:	Poorly Graded Sand (SP)
Sample Conditions:	Intact; Soaked
In-Place Dry Density (PCF):	106
In-Place Moisture Content (%):	4.2

	◇	●
Cohesion (PSF):	0	0
Friction Angle (Degrees):	37	32

Prepared: KSH
Checked:GA

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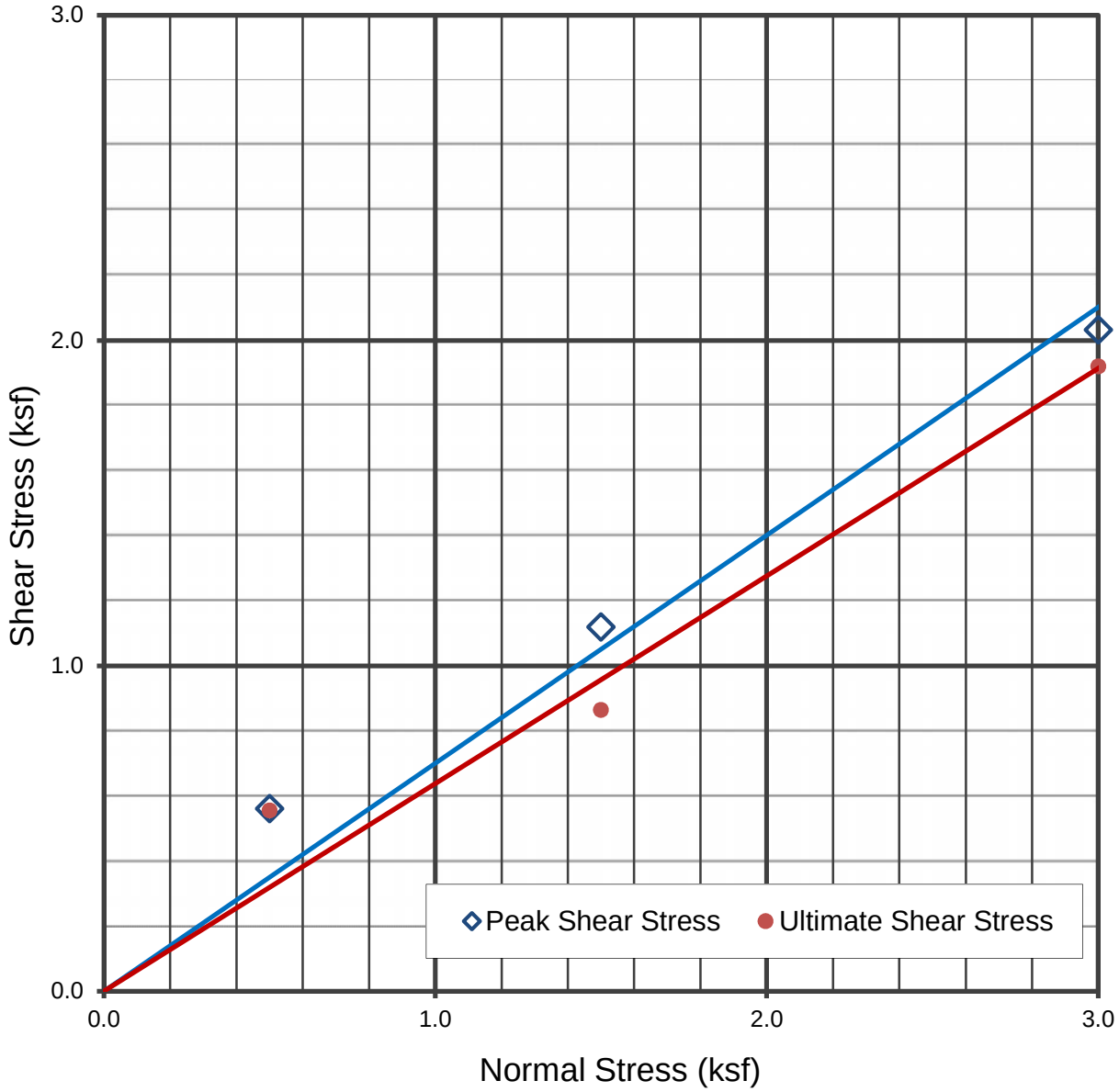
Figure
B-1.10



Boring No.:	BLMP-6
Sample No.:	n/a
Sample Depth (feet) :	0-5
Soil Type:	Poorly Graded Sand (SP)
Sample Conditions:	Remolded; Soaked
Remolded Dry Density (PCF):	108
Remolded Moisture Content (%):	11.4

	◇	●
Cohesion (PSF):	0	0
Friction Angle (Degrees):	35	32

Prepared: KSH
Checked:GA

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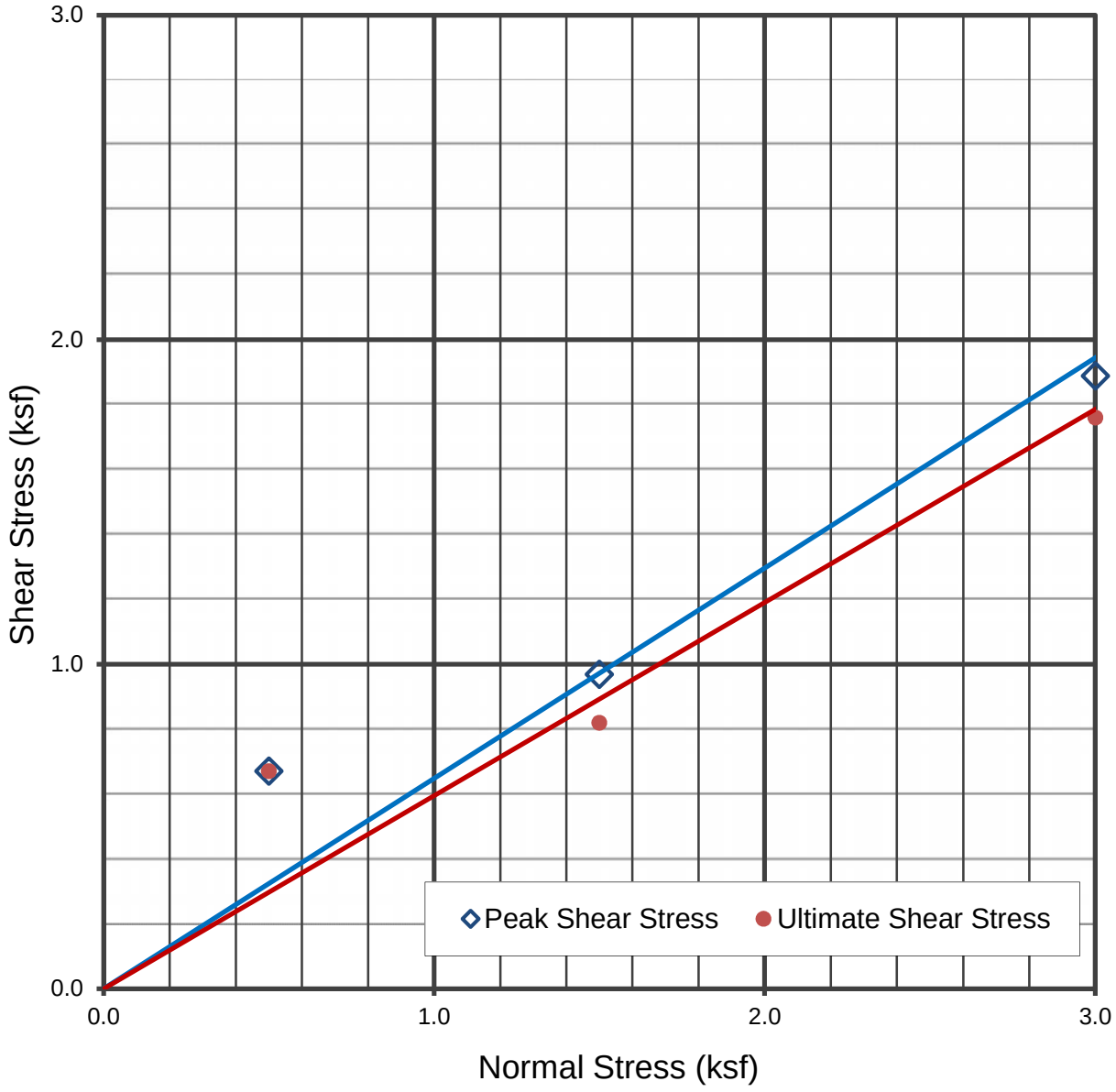
Figure
B-1.11



Boring No.:	BLMP-6
Sample No.:	n/a
Sample Depth (feet) :	3
Soil Type:	Poorly Graded Sand (SP)
Sample Conditions:	Intact; Soaked
In-Place Dry Density (PCF):	105
In-Place Moisture Content (%):	3.6

	◇	●
Cohesion (PSF):	0	0
Friction Angle (Degrees):	32	31

Prepared: KSH
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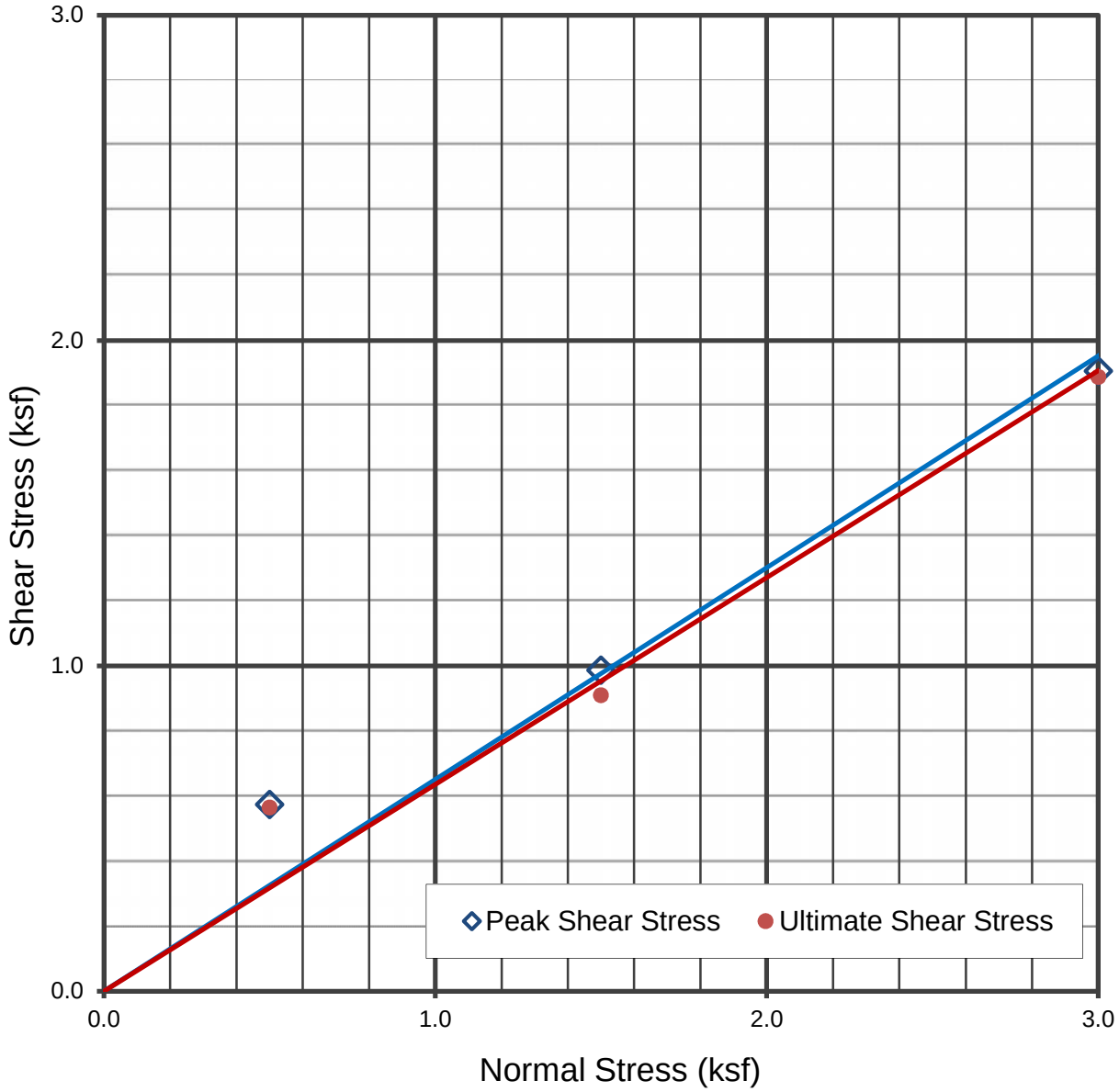
Figure
B-1.12



Boring No.:	BLMP-7
Sample No.:	n/a
Sample Depth (feet) :	8
Soil Type:	Poorly Graded Sand (SP)
Sample Conditions:	Intact; Soaked
In-Place Dry Density (PCF):	113
In-Place Moisture Content (%):	1.8

	◇	●
Cohesion (PSF):	0	0
Friction Angle (Degrees):	32	32

Prepared: KSH
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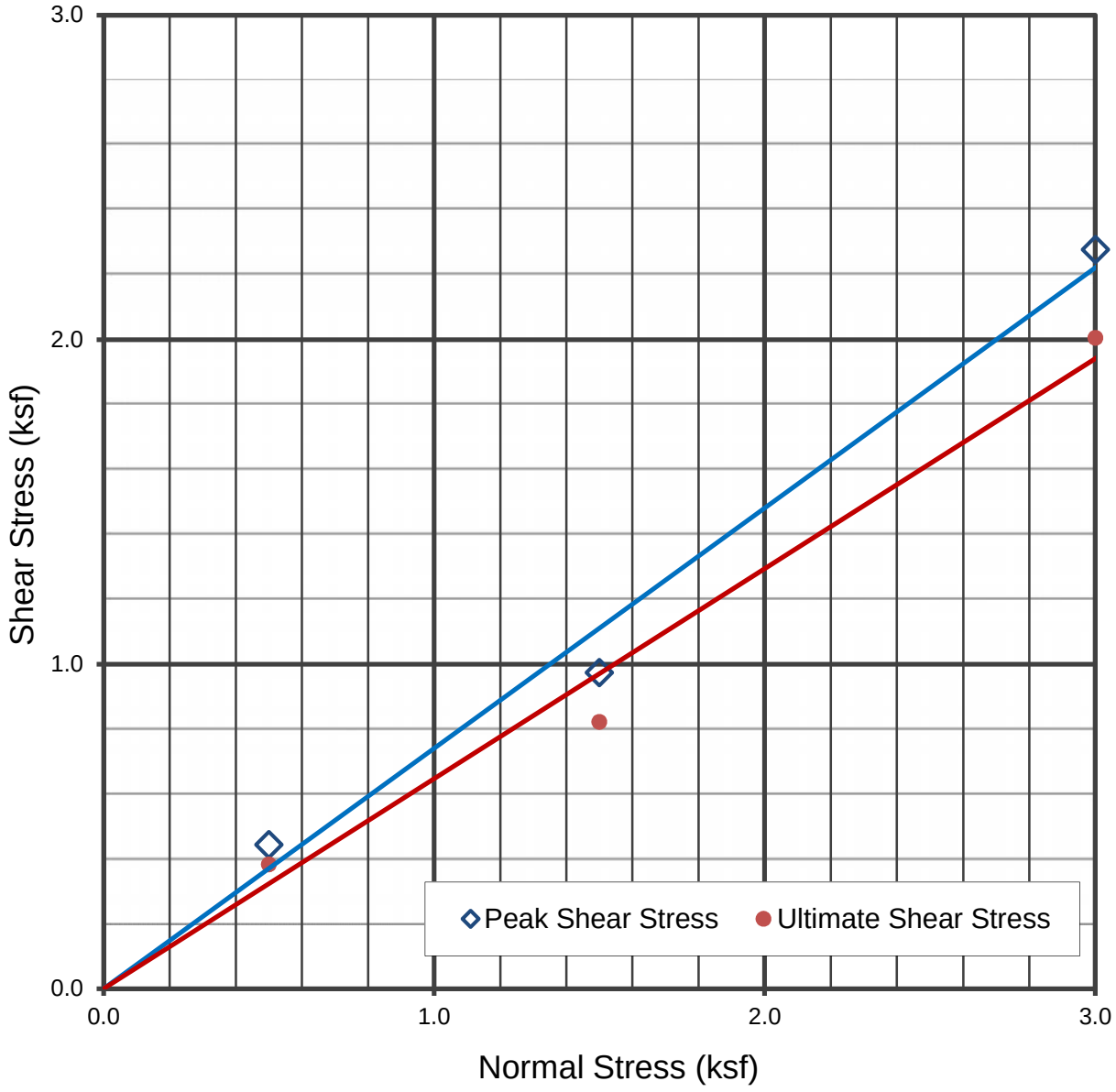
Figure
B-1.13



