



GEOTECHNICAL INVESTIGATION REPORT

Sunrise Engineering
JPWB Water Transmission Line
Rock Springs, Wyoming 82901

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EXECUTIVE SUMMARY

Sunrise Engineering commissioned Western-EGI to conduct a geotechnical investigation and report for a water transmission line for the Joint Powers Water Board (JPWB) in Rock Springs, WY 82901. The purpose of the investigation and report is to determine and document the subsurface conditions along the planned route for the project, and to offer recommendations for the implementation of the waterline.

To conduct the geotechnical investigation, a Simco 2800 H/S truck mounted drilling rig was used to bore 8 boreholes along the alignment. Originally, 11 boreholes were planned to be drilled, however, only 8 were drilled due to access constraints. Borehole 1 was located to the southeast of W Bar K, a trailer park on Sunset Blvd. Borehole 2 was drilled along Foothill Blvd. southeast of the KOA. Borehole 3 was drilled directly east of the KOA. Boreholes 4, 5, 6, and 7 were drilled along a northerly heading trail found east of the KOA. Borehole 11 was drilled to the southeast of the existing JPWB water tanks. Boreholes 8-10 were located to the southwest of Borehole 11, but access constraints made drilling these holes unfeasible. Sampling began at 1.5' below ground surface (bgs) then continued at 5' intervals during drilling to a total depth of 21.5' bgs in Boreholes 1, 2, 3, 5, 6, and 7. Borehole 4 and 11 were only drilled to a depth of 20.93' and 20.5' respectively due to sampler refusal, where bedrock was encountered. The water table was located at a depth of 15' in Boreholes 1 and 2. Samples taken during drilling were retained and transported to Western-EGI's soils lab for further testing.

Testing and analysis revealed that most of the existing soil conditions are "Fair to Poor" subgrade materials per AASHTO classification which would not be suitable for the water transmission line bedding. During installation of the water transmission line, efforts must be made to provide adequate pipe bedding material, manage the presence of groundwater, and removal of expansive soil. Furthermore, minimal disruption to vehicle traffic must be ensured during the construction of the water transmission line.

This Executive Summary is only an overview of the following report. The report should be used in its entirety for the design and construction of the project. Special attention should be given to the analysis, recommendations, and limitations of the report.

I. INTRODUCTION

A. Project Scope

Sunrise Engineering commissioned Western-EGI to complete a geotechnical investigation and report for a water transmission line for the Joint Powers Water Board located in Rock Springs, WY 82901. The purpose of the investigation and report is to determine and document the subsurface conditions found at the site, and to offer recommendations for construction of a water transmission line.

B. Investigation and Report Scope

The purpose of the investigation was to determine the physical and engineering properties of the subsurface soils to define and mitigate any subsurface conditions that are potentially hazardous to the proposed installation of the transmission line. In order to gather samples and analyze the subsurface soils, it was planned to drill 11 holes using coordinates provided to Western-EGI. However, poor trail conditions made reaching holes 8 – 10 unfeasible for the drill rig. Each borehole followed along the alignment of the planned transmission line and a location map can be located in Appendix B.

Samples were collected with a nominal 2” outside diameter Standard Split-Spoon Sampler. The sampler was driven by a 140-pound safety hammer operated by a rope-and-pulley system. Blow counts were recorded while the sampler was driven. Samples were collected from each borehole and retained for laboratory testing and classification.

The intention of this report is to present the results of the subsurface investigation and laboratory testing based on collected data. Recommendations for the construction of the water transmission line will be provided based on the results of the investigation.

This report contains results of the investigation and laboratory testing, and suitability of the soils on site for the development of a transmission line.

II. SITE SETTING AND BASE GEOLOGY

A. Site Description

The drilling sites followed along the proposed alignment of the water transmission line, beginning southeast of the W Bar K trailer park, spanning north to the Joint Powers Water Board water tanks to north of the Sweetwater Trap Club. Access to each of the boreholes varied as a majority of the land was undeveloped, requiring the use of unpaved trails that varied in condition and elevation. At the time of drilling, many of the drill sites were covered in snow. Sagebrush and natural vegetation were the only observed vegetation and covered a majority of the alignment. The vicinity map of the area is in Appendix A.

B. Drainage

Drainage to the north of Gookin-White Mountain Road flows from west to east. Water flows down the side of White Mountain into a series of drainages flowing into the Summit Channel at the base of White Mountain, which drains into the Bitter Creek. Drainage south of Gookin-White Mountain Road flows north to south. Water flows down White Mountain and into a

series of drainages that drain directly into the Bitter Creek. The land that the proposed transmission line cuts through is primarily undeveloped which allows for infiltration of surface water into the soils.

C. General Geology

The geology of the site is characterized as the Wasatch Formation and alluvium and colluvium. The Wasatch Formation consists of drab sandstone, drab to variegated claystone and siltstone. The alluvium and colluvium consist of clay, silt, sand, and gravel.

III. EXPLORATION AND INVESTIGATION

A. Subsurface Investigation

The subsurface investigation was completed with a Simco 2800 H/S drilling rig mounted on a truck carrier. All Boreholes were drilled with a 4 ½" solid-stem flight auger and sampled with a Standard Split Spoon Sampler. Sampling began at 1.5' below ground surface (bgs) then continued at 5' intervals during drilling to a total depth of 21.5' bgs in Boreholes 1, 2, 3, 5, 6, and 7. Boreholes 4 and 11 only reached a depth of 20.93' and 20.5' respectively as bedrock was encountered at that depth and resulted in sampler refusal.

Blow counts and soil types were recorded as sampling was completed. Sampling was conducted with a nominal 2" O.D. Standard Split-Spoon sampler and a 140-pound rope-and-pulley safety hammer with a 30" free fall stroke. The drilling and split-spoon sampling were done in general accordance with ASTM D1452 – 09 *Standard Practice for Soil Exploration and Sampling by Auger Boring*, and ASTM D1586 – 11 *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils*.

Overburden soils within the explored areas consisted of tan clayey sand, brown clay, tan silty, gravelly sand, and an instance of red clay. The groundwater table was encountered in the first two boreholes while drilling. Samples taken during drilling were retained and transported to Western-EGI's soils lab for further testing.

Notes were recorded during drilling and used to compile drill logs for each. The logs contain information such as soil types and descriptions, raw and corrected blow counts, elevations, general moisture content, and any other information pertinent to the physical properties of the soils found. The logs are located in Appendix C of this report.

B. Laboratory Testing

Samples collected during the investigation were transported to Western-EGI's soils lab for further testing and evaluation. To verify the material type, and to provide enough material, samples from Boreholes 1, 2, 3, 4, 5, 6, and 11 were used. Samples from different depths were combined based on similarity of physical characterization. The samples were subjected to testing for liquid and plastic limits, plasticity index, particle size distribution, and classification by the Unified Soil Classification System (USCS) and American Association of State Highway and Transportation Officials (AASHTO). These testing results are located in Appendix D of this report. A summary of the lab results is presented below:

SAMPLE ID	LL (%)	PL (%)	PI	NATURAL MOISTURE (AVE. %)	USCS SYMBOL	AASHTO SYMBOL
1B	25	18	7	24.9	CL-ML	A-4
1C	38	17	21	20.3	CL	A-6
1D	22	17	5	22.9	CL-ML	A-4
1E	NP	NP	NP	22.3	SW-SM	A-1-a
2B	42	17	25	19.8	CL	A-7-6
2C	30	17	13	16.4	CL	A-6
2E	29	12	13	23.7	CL	A-6
3D	35	14	21	17.3	CL	A-6
4C	28	15	13	14.4	CL	A-6
4E	45	22	23	12.6	CL	A-7-6
5C & 5D	32	17	15	8.8	CL	A-6
6D	37	16	21	14.9	CL	A-6
6E	41	16	25	15.3	CL	A-7-6
11D	52	21	31	13.4	CH	A-7-6

Samples 1B and 1D classified as silty clay with sand (CL-ML). Sample 1E classified as well-graded sand with silt and gravel (SW-SM) and 11D classified as fat clay (CH). The rest of the samples classified as lean clay (CL). AASHTO characterizes A-4, A-6, and A-7-6 materials as “Fair to Poor” as a general rating as subgrade. They characterize A-1-a materials as “Excellent to Good” as a general rating as subgrade. Only sample 1E classified A-1-a soil, however, this sample was below the groundwater table.

A Federal Housing Administration Potential Volumetric Change (FHA PVC) test was run using samples 11D, 4E, 1C, 7C, 11C, 2C, and 3C. All samples except for 11D indicated to have a low potential to swell. Sample 11D indicated the soil had high potential to swell.

IV. SUBSURFACE CONDITIONS

A. Soils

The soils profile was fairly consistent along the proposed length of the transmission line. The majority of the soil consisted of tan silty and clayey sands with varying amounts of clays and sands. There were a few outliers of brown clay and gravelly sand. There was one instance of gray clay and another of red sandy clay that was encountered in boreholes 4 and 11 respectively. Soils were dry to moist in-situ except BH-1 where the clay samples were saturated with natural moisture average above 20%. Standard Penetration Testing (SPT) indicated that the soils are “very stiff” (Engineering Geology Field Manual 2nd Vol. Chapter 22) across the entire site with an average blow count (N_c) value of 18 blows/foot. Boreholes 1 and 3 had a blow count within a 6-14 blow/foot range. The remaining borehole locations were above this range.

B. Groundwater

The groundwater table was encountered at the first two boreholes at a depth of 15' bgs. This resulted in samples past that depth being saturated. Moisture in subsequent samples is due to past precipitation and melting snow.

V. ANALYSIS AND RECOMMENDATIONS

A. Analysis

After the field and laboratory testing, the data was analyzed to determine the suitability of the subsurface conditions for construction of the intended project. The Standard Penetration Tests (SPT) taken during the field investigation were corrected for energy losses, rod length variations, and sampler disturbance affects. These corrected blow counts were used to determine the density and compactness of the subgrade soils. Laboratory testing was used to determine the physical and engineering properties of the soils encountered.

Sampling, testing and analysis of the soils indicated that efforts must be taken in order to provide adequate pipe bedding material, manage the groundwater table during construction, ensuring minimal traffic disruption and the removal of expansive soil. Recommendations are based on conditions observed during exploration and testing and should be revised if conditions are found to be different during construction.

B. Foundation Recommendations

As the pump station is considered critical infrastructure for the City of Rock Springs, Western-EGI recommends that the sandy lean clay and clayey sand materials should be over-excavated to allow for a minimum of 18" of structural fill to be installed beneath the foundation, along with 1.5' of structural fill extending past the edges of the footing. Although the material shows little potential to swell, exposure to water either from a leak or from infiltration would cause the soils to soften and potentially cause differential settlement. Prior to placing the structural fill, the subgrade should be compacted to 98% of the Standard Proctor as defined by ASTM D698-12e2 *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m³))*. Additionally, a separation fabric such as Mirafi RS280i or equivalent should be placed to prevent the structural base from sinking into the native soils if they were to soften from water exposure. The structural fill specification should call for a material that meets GW, GP, SW, or SC per USCS or production materials such as road base meeting WYDOT Grading Band J or W. The structural fill should be placed in lifts that are no more than 8 inches thick after compaction and should be compacted to 98% of the standard proctor as defined by ASTM D698-12e2 *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))*. Compaction should be done with equipment that is large enough to densify the entire thickness of the lift.

It is also crucial to ensure proper drainage away from the foundation. To ensure that water infiltration does not occur next to the foundation, the backfill around the foundation should be compacted in 8" lifts to 95% of the standard proctor. Additionally, positive drainage away from the foundation wall should be implemented, with a 5% grade for the first 10' away from the foundation. The lot should be graded so that water drains to streets, storm drains, or drainages and ponding should not be allowed on the site. It is our opinion that if this

recommendation is followed, the potential of differential settlement can be reduced and the bearing capacity of the material will be adequate for the construction of the pump station.

C. Water Transmission Line Recommendations

Based on the investigation and testing of the subgrade, it is Western-EGI's opinion that the materials present are not suitable for use as subgrade and bedding for the majority of the length of the transmission line. The existing material doesn't meet the requirement for Type 1 Pipe Bedding in accordance with the Wyoming Public Works Standard Specifications. Western-EGI recommends bringing in material that meets the requirements for Type 1 bedding. This material should be around the pipe from six inches under the pipe to twelve inches over the pipe. This material should consist of primarily coarse-grained soils and contain less than 5% fines such as gravel, sand, or silty sand. However, should adequate material be available in the material excavated, select material may be procured by screening, sifting, or manually sorting the material.

Based on testing and analysis of samples from Borehole 11, there is a high potential of swell at a depth of 15' caused by red clay. This could cause the pipe to crack should the soil experience swelling. Western EGI recommends a minimum of 18" should be over-excavated and replaced with a suitable backfill to mitigate swell. Compaction of this material will be required and must reach at least 92% of a standard proctor as determined by ASTM D698 *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort*. Over-excavation will require the use of Type 2 Pipe Bedding for foundation in the trench. In accordance with the Wyoming Public Works Standard Specifications, Type 2 Pipe Bedding will be placed six inches under the pipe and below. It should consist of sand, sandy gravel, compacted rock or gravel with a maximum size of 1 ½ inches, uniformly graded and having a maximum plasticity index of six as determined by ASTM D4318-10 *Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils*. Material should be placed per Wyoming Public Works Specifications.

Construction will be conducted primarily in fields and unsurfaced areas allowing for Type B Trench Backfill. It is recommended that a compaction requirement of at least 92% of the standard proctor as determined by ASTM D698 *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort* be met. Field density testing of compacted backfill will be required at all levels.

The groundwater table was only encountered in Borehole 1 and 2, at a depth of 15'. If the depth of the transmission line reaches this depth or greater, it is recommended that the trench be kept dry and any water encountered during the excavation of the trench or laying of the line should be removed to avoid interfering with pipe installation. Water infiltration rates will have to be determined in order to determine the size and quantity of pumps required to draw down the water table.

The water transmission line will cross Foothill Blvd, Sunset Blvd, Gookin-White Mountain Road, and all four lanes of Interstate 80. Interstate 80 will require the use of directional boring for the installation. Foothill Blvd and Sunset Blvd are considered state roads, and will require directional boring as per the Wyoming Department of Transportation Accommodation Regulations Manual. Furthermore, permitting will be required to conduct boring operations across these roads. Gookin-White Mountain Road may be open trenched as per the Wyoming Public Works Specifications. Gookin-White Mountain Road is a county

road with gravel surfacing and resurfacing should be coordinated with Sweetwater County Officials. Type 1 bedding material should be used and placed per Wyoming Public Works Specifications. This section will be the only section that will follow the Type A Trench Backfill specifications outlined in the Wyoming Public Works Standard Specifications. Compaction will be required and must reach 98% of the standard proctor as determined by ASTM D698 *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort*. The county engineer should be consulted for the construction of this section.

The subsurface condition of the area that surround Boreholes 8, 9, and 10 are unknown. Based on the samples collected, it is likely that the conditions are similar to those already determined for previous locations. However, the presence of expansive soil in Borehole 11 allows for the possibility of expansive soils to be present in the untested locations. If clays similar to those found in Borehole 11 are encountered in Boreholes 8, 9, or 10, the same recommendations made for Borehole 11 can be applied.

VI. CONCLUSIONS AND LIMITATIONS

A. Conclusions

Sunrise Engineering commissioned Western-EGI to complete a geotechnical investigation and report for the installation of the Joint Powers Water Board Water Transmission Line located in Rock Springs, WY 82901. The report includes an overview and discussion of our analysis of the existing conditions and recommendations for the proposed project. It is the opinion of Western-EGI that the project can be successfully completed. It is our opinion that a geotechnical engineer from Western-EGI be retained to assess conditions as the construction of the project proceeds. Recommendations given in this report assume that adequate field testing and inspection of the construction efforts will be made during installation.

If subsurface conditions are found during construction that differ from those described in this report and attached drill logs, Western-EGI should be notified so that additional recommendations can be given as necessary.

B. Limitations

Our professional services were performed, our findings obtained, and our recommendations prepared in accordance with generally accepted engineering principles and practices, and in accordance with the standards and codes cited.

This geotechnical report was prepared for the use of our Client in the design of the subject property and should be made available to potential contractors and/or the Contractor for information on factual data only. This report should not be used for contractual purposes as a warranty of interpreted subsurface conditions such as those indicated by the interpretive boring and test pit logs, cross-sections, or discussion of subsurface conditions contained herein.

The analyses, conclusions and recommendations contained in the report are based on site conditions as they presently exist and assume that the exploratory borings, test pits, and/or probes are representative of the subsurface conditions at the site. If, during construction,

subsurface conditions are found which are significantly different from those observed in the exploratory borings and test pits, or assumed to exist in the excavations, we should be advised at once so that we can review these conditions and reconsider our recommendations where necessary. If there is a substantial lapse of time between the submission of this report and the start of work at the site, or if conditions have changed due to natural causes or construction operations at, or adjacent to the site, this report should be reviewed to determine the applicability of the conclusions and recommendations considering the changed conditions and time lapse.

The Summary Boring Logs are our opinion of the subsurface conditions revealed by periodic sampling of the ground as the borings progressed. The soil descriptions and interfaces between strata are interpretive and actual changes may be gradual.

The drilling logs and related information depict subsurface conditions only at these specific locations and at the particular time designated on the logs. Soil conditions at other locations may differ from conditions occurring at these boring locations.

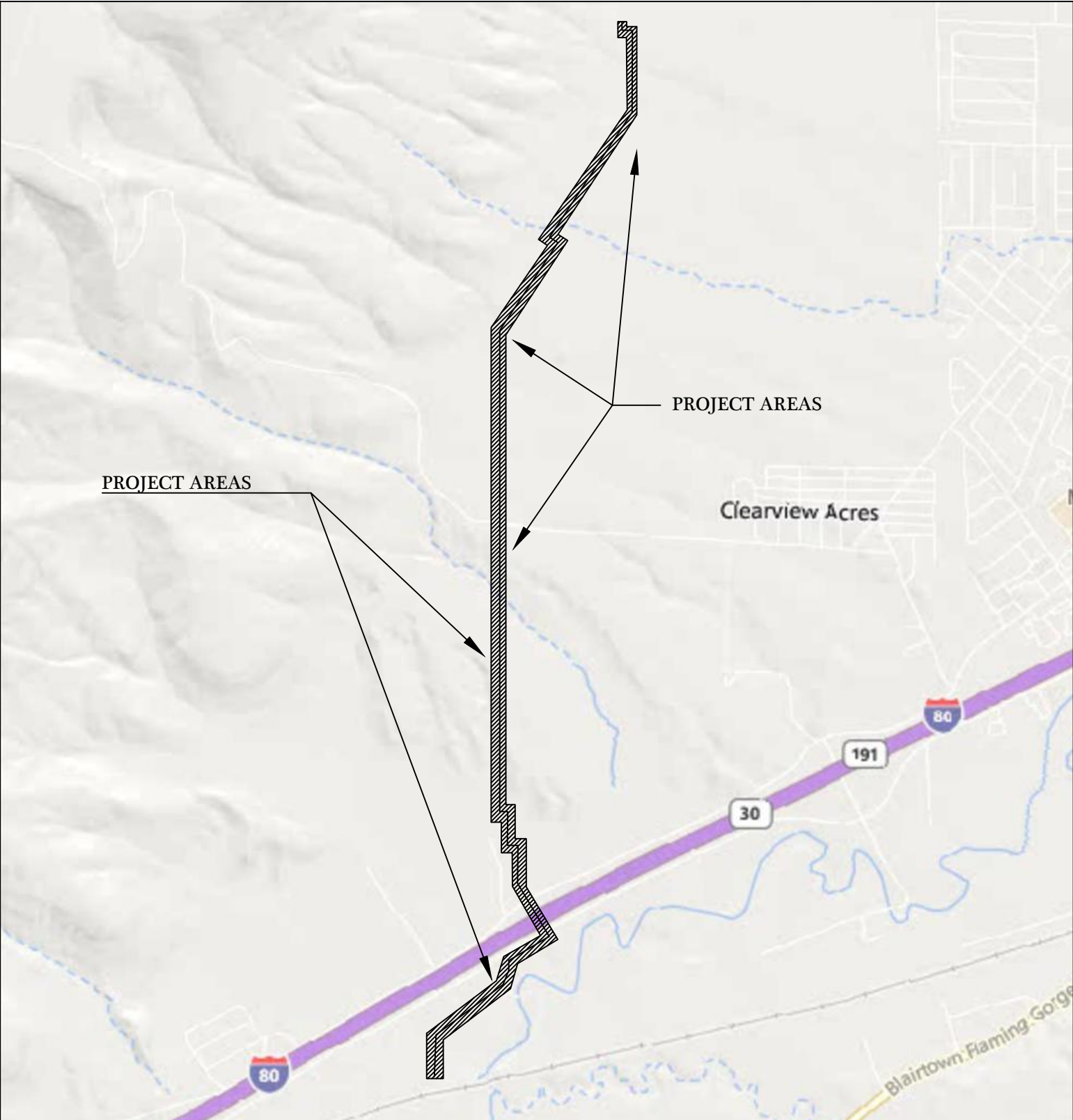
Also, the passage of time may result in a change in the soil conditions at these boring locations. Groundwater levels often vary seasonally. Groundwater levels reported on the drilling logs or in the body of the report are factual data only for the dates shown.

Unanticipated soil conditions are commonly encountered on construction sites and cannot be fully anticipated by merely taking soil samples, borings, or test pits. Such unexpected conditions frequently require that additional expenditures be made to attain a properly constructed project. It is recommended that the Owner consider providing a contingency fund to accommodate such potential extra costs.

Western-EGI will not be responsible for any deviation from the intent of this report including, but not restricted to, any changes to the scheduled time of construction, the nature of the project or the specific construction methods or means indicated in this report; nor can our firm be responsible for any construction activity on sites other than the specific site referred to in this report.

We appreciate this opportunity to help successfully complete this project. If you have any questions about the information contained in this report, please contact us at your convenience.

APPENDIX A
VICINITY MAP



PROJECT AREAS

PROJECT AREAS

Clearview Acres

VICINITY MAP

Layout: APP. A Plot Date: 3/14/2024 1:39 PM Plotted By: Juan
Path: Q:\Projects\2024 Projects\24-1004 Sunrise JPWB Geotech\DWG\VICINITY MAP AND BH LOCATIONS.dwg

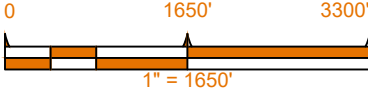
Job No.: 24-1004

In no event shall the Client copy or use any of the concepts, plans, drawings, specifications, designs, models, reports, photographs, computer software, surveys, calculations, construction and other data, documents, and processes produced by the Engineer in connection with the Project (the "Instruments of Service") for any purpose other than those noted above or in relation to any project other than the Project without the prior written permission of the Engineer. The Engineer shall not unreasonably withhold or deny such consent but shall be entitled to receive additional equitable remuneration in connection with its grant of consent.

