REVISED REPORT OF GEOTECHNICAL EXPLORATION

PROPOSED WEAVERVILLE PUMP STATION AND FORCEMAIN REPLACEMENT PROJECT

BUNCOMBE COUNTY, NORTH CAROLINA

Prepared for:

Metropolitan Sewerage District
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Prepared by:

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July 5, 2023

WSP Project No. 6252-13-0101.079

wsp

July 5, 2023

Mr. Shaun Armistead, PE
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Metropolitan Sewerage District
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Asheville, North Carolina 28804

Subject: **Revised Report of Geotechnical Exploration**
Proposed Weaverville Pump Station and
Force Main Replacement Project
Buncombe County, North Carolina
WSP Project No. 6252-13-0101.079

Dear Mr. Armistead :

WSP USA Environment & Infrastructure Inc. (WSP) is pleased to provide this Revised Report of Geotechnical Exploration, which superseeds the previous report issued by WSP dated March 28, 2023, for the proposed pump station to be constructed as a part of the proposed Weaverville Pump Station and Force Main Replacement project. The project site is located between the existing Pump Station No. 1, Pump Station No. 2, and the Woodfin wastewater treatment plant in Buncombe County, North Carolina. Our services were provided in general accordance with our Proposal for Geotechnical Evaluation (WSP Proposal PROP22CARO-066 dated February 17, 2022) authorized by the Metropolitan Sewerage District (MSD).

The purpose of this exploration was to evaluate general subsurface conditions at the project site and provide geotechnical recommendations for design of the proposed structures.

We thank you for the opportunity to provide our professional geotechnical services during this phase of your project and would be pleased to discuss our recommendations with you.

Sincerely,

WSP USA Environment & Infrastructure, Inc.

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ATTACHMENTS:

1.0 PROJECT AND SITE INFORMATION

Based on the information provided, we understand that a replacement pump station (Pump Station 1) and force main sewer pipeline are proposed for construction at locations between the existing Pump Station No. 1, Pump Station No. 2, and wastewater treatment plant. The overall length of the proposed pipeline is in excess of three miles. The proposed pump station will be a cast-in-place concrete structure that is currently proposed to be buried and founded at approximately 25 and 30 feet below the existing grade. Based on a preliminary engineering report preopared and provided by CDM, the new pipeline is will be constructed either parallel to or near the existing pipeline, depending largely on available space and impact on private residences. We understand trenchless construction by bore and jack methods may be required under Old Marshall Highway and/or Goldview Road, and the remaining pipeline portions will be constructed by open-cut trenching.

A boring location plan showing the requested locations for twenty five soil test borings is included in the Attachment of this report (Figure 1). The proposed twenty five borings were located along the proposed pipeline alignment. Some relatively minor field adjustments were made to the proposed boring locations due to safety and access conditions. Boring B-13 was relocated more significantly to the south due to proximity to the existing roadway and safe drilling access.

2.0 SUBSURFACE CONDITIONS

2.1 SITE GEOLOGY

The project site is located in the Blue Ridge Physiographic Province. The bedrock in this province is a complex mixture of igneous, sedimentary and metamorphic rock that has been repeatedly squeezed, fractured, faulted and distorted by past tectonic movements. The virgin soils encountered in this area are the residual product of in-place weathering of rock, which was similar to the rock presently underlying the site.

In areas not altered by erosion or disturbed by the activities of development, the typical residual soil profile consists of clayey soils near the surface, where soil weathering is more advanced, underlain by sandy silts and silty sands. The less weathered soils exhibit relict features of the parent rock, including foliation patterns and joints.

The boundary between soil and rock is not sharply defined. This transitional zone, termed "partially weathered rock" (PWR), is normally found overlying the parent bedrock. Partially weathered rock is defined, for engineering purposes, as residual material with standard penetration testing resistance values in excess of 100 blows per foot. Fractures, joints, and the presence of less resistant rock types facilitate weathering. Consequently, the profile of the partially weathered rock and hard rock is quite irregular and erratic, even over short horizontal distances. Also, it is not unusual to find lenses and boulders of hard rock and zones of partially weathered rock within the soil mantle, well above the general bedrock level.

The upper soils along drainage features and in floodplain areas are often water-deposited (alluvial) materials that have been eroded and washed down from adjacent higher ground.

2.2 SUBSURFACE EXPLORATION

Twenty five soil test borings (B-1 through B-25) were performed at the approximate locations shown on the attached Site and Boring Location Plan (Figure 1). The boring locations were located by WSP personnel near locations designated on the provided proposed boring location plan prior to drilling. Therefore, boring locations shown on Figure 1 should be considered approximate. The soil borings were terminated when encountering auger refusal. Additionally, rock coring was performed within seven of the borings below the auger refusal depths. Photographs of the rock cores obtained from these borings are included in this report.

Soil sampling and Standard Penetration Testing were performed in general accordance with ASTM D 1586. At assigned intervals, soil samples were obtained with a standard 1.4-inch I.D., 2-inch O.D. split-spoon sampler. The sampler was first seated 6 inches to penetrate any loose cuttings, and then driven an additional 12 inches with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final 12 inches was recorded and is designated the "N-Value" or "penetration resistance". Representative portions of the split spoon soil samples were sealed in glass jars and returned to our laboratory where they were visually classified by a geologist.

Once auger refusal was encountered in the borings, rock coring was performed to penetrate refusal materials and determine the continuity and condition within some of the borings. Rock coring was performed in general accordance with ASTM D 2113 and utilized "NQ" size wireline core barrel system.

The rock core samples were placed boxes and were returned to our laboratory where the core descriptions were logged/provided, and percent core recovery and Rock Quality Designation (RQD) was measured by a geologist. The RQD denotes the percentage of intact and sound rock retrieved during coring and is an index of of the degree of natural fracturing. To calculate the RQD, lengths of all pieces of intact and sound rock core equal to or greater than 4-inches long are summed and divided by the total length of the core run.

A temporary piezometer, consisting of a two-inch slotted PVC pipe, was inserted into boring B-2 after completion of drilling to monitor stabilized groundwater in the days following the completion of drilling. The boreholes were backfilled with soil after final groundwater level observations were made, as noted on the attached Soil Test Boring Records; except that bentonite was used as a backfill material within borings in which the rock coring was performed.

2.3 SUBSURFACE CONDITIONS ENCOUNTERED

Within the soil test borings performed, layers of existing fill, alluvial, and residual soils were encountered. The attached Soil Test Boring Records represent our interpretation of the field boring/coring logs based on engineering examination of the field samples. The lines designating the interfaces between soil strata represent approximate boundaries and the transition between soil strata may be gradual. It should be noted that subsurface soil and rock conditions may vary between the boring locations.

Soil test boring B-3 encountered existing fill until auger refusal depths of between 13.5 to 14.5 feet. Based on review of historical aerial photographs an existing circular shaped structure (possible a tank) was noted in the immediate vicinity of the boring location. Above grade portions of this structure are no longer visible onsite. This refusal may have been the result of concrete debris within the fill material.

Auger Refusal

Auger refusal was encountered in the soil test borings as summarized in Table 1. Auger refusal may result from boulders, lenses, ledges or layers of relatively hard rock underlain by partially weathered rock or residual soil. Refusal may also represent the surface of relatively continuous bedrock. Core drilling procedures are required to penetrate such refusal materials and determine their character and continuity. Core drilling was performed within seven of the borings performed.

Rock

Rock coring was performed beginning at the auger refusal depths within seven test borings. Generally, gneiss bedrock was encountered in borings with generally greater degrees of fracturing and weathering within the upper portions of rock.

The attached Soil Test Boring Records provide a summary of the rock core runs, percent core recovery, and RQD measured. Photographs of these rock cores are also attached to this report.

Table 1. Approximate Depths of Partially Weathered Rock and Auger Refusal Encountered

Boring Number	Depth to PWR, feet	Depth to Auger Refusal, feet
B-1	NE	13 (RC)
B-2	NE	13 (RC)
B-3	NE	13.5 to 14.2
B-4	8.5	9.5 (RC)
B-5	10.5	14.4 (RC)
B-6	5.5	8.1
B-7	8	10
B-8	NE	7.5
B-9	3	6.6
B-10	4.5	6.1
B-11	3 to 5.5 layer 14.5	14.9
B-12	NE	7.6
B-13	8	14.8
B-14	9.5	7.5 to 10.1
B-15	NE	8.7 (RC)
B-16	NE	NE (Boring terminated at 20 feet)
B-17	NE	NE (Boring terminated at 15 feet)
B-18	NE	NE (Boring terminated at 15 feet)
B-19	NE	NE (Boring terminated at 15 feet)
B-20	3	4.3 to 4.5
B-21	5.5	4.7 to 6.6
B-22	NE	2.5 to 5
B-23	NE	4.3 to 5
B-24	NE	NE (Boring terminated at 15 feet)
B-25	NE	NE (Boring terminated at 15 feet)

Note: NE – Not Encountered
RC – Rock Coring Performed

<u>Groundwater</u>: Groundwater was encountered during drilling within 13 soil test borings. The approximate depths and elevations are shown on the attached Soil Test Boring Records and are summarized in Table 2 below. Groundwater levels below the existing ground surface were measured at the time of drilling and prior to backfilling the boreholes.

Table 2. Approximate Observed Groundwater Depths

Boring No.	Depth to Groundwater at Time of Boring, feet	Depth to Stabilized Groundwater, feet
B-1	Dry at 13 feet	1.9
B-2	Dry at 13 feet	17.6
B-3	14	12
B-4	Dry at 9.5 feet	3.3
B-5	Caved and Dry at 14.4	10.8
B-6	6	2.3
B-7	7.6	6
B-8	Caved and Dry at 12.5	Caved and Dry at 11
B-9	Caved and Dry at 6.6	Caved and Dry at 6
B-10	Caved and Dry at 6.1	Caved and Dry at 6
B-11	Caved and Dry at 13.5	Caved and Dry at 11.5
B-12	Dry at 7.5	2.9
B-13	Caved and Dry at 11.5	Caved and Dry at 11
B-14	7.5	6.5
B-15	Dry at 8.7	3.7
B-16	16.4	10
B-17	Caved and Dry at 11	Caved and Dry at 11
B-18	Caved and Dry at 10.8	Caved and Dry at 10
B-19	Caved and Dry at 11.9	Caved and Dry at 11.5
B-20	Caved and Dry at 4.5	Caved and Dry at 4.5
B-21	4.7	4.8
B-22	3.1	2.7
B-23	Caved and Dry at 2.5	Caved and Dry at 2.5
B-24	Not Encountered	Not measured, backfilled after drilling
B-25	Caved and Dry at 12.8	Not measured, backfilled after drilling

Groundwater elevations will vary seasonally, with higher levels typically occurring during late winter and early spring, or be locally perched just above the bedrock elevations.

2.4 LABORATORY TESTING

Five jar samples from the boreholes were tested for natural moisture content (ASTM D2216), percent finer than #200 sieve (ASTM D1140) and Atterberg Limits (ASTM D4318). The laboratory tests were completed in general accordance with the applicable ASTMs. The results of the soil laboratory tests are summarized present in the attachments to this report.

2.5 SEISMIC SITE CLASS

The site seismic site class was determined based on the average Standard Penetration Testing N-value for the top 100 feet below the existing elevations in accordance with the North Carolina Building Code. Our experience in the site area has shown that it is reasonable to assume that material with standard penetration resistances (N-values) equal to or greater than 100 blows per foot will exist below auger refusal, where auger refusal is encountered below a layer of increasing harder residual soil. The rock coring performed confirmed this assumption.

Based on the subsurface conditions encountered by the soil test borings and our understanding of the proposed construction, we recommend a seismic site class "C" as defined in the North Carolina Building Code for pump station structure near boring B-2, bearing approximately 25 to 35 feet below the existing ground surface or on continuous rock. For the sections of pipeline along the alignment, a uniform Seismic Site Class D may be used, as allowed by the North Carolina Building Code.

An alternate method for determining the seismic site class, in accordance with the North Carolina State Building Code, is to measure the actual shear-wave velocity of the subsurface soils, rather than rely on the average N-value correlation with shear-wave velocity to determine the seismic site class. If a Refraction Microtremor (ReMi) Field Survey is performed to measure and analyze the shear-wave velocity at the site, a Site Class B could potentially be assigned for the proposed below grade pump station structure.

Based on our past experience, the results of the ReMi survey may produce a higher seismic site classification for this site, as compared with the average penetration resistance (N-value) method, which could potentially result in cost savings for design and construction of the proposed structure. If determined to be beneficial, WSP can perform this field ReMi survey as an addition of scope.

3.0 SITE PREPARATION AND GRADING

At the start of construction, the existing surficial vegetation should be stripped from the construction area. Existing below-grade utilities and structures should also be removed. Voids left from removing underground utilities, structures or foundations should be filled with structural fill that is placed and compacted as recommended in this report. Where stormwater or wastewater pipelines are abandoned and left in place, the pipeline should be filled with grout or excavatable flowable fill. During stripping and rough grading, positive surface drainage should be maintained to prevent the accumulation of water. If the exposed subgrade becomes excessively wet, or if conditions are encountered different from those described previously in this report, the geotechnical engineer should be contacted.

Prior to construction of shallow foundations or grade slabs, the exposed subgrade should be proofrolled to detect unsuitable soil conditions. Proofrolling should be performed with a heavily loaded dump truck or with similar approved construction equipment, or vibratory plate compactor withinlimited access areas. The proofroller should make at least four passes over each location, with the last two passes perpendicular to the first two. Proofrolling should be done after a suitable period of dry weather to avoid degrading an otherwise acceptable subgrade. The proofrolling should be monitored by an engineering technician working under the supervision of the geotechnical engineer. Areas that wave, rut, or deflect excessively and continue to do so after several passes of the proofroller should be excavated and replaced with suitable structural fill material (compacted as recommended in this report).

Based on the presence of existing fill and alluvial soils encountered within our borings, it should be anticipated that some areas of unsuitable soils will be encountered during profrolling that will require undercut and replacement with suitable soils.

3.1 GROUNDWATER CONTROL

Groundwater was encountered within our boreholes at the time of our field exploration at depths summarized in Table 2. These groundwater depths are likely within the anticipated construction depths at some locations. The contractor should be prepared to promptly remove any surface water or groundwater from the construction area by means of, such as, gravity ditches and pumping from filtered sumps. Deeper excavations that may remain open for relatively longer periods of time may require additional measures to be installed by a specialty dewatering contractor to effectively remove and control groundwater in order to provide safe working conditions.

3.2 COMPACTED FILL

Fill used for raising the site grade or for replacement of material that is undercut should be uniformly compacted in thin lift, with loose lift thickness no greater than 8 inches, to at least 95 percent of the standard Proctor maximum dry density (ASTM D 698). In addition, at least the upper 18 inches of subgrade fill beneath pavements and floor slabs should be compacted to 100 percent of the standard Proctor maximum dry density.

Based on our visual examination and experience with similar type soils, the on-site excavated soil appears to be suitable for reuse as structural fill. Plastic (clayey) fill and alluvial soils encountered will be moisture sensitive and will be difficult to re-use as compacted fill, particularly if they are above optimum moisture content. These materials will require drying to the optimum moisture content prior to placement as fill.

Unless otherwise recommended, compacted structural fill should have less than five percent organic content by weight and have a maximum particle size of three inches, and consist of materials classified as either SC, SM, SP, SW, GC, GM, GP, or GW per ASTM D2487, or on-site excavated soils classified as ML or CL with a plasticity index (PI) no greater than 20. Off-site borrow soils, if needed, should be classified as SC, SM, SP, SW, ML, GC, GM, GP, or GW in accordance with ASTM D2487. Soils classified as silty/lean clays (CL) with a PI-value greater than 20, elastic silts (MH), clays of high plasticity (CH), organic silts (OL), organic clays (OH), or highly organic clays/peat (PT) should not be used as backfill behind retaining walls.

Unless otherwise indicated, structural fill should be placed in maximum eight-inch thick horizontal, loose lifts, and compacted to at least 95 percent of maximum dry density per ASTM D698, Standard Proctor, at moisture contents within two percent of its optimum. The upper one foot of the structural fill should be compacted to a minimum of 100 percent of the Standard Proctor maximum dry density. Fill placed in landscape, non-structure support, and non-pavement areas should be compacted to at least 90 percent of the Standard Proctor maximum dry density.

Note that the on-site excavated ML or CL soils could be difficult to compact if they are too wet or too dry. As a result, the ability to use such soils will depend on their moisture contents and the prevailing weather conditions. Soils that are too wet to properly compact could be dried by aeration or mixed with an additive such as cement or lime to stabilize the soil and facilitate compaction.

For pipe trench construction, backfill material under the haunches should be in firm contact with the bottom surface of the pipe without voids and soft spots. Measures should be taken by the contractor, such as (but not limited to) utilizing a shovel or a 2 by 4 timber to hand compact the backfill material. In limited/restricted construction spaces, a controlled low strength material (CLSM), such as excavatable flowable fill, with a 28-day compressive strength ranging from 100 to 150 pounds per square inch (psi), could be used in lieu of compacted soils. In such a case, temporary measures should be taken by the contractor, as need, to prevent the pipe from uplifting while the flowable fill is still wet.

Quality Control of Compacted Structural Fill Placement

Moisture conditioning may be required during the compaction, methods may include drying back or wetting of the soil to adjust the moisture content to achieve specified compaction criteria. The moisture content should be uniform, as practicable, throughout the layer. To confirm that the contractor’s means and methods are suitable for achieving the specified compaction, recommendations of minimum frequencies for performing in-place density and moisture content testing during fill placement are:

- One test for each 2,500 cubic yards of material placed plus,
- One in-place density test per 2,500 square feet for each fill lift with a minimum of two tests per lift in small areas.
- With respect to backfilling within utility trenches– One density test for every approximately 150 feet of length for every other loose lift layer from bottom to top of the fill starting with the second lift.

- In cases where AASHTO Size No. 57 aggregate is utilized around pipes as structural fill, the aggregate should be compacted in place by at least two passes with vibratory compaction equipment.