Boring No.:	BLMP-8
Sample No.:	n/a
Sample Depth (feet) :	0-5
Soil Type:	Poorly Graded Sand (SP)
Sample Conditions:	Remolded; Soaked
Remolded Dry Density (PCF):	128.9
Remolded Moisture Content (%):	12.4

	◇	●
Cohesion (PSF):	0	0
Friction Angle (Degrees):	36	32

Prepared: KSH
Checked: GA

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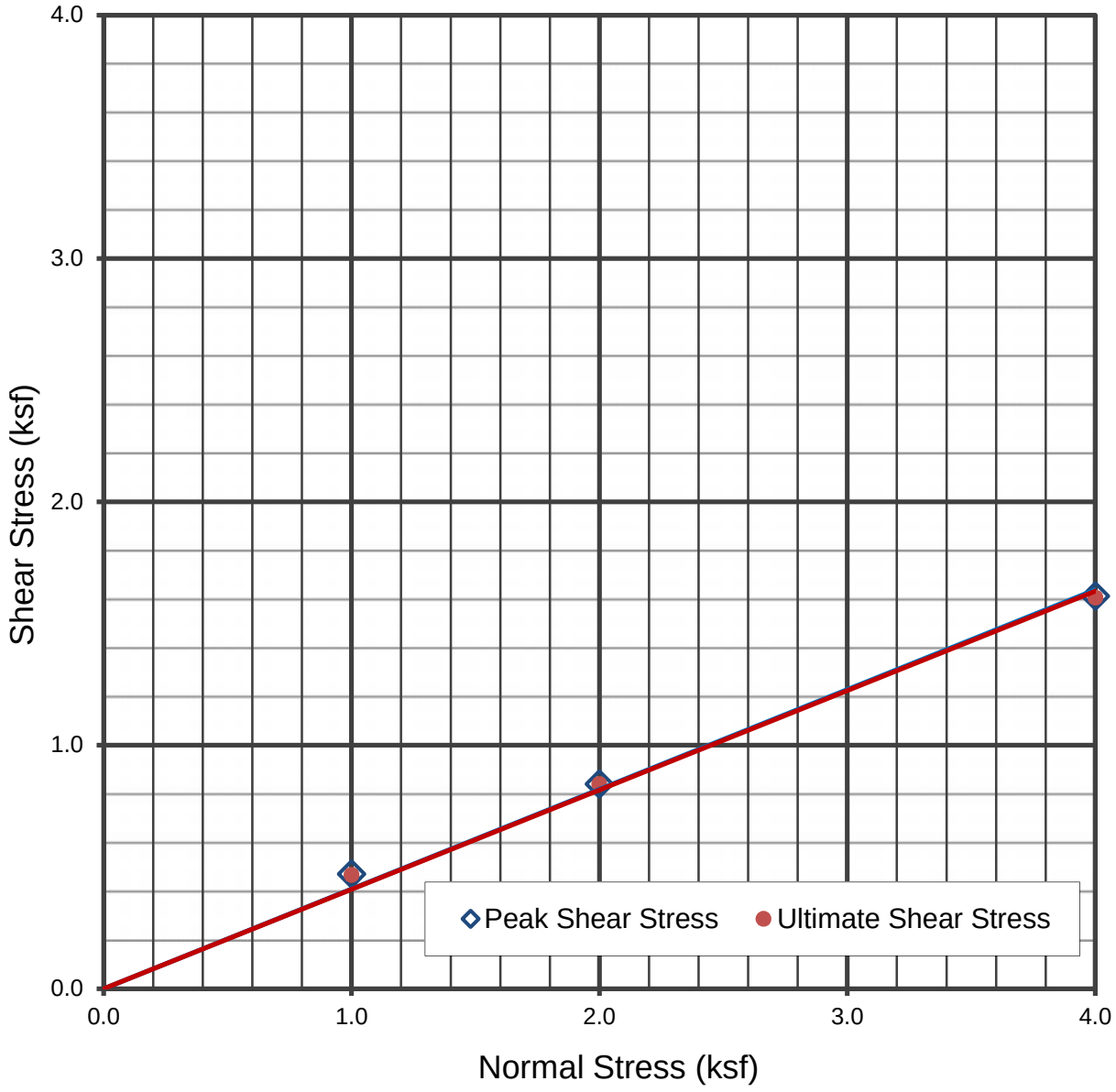
Figure
B-1.14



Boring No.:	BLMP-9
Sample No.:	n/a
Sample Depth (feet) :	0-5
Soil Type:	Poorly Graded Sand (SP)
Sample Conditions:	Remolded; Soaked
Remolded Dry Density (PCF):	93
Remolded Moisture Content (%):	21.5

	◇	●
Cohesion (PSF):	0	0
Friction Angle (Degrees):	28	28

Prepared: KSH
Checked:GA

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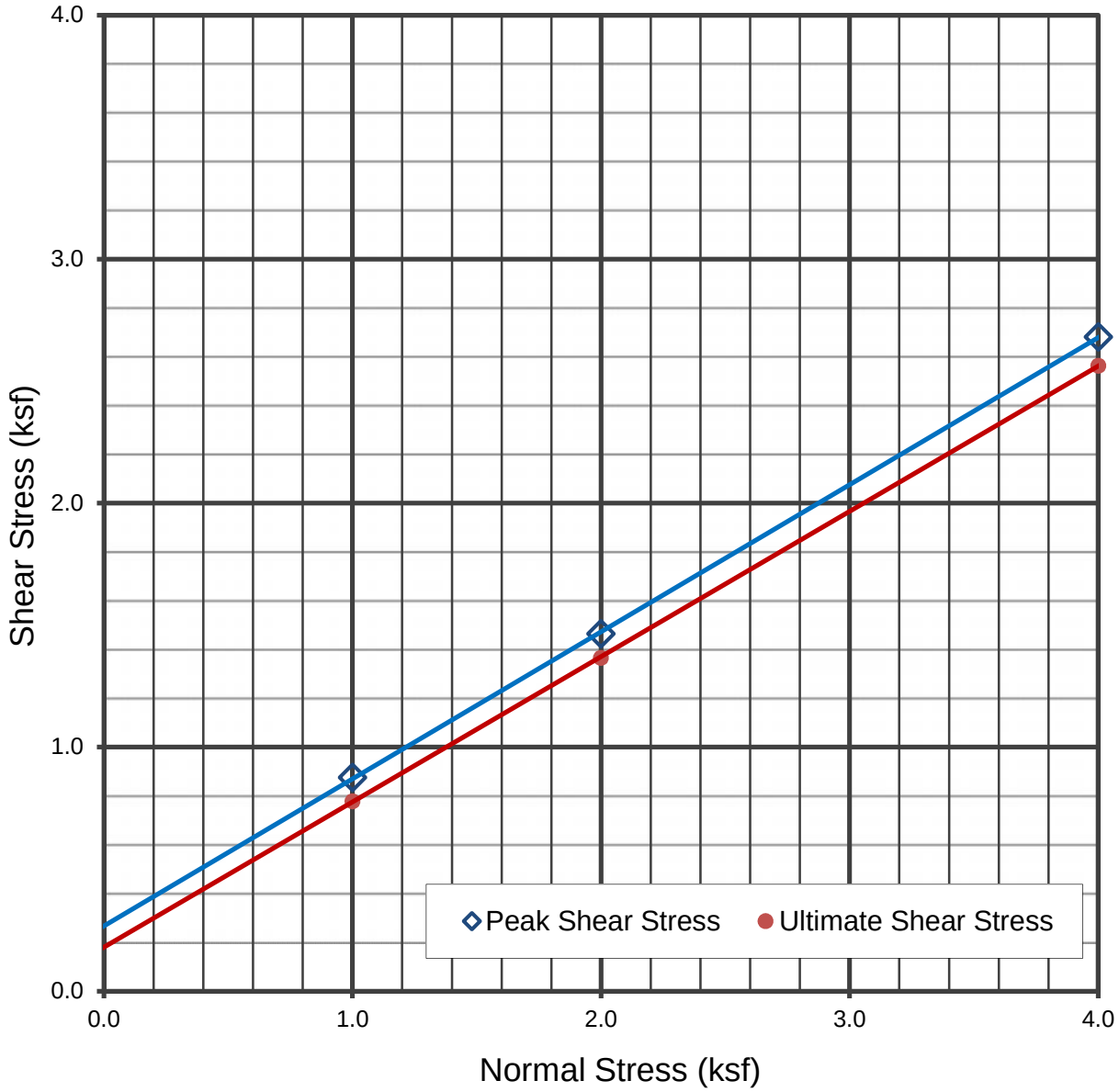
4953-17-0231

Figure
B-1.15



Boring No.:	BLMP-9
Sample No.:	n/a
Sample Depth (feet) :	11
Soil Type:	Poorly Graded Sand (SP)
Sample Conditions:	Intact; Soaked
In-Place Dry Density (PCF):	111
In-Place Moisture Content (%):	4.0

	◇	●
Cohesion (PSF):	0	0
Friction Angle (Degrees):	31	31

Prepared: KSH
Checked:GA

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DIRECT SHEAR TEST
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Ludlow Site 4 500kV Midline Capacitor Construction
Pisgah, San Bernardino County, California

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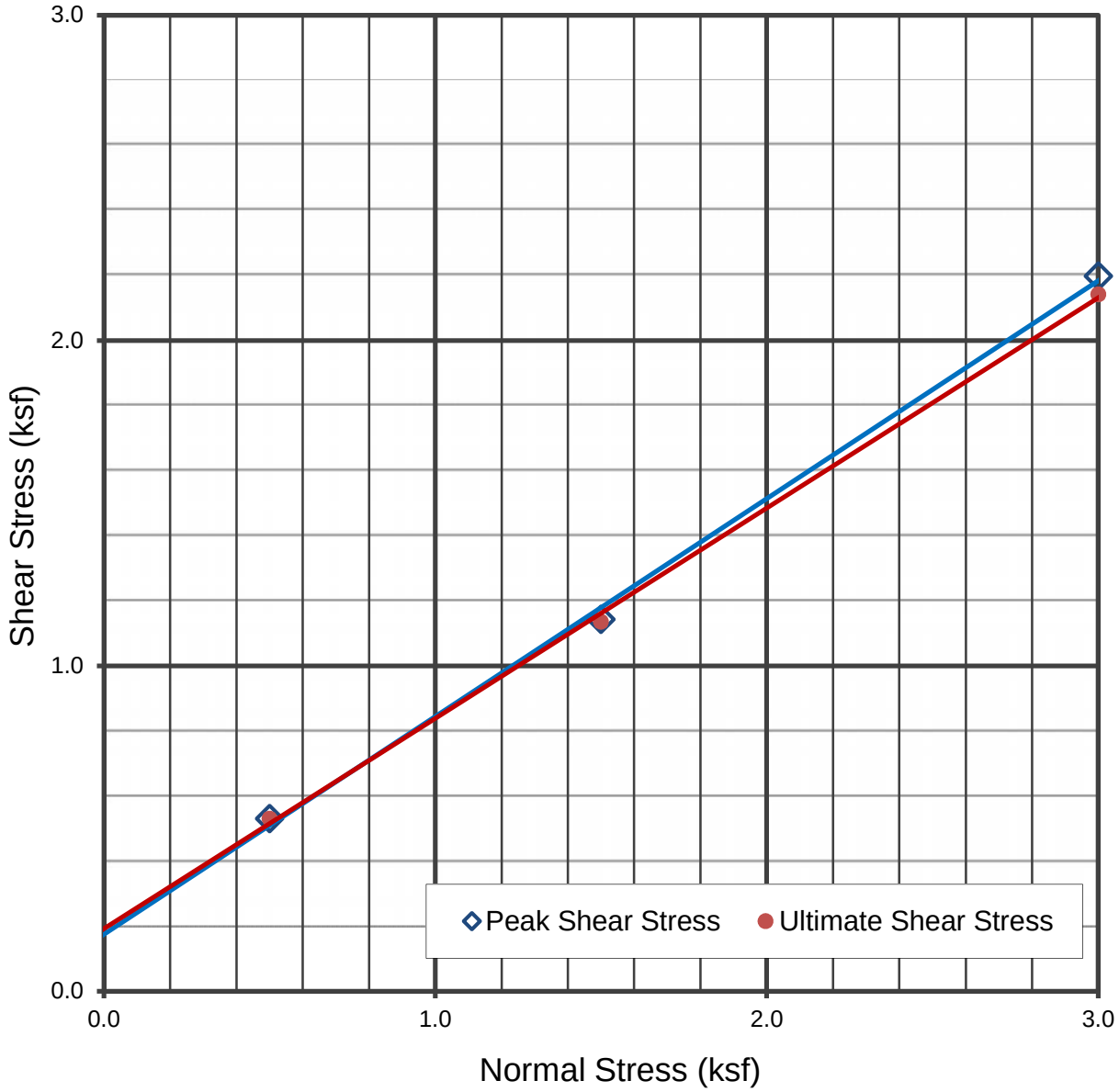
Figure
B-1.16