Date: 3/7/2024

Drawn By: JCP

Checked By: ZCM



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APP. A

APPENDIX B

BOREHOLE LOCATIONS



BOREHOLE LOCATIONS	Layout: APP. B-1 Plot Date: 3/14/2024 1:37 PM Plotted By: Juan Path:Q:\Projects\2024 Projects\24-1004 Sunrise JPWB Geotech\DWG\VICINITY MAP AND BH LOCATIONS.dwg	Job No.: 24-1004
	In no event shall the Client copy or use any of the concepts, plans, drawings, specifications, designs, models, reports, photographs, computer software, surveys, calculations, construction and other data, documents, and processes produced by the Engineer in connection with the Project (the "Instruments of Service") for any purpose other than those noted above or in relation to any project other than the Project without the prior written permission of the Engineer. The Engineer shall not unreasonably withhold or deny such consent but shall be entitled to receive additional equitable remuneration in connection with its grant of consent.	Date: 3/7/2024
		Drawn By: JCP
		Checked By: ZCM
	PO BOX 1478 1130 ROCKIES CIRCLE ROCK SPRINGS, WY 82901 307-362-5180 WESTERN@WESTERNEGI.COM WWW.WESTERNEGI.COM	APP. B-1



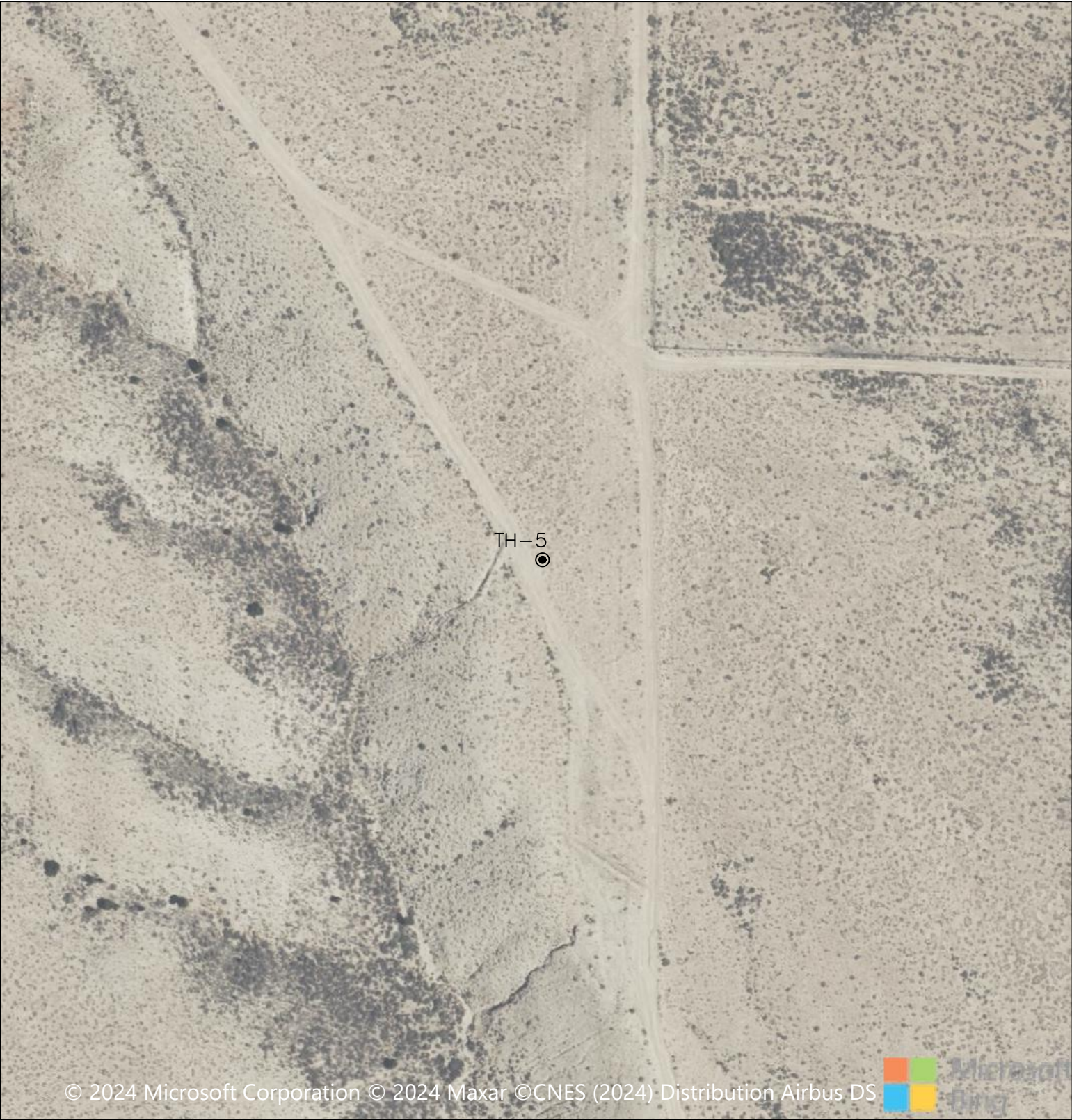
BOREHOLE LOCATIONS	Layout: APP. B-2 Plot Date: 3/14/2024 1:38 PM Plotted By: Juan Path:Q:\Projects\2024 Projects\24-1004 Sunrise JPWB Geotech\DWG\VICINITY MAP AND BH LOCATIONS.dwg	Job No.: 24-1004
	In no event shall the Client copy or use any of the concepts, plans, drawings, specifications, designs, models, reports, photographs, computer software, surveys, calculations, construction and other data, documents, and processes produced by the Engineer in connection with the Project (the "Instruments of Service") for any purpose other than those noted above or in relation to any project other than the Project without the prior written permission of the Engineer. The Engineer shall not unreasonably withhold or deny such consent but shall be entitled to receive additional equitable remuneration in connection with its grant of consent.	Date: 3/7/2024
		Drawn By: JCP
		Checked By: ZCM
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BOREHOLE LOCATIONS	Layout: APP. B-3 Plot Date: 3/14/2024 1:38 PM Plotted By: Juan Path:Q:\Projects\2024 Projects\24-1004 Sunrise JPWB Geotech\DWG\VICINITY MAP AND BH LOCATIONS.dwg	Job No.: 24-1004
	In no event shall the Client copy or use any of the concepts, plans, drawings, specifications, designs, models, reports, photographs, computer software, surveys, calculations, construction and other data, documents, and processes produced by the Engineer in connection with the Project (the "Instruments of Service") for any purpose other than those noted above or in relation to any project other than the Project without the prior written permission of the Engineer. The Engineer shall not unreasonably withhold or deny such consent but shall be entitled to receive additional equitable remuneration in connection with its grant of consent.	Date: 3/7/2024
		Drawn By: JCP
		Checked By: ZCM
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BOREHOLE LOCATIONS	Layout: APP. B-4 Plot Date: 3/14/2024 1:38 PM Plotted By: Juan Path:Q:\Projects\2024 Projects\24-1004 Sunrise JPWB Geotech\DWG\VICINITY MAP AND BH LOCATIONS.dwg	Job No.: 24-1004
	In no event shall the Client copy or use any of the concepts, plans, drawings, specifications, designs, models, reports, photographs, computer software, surveys, calculations, construction and other data, documents, and processes produced by the Engineer in connection with the Project (the "Instruments of Service") for any purpose other than those noted above or in relation to any project other than the Project without the prior written permission of the Engineer. The Engineer shall not unreasonably withhold or deny such consent but shall be entitled to receive additional equitable remuneration in connection with its grant of consent.	Date: 3/7/2024
		Drawn By: JCP
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BOREHOLE LOCATIONS	Layout: APP. B-5 Plot Date: 3/14/2024 1:38 PM Plotted By: Juan Path:Q:\Projects\2024 Projects\24-1004 Sunrise JPWB Geotech\DWG\VICINITY MAP AND BH LOCATIONS.dwg	Job No.: 24-1004
	In no event shall the Client copy or use any of the concepts, plans, drawings, specifications, designs, models, reports, photographs, computer software, surveys, calculations, construction and other data, documents, and processes produced by the Engineer in connection with the Project (the "Instruments of Service") for any purpose other than those noted above or in relation to any project other than the Project without the prior written permission of the Engineer. The Engineer shall not unreasonably withhold or deny such consent but shall be entitled to receive additional equitable remuneration in connection with its grant of consent.	Date: 3/7/2024
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BOREHOLE LOCATIONS	Layout: APP. B-6 Plot Date: 3/14/2024 1:38 PM Plotted By: Juan Path:Q:\Projects\2024 Projects\24-1004 Sunrise JPWB Geotech\DWG\VICINITY MAP AND BH LOCATIONS.dwg	Job No.: 24-1004
	In no event shall the Client copy or use any of the concepts, plans, drawings, specifications, designs, models, reports, photographs, computer software, surveys, calculations, construction and other data, documents, and processes produced by the Engineer in connection with the Project (the "Instruments of Service") for any purpose other than those noted above or in relation to any project other than the Project without the prior written permission of the Engineer. The Engineer shall not unreasonably withhold or deny such consent but shall be entitled to receive additional equitable remuneration in connection with its grant of consent.	Date: 3/7/2024
		Drawn By: JCP
		Checked By: ZCM
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BOREHOLE LOCATIONS	Layout: APP. B-7 Plot Date: 3/14/2024 1:38 PM Plotted By: Juan Path:Q:\Projects\2024 Projects\24-1004 Sunrise JPWB Geotech\DWG\VICINITY MAP AND BH LOCATIONS.dwg	Job No.: 24-1004
	In no event shall the Client copy or use any of the concepts, plans, drawings, specifications, designs, models, reports, photographs, computer software, surveys, calculations, construction and other data, documents, and processes produced by the Engineer in connection with the Project (the "Instruments of Service") for any purpose other than those noted above or in relation to any project other than the Project without the prior written permission of the Engineer. The Engineer shall not unreasonably withhold or deny such consent but shall be entitled to receive additional equitable remuneration in connection with its grant of consent.	Date: 3/7/2024
		Drawn By: JCP
		Checked By: ZCM
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APPENDIX C

DRILL LOGS

GROUP SYMBOLS AND NAMES			
Graphic / Symbol	Group Names	Graphic / Symbol	Group Names
	GW Well-graded GRAVEL		CL Lean CLAY
	Well-graded GRAVEL with SAND		Lean CLAY with SAND
	GP Poorly-graded GRAVEL		CL SANDY lean CLAY
	Poorly-graded GRAVEL with SAND		SANDY Lean CLAY with GRAVEL
	GW-GM Well-graded GRAVEL with SILT		CL-SILTY CLAY
	Well-graded GRAVEL with SILT and SAND		SILTY CLAY with SAND
	GW-GC Well-graded GRAVEL with CLAY or (SILTY CLAY)		CL-SANDY SILTY CLAY
	Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		SANDY SILTY CLAY with GRAVEL
	GP-GM Poorly-graded GRAVEL with SILT		CL-GRAVELLY SILTY CLAY
	Well-graded GRAVEL with SILT and SAND		SILTY CLAY with SAND
	GP-GC Poorly-graded GRAVEL with CLAY (or SILTY CLAY)		CL-SANDY SILTY CLAY with GRAVEL
	Poorly-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		GRAVELLY SILTY CLAY
	GM SILTY GRAVEL		CL-GRAVELLY SILTY CLAY with SAND
	SILTY GRAVEL with SAND		SANDY SILTY CLAY
	GC CLAYEY GRAVEL		ML SILT with SAND
	CLAYEY GRAVEL with SAND		SILT with GRAVEL
	GC-GM SILTY, CLAYEY GRAVEL		ML SANDY SILT
	SILTY, CLAYEY GRAVEL with SAND		SANDY SILT with GRAVEL
	SW Well-graded SAND		ML-GRAVELLY SILT
	Well-graded SAND with GRAVEL		SILT with SAND
	SP Poorly graded SAND		OL ORGANIC lean CLAY
	Poorly graded SAND with GRAVEL		ORGANIC lean CLAY with SAND
	SW-SM Well-graded SAND with SILT		OL SANDY ORGANIC lean CLAY
	Well-graded SAND with SILT and GRAVEL		SANDY ORGANIC lean CLAY with GRAVEL
	SW-SC Well-graded SAND with CLAY (or SILTY CLAY)		OL-GRAVELLY ORGANIC lean CLAY
	Well-graded SAND with CLAY and Gravel (or SILTY CLAY and GRAVEL)		GRAVELLY ORGANIC lean CLAY with SAND
	SP-SM Poorly graded SAND with SILT		OL ORGANIC SILT
	Poorly graded SAND with SILT and GRAVEL		ORGANIC SILT with SAND
	SP-SC Poorly graded SAND with CLAY (or SILTY CLAY)		OL SANDY ORGANIC SILT
	Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)		SANDY ORGANIC SILT with GRAVEL
	SM SILTY SAND		OL-GRAVELLY ORGANIC SILT
	SILTY SAND WITH GRAVEL		ORGANIC SILT with SAND
	SC CLAYEY SAND		OL ORGANIC elastic SILT
	CLAYEY SAND With GRAVEL		ORGANIC elastic SILT with SAND
	SC-SM SILTY, CLAYEY SAND		OL SANDY ORGANIC elastic SILT
	SILTY, CLAYEY SAND with GRAVEL		SANDY ORGANIC elastic SILT with GRAVEL
	PT PEAT		OL-GRAVELLY ORGANIC elastic SILT
	COBBLES		ORGANIC elastic SILT with SAND
	COBBLES AND BOULDERS		OL ORGANIC Soil
	BOULDERS		ORGANIC Soil with GRAVEL

FIELD AND LABORATORY TESTS

C	Consolidation (ASTM D 2435-04)
CL	Collapse Potential (ASTM D 5333-03)
CP	Compaction Curve (CTM 216-06)
CR	Corrosion, Sulfates, Chlorides (ASTM 643-99; CTM 417-06; CTM 422-06)
CU	Consolidated Undrained Triaxial (ASTM D 4767-02)
DS	Direct Shear (ASTM D 3080-04)
EI	Expansion Index (ASTM D 4829-03)
M	Moisture Content (ASTM D 2216-05)
OC	Organic Content (ASTM D 2974-07)
P	Permeability (CTM 220-05)
PA	Particle Size Analysis (ASTM D 422-02)
PI	Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89-02, AASHTO T 90-00)
PL	Point Load Index (ASTM D 5731-05)
PM	Pressure Meter
PP	Pocket Penetrometer
R	R-Value (CTM 301-00)
SE	Sand Equivalent (CTM 217-99)
SG	Specific Gravity (AASHTO T 100-06)
SL	Shrinkage Limit (ASTM D 427-04)
SW	Swell Potential (ASTM D 4546-03)
TV	Pocket Torvane
UC	Unconfined Compression - Soil (ASTM D 2166-06)
UU	Unconsolidated Undrained Triaxial (ASTM D 2850-03)
UW	Unit Weight (ASTM D 4767-04)
VS	Vane Shear (AASHTO T 223-96)

SAMPLER GRAPHIC SYMBOLS

	Standard Penetration Test (SPT)
	Standard California Sampler
	Modified California Sampler
	Shelby Tube
	Piston Sampler
	NX Rock Core
	HQ Rock Core
	Bulk Sample
	Other (see remarks)

GROUP SYMBOLS AND NAMES

	Auger Drilling		Rotary Drilling		Dynamic Cone or Hand Driven		Diamond Core
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WATER LEVEL SYMBOLS

	First Water Level Reading (During Drilling)
	Static Water Level Reading (short-term)
	Static Water Level Reading (long-term)



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DRILL LOG LEGEND
SHEET 1 OF 1



DRILL LOG NO.: TH-1

CLIENT: SUNRISE

PROJECT: JOINT POWERS WATER BOARD WATERLINE

LOC.: 41.56188, -109.29422

PROJ. NO.: 24-1004

AUGER: 4" Solid Stem Flight O.D.

GND EL (FT): ~6220.00

HAMMER: ROPE & PULLEY SAFETY

DROP: 30 in.

WEIGHT: 140 lb

TD (FT): 21.50'

SAMPLER: STANDARD SPLIT SPOON, 2" O.D.

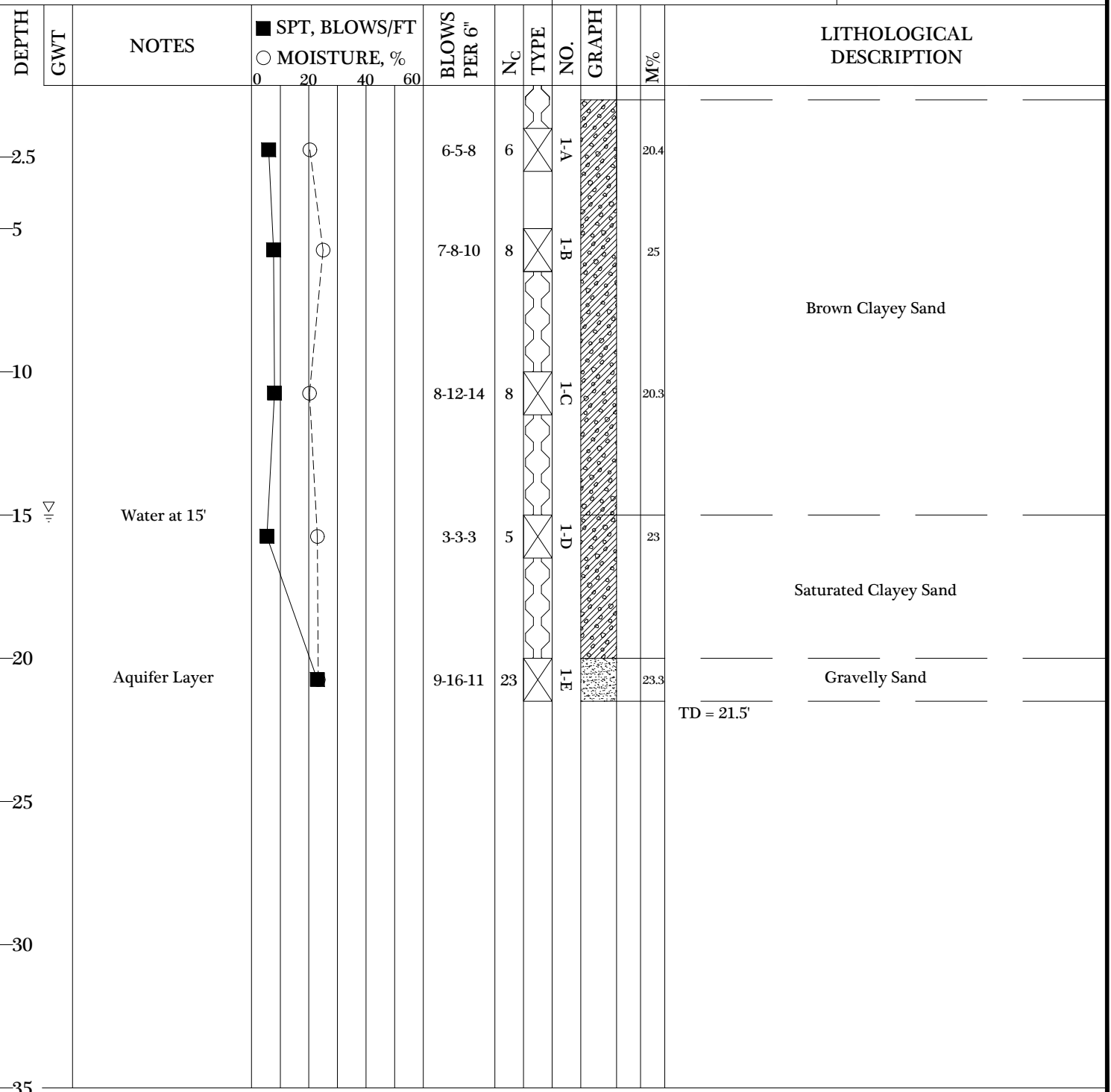
GWT W.D.: N/A

LOGGED BY: JCP

WEATHER: COLD/WINDY

DATE: 01/10/2024

DRAWN BY: JCP



COMMENTS: HOLE DRILLED WITH SIMCO 2800 H/S.



DRILL LOG NO.: TH-2

CLIENT: SUNRISE

PROJECT: JOINT POWERS WATER BOARD WATERLINE

LOC.: 41.56720, -109.28958

PROJ. NO.:24-1004

AUGER: 4" Solid Stem Flight O.D.

GND EL (FT): ~6227.00

HAMMER: ROPE & PULLEY SAFETY

DROP: 30 in.

WEIGHT: 140 lb

TD (FT): 21.50'

SAMPLER: STANDARD SPLIT SPOON, 2" O.D.

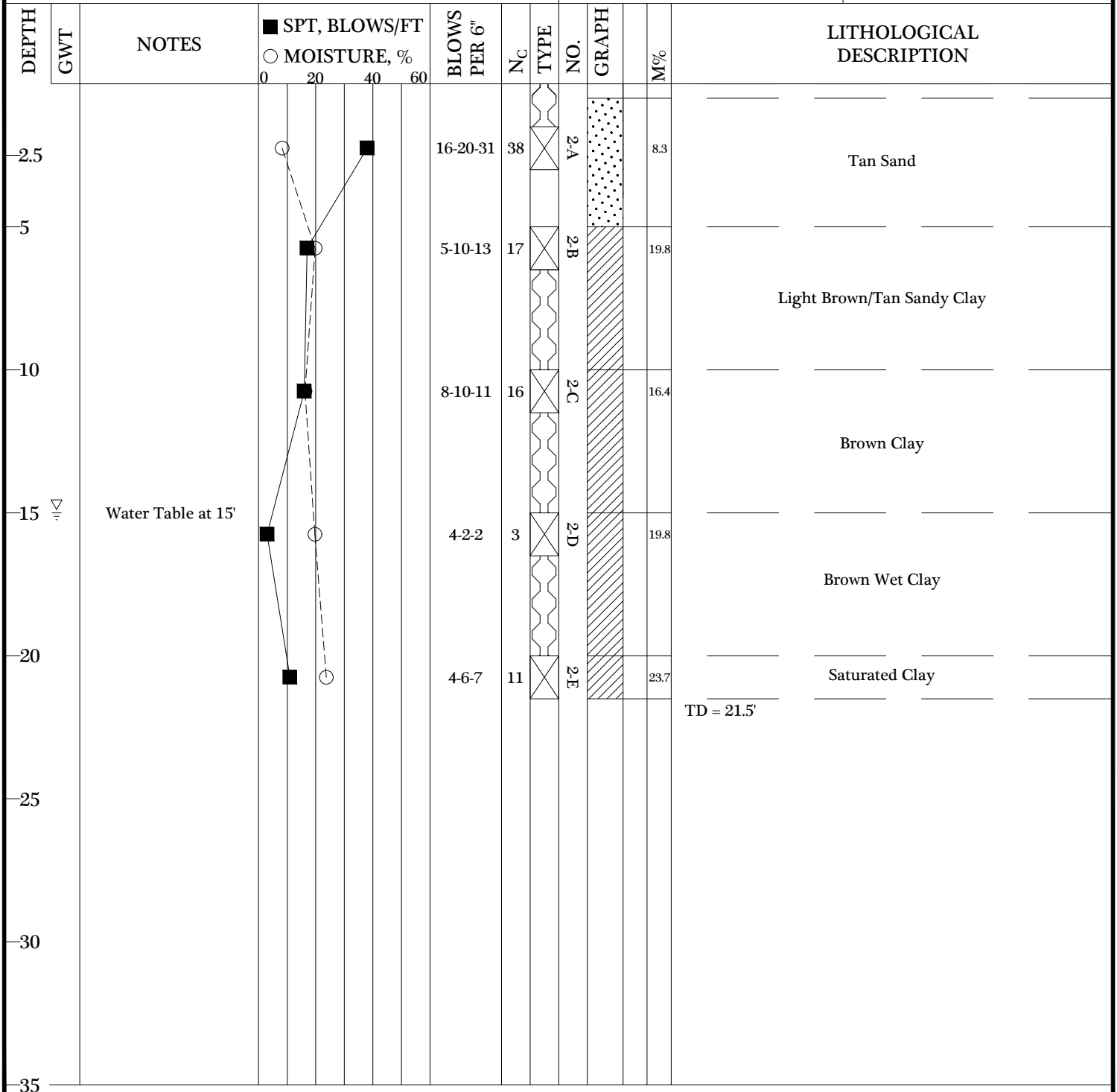
GWT W.D.: N/A

LOGGED BY: JCP

WEATHER: COLD/WINDY

DATE: 01/10/2024

DRAWN BY: JCP

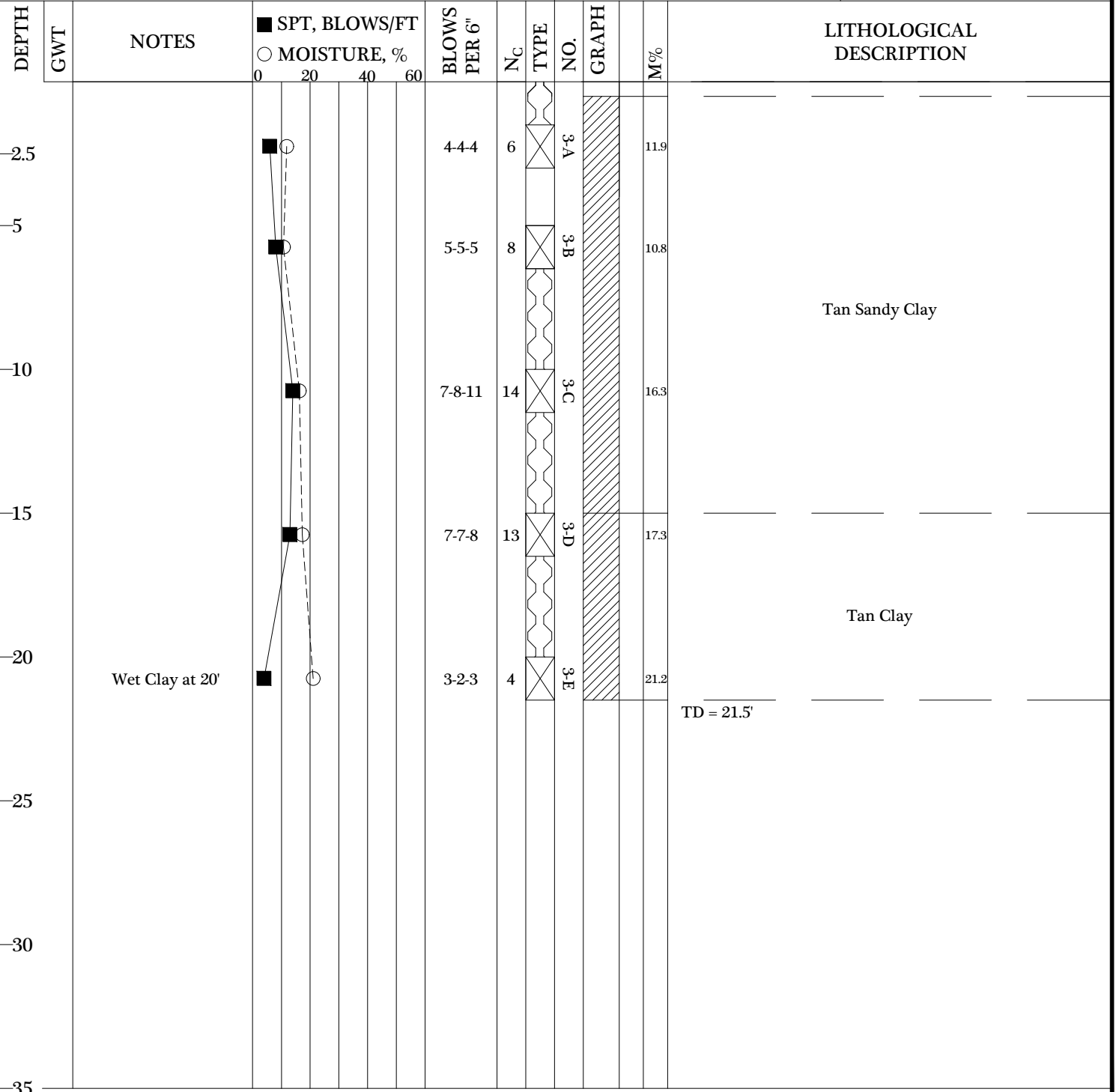


COMMENTS: HOLE DRILLED WITH SIMCO 2800 H/S.



