Geotechnical Report
Fort Yukon Solar

Prepared For:
Tanana Chiefs Conference
122 1st Avenue
Fairbanks, AK 99701

Prepared By:

DEVISE ENGINEERING
8301 Schoon St. Ste 200
Anchorage, Alaska 99518

Devise Project No. 25.214
November 2025

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Steven Halcomb, PE, GE, BC.GE
Principal Geotechnical Engineer

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1.0 Introduction and Project Description

1.1 Purpose and Scope

Devise Engineering, Inc. (Devise) is pleased to present this geotechnical data and design recommendations report to support the design and construction of a solar array in Fort Yukon, Alaska. The information provided here is based on Devise's geotechnical exploration completed in July 2025.

The scope of work included:

- Advancing geotechnical test pits within the proposed footprint of the solar array.
- Overseeing laboratory testing of recovered soil samples.
- Preparing the geotechnical report.

1.2 Location and Physiography

The project location is north of Base Road and approximately one mile southeast of the Fort Yukon Airport in Fort Yukon, Alaska. GPS coordinates for the general project location are 66° 33' 39.98" N and 145° 13' 9.84" W. A Vicinity and Test Pit Location Map is in Appendix A.

The project location is a former military operations area with low topographic relief. Much of the area is covered with spruce or aspen. Some areas have been extensively disturbed, and only small trees and shrubs have grown back. An abandoned overhead powerline exists on the property. There is a tent structure used for sheltering large equipment and components of a wood-burning power generation project that has been terminated. Several stockpiles of logs are present in the vicinity of the tent structure.

1.3 Proposed Facilities

The proposed facilities for this project include the construction of a solar array and associated site development. This report summarizes the geotechnical field data, soil laboratory testing, and recommendations for the site development and foundations for the solar array.

2.0 Subsurface Exploration

Devise completed a geotechnical exploration on July 29, 2025, to explore subsurface conditions and obtain geotechnical information. This section discusses the geotechnical exploration.

2.1 Soil Exploration Equipment and Methods

The field exploration plan consisted of excavating five (5) test pits, designated TP-01 through TP-05. The test pits were advanced across the area of the proposed solar array with exact locations selected in the field based on equipment access and topography. The CAT324DL excavator and operator Jay Stackhouse were supplied by the City of Fort Yukon.

Samples were collected from significantly distinct soil layers observed in the test pits. Samples were either collected from the test pit wall (above 3 feet below ground surface (BGS)) or from the excavator bucket. The recovered samples were visually classified in the field before being individually sealed in plastic bags and transported back to Anchorage for additional laboratory testing. Soil characteristics such as classification, moisture, color, and plasticity were noted for each sample recovered in addition to permafrost bonding, where observed. Classification in the field was completed following the Unified Soil Classification System (USCS) according to ASTM D2487. Test pit logs are in Appendix B.

2.2 Test Pit Completion

All test pits were backfilled with spoils upon completion and tracked to restore the locations as closely as possible to original grade. No piezometers or thermistors were installed.

2.3 Groundwater Monitoring

No groundwater monitoring was performed as part of the fieldwork.

2.4 PID Field Screening

A photoionization detector (PID) was not within Devise's scope and was not used in the geotechnical exploration.

3.0 Laboratory Testing

Soil laboratory tests to evaluate soil index properties of representative samples were performed by the Alaska Testlab (ATL) in their Anchorage facility. The laboratory testing program consisted of soil index tests to determine the moisture content, grain-size distribution (including 8-hour hydrometer for frost classification), Atterberg limits, salinity, and Limited Mechanical Analysis (LMA). LMA consists of washing a sample over the Number 200 mesh sieve. The coarse fraction of the remaining soil is then dried and sieved through the Number 4 sieve to determine the sand and gravel content. The LMA is a means to determine the percentage of coarse and fine soil in a sample without performing full gradations.

All laboratory tests were performed in accordance with the test methods of ASTM International or in-house procedures as listed in Table 3-1.