Boring No.:	BLMP-10
Sample No.:	n/a
Sample Depth (feet) :	8
Soil Type:	Poorly Graded Sand (SP)
Sample Conditions:	Intact; Soaked
In-Place Dry Density (PCF):	92.4
In-Place Moisture Content (%):	2.2

	◇	●
Cohesion (PSF):	0	0
Friction Angle (Degrees):	34	33

Prepared: KSH
Checked:GA

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DIRECT SHEAR TEST
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Pisgah, San Bernardino County, California

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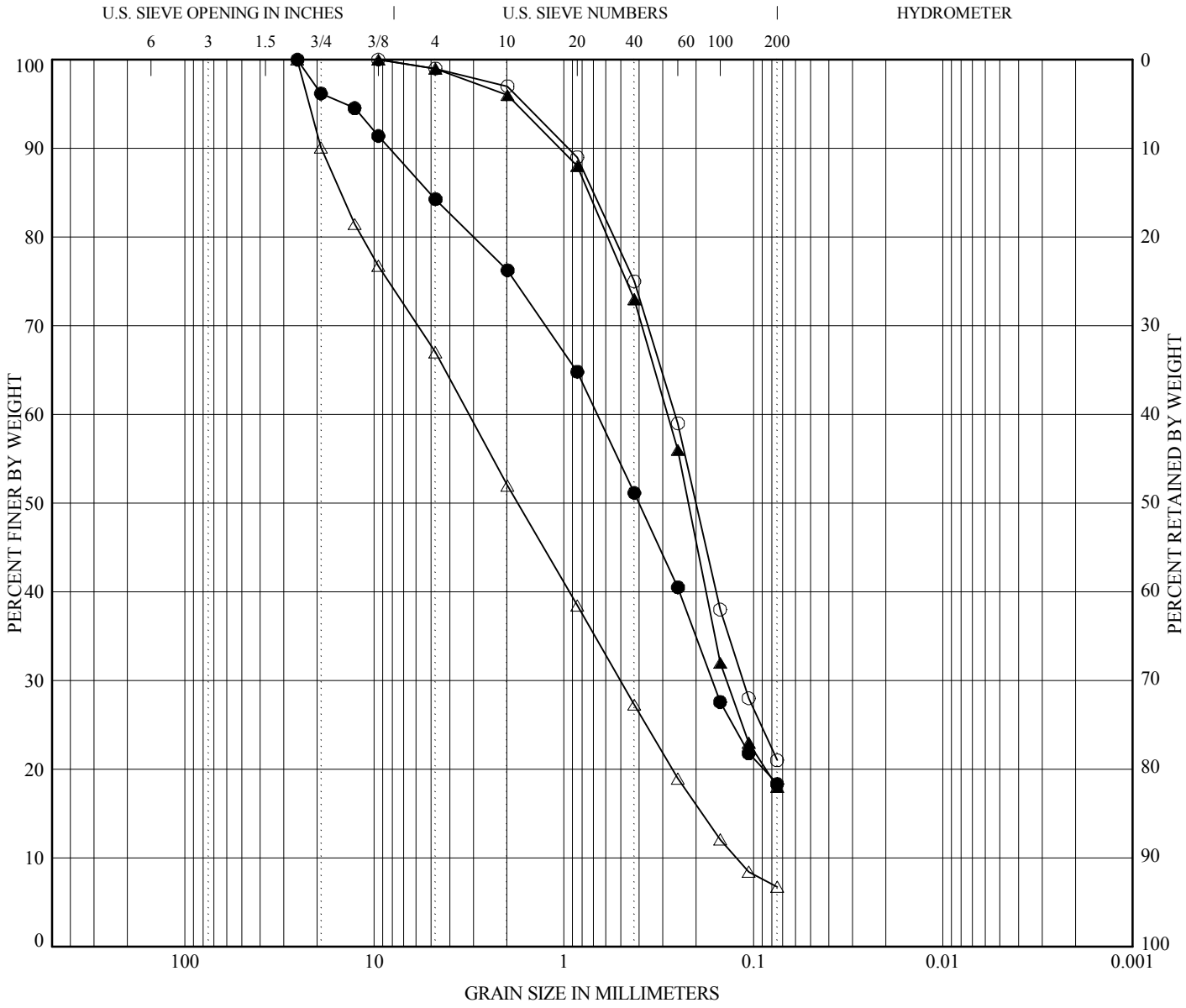
4953-17-0231

Figure
B-1.17



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SYMBOL	BORING	DEPTH (ft)	CLASSIFICATION	LL (%)*	PL (%)*	PI (%)*	C_c	C_u
○	BLMP-1	0.0	SILTY SAND	--	--	--	--	--
●	BLMP-1	8.0	SILTY SAND	--	--	--	--	--
△	BLMP-1	30.0	POORLY GRADED SAND WITH SILT	--	--	--	0.7	25.7
▲	BLMP-2	0.0	SILTY SAND	--	--	--	--	--

SYMBOL	BORING	DEPTH (ft)	D_{100} (mm)	D_{60} (mm)	D_{30} (mm)	D_{10} (mm)	% Gravel	% Sand	% Silt or % Clay
○	BLMP-1	0.0	9.52	0.258	0.114	--	1.0	78.0	21.0
●	BLMP-1	8.0	25.40	0.666	0.165	--	15.7	65.9	18.3
△	BLMP-1	30.0	25.40	3.159	0.503	0.123	33.0	60.3	6.7
▲	BLMP-2	0.0	9.52	0.283	0.139	--	1.0	81.0	18.0

Laboratory Test Method: ASTM D 422

*As determined by ASTM D 4318; see attached Atterberg Limits Test Results.

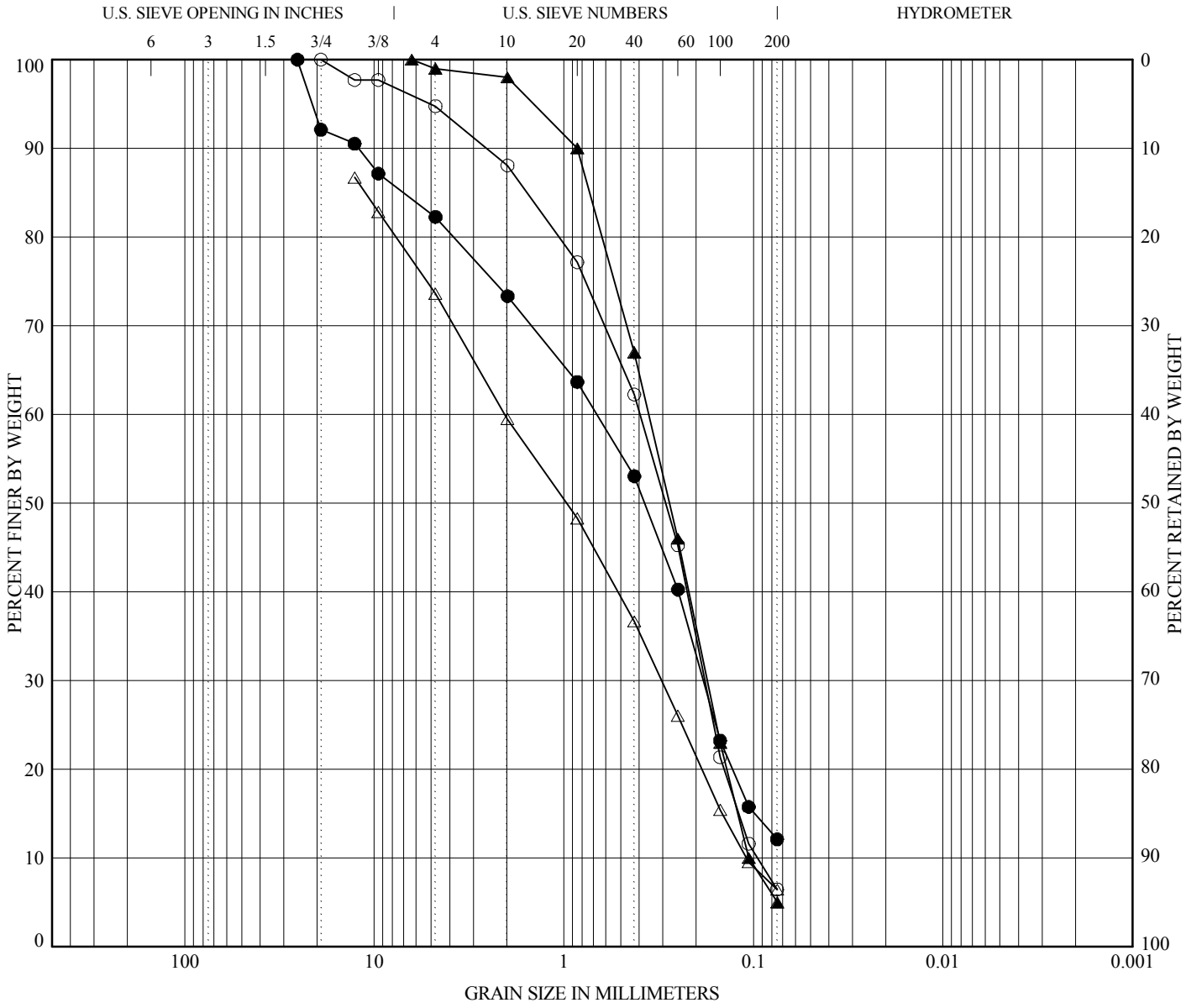
Prepared/Date: KSH Nov. 15, 2017
Checked/Date: GA Nov. 16, 2017

Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

PARTICLE SIZE DISTRIBUTION
Project No.: 4953-17-0231
Figure: B-2.1

AMEC FW_GRAIN SIZE_C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\LIBRARIES\LIBRARY AMEC JUNE2012.GLB
P:\4953 GEOTECH\2017-PROJ\170231 SCE LUDLOW SITE 4\3.2 ALL FIELD NOTES\GINT\4953-17-0231_BORING_LOGS.GPJ 11/29/17



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SYMBOL	BORING	DEPTH (ft)	CLASSIFICATION	LL (%)*	PL (%)*	PI (%)*	C_c	C_u
○	BLMP-2	10.5	SILTY SAND	--	--	--	0.9	4.2
●	BLMP-2	25.5	SILTY SAND	--	--	--	0.8	10.9
△	BLMP-2	45.5	POORLY GRADED SAND WITH SILT	--	--	--	0.4	18.8
▲	BLMP-3	0.0	POORLY GRADED SAND WITH SILT	--	--	--	0.8	3.4

SYMBOL	BORING	DEPTH (ft)	D_{100} (mm)	D_{60} (mm)	D_{30} (mm)	D_{10} (mm)	% Gravel	% Sand	% Silt or % Clay
○	BLMP-2	10.5	19.10	0.396	0.180	0.095	5.2	88.3	6.4
●	BLMP-2	25.5	25.40	0.669	0.184	--	17.7	70.2	12.1
△	BLMP-2	45.5	12.70	2.046	0.305	0.109	13.1	67.2	6.4
▲	BLMP-3	0.0	6.35	0.356	0.175	0.106	1.0	94.0	5.0

Laboratory Test Method: ASTM D 422

*As determined by ASTM D 4318; see attached Atterberg Limits Test Results.

Prepared/Date: KSH Nov. 15, 2017
Checked/Date: GA Nov. 16, 2017

Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

PARTICLE SIZE DISTRIBUTION
Project No.: 4953-17-0231
Figure: B-2.2

AMEC FW GRAIN SIZE C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\LIBRARIES\LIBRARY AMEC JUNE2012.GLB
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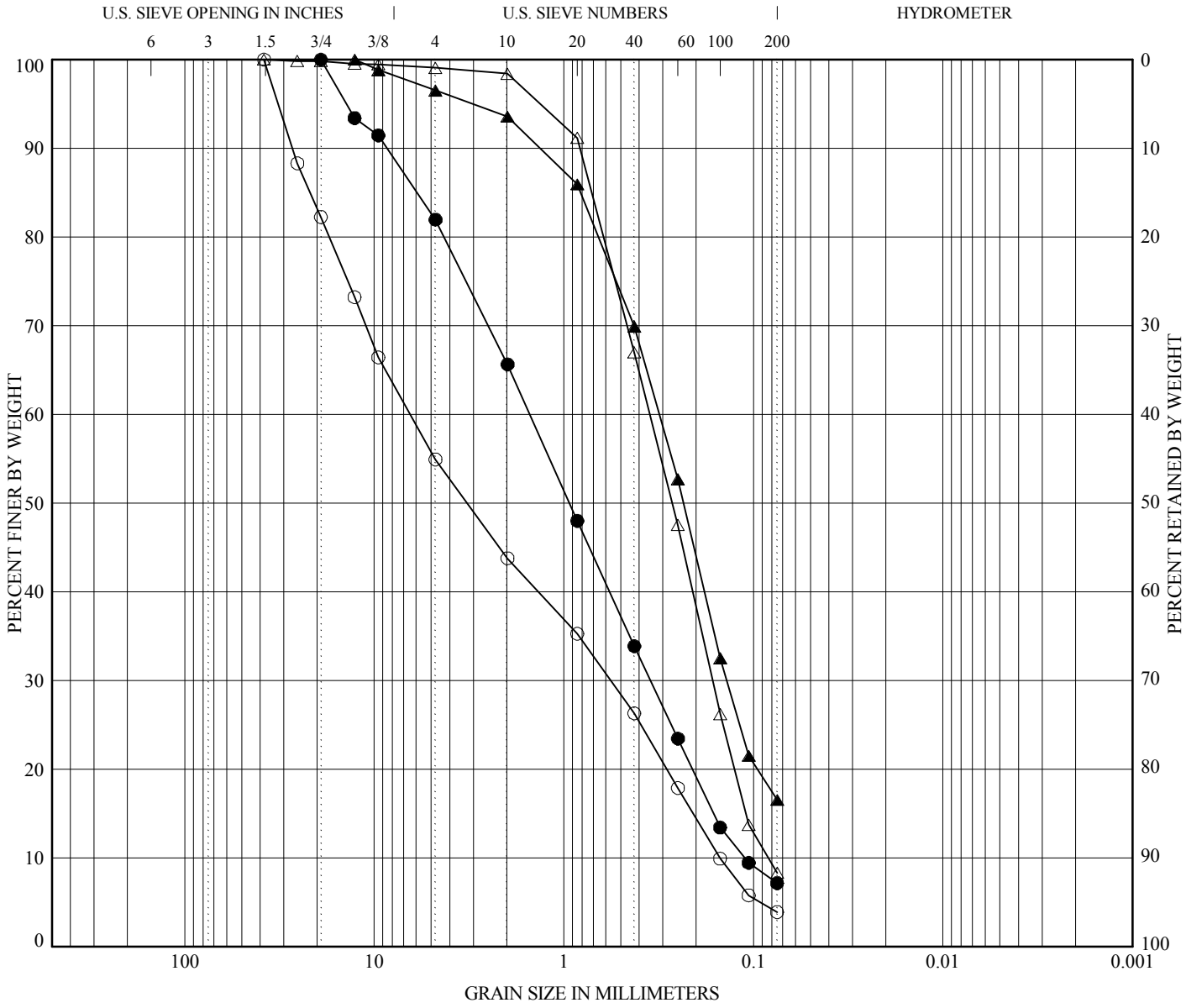

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SYMBOL	BORING	DEPTH (ft)	CLASSIFICATION	LL (%)*	PL (%)*	PI (%)*	C_c	C_u
○	BLMP-3	7.5	POORLY GRADED SAND WITH SILT	--	--	--	0.3	42.8
●	BLMP-3	25.5	POORLY GRADED SAND WITH SILT	--	--	--	0.7	13.6
△	BLMP-4	0.0	POORLY GRADED SAND WITH SILT	--	--	--	0.9	4.2
▲	BLMP-4	10.5	SILTY SAND	--	--	--	--	--

SYMBOL	BORING	DEPTH (ft)	D_{100} (mm)	D_{60} (mm)	D_{30} (mm)	D_{10} (mm)	% Gravel	% Sand	% Silt or % Clay
○	BLMP-3	7.5	38.10	6.455	0.566	0.151	45.1	51.0	3.9
●	BLMP-3	25.5	19.10	1.510	0.349	0.111	18.0	74.8	7.2
△	BLMP-4	0.0	38.10	0.351	0.164	0.083	0.9	90.7	8.3
▲	BLMP-4	10.5	12.70	0.313	0.139	--	3.5	80.0	16.5

Laboratory Test Method: ASTM D 422

*As determined by ASTM D 4318; see attached Atterberg Limits Test Results.