DRILL LOG NO.: TH-3	CLIENT: SUNRISE
PROJECT: JOINT POWERS WATER BOARD WATERLINE	
LOC.: 41.56908, -109.29112	PROJ. NO.: 24-1004
AUGER: 4" Solid Stem Flight O.D.	GND EL (FT): ~6237.00

HAMMER: ROPE & PULLEY SAFETY	DROP: 30 in.	WEIGHT: 140 lb	TD (FT): 21.50'
SAMPLER: STANDARD SPLIT SPOON, 2" O.D.		GWT W.D.: N/A	LOGGED BY: JCP
WEATHER: COLD/WINDY		DATE: 01/10/2024	DRAWN BY: JCP



COMMENTS: HOLE DRILLED WITH SIMCO 2800 H/S.



DRILL LOG NO.: TH-4

CLIENT: SUNRISE

PROJECT: JOINT POWERS WATER BOARD WATERLINE

LOC.: 41.57175, -109.29176

PROJ. NO.: 24-1004

AUGER: 4" Solid Stem Flight O.D.

GND EL (FT): ~6280.00

HAMMER: ROPE & PULLEY SAFETY

DROP: 30 in.

WEIGHT: 140 lb

TD (FT): 20.94'

SAMPLER: STANDARD SPLIT SPOON, 2" O.D.

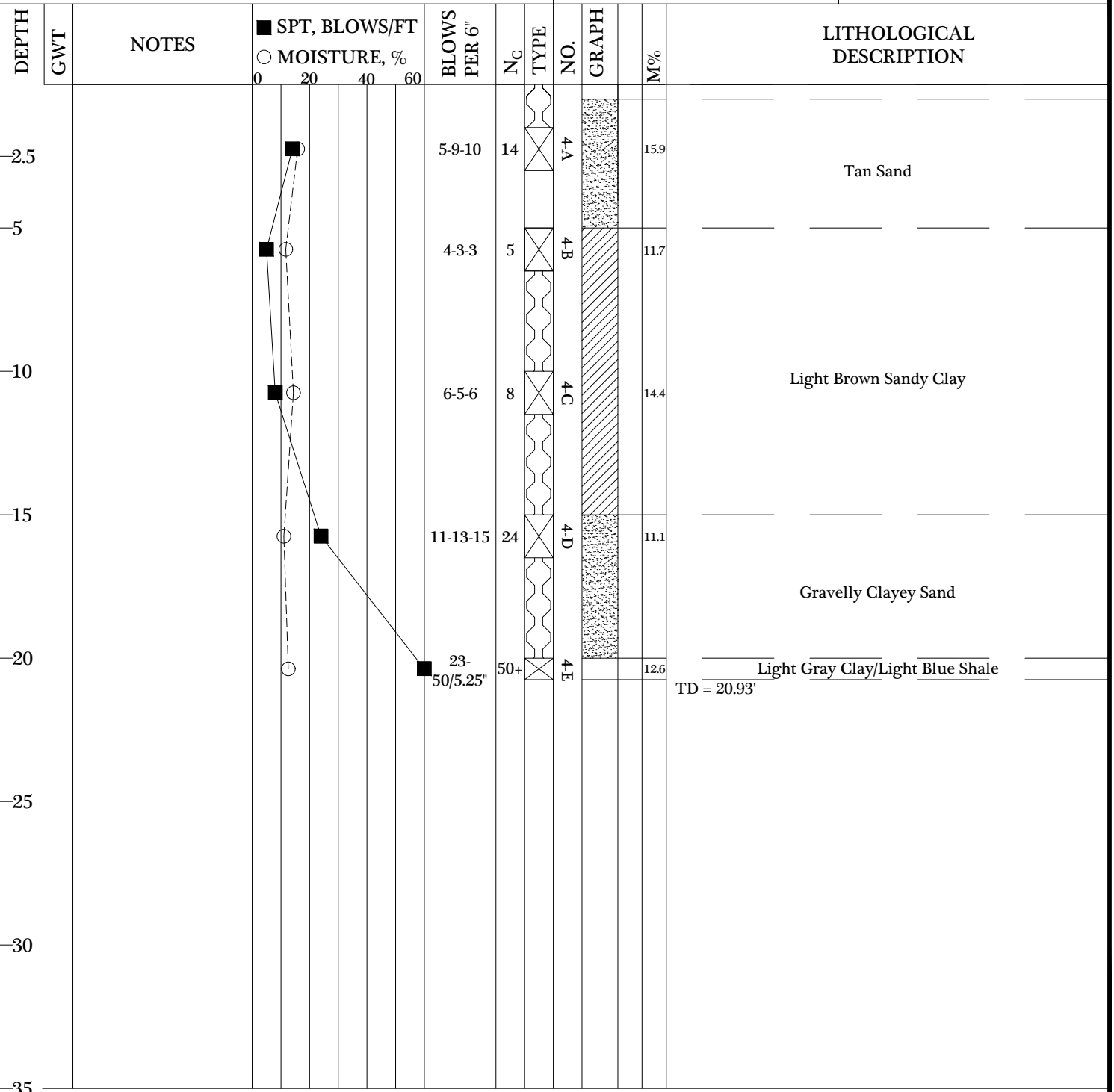
GWT W.D.: N/A

LOGGED BY: JCP

WEATHER: COLD/WINDY

DATE: 01/10/2024

DRAWN BY: JCP



COMMENTS: HOLE DRILLED WITH SIMCO 2800 H/S.



DRILL LOG NO.: TH-5

CLIENT: SUNRISE

PROJECT: JOINT POWERS WATER BOARD WATERLINE

LOC.: 41.57476, -109.29173

PROJ. NO.:24-1004

AUGER: 4" Solid Stem Flight O.D.

GND EL (FT): ~6387.00

HAMMER:ROPE & PULLEY SAFETY

DROP: 30 in.

WEIGHT: 140 lb

TD (FT): 21.50'

SAMPLER:STANDARD SPLIT SPOON, 2" O.D.

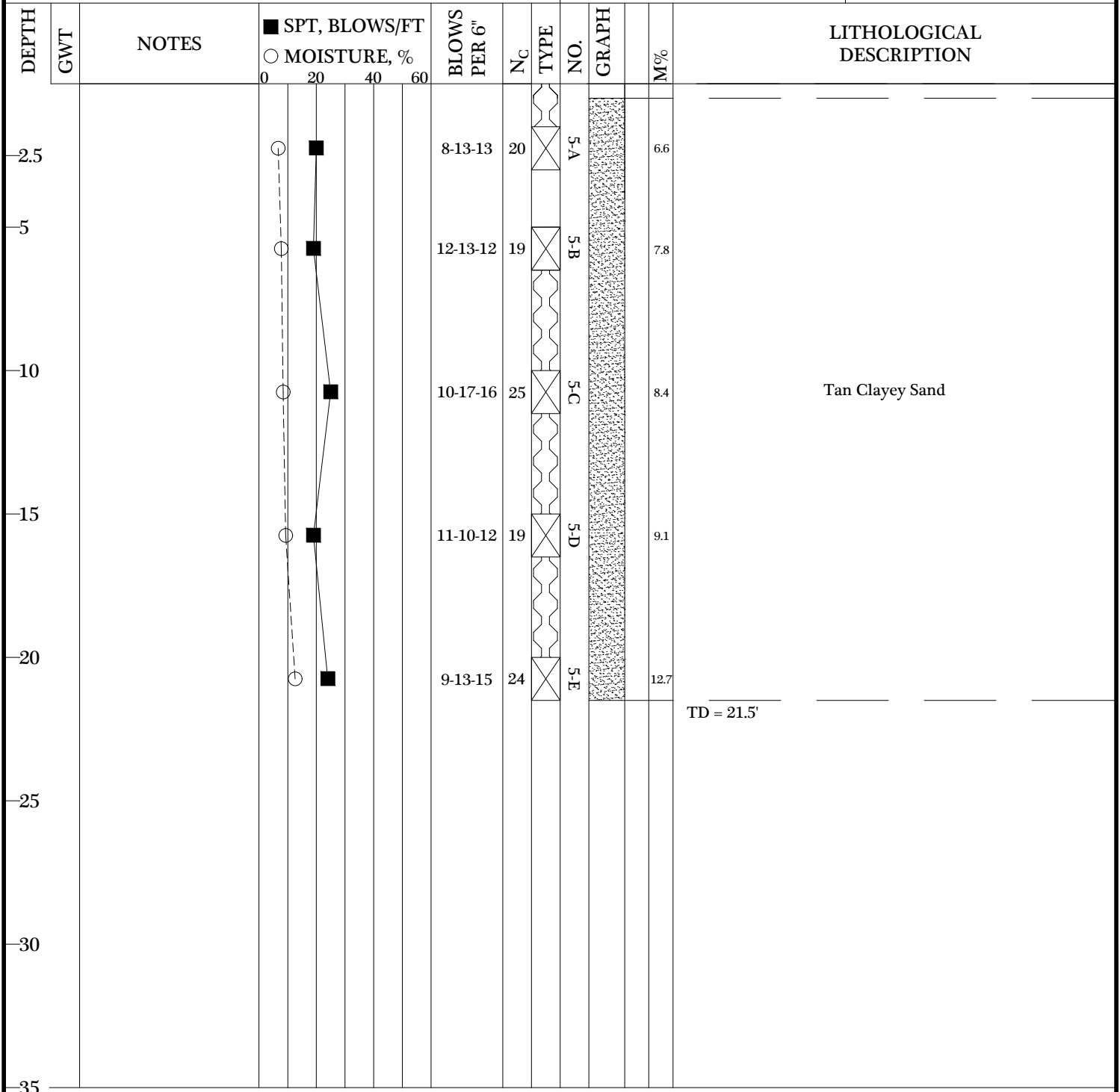
GWT W.D.: N/A

LOGGED BY: JCP

WEATHER: COLD/WINDY

DATE: 01/11/2024

DRAWN BY: JCP



COMMENTS: HOLE DRILLED WITH SIMCO 2800 H/S.



DRILL LOG NO.: TH-6		CLIENT: SUNRISE
PROJECT: JOINT POWERS WATER BOARD WATERLINE		
LOC.: 41.57873, -109.29178		PROJ. NO.: 24-1004
AUGER: 4" Solid Stem Flight O.D.		GND EL (FT): ~6424.00
DROP: 30 in.	WEIGHT: 140 lb	TD (FT): 21.50'
SPOON, 2" O.D.	GWT W.D.: N/A	LOGGED BY: JCP
	DATE: 01/10/2024	DRAWN BY: JCP

DEPTH	GWT	NOTES	■ SPT, BLOWS/FT ○ MOISTURE, %	BLOWS PER 6"	N _c	TYPE	NO.	GRAPH	M%	LITHOLOGICAL DESCRIPTION
2.5			14	6-5-8	10	V-9			14	
5			13.7	7-8-10	14	B-9			13.7	
10			18	8-12-14	20	C-9			18	Tan Sand
15			14.9	10-16-16	27	D-6			14.9	
20			15.3	10-21-23	37	E-6			15.3	Tan Sandy Clay
21.5										TD = 21.5'
25										
30										
35										

COMMENTS: HOLE DRILLED WITH SIMCO 2800 H/S.



DRILL LOG NO.: TH-7

CLIENT: SUNRISE

PROJECT: JOINT POWERS WATER BOARD WATERLINE

LOC.: 41.57939, -109.29187

PROJ. NO.: 24-1004

AUGER: 4" Solid Stem Flight O.D.

GND EL (FT): ~6444.00

HAMMER: ROPE & PULLEY SAFETY

DROP: 30 in.

WEIGHT: 140 lb

TD (FT): 21.50'

SAMPLER: STANDARD SPLIT SPOON, 2" O.D.

GWT W.D.: N/A

LOGGED BY: JCP

WEATHER: COLD/WINDY

DATE: 01/10/2024

DRAWN BY: JCP

DEPTH	GWT	NOTES	■ SPT, BLOWS/FT ○ MOISTURE, %				BLOWS PER 6"	N _C	TYPE	NO.	GRAPH	M%	LITHOLOGICAL DESCRIPTION
			0	20	40	60							
-2.5							6-7-7	11	7-L	7-L		13.4	Tan Sand
-5							9-10-13	17	7-B	7-B		11.9	
-10							11-12-16	21	7-C	7-C		11.5	
-15							11-13-12	21	7-D	7-D		12.1	
-20							9-11-14	21	7-E	7-E		16.9	Tan Sandy Clay
-25													
-30													
-35													

TD = 21.5'

COMMENTS: HOLE DRILLED WITH SIMCO 2800 H/S.



DRILL LOG NO.: TH-11

CLIENT: SUNRISE

PROJECT: JOINT POWERS WATER BOARD WATERLINE

LOC.: 41.59513, -109.28583

PROJ. NO.:24-1004

AUGER: 4" Solid Stem Flight O.D.

GND EL (FT): ~6486.00

HAMMER: ROPE & PULLEY SAFETY

DROP: 30 in.

WEIGHT: 140 lb

TD (FT): 20.50'

SAMPLER: STANDARD SPLIT SPOON, 2" O.D.

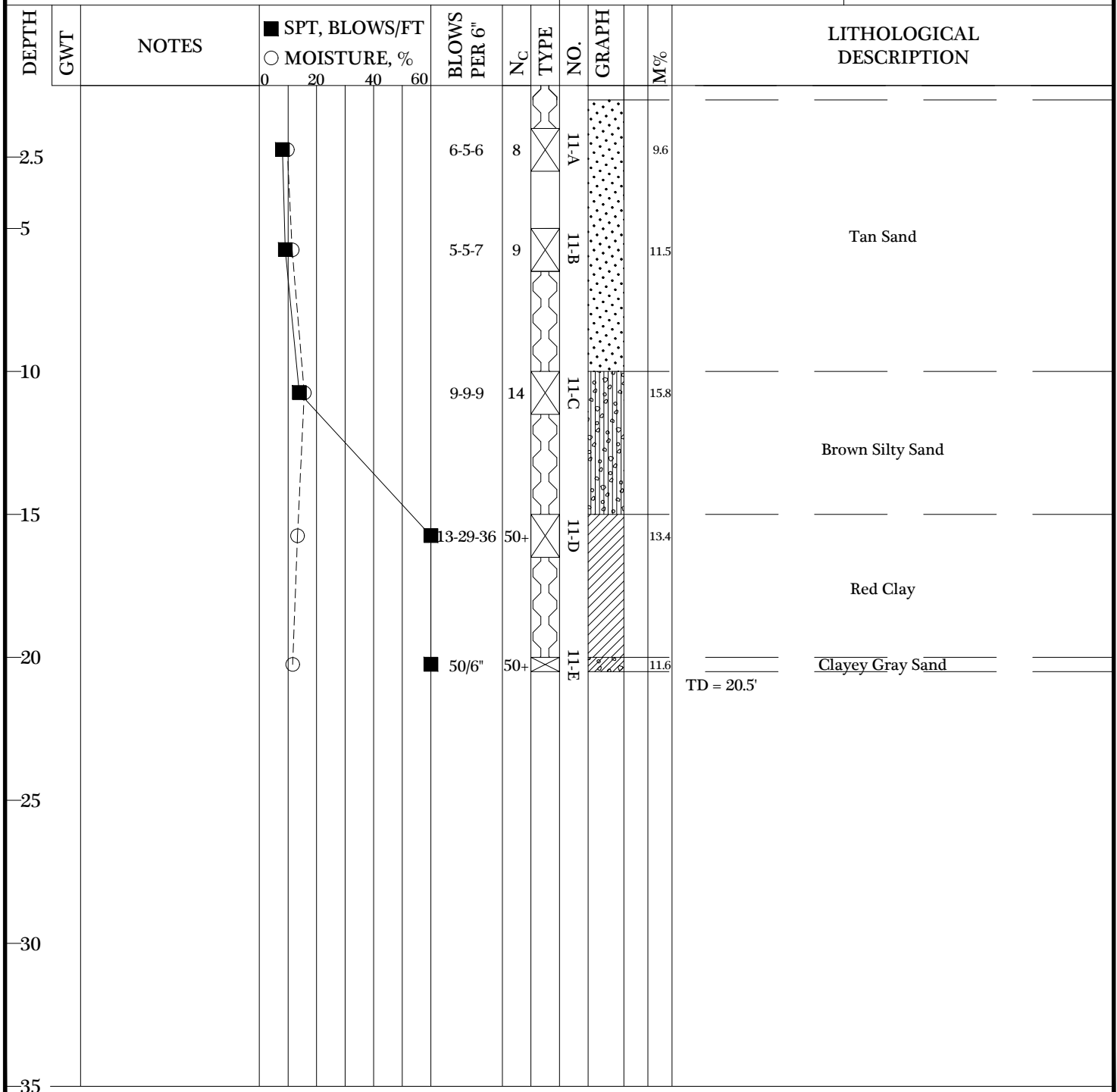
GWT W.D.: N/A

LOGGED BY: JCP

WEATHER: COLD/WINDY

DATE: 01/11/2024

DRAWN BY: JCP



COMMENTS: HOLE DRILLED WITH SIMCO 2800 H/S.

APPENDIX D

TESTING RESULTS

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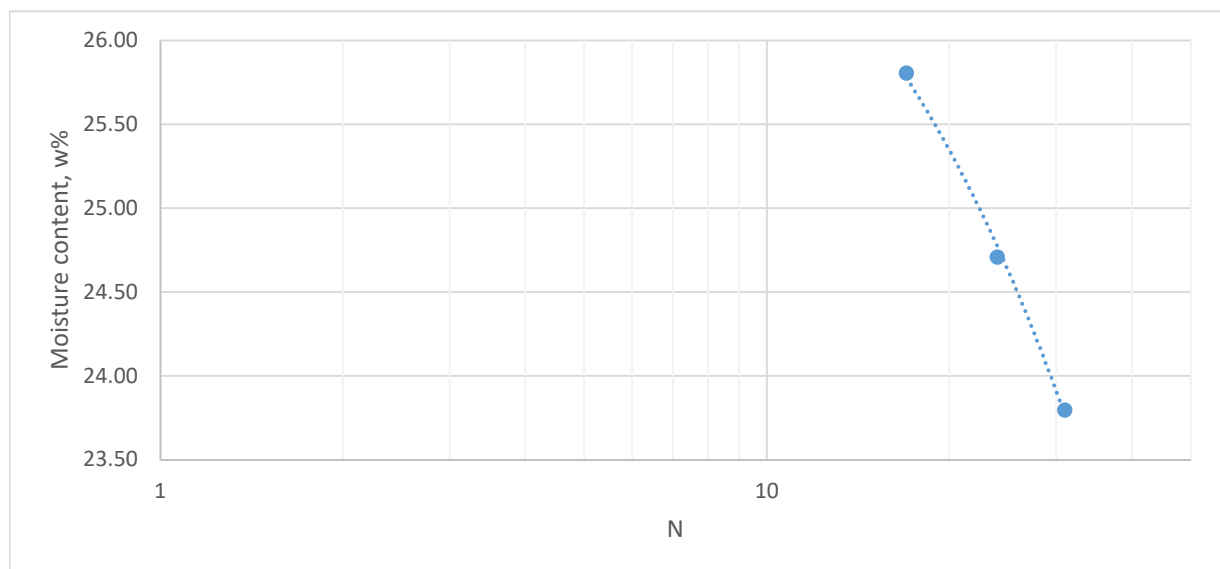
CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM D4318-10
PROJECT:	JPWB	SAMPLE NUMBER:	TH1 - 1B - 5-6.5 ft.
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	1/31/2024	SOURCE:	Borehole TH1
SAMPLE DESCRIPTION:	Silty Clay with Sand, AASHTO = A-4		

	Liquid Limit		
Can No.	31	E	35
Mass of can	20.74	20.81	20.87
Can + wet	39.52	39.13	34.91
Can + dry	35.91	35.50	32.03
%M	23.80	24.71	25.81
Blows N	31	24	17
Blows Required	25-35	20-30	15-25

Plastic Limit	
23	9
20.83	20.89
31.76	32.46
30.11	30.79
17.78	16.87

LL =	25
PI =	7

Classification	CL-ML
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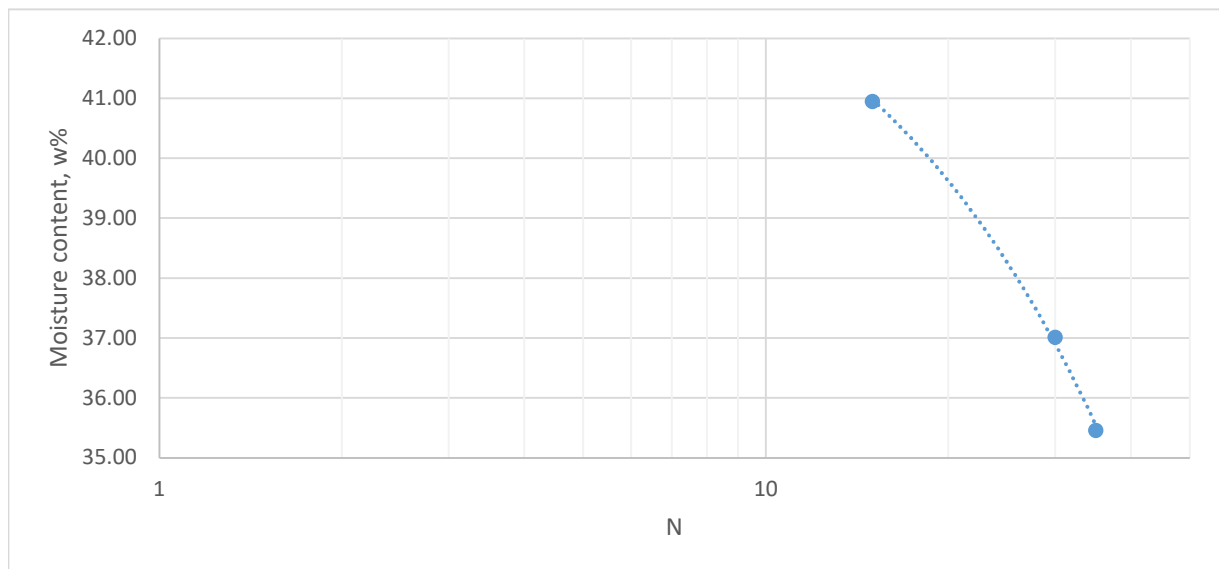
CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM D4318-10
PROJECT:	JPWB	SAMPLE NUMBER:	TH1 - 1C - 10-11.5 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	1/30/2024	SOURCE:	Borehole TH1
SAMPLE DESCRIPTION:	Lean Clay, AASHTO = A-6		