Table 3-1: Laboratory Analyses and Methods

Test	Method	Number of Samples
Moisture content	ASTM D2216	25
Grain-size Distribution	ASTM D6913 ASTM D422	4
Atterberg Limits	ASTM D4318	2
Limited Mechanical Analysis	In-house procedure, ASTM C117	9
Salinity	In-house procedure	4

The results of the laboratory testing are presented in Appendix C.

4.0 Project Setting and Site Conditions

4.1 Local Geology

The community of Fort Yukon is located approximately 138 miles north-northeast of Fairbanks in the Yukon Flats Basin on the north bank of the Yukon River near the confluence with the Porcupine River. Soils in the area primarily comprise quaternary alluvial, colluvial, eolian, and glacial deposits. (Williams, 1962). The region is known to have permafrost, generally continuous depending on location. Depth to top of permafrost varies depending on vegetation, geology, and environmental history.

4.2 Climate

Fort Yukon has a subarctic continental climate. Temperatures vary to an extreme range that has included historical record low and high temperatures for the State of Alaska, from -78 degrees Fahrenheit (°F) in January 1934 to 100°F in June 1915. Total annual precipitation is low.

Average monthly temperature ranges from -22.3°F in January to 73.3°F in July. Average annual precipitation is 6.42 inches. Average annual snowfall is 41.9 inches. The period of record represented by these averages or ranges is 1981 to 2010 (Western Region Climate Center, 2025).

4.3 Seismic Considerations

The project site sits in a region of low seismicity. Seismic design parameters were determined using the US Seismic Design Maps online tool from the United States Geological Survey (USGS, http://earthquake.usgs.gov/hazards/interactive) and The American Society of Civil Engineers (ASCE) online Hazard Tool (https://ascehazardtool.org/). Table 4-1 provides the seismic design parameters for the 2,475-year return period design earthquake consistent with the International Building Code (IBC, 2018) and ASCE Minimum Design Loads for Buildings and Other Structures, 2016 (ASCE 7-2016), assuming risk category I. Based on our test pits, general knowledge of the geology, and judgment, we recommend the Site Class be D for this site. The seismic parameters below should be adjusted for site class and occupancy category.

Table 4-1: Seismic Design Parameters

Parameter	Value
Site Class	D
Peak Ground Acceleration, PGA_M	0.231
S_s (0.2 second period acceleration)	0.386
S_1 (1.0 second period acceleration)	0.162
Moment Magnitude, Mw	6.13 (mean)

4.4 Contaminated Sites Review

The nearest active contaminated site shown on the Alaska Department of Environmental Conservation (ADEC) Contaminated Sites Program (CSP) online map is more than 500 feet away from the proposed solar array development. The ADEC CSP database designates contaminated sites as either Active, Cleanup Complete, and Cleanup Complete – Institutional Controls. No evidence of contamination was observed during the geotechnical exploration. The site is a former military facility and may have undocumented contamination associated with the previous uses.

5.0 Subsurface Soil Conditions

5.1 Soil Lithology

The soil conditions at the site consist of silty sand, sandy silt, and occasional lenses of poorly graded sand with silt. In some areas, imported fill containing sand and gravel is present.

The fines content ranged from 12 to 95 percent. The moisture content varied from 3 to 26 percent. The silts were tested for their Atterberg Limits and were found to be nonplastic. Four samples were tested for frost classification and found to range between F2 and F4.

Salinities were measured for the frozen samples and were found to be consistently 0.2 parts per thousand (ppt) across the site. The presence of salinity results in depression of the freezing point of water within the soil and greater creep potential in frozen soils. For reference, the freezing point of water is decreased by approximately 1°F for every 10 ppt. At the detected salinities, significant depression of the freezing point is not expected.

5.2 Groundwater Conditions

Groundwater was not encountered in any test pit.