Prepared/Date: KSH Nov. 15, 2017
Checked/Date: GA Nov. 16, 2017

Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

PARTICLE SIZE DISTRIBUTION
Project No.: 4953-17-0231
Figure: B-2.3

AMEC FW_GRAIN SIZE_C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\LIBRARIES\LIBRARY AMEC JUNE2012.GLB
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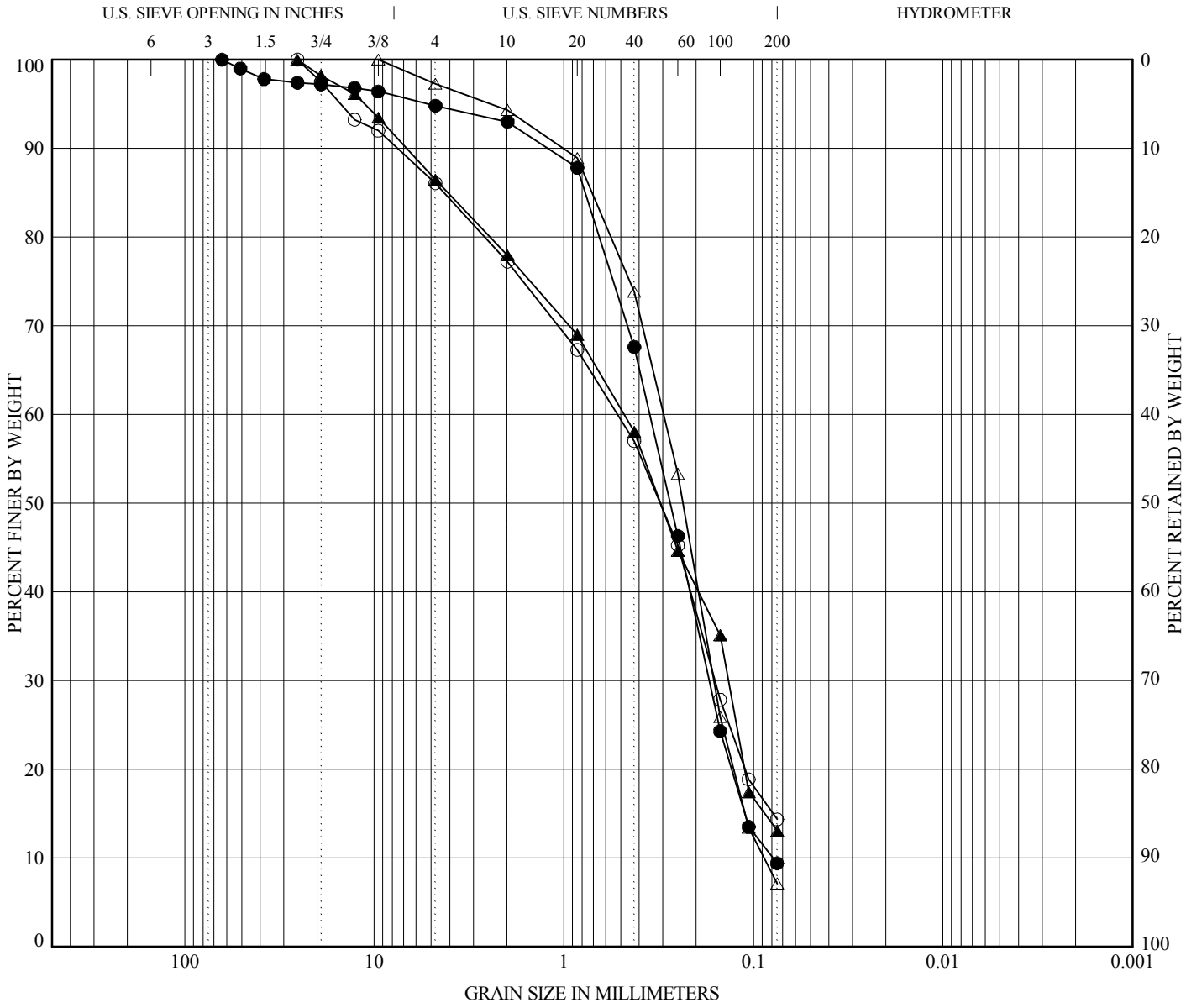

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SYMBOL	BORING	DEPTH (ft)	CLASSIFICATION	LL (%)*	PL (%)*	PI (%)*	C_c	C_u
○	BLMP-4	30.5	SILTY SAND	--	--	--	--	--
●	BLMP-5	0.0	WELL GRADED SAND WITH SILT	--	--	--	1.1	4.5
△	BLMP-5	15.5	WELL GRADED SAND WITH SILT	--	--	--	1.0	3.4
▲	BLMP-5	35.5	POORLY GRADED GRAVEL	--	--	--	--	--

SYMBOL	BORING	DEPTH (ft)	D_{100} (mm)	D_{60} (mm)	D_{30} (mm)	D_{10} (mm)	% Gravel	% Sand	% Silt or % Clay
○	BLMP-4	30.5	25.40	0.520	0.160	--	13.9	71.7	14.3
●	BLMP-5	0.0	63.50	0.352	0.171	0.079	5.2	85.4	9.4
△	BLMP-5	15.5	9.52	0.297	0.162	0.088	2.7	90.2	7.1
▲	BLMP-5	35.5	25.40	0.481	0.136	--	13.5	73.4	13.1

Laboratory Test Method: ASTM D 422

*As determined by ASTM D 4318; see attached Atterberg Limits Test Results.

Prepared/Date: KSH 11/15/2017
Checked/Date: GA Nov. 16, 2017

Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

PARTICLE SIZE DISTRIBUTION
Project No.: 4953-17-0231
Figure: B-2.4

AMEC FW_GRAIN SIZE_C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\LIBRARIES\LIBRARY AMEC JUNE2012.GLB
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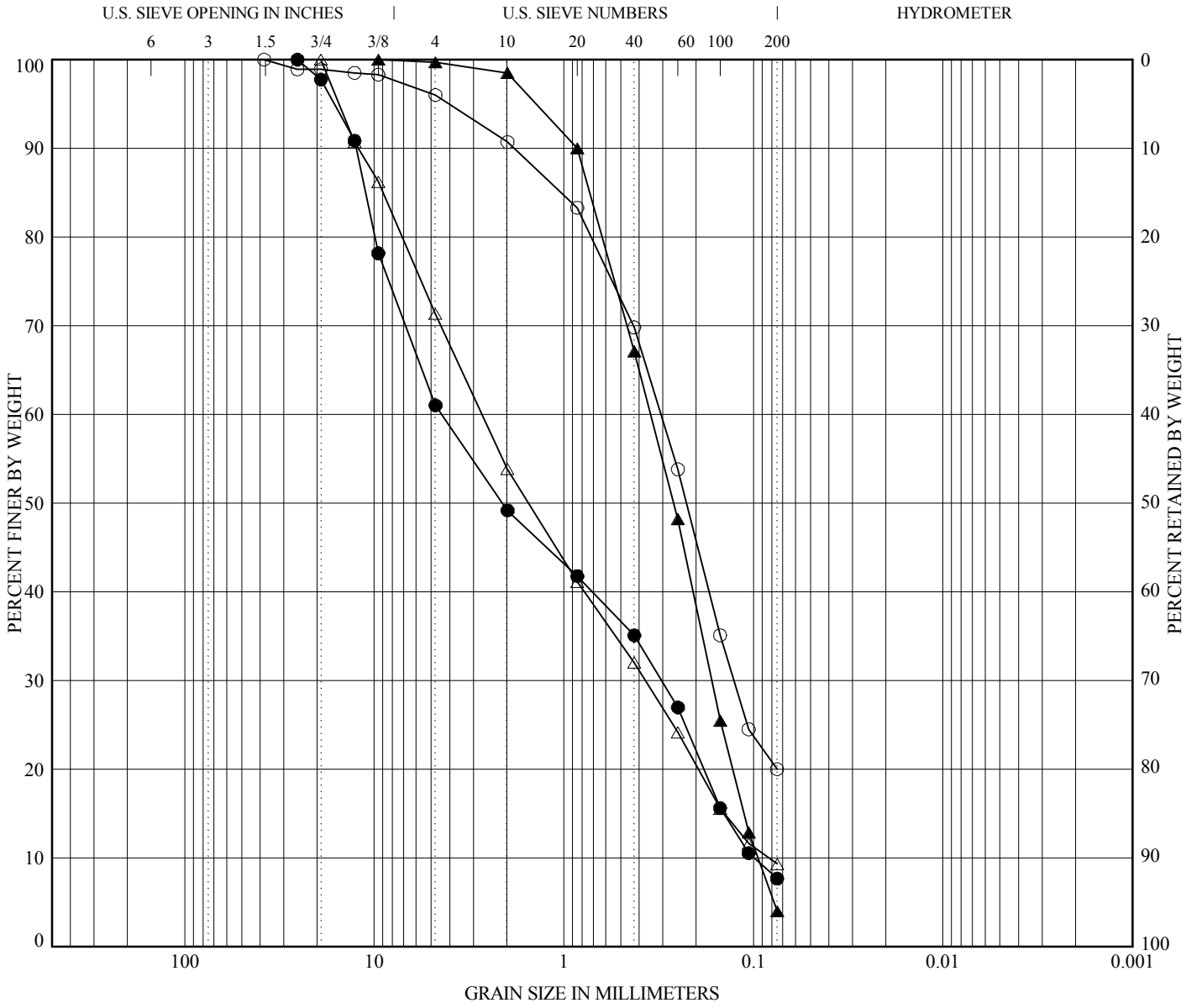

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SYMBOL	BORING	DEPTH (ft)	CLASSIFICATION	LL (%)*	PL (%)*	PI (%)*	C_c	C_u
○	BLMP-6	0.0	SILTY SAND	--	--	--	--	--
●	BLMP-6	15.5	POORLY GRADED SAND WITH SILT	--	--	--	0.2	44.3
△	BLMP-6	35.5	POORLY GRADED SAND WITH SILT	--	--	--	0.6	32.4
▲	BLMP-7	0.0	POORLY GRADED SAND	--	--	--	0.8	3.7

SYMBOL	BORING	DEPTH (ft)	D_{100} (mm)	D_{60} (mm)	D_{30} (mm)	D_{10} (mm)	% Gravel	% Sand	% Silt or % Clay
○	BLMP-6	0.0	38.10	0.307	0.127	--	4.0	76.0	20.0
●	BLMP-6	15.5	25.40	4.405	0.305	0.099	39.0	53.3	7.7
△	BLMP-6	35.5	19.10	2.695	0.371	0.083	28.7	62.0	9.3
▲	BLMP-7	0.0	9.52	0.348	0.166	0.095	0.3	95.7	4.0

Laboratory Test Method: ASTM D 422

*As determined by ASTM D 4318; see attached Atterberg Limits Test Results.

Prepared/Date: KSH Nov. 15, 2017
Checked/Date: GA Nov. 16, 2017

Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

PARTICLE SIZE DISTRIBUTION
Project No.: 4953-17-0231
Figure: B-2.5

AMEC FW_GRAIN SIZE_C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\LIBRARIES\LIBRARY AMEC JUNE2012.GLB
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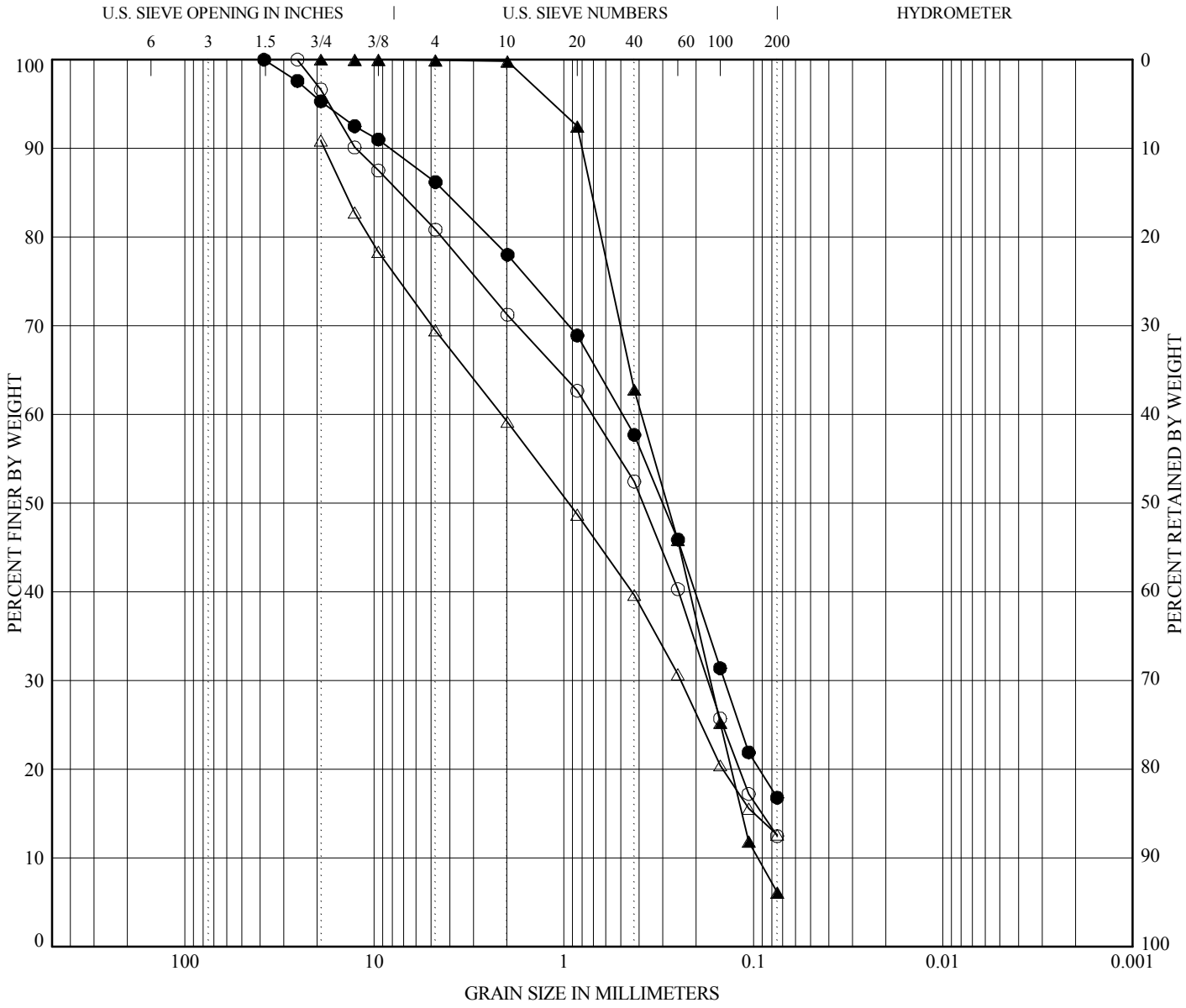