In areas where are there are more than 5 feet thick of fill to be placed, if results of the proof-rolling are not acceptable, a one-foot thick bridge lift could be placed prior to placing additional lifts of compacted fill. The bridge lift materials should consist of acceptable soil fill, preferably granular materials, and should be static rolled in place, without a need to achieved degree of compaction, to provide a stable base for placing subsequent compacted lifts of fill.

When testing is not being conducted, the Inspector is to visually observe lifts being placed to ensure that proper placement and compaction procedures are being used.

The surface of compacted subgrade soils can deteriorate and lose its support capabilities when exposed to environmental changes and construction activity. Deterioration can occur in the form of freezing, formation of erosion gullies, extreme drying, exposure for a long period of time or rutting by construction traffic.

3.3 EXCAVATION CONDITIONS

Material sufficiently hard enough to cause auger refusal was encountered within the borings as shown on our attached Soil Test Boring Records.

In general, very dense residual soil and partially weathered rock with N-values ranging from 50 blows per 6 inches to 50 blows per 3 inches can often be excavated with bulldozers (Caterpillar D-8 with a single tooth-ripper, or equivalent) or powerful tractor-drawn rippers without blasting, although often with difficulty. Much can depend on the quality of the equipment and the experience of the operators, as well as the nature of the material being excavated (i.e., presence and direction of more weathered seams, bedding planes, etc.). Our experience indicates that partially weathered rock that has a standard penetration resistance of 50 blows over no greater than 3 inches, as indicated on the boring records, will require an extreme amount of effort to be removed by ripping and can most effectively be removed by blasting.

Confined excavations, such as utility trenches and excavations for shallow foundations, in partially weathered rock may require pneumatic hammers or blasting. Blasting may be necessary to efficiently remove more resistant rock and large boulders that could be present within the partially weathered rock. The ease of excavation of partially weathered rock cannot be specifically quantified and depends on the quality of grading equipment, skill of the equipment operators and geologic structure of the material itself, such as the direction of bedding, planes of weakness and spacing between discontinuities.

Auger refusal material, confirmed to be continuous based on the rock coring performed, will require blasting to excavate. Alternatively, non-explosive methods such as pneumatic hammers and expansive grout poured into drilled holes in the rock could be utilized for rock excavation. We recommend that the requirement for blasting be defined in terms of equipment performance. For general excavation, typical recommendations would be that rock be defined as material that cannot be excavated with a single tooth-ripper drawn by a Caterpillar D-8 or equivalent bulldozer. For trench excavation, typical recommendations would be that rock be defined as material that cannot be excavated by a Caterpillar 225 or equivalent backhoe equipped with rock teeth.

Prior to blasting, pre-blast surveys of nearby structures should be performed to document existing damage to these structures. Vibration monitoring should also be performed near the closest structures to the site during blasting.

In a larger, open excavation site, a particularly resistant area could be approached from any direction with the ripper and thus align with a plane of weakness. Partially weathered rock that is excavated by ripping may be removed in large slabs or boulders which are difficult to move and/or break into smaller pieces for use in the fill. Given the anticipated relatively small sizes of the excavations on this project, this may prove difficult.

3.4 CUT AND FILL SLOPES

Based on our understanding of the proposed construction, cut and fill slopes may be constructed as part of this project. A slope stability analysis was outside the scope of our work. However, based on precedent, the recommended slopes should have an acceptable factor of safety against slope failure (global stability), if properly constructed in accordance with the criteria of this report.

Based on local experience, cut slopes of up to 2:1 (H:V) excavated in residual soils similar to those encountered in our soil test borings should have an acceptable factor of safety against slope failure (global stability). However, if slickensides are encountered during excavation, flatter slopes or benches may have to be used to provide slope stability.

Where normal slope maintenance is desired, we recommend cut and fill slopes be constructed at 2.5:1 (H:V), or flatter. It has been our experience with soils similar to those encountered at the site, that permanent slopes constructed steeper than 2:1 (H:V), may exhibit surficial erosion and/or sloughing during periods of heavy rain or prolonged rainfall. Permanent slopes constructed at 3:1 (H:V) or flatter would be desirable for mowing. All slopes should be seeded and mulched as soon as practical to prevent surface erosion.

After stripping and removal of the surficial topsoil layer, the surface of the existing slope should be leveled and benched prior to placement of fill. Fill should then be placed on a suitable natural soil foundation and benched into the existing slope as the fill is placed and compacted in horizontal layers from the prepared foundation up the existing natural slope. Fill slopes should initially be constructed beyond the design slope edge due to the difficulty of compacting the edge of the slopes. The fill should then be cut back, leaving the exposed face of the slope well compacted. Fill should be placed and compacted to at least 95 percent of the standard Proctor maximum dry density. We recommend that the edge of paved areas be constructed at least 10 feet away from theedge of slopes

It has been our experience with soils similar to those encountered at the site, that permanent cut and fill slopes may exhibit surficial erosion and/or sloughing during periods of heavy rain or prolonged rainfall if effective erosion control measures are not implemented. Ditches at the top of the cut slopes and berms or grades sloping away from the top of fill slopes should be planned to control and divert storm water away from the face of the slopes. Construction and maintenance of these diversion ditches, berms, and grades will be crucial to preventing excessive erosion on the cut and fill slopes. Establishment and maintenance of a suitable ground cover on the cut and fill slopes will be critical to preventing excessive erosion and surface raveling on the slopes at this site. We recommend that the owner adopt a regular maintenance plan to monitor the amount of erosion experienced on the slopes and to remove displaced soil that may collect along the bottom of the cut slopes, especially until a suitable ground cover has become established.

Confined excavations such as for utility installation or below-grade wall construction and temporary construction slopes should conform to OSHA regulations. Temporary shoring and dewatering systems, designed by a specialty contractor, will be required during construction of the deeper portions of the pump station and trenches.

3.5 LATERAL EARTH PRESSURES

Below-grade or site retaining walls, such as for the below-grade concrete structure for the pump station, must be capable of resisting the lateral earth pressures that will be imposed on them. We have assumed that soil similar to the on-site silty sands, sandy silts or wash stone will be used as backfill for below-grade or site retaining walls.

Based on previously developed correlations for silty sands, sandy silts and washed stone, the effective stress properties and earth pressure coefficients for a horizontal backfill condition are recommended in the following table:

Table 3. Recommended Soil Properties and Earth Pressure Coefficients

Material Description	**Soil Properties**			**Earth Pressure Coefficients(a)**		
	Saturated Unit Weight (pcf)	**Cohesion (psf)**	**Internal Angle of Friction (degrees)**	**Ko**	**Ka**	**Kp**
Silty Sand	120	0	28	0.53	0.36	1.4
Sandy Silt	120	100	24	0.59	0.42	1.2
Clean washed stone (#57)	100	0	40	0.36	0.22	2.3

Notes:

1. Ko, Ka, and Kp = At-Rest, Active, and Passive earth pressure coefficients, respectively
2. The tabulated value was obtainined by applying a reduction factor of 2.0 to the fully-mobilized passive earth pressure coefficient, considering that wall deflections required to mobilize full passive resistance are greater than that required for mobilizing the active lateral earth pressure.

To minimize potential for hydrostatic pressure, periodically spaced weep holes should be placed near the base of walls to drain from the wall drains. Groundwater for boring B-2 (closest to the proposed pump station location) was encountered at a stabilized depth of approximately 17.6 feet below the existing ground surface during our field exploration. Groundwater elevations will vary seasonally, with higher levels typically occurring during late winter and early spring, or be locally perched just above the bedrock elevations.

For the purposes of designing for hydrostatic pressures against the below grade pump structure, the design groundwater elevation should be the same as as the project design flood elevation. If the project design flood elevation is unknown, conservatively, the design groundwater elevation should be considered at the finished grade elevation.

In addition, transient loads imposed on the walls by construction equipment during backfilling should be taken into consideration during design and construction. Excessively heavy grading equipment (that could impose temporary excessive pressures or long term excessive residual pressures against the constructed walls) should not be allowed within about 5 feet (horizontally) of the walls. Sloping backfill will increase the above earth pressure coefficients. We should be consulted regarding the appropriate earth pressure coefficients if a sloping backfill condition will exist. A coefficient of 0.35

could be reasonably assumed for evaluating ultimate frictional resistance to sliding at the soil (fill or residual) to foundation contact.

Walls which will be prevented from rotating such as below grade walls braced against the upper floor level should be designed to resist the "at-rest" lateral earth pressure. Walls such as exterior retaining walls which are permitted to rotate at the top may be designed to resist "active" lateral earth pressure. Typically, a top rotation of about 1 inch per 10 feet height of wall is sufficient to develop active pressure conditions in soils similar to those encountered at the site. Less deflection would be required to develop active conditions in the crushed stone backfill.

The total unit weight of the backfill soil should be used with the above earth pressure coefficients to calculate lateral earth pressures. Lateral pressure arising from surcharge loading, earthquake loading, and groundwater, should be added to the above soil earth pressures to determine the total lateral pressures which the walls must resist. We recommend placement of a vertical wall drain behind below-ground walls to minimize potential for hydrostatic pressure against the walls.

If washed stone is to be used as backfill behind the below-grade walls, the minimum area of stone backfill should be within the wedge behind the wall defined by a line extending upward from the base of the wall at a 45 degree angle. Filter fabric should be placed between the soil and the washed stone to prevent soil fines from migrating into the stone backfill.

4.0 DESIGN AND CONSTRUCTION RECOMMENDATIONS

4.1 FOUNDATION RECOMMENDATIONS

We understand that the foundation bearing elevations will vary within the proposed structure areas. Foundations bearing on rock or partially weathered rock (such as the below grade pump station near boring B-2) may be designed using an allowable foundation bearing resistance of up to 20,000 pounds per square feet (psf). Foundations for smaller, lightly loaded surficial structures near the pump station bearing in approved residual soil within the area of soil test boring B-2 may be designed with an allowable net soil bearing pressure of 3,000 psf. Foundations bearing in existing fill should be evaluated by WSP with hand auger and dynamic cone penetrometer borings prior to placement of concrete, as discussed subsequently.

We recommend that the footing be designed for a minimum width of two feet. An interface coefficient of friction of 0.50 may be used for mass concrete placed on a clean rock surface and 0.35 for structures bearing on fill or residual soil in evaluating ultimate frictional resistance to sliding for the structure foundations.

Design structural loads were not provided. However, based on our experience with similar lightly loaded structures, settlement values should be less than 1 inch, with differential settlement values of less than 0.5 inches. Suitable construction and/or expansion joints should be included in walls (but not the footing itself) to accommodate potential settlement at locations where the structure spans across varying supporting materials (e.g., fill soils to residual soils or partially weathered rock or hard rock).

Rock loosened during blasting should be removed. Additional rock excavation and removal during the construction of foundations may require blasting. Care should be taken to ensure that the foundations will be constructed with a level or stepped bottom bearing on bedrock. Drilling and wedging or jack-hammering of rock encountered during excavation for the foundations may be required to achieve a level or stepped excavation bottom. An engineering technician working under the supervision of the Geotechnical Engineer should observe and document the foundation excavations and confirm that the foundations will be bearing on rock as anticipated.

Due to difficulty of excavating a keyway within the foundation rock to provide lateral resistance against foundation sliding, if considered, we recommend the use of steel dowels grouted into the foundation rock as an alternate to function as a foundation keyway. The required dowel spacing and embedment will depend on the design lateral loads and the size of dowels selected should be designed by the Structural Engineer. Particular care should be taken to ensure that the dowels are fully encapsulated in grout to prevent corrosion. In addition, we recommend that the dowels be epoxy coated. An engineering technician working under the direction of the Geotechnical Engineer should observe the installation of the dowels and document that they comply with the specified size, spacing, embedment length, and grouting procedures.

An engineering technician working under the supervision of the geotechnical engineer should observe the foundation excavations immediately prior to concrete placement. The foundation bearing areas should be level or suitably benched and be free of loose soil, ponded water, and debris prior to the observation. Within foundation excavations bearing in soil, the engineering technician should perform hand auger borings with dynamic cone penetration testing below the excavated surface to correlate actual soil conditions observed with those indicated by this geotechnical exploration. Significant differences between the actual bearing conditions and those indicated by this exploration should be brought to the attention of the owner's representative along with appropriate recommendations for correction of the observed differences (such as excavation and replacement of unsuitable bearing material, lowering the foundation bearing elevation, or increasing the foundation bearing area).

Minimum column and continuous wall footing widths should be 24 and 18 inches, respectively, to provide a margin of safety against local or punching shear failure of the bearing soils. Exterior footings should bear at least 24 inches below final exterior grade and interior footings should bear at least 18 inches below the surface of the grade slab to provide frost protection and protective embedment.

Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open for a prolonged period of time. Therefore, foundation concrete should be placed as soon as possible, preferably on the same day excavated. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed immediately prior to placement of concrete. Foundation concrete should not be placed on frozen or saturated soil. If foundation excavations must remain open overnight when rainfall is imminent, we recommend that a 2- to 3-inch thick "mud-mat" of "lean" (2000 psi) concrete be placed on the excavated surface to protect the bearing surface.

Removal of Existing Foundations and Underground Structures

Existing below-grade utilities, foundations, and below grade structures within 10 feet beyond the fooprints of the new structures should be removed. If future development is anticipated to occur at the project site, the Client should consider removing all existing below-grade utilities, foundations, and below grade structures, rather than partially at this time as it will likely be more difficult to do so after construction of the new structures. If these existing below grade items are unable to be practically or economically removed prior to construction of the new structures WSP should be contacted to review and provide alternative recommendations based on individual conditions.

Voids left from removing underground utilities, structures or foundations should be filled with structural fill that is placed and compacted as recommended in this report.

4.2 UPLIFT RESISTANCE – ROCK ANCHORS

Below-grade structures, such as the pump station, and other structures bearing below anticipated groundwater levels should also be designed to resist uplift forces from fluctuations in the groundwater level as well as during flood events. For structures bearing on continuous rock, such as the bottom of the pump station to be approximately 25 to 30 feet below the existing ground surface, a rock anchor system could be utilized to resist these uplift forces.

We recommend the use of a post-tensioned rock anchor system. A specialty geotechnical subcontractor who install rock anchor systems should perform the actual design of these systems. However, based on our experience on similar projects and review of published values within the Post Tension Institute’s Recommendations for Prestressed Rock and Soil Anchors 2014 reference manual, estimated values for ultimate grout to rock bond strengths in competent, continuous rock would be between 150 to 250 psi, or greater.

Assuming an allowable grout to rock bond strength of 60 psi (ultimate 150 psi with a safety factor of 2.5), a rock anchor with a 6 inch diameter hole with a grouted bond length of 10 feet into competent, continuous rock could develop a allowable uplift capacity of approximately 135 kips. Practically and based on past experience, the maximum depths of most rock anchors are limited to 30 feet. We recommend that rock anchors be spaced a minimum of 10 feet apart from one another. For redundancy purposes, we recommend that a minimum of at least two rock anchors be installed for each structure being resisted for uplift.

We recommend that the holes should be drilled into the rock utilizing an air rig and then grouted as soon as possible after the installation of the rock anchor. We recommend that Class II corrosion protection be provided to the anchorage system due to the presence of groundwater and the importance of the structure. Once the grout has reached sufficient strength and the foundation is constructed the anchor may be tensioned. Post tensioned anchors should also be load tested, as required, prior to foundation construction, to verify they are providing the required uplift resistance for the design load.

4.3 GRADE SLAB

Following the performance of a proofroll and replacement of areas identified as being unsuitable, a modulus of subgrade reaction of 130 pounds per cubic inch (pci) may be used in design of grade slabs for the building bearing at or near the existing ground surface in residual soil or newly compacted and tested fill. This modulus of subgrade reaction is not intended for use in design of mat foundations. WSP can provide assistance in determining the appropriate modulus for use in design of mat foundations, if desired.

A minimum 4-inch layer of crushed stone covered with an impermeable membrane should be placed on the soil subgrade prior to slab construction to provide a level bearing surface and to increase the load distribution capabilities. The grade slabs should be jointed around columns and along footing-supported walls so that the slabs and foundations can settle differentially without damage. Joints containing smooth dowels or keys may be used in the slab to permit rotational movement between parts of the slab without sharp vertical displacements or cracking.

Exposure to the environment and construction traffic may disturb the subgrade soils at the slab bearing level. The slab subgrade should be graded and maintained to prevent ponding of surface water. If the subgrade soils are softened by water intrusion, exposure or construction traffic, the softened soils must be removed or scarified, allowed to dry, and recompacted prior to placement of the crushed stone leveling course or construction of the grade slab.

We recommend that a WSP engineering technician observe the soil subgrade immediately prior to placement of the crushed stone leveling course and document the conditions observed. The slab subgrade should be free of loose soil, ponded water, and debris. Any significant differences from the specified subgrade condition should be brought to the attention of the owner's representative along with appropriate recommendations for correction of the observed condition.

4.4 ADDITIONAL CONSTRUCTION CONSIDERATIONS

Existing fill and alluvial soils were encountered in the boreholes performed. It should be anticipated that some areas with unsuitable soils will be identified during construction that will need to be undercut and replaced or undercut and re-compacted within the area. Some of these soils may not be suitable for use as pipe backfill along the alignment as well. Proofrolling the subgrade, as recommended within this report, should assist in identifying potential areas of unsuitable soils. However, the only way to completely eliminate the potential risk of excessive foundation settlement or slab on grade distress would be to completely undercut and replace the existing soil fill and alluvial soils within the construction area. Our recommendations provided are based on the subsurface conditions encountered within our boreholes and are intended to help reduce, but not eliminate the possible future risk of building settlement or pavement distress over the previously placed, variably compacted existing fill and alluvial soils.

5.0 QUALIFICATION OF REPORT

The recommendations provided in this report are based in part on project information provided to us and they only apply to the specific project and site discussed in this report. If the project information section in this report contains incorrect information or if additional information is available, you should convey the correct or additional information to us and retain us to review our recommendations. We can then modify our recommendations, as necessary, for the proposed project.