5.3 Ground Temperatures

No thermistor wells were installed. Measuring ground temperatures from test pit samples is imprecise and subject to error. Where possible, a hand-held infrared temperature sensor was used to capture the temperature of samples retrieved from the excavator bucket. Temperatures measured in this manner ranged from approximately 30.5 to 31.5°F.

6.0 Engineering Discussion and Recommendations

Based on our findings and results of our laboratory testing, we have developed the following recommendations based on our understanding of the project.

6.1 Frost Depth and Permafrost

No seasonal frost was encountered during the exploration.

We observed permafrost in all test pits ranging from 5.5 to 15.25 feet BGS. The variation in depth to permafrost is likely due to the variation in surface conditions. Areas that had been previously cleared and with relatively thin vegetation had the deepest permafrost. Test pits in wooded areas and in topographic lows tended to have permafrost 6 feet BGS or less. The permafrost was generally poorly bonded when first encountered and rapidly transitioned to a well-bonded condition that prevented advancement of the test pit.

6.2 Stability Evaluation

6.2.1 Slope Instability

The existing site grades are flat; therefore, by inspection local slope instability is deemed of no concern.

6.2.2 Loss of Bearing Resistance

Assuming foundations do not bear on deleterious material, the risk of loss of bearing resistance during a seismic event is low, assuming our recommendations are followed.

6.2.3 Liquefaction and Lateral Spreading

Liquefaction is the result of the buildup of excess pore water pressure, beyond hydrostatic pressure, generated in an undrained soil loading condition. In this condition, partial or complete loss of inter-particle friction within the soil mass occurs, resulting in a dramatic decrease of the soil's shear strength.

The presence of permafrost underlying the site eliminates the potential for liquefaction and lateral spreading. Nearly surface soils may experience minor strength loss. Overtime, degradation of permafrost could yield unconsolidated soils that have potential for liquefaction. Additional geotechnical explorations, potentially advanced testing, and rigorous analysis is required for confirmation of liquefaction potential. This additional work is not considered warranted for this project.

6.3 Surface Preparation

Disturbance of the surface organics is not recommended as this layer provides protection against permafrost degradation. We recommend that any construction activities minimize the removal of the surface organics. Should surface organics be required for removal to develop any proposed infrastructure, we recommend the design include the use of insulation or subgrade cooling (i.e. thermosyphons) to minimize or protect against permafrost degradation.

6.4 Site Grading and Drainage

Site grading should be established to provide drainage of surface water and runoff away from the proposed infrastructure. Grading should be designed to prevent ponding of surface water except where retention ponds or similar devices are intended.

6.5 Foundation Recommendations

Shallow and deep foundations are used to transfer infrastructure loads to the soils beneath. The soil type, consistency, density, heave/swell/collapse potential, thermal considerations (including climate change), groundwater table, and depth to and type of bedrock, if applicable, are all considered in the foundation recommended for the proposed infrastructure.

6.5.1 Foundation Option Discussion

The proposed infrastructure is a solar array, expected to extend over most of the site. In our experience, solar arrays can be founded on both shallow and deep foundations. The use of shallow foundations, however, at this site is not recommended primarily due to the fine-grained nature of the native soils and their potential for frost heaving. We understand solar arrays are sensitive to movement and will not likely perform well with shallow foundations at this site. Therefore, we recommend the use of deep foundations for the solar array.

The solar array has at least two options for deep foundations, as summarized below. For this report, we have developed preliminary recommendations for two options to prompt engagement between the geotechnical engineer and the design team with the intent of collaborating on the foundation design and final recommendations, considering logistics and cost. Not all design related elements can be addressed in a geotechnical report, therefore, we recommend the geotechnical engineer be retained to provide further guidance during design development and construction.