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SYMBOL	BORING	DEPTH (ft)	CLASSIFICATION	LL (%)*	PL (%)*	PI (%)*	C_c	C_u
○	BLMP-7	15.5	SILTY SAND	--	--	--	0.7	11.3
●	BLMP-8	0.0	SILTY SAND	--	--	--	--	--
△	BLMP-8	10.5	SILTY SAND	--	--	--	--	--
▲	BLMP-9	0.0	POORLY GRADED SAND WITH SILT	--	--	--	0.8	4.1

SYMBOL	BORING	DEPTH (ft)	D_{100} (mm)	D_{60} (mm)	D_{30} (mm)	D_{10} (mm)	% Gravel	% Sand	% Silt or % Clay
○	BLMP-7	15.5	25.40	0.709	0.174	--	19.2	68.4	12.5
●	BLMP-8	0.0	38.10	0.490	0.143	--	13.8	69.4	16.8
△	BLMP-8	10.5	19.10	2.128	0.241	--	21.4	56.9	12.6
▲	BLMP-9	0.0	19.10	0.390	0.169	0.095	0.1	93.8	6.1

Laboratory Test Method: ASTM D 422

*As determined by ASTM D 4318; see attached Atterberg Limits Test Results.

Prepared/Date: KSH Nov. 15, 2017
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Proposed Ludlow Site 4 500kV Midline Capacitor Project

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PARTICLE SIZE DISTRIBUTION
Project No.: 4953-17-0231
Figure: B-2.6

AMEC FW GRAIN SIZE C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\LIBRARIES\LIBRARY AMEC JUNE2012.GLB
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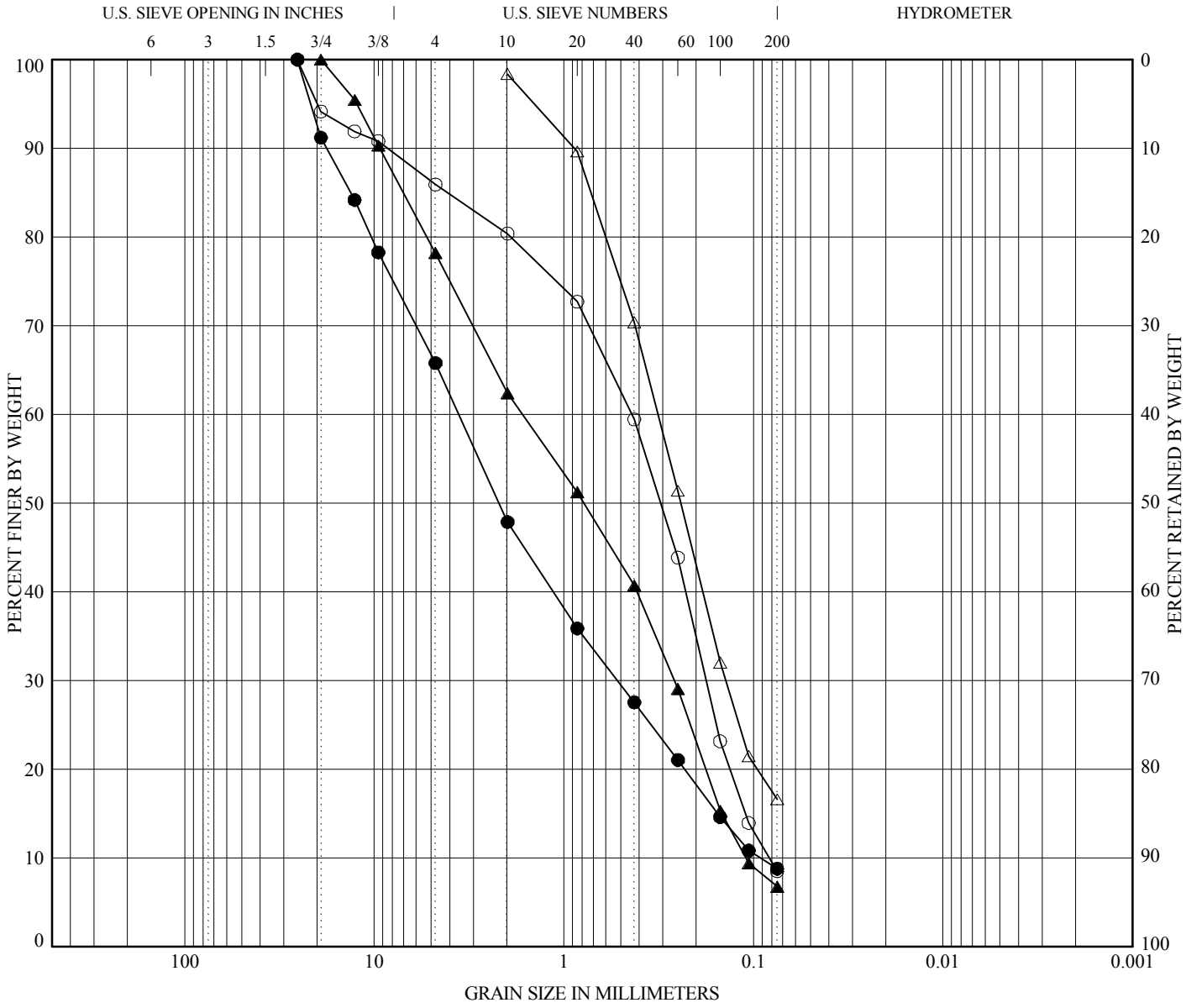

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SYMBOL	BORING	DEPTH (ft)	CLASSIFICATION	LL (%)*	PL (%)*	PI (%)*	C_c	C_u
○	BLMP-9	11.0	POORLY GRADED SAND WITH SILT	--	--	--	0.9	5.3
●	BLMP-9	35.0	POORLY GRADED SAND WITH SILT	--	--	--	0.8	38.9
△	BLMP-10	0.0	SILTY SAND	--	--	--	--	--
▲	BLMP-10	15.5	POORLY GRADED SAND WITH SILT	--	--	--	0.4	15.0

SYMBOL	BORING	DEPTH (ft)	D_{100} (mm)	D_{60} (mm)	D_{30} (mm)	D_{10} (mm)	% Gravel	% Sand	% Silt or % Clay
○	BLMP-9	11.0	25.40	0.438	0.178	0.082	14.1	77.4	8.5
●	BLMP-9	35.0	25.40	3.580	0.521	0.092	34.2	57.0	8.8
△	BLMP-10	0.0	1.98	0.318	0.140	--	0.0	81.8	16.6
▲	BLMP-10	15.5	19.10	1.650	0.261	0.110	21.8	71.4	6.8

Laboratory Test Method: ASTM D 422

*As determined by ASTM D 4318; see attached Atterberg Limits Test Results.

Prepared/Date: KSH Nov. 15, 2017
Checked/Date: GA Nov. 16, 2017

Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

PARTICLE SIZE DISTRIBUTION
Project No.: 4953-17-0231
Figure: B-2.7

AMEC FW GRAIN SIZE C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\LIBRARIES\LIBRARY AMEC JUNE2012.GLB
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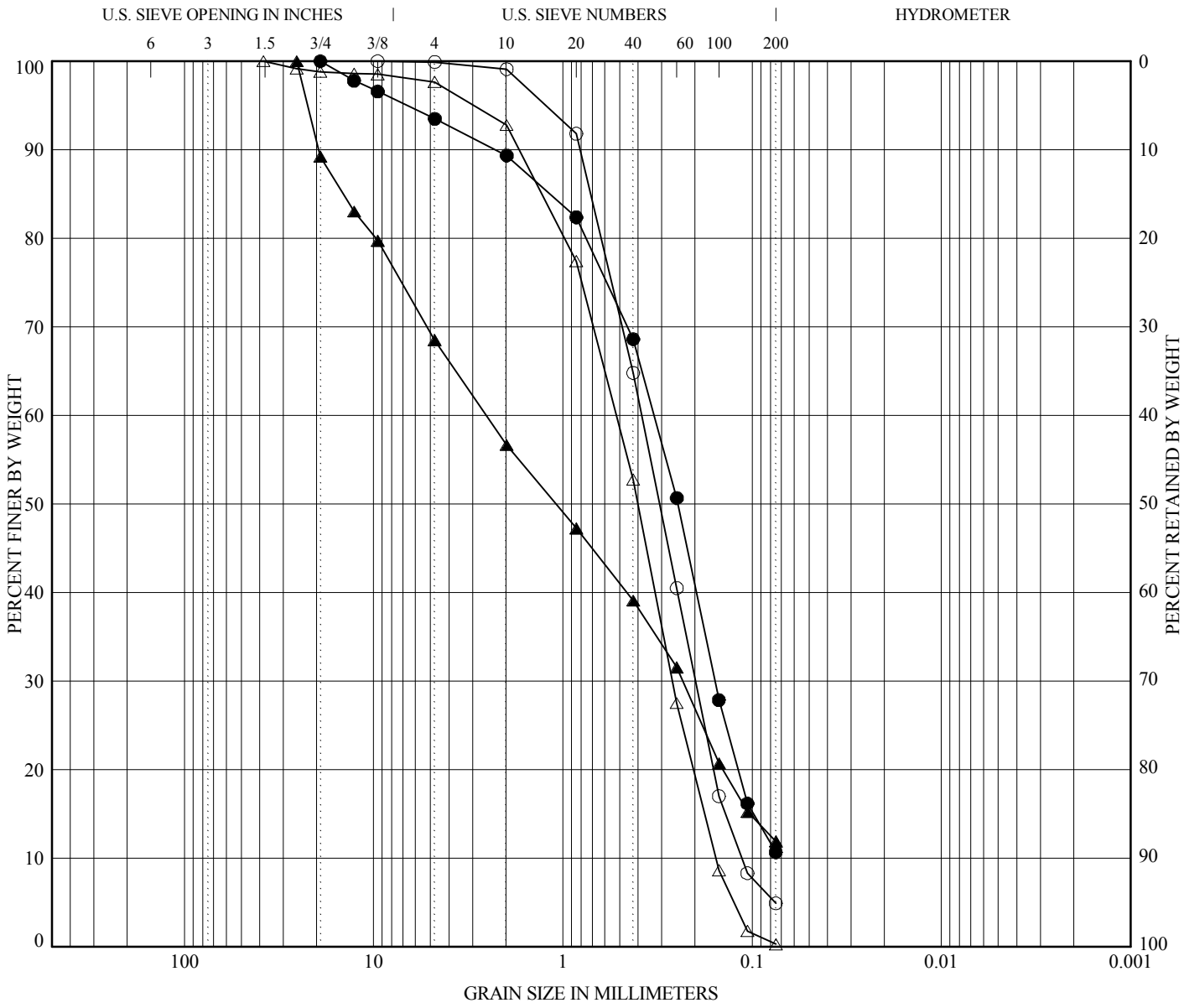

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SYMBOL	BORING	DEPTH (ft)	CLASSIFICATION	LL (%)*	PL (%)*	PI (%)*	C_c	C_u
○	BLMP-11	0.0	POORLY GRADED SAND	--	--	--	0.9	3.4
●	BLMP-11	15.5	WELL GRADED SAND WITH SILT	--	--	--	1.0	4.6
△	BLMP-12	0.0	POORLY GRADED SAND	--	--	--	0.9	3.3
▲	BLMP-12	15.5	POORLY GRADED SAND WITH SILT	--	--	--	0.3	41.0

SYMBOL	BORING	DEPTH (ft)	D_{100} (mm)	D_{60} (mm)	D_{30} (mm)	D_{10} (mm)	% Gravel	% Sand	% Silt or % Clay
○	BLMP-11	0.0	9.52	0.383	0.199	0.113	0.1	95.0	4.9
●	BLMP-11	15.5	19.10	0.329	0.157	--	6.5	82.8	10.7
△	BLMP-12	0.0	38.10	0.521	0.263	0.156	2.3	97.4	0.3
▲	BLMP-12	15.5	25.40	2.533	0.232	--	31.5	56.6	11.9

Laboratory Test Method: ASTM D 422

*As determined by ASTM D 4318; see attached Atterberg Limits Test Results.