	Liquid Limit		
Can No.	5A	K4	BL
Mass of can	20.69	21.12	20.81
Can + wet	34.48	34.52	35.06
Can + dry	30.87	30.90	30.92
%M	35.46	37.01	40.95
Blows N	35	30	15
Blows Required	25-35	20-30	15-25

Plastic Limit	
Y9	ML
20.79	20.63
35.25	29.26
33.13	27.97
17.18	17.57

LL =	38
PI =	21

Classification	CL
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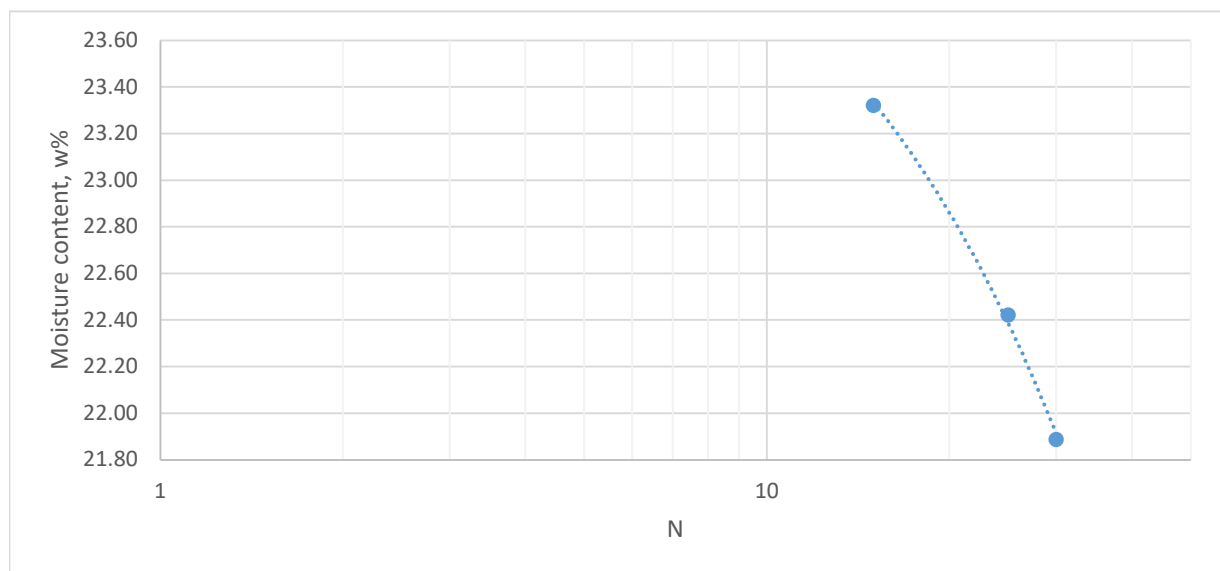
CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM D4318-10
PROJECT:	JPWB	SAMPLE NUMBER:	TH1 - 1D - 15-16.5 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	1/31/2024	SOURCE:	Borehole TH1
SAMPLE DESCRIPTION:	Sandy Silty Clay, AASHTO = A-4		

	Liquid Limit		
Can No.	1	Y5	7A
Mass of can	20.80	20.84	20.61
Can + wet	41.46	37.11	39.17
Can + dry	37.75	34.13	35.66
%M	21.89	22.42	23.32
Blows N	30	25	15
Blows Required	25-35	20-30	15-25

Plastic Limit	
F	B
20.68	21.20
37.69	35.16
35.10	33.12
17.96	17.11

LL =	22
PI =	5

Classification	CL-ML
----------------	--------------



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CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM D4318-10
PROJECT:	JPWB	SAMPLE NUMBER:	TH1 - 1E - 20-21.5 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	1/30/2024	SOURCE:	Borehole TH1
SAMPLE DESCRIPTION:	SW-SM - Well-graded sand with silt and gravel, AASHTO = A-1-a		

Liquid Limit

Plastic Limit

Can No.

Mass of can

Can + wet

Can + dry

%M

Blows N

Blows Required

#DIV/0!	#DIV/0!	#DIV/0!

#DIV/0!	#DIV/0!

25-35

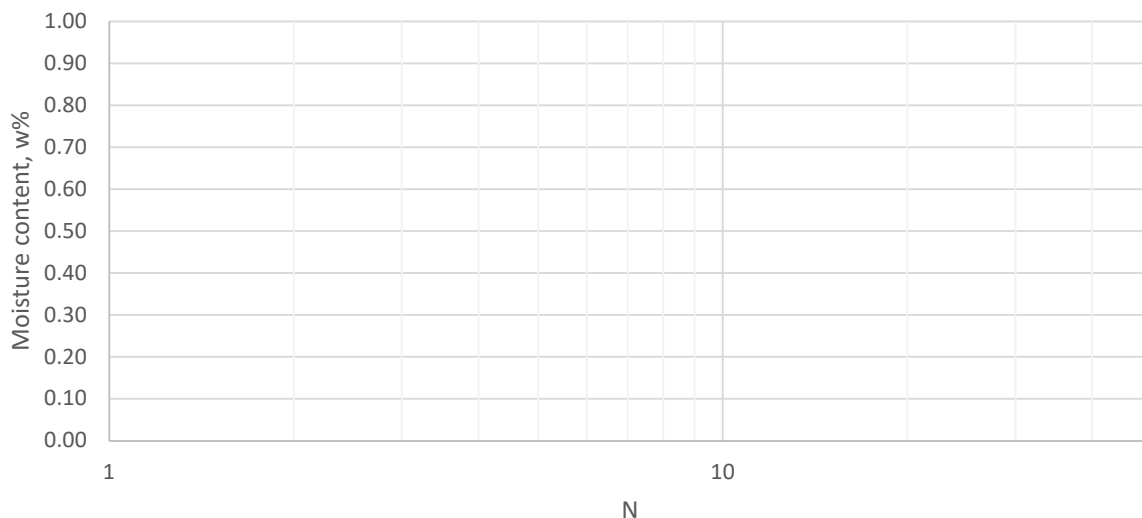
20-30

15-25

LL =	
PI =	#DIV/0!

Non Plastic

Classification	ML
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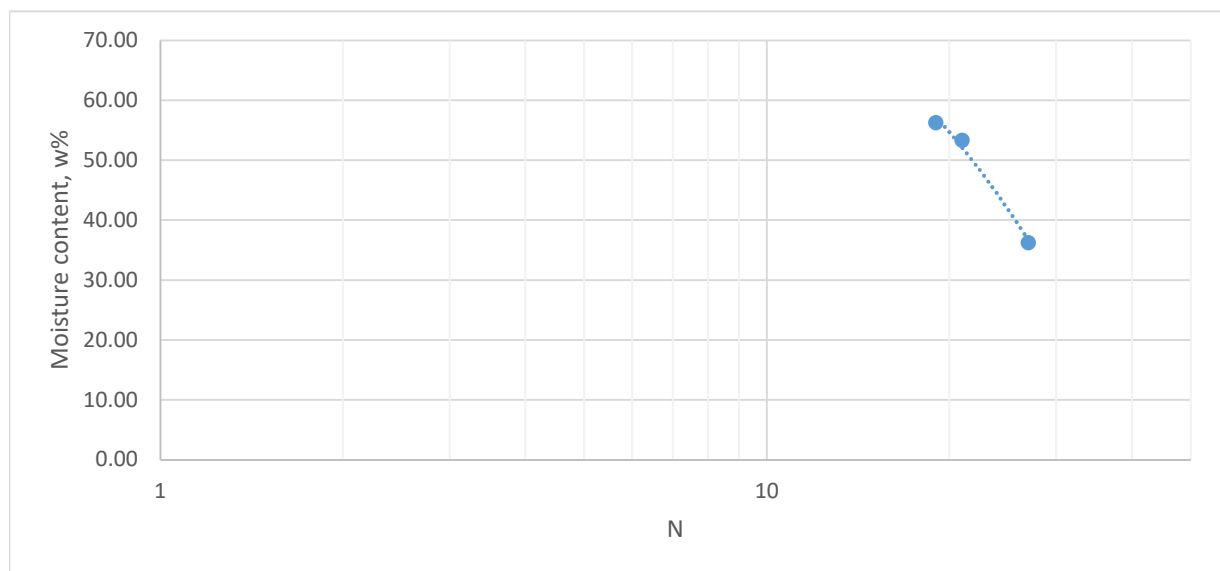
CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM D4318-10
PROJECT:	JPWB	SAMPLE NUMBER:	TH2 - 2B - 5-6.5 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	1/30/2024	SOURCE:	Borehole TH2
SAMPLE DESCRIPTION:	Lean Clay with Sand, AASHTO = A-7-6		

	Liquid Limit		
Can No.	MA	17	30
Mass of can	20.86	20.75	21.01
Can + wet	33.29	38.59	34.92
Can + dry	29.98	32.38	29.91
%M	36.29	53.40	56.29
Blows N	27	21	19
Blows Required	25-35	20-30	15-25

Plastic Limit	
2D	2F
20.73	20.66
28.16	28.37
27.05	27.26
17.56	16.82

LL =	42
PI =	25

Classification	CL
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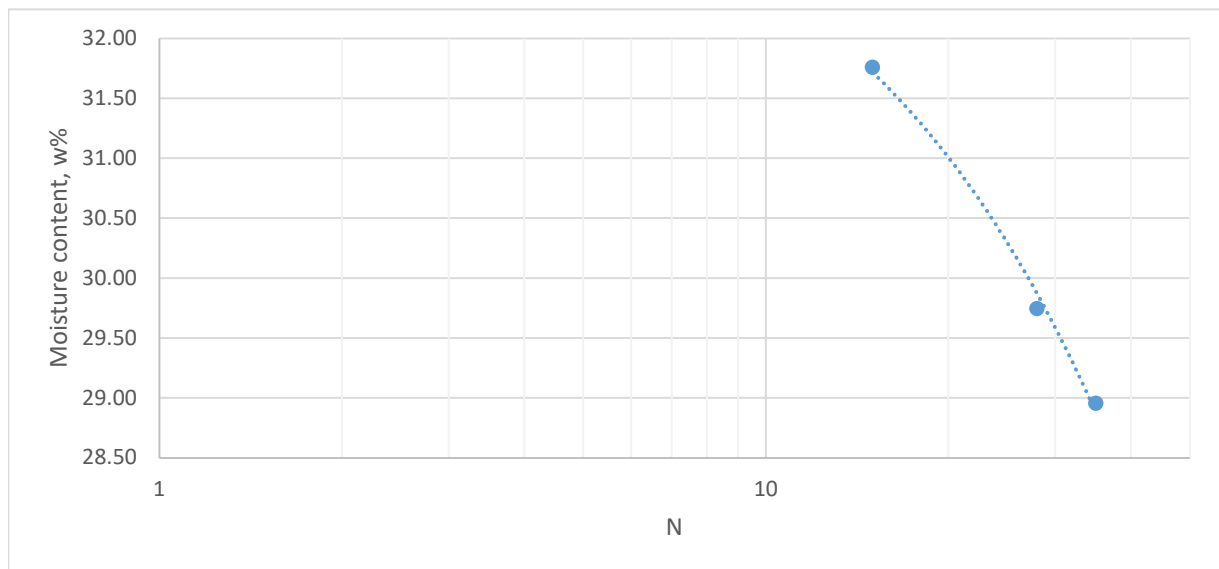
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JOB NUMBER:	24-1004	TEST METHOD:	ASTM D4318-10
PROJECT:	JPWB	SAMPLE NUMBER:	TH2 - 2C - 10-11.5 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	1/31/2024	SOURCE:	Borehole TH2
SAMPLE DESCRIPTION:	Lean Clay with Sand, AASHTO = A-6		

	Liquid Limit		
Can No.	X9	K1	2E
Mass of can	21.22	20.75	20.60
Can + wet	38.41	35.71	36.24
Can + dry	34.55	32.28	32.47
%M	28.96	29.75	31.76
Blows N	35	28	15
Blows Required	25-35	20-30	15-25

Plastic Limit	
3	15
20.74	20.87
36.28	31.68
34.02	30.08
17.02	17.37

LL =	30
PI =	13

Classification	CL
----------------	----



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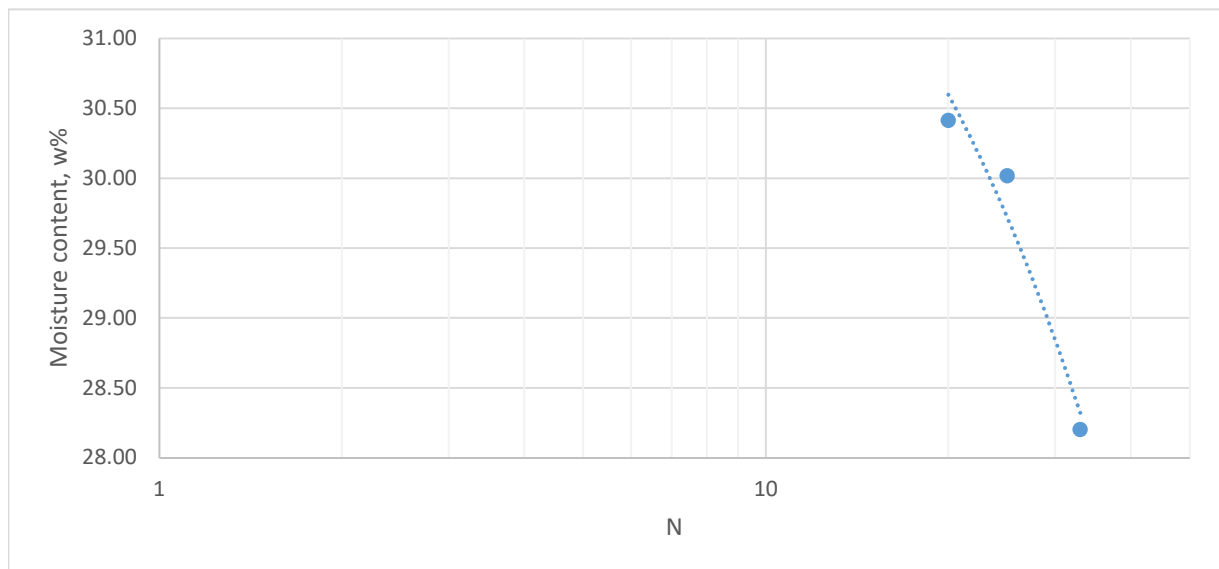
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PROJECT:	JPWB	SAMPLE NUMBER:	TH2 - 2E - 20-21.5 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	1/29/2024	SOURCE:	Borehole TH2
SAMPLE DESCRIPTION:	Lean Clay with Sand, AASHTO = A-6		

	Liquid Limit		
Can No.	K2	2A	13
Mass of can	20.93	20.59	20.81
Can + wet	38.34	34.58	35.26
Can + dry	34.51	31.35	31.89
%M	28.20	30.02	30.42
Blows N	33	25	20
Blows Required	25-35	20-30	15-25

Plastic Limit	
21	27
20.68	20.74
30.72	30.58
29.37	29.23
15.54	15.90

LL =	29
PI =	13

Classification	CL
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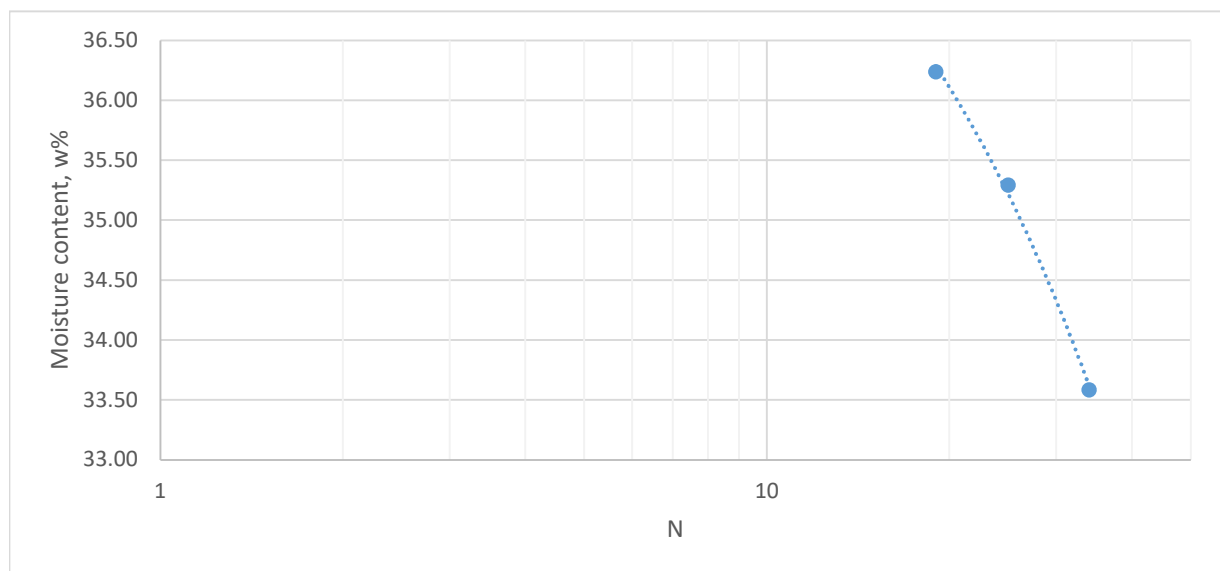
CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM D4318-10
PROJECT:	JPWB	SAMPLE NUMBER:	TH3 - 3D - 15-16.5 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	1/31/2024	SOURCE:	Borehole TH3
SAMPLE DESCRIPTION:	Lean Clay with Sand, AASHTO = A-6		

	Liquid Limit		
Can No.	2B	CB	12
Mass of can	20.73	20.56	13.62
Can + wet	36.60	32.98	29.86
Can + dry	32.61	29.74	25.54
%M	33.59	35.29	36.24
Blows N	34	25	19
Blows Required	25-35	20-30	15-25

Plastic Limit	
28	XL
20.65	13.79
28.81	24.46
27.79	23.10
14.29	14.61

LL =	35
PI =	21

Classification	CL
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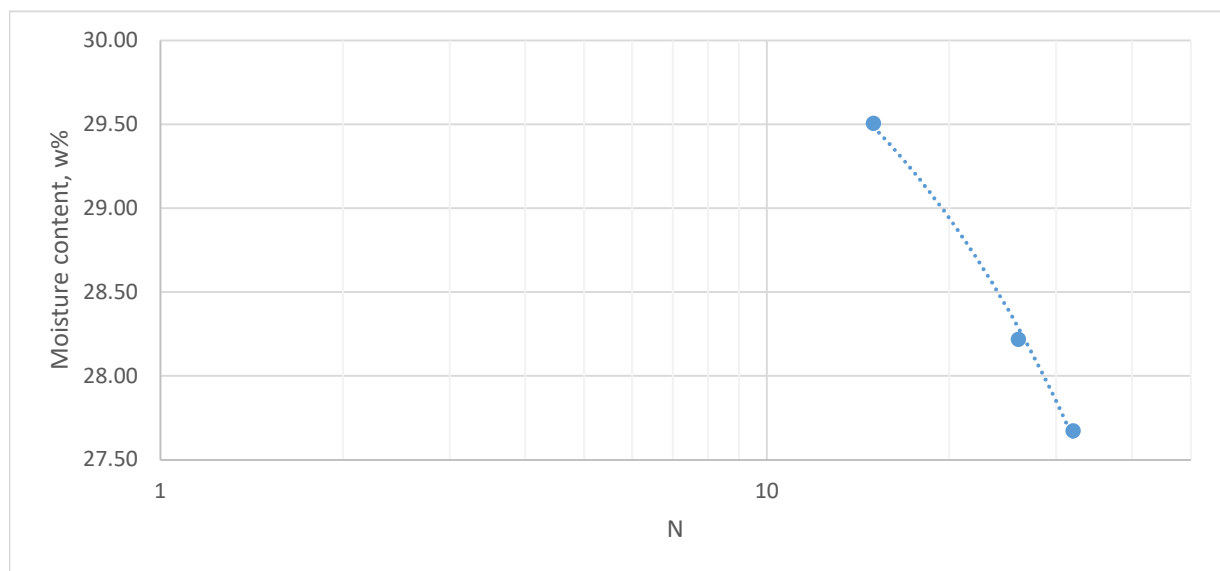
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JOB NUMBER:	24-1004	TEST METHOD:	ASTM D4318-10
PROJECT:	JPWB	SAMPLE NUMBER:	TH4 - 4C - 10-11.5 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	1/31/2024	SOURCE:	Borehole TH4
SAMPLE DESCRIPTION:	Sandy Lean Clay, AASHTO = A-6		

	Liquid Limit		
Can No.	2C	1A	19
Mass of can	20.77	20.54	21.03
Can + wet	37.01	34.58	36.04
Can + dry	33.49	31.49	32.62
%M	27.67	28.22	29.51
Blows N	32	26	15
Blows Required	25-35	20-30	15-25

Plastic Limit	
H	6
21.04	20.65
35.82	32.40
33.77	30.87
16.10	14.97

LL =	28
PI =	13

Classification	CL
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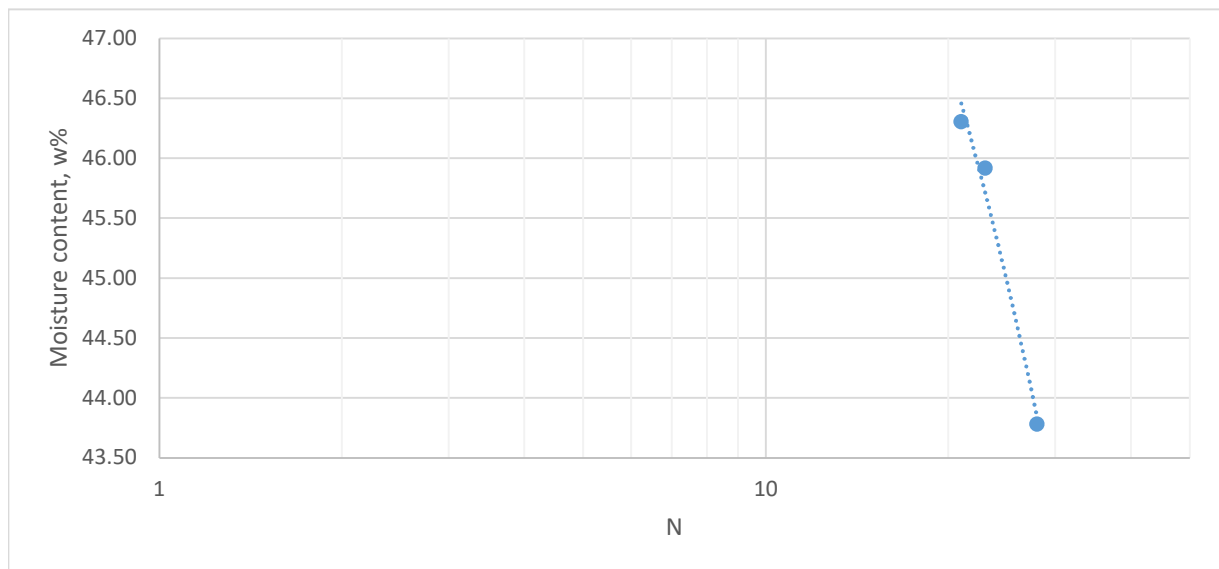
CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM D4318-10
PROJECT:	JPWB	SAMPLE NUMBER:	TH4 - 4E- 20-20.93 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	1/29/2024	SOURCE:	Borehole TH4
SAMPLE DESCRIPTION:	SC - Clayey Sand, AASHTO = A-7-6		