- Helical Piles. Helical piles are relatively small-diameter, though larger diameters are feasible, shaft piles with helical plates installed along the shaft and then screwed into the ground to provide axial support. Their advantages are rapid installation with small equipment, high uplift resistance, and decreased cost. Their primary disadvantage is their limited resistance to lateral loads; however, large diameter helical piles, about 6 inches in diameter and larger, are possible to provide the lateral resistance, though at an increased cost.
- Pipe or HP Piles. Pipe or HP piles are common deep foundation types in Alaska and have been used in similar communities. They are typically installed either driven or drilled/slurried into the ground. Their primary advantage is high axial and lateral resistance. Their primary disadvantage is higher cost, due to materials and installation labor/equipment.

The design of deep foundations in permafrost requires an understanding of the thermal conditions, in addition to installation methods. The presence of cold permafrost will present unique challenges to the installation of either helical or pipe/HP piles. See further discussion below.

6.5.2 Thermal Considerations

The presence of permafrost below the proposed solar array presents a challenge to the design and long-term performance of the foundation. We do not anticipate the solar array to introduce significant heat into the soils. We anticipate climate change being the primary driver for permafrost degradation with subsequent thaw-strain-induced settlement. We considered three options for the long-term foundation performance of the solar array deep foundations.

- Foundations extend to a considerable depth to accommodate thawing and associated downdrag of the permafrost.
- Use of a thick layer of insulation near the ground surface to slow the effects of climate change.
- Use of subgrade cooling (i.e. thermosyphons) to passively maintain the existing ground temperature regime and prolong the life of the solar array site.

We anticipate the cost of deep foundations to a considerable depth to be uneconomical and therefore do not consider this a reasonable option.

The use of insulation will slow heat flow into the ground due to climate change, as well as mitigate frost heave on piles, which should result in shorter piles. Ideally, the layer of insulation would be a minimum of 6 inches of rigid foam insulation and extend continuously over the full area of the solar array. The insulation would be/have

- Installed at a minimum of 2 feet below grade,
- A minimum compressive strength of 40 psi at 10 percent strain,
- A maximum water absorption of 0.1 percent by volume, and
- Extend beyond the solar array footprint in all directions a minimum of 10 feet.

Extruded polystyrene (XPS) is recommended due to its improved long-term thermal performance in burial applications based on testing of recovered samples in Alaska. Expanded polystyrene (EPS) insulation can be used though may require a thicker layer than XPS to achieve the same, long-term thermal benefit. The long-term thermal performance of whichever is used, XPS or EPS, should be evaluated as part of the design process.

Thermosyphons are commonly used in the Arctic to preserve existing permafrost by extracting heat from the ground during winter with sufficient "cold" to resist the climate thermal energy from summer heat. Deep foundation designs commonly use vertical thermosyphons in the form of Arctic Foundations Inc. (AFI) nominal 2-inch diameter thermoprobe. Typically, a conduit via a small pipe, L-channel, or bracket is welded on the side of the pile in which the thermoprobe is installed. A cement grout backfill is then installed to provide a medium between the thermoprobe and the surrounding soil. Coordination between the solar panel and thermosyphon condenser is required as the condensers usually extend upward from the pile head.

Alternately, large areas have used flat-loop thermosyphons which are tubes laid horizontally over the project area to extract heat. We recommend that the designers consult with AFI to determine the required condenser size based on permafrost conditions, ground temperatures, climate change, and design life.

We recommend thermal analyses be completed as appropriate for the required designed elements. This includes, but is not limited to, effects of climate change on the permafrost, seasonal freeze/thaw depths, affects of insulation, or thermosyphon performance.

6.5.3 Pile Foundation Bearing Resistance and Settlement

We anticipate the primary forces on the pile foundations to be lateral due to wind and uplift due to frost heave. Piles will carry some axial load through soil adfreeze to the permafrost in addition to adfreeze being needed to resist frost heaving forces. Adfreeze piles have higher short-term load resistance but must also consider long-term (i.e. creep) settlement under sustained loads. We recommend sustained loads be determined using the full dead load plus 50 percent of the total live load.