Prepared/Date: KSH Nov. 15, 2017
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Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

PARTICLE SIZE DISTRIBUTION
Project No.: 4953-17-0231
Figure: B-2.8

AMEC FW_GRAIN SIZE_C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\LIBRARIES\LIBRARY AMEC JUNE2012.GLB
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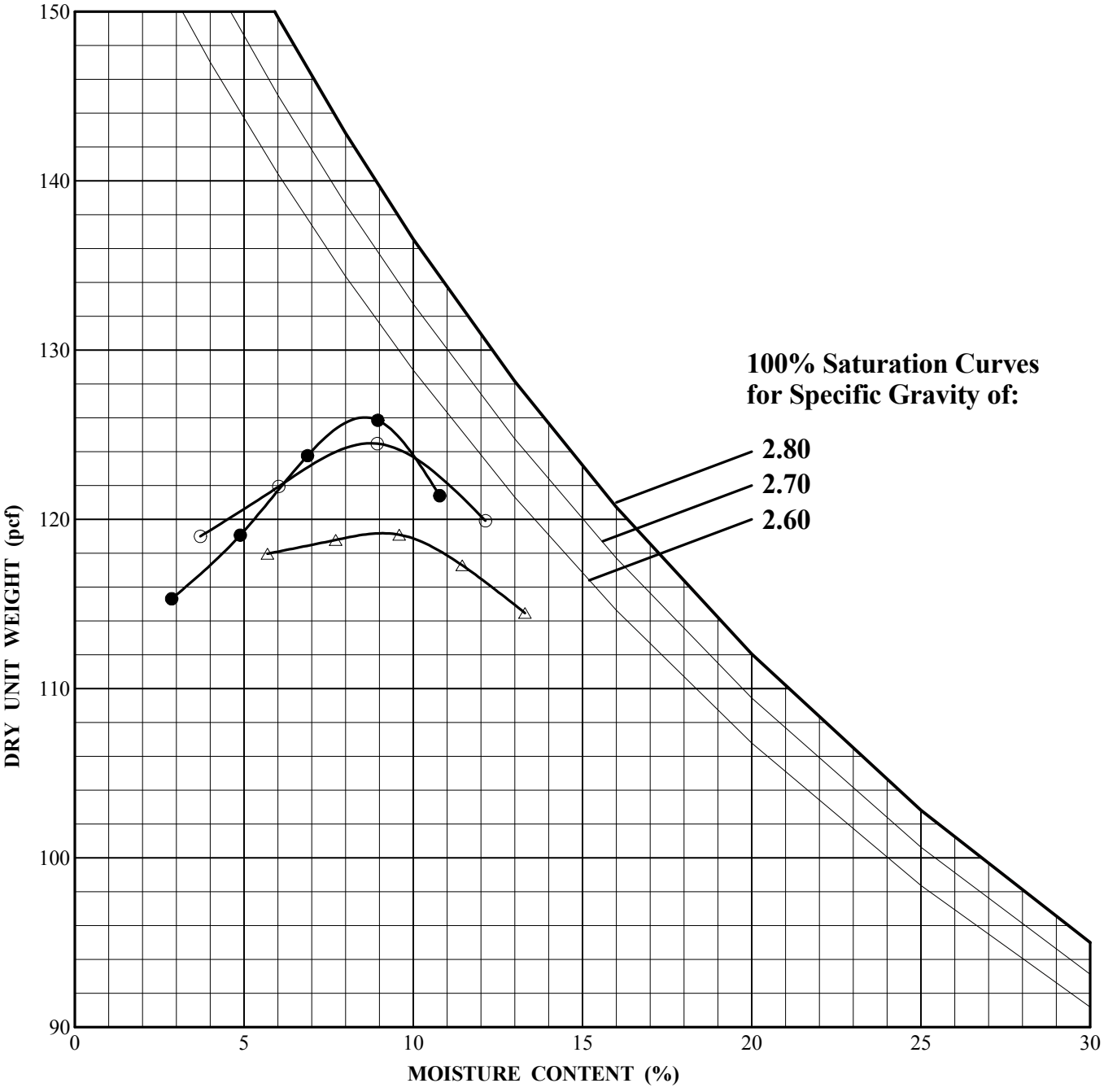


SYMBOL	BORING	DEPTH (ft)	CLASSIFICATION	OPTIMUM MOISTURE CONTENT (%)	MAXIMUM DRY UNIT WEIGHT (pcf)
○	BLMP-1	0-5	SILTY SAND	9	124
●	BLMP-2	0-5	SILTY SAND	9	126
△	BLMP-3	0-5	POORLY GRADED SAND WITH SILT	9	119

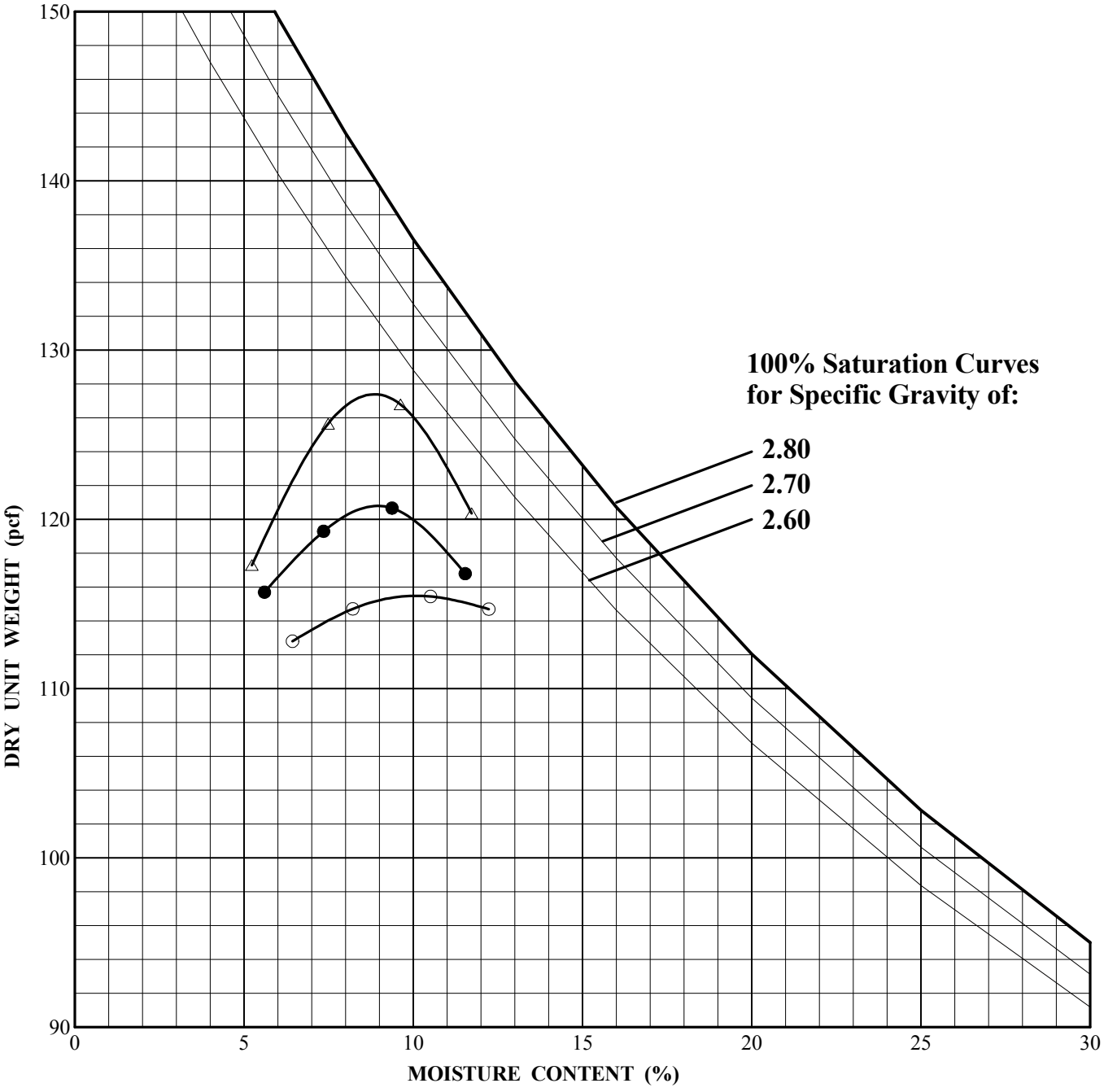
Laboratory Test Method: ASTM D 1557

Prepared/Date: KSH Nov. 15, 2017
Checked/Date: GA Nov. 16, 2017

Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

COMPACTION TEST RESULTS
Project No.: 4953-17-0231
Figure: B-3.1



SYMBOL	BORING	DEPTH (ft)	CLASSIFICATION	OPTIMUM MOISTURE CONTENT (%)	MAXIMUM DRY UNIT WEIGHT (pcf)
○	BLMP-4	0-5	POORLY GRADED SAND WITH SILT	10	115
●	BLMP-5	0-5	WELL GRADED SAND WITH SILT	9	121
△	BLMP-6	0-5	SILTY SAND	9	127

Laboratory Test Method: ASTM D 1557

Prepared/Date: KSH Nov. 15, 2017
Checked/Date: GA Nov. 16, 2017

Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

COMPACTION TEST RESULTS
Project No.: 4953-17-0231
Figure: B-3.2

AMEC FW_COMPACTION 3 TESTS L:\70131 GEOTECH\GINT\LIBRARY AMEC JUNE2012.GLB
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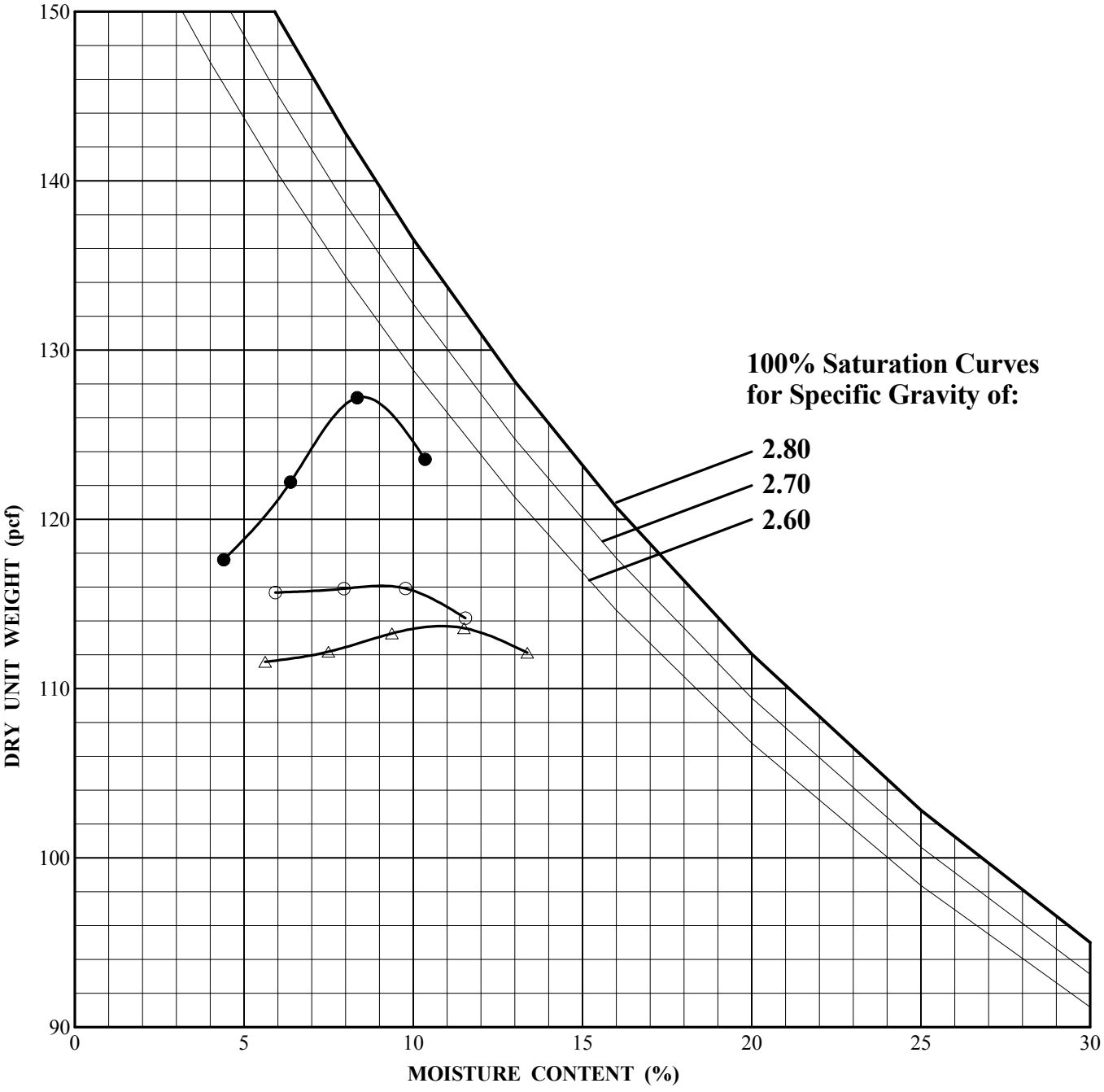

SYMBOL	BORING	DEPTH (ft)	CLASSIFICATION	OPTIMUM MOISTURE CONTENT (%)	MAXIMUM DRY UNIT WEIGHT (pcf)
○	BLMP-7	0-5	POORLY GRADED SAND	9	116
●	BLMP-8	0-5	SILTY SAND	9	127
△	BLMP-9	0-5	POORLY GRADED SAND WITH SILT	11	114

Laboratory Test Method: ASTM D 1557

Prepared/Date: KSH Nov. 15, 2017
Checked/Date: GA Nov. 16, 2017

Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

COMPACTION TEST RESULTS
Project No.: 4953-17-0231
Figure: B-3.3

AMEC FW_COMPACTION 3 TESTS L:\70131 GEOTECH\GINT\LIBRARY AMEC JUNE2012.GLB
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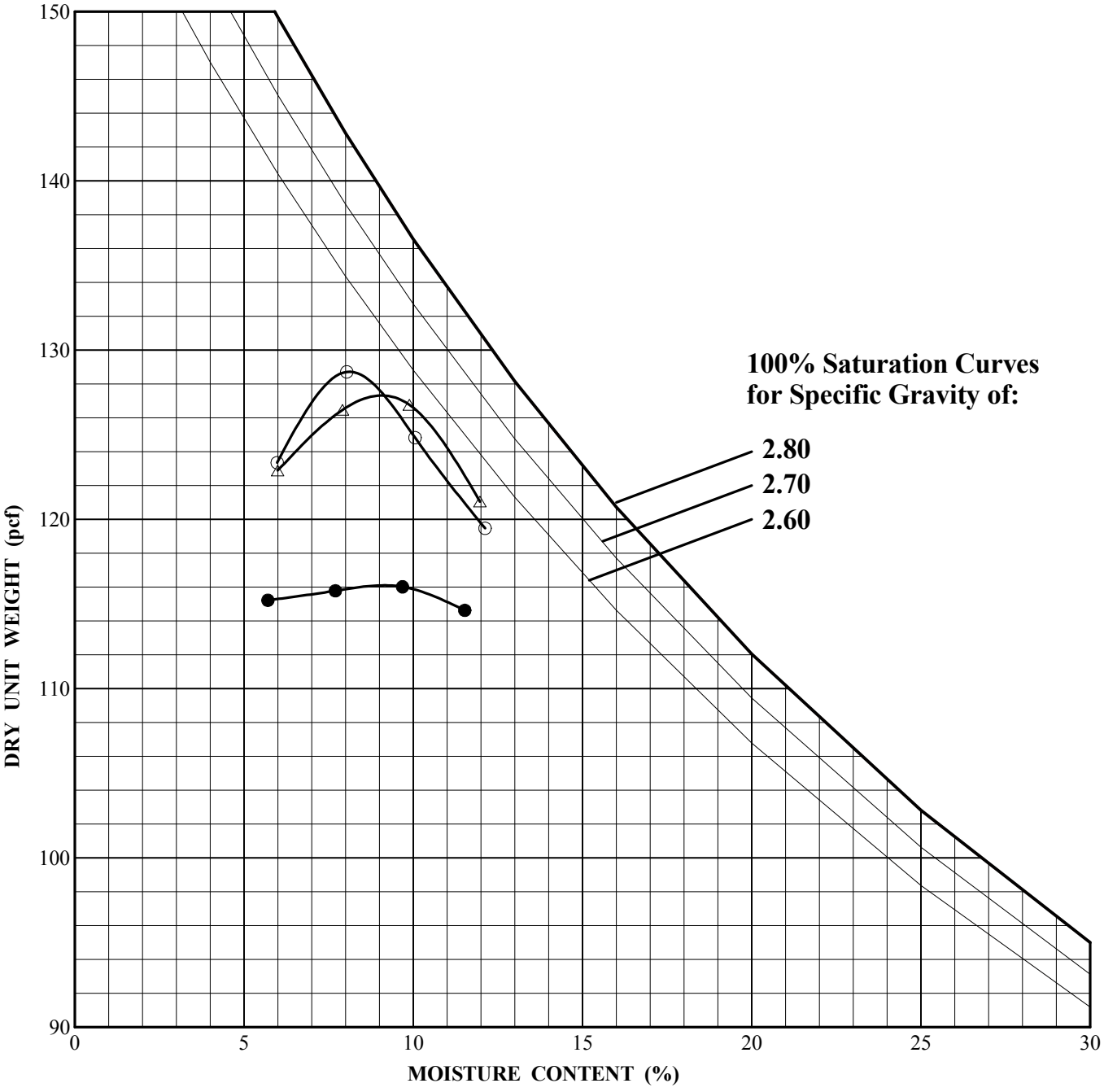