Regardless of the thoroughness of a geotechnical exploration, there is always a possibility that conditions between borings will be different from those at specific locations and that conditions will not be as anticipated by the designers or contractors. In addition, the construction process may itself alter subsurface conditions. Therefore, experienced geotechnical personnel should observe and document the construction procedures used and the conditions encountered. Unanticipated conditions and inadequate procedures should be reported to the design team along with timely recommendations for addressing the observed conditions/procedures. We recommend that WSP be retained to provide this service based upon our familiarity with the project, the subsurface conditions, and the intent of the recommendations and design.

The assessment of site environmental conditions for the presence of pollutants in the soil, rock, or groundwater of the site was beyond the scope of this exploration.

ATTACHMENTS

WSP USA Environment & Infrastructure Inc.

1308 Patton Ave Suite C
Asheville, NC 28806

Note: This map is for reference only.

TITLE:

SITE AND BORING LOCATION PLAN
WEAVERVILLE PUMP STATION AND
FORCE MAIN REPLACEMENT PROJECT
BUNCOMBE COUNTY, NORTH CAROLINA

PREPARED BY:
G. HUTCHINS 2/14/2023

CHECKED BY:
T. QUIGLEY 2/14/2023

PROJECT NUMBER:
6252.13.0101.079

REFERENCE:
Boring location KMZ file provided by CDM Smith on 11/3/2022

Figure No.
1

Document Path: \\avl-fs1\projects\MSD\Phase 79 - Weaverville Pump Station Geotech\GIS\Site and Boring Location.mxd

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WSP USA Environment & Infrastructure Inc.

1308 Patton Ave Suite C
Asheville, NC 28806

Note: This map is for reference only.

TITLE:

SITE AND BORING LOCATION PLAN - PUMP STATION AREA
WEAVERVILLE PUMP STATION AND
FORCE MAIN REPLACEMENT PROJECT
BUNCOMBE COUNTY, NORTH CAROLINA

PREPARED BY:
G. HUTCHINS 6/28/2023

CHECKED BY:
T. QUIGLEY 6/28/2023

PROJECT NUMBER:
6252.13.0101.079

REFERENCE:
Boring location KMZ file provided by CDM Smith on 11/3/2022

Figure No.
1A

Document Path: B:\projects\MSD\Phase 79 - Weaverville Pump Station Geotech\GIS\Site and Boring Location.mxd

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size)	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravels, gravel - sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel - sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amount of fines)	GM	Silty gravels, gravel - sand - silt mixtures.
			GC	Clayey gravels, gravel - sand - clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 Sieve Size)	CLEAN SANDS (Little or no fines)	SW	Well graded sands, well graded sands with gravel.
			SP	Poorly graded sands, poorly graded sands with gravel.
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands.
			SC	Clayey sands.
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts, sandy or clayey silts with low plasticity.
			CL	Inorganic clays of low plasticity.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of high plasticity, organic silts.
CORED ROCK			RK	Rock

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

SILT OR CLAY	SAND			GRAVEL		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

No.200 No.40 No.10 No.4 3/4" 3" 12"

U.S. STANDARD SIEVE SIZE

<u>Reference:</u> "Classification of Soils for Engineering Purposes" (Unified Soil Classification System) ASTM D 2487, and/or "Description and Identification of Soils" (Visual-Manual Procedure), ASTM D 2488.

■	Undisturbed Sample		Auger Cuttings
⊠	Split Spoon Sample		Bulk Sample
▮	Rock Core	▩	Crandall Sampler
▩	Dilatometer		Pressure Meter
▯	Packer	○	No Recovery
▽	Water Table at time of drilling	▼	Water Table after 24 hours
▨	Caved Depth		WOH = Weight of Hammer

Monitoring Well Explanation

Cement Bentonite Sand Filter Screen

Correlation of Penetration Resistance with Relative Density and Consistency

NON-COHESIVE		COHESIVE	
No. of Blows	Relative Density	No. of Blows	Consistency
0 - 4	Very Loose	0 - 1	Very Soft
5 - 10	Loose	2 - 4	Soft
11 - 30	Medium Dense	5 - 8	Firm
31 - 50	Dense	9 - 15	Stiff
Over 50	Very Dense	16 - 30	Very Stiff
		Over 30	Hard

wsp

KEY TO SYMBOLS AND DESCRIPTIONS

WSP USA Environment & Infrastructure Inc.

SOIL TEST BORING RECORD

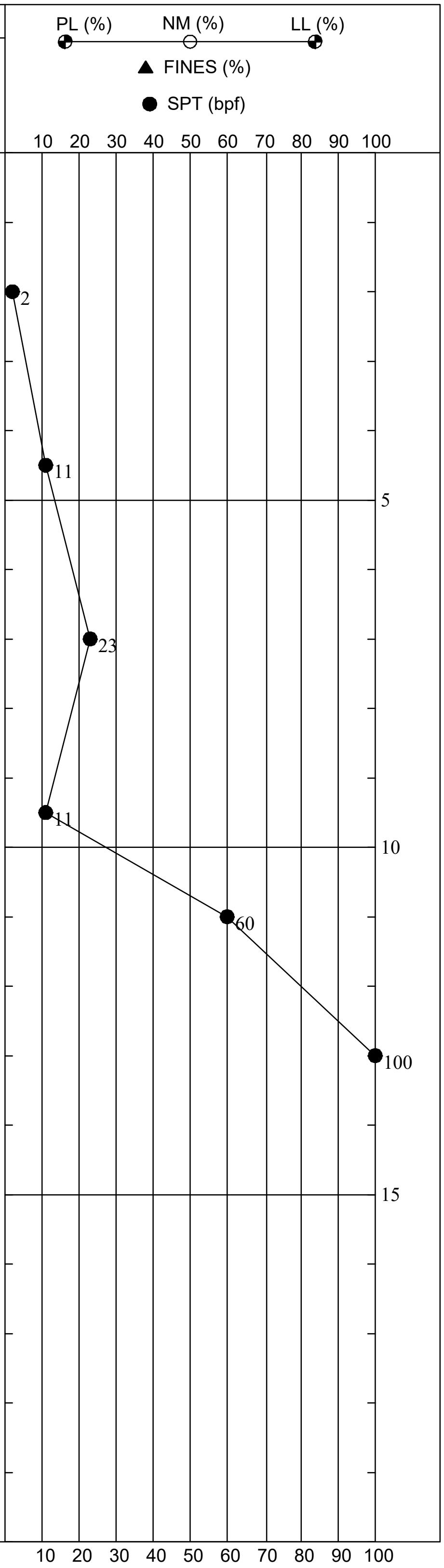
SOIL CLASSIFICATION AND REMARKS

SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS
0	Rootmat/Grass (2 Inches)
	RESIDUUM- Very Loose, Brown To Light Brown, Silty, Fine To Medium SAND (SM), Trace Roots, Moist
	Medium Dense, Brown, Silty, Fine SAND (SM), Trace Relict Rock Structure And Rock Fragments, Moist
5	
	Medium Dense, Brown To Grayish Brown, Silty, Fine SAND (SM), Trace Relict Rock Structure And Rock Fragments, Moist
	Medium Dense, Reddish Brown With Some Grayish Brown, Silty, Fine SAND (SM), Trace To Little Mica, Moist To Slightly Wet
10	Very Dense, Gray, Silty, Fine SAND (SM), Some Rock Fragments Hard Drilling From 10 To 12.9 Feet
	ROCK- Very Hard, Gray And White, Quartz Biotite, Gneiss, Very Slight Weathering To Fresh, Gneiss Foliation 85 To 90 Degrees **Rock Core Run From 13 To 17 Feet** **Recovery = 80%** **RQD = 59%**
15	
	Auger Refusal At 13 Feet Rock Coring Performed From 13 To 17 Feet Boring Terminated At 17 Feet Dry At 13 Feet Prior To Rock Coring Groundwater Encountered At 1.9 Feet On 12/30/2022
20	

SAMPLES

IDENT	N-COUNT 1st 6" 2nd 6" 3rd 6"
SS-1	3-1-1
SS-2	5-5-6
SS-3	9-11-12
SS-4	3-4-7
SS-5	21-31-29
SS-6	50/0.1"



DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

PROJECT: MSD Weaverville Pump Station
BORING NO.:B-1
LATITUDE:
LONGITUDE:
DRILLED: December 21, 2022
PROJ. NO.: 6252-13-0101.079

SOIL CLASSIFICATION AND REMARKS

SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.

Roots/Grassmat (2 Inches)

RESIDUUM- Medium Dense, Light Yellowish Brown, Silty, Fine SAND (SM), Some Relict Rock Structure, Trace Roots, Moist

Dense, Light Yellowish Brown, Silty, Fine SAND (SM), Some Relict Rock Structure, Trace Angular Gravel And Rock Fragments, Moist

Dense, Light Yellowish Brown, Silty, Fine SAND (SM), Some Relict Rock Structure, Trace Angular Gravel And Rock Fragments, Moist

Dense, Brown To Light Grayish Brown, Fine SAND (SM), Trace To Little Mica, Some Relict Rock Structure, Moist

Very Dense, Brown To Light Grayish Brown, Silty, Fine SAND (SM), Moist
Very Hard Drilling From 11 To 13 Feet

ROCK- Hard To Very Hard, Gray And White, Quartz Biotite, Gneiss, Fresh To Very Slightly Weathered, Gneiss Foiliation Is 75° to 95°

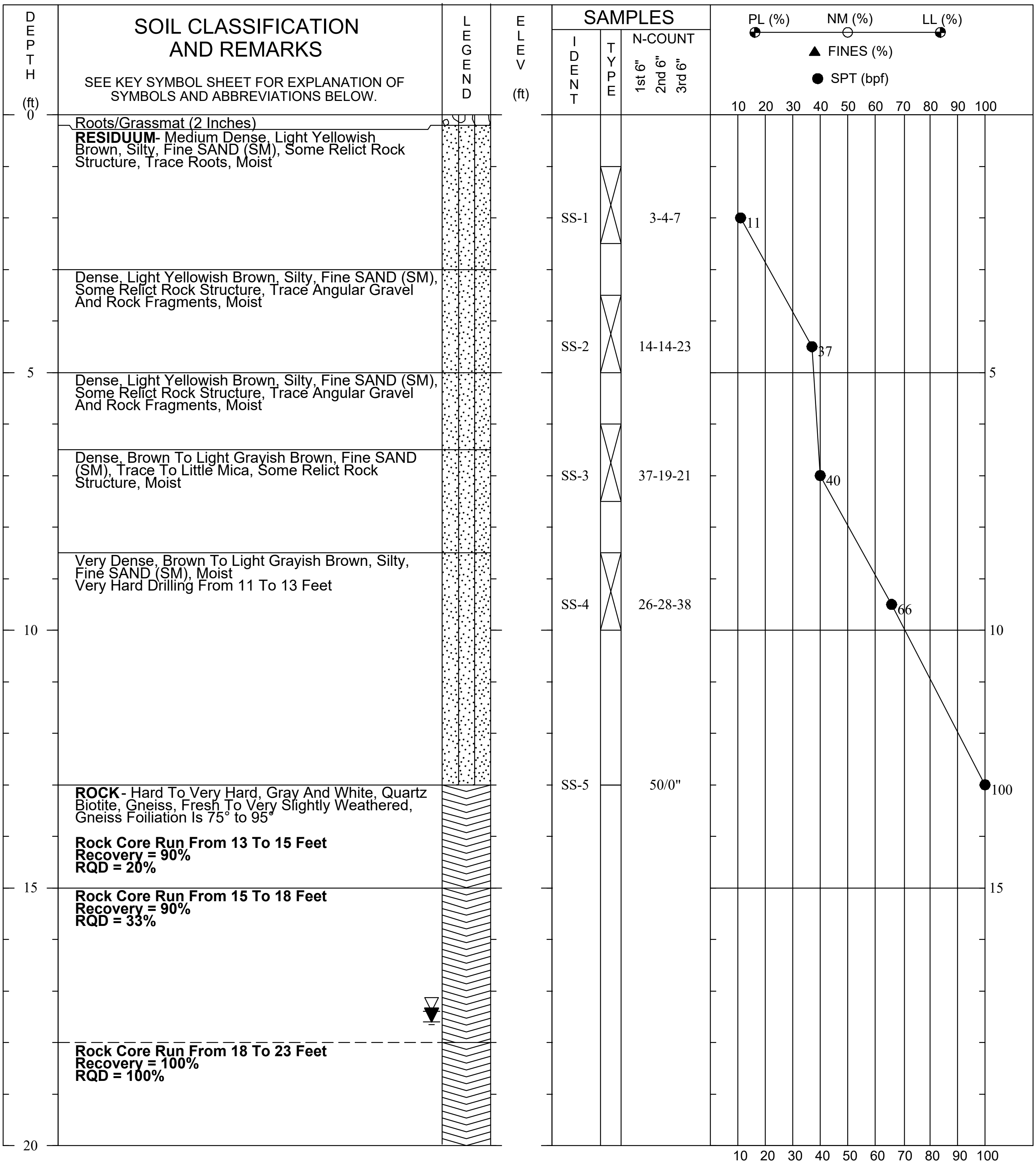
Rock Core Run From 13 To 15 Feet
Recovery = 90%
RQD = 20%

Rock Core Run From 15 To 18 Feet
Recovery = 90%
RQD = 33%

Rock Core Run From 18 To 23 Feet
Recovery = 100%
RQD = 100%

SAMPLES

IDENT	N-COUNT 1st 6" 2nd 6" 3rd 6"
SS-1	3-4-7
SS-2	14-14-23
SS-3	37-19-21
SS-4	26-28-38
SS-5	50/0"



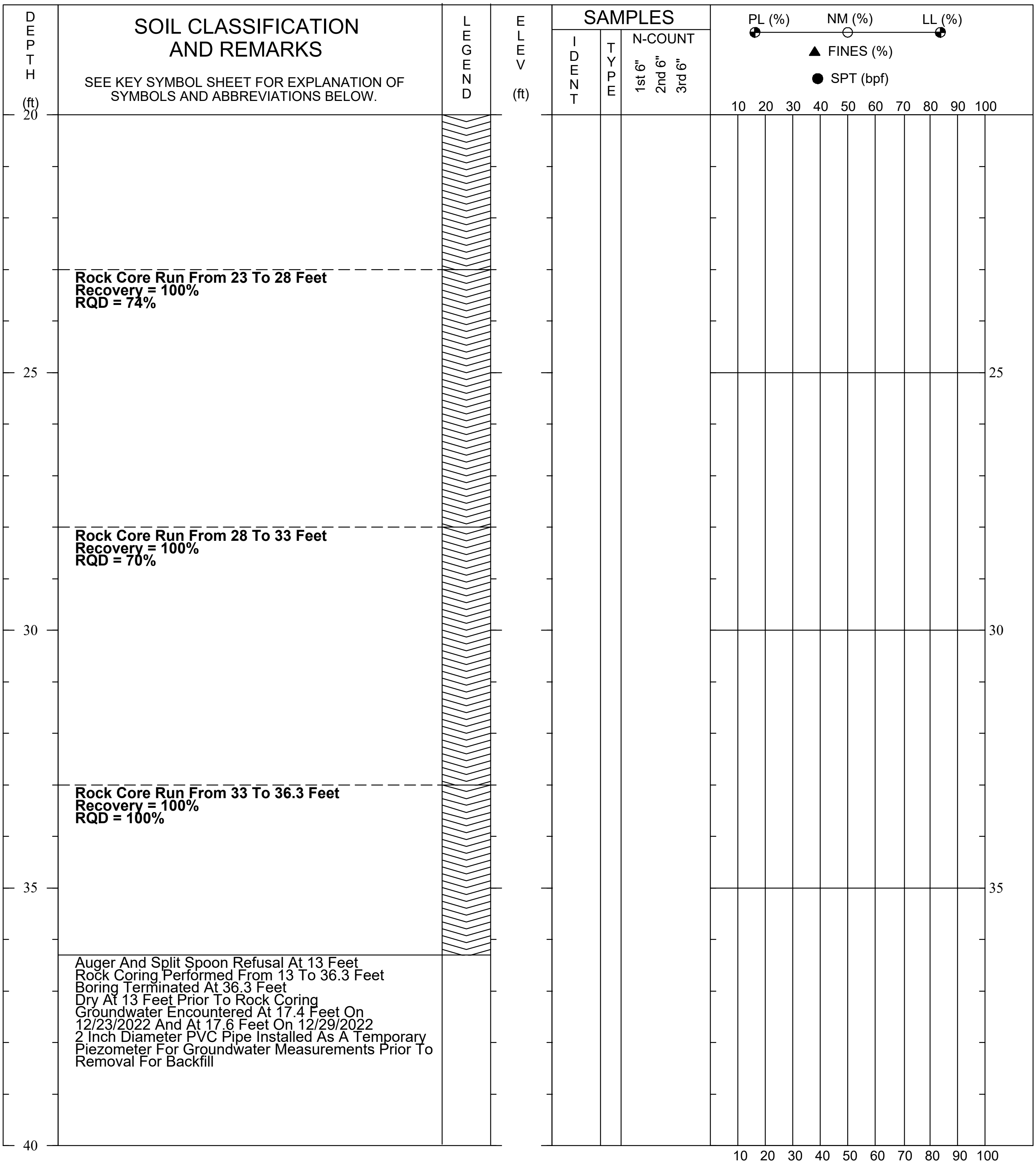
DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station
BORING NO.:B-2
LATITUDE:
LONGITUDE:
DRILLED: December 19, 2022
PROJ. NO.: 6252-13-0101.079
PAGE 1 **OF** 2



Rock Core Run From 23 To 28 Feet
Recovery = 100%
RQD = 74%

Rock Core Run From 28 To 33 Feet
Recovery = 100%
RQD = 70%

Rock Core Run From 33 To 36.3 Feet
Recovery = 100%
RQD = 100%

Auger And Split Spoon Refusal At 13 Feet
Rock Coring Performed From 13 To 36.3 Feet
Boring Terminated At 36.3 Feet
Dry At 13 Feet Prior To Rock Coring
Groundwater Encountered At 17.4 Feet On 12/23/2022 And At 17.6 Feet On 12/29/2022
2 Inch Diameter PVC Pipe Installed As A Temporary Piezometer For Groundwater Measurements Prior To Removal For Backfill