	Liquid Limit		
Can No.	X7	NO	BL
Mass of can	20.74	20.77	20.79
Can + wet	34.73	34.18	31.69
Can + dry	30.47	29.96	28.24
%M	43.78	45.92	46.31
Blows N	28	23	21
Blows Required	25-35	20-30	15-25

Plastic Limit	
29	2
20.92	20.93
28.80	31.90
27.36	29.91
22.36	22.16

LL =	45
PI =	23

Classification	CL
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CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM D4318-10
PROJECT:	JPWB	SAMPLE NUMBER:	TH5 - 5C &D Combo 5-11.5 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	1/30/2024	SOURCE:	TH 5
SAMPLE DESCRIPTION:	Sandy Lean Clay, AASHTO = A-6		

Liquid Limit

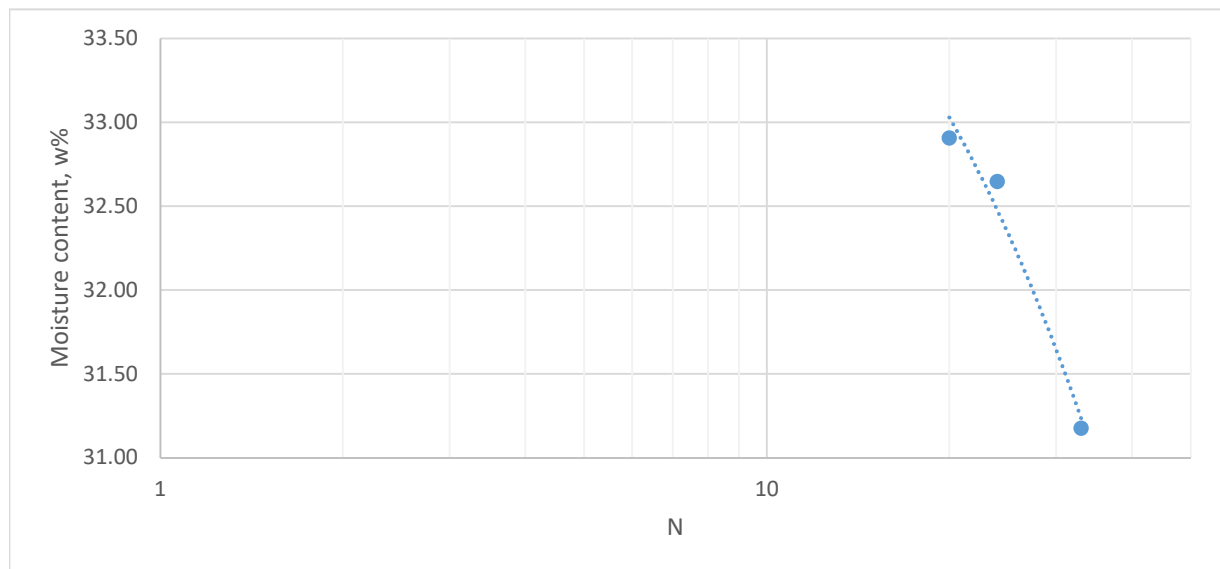
Can No.	K5	Y7	Y3
Mass of can	20.93	21.10	21.01
Can + wet	35.53	35.32	35.63
Can + dry	32.06	31.82	32.01
%M	31.18	32.65	32.91
Blows N	33	24	20
Blows Required	25-35	20-30	15-25

Plastic Limit

Y8	Y2
21.12	20.98
30.43	28.92
29.10	27.80
16.67	16.42

LL =	32
PI =	15

Classification	CL
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CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM D4318-10
PROJECT:	JPWB	SAMPLE NUMBER:	TH6 - 6D - 15-16.5 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	1/30/2024	SOURCE:	Borehole TH6
SAMPLE DESCRIPTION:	Sandy Lean Clay, AASHTO = A-6		

Liquid Limit

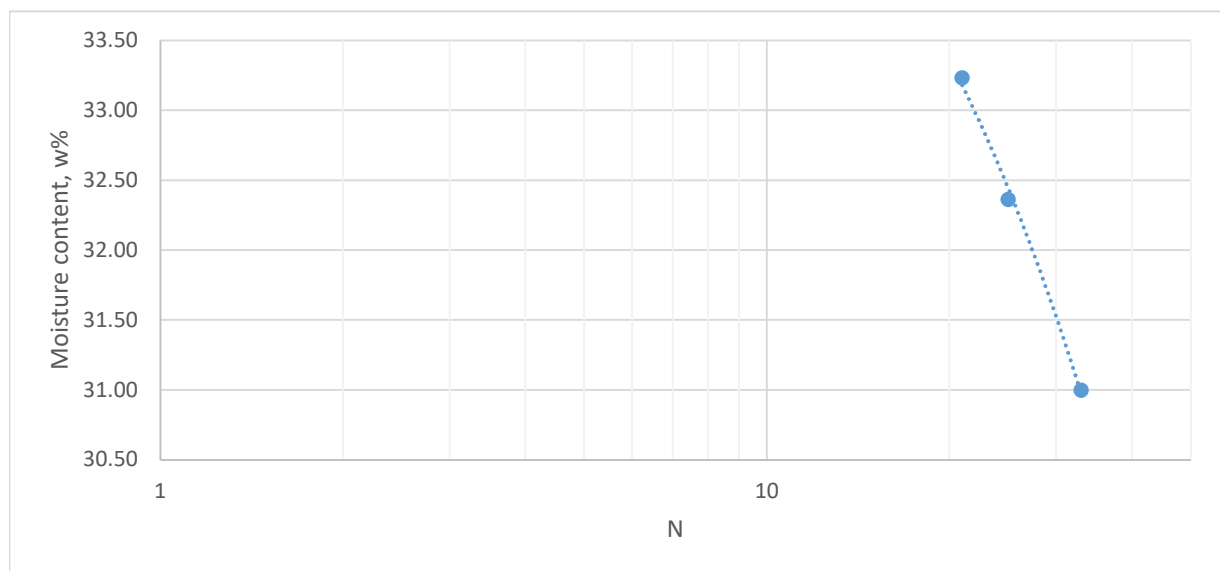
Can No.	13	K2	NO
Mass of can	20.86	20.95	20.70
Can + wet	37.13	37.80	34.01
Can + dry	33.28	33.68	30.69
%M	31.00	32.36	33.23
Blows N	33	25	21
Blows Required	25-35	20-30	15-25

Plastic Limit

A	2
20.94	20.90
34.79	34.00
32.87	32.19
16.09	16.03

LL =	37
PI =	21

Classification	CL
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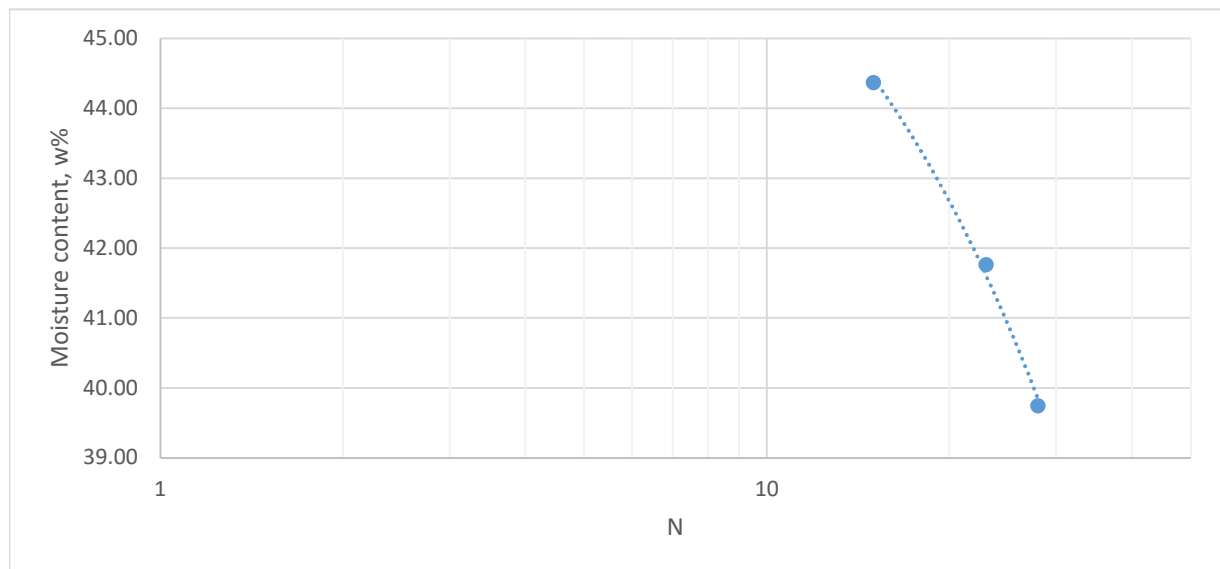
CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM D4318-10
PROJECT:	JPWB	SAMPLE NUMBER:	TH6 - 6E - 20-21.5 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	1/30/2024	SOURCE:	Borehole TH6
SAMPLE DESCRIPTION:	Sandy Lean Clay, AASHTO = A-7-6		

	Liquid Limit		
Can No.	X6	3A	K3
Mass of can	20.72	20.78	20.95
Can + wet	36.05	33.61	32.24
Can + dry	31.69	29.83	28.77
%M	39.74	41.77	44.37
Blows N	28	23	15
Blows Required	25-35	20-30	15-25

Plastic Limit	
Y4	Y6
20.99	20.94
27.74	33.96
26.83	32.23
15.58	15.32

LL =	41
PI =	25

Classification	CL
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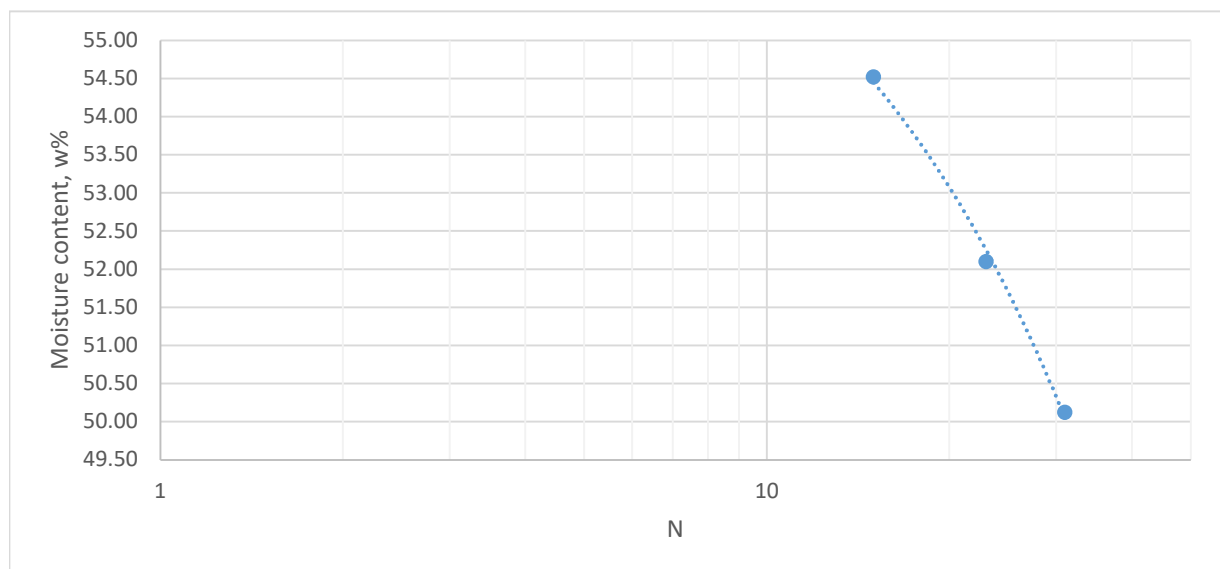
CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM D4318-10
PROJECT:	JPWB	SAMPLE NUMBER:	TH11 - 11D - 15-16.5ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	1/30/2024	SOURCE:	Borehole TH11
SAMPLE DESCRIPTION:	Sandy Fat Clay, AASHTO = A-7-6		

	Liquid Limit		
Can No.	X7	27	29
Mass of can	20.82	20.75	20.91
Can + wet	32.68	33.42	33.38
Can + dry	28.72	29.08	28.98
%M	50.13	52.10	54.52
Blows N	31	23	15
Blows Required	25-35	20-30	15-25

Plastic Limit	
2A	21
20.61	20.68
32.16	31.91
30.16	30.03
20.94	20.11

LL =	52
PI =	31

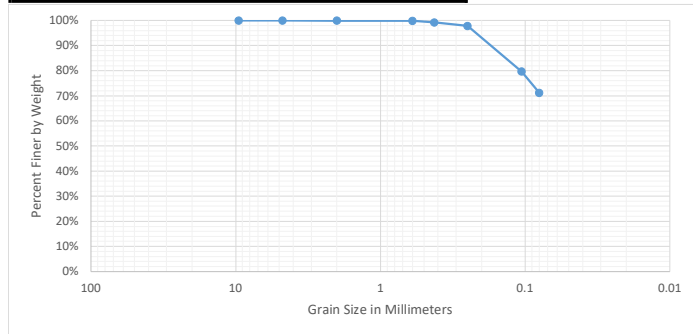
Classification	CH
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CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM C136, ASTM C117
PROJECT:	JPWB Pipeline	SAMPLE NUMBER:	TH1 - 1B - 5-6.5 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	2/7/2024	SOURCE:	Borehole TH1
SAMPLE DESCRIPTION:	Silty Clay with Sand, AASHTO = A-4		

Pan = 266.6					
	Sieve Size	Weight Retained +	Weight Retained	Percent	
Sieve Number	(mm)	Pan (gm)	(gm)	Retained	Percent Finer
0.375	9.53	266.6	0.0	0%	100%
4	4.75	266.6	0.0	0%	100%
10	2	266.7	0.1	0%	100%
30	0.6	266.7	0.2	0%	100%
40	0.425	267.5	0.9	1%	99%
60	0.25	268.8	2.2	2%	98%
140	0.106	294.2	27.7	20%	80%
200	0.08	279.5	13.0	29%	71%
Pan		271.9	108.5	100%	0%
		Total	152.5		

Uniformity Coefficient, Percent Moisture, and Mass Lost				Washing	
Initial Mass:	152.6	% Moisture:	#DIV/0!	Initial Mass	152.6
Final Mass:	152.5	D10:		Mass of Pan + Soil (B)	306.49
% Mass Lost:	0.1%	D30:		Mass of Pan + Soil (A)	203.35
Tin:		D60:		Mass Passing 200	103.1
Tin + M _D :		C _L :	#DIV/0!		
Tin + M _W :		C _U :	#DIV/0!		



Reviewed by: Zack Meek Date: 3/14/2024

Criteria for assigning group symbols and group names using laboratory tests ^a				Soil classification		
				Group symbol	Group name ^b	
Coarse-grained soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines ^c	$C_u \geq 4$ and $1 \leq C_u \leq 3$	GW	Well graded gravel ^d	
		Gravels with Fines More than 12% fines ^c	$C_u < 4$ and/or $1 > C_u > 3$	GP	Poorly graded gravel ^d	
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines ^d	$C_u \geq 6$ and $1 \leq C_u \leq 3$	SW	Well-graded sand ^d	
		Sand with Fines More than 12% fines ^d	$C_u < 6$ and/or $1 > C_u > 3$	SP	Poorly graded sand ^d	
		Silt and Clays Liquid limit less than 50	Inorganic	Fines classify as ML or MH Fines classify as CL or CH	SM	Silty sand ^{e, h, i}
			Organic	Liquid limit—oven dried Liquid limit—not dried	SC	Clayey sand ^{i, h, n}
Fine-grained soils 50% or more passes the No. 200 sieve	Silt and Clays Liquid limit less than 50	Inorganic	PI ≥ 7 and plots on or above "A" line ^j	CL	Lean clay ^{j, l, m}	
		Inorganic	PI < 4 or plots below "A" line ^j	ML	Silt ^{k, l, n}	
	Silt and Clays Liquid limit 50 or more	Organic	Liquid limit—oven dried Liquid limit—not dried	OL	Organic clay ^{k, l, m, p} Organic silt ^{k, l, m, q}	
		Inorganic	PI plots on or above "A" line	CH	Fat clay ^{k, l, m}	
			PI plots below "A" line	MH	Elastic silt ^{k, l, m}	
		Organic	Liquid limit—oven dried Liquid limit—not dried	OH	Organic clay ^{k, l, m, p} Organic silt ^{k, l, m, q}	
Highly organic soils				Primarily organic matter, dark in color, and organic odor	PT	Peat

^aBased on the material passing the 75-mm. (3-in.) sieve.

^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^cGravels with 5 to 12% fines require dual symbols: GW-GM well graded gravel with silt; GW-GC well graded gravel with clay; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay.

^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SW-SC well-graded sand with clay; SP-SM poorly graded sand with silt; SP-SC poorly graded sand with clay.

^eIf soil contains $\geq 15\%$ sand, add "with sand" to group name.

^fIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.

^gIf fines are organic, add "with organic fines" to group name.

^hIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

ⁱIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

^jIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.

^kIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.

^lIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^mPI ≥ 4 and plots on or above "A" line.

ⁿPI < 4 or plots below "A" line.

^oPI plots on or above "A" line.

^pPI plots below "A" line.

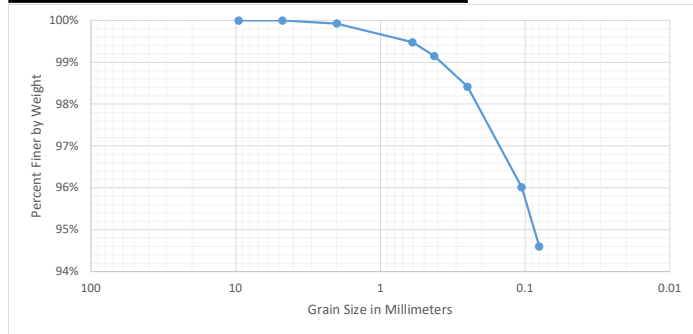
^aBased on the material passing the 75-mm (3-in) sieve.
^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^cGravels with 5 to 12% fines require dual symbols: GW-GM well graded gravel with silt; GP-GM poorly graded gravel with silt; GM well graded gravel with clay; GP-GM poorly graded gravel with clay; GP-GC poorly graded gravel with clay.
^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SP-SM poorly graded sand with silt; SP-SC poorly graded sand with clay.
^eIf soil contains $\geq 15\%$ sand, add "with sand" to group name.
^fIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
^gIf fines are organic, add "with organic fines" to group name.
^hIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
ⁱIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.
^jIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.
^kIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
^lIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
^mPI ≥ 4 and plots on or above "A" line.
ⁿPI < 4 or plots below "A" line.
^oPI plots on or above "A" line.
^pPI plots below "A" line.

CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM C136, ASTM C117
PROJECT:	JPWB Pipeline	SAMPLE NUMBER:	TH1 - 1C - 10-11.5 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	2/7/2024	SOURCE:	Borehole TH1
SAMPLE DESCRIPTION:	Lean Clay, AASHTO = A-6		

Pan = 266.6

Sieve Number	Sieve Size (mm)	Weight Retained + Pan (gm)	Weight Retained (gm)	Percent Retained	Percent Finer
0.375	9.53	266.6	0.0	0%	100%
4	4.75	266.6	0.0	0%	100%
10	2	266.7	0.2	0%	100%
30	0.6	267.6	1.0	1%	99%
40	0.425	267.3	0.7	1%	99%
60	0.25	268.2	1.6	2%	98%
140	0.106	271.8	5.2	4%	96%
200	0.08	269.7	3.1	5%	95%
Pan		269.0	206.1	100%	0%
Total		217.8			

Uniformity Coefficient, Percent Moisture, and Mass Lost				Washing	
Initial Mass:	217.8	% Moisture:	#DIV/0!	Initial Mass	217.8
Final Mass:	217.8	D10:		Mass of Pan + Soil (B)	372.27
% Mass Lost:	0.0%	D30:		Mass of Pan + Soil (A)	168.57
Tin:		D60:		Mass Passing 200	203.7
Tin + M _D :		C _c :	#DIV/0!		
Tin + M _W :		C _u :	#DIV/0!		



Reviewed by: Zack Meek Date: 3/14/2024

Criteria for assigning group symbols and group names using laboratory tests ^a				Soil classification	
				Group symbol	Group name ^b
Coarse-grained soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines ^c	$C_u \geq 4$ and $1 \leq C_u \leq 3$ $C_u < 4$ and/or $1 > C_u > 3$	GW	Well graded gravel ^d
		Gravels with Fines More than 12% fines ^c	Fines classify as ML or MH Fines classify as CL or CH	GP	Poorly graded gravel ^d
		Sands 50% or more of coarse fraction passes No. 4 sieve	$C_u \geq 6$ and $1 \leq C_u \leq 3$ $C_u < 6$ and/or $1 > C_u > 3$	SW	Well-graded sand ^d
		Sand with Fines More than 12% fines ^c	Fines classify as ML or MH Fines classify as CL or CH	SP	Poorly graded sand ^d
	Silt and Clays Liquid limit less than 50	Inorganic	$PI \geq 7$ and plots on or above "A" line ^e $PI < 4$ or plots below "A" line ^e	SM	Silt ^{f, g, h}
		Organic	Liquid limit—oven dried Liquid limit—not dried	OL	Organic silt ^{k, l, m, n}
Fine-grained soils 50% or more passes the No. 200 sieve	Silt and Clays Liquid limit less than 50	Inorganic	PI plots on or above "A" line ^e PI plots below "A" line ^e	CH	Clay ^{f, g, h}
		Organic	Liquid limit—oven dried Liquid limit—not dried	MH	Organic clay ^{k, l, m, p}
	Silt and Clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line ^e PI plots below "A" line ^e	CH	Clay ^{f, g, h}
		Organic	Liquid limit—oven dried Liquid limit—not dried	MH	Organic clay ^{k, l, m, p}
				OH	Organic silt ^{k, l, m, q}
				PT	Peat
Highly organic soils				Primarily organic matter, dark in color, and organic odor	
				PT	Peat

^aBased on the material passing the 75-mm. (3-in.) sieve.

^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^cGravels with 5 to 12% fines require dual symbols: GW-GM well graded gravel with silt; GW-GC well graded gravel with clay; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay.

^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SW-SG well-graded sand with clay; SP-SM poorly graded sand with silt; SP-SG poorly graded sand with clay.

^eIf $C_u \geq 4$ and $1 \leq C_u \leq 3$, add "with sand" to group name.

^fIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.

^gIf fines are organic, add "with organic fines" to group name.

^hIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

ⁱIf soil contains 15 to 29% plus No. 200 and "with sand" or "with gravel," whichever is predominant.

^jIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.

^kIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^l $PI \geq 4$ and plots on or above "A" line.

^m $PI < 4$ or plots below "A" line.

ⁿ PI plots on or above "A" line.

^o PI plots below "A" line.

^aBased on the material passing the 75-mm (3-in) sieve.
^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^cGravels with 5 to 12% fines require dual symbols: GW-GM well graded gravel with silt; GP-GM poorly graded gravel with silt; GM well graded gravel with clay; GW-GC well graded gravel with clay; GP-GC poorly graded gravel with clay.
^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SP-SM poorly graded sand with silt; SP-SC poorly graded sand with clay.
^eIf PI plots on or above "A" line, soil is a CL-MH, silty clay.
^fIf PI plots below "A" line, soil is a CL-MH, silty clay.