SYMBOL	BORING	DEPTH (ft)	CLASSIFICATION	OPTIMUM MOISTURE CONTENT (%)	MAXIMUM DRY UNIT WEIGHT (pcf)
○	BLMP-10	0-5	SILTY SAND	8	129
●	BLMP-11	0-5	POORLY GRADED SAND	9	116
△	BLMP-12	0-5	POORLY GRADED SAND	9	127

Laboratory Test Method: ASTM D 1557

Prepared/Date: KSH Nov. 15, 2017
Checked/Date: GA Nov. 16, 2017

Proposed Ludlow Site 4 500kV Midline Capacitor Project

amec foster wheeler

COMPACTION TEST RESULTS
Project No.: 4953-17-0231
Figure: B-3.4

AMEC FW_COMPACTION 3 TESTS L:\70131 GEOTECH\GINT\LIBRARY AMEC JUNE2012.GLB
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BORING NUMBER AND SAMPLE DEPTH:	BLMP-2 at 6'	BLMP-3 at 6'	BLMP-6 at 6'	BLMP-7 at 10.5'
SOIL TYPE:	POORLY GRADED SAND WITH SILT	POORLY GRADED SAND	POORLY GRADED SAND WITH SILT	SILTY SAND
SURCHARGE PRESSURE: (lbs./sq.ft.)	2100	2100	2100	2100
PERCENT HYDROCONSOLIDATION: (%)	-1.24	-2.33	-1.61	-1.58

Prepared/Date: KSH 11/16/17
Checked/Date: GA 11/16/17

Southern California Edison
Ludlow 500kV Midline Capacitor
Construction Pisgah, San Bernardino County, CA

amec foster wheeler

HYDROCONSOLIDATION TEST DATA
Project No.: 4953-17-0231
Figure B-4.1

BORING NUMBER AND SAMPLE DEPTH:	BLMP-9 at 8'	BLMP-10 at 5.5'
SOIL TYPE:	POORLY GRADED SAND WITH SILT	SILTY SAND
SURCHARGE PRESSURE: (lbs./sq.ft.)	2100	2100
PERCENT HYDROCONSOLIDATION: (%)	-2.56	-2.33

Prepared/Date: KSH 11/16/17
Checked/Date: GA 11/16/17

Southern California Edison
Ludlow □□□□□□500kV Midline Capacitor
Construction Pisgah, San Bernardino County, CA

amec foster wheeler

HYDROCONSOLIDATION TEST DATA
Project No.: 4953-17-0231
Figure B-4.2

LaBelle Marvin

R - VALUE DATA SHEET

PROJECT No. 43000

DATE: 11/14/2017

BORING NO. Boring 11 @ 0'-5'

SCE, Ludlow Site 4, Proposed Capacitor

P.N. 4953-17-0231

SAMPLE DESCRIPTION: Brown Silty Sand

R-VALUE TESTING DATA | CA TEST 301			
	SPECIMEN ID		
	a	b	c
Mold ID Number	10	11	12
Water added, grams	113	96	87
Initial Test Water, %	13.2	11.5	10.6
Compact Gage Pressure,psi	150	230	300
Exudation Pressure, psi	141	384	772
Height Sample, Inches	2.64	2.56	2.57
Gross Weight Mold, grams	3037	3026	3013
Tare Weight Mold, grams	1960	1961	1958
Sample Wet Weight, grams	1077	1065	1055
Expansion, Inches x 10exp-4	0	6	7
Stability 2,000 lbs (160psi)	14 / 28	13 / 27	11 / 22
Turns Displacement	4.90	4.80	4.75
R-Value Uncorrected	71	72	77
R-Value Corrected	73	73	78
Dry Density, pcf	109.2	113.1	112.5

DESIGN CALCULATION DATA

Traffic Index	Assumed:	4.0	4.0	4.0
G.E. by Stability		0.28	0.28	0.23
G. E. by Expansion		0.00	0.20	0.23

Equilibrium R-Value	**73** by EXUDATION	Examined & Checked: 11 /14/ 17
REMARKS:	Gf = 1.25 0.0% Retained on the 3/4" Sieve. Free Drainage.	Steven R. Marvin, RCE 30659

The data above is based upon processing and testing samples as received from the field. Test procedures in accordance with latest revisions to Department of Transportation, State of California, Materials & Research Test Method No. 301.

LaBelle Marvin

R-VALUE GRAPHICAL PRESENTATION

PROJECT NO. 43000

DATE: 11 /14/ 16

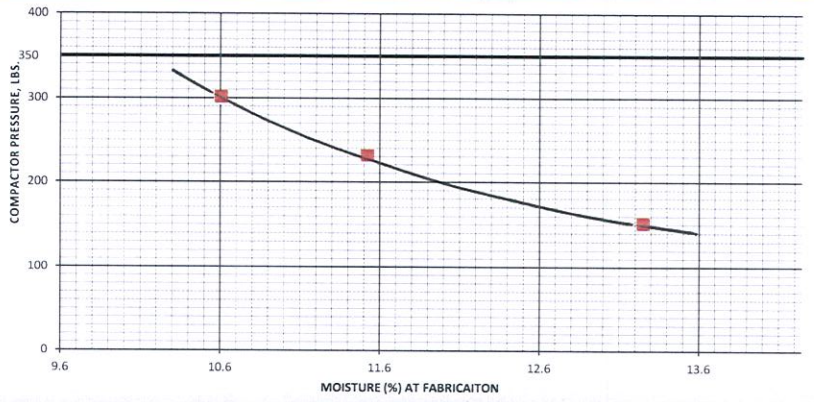
REMARKS:

BORING NO. Boring 11 @ 0'-5'

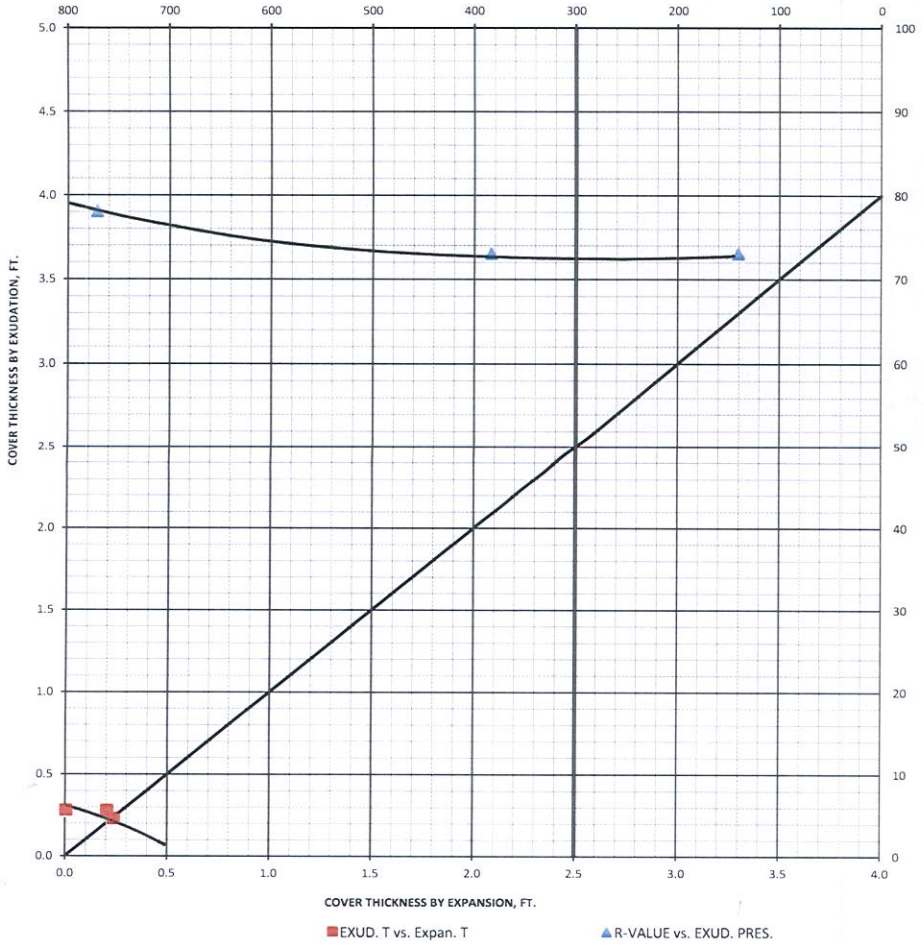
SCE, Ludlow Site 4, Proposed Capacitor

P.N. 4953-17-0231

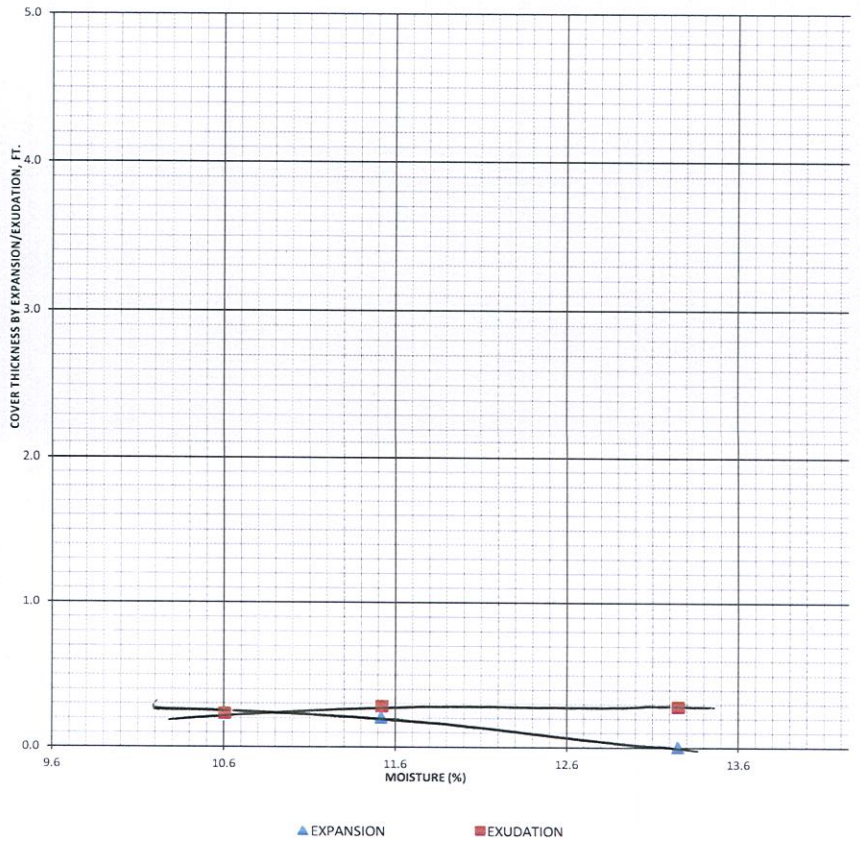
COMPACTOR PRESSURE vs MOISTURE %



COVER THICKNESS BY EXUDATION vs COVER THICKNESS BY EXPANSION



COVER THICKNESS vs MOISTURE %



LaBelle Marvin

R - VALUE DATA SHEET

PROJECT No. 43000

DATE: 11/14/2017

BORING NO. Boring 12 @ 0'-5'

SCE, Ludlow Site 4, Proposed Capacitor

P.N. 4953-17-0231

SAMPLE DESCRIPTION: Brown Silty Sand

R-VALUE TESTING DATA | CA TEST 301			
	SPECIMEN ID		
	a	b	c
Mold ID Number	7	8	9
Water added, grams	94	70	60
Initial Test Water, %	12.3	10.0	9.1
Compact Gage Pressure,psi	45	140	210
Exudation Pressure, psi	159	351	533
Height Sample, Inches	2.63	2.62	2.58
Gross Weight Mold, grams	3117	3088	2897
Tare Weight Mold, grams	1955	1950	1775
Sample Wet Weight, grams	1162	1138	1122
Expansion, Inches x 10exp-4	1	13	36
Stability 2,000 lbs (160psi)	35 / 73	16 / 35	15 / 31
Turns Displacement	4.47	4.42	4.34
R-Value Uncorrected	40	67	71
R-Value Corrected	44	70	72
Dry Density, pcf	119.2	119.6	120.8

DESIGN CALCULATION DATA

Traffic Index	Assumed:	4.0	4.0	4.0
G.E. by Stability		0.57	0.31	0.29
G. E. by Expansion		0.03	0.43	1.20

Equilibrium R-Value	**63** by EXPANSION	Examined & Checked: 11 /14/ 17
REMARKS:	Gf = 1.25 0.0% Retained on the 3/4" Sieve.	Steven R. Marvin, RCE 30659

The data above is based upon processing and testing samples as received from the field. Test procedures in accordance with latest revisions to Department of Transportation, State of California, Materials & Research Test Method No. 301.