DRILLER:	IET
EQUIPMENT:	Geoprobe 8040
METHOD:	3 1/4 HSA/NQ
HOLE DIA.:	8"
REMARKS:	

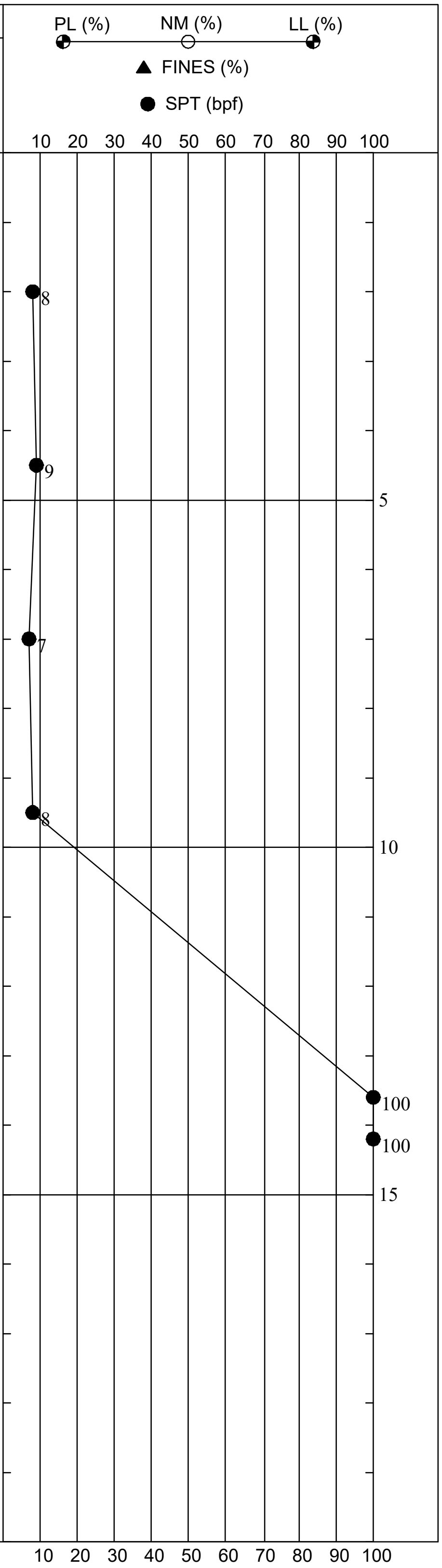
PREPARED BY: MNQ
CHECKED BY: TPQ

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station
BORING NO.:B-2
LATITUDE:
LONGITUDE:
DRILLED: December 19, 2022
PROJ. NO.: 6252-13-0101.079
PAGE 2 **OF** 2

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Rootmat/Grass (2 Inches) **FILL** - Firm, Yellowish Brown, Sandy SILT (ML), Moist			SS-1		2-3-5
	Loose, Orangish Brown Grades To Grayish Brown, Silty, Fine SAND (SM), Trace Roots, Moist			SS-2		4-4-5
5	Loose, Greenish Gray, Silty, Fine SAND (SM), Trace Roots, Moist To Wet			SS-3		5-3-4
	Loose, Tan To Light Grayish Brown, Silty, Fine SAND (SM), Moist			SS-4		5-4-4
10	Loose, Black, Silty, Fine SAND (SM), Some Organics, Strong Organic Odor, Moist **Concrete Fragments And Black Geotextile Fabric Encountered In Deeper Sample**			SS-5 SS-6		50/1" 50/0"
15	Auger Refusal At 14.2 Feet 13.5 Feet In Two Offset Borings Groundwater Encountered At 14 Feet At Time Of Boring And At 12 Feet On 12/20/2022					
20						



DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

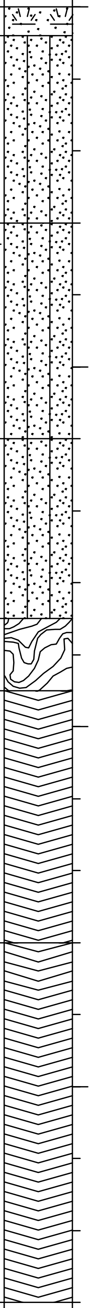
SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station **BORING NO.:**B-3
LATITUDE:
LONGITUDE:
DRILLED: December 19, 2022
PROJ. NO.: 6252-13-0101.079 **PAGE** 1 **OF** 1

SOIL TEST BORING RECORD

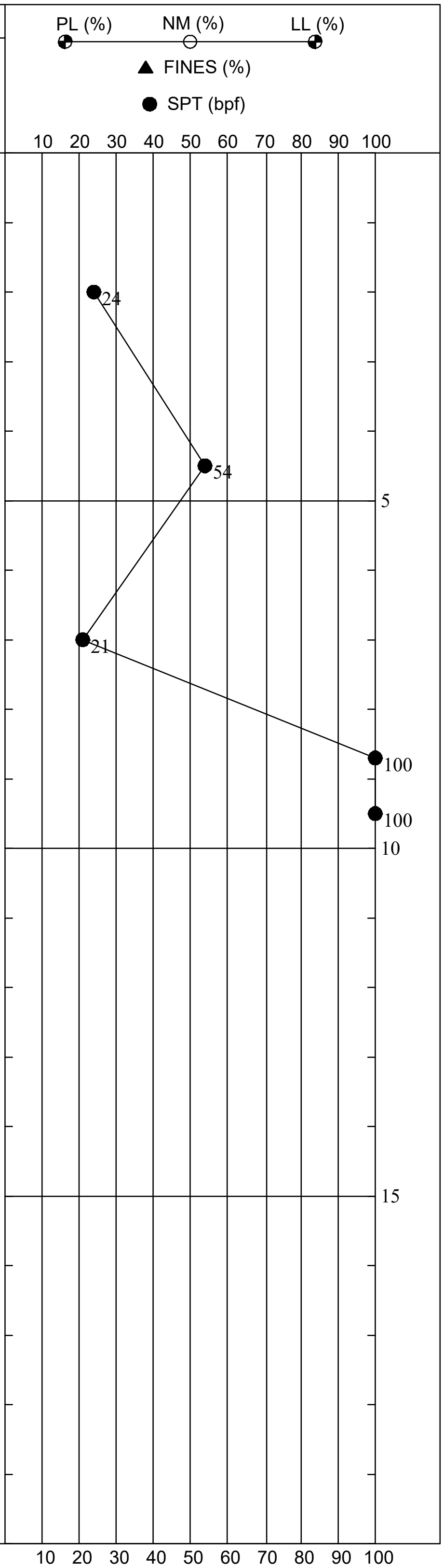
PROJECT: MSD Weaverville Pump Station **BORING NO.:**B-4
LATITUDE:
LONGITUDE:
DRILLED: December 20, 2022
PROJ. NO.: 6252-13-0101.079 **PAGE** 1 **OF** 1

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.
0	Topsoil (4 inches)
	RESIDUUM- Medium Dense, Light Brown, Yellowish Brown, Silty, Fine SAND (SM), Trace Roots, Moist
	Very Dense, Tan To Light Yellowish Brown, Silty, Fine SAND (SM), Moist
5	Medium Dense, Tan To Light Yellowish Brown, Silty, Fine SAND (SM), Trace Angular Quartz, Moist
	PARTIALLY WEATHERED ROCK Sampled As, Tan To Light Yellowish Brown, Silty, Fine SAND (SM), Some Angular Rock Fragments, Moist
10	**ROCK**- Very Hard, Gray, Trace White, Quartz Biotite, GNEISS, Fresh To Very Slight Weathering **Rock Core Run From 9.5 To 13 Feet** **Recovery = 19%** **RQD = 8%** Hard Zone At 10 Feet Re-encountered Hard Rock At 12.5 Feet
15	**Rock Core Run From 13 To 18 Feet** **Recovery = 94%** **RQD = 94%**
20	Auger Refusal At 9.5 Feet Rock Coring Performed From 9.5 To 18 Feet Boring Terminated At 18 Feet Dry At 9.5 Feet Prior To Rock Coring Groundwater Encountered At 3.3 Feet On 12/30/2022



ELEV (ft)

SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
SS-1		WOH-8-16
SS-2		10-21-33
SS-3		7-9-12
SS-4		50/0.2"
SS-5		50/0"



DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL CLASSIFICATION AND REMARKS

SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.

DEPTH (ft) | LEGEND | ELEV (ft)

0

ALLUVIUM- Tan To Light Brown, Silty SAND (SM)

RESIDUUM- Very Loose, Light Brown, Silty, Fine To Medium SAND (SM), Trace Mica, Moist

Loose, Light Brown, Silty, Fine To Medium SAND (SM), Trace Mica, Moist

5

Medium Dense, Light Brown, Silty, Fine To Medium SAND (SM), Trace Mica, Moist

Medium Dense, Brown, Silty, Fine To Medium SAND (SM), Trace Rock Fragments And Quartz, Moist

10

PARTIALLY WEATHERED ROCK Sampled As, Brown, Silty, Fine To Medium SAND (SM), Trace Rock Fragments, Quartz, And Mica, Moist
Hard Drilling From 10.5 To 14.4 Feet

ROCK- Very Hard, Gray And White, Quartz, Biotite, GNEISS, Fresh Gneiss Foliation 45° To 85°

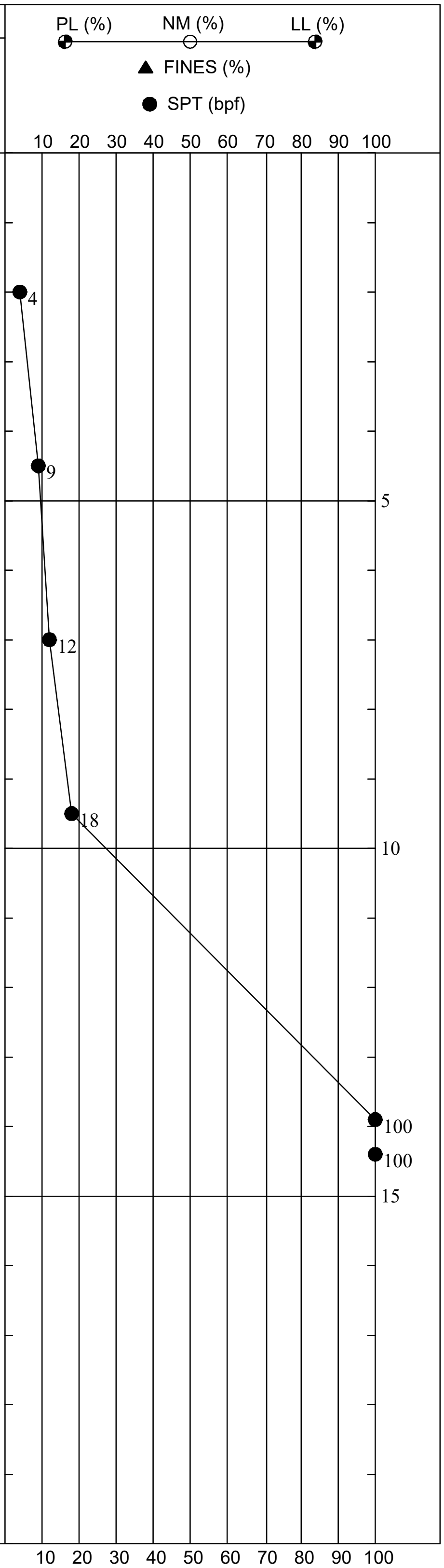
15

Rock Core Run From 14.4 To 18.1 Feet
Recovery = 84%
RQD = 54%

Rock Core Run From 18.1 To 21.4 Feet
Recovery = 100%
RQD = 100%

20

SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
SS-1		2-2-2
SS-2		4-4-5
SS-3		4-5-7
SS-4		13-9-9
SS-5		50/0.4"
SS-6		50/0"



DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station **BORING NO.:**B-5
LATITUDE:
LONGITUDE:
DRILLED: December 22, 2022
PROJ. NO.: 6252-13-0101.079 **PAGE** 1 **OF** 2

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	N-COUNT 1st 6"	N-COUNT 2nd 6"	N-COUNT 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
20		▨							
	Auger Refusal At 14.4 Feet Rock Coring Performed From 14.4 To 21.4 Feet Boring Terminated At 21.4 Feet Groundwater Encountered At 10.8 Feet On 12/30/2022 Borehole Caved And Dry At 1.4 Feet At Time Of Boring								
25									25
30									30
35									35
40									10 20 30 40 50 60 70 80 90 100

DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

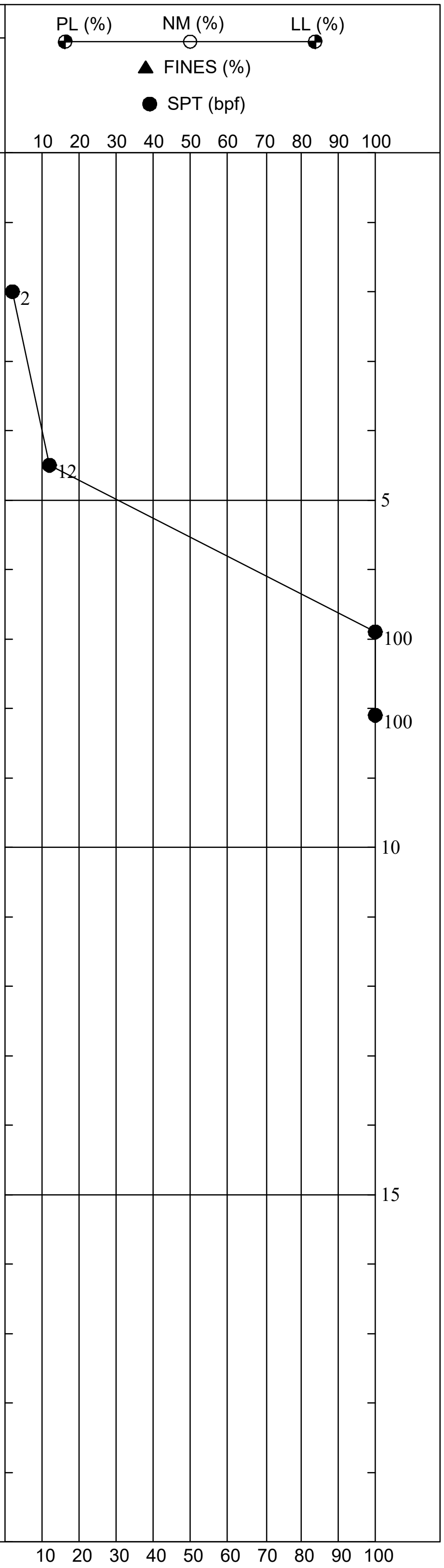
SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station **BORING NO.:**B-5
LATITUDE:
LONGITUDE:
DRILLED: December 22, 2022
PROJ. NO.: 6252-13-0101.079 **PAGE** 2 **OF** 2

wsp

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)
0	Topsoil (4 inches)		
	RESIDUUM- Very Soft, Brown, Fine, Sandy SILT (ML), Trace Roots, Moist To Wet		
	Medium Dense, Light Yellowish Brown To Tan, Silty, Fine SAND (SM), Trace Relict Rock Structure, Moist		
5	**PARTIALLY WEATHERED ROCK** Sampled As, Yellowish Brown To Tan, Silty, Fine To Medium SAND (SM), Some Relict Rock Structure, Trace Rock Fragments, Wet		
	Auger And Split Spoon Refusal At 8.1 Feet Groundwater Encountered At 6 feet At Time Of Boring And At 2.3 Feet On 12/30/2022		
10			
15			
20			

SAMPLES IDENT	TYPE	N-COUNT (1st 6" 2nd 6" 3rd 6")
SS-1		1-1-1
SS-2		3-5-7
SS-3		19-50/5"
SS-4		50/0"



DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

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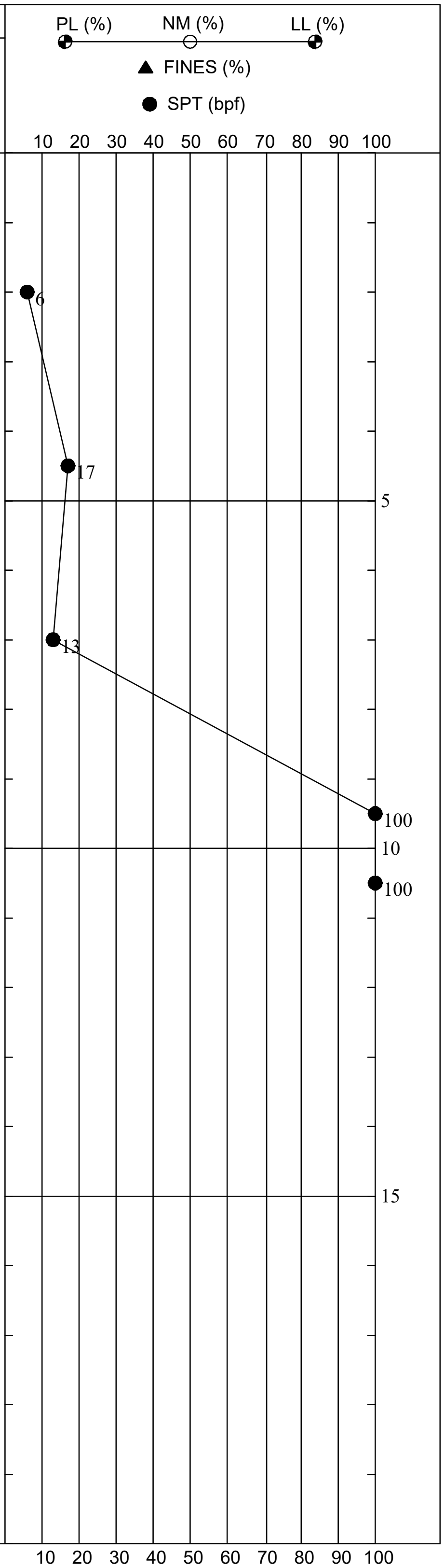
SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station **BORING NO.:** B-6
LATITUDE:
LONGITUDE:
DRILLED: December 22, 2022
PROJ. NO.: 6252-13-0101.079 **PAGE** 1 **OF** 1

wsp

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Topsoil And Grass (4 Inches)					
	RESIDUUM- Loose, Orange, White, Tan, Silty, Fine To Coarse SAND (SM), Moist			SS-1	☒	2-2-4
	Medium Dense, Red, Tan, Brown, Silty, Fine To Coarse SAND (SM), Moist			SS-2	☒	8-8-9
5						
	Medium Dense, Orange, Tan, Silty, Fine To Coarse SAND (SM), With Partially Weathered Rock Fragments, Moist ▼ ▽			SS-3	☒	8-7-6
	PARTIALLY WEATHERED ROCK Sampled As, White, Brown, Tan, Silty, Fine To Coarse SAND (SM), With Fine Gravel And Partially Weathered Rocks, Wet			SS-4	☒	45-43-50/5"
10				SS-5	☒	50/6"
	Auger Refusal At 10 Feet Groundwater Encountered At 7.6 Feet At Time Of Boring And At 6 Feet On 12/30/2022 Borehole Caved At 7 feet At Time Of Boring					
15						
20						



DRILLER:	IET
EQUIPMENT:	Geoprobe 8040
METHOD:	3 1/4 HSA/NQ
HOLE DIA.:	8"
REMARKS:	

PREPARED BY: MNQ
CHECKED BY: TPQ

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SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station **BORING NO.:**B-7
LATITUDE:
LONGITUDE:
DRILLED: December 27, 2022
PROJ. NO.: 6252-13-0101.079 **PAGE** 1 **OF** 1

SOIL CLASSIFICATION AND REMARKS

SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.