$C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
^gIf soil contains $\geq 15\%$ sand, add "with sand" to group name.
^hIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
ⁱIf fines are organic, add "with organic fines" to group name.
^jIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
^kIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

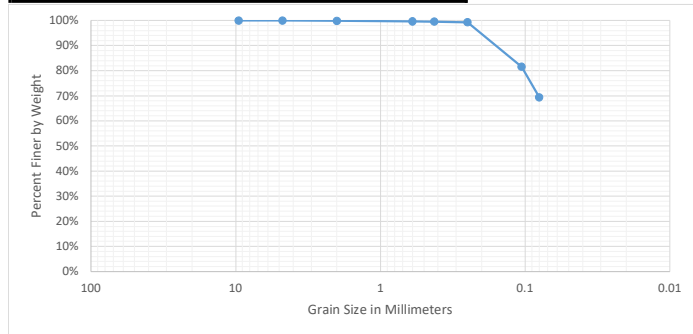
^lIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.
^mIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
ⁿIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
^o $PI \geq 4$ and plots on or above "A" line.
^p $PI < 4$ or plots below "A" line.
^q PI plots on or above "A" line.
^r PI plots below "A" line.

CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM C136, ASTM C117
PROJECT:	JPWB Pipeline	SAMPLE NUMBER:	TH1 - 1D - 15-16.5 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	2/7/2024	SOURCE:	MPR
SAMPLE DESCRIPTION:	Sandy Silty Clay, AASHTO = A-4		

Pan = 266.6

Sieve Number	Sieve Size (mm)	Weight Retained + Pan (gm)	Weight Retained (gm)	Percent Retained	Percent Finer
0.375	9.53	266.6	0.0	0%	100%
4	4.75	266.6	0.0	0%	100%
10	2	267.1	0.6	0%	100%
30	0.6	267.7	1.2	0%	100%
40	0.425	266.8	0.2	0%	100%
60	0.25	267.7	1.1	1%	99%
140	0.106	344.4	77.9	18%	82%
200	0.08	319.6	53.0	31%	69%
Pan		279.9	302.4	100%	0%
Total		436.3			

Uniformity Coefficient, Percent Moisture, and Mass Lost				Washing	
Initial Mass:	437.6	% Moisture:	#DIV/0!	Initial Mass	437.6
Final Mass:	436.3	D10:		Mass of Pan + Soil (B)	832.44
% Mass Lost:	0.3%	D30:		Mass of Pan + Soil (A)	543.38
Tin:		D60:		Mass Passing 200	289.1
Tin + M _D :		C _c :	#DIV/0!		
Tin + M _W :		C _u :	#DIV/0!		



Reviewed by: Zack Meek Date: 3/14/2024

Criteria for assigning group symbols and group names using laboratory tests ^a				Soil classification			
				Group symbol	Group name ^b		
Coarse-grained soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines ^c	$C_u \geq 4$ and $1 \leq C_c \leq 3$	GW	Well graded gravel ^f		
		Gravels with Fines More than 12% fines ^c	$C_u < 4$ and/or $1 > C_c > 3$	GP	Poorly graded gravel ^f		
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines ^d	$C_u \geq 6$ and $1 \leq C_c \leq 3$	SW	Well-graded sand ^f		
			$C_u < 6$ and/or $1 > C_c > 3$	SP	Poorly graded sand ^f		
		Sand with Fines More than 12% fines ^d	Fines classify as ML or MH	SM	Silty sand ^{g, h, i}		
			Fines classify as CL or CH	SC	Clayey sand ^{g, h, i}		
Fine-grained soils 50% or more passes the No. 200 sieve	Silt and Clays Liquid limit less than 50	Inorganic	PI > 7 and plots on or above "A" line ^j	CL	Lean clay ^{k, l, m}		
			PI < 4 or plots below "A" line ^j	ML	Silt ^{k, l, n}		
	Silt and Clays Liquid limit 50 or more	Organic	Liquid limit—oven dried Liquid limit—not dried	$U < 0.75$	OL	Organic clay ^{k, l, m, n} Organic silt ^{k, l, m, n}	
		Inorganic		PI plots on or above "A" line	CH	Fat clay ^{k, l, m}	
				PI plots below "A" line	MH	Elastic silt ^{k, l, m}	
		Organic		Liquid limit—oven dried Liquid limit—not dried	$U < 0.75$	OH	Organic clay ^{k, l, m, p} Organic silt ^{k, l, m, q}
						PT	Peat
		Highly organic soils		Primarily organic matter, dark in color, and organic odor			

^aBased on the material passing the 75-mm. (3-in.) sieve.
^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^cGravels with 5 to 12% fines require dual symbols: GW-GM well graded gravel with silt; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay.
^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SW-SC well-graded sand with clay; SP-SM poorly graded sand with silt; SP-SC poorly graded sand with clay.

^e $C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

^fIf soil contains $\geq 15\%$ sand, add "with sand" to group name.
^gIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
^hIf fines are organic, add "with organic fines" to group name.
ⁱIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
^jIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

^kIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.
^lIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
^mIf soil contains $\geq 33\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
ⁿPI ≥ 4 and plots on or above "A" line.
^oPI < 4 or plots below "A" line.
^pPI plots on or above "A" line.
^qPI plots below "A" line.

^aBased on the material passing the 75-mm (3-in) sieve.
^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^cGravels with 5 to 12% fines require dual symbols: GW-GM well graded gravel with silt; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay.
^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SP-SM poorly graded sand with silt; SP-SC poorly graded sand with clay.
^e $C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
^fIf soil contains $\geq 15\%$ sand, add "with sand" to group name.
^gIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
^hIf fines are organic, add "with organic fines" to group name.
ⁱIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
^jIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.
^kIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.
^lIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
^mIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
ⁿPI ≥ 4 and plots on or above "A" line.
^oPI < 4 or plots below "A" line.
^pPI plots on or above "A" line.
^qPI plots below "A" line.

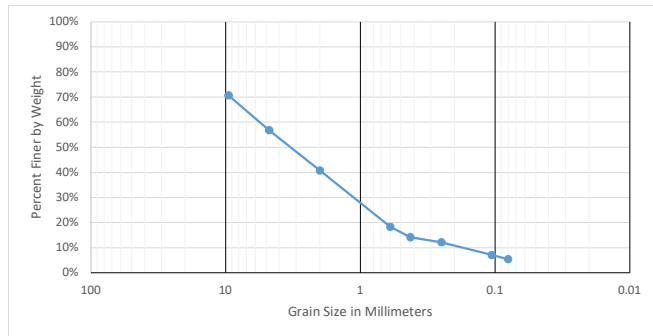
CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM C136, ASTM C117
PROJECT:	JPWB Pipeline	SAMPLE NUMBER:	TH1 - 1E - 20-21.5 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	2/7/2024	SOURCE:	Borehole TH1
SAMPLE DESCRIPTION:	SW-SM - Well-graded sand with silt and gravel, AASHTO = A-1-a		

Pan = 266.6

Sieve Number	Sieve Size (mm)	Weight Retained + Pan (gm)	Weight Retained (gm)	Percent Retained	Percent Finer
0.375	9.53	330.7	64.1	29%	71%
4	4.75	296.9	30.4	43%	57%
10	2	301.6	35.1	59%	41%
30	0.6	315.5	48.9	82%	18%
40	0.425	275.8	9.2	86%	14%
60	0.25	270.9	4.3	88%	12%
140	0.106	277.6	11.0	93%	7%
200	0.08	270.3	3.7	95%	5%
Pan		267.7	11.7	100%	0%

Total 218.4

Uniformity Coefficient, Percent Moisture, and Mass Lost				Washing	
Initial Mass:	218.6	% Moisture:	#DIV/0!	Initial Mass	218.6
Final Mass:	218.4	D10:	0.18	Mass of Pan + Soil (B)	375.12
% Mass Lost:	0.1%	D30:	1.20	Mass of Pan + Soil (A)	364.53
Tin:		D60:	5.70	Mass Passing 200	10.6
Tin + M _D :		C _c :	1		
Tin + M _W :		C _u :	32		



Reviewed by: Zack Meek

Date: 3/14/2024

Criteria for assigning group symbols and group names using laboratory tests ^a				Soil classification			
				Group symbol	Group name ^b		
Coarse-grained soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines ^c	$C_u \geq 4$ and $1 \leq C_u \leq 3$	GW	Well-graded gravel ^f		
		Gravels with Fines More than 12% fines ^c	$C_u < 4$ and/or $1 > C_u > 3$	GP	Poorly-graded gravel ^f		
			Fines classify as ML or MH	GM	Silty gravel ^{f,g,h}		
			Fines classify as CL or CH	GC	Clayey gravel ^{f,g,h}		
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines ^d	$C_u \geq 6$ and $1 \leq C_u \leq 3$	SW	Well-graded sand ^f		
		Sand with Fines More than 12% fines ^d	$C_u < 6$ and/or $1 > C_u > 3$	SP	Poorly-graded sand ^f		
Fines classify as ML or MH			SM	Silty sand ^{f,g,h}			
		Fines classify as CL or CH	SC	Clayey sand ^{f,g,h}			
Fine-grained soils 50% or more passes the No. 200 sieve	Silt and Clays Liquid limit less than 50	Inorganic	PI ≥ 7 and plots on or above "A" line ⁱ	CL	Lean clay ^{k,l,m}		
			PI < 4 or plots below "A" line ⁱ	ML	Silt ^{k,l,n}		
		Organic	Liquid limit—oven dried	$U < 0.75$	OL	Organic clay ^{k,l,m,p}	
			Liquid limit—not dried		Organic silt ^{k,l,n,q}		
	Silt and Clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line	CH	Fat clay ^{k,l,m}		
			PI plots below "A" line	MH	Elastic silt ^{k,l,m}		
		Organic	Liquid limit—oven dried	$U < 0.75$	OH	Organic clay ^{k,l,m,p}	
			Liquid limit—not dried		Organic silt ^{k,l,n,q}		
			Primarily organic matter, dark in color, and organic odor		PT	Peat	

^aBased on the material passing the 75-mm. (3-in.) sieve.

^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^cGravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt; GW-GC well-graded gravel with clay; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay.

^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SW-SC well-graded sand with clay; SP-SM poorly graded sand with silt; SP-SC poorly graded sand with clay.

^eIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

^fIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.

^gIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.

^hIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

ⁱPI ≥ 4 and plots on or above "A" line.

^jPI < 4 or plots below "A" line.

^kPI plots on or above "A" line.

^lPI plots below "A" line.

^aBased on the material passing the 75-mm (3-in) sieve.
^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^cGravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay.
^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SP-SM poorly graded sand with silt; SP-SC poorly graded sand with clay.

$C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
^eIf soil contains $\geq 15\%$ sand, add "with sand" to group name.
^fIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
^gIf fines are organic, add "with organic fines" to group name.
^hIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
ⁱIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

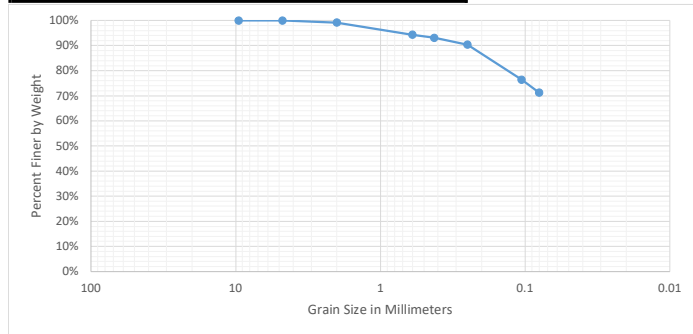
^jIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.
^kIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
^lIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
^mPI ≥ 4 and plots on or above "A" line.
ⁿPI < 4 or plots below "A" line.
^oPI plots on or above "A" line.
^pPI plots below "A" line.

CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM C136, ASTM C117
PROJECT:	JPWB Pipeline	SAMPLE NUMBER:	TH2 - 2B - 5-6.5 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	2/7/2024	SOURCE:	Borehole TH2
SAMPLE DESCRIPTION:	Lean Clay with Sand, AASHTO = A-7-6		

Pan = 266.6

Sieve Number	Sieve Size (mm)	Weight Retained + Pan (gm)	Weight Retained (gm)	Percent Retained	Percent Finer
0.375	9.53	266.6	0.0	0%	100%
4	4.75	266.6	0.0	0%	100%
10	2	269.2	2.6	1%	99%
30	0.6	281.3	14.7	6%	94%
40	0.425	270.1	3.6	7%	93%
60	0.25	274.9	8.3	10%	90%
140	0.106	308.6	42.1	24%	76%
200	0.08	282.3	15.7	29%	71%
Pan		283.4	214.6	100%	0%
Total		301.5			

Uniformity Coefficient, Percent Moisture, and Mass Lost				Washing	
Initial Mass:	302.4	% Moisture:	#DIV/0!	Initial Mass	302.4
Final Mass:	301.5	D10:		Mass of Pan + Soil (B)	681.91
% Mass Lost:	0.3%	D30:		Mass of Pan + Soil (A)	484.13
Tin:		D60:		Mass Passing 200	197.8
Tin + M _D :		C _L :	#DIV/0!		
Tin + M _W :		C _U :	#DIV/0!		



Reviewed by: Zack Meek Date: 3/14/2024

Criteria for assigning group symbols and group names using laboratory tests ^a				Soil classification			
				Group symbol	Group name ^b		
Coarse-grained soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines ^c	$C_u \geq 4$ and $1 \leq C_c \leq 3$	GW	Well-graded gravel ^d		
		Gravels with Fines More than 12% fines ^c	$C_u < 4$ and/or $1 > C_c > 3$	GP	Poorly-graded gravel ^d		
			Fines classify as ML or MH	GM	Silty gravel ^{d,e,h}		
			Fines classify as CL or CH	GC	Clayey gravel ^{d,e,h}		
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines ^d	$C_u \geq 6$ and $1 \leq C_c \leq 3$	SW	Well-graded sand ^f		
			$C_u < 6$ and/or $1 > C_c > 3$	SP	Poorly-graded sand ^f		
Sand with Fines More than 12% fines ^d		Fines classify as ML or MH	SM	Silty sand ^{f,h,i}			
		Fines classify as CL or CH	SC	Clayey sand ^{f,h,i}			
Fine-grained soils 50% or more passes the No. 200 sieve	Silt and Clays Liquid limit less than 50	Inorganic	PI ≥ 7 and plots on or above "A" line ^j	CL	Lean clay ^{k,l,m}		
			PI < 4 or plots below "A" line ^j	ML	Silt ^{k,l,n}		
		Organic	Liquid limit—oven dried	$U < 0.75$	OL	Organic clay ^{k,l,m,q}	
			Liquid limit—not dried			Organic silt ^{k,l,n,q}	
	Silt and Clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line	CH	Fat clay ^{k,l,m}		
			PI plots below "A" line	MH	Elastic silt ^{k,l,m}		
		Organic	Liquid limit—oven dried	$U < 0.75$	OH	Organic clay ^{k,l,m,p}	
			Liquid limit—not dried			Organic silt ^{k,l,n,q}	
Highly organic soils		Primarily organic matter, dark in color, and organic odor		PT	Peat		

^aBased on the material passing the 75-mm (3-in.) sieve. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^bGravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt; GP-GC poorly graded gravel with clay; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay.

^cSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SW-SC well-graded sand with clay; SP-SM poorly graded sand with silt; SP-SC poorly graded sand with clay.

^dIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^eIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.

^fIf fines are organic, add "with organic fines" to group name.

^gIf soil contains >15% gravel, add "with gravel" to group name.

^hIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

ⁱIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.

^jIf soil contains >30% plus No. 200, predominantly sand, add "sandy" to group name.

^kIf soil contains >33% plus No. 200, predominantly gravel, add "gravelly" to group name.

^lPI ≥ 4 and plots on or above "A" line.

^mPI < 4 or plots below "A" line.

ⁿPI plots on or above "A" line.

^oPI plots below "A" line.

^aBased on the material passing the 75-mm (3-in) sieve.
^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^cGravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt; GP-GM poorly-graded gravel with silt; GP-GC poorly-graded gravel with clay.
^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SP-SM poorly-graded sand with silt; SP-SC poorly-graded sand with clay.

$C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
^eIf soil contains $\geq 15\%$ sand, add "with sand" to group name.
^fIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
^gIf fines are organic, add "with organic fines" to group name.
^hIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
ⁱIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

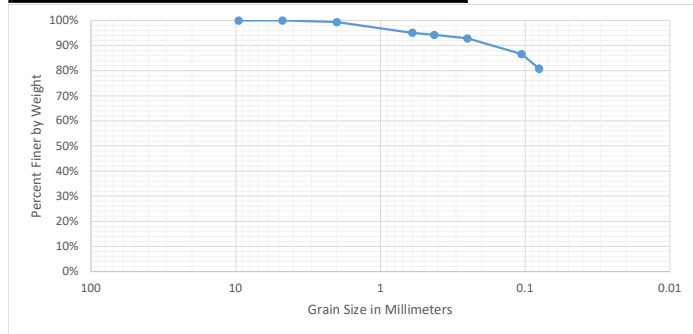
^jIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.
^kIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
^lIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
^mPI ≥ 4 and plots on or above "A" line.
ⁿPI < 4 or plots below "A" line.
^oPI plots on or above "A" line.
^pPI plots below "A" line.

CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM C136, ASTM C117
PROJECT:	JPWB Pipeline	SAMPLE NUMBER:	TH2 - 2C - 10-11.5 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	2/7/2024	SOURCE:	TH2
SAMPLE DESCRIPTION:	Lean Clay with Sand, AASHTO = A-6		

Pan = 266.6

Sieve Number	Sieve Size (mm)	Weight Retained + Pan (gm)	Weight Retained (gm)	Percent Retained	Percent Finer
0.375	9.53	266.6	0.0	0%	100%
4	4.75	266.6	0.0	0%	100%
10	2	267.8	1.3	1%	99%
30	0.6	274.3	7.8	5%	95%
40	0.425	268.1	1.5	6%	94%
60	0.25	269.1	2.6	7%	93%
140	0.106	278.1	11.6	13%	87%
200	0.08	277.2	10.7	19%	81%
Pan		272.1	148.5	100%	0%
Total		183.8			

Uniformity Coefficient, Percent Moisture, and Mass Lost				Washing	
Initial Mass:	183.8	% Moisture:	#DIV/0!	Initial Mass	183.8
Final Mass:	183.8	D10:		Mass of Pan + Soil (B)	616.15
% Mass Lost:	0.0%	D30:		Mass of Pan + Soil (A)	473.22
Tin:		D60:		Mass Passing 200	142.9
Tin + M _D :		C _L :	#DIV/0!		
Tin + M _W :		C _U :	#DIV/0!		



Reviewed by: Zack Meek Date: 3/14/2024

Criteria for assigning group symbols and group names using laboratory tests ^a				Soil classification		
				Group symbol	Group name ^b	
Coarse-grained soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines ^c	$C_u \geq 4$ and $1 \leq C_c \leq 3$	GW	Well-graded gravel ^f	
		Gravels with Fines More than 12% fines ^c	$C_u < 4$ and/or $1 > C_c > 3$	GP	Poorly-graded gravel ^f	
			Fines classify as ML or MH	GM	Silty gravel ^{f,g,h}	
		Fines classify as CL or CH	GC	Clayey gravel ^{f,g,h}		
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines ^d	$C_u \geq 6$ and $1 \leq C_c \leq 3$	SW	Well-graded sand ^f	
		$C_u < 6$ and/or $1 > C_c > 3$	SP	Poorly-graded sand ^f		
Fine-grained soils 50% or more passes the No. 200 sieve	Silt and Clays Liquid limit less than 50	Inorganic	Fines classify as ML or MH	SM	Silty sand ^{f,g,h}	
			Fines classify as CL or CH	SC	Clayey sand ^{f,g,h}	
		Organic	PI ≥ 7 and plots on or above "A" line ⁱ	CL	Lean clay ^{k,l,m,n}	
			PI < 4 or plots below "A" line ⁱ	ML	Silt ^{k,l,n}	
	Silt and Clays Liquid limit 50 or more	Inorganic	Liquid limit—oven dried	$U < 0.75$	OL	Organic clay ^{k,l,m,n}
			Liquid limit—not dried			Organic silt ^{k,l,m,n}
Organic		PI plots on or above "A" line	CH	Fat clay ^{k,l,m}		
		PI plots below "A" line	MH	Elastic silt ^{k,l,m}		
Highly organic soils	Primarily organic matter, dark in color, and organic odor	Liquid limit—oven dried	$U < 0.75$	OH	Organic clay ^{k,l,m,p}	
		Liquid limit—not dried			Organic silt ^{k,l,m,q}	
		PT	Peat			

^aBased on the material passing the 75-mm (3-in.) sieve.
^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^cGravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt; GP-GC poorly graded gravel with clay; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay.
^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SW-SC well-graded sand with clay; SP-SM poorly graded sand with silt; SP-SC poorly graded sand with clay.

$C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

^eIf soil contains $\geq 15\%$ sand, add "with sand" to group name.
^fIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
^gIf fines are organic, add "with organic fines" to group name.
^hIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
ⁱIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

^jIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.
^kIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
^lIf soil contains $\geq 33\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
^mPI ≥ 4 and plots on or above "A" line.
ⁿPI < 4 or plots below "A" line.
^oPI plots on or above "A" line.
^pPI plots below "A" line.

^aBased on the material passing the 75-mm (3-in) sieve.
^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^cGravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt; GP-GM poorly-graded gravel with silt; GP-GC poorly-graded gravel with clay.
^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SP-SM poorly-graded sand with silt; SP-SC poorly-graded sand with clay.

$C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
^eIf soil contains $\geq 15\%$ sand, add "with sand" to group name.
^fIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
^gIf fines are organic, add "with organic fines" to group name.
^hIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
ⁱIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

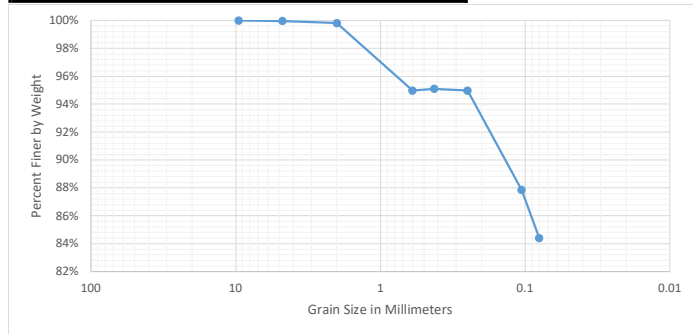
^jIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.
^kIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
^lIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
^mPI ≥ 4 and plots on or above "A" line.
ⁿPI < 4 or plots below "A" line.
^oPI plots on or above "A" line.
^pPI plots below "A" line.

CLIENT: Sunrise Engineering	TECHNICIAN: MPR
JOB NUMBER: 24-1004	TEST METHOD: ASTM C136, ASTM C117
PROJECT: JPWB Pipeline	SAMPLE NUMBER: TH2 - 2E - 20-21.5 ft
SAMPLE DATE: 1/10/2024	SAMPLED BY: JCP
TEST DATE: 2/7/2024	SOURCE: Borehole TH2
SAMPLE DESCRIPTION: Lean Clay with Sand, AASHTO = A-6	

Pan = 266.6

Sieve Number	Sieve Size (mm)	Weight Retained + Pan (gm)	Weight Retained (gm)	Percent Retained	Percent Finer
0.375	9.53	266.6	0.0	0%	100%
4	4.75	266.8	0.2	0%	100%
10	2	267.3	0.7	0%	100%
30	0.6	290.1	23.5	5%	95%
40	0.425	266.0	-0.6	5%	95%
60	0.25	267.2	0.6	5%	95%
140	0.106	301.2	34.6	12%	88%
200	0.08	283.3	16.8	16%	84%
Pan		272.0	409.7	100%	0%
Total		485.5			

Uniformity Coefficient, Percent Moisture, and Mass Lost				Washing	
Initial Mass:	485.9	% Moisture:	#DIV/0!	Initial Mass	485.9
Final Mass:	485.5	D10:		Mass of Pan + Soil (B)	878.08
% Mass Lost:	0.1%	D30:		Mass of Pan + Soil (A)	473.84
Tin:		D60:		Mass Passing 200	404.2
Tin + M _D :		C _L :	#DIV/0!		
Tin + M _W :		C _U :	#DIV/0!		