LaBelle Marvin

R-VALUE GRAPHICAL PRESENTATION

PROJECT NO. 43000

DATE: 11 /14/ 16

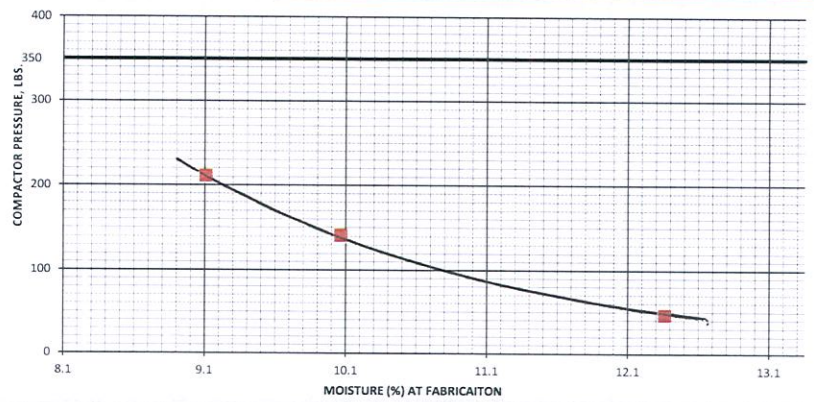
REMARKS:

BORING NO. Boring 12 @ 0'-5'

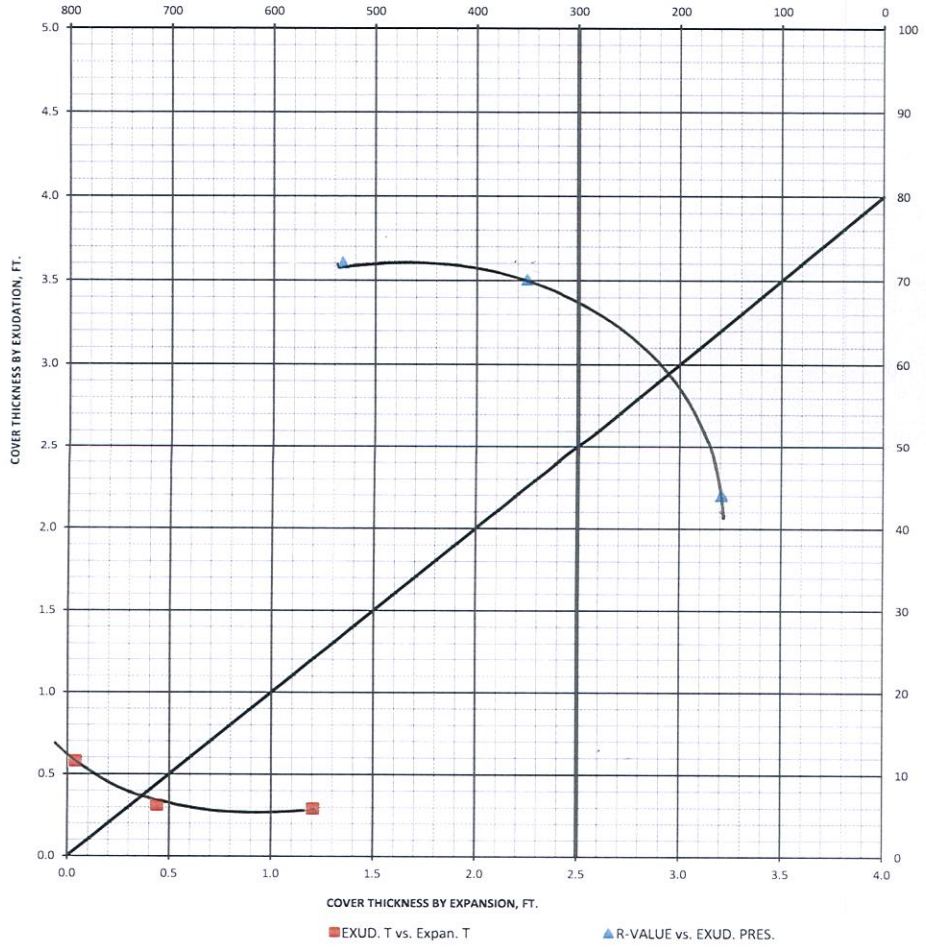
SCE, Ludlow Site 4, Proposed Capacitor

P.N. 4953-17-0231

COMPACTOR PRESSURE vs MOISTURE %



COVER THICKNESS BY EXUDATION vs COVER THICKNESS BY EXPANSION



COVER THICKNESS vs MOISTURE %

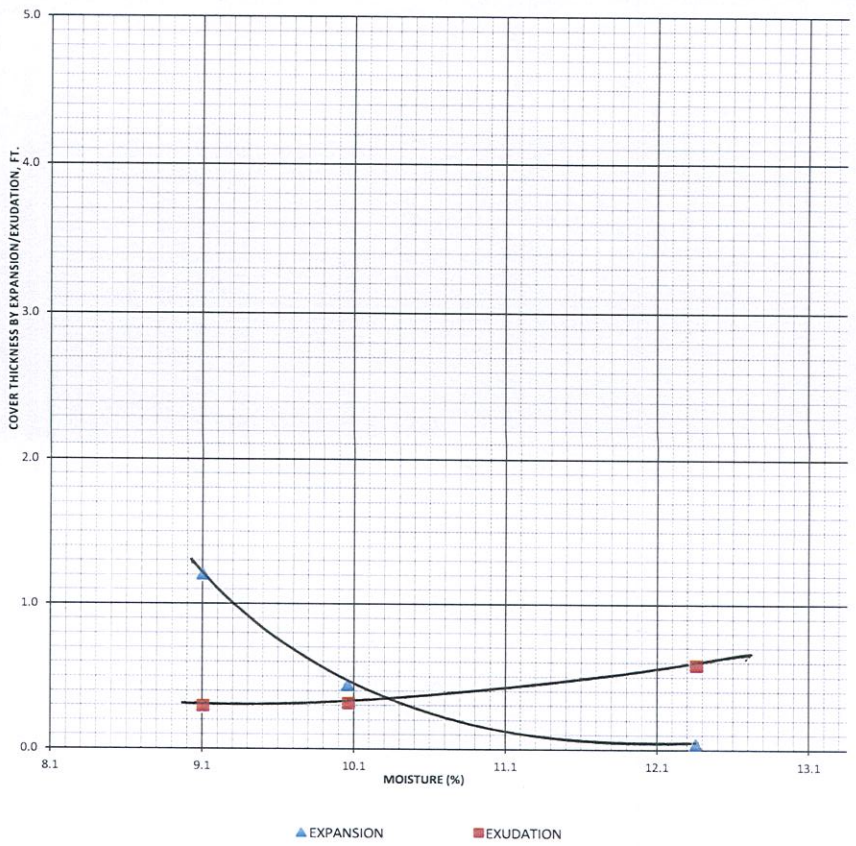


Table 1 - Laboratory Tests on Soil Samples

AMEC Foster Wheeler
Ludlow 500kV Midline Capacitor Construction Project
Your #4953-17-0231, HDR Lab #17-0769LAB
14-Nov-17

Sample ID			B1 @ 0-5'	B1 @ 15-20'	B2 @ 0-5'	B3 @ 0-5'	B4 @ 0-5'
Resistivity		**Units**					
as-received		ohm-cm	64,000	64,000	960,000	18,400	120,000
saturated		ohm-cm	280	312	1,040	5,600	7,200
pH			8.0	7.8	8.5	8.2	8.4
Electrical Conductivity		mS/cm	3.97	1.92	0.37	0.09	0.09
Chemical Analyses							
Cations							
calcium	Ca^{2+}	mg/kg	3,030	487	35	43	36
magnesium	Mg^{2+}	mg/kg	36	13	5.6	6.1	6.0
sodium	Na^{1+}	mg/kg	2,050	1,560	399	75	78
potassium	K^{1+}	mg/kg	37	21	7.4	15	11
Anions							
carbonate	CO_3^{2-}	mg/kg	ND	ND	89	36	39
bicarbonate	HCO_3^{1-}	mg/kg	70	116	186	104	101
fluoride	F^{1-}	mg/kg	4.1	3.9	8.4	12	2.9
chloride	Cl^{1-}	mg/kg	1480	934	190	15	14
sulfate	SO_4^{2-}	mg/kg	10,400	3,380	103	33	9.3
phosphate	PO_4^{3-}	mg/kg	ND	ND	ND	4.7	4.9
Other Tests							
ammonium	NH_4^{1+}	mg/kg	ND	ND	ND	ND	18
nitrate	NO_3^{1-}	mg/kg	154	106	22	14	14
sulfide	S^{2-}	qual	na	na	na	na	na
Redox		mV	na	na	na	na	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.
Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

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Table 1 - Laboratory Tests on Soil Samples

AMEC Foster Wheeler
Ludlow 500kV Midline Capacitor Construction Project
Your #4953-17-0231, HDR Lab #17-0769LAB
14-Nov-17

Sample ID

			B4 @ 15-20'	B5 @ 0-5'	B6 @ 25.5'	B7 @ 0-5'	B8 @ 0-5'
Resistivity		**Units**					
as-received		ohm-cm	100,000	>4,400,000	164,000	292,000	228,000
saturated		ohm-cm	16,400	10,800	1,680	7,600	1,040
pH			8.7	8.3	9.1	7.9	7.8
Electrical Conductivity		mS/cm	0.35	0.06	0.24	0.04	0.53
Chemical Analyses							
Cations							
calcium	Ca^{2+}	mg/kg	17	27	16	53	168
magnesium	Mg^{2+}	mg/kg	5.2	5.9	5.3	6.6	8.2
sodium	Na^{1+}	mg/kg	378	26	251	7.2	302
potassium	K^{1+}	mg/kg	4.2	18	5.2	5.9	13
Anions							
carbonate	CO_3^{2-}	mg/kg	161	23	113	23	6.0
bicarbonate	HCO_3^{1-}	mg/kg	18	40	31	95	119
fluoride	F^{1-}	mg/kg	2.1	4.9	2.8	1.5	7.9
chloride	Cl^{1-}	mg/kg	100	6.9	94	3.6	60
sulfate	SO_4^{2-}	mg/kg	95	9.4	14	9.9	1,070
phosphate	PO_4^{3-}	mg/kg	ND	6.0	ND	4.8	ND
Other Tests							
ammonium	NH_4^{1+}	mg/kg	ND	ND	ND	ND	ND
nitrate	NO_3^{1-}	mg/kg	9.7	11	3.5	8.1	5.2
sulfide	S^{2-}	qual	na	na	na	na	na
Redox		mV	na	na	na	na	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.
Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
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Table 1 - Laboratory Tests on Soil Samples

AMEC Foster Wheeler
Ludlow 500kV Midline Capacitor Construction Project
Your #4953-17-0231, HDR Lab #17-0769LAB
14-Nov-17

Sample ID			B9 @ 15-20'	B10 @ 0-5'	B10 @ 15-20'
Resistivity		**Units**			
as-received		ohm-cm	80,000	84,000	56,000
saturated		ohm-cm	1,160	1,000	880
pH			8.3	8.4	8.1
Electrical Conductivity		mS/cm	0.20	0.32	0.32
Chemical Analyses					
Cations					
calcium	Ca^{2+}	mg/kg	21	36	26
magnesium	Mg^{2+}	mg/kg	5.5	5.7	ND
sodium	Na^{1+}	mg/kg	202	338	337
potassium	K^{1+}	mg/kg	4.3	6.9	4.9
Anions					
carbonate	CO_3^{2-}	mg/kg	50	110	93
bicarbonate	HCO_3^{1-}	mg/kg	76	76	27
fluoride	F^{1-}	mg/kg	2.5	9.7	3.5
chloride	Cl^{1-}	mg/kg	82	146	115
sulfate	SO_4^{2-}	mg/kg	105	89	241
phosphate	PO_4^{3-}	mg/kg	ND	4.8	4.4
Other Tests					
ammonium	NH_4^{1+}	mg/kg	ND	ND	ND
nitrate	NO_3^{1-}	mg/kg	17	20	4.6
sulfide	S^{2-}	qual	na	na	na
Redox		mV	na	na	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.
Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
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Appendix C

Field Permeability Test Results

APPENDIX C
FIELD PERMEABILITY TEST RESULTS

Two borings were drilled to a depth of 5 feet bgs using 8-inch diameter hollow stem auger drilling equipment. After drilling was completed, a perforated pvc pipe was placed in each boring. Each hole was pre-soaked for two hours, using water from a portable water trailer to maintain a constant level at about 1 foot bgs (4 feet above the bottom of the hole). After presoaking, each hole was filled to 1 foot bgs and the time and water level were recorded. After 25 minutes, the water level was measured again. This procedure was repeated. Both 25 minute intervals in both holes showed a fast infiltration rate, losing greater than six inches of water, therefore an interval of 10 minutes was chosen for taking subsequent measurements. Six ten-minute intervals were measured, refilling the water to about 1 foot bgs after every 10 minute reading. This procedure is described under the Percolation Test Procedure Section VII.3.8 in the Orange County Technical Guidance Document Appendices, which is used by San Bernardino as their Infiltration Rate Evaluation Protocol (OC TGD).

The infiltration rates were calculated according to the procedure described in Appendix VII (OC TGD). The calculations for the permeability tests are attached. The calculated infiltration rates from the two field permeability tests are 7.6 and 21.1 inch/hour. No safety factor has been applied.

SCE Ludlow Site #4

Infiltration Testing - Shallow Percolation Test

Amec Foster Wheeler

Job No: 4953-17-0231
by: KSH 10/26/2017
checked: GA 11/16/2017

The following tests were conducted on 10/25/17

Boring:	Site:	Logged by:	Soil type:	Diameter (in)	Width (in)	Depth (in)	Volume (ft^3)
PT-1	4	KSH	Poorly Graded Sand	8		60	12063.71579

Test results:

Trial no.	Start time	End time	change in time (min)	initial height of water (ft)	final height of water (ft)	change in height of water (ft)	inflitration rate (in/hr)
1	10:43	11:08	25	1.02	3.59	2.57	4.3
2	11:15	11:41	26	1.40	3.75	2.35	4.2
3	11:49	11:59	10	1.46	3.20	1.74	7.4
4	12:03	12:13	10	1.80	3.29	1.49	6.8
5	12:20	12:30	10	1.60	3.17	1.57	6.8
6	12:35	12:45	10	1.00	3.13	2.13	8.2
7	12:50	13:00	10	1.00	2.97	1.97	7.4
8	13:02	13:12	10	1.00	3.01	2.01	7.6

Notes: Trial 1 at 2.07 ft after 2 min, 2.7 ft after 6.5 min, 3 ft after 11 min

Test Pit:	Site:	Logged by:	Soil type:	Diameter (in)	Width (in)	Depth (in)	Volume (ft^3)
PT-2	4	KSH	Poorly Graded Sand	8		60	12063.71579

Test results:

Trial no.	Start time	End time	change in time (min)	initial height of water (ft)	final height of water (ft)	change in height of water (ft)	inflitration rate (in/hr)
1	10:12	10:37	25	1.50	4.92	3.42	8.4
2	10:41	11:06	25	1.00	4.92	3.92	8.5
3	11:11	11:21	10	1.00	4.92	3.92	21.3
4	11:26	11:36	10	1.00	4.92	3.92	21.3
5	11:40	11:50	10	1.00	4.92	3.92	21.3
6	11:54	12:04	10	1.00	4.92	3.92	21.3
7	12:08	12:18	10	1.00	4.90	3.90	21.1
8	12:22	12:32	10	1.00	4.90	3.90	21.1

Notes: 4.92 feet is the bottom of the pvc pipe, measurments with red text are greater than that value.
Trial 1 at 2.4 ft after 45 sec, 3.25 ft after 2.5 min, 4 ft after 4 min, 4.9 ft after 10 min
Trial 6 at 2.4 ft after 1 min, 3 ft after 2 min, 3.45 ft after 3 min
Trial 7 at 2 ft after 45 sec, 3 ft after 2 min, 4.5 ft after 7 min, 4.9 feet after 10 min
Trial 8 at 3.5 ft after 3 min