DEPTH (ft): 0

Rootmat/Grass (2 Inches)

RESIDUUM- Loose, Light Yellowish Brown To Tan, Silty, Fine SAND (SM), Trace Roots, Moist

Medium Dense, Light Yellowish Brown To Tan, Silty, Fine to Medium SAND (SM), Trace Quartz And Angular Rock Fragments, Moist

DEPTH (ft): 5

Dense, Light Yellowish Brown To Tan, Silty, Fine To Medium SAND (SM), Trace Quartz And Angular Rock Fragments, Moist

ROCK- Hard To Very Hard, Quartz Biotite, GNEISS, Moderate to Slight Weathering, Possibly Partially Weathered Rock Approximately 8 To 12 Feet Due To Low Recovery, Slight Weathering

Rock Core Run From 7.5 To 12.5 Feet
Recovery = 16%
RQD = 0%

DEPTH (ft): 10

Rock Core Run From 12.5 To 17.5 Feet
Recovery = 48%
RQD = 0%

13.5 To 16 Feet Partially Weathered Rock, Low Recovery, Light Yellowish Brown, Silty, Fine To Coarse SAND (SM), Some Rock Fragments, Moist
1.4 Feet Of Hard Rock Recovery

DEPTH (ft): 15

Rock Core Run From 17.5 To 22.5 Feet
Recovery = 22%
RQD = 10%

Hard Drilling 17.5 To 18 Feet
18 To 20.5 Feet Partially Weathered Rock
20.5 To 22.5 Rock

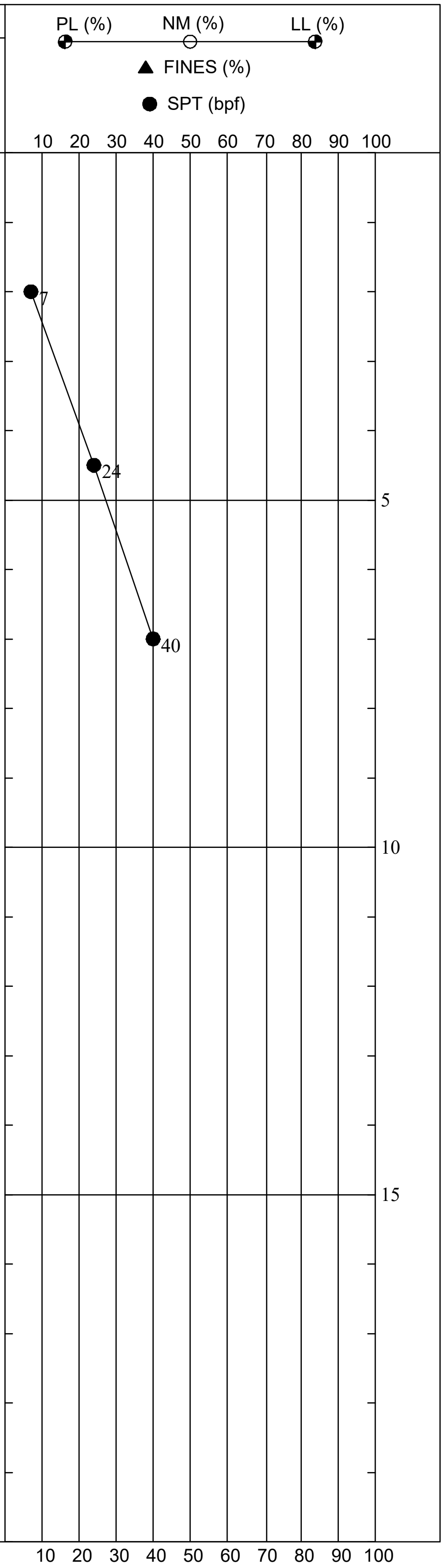
DEPTH (ft): 20

LEGEND

ELEV (ft)

SAMPLES

IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
SS-1	☒	WOH-3-4
SS-2	☒	6-10-14
SS-3	☒	7-17-23



DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

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SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station
BORING NO.:B-8
LATITUDE:
LONGITUDE:
DRILLED: December 21, 2022
PROJ. NO.: 6252-13-0101.079
PAGE 1 **OF** 2

wsp

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
20		▨					
	Auger Refusal At 7.5 Feet Rock Coring Performed From 7.5 To 22.5 Feet Boring Terminated At 22.3 Feet Borehole Caved At 12.5 Feet At Time Of Boring Borehole Caved And Dry At 11 Feet On 12/30/2022						
25							25
30							30
35							35
40							10 20 30 40 50 60 70 80 90 100

DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

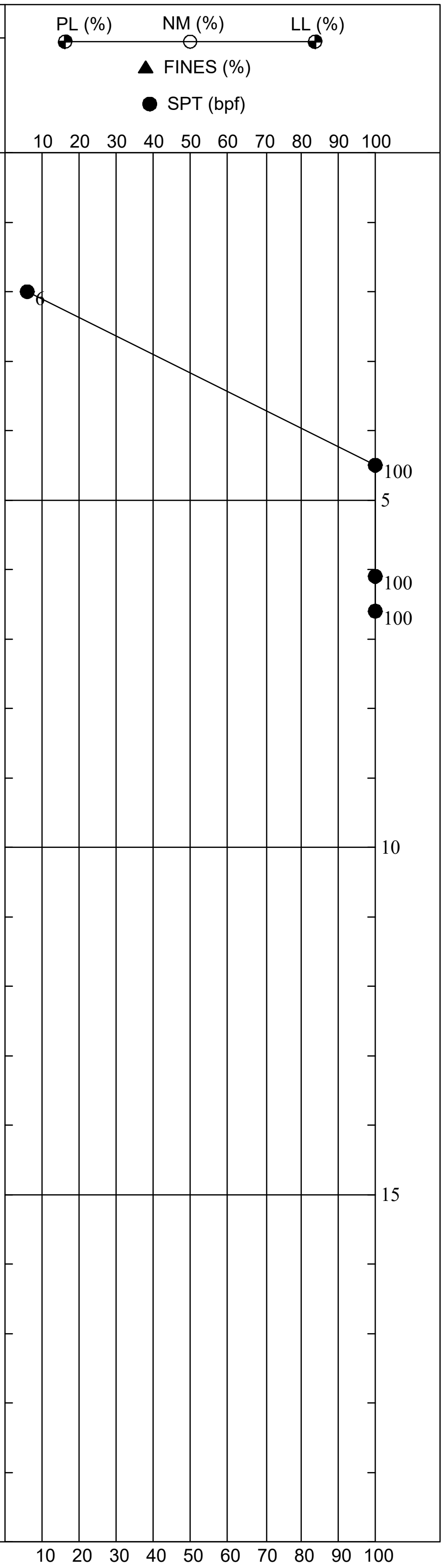
PREPARED BY: MNQ
CHECKED BY: TPQ

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station **BORING NO.:**B-8
LATITUDE:
LONGITUDE:
DRILLED: December 21, 2022
PROJ. NO.: 6252-13-0101.079 **PAGE** 2 **OF** 2

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Topsoil (5 Inches)					
	RESIDUUM- Loose, Light Brown To Light Yellowish Brown, Silty, Fine To Medium SAND (SM), Trace To Little Coarse Sand, Moist			SS-1		1-3-3
	PARTIALLY WEATHERED ROCK AND DENSE SOIL - Sampled As, Light Yellowish Brown To Tan, Silty, Fine To Coarse SAND (SM), Some Rock Fragments And Quartz, Moist			SS-2		21-45-50/4"
5						
				SS-3		50/1"
				SS-4		50/0"
	Auger And Split Spoon Refusal At 6.6 Feet Borehole Caved And Dry At 6.6 Feet At Time Of Boring And At 6 Feet On 12/29/2022					
10						
15						
20						



SOIL LOG MSD WEAVERVILLE PUMP STATION.GPJ 3/17/23

DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

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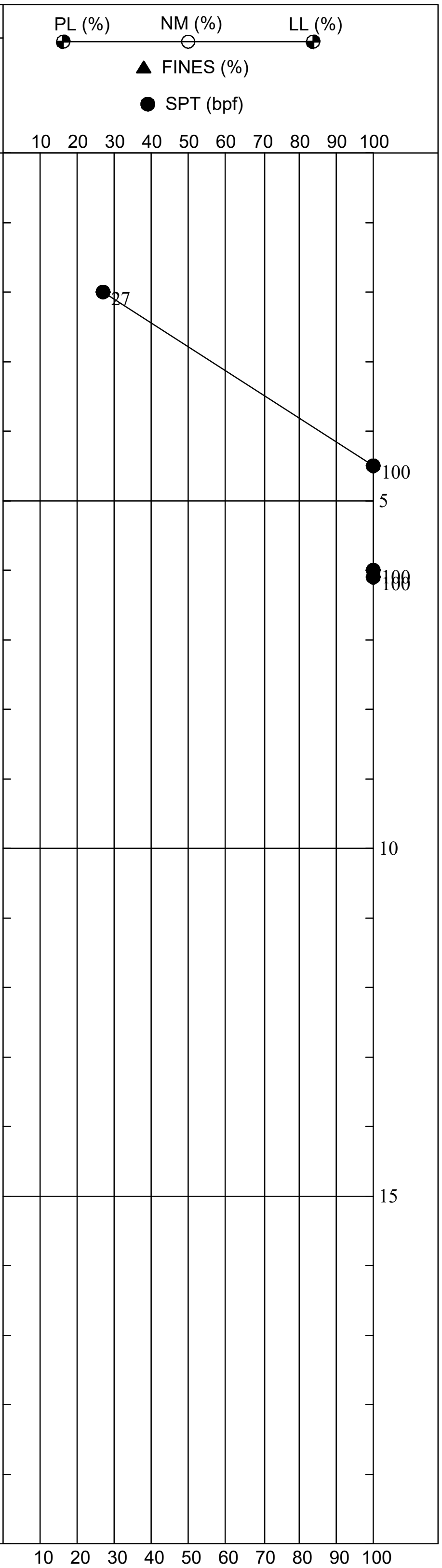
SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station
BORING NO.:B-9
LATITUDE:
LONGITUDE:
DRILLED: December 22, 2022
PROJ. NO.: 6252-13-0101.079
PAGE 1 **OF** 1

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Topsoil (4 Inches)					
	RESIDUUM- Medium Dense, Light Yellowish Brown, Silty, Fine SAND (SM), Trace Relict Rock Structure, Moist			SS-1	☒	3-6-21
	Dense, Tan To Light Yellowish Brown, Silty, Fine SAND (SM), Moist			SS-2	☒	12-23-50/3"
5	**PARTIALLY WEATHERED ROCK** Sampled As, Tan To Light Yellowish Brown, Silty, Fine SAND (SM), Moist			SS-3 SS-4		50/0" 50/0"
	Auger Refusal At 6.1 Feet Borehole Caved And Dry At 6.1 Feet At Time Of Boring And At 6 Feet On 12/29/2022					
10						
15						
20						



SOIL LOG MSD WEAVERVILLE PUMP STATION.GPJ 3/17/23

DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

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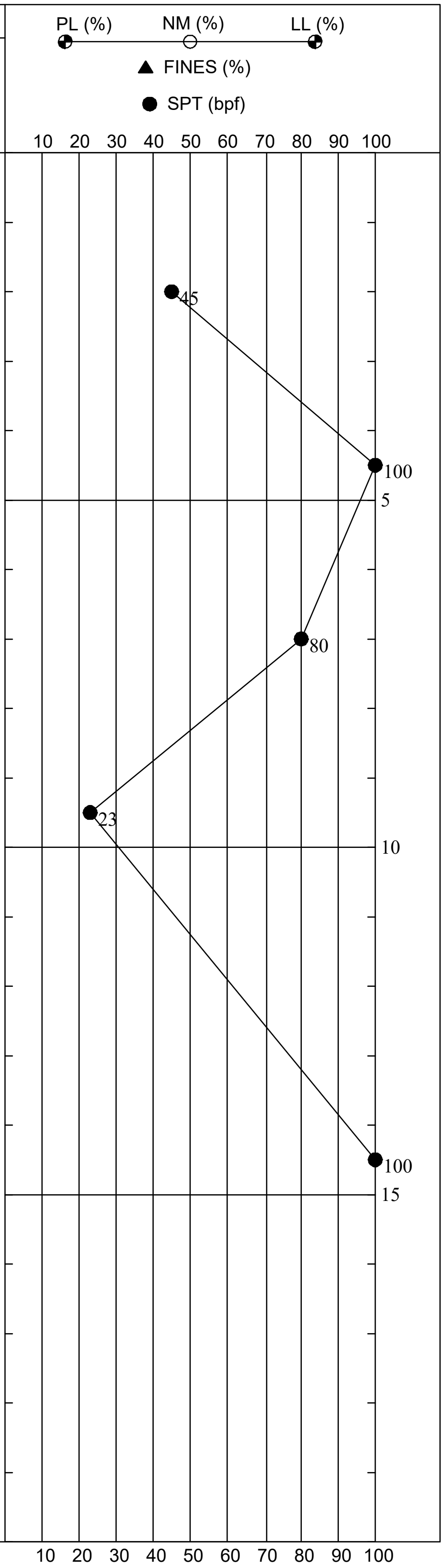
SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station **BORING NO.:**B-10
LATITUDE:
LONGITUDE:
DRILLED: December 22, 2022
PROJ. NO.: 6252-13-0101.079 **PAGE** 1 **OF** 1

wsp

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Topsoil/Grass/Rootmat (4 Inches)					
	RESIDUUM- Dense, Tan To Light Yellowish Brown, Silty, Fine To Medium SAND (SM), Some Relict Rock Structure, Moist			SS-1	☒	14-12-33
	PARTIALLY WEATEHRED ROCK Sampled As, Tan to Light Yellowish Brown, Silty, Fine To Medium SAND (SM), Some Relict Rock Structure, Moist			SS-2	☒	26-50-50/5"
5	Very Dense, Tan To Light Yellowish Brown, Silty, Fine To Medium SAND (SM), Moist			SS-3	☒	47-50-30
10	**RESIDUUM**- Medium Dense, Brown, Silty, Fine SAND (SM), Micaceous, Moist			SS-4	☒	13-10-13
15	**PARTIALLY WEATHERED ROCK** Sampled As, Yellowish And Grayish Brown, Silty, Fine SAND (SM), Trace Mica, Moist			SS-5	☒	14-23-50/5"
	Auger Refusal At 14.9 Feet Borehole Caved And Dry At 13.5 Feet At Time Of Boring And At 11.5 Feet On 1/3/2023					
20						



DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

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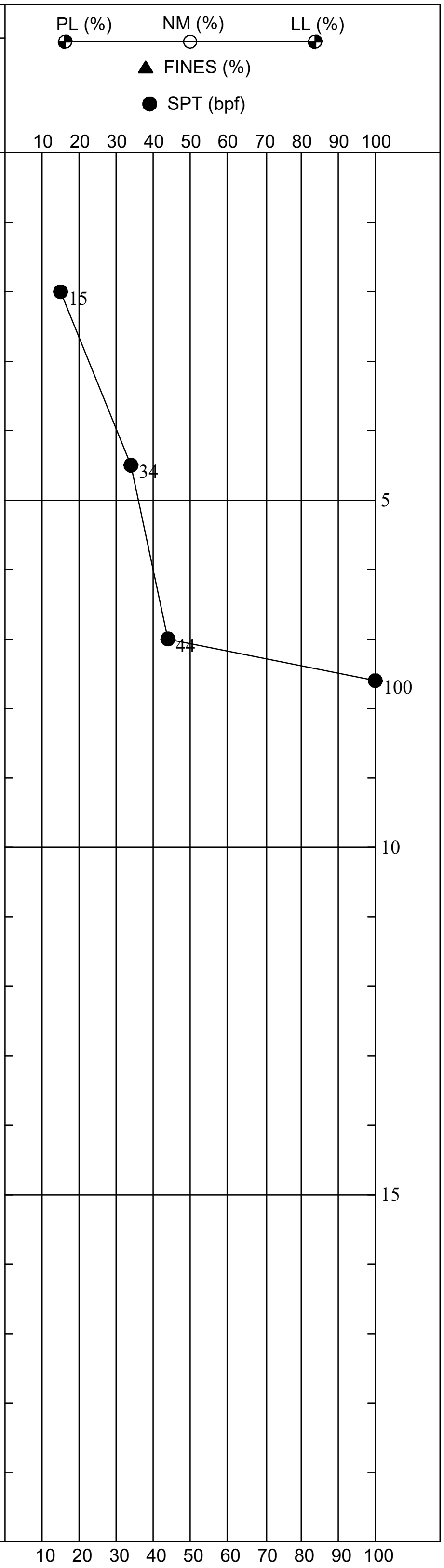
SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station **BORING NO.:** B-11
LATITUDE:
LONGITUDE:
DRILLED: December 30, 2022
PROJ. NO.: 6252-13-0101.079 **PAGE** 1 **OF** 1

wsp

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Topsoil (3 Inches)				
	FILL - Medium Dense, Brown, Silty, Fine To Medium SAND (SM), Trace Gravel, Moist		SS-1		7-6-9
	▼				
	RESIDUUM- Dense, Tan To Brown, Silty, Fine To Medium SAND (SM), Some Mica, Rock Fragments, And Quartz, Trace Relict Rock Structure, Moist		SS-2		4-16-18
5			SS-3		15-13-31
			SS-4		50/0.1"
	ROCK - Hard To Very Hard, Gray, White, Some Brown Staining, Quartz Biotite, Gneiss, Fresh To Moderate Weathering **Rock Core Run From 7.6 To 12.6 Feet** **Recovery = 64%** **RQD = 28%**				
10					
	Auger Refusal At 7.6 Feet Rock Coring Performed From 7.6 To 12.6 Feet Boring Terminated At 12.6 Feet Boring Dry At 7.5 Feet Prior To Rock Coring Groundwater Encountered At 2.9 Feet On 1/3/2023				
15					
20					



DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

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SOIL TEST BORING RECORD

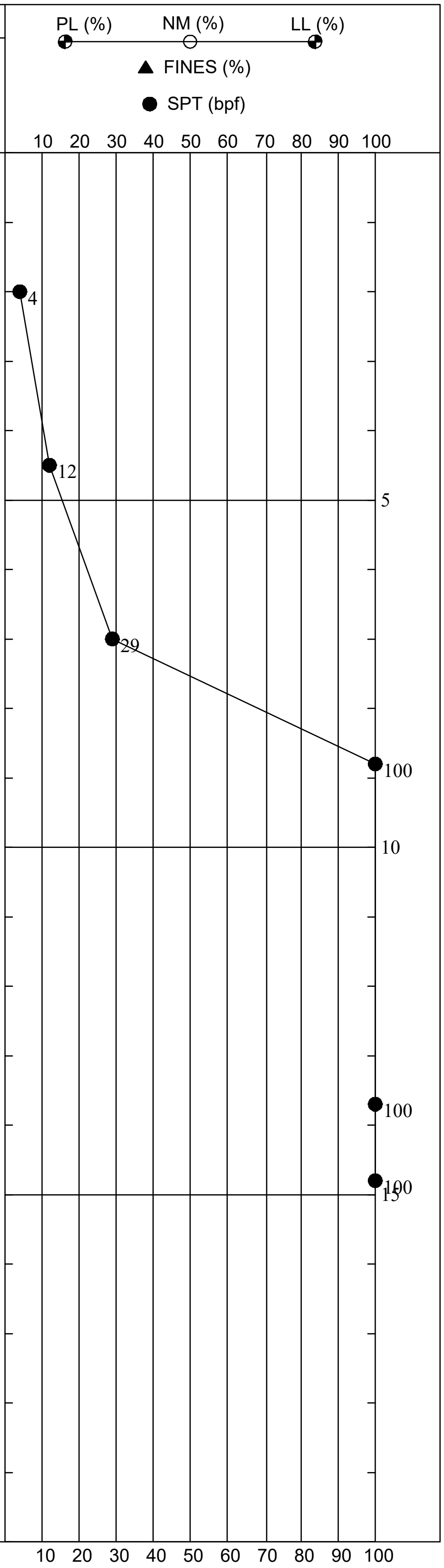
PROJECT: MSD Weaverville Pump Station **BORING NO.:**B-12
LATITUDE:
LONGITUDE:
DRILLED: December 29, 2022
PROJ. NO.: 6252-13-0101.079 **PAGE** 1 **OF** 1

SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.
Topsoil (4 Inches)
FILL - Very Loose, Grayish Brown To Yellowish Brown, Silty, Fine SAND (SM), Trace Mica And Roots, Moist
RESIDUUM- Medium Dense, Light Yellowish Brown, Silty, Fine To Medium SAND (SM), Trace Rock Fragments And Relict Rock Structure, Moist
PARTIALLY WEATHERED ROCK Sampled As, Tan, Silty, Fine To Medium SAND (SM), Trace Rock Fragments And Relict Rock Structure, Moist Hard Drilling From 8 To 9.5 Feet Very Hard Drilling From 9.5 To 14.8 Feet
Auger And Split Spoon Refusal At 14.8 Feet Borehole Caved And Dry At 11.5 feet At Time Of Boring And At 11 Feet On 1/3/2023

DEPTH (ft): 0, 5, 10, 15, 20

ELEV (ft)

SAMPLES		
IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
SS-1	☒	2-2-2
SS-2	☒	4-5-7
SS-3	☒	11-18-11
SS-4	☒	50/3"
SS-5	☒	50/2"
SS-6		50/0"



DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

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SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station **BORING NO.:**B-13
LATITUDE:
LONGITUDE:
DRILLED: December 30, 2022
PROJ. NO.: 6252-13-0101.079 **PAGE** 1 **OF** 1

wsp

SOIL CLASSIFICATION AND REMARKS

SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.

Gravel/Aggregate Base (2 Inches)

FILL - Loose, Brown, Silty, Fine SAND (SM), Trace Gravel, Moist

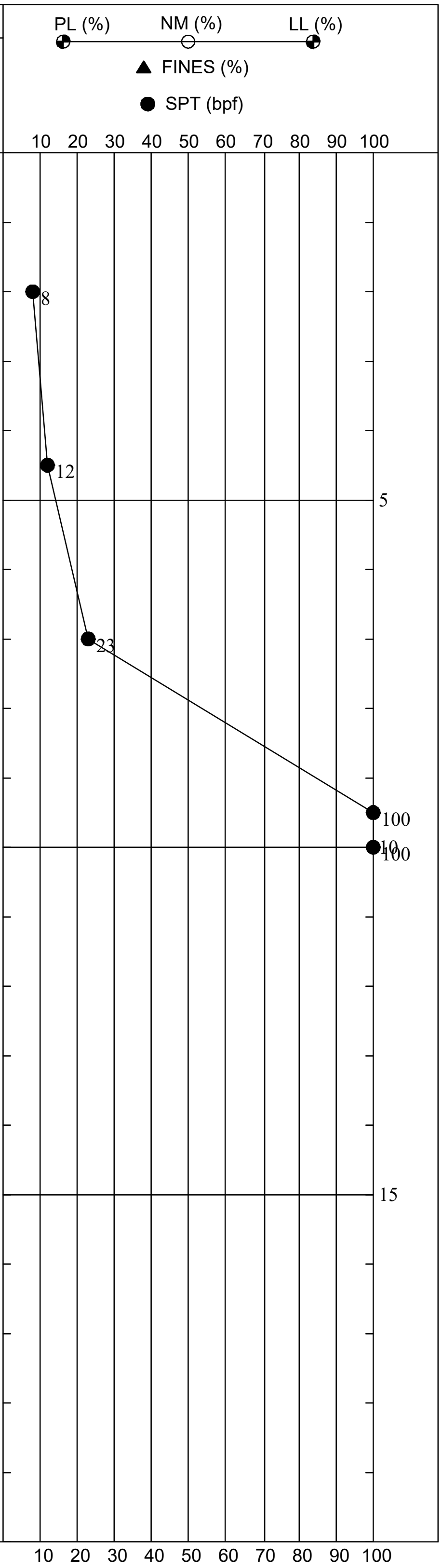
Medium Dense, Reddish Brown, Silty, Fine SAND (SM), Trace Gravel, Moist

RESIDUUM- Medium Dense, Light Yellowish Brown To Tan, Silty, Fine To Medium SAND (SM), Some Angular Rock Fragments, Little Quartz, Moist

PARTIALLY WEATHERED ROCK Sampled As, Brown, Silty, Fine To Medium SAND (SM), Some Rock Fragments, Wet

Auger And Split Spoon Refusal At 10.1 Feet
Initial Boring Refused At 7.5 feet
Groundwater Encountered At 7.5 Feet At Time Of Boring And At 6.5 Feet On 1/3/2023

SAMPLES IDENT	N-COUNT 1st 6" 2nd 6" 3rd 6"
SS-1	4-4-4
SS-2	4-6-6
SS-3	6-13-10
SS-4	6-18-50/4"
SS-5	50/0"



DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

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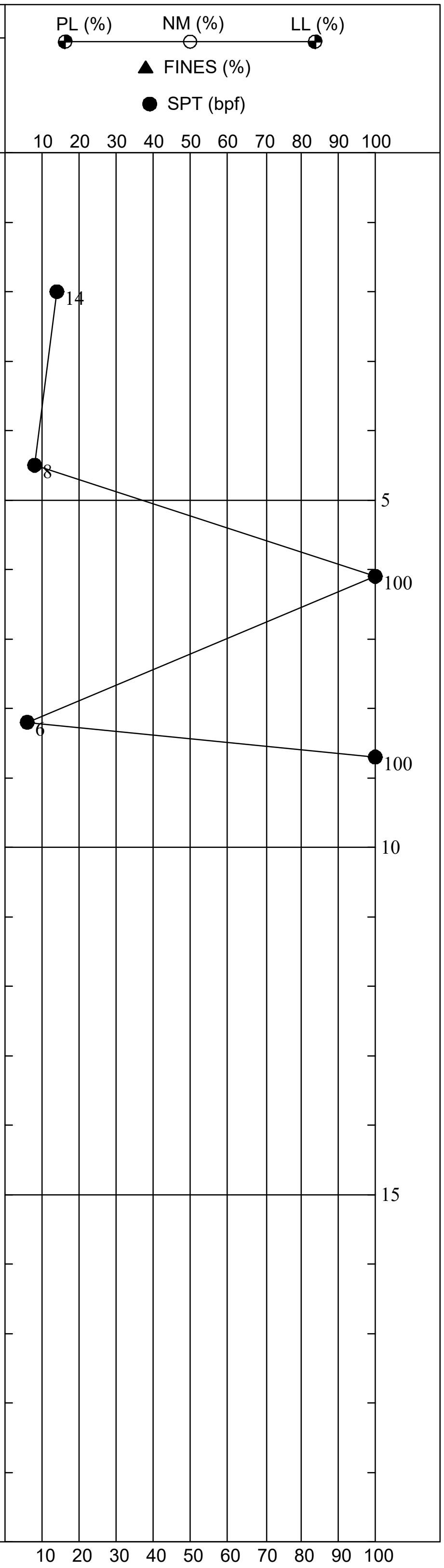
SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station
BORING NO.:B-14
LATITUDE:
LONGITUDE:
DRILLED: December 30, 2022
PROJ. NO.: 6252-13-0101.079
PAGE 1 **OF** 1

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Topsoil (5 Inches)					
	FILL - Medium Dense, Dark Brown, Gravelly, Silty, SAND (SM), Moist Drill Chatter From 0 To 1.5 Feet			SS-1		21-11-3
	Loose, Light Brown to Dark Brown, Silty, Fine SAND (SM), Some Angular Gravel, Moist To Wet ▼			SS-2		4-7-1
5						
	Boudler/Cobble- Zone 6 To 7.2 Feet			SS-3		50/1"
	Loose, Brown, Silty, Fine To Medium SAND (SM), Trace Gravel, Moist			SS-4		12-5-1
	ROCK- Very Hard, Gray And White, Quartz Biotite, GNEISS, Fresh			SS-5		50/0"
	Rock Core Run From 8.7 To 10.2 Feet **Recovery = 40%** **RQD = 7%** **Encountered Soft Coring From 9 To 10.2 Feet**					
10	**Rock Core Run From 10.2 To 12.2 Feet** **Recovery = 100%** **RQD = 100%**					
	Rock Core Run From 12.2 To 16.7 Feet **Recovery = 93%** **RQD = 93%**					
15						
	Auger And Split Spoon Refusal At 8.7 Feet Rock Coring Performed From 8.7 To 16.7 Feet Boring Terminated At 16.7 Feet Borehole Dry At 8.7 Feet Prior To Rock Coring Groundwater Encountered At 3.7 Feet On 1/3/2023					
20						



DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

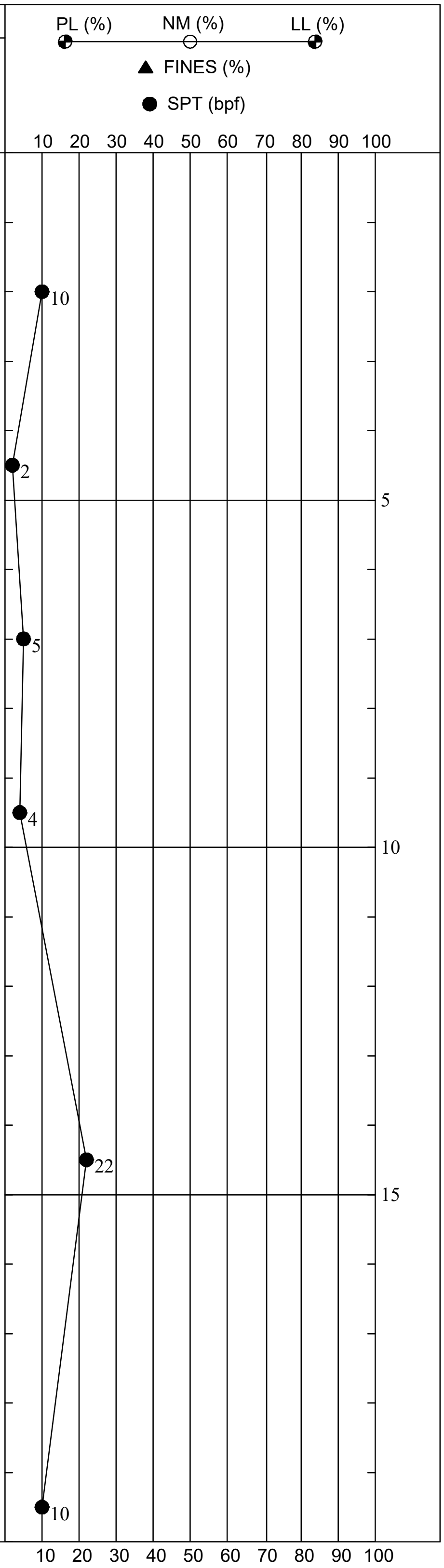
PROJECT: MSD Weaverville Pump Station **BORING NO.:**B-15
LATITUDE:
LONGITUDE:
DRILLED: December 28, 2022
PROJ. NO.: 6252-13-0101.079 **PAGE** 1 **OF** 1

DEPTH (ft) | SOIL CLASSIFICATION AND REMARKS | LEGEND | ELEV (ft) | SAMPLES

SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.

Depth (ft)	Soil Classification and Remarks
0	Topsoil/Gravel (4 Inches)
	FILL - Loose, Brown, Gray, Silty, Fine SAND (SM), Slight Organic Odor, Trace Fine Roots, Moist
	Very Soft, Brown, Red, Sandy SILT(ML), With Mica, Fine Gravel, Trace Fine Roots, Moist
5	Firm, Gray, Brown, Sandy, SILT (ML), With Fine Gravel And Roots, Moist
	Soft, Brown, Sandy SILT (ML), Wet
10	**RESIDUUM**- Very Loose, White, Gray, Silty, Fine To Coarse SAND (SM), Wet Hard Drilling 10 To 12 Feet
	Medium Dense, Orange, Brown, Silty, Fine To Medium SAND (SM), Trace Mica, Wet Hard Drilling 15 To 18.5 Feet
15	
	Loose, Orange, Dark Brown, Black, Silty, Fine To Medium SAND (SM), With Mica, Wet
20	

IDENT	TYPE	N-COUNT (1st 6" 2nd 6" 3rd 6")
SS-1	☒	4-5-5
SS-2	☒	1-1-1
SS-3	☒	1-2-3
SS-4	☒	WOH-2-2
SS-5	☒	WOH-6-16
SS-6	☒	3-5-5



DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station
BORING NO.:B-16
LATITUDE:
LONGITUDE:
DRILLED: December 27, 2022
PROJ. NO.: 6252-13-0101.079
PAGE 1 **OF** 2

wsp

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
20	Boring Terminated At 20 Feet Groundwater Encountered At 16.4 Feet At Time Of Boring And At 10 Feet 24 Hours After Boring						
25							25
30							30
35							35
40							10 20 30 40 50 60 70 80 90 100