We recommend the axial pile design for creep use 1 inch of settlement over a 30-year service life, unless the solar array manufacturer requires less movement or an alternate service life. We recommend assuming ice-rich soil creep behavior, considering salinity, for the soils encountered. The axial resistance of adfreeze piles should consider the spacing of the piles relative to their capacity. We recommend a minimum center-to-center pile spacing of three times the largest dimension of the pile, either helical plate or shaft/pile diameter.

We recommend all structural loads for the pile design be computed using allowable stress design (ASD) load combinations to avoid being overly conservative when determining pile embedment.

The axial design for adfreeze will require the development of ground temperatures as test pits do not allow for the measurement of ground temperatures adequately for design. As the design advances, we can develop ground temperatures based on forecasted climate data and expected soil lithology.

6.5.4 Lateral Load Resistance

Lateral pile resistances in permafrost are considered in two categories: 1) short-term and 2) long-term. Short-term loadings, like wind and seismic, are treated in a manner typical of lateral pile analyses, with lateral load resisted by passive pressure against the piles. When in relatively shallow permafrost, the piles can be assumed to be a cantilever at the point of fixity. The point of fixity is taken as one foot below the top of permafrost. When permafrost is deeper than the pile tip, the design should assume unfrozen conditions. A sensitivity analysis should be performed by the designers to evaluate the behavior of the pile relative to the permafrost depth at the site. Should the lateral loads be sustained, long-term loads, then creep should be considered. Long-term lateral loading is not common; therefore, no recommendations are included here but can be provided upon request.

The behavior of unfrozen soil surrounding and reacting to a laterally loaded pile can be characterized by the p-y method, which offers a family of curves that relate soil reaction (p) to lateral pile deflection (y). P-y curves are assigned at discrete depths along the pile and are equivalent to stiff, non-linear springs counteracting the pile movement.

For the use of modeling in unfrozen conditions, lateral soil properties are provided in Table 6-1 (Reese and Van Impe, 2011). No factors of safety should be applied to these parameters, as they are for displacement-based analyses. Reductions should be applied if piles are spaced less than 6 times the largest pile dimension (including helical plates) following the recommendations in the AASHTO LRFD Bridge Manual for pile groups. Depths shown in the table are measured from the ground surface at the time of the geotechnical exploration and do not reflect any changes due to construction.

Table 6-1: Lateral Soil Profile and Parameter

Depth (feet)	Model Type	Total Unit Weight (pcf)	Modulus of Horizontal Subgrade Reaction (psi/inch)	Drained Friction Angle (degrees)	Effective Cohesion (psf)
0 – 3	Reese Sand	100	15	27	0
3 – 15+	Reese Sand	115	35	30	0

6.5.5 Uplift Resistance

Uplift loads may occur due to overturning loads due to wind and seismic loading and the foundation should be designed to resist these loads. Further ,we anticipate an additional uplift load will be from frost heaving. We recommend the design use an uplift frost heaving stress of 40 psi acting over the surface area of the pile based on the diameter and depth of frost. The depth of frost should be computed based on the maximum frost depth, considering surface conditions, insulation, and design air freezing index with an appropriate surface-to-air n-factor. Uplift loads will be resisted by either adfreeze along the pile shaft or bearing from the helical plates, depending on the selected pile foundation.

6.6 Utility Recommendations

Utilities should be installed per the local utility agencies' standards, considering frost depth and other constraints. If buried, inspection of the utility line subgrade should follow the requirements and standards of the local utility owner.

Any buried utilities should be bedded, backfilled, and compacted following the most stringent requirements of the pipe manufacturer or local utility owner. The satisfactory performance of pipe utilities is highly dependent on the quality of the soil below and alongside the pipe. Buried utilities that are susceptible to damage from freezing need to be frost-protected by sufficient depth, insulation, or active freeze protection like heat tape. Some combination of these methods could also be used.