Reviewed by: Zack Meek Date: 3/14/2024

Criteria for assigning group symbols and group names using laboratory tests ^a				Soil classification		
				Group symbol	Group name ^b	
Coarse-grained soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines ^c	$C_u \geq 4$ and $1 \leq C_c \leq 3$	GW	Well graded gravel ^f	
		Gravels with Fines More than 12% fines ^c	$C_u < 4$ and/or $1 > C_c > 3$	GP	Poorly graded gravel ^f	
			Fines classify as ML or MH	GM	Silty gravel ^{f,g,h}	
			Fines classify as CL or CH	GC	Clayey gravel ^{f,g,h}	
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines ^d	$C_u \geq 6$ and $1 \leq C_c \leq 3$	SW	Well-graded sand ^f	
		Sand with Fines More than 12% fines ^d	$C_u < 6$ and/or $1 > C_c > 3$	SP	Poorly graded sand ^f	
Fines classify as ML or MH			SM	Silty sand ^{f,g,h,i}		
		Fines classify as CL or CH	SC	Clayey sand ^{f,g,h,i}		
Fine-grained soils 50% or more passes the No. 200 sieve	Silt and Clays Liquid limit less than 50	Inorganic	PI ≥ 7 and plots on or above "A" line ^j	CL	Lean clay ^{k,l,m}	
			PI < 4 or plots below "A" line ^j	ML	Silt ^{k,l,n}	
		Organic	Liquid limit—oven dried	$U < 0.75$	OL	Organic clay ^{k,l,m,q}
			Liquid limit—not dried			Organic silt ^{k,l,m,q}
	Silt and Clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line	CH	Fat clay ^{k,l,m}	
			PI plots below "A" line	MH	Elastic silt ^{k,l,m}	
		Organic	Liquid limit—oven dried	$U < 0.75$	OH	Organic clay ^{k,l,m,p}
			Liquid limit—not dried			Organic silt ^{k,l,m,q}
	Highly organic soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

^aBased on the material passing the 75-mm. (3-in.) sieve.

^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^cGravels with 5 to 12% fines require dual symbols: GW-GM well graded gravel with silt; GW-GC well graded gravel with clay; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay.

^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SW-SC well-graded sand with clay; SP-SM poorly graded sand with silt; SP-SC poorly graded sand with clay.

^eIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

^fIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.

^gIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.

^hIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

ⁱPI ≥ 4 and plots on or above "A" line.

^jPI < 4 or plots below "A" line.

^kPI plots on or above "A" line.

^lPI plots below "A" line.

^aBased on the material passing the 75-mm (3-in) sieve.
^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^cGravels with 5 to 12% fines require dual symbols: GW-GM well graded gravel with silt; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay.
^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SP-SM poorly graded sand with silt; SP-SC poorly graded sand with clay.

$C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
^fIf soil contains $\geq 15\%$ sand, add "with sand" to group name.
^gIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
^hIf fines are organic, add "with organic fines" to group name.
ⁱIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
^jIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

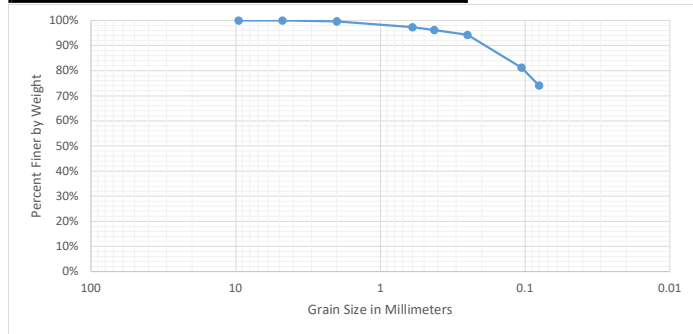
^kIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.
^lIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
^mIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
ⁿPI ≥ 4 and plots on or above "A" line.
^oPI < 4 or plots below "A" line.
^pPI plots on or above "A" line.
^qPI plots below "A" line.

CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	23-1004	TEST METHOD:	ASTM C136, ASTM C117
PROJECT:	JPWB Pipeline	SAMPLE NUMBER:	TH3 -3D - 15-16.5ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	2/1/2024	SOURCE:	TH3
SAMPLE DESCRIPTION:	Lean Clay with Sand, AASHTO = A-6,		

Pan = 266.6

Sieve Number	Sieve Size (mm)	Weight Retained + Pan (gm)	Weight Retained (gm)	Percent Retained	Percent Finer
0.375	9.53	266.7	0.1	0%	100%
4	4.75	266.7	0.1	0%	100%
10	2	268.3	1.7	0%	100%
30	0.6	279.6	13.0	3%	97%
40	0.425	272.9	6.3	4%	96%
60	0.25	277.8	11.2	6%	94%
140	0.106	339.5	72.9	19%	81%
200	0.08	306.3	39.7	26%	74%
Pan		280.3	412.5	100%	0%
Total		557.6			

Uniformity Coefficient, Percent Moisture, and Mass Lost				Washing	
Initial Mass:	559.3	% Moisture:	#DIV/0!	Initial Mass	559.3
Final Mass:	557.6	D10:		Mass of Pan + Soil (B)	964.18
% Mass Lost:	0.3%	D30:		Mass of Pan + Soil (A)	565.36
Tin:		D60:		Mass Passing 200	398.8
Tin + M _D :		C _c :	#DIV/0!		
Tin + M _W :		C _u :	#DIV/0!		



Reviewed by: Zack Meek Date: 3/14/2024

Criteria for assigning group symbols and group names using laboratory tests ^a				Soil classification		
				Group symbol	Group name ^b	
Coarse-grained soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines ^c	$C_u \geq 4$ and $1 \leq C_c \leq 3$	GW	Well graded gravel ^f	
		Gravels with Fines More than 13% fines ^c	$C_u < 4$ and/or $1 > C_c > 3$	GP	Poorly graded gravel ^f	
			Fines classify as ML or MH	GM	Silty gravel ^{f,g,h}	
			Fines classify as CL or CH	GC	Clayey gravel ^{f,g,h}	
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines ^d	$C_u \geq 6$ and $1 \leq C_c \leq 3$	SW	Well-graded sand ^f	
			$C_u < 6$ and/or $1 > C_c > 3$	SP	Poorly graded sand ^f	
Fine-grained soils 50% or more passes the No. 200 sieve	Silt and Clays Liquid limit less than 50	Inorganic	PI ≥ 7 and plots on or above "A" line ^j	CL	Lean clay ^{k,l,m}	
			PI < 4 or plots below "A" line ^j	ML	Silt ^{k,l,n}	
	Silt and Clays Liquid limit 50 or more	Inorganic	Liquid limit—oven dried	< 0.75	OL	Organic clay ^{k,l,m,q}
			Liquid limit—not dried			Organic silt ^{k,l,n,q}
		Inorganic	PI plots on or above "A" line	CH	Fat clay ^{k,l,m}	
			PI plots below "A" line	MH	Elastic silt ^{k,l,m}	
	Organic	Liquid limit—oven dried	< 0.75	OH	Organic clay ^{k,l,m,p}	
		Liquid limit—not dried			Organic silt ^{k,l,n,q}	
	Highly organic soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

^aBased on the material passing the 75-mm. (3-in.) sieve.

^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^cGravels with 5 to 12% fines require dual symbols: GW-GM well graded gravel with silt; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay.

^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SP-SM well-graded sand with silt; SP-SW poorly graded sand with silt; SP-SC poorly graded sand with clay.

^eIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^fIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.

^gIf fines are organic, add "with organic fines" to group name.

^hIf silt contains $\geq 15\%$ gravel, add "with gravel" to group name.

ⁱIf silt contains $\geq 15\%$ sand, add "with sand" to group name.

^jIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

^kIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.

^lIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.

^mIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

ⁿPI ≥ 4 and plots on or above "A" line.

^oPI < 4 or plots below "A" line.

^pPI plots on or above "A" line.

^qPI plots below "A" line.

^aBased on the material passing the 75-mm (3-in) sieve.
^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^cGravels with 5 to 12% fines require dual symbols: GW-GM well graded gravel with silt; GW-GC well graded gravel with clay; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay.
^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SW-SC well-graded sand with clay; SP-SM poorly graded sand with silt; SP-SC poorly graded sand with clay.

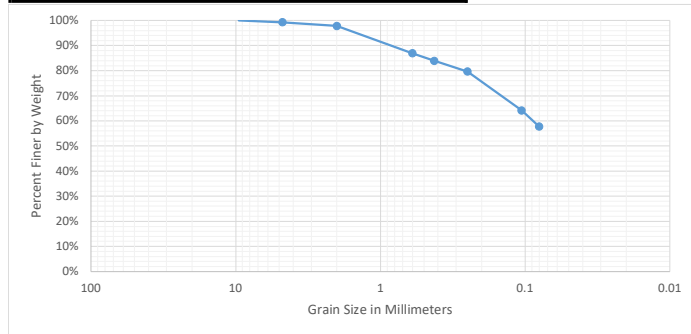
$C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
^eIf soil contains $\geq 15\%$ sand, add "with sand" to group name.
^fIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
^gIf fines are organic, add "with organic fines" to group name.
^hIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
ⁱIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

^jIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.
^kIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
^lIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
^mPI ≥ 4 and plots on or above "A" line.
ⁿPI < 4 or plots below "A" line.
^oPI plots on or above "A" line.
^pPI plots below "A" line.

CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM C136, ASTM C117
PROJECT:	JPWB Pipeline	SAMPLE NUMBER:	TH4 - 4C - 10-11.5 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	2/7/2024	SOURCE:	Borehole TH4
SAMPLE DESCRIPTION:	Sandy Lean Clay, AASHTO = A-6		

Pan = 266.7					
	Sieve Size	Weight Retained +	Weight Retained	Percent	
Sieve Number	(mm)	Pan (gm)	(gm)	Retained	Percent Finer
0.375	9.53	266.6	-0.1	0%	100%
4	4.75	268.3	1.6	1%	99%
10	2	269.8	3.1	2%	98%
30	0.6	289.9	23.2	13%	87%
40	0.425	273.0	6.3	16%	84%
60	0.25	275.8	9.1	20%	80%
140	0.106	299.8	33.1	36%	64%
200	0.08	280.4	13.7	42%	58%
Pan		270.4	122.5	100%	0%
Total		212.6			

Uniformity Coefficient, Percent Moisture, and Mass Lost				Washing	
Initial Mass:	213.1	% Moisture:	#DIV/0!	Initial Mass	213.1
Final Mass:	212.6	D10:		Mass of Pan + Soil (B)	604.04
% Mass Lost:	0.2%	D30:		Mass of Pan + Soil (A)	485.25
Tin:		D60:		Mass Passing 200	118.8
Tin + M _D :		C _c :	#DIV/0!		
Tin + M _W :		C _u :	#DIV/0!		



Reviewed by: Zack Meek Date: 3/14/2024

Criteria for assigning group symbols and group names using laboratory tests ^a				Soil classification				
				Group symbol	Group name ^b			
Coarse-grained soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines ^c	$C_u \geq 4$ and $1 \leq C_c \leq 3$	GW	Well graded gravel ^d			
		Gravels with Fines More than 13% fines ^c	$C_u < 4$ and/or $1 > C_c > 3$	GP	Poorly graded gravel ^d			
			Fines classify as ML or MH	GM	Silty gravel ^{d,e,h}			
			Fines classify as CL or CH	GC	Clayey gravel ^{d,e,h}			
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines ^d	$C_u \geq 6$ and $1 \leq C_c \leq 3$	SW	Well-graded sand ^f			
			$C_u < 6$ and/or $1 > C_c > 3$	SP	Poorly graded sand ^f			
Sand with Fines More than 12% fines ^d		Fines classify as ML or MH	SM	Silty sand ^{f,h,i}				
		Fines classify as CL or CH	SC	Clayey sand ^{f,h,i}				
Fine-grained soils 50% or more passes the No. 200 sieve	Silt and Clays Liquid limit less than 50	Inorganic	PI ≥ 7 and plots on or above "A" line ^j	CL	Lean clay ^{k,l,m}			
			PI < 4 or plots below "A" line ^j	ML	Silt ^{k,l,n}			
		Organic	Liquid limit—oven dried	$U < 0.75$	OL	Organic clay ^{k,l,m,q}		
			Liquid limit—not dried			Organic silt ^{k,l,n,q}		
	Silt and Clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line	CH	Fat clay ^{k,l,m}			
			PI plots below "A" line	MH	Elastic silt ^{k,l,m}			
		Organic	Liquid limit—oven dried	$U < 0.75$	OH	Organic clay ^{k,l,m,p}		
			Liquid limit—not dried			Organic silt ^{k,l,n,q}		
						PT	Peat	

^aBased on the material passing the 75-mm (3-in.) sieve. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^bGravels with 5 to 12% fines require dual symbols: GW-GM well graded gravel with silt; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay.

^cSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SW-SC well-graded sand with clay; SP-SM poorly graded sand with silt; SP-SC poorly graded sand with clay.

^dIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^eIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.

^fIf fines are organic, add "with organic fines" to group name.

^gIf soil contains >15% gravel, add "with gravel" to group name.

^hIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

ⁱIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.

^jIf soil contains >30% plus No. 200, predominantly sand, add "sandy" to group name.

^kIf soil contains >33% plus No. 200, predominantly gravel, add "gravelly" to group name.

^lPI ≥ 4 and plots on or above "A" line.

^mPI < 4 or plots below "A" line.

ⁿPI plots on or above "A" line.

^oPI plots below "A" line.

^aBased on the material passing the 75-mm (3-in) sieve.
^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^cGravels with 5 to 12% fines require dual symbols: GW-GM well graded gravel with silt; GW-GC well graded gravel with clay; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay.
^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SW-SC well-graded sand with clay; SP-SM poorly graded sand with silt; SP-SC poorly graded sand with clay.

$C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
^eIf soil contains $\geq 15\%$ sand, add "with sand" to group name.
^fIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
^gIf fines are organic, add "with organic fines" to group name.
^hIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
ⁱIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

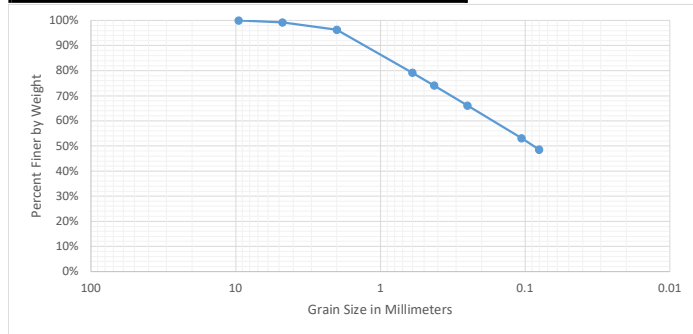
^jIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.
^kIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
^lIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
^mPI ≥ 4 and plots on or above "A" line.
ⁿPI < 4 or plots below "A" line.
^oPI plots on or above "A" line.
^pPI plots below "A" line.

CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM C136, ASTM C117
PROJECT:	JPWB Pipeline	SAMPLE NUMBER:	TH4 - 4E - 20-20.93 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	2/7/2024	SOURCE:	Borehole TH4
SAMPLE DESCRIPTION:	SC - Clayey Sand, AASHTO = A-7-6		

Pan = 266.6

Sieve Number	Sieve Size (mm)	Weight Retained + Pan (gm)	Weight Retained (gm)	Percent Retained	Percent Finer
0.375	9.53	266.6	0.0	0%	100%
4	4.75	267.9	1.3	1%	99%
10	2	271.4	4.9	4%	96%
30	0.6	294.9	28.3	21%	79%
40	0.425	274.9	8.4	26%	74%
60	0.25	279.8	13.2	34%	66%
140	0.106	288.1	21.5	47%	53%
200	0.08	274.1	7.5	51%	49%
Pan		269.0	79.7	100%	0%
Total		164.7			

Uniformity Coefficient, Percent Moisture, and Mass Lost				Washing	
Initial Mass:	165.3	% Moisture:	#DIV/0!	Initial Mass	165.3
Final Mass:	164.7	D10:		Mass of Pan + Soil (B)	598.85
% Mass Lost:	0.3%	D30:		Mass of Pan + Soil (A)	521.59
Tin:		D60:		Mass Passing 200	77.3
Tin + M _D :		C _c :	#DIV/0!		
Tin + M _W :		C _u :	#DIV/0!		



Reviewed by: Zack Meek Date: 3/14/2024

Criteria for assigning group symbols and group names using laboratory tests ^a				Soil classification		
				Group symbol	Group name ^b	
Coarse-grained soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines ^c	$C_u \geq 4$ and $1 \leq C_c \leq 3$	GW	Well-graded gravel ^f	
		Gravels with Fines More than 12% fines ^c	$C_u < 4$ and/or $1 > C_c > 3$	GP	Poorly-graded gravel ^f	
			Fines classify as ML or MH	GM	Silty gravel ^{f,g,h}	
			Fines classify as CL or CH	GC	Clayey gravel ^{f,g,h}	
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines ^d	$C_u \geq 6$ and $1 \leq C_c \leq 3$	SW	Well-graded sand ^f	
			$C_u < 6$ and/or $1 > C_c > 3$	SP	Poorly-graded sand ^f	
Fine-grained soils 50% or more passes the No. 200 sieve	Silt and Clays Liquid limit less than 50	Inorganic	PI ≥ 7 and plots on or above "A" line ^j	CL	Lean clay ^{k,l,m}	
			PI < 4 or plots below "A" line ^j	ML	Silt ^{k,l,n}	
	Silt and Clays Liquid limit 50 or more	Inorganic	Liquid limit—oven dried	$U \leq 0.75$	OL	Organic clay ^{k,l,m,p}
			Liquid limit—not dried			Organic silt ^{k,l,n,q}
		Organic	PI plots on or above "A" line	CH	Fat clay ^{k,l,m}	
			PI plots below "A" line	MH	Elastic silt ^{k,l,m}	
		Organic	Liquid limit—oven dried	$U \leq 0.75$	OH	Organic clay ^{k,l,m,p}
			Liquid limit—not dried			Organic silt ^{k,l,n,q}
	Highly organic soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

^aBased on the material passing the 75-mm. (3-in.) sieve.

^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^cGravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt; GP-GM poorly-graded gravel with silt; GP-GC poorly-graded gravel with clay.

^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SP-SM poorly-graded sand with silt; SP-SC poorly-graded sand with clay.

^eIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^fIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.

^gIf fines are organic, add "with organic fines" to group name.

^hIf silt contains $\geq 15\%$ gravel, add "with gravel" to group name.

ⁱIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

^jIf soil contains ≥ 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^kIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.

^lIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^mPI ≥ 4 and plots on or above "A" line.

ⁿPI < 4 or plots below "A" line.

^oPI plots on or above "A" line.

^pPI plots below "A" line.

^aBased on the material passing the 75-mm (3-in) sieve.
^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^cGravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt; GW-GC well-graded gravel with clay; GP-GM poorly-graded gravel with silt; GP-GC poorly-graded gravel with clay.
^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SW-SC well-graded sand with clay; SP-SM poorly-graded sand with silt; SP-SC poorly-graded sand with clay.

$C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
^eIf soil contains $\geq 15\%$ sand, add "with sand" to group name.
^fIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
^gIf fines are organic, add "with organic fines" to group name.
^hIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
ⁱIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

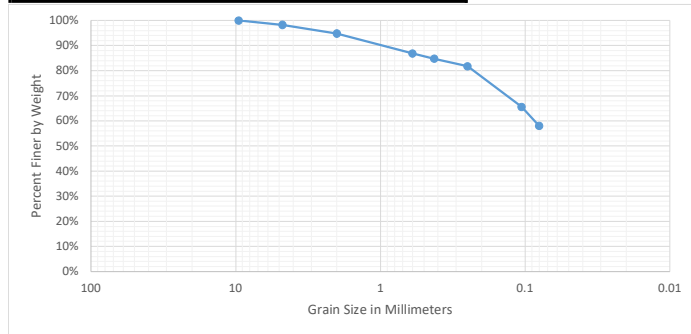
^jIf soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
^kIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
^lIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
^mPI ≥ 4 and plots on or above "A" line.
ⁿPI < 4 or plots below "A" line.
^oPI plots on or above "A" line.
^pPI plots below "A" line.

CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM C136, ASTM C117
PROJECT:	JPWB Pipeline	SAMPLE NUMBER:	TH5 - 5C+5D - 5-11.5 ft
SAMPLE DATE:	1/11/2024	SAMPLED BY:	JCP
TEST DATE:	2/7/2024	SOURCE:	Borehole TH5
SAMPLE DESCRIPTION:	Sandy Lean Clay, AASHTO = A-6		

Pan = 266.6

Sieve Number	Sieve Size (mm)	Weight Retained + Pan (gm)	Weight Retained (gm)	Percent Retained	Percent Finer
0.375	9.53	266.6	0.0	0%	100%
4	4.75	275.9	9.4	2%	98%
10	2	284.8	18.2	5%	95%
30	0.6	308.4	41.8	13%	87%
40	0.425	277.8	11.3	15%	85%
60	0.25	282.6	16.1	18%	82%
140	0.106	352.2	85.6	34%	66%
200	0.08	306.6	40.1	42%	58%
Pan		286.6	306.4	100%	0%
Total		528.8			

Uniformity Coefficient, Percent Moisture, and Mass Lost				Washing	
Initial Mass:	529.2	% Moisture:	#DIV/0!	Initial Mass	529.2
Final Mass:	528.8	D10:		Mass of Pan + Soil (B)	922
% Mass Lost:	0.1%	D30:		Mass of Pan + Soil (A)	635.59
Tin:		D60:		Mass Passing 200	286.4
Tin + M _D :		C _c :	#DIV/0!		
Tin + M _w :		C _u :	#DIV/0!		



Reviewed by: Zack Meek Date: 3/14/2024

Criteria for assigning group symbols and group names using laboratory tests ^a				Soil classification				
				Group symbol	Group name ^b			
Coarse-grained soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines ^c	$C_u \geq 4$ and $1 \leq C_c \leq 3$	GW	Well-graded gravel ^d			
		Gravels with Fines More than 12% fines ^c	$C_u < 4$ and/or $1 > C_c > 3$	GP	Poorly-graded gravel ^d			
			Fines classify as ML or MH	GM	Silty gravel ^{d,e,h}			
			Fines classify as CL or CH	GC	Clayey gravel ^{d,e,h}			
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines ^d	$C_u \geq 6$ and $1 \leq C_c \leq 3$	SW	Well-graded sand ^f			
			$C_u < 6$ and/or $1 > C_c > 3$	SP	Poorly-graded sand ^f			
Sand with Fines More than 12% fines ^d		Fines classify as ML or MH	SM	Silty sand ^{f,h,i}				
		Fines classify as CL or CH	SC	Clayey sand ^{f,h,i}				
Fine-grained soils 50% or more passes the No. 200 sieve	Silt and Clays Liquid limit less than 50	Inorganic	PI ≥ 7 and plots on or above "A" line ^j	CL	Lean clay ^{k,l,m}			
			PI < 4 or plots below "A" line ^j	ML	Silt ^{k,l,n}			
		Organic	Liquid limit—oven dried	$U < 0.75$	OL	Organic clay ^{k,l,m,q}		
			Liquid limit—not dried			Organic silt ^{k,l,m,q}		
	Silt and Clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line	CH	Fat clay ^{k,l,m}			
			PI plots below "A" line	MH	Elastic silt ^{k,l,m}			
		Organic	Liquid limit—oven dried	$U < 0.75$	OH	Organic clay ^{k,l,m,p}		
			Liquid limit—not dried			Organic silt ^{k,l,m,q}		
						PT	Peat	

^aBased on the material passing the 75-mm (3-in.) sieve.
^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^cGravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt; GP-GC poorly graded gravel with clay; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay.
^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SW-SC well-graded sand with clay; SP-SM poorly graded sand with silt; SP-SC poorly graded sand with clay.
^eIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^fGravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt; GP-GC poorly graded gravel with clay; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay.
^gSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SW-SC well-graded sand with clay; SP-SM poorly graded sand with silt; SP-SC poorly graded sand with clay.
^hIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
ⁱIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^jIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^kIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^lIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^mIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
ⁿIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^oIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^pIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^qIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^aBased on the material passing the 75-mm (3-in) sieve.
^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^cGravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt; GP-GM poorly-graded gravel with silt; GP-GC poorly-graded gravel with clay.
^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SP-SM poorly-graded sand with silt; SP-SC poorly-graded sand with clay.