SOIL LOG MSD WEAVERVILLE PUMP STATION.GPJ 3/17/23

DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

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SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station **BORING NO.:**B-16
LATITUDE:
LONGITUDE:
DRILLED: December 27, 2022
PROJ. NO.: 6252-13-0101.079 **PAGE** 2 **OF** 2

wsp

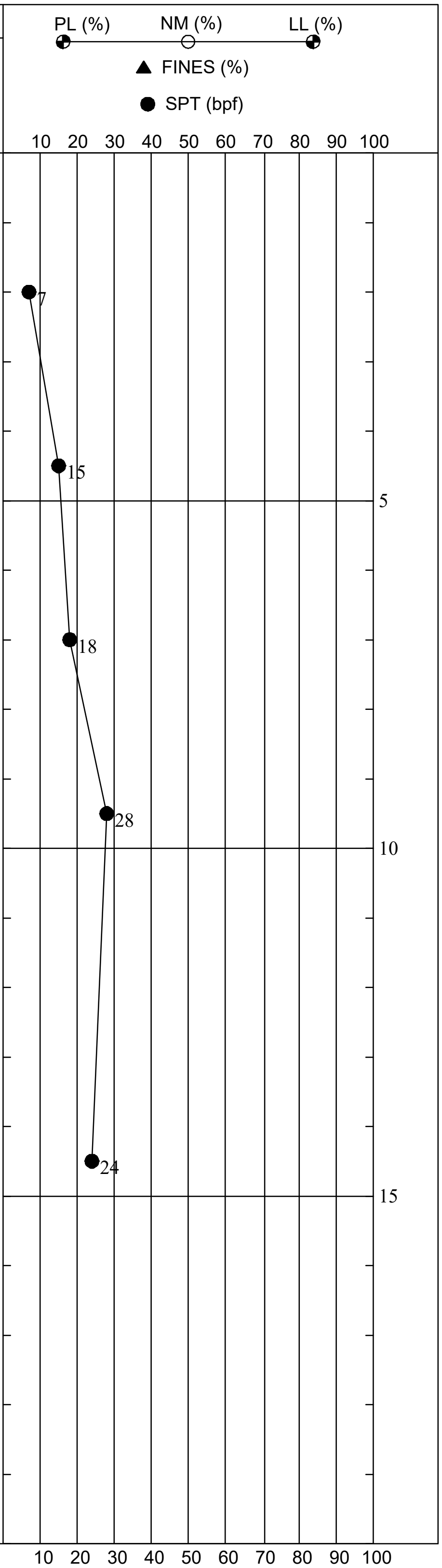
SOIL CLASSIFICATION AND REMARKS

SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS
0	Topsoil/Grass (3 Inches)
	FILL - Firm, Brown, Red, Sandy, SILT (ML), Moist
	RESIDUUM- Medium Dense, Orange, Red, Silty, Fine To Medium SAND (SM), With Mica, Moist
5	Medium Dense, Black, Tan, Red,Silty, Fine SAND (SM), Micaceous, Moist
	Medium Dense, Brown, White, Orange, Silty, Fine To Medium SAND (SM), Moist
10	
	Medium Dense, Brown, Pink, White, Silty, Fine To Coarse SAND (SM), Trace Fine Gravel And Kaolinite, Moist
15	Boring Terminated At 15 Feet Borehole Dry And Caved At 11 Feet On 12/30/2022 And At Time Of Boring
20	

SAMPLES

IDENT	N-COUNT (1st 6" 2nd 6" 3rd 6")
SS-1	3-3-4
SS-2	6-7-8
SS-3	7-9-9
SS-4	8-12-16
SS-5	9-13-11



DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

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SOIL TEST BORING RECORD

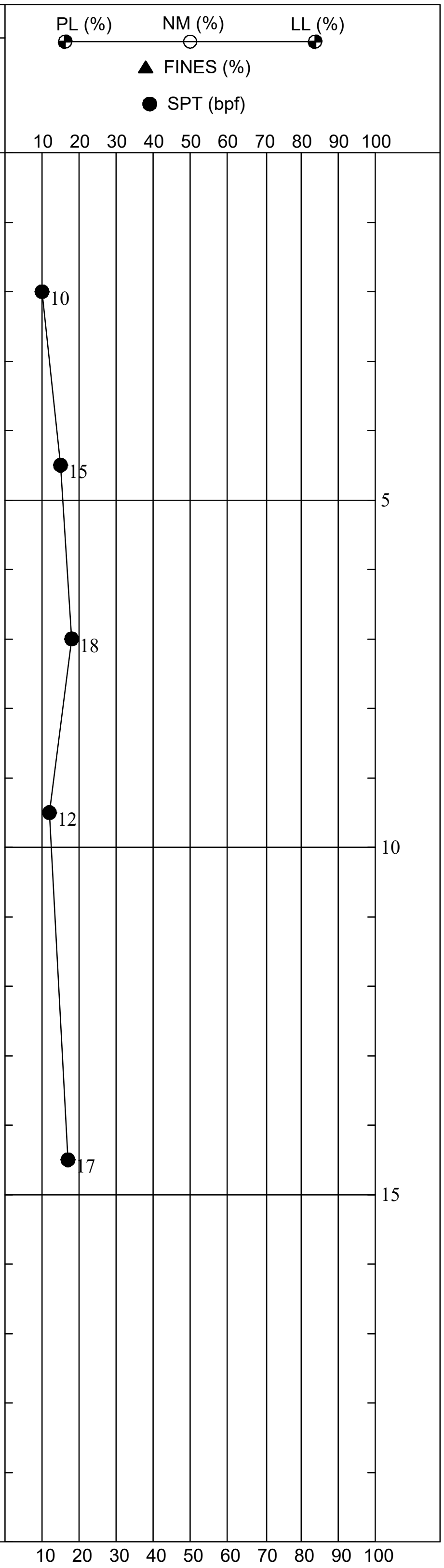
PROJECT: MSD Weaverville Pump Station **BORING NO.:**B-17
LATITUDE:
LONGITUDE:
DRILLED: December 27, 2022
PROJ. NO.: 6252-13-0101.079 **PAGE** 1 **OF** 1

SOIL CLASSIFICATION AND REMARKS

SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS
0	Topsoil/Grass (3 Inches)
	RESIDUUM- Loose, Tan, Orange, Silty Fine To Medium SAND (SM), Trace Mica, Moist
	Medium Dense, Yellow, Red, Orange, Silty, Fine SAND (SM), With Trace Mica and Kaolinite, Moist
5	
	Medium Dense, Red, Yellow, Orange, Silty, Fine SAND (SM), Trace Mica, Moist
10	
	Medium Dense, Brown, Tan, Orange, Silty, Fine SAND (SM), Moist
15	Boring Terminated At 15 Feet Borehole Caved And Dry At 10.8 Feet And At 10 Feet On 12/30/2022
20	

SAMPLES IDENT	N-COUNT 1st 6" 2nd 6" 3rd 6"
SS-1	4-4-6
SS-2	4-7-8
SS-3	7-8-10
SS-4	3-6-6
SS-5	3-7-10



SOIL LOG MSD WEAVERVILLE PUMP STATION.GPJ 3/17/23

DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

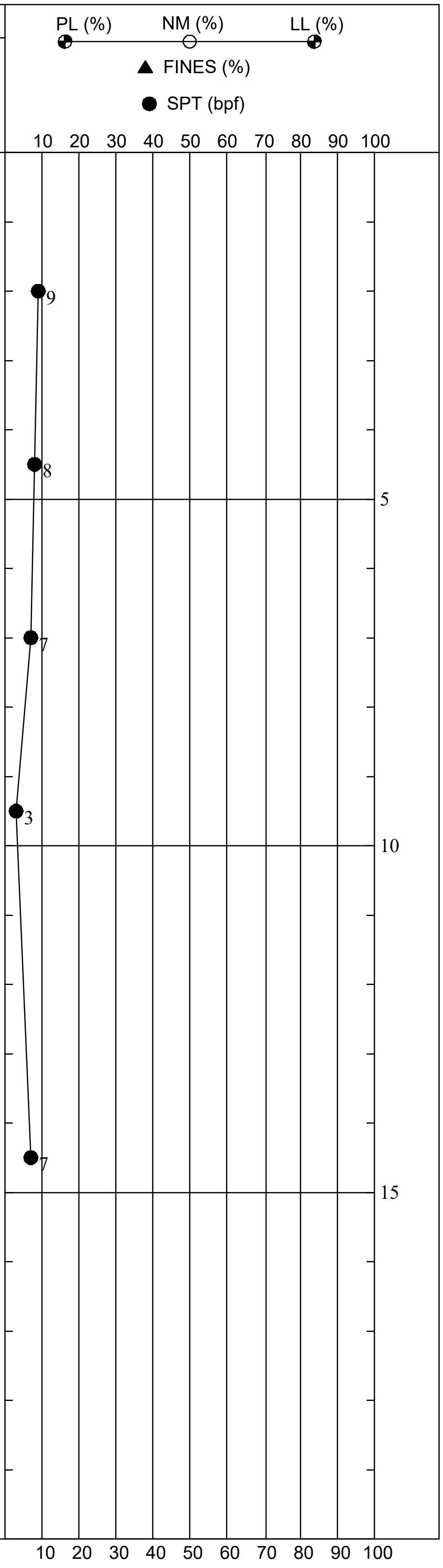
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station **BORING NO.:**B-18
LATITUDE:
LONGITUDE:
DRILLED: December 28, 2022
PROJ. NO.: 6252-13-0101.079 **PAGE** 1 **OF** 1

wsp

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Topsoil/Grass (3 Inches)					
	FILL - Loose, Light Yellowish Brown, Silty, Fine SAND (SM), Trace Gravel And Mica, Moist			SS-1	☒	3-5-4
	Loose, Light Brown, Silty, Fine SAND (SM), Some Mica, Moist			SS-2	☒	3-4-4
5				SS-3	☒	4-3-4
	Very Loose, Reddish Brown, Silty, Fine To Mediun SAND (SM), Some Mica, Moist			SS-4	☒	1-1-2
10						
	Firm, Reddish Brown, Fine, Sandy SILT (ML), Trace Roots, Moist			SS-5	☒	2-3-4
15	Boring Terminated At 15 Feet Borehole Dry At 11.9 Feet At Time Of Boring And At 11.5 Feet On 12/29/2022					
20						



DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

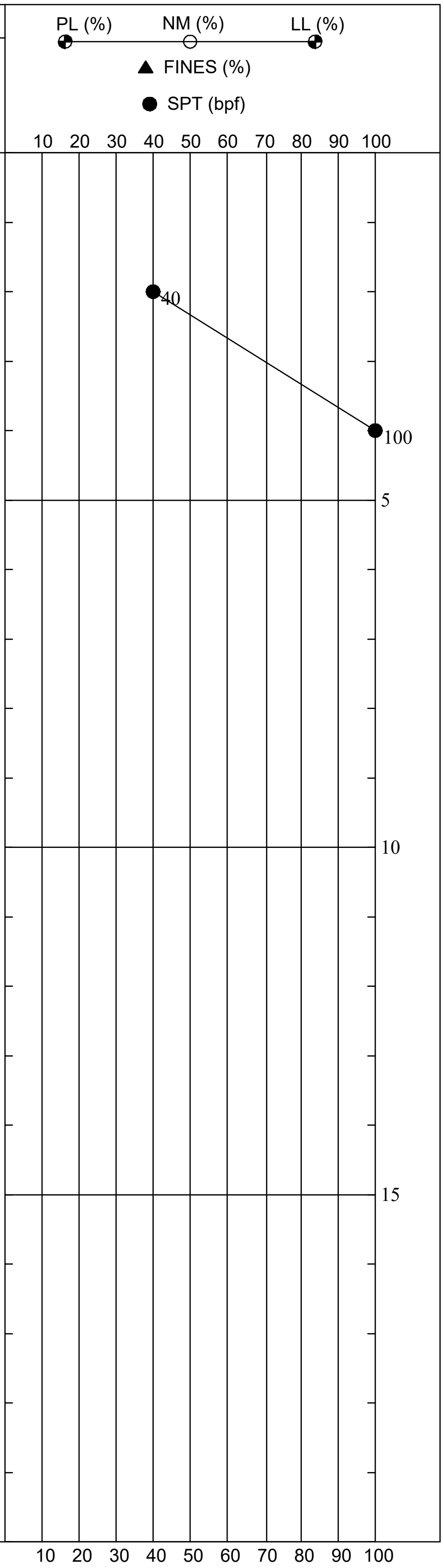
PREPARED BY: MNQ
CHECKED BY: TPQ

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station
BORING NO.: B-19
LATITUDE:
LONGITUDE:
DRILLED: December 28, 2022
PROJ. NO.: 6252-13-0101.079
PAGE 1 **OF** 1

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES N-COUNT 1st 6" 2nd 6" 3rd 6"
0	**RESIDUUM**- Dense, Grayish Brown To Gray, Silty, Fine To Medium SAND (SM), Some Angular Gravel, Moist					
				SS-1	⊠	10-12-28
	PARTIALLY WEATHERED ROCK Sampled As, Grayish Brown To Gray, Silty, Fine To Medium SAND (SM), Some Angular Gravel, Moist					
				SS-2	⊠	39-50/1"
	Auger Refusal At 4.3 feet Offset Boring Performed 5 Feet To The Northeast Aufer And Split Spoon Refusal Encountered At 4.5 Feet Borehole Caved And Dry At 4.5 Feet At Time Of Boring And On 12/29/2022					
5						
10						
15						
20						



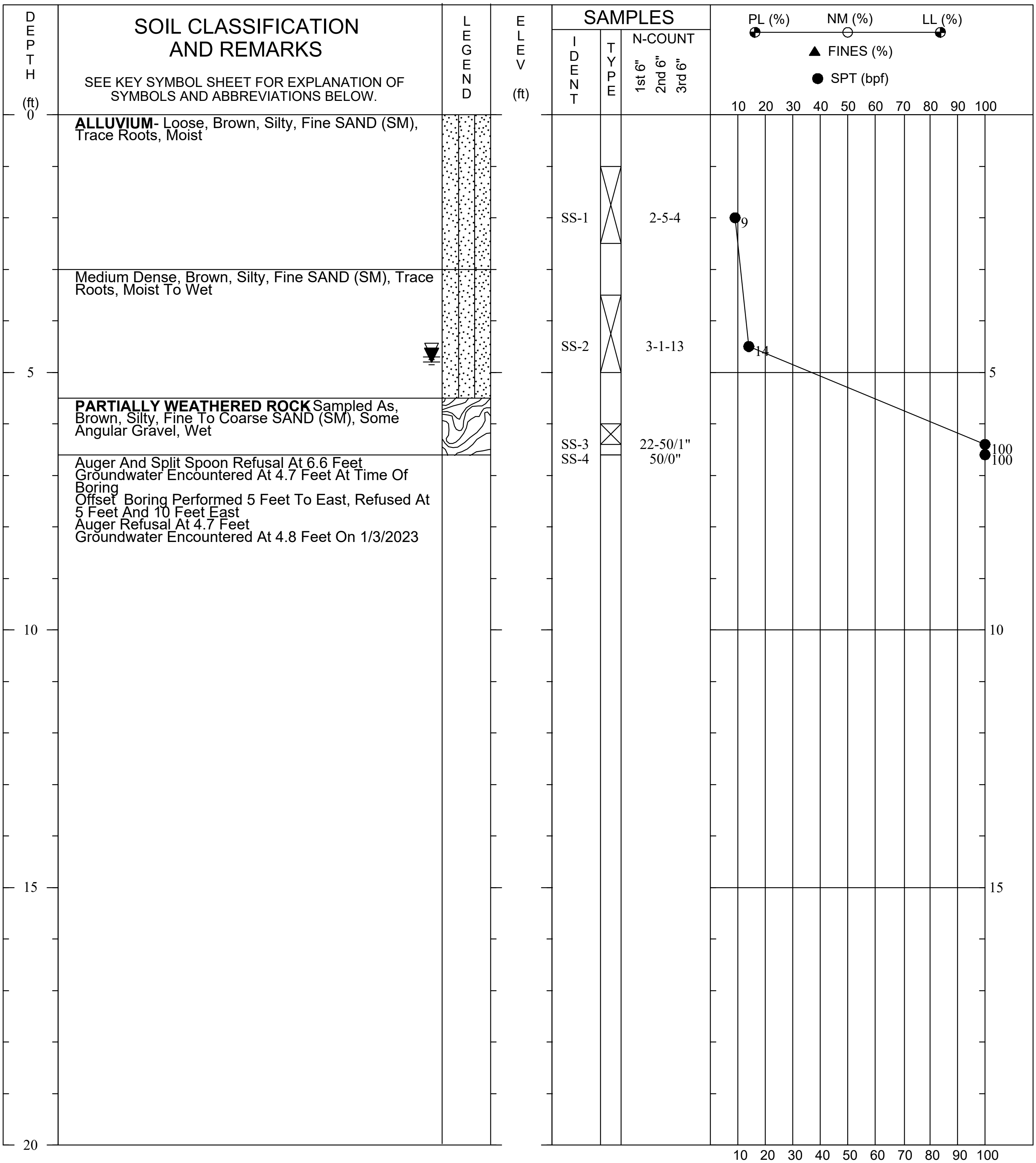
DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station **BORING NO.:**B-20
LATITUDE:
LONGITUDE:
DRILLED: December 28, 2022
PROJ. NO.: 6252-13-0101.079 **PAGE** 1 **OF** 1



ALLUVIUM- Loose, Brown, Silty, Fine SAND (SM), Trace Roots, Moist

Medium Dense, Brown, Silty, Fine SAND (SM), Trace Roots, Moist To Wet

PARTIALLY WEATHERED ROCK Sampled As, Brown, Silty, Fine To Coarse SAND (SM), Some Angular Gravel, Wet

Auger And Split Spoon Refusal At 6.6 Feet
Groundwater Encountered At 4.7 Feet At Time Of Boring
Offset Boring Performed 5 Feet To East, Refused At 5 Feet And 10 Feet East
Auger Refusal At 4.7 Feet
Groundwater Encountered At 4.8 Feet On 1/3/2023

IDENT	N-COUNT
SS-1	2-5-4
SS-2	3-1-13
SS-3	22-50/1"
SS-4	50/0"