Many utility designs in permafrost areas are for above-grade via a utilidor. The design of utilidors is not a geotechnical exercise, though they do require foundations for support. See the previous discussion for foundation design considerations. The designers should consult local utility owners to determine which method is permitted and applicable for each utility line.

6.7 Construction Recommendations

All earthworks should be performed according to the project specifications and in accordance with local, state, and federal laws and regulations.

6.7.1 Thermal Considerations

Construction activities will likely alter the existing thermal conditions; therefore, we recommend thermal analyses be performed as appropriate to evaluate the impacts of construction on long-term performance of the site.

6.7.2 Earthwork and Subgrade Preparation

We discussed previously, we recommend minimizing the disturbance of the surface organics to the extent possible. All earthworks should be performed in accordance with the project specifications and with local, state, and federal laws and regulations. All excavations should be cleared of debris and any structural material, if used, for retention or access at the completion of construction activities.

Exposed subgrade below fill placement, if applicable, should be scarified, moisture conditioned, tamped, and rolled smooth to an unyielding condition prior to any fill placement.

6.7.3 Foundation Installation Construction

We have provided recommendations for each of the deep foundation types discussed to aid in the pile design development, as pile installation is an important consideration in the design process.

6.7.3.1 Helical Piles

Helical piles should be installed following the manufacturer's installation recommendations. Typical unfrozen soil helical installation is required to ensure that significant soil disturbance does not occur, and that the helices develop the required installation torque. The helical piles should be advanced in a continuous manner that allows the helix to "screw" into the soil, rather than "auger." The down pressure applied from installation equipment should be controlled so the penetration rate as recommended by the manufacturer.

The installation of helical piles into cold permafrost will likely require either predrilling or thermal modifications. Predrilling consists of drilling before the helical pile installation. The predrilling is not intended to remove material and should be a diameter that is a percentage of the helical plate size and extends to a design depth relative to the pile depth. Thermal modification consists of predrilling a small-diameter hole and using either hot water or steam to radially thaw the soil to permit installation of the pile. We recommend a minimum predrilling to at least 75 percent of the maximum helical plate size to a depth of at least 1 foot above pile embedment depth. The helical pile should be advanced below the predrilling until the design torque is achieved.

During installation, a record of torque versus depth should be maintained to ensure the design torque is achieved over a minimum of the final three feet of embedment. Extensions should be added until the design installation torque is achieved. The maximum allowable installation torque per the helical manufacturer should not be exceeded prior to attaining the minimum embedment. If the maximum allowable torque is reached prior to attaining the minimum embedment, the contractor should consult with the design engineer of record on a corrective course of action.

6.7.3.2 Pipe/HP Piles

Pipe and HP piles are commonly installed using an impact hammer to advance the pile to the required minimum depth and driving resistance. However, in cold permafrost, driven piles are

not feasible without predrilling or thermal modifications. The predrilling and thermal modifications of driven piles are similar to helical piles as discussed above. Once either predrilling or thermal modifications are complete, the pile is driven to the required depth and allowed to freezeback (i.e. the disturbed ground temperature return close to original conditions). We recommend a minimum predrilled pilot hole at least 75 percent of the maximum pile dimension to a depth of at least 1 foot above final pile depth.

Driven piles should use a hammer sized such that pile advancement can be achieved without damage. We recommend a wave equation analysis be performed to evaluate the pile/hammer performance to achieve the required pile depth without damage to the pile. We recommend the pile driving stresses not exceed 90 percent of the pile yield strength and the pile penetration rate not exceed 100 blows per foot. The wave equation analysis should be performed by a qualified geotechnical engineer as part of the submittal process and be approved prior to mobilization of equipment and materials to the site. While impact pile driving, if there are significant stopping times, it could be difficult to remobilize the pile due to development of adfreeze bond. This potential driving condition should be considered as part of the wave equation analysis.

In permafrost, piles are also installed via drill and slurry instead of driven. In drill and slurry applications, an oversized shaft, typically 6 to 10 inches larger than the effective pile diameter, is drilled first, then the pile is lowered into the shaft, followed by the annulus filled with a clean sand slurry.