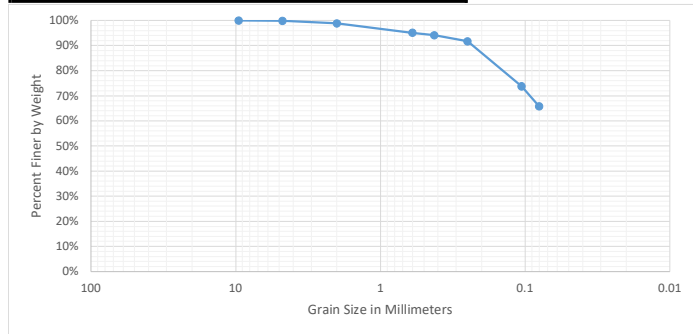
$C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
^eIf soil contains $\geq 15\%$ sand, add "with sand" to group name.
^fIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
^gIf fines are organic, add "with organic fines" to group name.
^hIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
ⁱIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

^jIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.
^kIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
^lIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
^mPI ≥ 4 and plots on or above "A" line.
ⁿPI < 4 or plots below "A" line.
^oPI plots on or above "A" line.
^pPI plots below "A" line.

CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM C136, ASTM C117
PROJECT:	JPWB Pipeline	SAMPLE NUMBER:	TH6 - 6D - 15-16.5 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	2/7/2024	SOURCE:	Borehole TH6
SAMPLE DESCRIPTION:	Sandy Lean Clay, AASHTO = A-6		

Pan = 266.6					
	Sieve Size	Weight Retained +	Weight Retained	Percent	
Sieve Number	(mm)	Pan (gm)	(gm)	Retained	Percent Finer
0.375	9.53	266.6	0.0	0%	100%
4	4.75	267.1	0.5	0%	100%
10	2	269.3	2.7	1%	99%
30	0.6	277.4	10.8	5%	95%
40	0.425	269.2	2.7	6%	94%
60	0.25	273.4	6.8	8%	92%
140	0.106	317.3	50.8	26%	74%
200	0.08	289.3	22.7	34%	66%
Pan		285.1	185.4	100%	0%
		Total	282.4		

Uniformity Coefficient, Percent Moisture, and Mass Lost				Washing	
Initial Mass:	283.2	% Moisture:	#DIV/0!	Initial Mass	283.2
Final Mass:	282.4	D10:		Mass of Pan + Soil (B)	703.1
% Mass Lost:	0.3%	D30:		Mass of Pan + Soil (A)	536.23
Tin:		D60:		Mass Passing 200	166.9
Tin + M _D :		C _L :	#DIV/0!		
Tin + M _W :		C _U :	#DIV/0!		



Reviewed by: Zack Meek Date: 3/14/2024

Criteria for assigning group symbols and group names using laboratory tests ^a				Soil classification			
				Group symbol	Group name ^b		
Coarse-grained soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines ^c	$C_u \geq 4$ and $1 \leq C_u \leq 3$ $C_u < 4$ and/or $1 > C_u > 3$	GW	Well graded gravel ^f		
		Gravels with Fines More than 13% fines ^c	Fines classify as ML or MH Fines classify as CL or CH	GP	Poorly graded gravel ^f		
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines ^d	$C_u \geq 6$ and $1 \leq C_u \leq 3$ $C_u < 6$ and/or $1 > C_u > 3$	SW	Well-graded sand ^f		
		Sands with Fines More than 12% fines ^d	Fines classify as ML or MH Fines classify as CL or CH	SP	Poorly graded sand ^f		
		Silt and Clays Liquid limit less than 50	Inorganic	$PI \geq 7$ and plots on or above "A" line ^d $PI < 4$ or plots below "A" line ^e	SM	Silt ^{h,i,n}	
			Organic	Liquid limit—oven dried Liquid limit—not dried	OL	Organic silt ^{k,l,m,p}	
Fine-grained soils 50% or more passes the No. 200 sieve	Silt and Clays Liquid limit less than 50	Inorganic	PI plots on or above "A" line ^d PI plots below "A" line ^e	CH	Clay ^{h,i,n}		
				MH	Organic clay ^{k,l,m,p}		
	Silt and Clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line ^d PI plots below "A" line ^e	OH	Organic silt ^{k,l,m,p}		
				PT	Peat		
				Highly organic soils		Primarily organic matter, dark in color, and organic odor	

^aBased on the material passing the 75-mm. (3-in.) sieve.

^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^cGravels with 5 to 12% fines require dual symbols: GW-GM well graded gravel with silt; GW-GC well graded gravel with clay; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay.

^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SW-SG well-graded sand with gravel; SP-SM poorly graded sand with silt; SP-SG poorly graded sand with gravel.

^eIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^fIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^gIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^hIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

ⁱIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^jIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^kIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^lIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^mIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

ⁿIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^oIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^pIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^aBased on the material passing the 75-mm (3-in) sieve.
^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^cGravels with 5 to 12% fines require dual symbols: GW-GM well graded gravel with silt; GP-GM poorly graded gravel with silt; GM well graded gravel with clay; GP-GM poorly graded gravel with clay; GP-GC poorly graded gravel with clay.
^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SP-SM poorly graded sand with silt; SP-SC poorly graded sand with clay.
^eIf fines are organic, add "with organic fines" to group name.
^fIf soil contains ≥15% gravel, add "with gravel" to group name.
^gIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

$C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
^hIf soil contains ≥15% sand, add "with sand" to group name.
ⁱIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
^jIf soil contains ≥15% gravel, add "with gravel" to group name.
^kIf soil contains ≥15% gravel, add "with gravel" to group name.
^lIf soil contains ≥15% gravel, add "with gravel" to group name.
^mIf soil contains ≥15% gravel, add "with gravel" to group name.
ⁿIf soil contains ≥15% gravel, add "with gravel" to group name.
^pIf soil contains ≥15% gravel, add "with gravel" to group name.

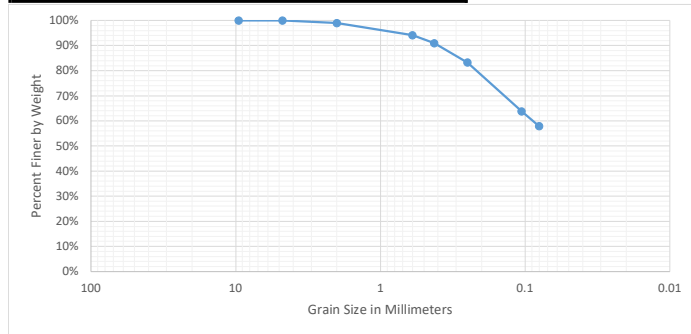
^aIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.
^bIf soil contains ≥30% plus No. 200, predominantly sand, add "sandy" to group name.
^cIf soil contains ≥30% plus No. 200, predominantly gravel, add "gravelly" to group name.
^d $PI \geq 4$ and plots on or above "A" line.
^e $PI < 4$ or plots below "A" line.
^f PI plots on or above "A" line.
^g PI plots below "A" line.

CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM C136, ASTM C117
PROJECT:	JPWB Pipeline	SAMPLE NUMBER:	TH6 - 6E - 20-21.5 ft
SAMPLE DATE:	1/10/2024	SAMPLED BY:	JCP
TEST DATE:	2/7/2024	SOURCE:	Borehole TH6
SAMPLE DESCRIPTION:	Sandy Lean Clay, AASHTO = A-7-6		

Pan = 266.6

Sieve Number	Sieve Size (mm)	Weight Retained + Pan (gm)	Weight Retained (gm)	Percent Retained	Percent Finer
0.375	9.53	266.7	0.1	0%	100%
4	4.75	266.6	0.0	0%	100%
10	2	269.9	3.3	1%	99%
30	0.6	282.6	16.0	6%	94%
40	0.425	276.8	10.2	9%	91%
60	0.25	292.1	25.5	17%	83%
140	0.106	330.3	63.7	36%	64%
200	0.08	286.2	19.6	42%	58%
Pan		277.1	189.1	100%	0%
Total		327.6			

Uniformity Coefficient, Percent Moisture, and Mass Lost				Washing	
Initial Mass:	328.5	% Moisture:	#DIV/0!	Initial Mass	328.5
Final Mass:	327.6	D10:		Mass of Pan + Soil (B)	748.61
% Mass Lost:	0.3%	D30:		Mass of Pan + Soil (A)	570
Tin:		D60:		Mass Passing 200	178.6
Tin + M _D :		C _c :	#DIV/0!		
Tin + M _W :		C _u :	#DIV/0!		



Reviewed by: Zack Meek Date: 3/14/2024

Criteria for assigning group symbols and group names using laboratory tests ^a				Soil classification			
				Group symbol	Group name ^b		
Coarse-grained soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines ^c	$C_u \geq 4$ and $1 \leq C_u \leq 3$ $C_u < 4$ and/or $1 > C_u > 3$	GW	Well graded gravel ^d		
		Gravels with Fines More than 12% fines ^c	Fines classify as ML or MH Fines classify as CL or CH	GP	Poorly graded gravel ^d		
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines ^d	$C_u \geq 6$ and $1 \leq C_u \leq 3$ $C_u < 6$ and/or $1 > C_u > 3$	SW	Well-graded sand ^d		
		Sands with Fines More than 12% fines ^d	Fines classify as ML or MH Fines classify as CL or CH	SP	Poorly graded sand ^d		
		Silt and Clays Liquid limit less than 50	Inorganic	PI ≥ 7 and plots on or above "A" line ^e PI < 4 or plots below "A" line ^e	SM	Silt ^{d, f, n}	
			Organic	Liquid limit—oven dried Liquid limit—not dried	OL	Organic silt ^{d, f, m, n}	
Fine-grained soils 50% or more passes the No. 200 sieve	Silt and Clays Liquid limit less than 50	Inorganic	PI plots on or above "A" line ^e PI plots below "A" line ^e	CH	Clay ^{d, f, n}		
				MH	Elastic silt ^{d, f, m, n}		
	Silt and Clays Liquid limit 50 or more	Organic	Liquid limit—oven dried Liquid limit—not dried	OH	Organic clay ^{d, f, m, n}		
				PT	Peat		
				Highly organic soils		Primarily organic matter, dark in color, and organic odor	

^aBased on the material passing the 75-mm. (3-in.) sieve.

^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^cGravels with 5 to 12% fines require dual symbols: GW-GM well graded gravel with silt; GP-GC well graded gravel with clay; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay.

^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SW-SM well-graded sand with clay; SP-SM poorly graded sand with silt; SP-SC poorly graded sand with clay.

^eIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

^fIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.

^gIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.

^hIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

ⁱPI ≥ 4 and plots on or above "A" line.

^jPI < 4 or plots below "A" line.

^kPI plots on or above "A" line.

^lPI plots below "A" line.

^aBased on the material passing the 75-mm (3-in) sieve.
^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^cGravels with 5 to 12% fines require dual symbols: GW-GM well graded gravel with silt; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay.
^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SP-SM poorly graded sand with silt; SP-SC poorly graded sand with clay.
^eIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^fIf field sample contained silt or clay, add "with silt" or "with clay" to group name.
^gIf field sample contained gravel, add "with gravel" to group name.
^hIf field sample contained sand, add "with sand" to group name.
ⁱIf field sample contained silt or clay, add "with silt" or "with clay" to group name.
^jIf field sample contained gravel, add "with gravel" to group name.
^kIf field sample contained sand, add "with sand" to group name.
^lIf field sample contained silt or clay, add "with silt" or "with clay" to group name.
^mIf field sample contained gravel, add "with gravel" to group name.
ⁿIf field sample contained sand, add "with sand" to group name.

$C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
^aIf soil contains $\geq 15\%$ sand, add "with sand" to group name.
^bIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
^cIf fines are organic, add "with organic fines" to group name.
^dIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
^eIf Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.

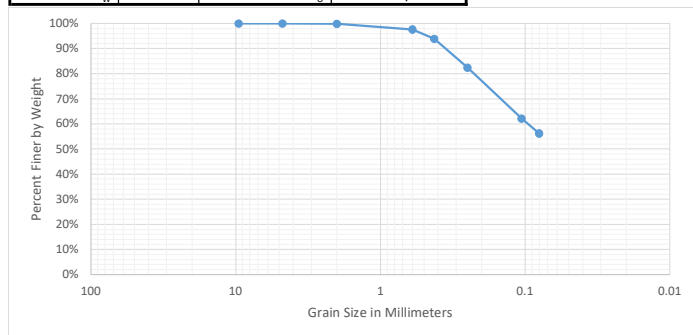
^fIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.
^gIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
^hIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
ⁱPI ≥ 4 and plots on or above "A" line.
^jPI < 4 or plots below "A" line.
^kPI plots on or above "A" line.
^lPI plots below "A" line.

CLIENT:	Sunrise Engineering	TECHNICIAN:	MPR
JOB NUMBER:	24-1004	TEST METHOD:	ASTM C136, ASTM C117
PROJECT:	JPWB Pipeline	SAMPLE NUMBER:	TH11 - 11D - 15-16.5 ft
SAMPLE DATE:	1/11/2024	SAMPLED BY:	JCP
TEST DATE:	2/7/2024	SOURCE:	Borehole TH11
SAMPLE DESCRIPTION:	Sandy Fat Clay, AASHTO = A-7-6		

Pan = 266.6

Sieve Number	Sieve Size (mm)	Weight Retained + Pan (gm)	Weight Retained (gm)	Percent Retained	Percent Finer
0.375	9.53	266.6	0.0	0%	100%
4	4.75	266.6	0.0	0%	100%
10	2	267.0	0.4	0%	100%
30	0.6	272.8	6.3	2%	98%
40	0.425	276.9	10.4	6%	94%
60	0.25	298.5	32.0	18%	82%
140	0.106	323.1	56.6	38%	62%
200	0.08	283.2	16.7	44%	56%
Pan		273.7	156.2	100%	0%
Total		278.4			

Uniformity Coefficient, Percent Moisture, and Mass Lost				Washing	
Initial Mass:	278.7	% Moisture:	#DIV/0!	Initial Mass	278.7
Final Mass:	278.4	D10:		Mass of Pan + Soil (B)	669.98
% Mass Lost:	0.1%	D30:		Mass of Pan + Soil (A)	520.96
Tin:		D60:		Mass Passing 200	149.0
Tin + M _D :		C _c :	#DIV/0!		
Tin + M _W :		C _u :	#DIV/0!		



Reviewed by: Zack Meek Date: 3/14/2024

Criteria for assigning group symbols and group names using laboratory tests ^a				Soil classification		
				Group symbol	Group name ^b	
Coarse-grained soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines ^c	$C_u \geq 4$ and $1 \leq C_c \leq 3$	GW	Well-graded gravel ^d	
		Gravels with Fines More than 12% fines ^c	$C_u < 4$ and/or $1 > C_c > 3$	GP	Poorly-graded gravel ^d	
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines ^d	Fines classify as ML or MH	GM	Silty gravel ^{d, e, h}	
			Fines classify as CL or CH	GC	Clayey gravel ^{d, e, h}	
		Sand with Fines More than 12% fines ^d	$C_u \geq 6$ and $1 \leq C_c \leq 3$	SW	Well-graded sand ^f	
			$C_u < 6$ and/or $1 > C_c > 3$	SP	Poorly-graded sand ^f	
Fine-grained soils 50% or more passes the No. 200 sieve	Silt and Clays Liquid limit less than 50	Inorganic	Fines classify as ML or MH	SM	Silty sand ^{f, h, i}	
			Fines classify as CL or CH	SC	Clayey sand ^{f, h, i}	
		Organic	PI ≥ 7 and plots on or above "A" line ^j	CL	Lean clay ^{j, l, m}	
			PI < 4 or plots below "A" line ^j	ML	Silt ^{k, l, n}	
			Liquid limit—oven dried Liquid limit—not dried	< 0.75	OL	Organic clay ^{k, l, m, o} Organic silt ^{k, l, n, o}
	Silt and Clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line	CH	Fat clay ^{k, l, m}	
			PI plots below "A" line	MH	Elastic silt ^{k, l, m}	
		Organic	Liquid limit—oven dried Liquid limit—not dried	< 0.75	OH	Organic clay ^{k, l, m, p} Organic silt ^{k, l, n, q}
Highly organic soils		Primarily organic matter, dark in color, and organic odor		PT	Peat	

^aBased on the material passing the 75-mm. (3-in.) sieve.

^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^cGravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt; GW-GC well-graded gravel with clay; GP-GM poorly graded gravel with silt; GP-GC poorly graded gravel with clay.

^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SW-SC well-graded sand with clay; SP-SM poorly graded sand with silt; SP-SC poorly graded sand with clay.

^e $C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

^fIf soil contains $\geq 15\%$ sand, add "with sand" to group name.

^gIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.

^hIf fines are organic, add "with organic fines" to group name.

ⁱIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^jAtterberg limits plot in hatched area, soil is a CL-MH, silty clay.

^kIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.

^lIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.

^mIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

ⁿPI ≥ 4 and plots on or above "A" line.

^oPI < 4 or plots below "A" line.

^pPI plots on or above "A" line.

^qPI plots below "A" line.

^aBased on the material passing the 75-mm (3-in) sieve.
^bIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^cGravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt; GW-GC well-graded gravel with clay; GP-GM poorly-graded gravel with silt; GP-GC poorly-graded gravel with clay.
^dSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt; SW-SC well-graded sand with clay; SP-SM poorly-graded sand with silt; SP-SC poorly-graded sand with clay.

$C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
^eIf soil contains $\geq 15\%$ sand, add "with sand" to group name.
^fIf fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
^gIf fines are organic, add "with organic fines" to group name.
^hIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
ⁱIf Atterberg limits plot in hatched area, soil is a CL-MH, silty clay.

^jIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel," whichever is predominant.
^kIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
^lIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
^mPI ≥ 4 and plots on or above "A" line.
ⁿPI < 4 or plots below "A" line.
^oPI plots on or above "A" line.
^pPI plots below "A" line.

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Natural Moisture Percentages	
CLIENT:	Sunrise Eng.
JOB NUMBER:	24-1004
PROJECT:	JPWB
SAMPLE DATE:	1/10/2024

BH	Depth	Tin	Mass of Tin	Tin + Wet	Tin + Dry	Moisture %
1A	1 - 2.5	2F	20.64	51.03	45.88	20.4%
1B	5 - 6.5	18	20.69	40.88	36.86	24.9%
1C	10 - 11.5	31	20.76	69.44	61.22	20.3%
1D	15 - 16.5	30	20.8	51.23	45.55	22.9%
1E	20-21.5	B	20.95	38.39	35.09	23.3%
2A	1.5 - 3	E	20.77	52.78	50.33	8.3%
2B	5 - 6.5	75	20.86	67.69	59.96	19.8%
2C	10 - 11.5	3	20.77	55.21	50.36	16.4%
2D	15- 16.5	23	20.84	48.16	43.64	19.8%
2E	20-21.5	19	20.56	62.73	54.65	23.7%
3A	1 - 2.5	X9	20.74	68.16	63.10	11.9%
3B	5 - 6.5	X6	20.77	62.05	58.03	10.8%
3C	10 - 11.5	Y6	20.90	61.44	55.75	16.3%
3D	15 - 16.5	11	20.85	66.78	60.01	17.3%
3E	20-21.5	Y8	21.08	61.88	54.73	21.2%
4A	1 - 2.5	Y3	21.02	59.93	54.59	15.9%
4B	5 - 6.5	CB	20.53	59.09	55.06	11.7%
4C	10 - 11.5	6	20.72	58.99	54.16	14.4%
4D	15 - 16.5	5A	20.67	51.05	48.02	11.1%
4E	20-20.93	ML	20.62	71.59	65.88	12.6%
5A	1 - 2.5	17	20.66	60.04	57.61	6.6%
5B	5 - 6.5	2D	20.63	74.35	70.44	7.8%
5C	10 - 11.5	Y7	21.05	69.15	65.44	8.4%
5D	15 - 16.5	4	20.54	60.62	57.27	9.1%
5E	20-21.5	H	21.01	65.74	60.7	12.7%
6A	1 - 2.5	MA	20.77	75.88	69.11	14.0%
6B	5 - 6.5	Y4	20.91	58.31	53.8	13.7%
6C	10 - 11.5	35	20.82	54.24	49.15	18.0%
6D	15 - 16.5	16	20.79	66.23	60.33	14.9%
6E	20-21.5	Y2	21.03	57.18	52.38	15.3%

The logo for Western EGI features a stylized orange compass rose with four points. The word "WESTERN" is written in a bold, grey, sans-serif font across the center of the compass rose. To the right of the compass rose, the word "EGI" is written in a bold, orange, sans-serif font.[illegible]

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SPT Corrections N_{60}	
CLIENT:	Sunrise
JOB NUMBER:	24-1004
PROJECT:	JPWB
SAMPLE DATE:	1/10-1/11

Borehole	DEPTH (FT)	N (BLOWS/FT)	ROD LENGTH (FT)	HOLE DIA. (IN)	η_H	η_B	η_S	η_R	N_C , BLOWS/FT	N_C , BLOWS/FT
TH-1	3	8	1	4.5	60	1	1	0.75	6.00	6
	6.5	10	4.5	4.5	60	1	1	0.75	7.50	8
	11.5	11	9.5	4.5	60	1	1	0.75	8.25	8
	16.5	6	14.5	4.5	60	1	1	0.85	5.10	5
	21.5	27	19.5	4.5	60	1	1	0.85	22.95	23
TH-2	3	51	1	4.5	60	1	1	0.75	38.25	38
	6.5	23	4.5	4.5	60	1	1	0.75	17.25	17
	11.5	21	9.5	4.5	60	1	1	0.75	15.75	16
	16.5	4	14.5	4.5	60	1	1	0.85	3.40	3
	21.5	13	19.5	4.5	60	1	1	0.85	11.05	11
TH-3	3	8	1	4.5	60	1	1	0.75	6.00	6
	6.5	10	4.5	4.5	60	1	1	0.75	7.50	8
	11.5	19	9.5	4.5	60	1	1	0.75	14.25	14
	16.5	15	14.5	4.5	60	1	1	0.85	12.75	13
	21.5	5	19.5	4.5	60	1	1	0.85	4.25	4
TH-4	3	19	1	4.5	60	1	1	0.75	14.25	14
	6.5	6	4.5	4.5	60	1	1	0.75	4.50	5
	11.5	11	9.5	4.5	60	1	1	0.75	8.25	8
	16.5	28	14.5	4.5	60	1	1	0.85	23.80	24
	20.93	73	18.93	4.5	60	1	1	0.85	62.05	62
TH-5	3	26	1	4.5	60	1	1	0.75	19.50	20
	6.5	25	4.5	4.5	60	1	1	0.75	18.75	19
	11.5	33	9.5	4.5	60	1	1	0.75	24.75	25
	16.5	22	14.5	4.5	60	1	1	0.85	18.70	19
	21.5	28	19.5	4.5	60	1	1	0.85	23.80	24
TH-6	3	13	1	4.5	60	1	1	0.75	9.75	10
	6.5	18	4.5	4.5	60	1	1	0.75	13.50	14
	11.5	26	9.5	4.5	60	1	1	0.75	19.50	20
	16.5	32	14.5	4.5	60	1	1	0.85	27.20	27
	21.5	44	19.5	4.5	60	1	1	0.85	37.40	37

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Borehole	DEPTH (FT)	N (BLOWS/FT)	ROD LENGTH (FT)	HOLE DIA. (IN)	η_H	η_B	η_S	η_R	N_C , BLOWS/FT	N_C , BLOWS/FT
TH-7	3	14	1	4.5	60	1	1	0.75	10.50	11
	6.5	23	4.5	4.5	60	1	1	0.75	17.25	17
	11.5	28	9.5	4.5	60	1	1	0.75	21.00	21
	16.5	25	14.5	4.5	60	1	1	0.85	21.25	21
	21.5	25	19.5	4.5	60	1	1	0.85	21.25	21
TH-11	3	11	1	4.5	60	1	1	0.75	8.25	8
	6.5	12	4.5	4.5	60	1	1	0.75	9.00	9
	11.5	18	9.5	4.5	60	1	1	0.75	13.50	14
	16.5	63	14.5	4.5	60	1	1	0.85	53.55	54
	20.5	50	18.5	4.5	60	1	1	0.85	42.50	43