SOIL LOG MSD WEAVERVILLE PUMP STATION.GPJ 3/17/23

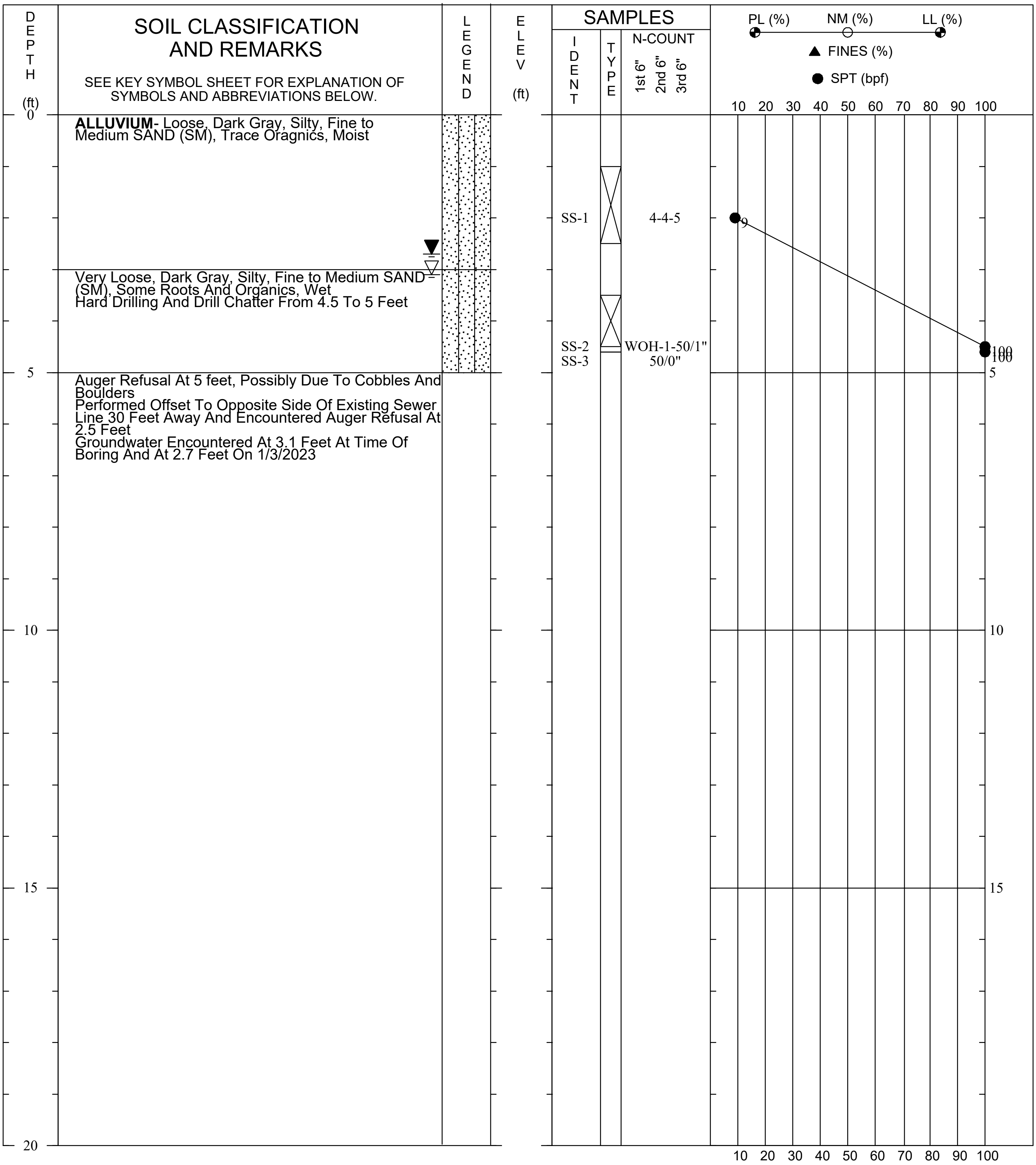
DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station **BORING NO.:**B-21
LATITUDE:
LONGITUDE:
DRILLED: December 29, 2022
PROJ. NO.: 6252-13-0101.079 **PAGE** 1 **OF** 1



SOIL CLASSIFICATION AND REMARKS

SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS	IDENT	N-COUNT
0	**ALLUVIUM**- Loose, Dark Gray, Silty, Fine to Medium SAND (SM), Trace Oragnics, Moist		
		SS-1	4-4-5
	Very Loose, Dark Gray, Silty, Fine to Medium SAND (SM), Some Roots And Organics, Wet Hard Drilling And Drill Chatter From 4.5 To 5 Feet		
		SS-2	WOH-1-50/1"
		SS-3	50/0"
5	Auger Refusal At 5 feet, Possibly Due To Cobbles And Boulders Performed Offset To Opposite Side Of Existing Sewer Line 30 Feet Away And Encountered Auger Refusal At 2.5 Feet Groundwater Encountered At 3.1 Feet At Time Of Boring And At 2.7 Feet On 1/3/2023		

DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

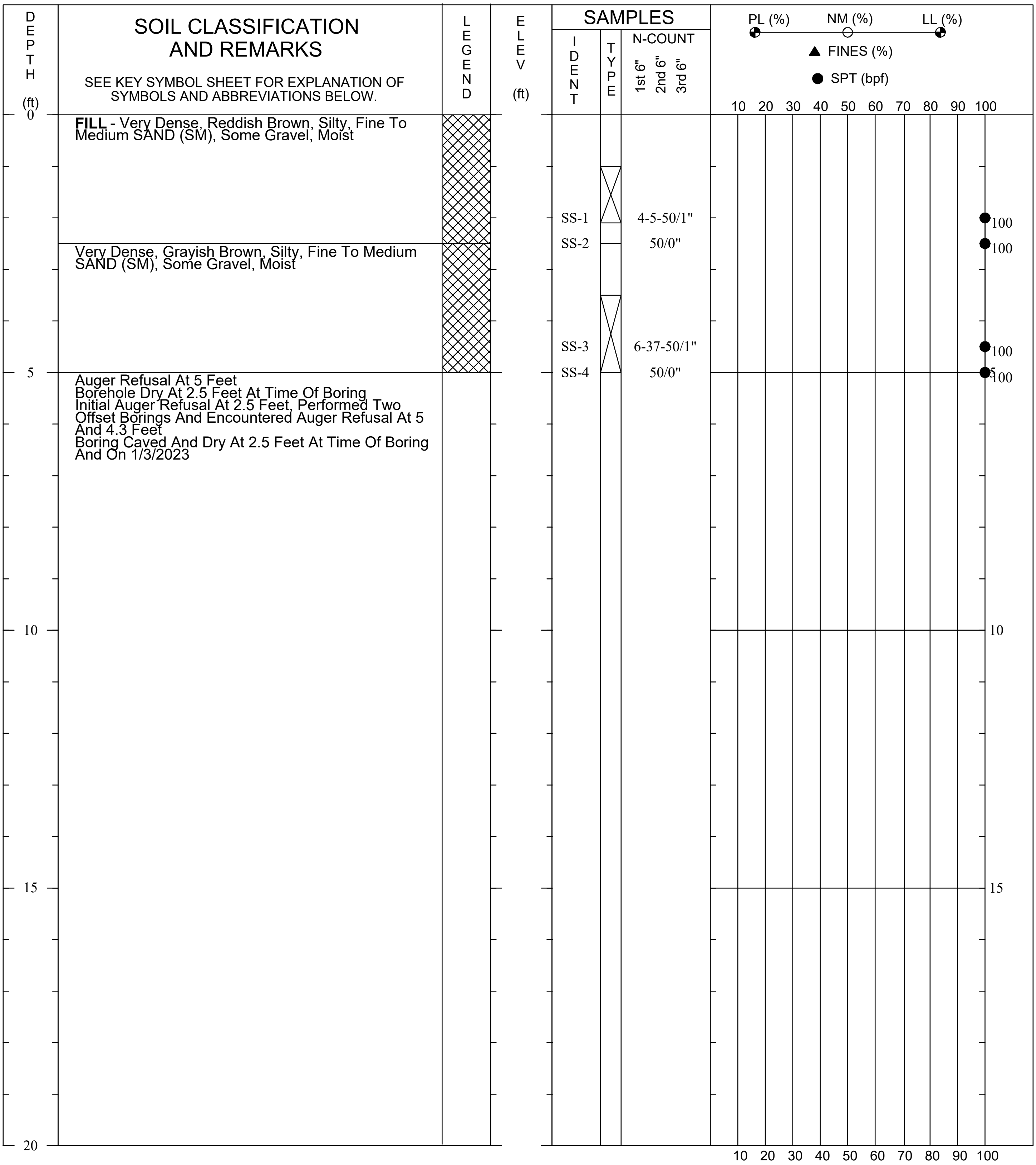
PREPARED BY: MNQ
CHECKED BY: TPQ

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station
BORING NO.:B-22
LATITUDE:
LONGITUDE:
DRILLED: December 29, 2022
PROJ. NO.: 6252-13-0101.079

wsp



SOIL CLASSIFICATION AND REMARKS

SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.

FILL - Very Dense, Reddish Brown, Silty, Fine To Medium SAND (SM), Some Gravel, Moist

Very Dense, Grayish Brown, Silty, Fine To Medium SAND (SM), Some Gravel, Moist

Auger Refusal At 5 Feet
Borehole Dry At 2.5 Feet At Time Of Boring
Initial Auger Refusal At 2.5 Feet, Performed Two Offset Borings And Encountered Auger Refusal At 5 And 4.3 Feet
Boring Caved And Dry At 2.5 Feet At Time Of Boring And On 1/3/2023

SAMPLES

IDENT	N-COUNT 1st 6" 2nd 6" 3rd 6"	SPT (bpf)
SS-1	4-5-50/1"	100
SS-2	50/0"	100
SS-3	6-37-50/1"	100
SS-4	50/0"	100

DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

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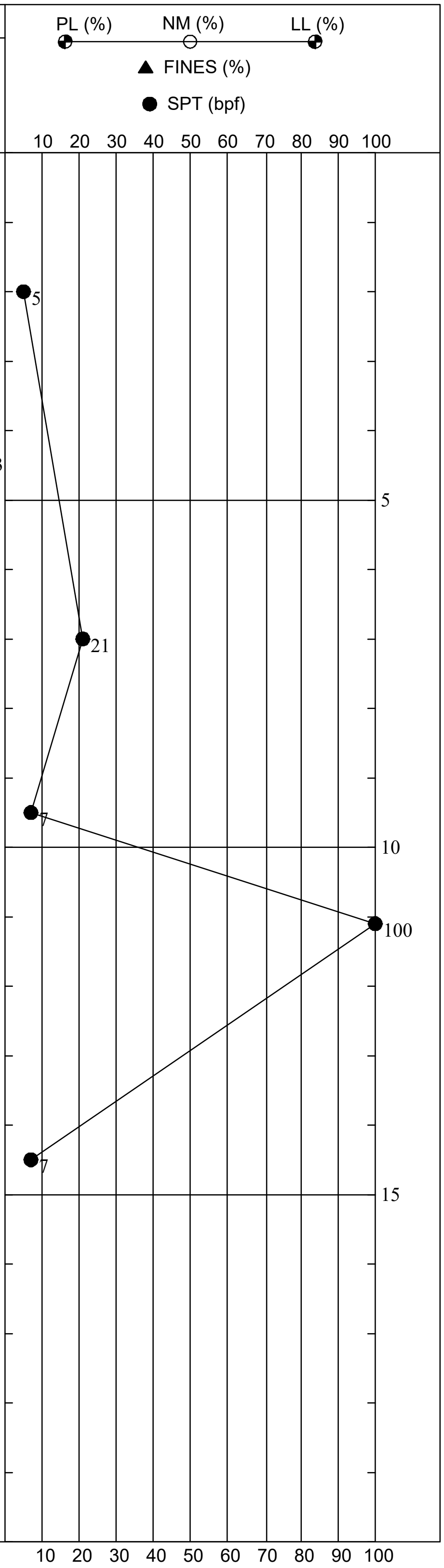
SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station **BORING NO.:**B-23
LATITUDE:
LONGITUDE:
DRILLED: December 29, 2022
PROJ. NO.: 6252-13-0101.079 **PAGE** 1 **OF** 1

wsp

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Topsoil (3 Inches)					
	FILL Loose, Reddish Brown, Silty, Fine SAND (SM), Trace Roots, Moist			SS-1		2-3-2
	Very Loose, Reddish Brown, Silty, Fine SAND (SM), Trace Roots, Moist			SS-2		WOH-WOH-3
5	Medium Dense, Brown, Silty, Fine to Medium SAND (SM), Some Gravel, Moist			SS-3		10-12-9
	Cobble/Gravel Zone Hard Drilling From 7.5 To 8 Feet					
	FILL - Loose, Brown, Silty, Fine To Medium SAND (SM), Trace Gravel, Moist To Wet			SS-4		WOH-3-4
10	Cobble/Gravel Zone/Possible Alluvium Drill Chatter And Hard Drilling From 10.5 To 13.5 Feet			SS-5		50/0.1"
	POSSIBLE ALLUVIUM Loose, Dark Brown, Silty, Fine To Medium SAND (SM), Some Gravel, Wet, Possible Alluvium			SS-6		7-3-4
15	Initial Boring Encountered Auger Refusal At 11.1 Feet Performed Offset Boring 5 Feet To North, Terminated Boring At 15 feet Groundwater Not Encountered At Time Of Drilling					
20						



SOIL LOG MSD WEAVERVILLE PUMP STATION.GPJ 3/17/23

DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

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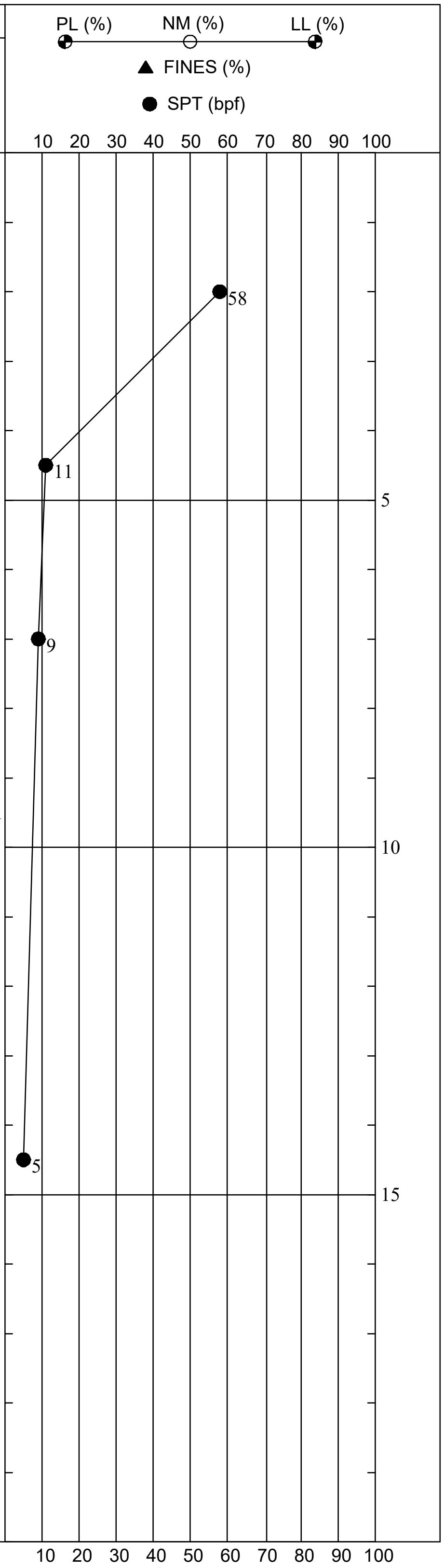
SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station **BORING NO.:**B-24
LATITUDE:
LONGITUDE:
DRILLED: January 3, 2023
PROJ. NO.: 6252-13-0101.079 **PAGE** 1 **OF** 1

wsp

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Grass/Rootmat (1 Inch) **FILL** Very Dense, Brown, Silty, Fine To Medium SAND (SM), Some Gravel, Moist	▨		SS-1	☒	14-35-23
	Medium Dense, Light Brown To Gray, Silty, Fine To Medium SAND (SM), Trace Gravel, Moist	▨		SS-2	☒	5-5-6
5	Loose, Light Brown, Silty, Fine To Medium SAND (SM), Little Mica, Moist	▨		SS-3	☒	5-4-5
	Very Loose, Light Brown, Silty, Fine To Medium SAND (SM), Trace Mica, Moist To Wet	▨		SS-4	☒	WOH-WOH-1
10						
	RESIDUUM- Loose, Reddish Brown, Silty, Fine SAND (SM), Trace Mica And Relict Rock Structure, Moist	⁘		SS-5	☒	2-2-3
15	Boring Terminated At 15 Feet Borehole Caved And Dry At 12.8 Feet At Time Of Boring					
20						



DRILLER: IET
EQUIPMENT: Geoprobe 8040
METHOD: 3 1/4 HSA/NQ
HOLE DIA.: 8"
REMARKS:

PREPARED BY: MNQ
CHECKED BY: TPQ

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

PROJECT: MSD Weaverville Pump Station **BORING NO.:**B-25
LATITUDE:
LONGITUDE:
DRILLED: January 3, 2023
PROJ. NO.: 6252-13-0101.079 **PAGE** 1 **OF** 1

ROCK CORE PHOTOGRAPHS

Rock core from 13.0 to 17.0 feet (going left to right and top to bottom) boring B-1

Rock core from 13.0 to 23.0 feet (going left to right and top to bottom) boring B-2.

Rock core from 23.0 to 33.0 feet (going left to right and top to bottom) boring B-2.

Rock core from 33.0 to 36.3 feet (going left to right and top to bottom) boring B-2.

Rock core from 9.5 to 18.1 feet (going left to right and top to bottom) boring B-4.

Rock core from 14.4 to 21.4 feet (going left to right and top to bottom) boring B-5.

Rock core from 7.5 to 22.5 feet (going left to right and top to bottom) boring B-8.

Rock core from 7.6 to 12.6 feet (going left to right and top to bottom) boring B-12.

Rock core from 8.7 to 16.7 feet (going left to right and top to bottom) boring B-15.

WSP USA Environment & Infrastructure Solutions, Inc.

1308 Patton Avenue
Asheville, North Carolina 28806

MSD Weaverville Pump Station and Force Main Replacement
Buncombe County, North Carolina
WSP Project No. 6252-13-0100.079

SUMMARY OF SOIL LABORATORY TEST RESULTS

Sample Location	Sample Depth, ft	Sample Type	Atterbergs Limits Testing			Percent Passing No. 200 Sieve	Natural Moisture Content (%)
			LL	PL	PI		
B-2	3.5-5.0	Split Spoon	▨	▨	▨	35.6	8.7
B-3	1.0-2.5	Split Spoon	▨	▨	▨	57.0	24.5
B-8	6.0-7.5	Split Spoon	▨	▨	▨	24.3	8.5
B-16	8.5-10.0	Split Spoon	22.0	17.9	4.4	▨	20.5
B-22	3.5-5.0	Split Spoon	▨	▨	▨	30.7	43.6

Laboratory testing was performed in general accordance with the following test methods:
Percent Passing No. 200 Sieve - ASTM D1140
Atterberg Limits Testing - ASTM D4318

▨ Indicates laboratory testing not performed on this sample.

Prepared By: T. Quigley 3/6/2023

Reviewed By: J. Rodenberg 3/6/2023