Care should be taken to ensure that snow, ice, water, or soil cuttings are not allowed to enter the hole prior to placement of the piles and slurry. Drilled holes should be covered immediately after completion to ensure that no material enters the hole.

The slurry is allowed to freezeback before the pile is substantially loaded. Under no circumstances should heat, circulating fluids, or other means that would alter the in-place ground temperatures be used to advance the piles. The slurry should be a mixture of clean sand and potable water. Saline water or untreated river water should not be used for slurry. The temperature of the slurry during placement should be between 35°F and 50°F during placement. Slurry placement should proceed in a continuous manner unless separate lifts are planned. The annular space should be completely filled with slurry to the top of final grade.

Drill and slurry piles should be installed in such a way as to resist buoyant forces when the hole is filled with slurry and should be held firmly in place during the freezeback period. Under no circumstances should heat, circulating fluids, or other means that would alter the in-place ground temperatures be used to advance the piles.

Regardless of the method, we should be retained to review the pile design, wave equation analysis, and proposed construction methodology to ensure our recommendations are followed, or if not addressed in this report, are considered in design and construction.

6.7.3.3 Pile Installation

We recommend that piles be installed plumb and be only a 1/4-inch per foot from the vertical and be installed within 3 horizontal inches of the design location, unless the solar array manufacturer requires stricter tolerances. Void spaces along the helical pile extensions are not permitted.

The Engineer of Record (EOR) or a qualified designee should monitor holes during the drilling to note any unusual subsurface conditions such as mass ice or water. These holes shall be logged to include date drilled, soil conditions (including ice, thawed/unbonded permafrost, or water), plumbness, hole diameter, and depth as a minimum information as part of the permanent record. Should massive ice be encountered in a drilled hole, the piles should be lengthened by one foot for each foot of massive ice over 3 feet in thickness encountered below 15 feet BGS. Piles should not be terminated in ice or in unbonded soil unless specifically designed for these conditions.

A copy of the drilling log for each hole shall be reviewed by the EOR. The EOR should be notified immediately of any unusual subsurface conditions are encountered during hole preparation. The conditions of mass ice or unbonded permafrost may require alterations to design parameters. The EOR can then provide guidance on when piles can be cut and capped relative to the actual subsurface conditions encountered.

Should unbonded subsurface soil, unfrozen ground thermal states, or massive ice be encountered or inferred during installation, the EOR may require additional time for sufficient freezeback. When the EOR deems it necessary, freezeback should be monitored with a thermistor string via a previously installed thermistor well or additional conduit along the pile shaft.

A thorough and complete record for each foundation installation should be kept during construction. At a minimum, the as-built record should include:

- Pile installation contractor means and methods including predrilling, if performed
- Site and weather conditions during installation of each pile
- Pile embedment depth
- Blows per foot and hammer stroke if pile is driven
- Installation torque as a function of depth for helicals
- Survey as-built of the pile relative to plan location and plumbness
- Notes of any changes to subsurface conditions inferred during pile installation
- Notes of any observed or inferred damage to the piles during installation

6.7.4 Excavations

Any excavations should follow proper local, state, and federal requirements including those in 29 Code of Federal Regulations (CFR) Part 1926 Occupational Safety and Health Standards (OSHA) Subpart P – Excavations for trenching and slope angles based on soil type encountered. Permanent excavations into soil should either be retained or sloped to meet long term stability requirements. The contractor is responsible for trench stability, worker safety, and regulation compliance as he will be present on a day-to-day basis and can adjust efforts to obtain the needed stability.

We recommend the area surrounding any excavation be prepared to direct surface water away from any excavations and to minimize surface water or runoff from entering the excavation. Alternatives to grading, such as sandbags or silt fences, could be employed to reduce surface runoff infiltration into the trench. Excavation and backfilling operations should be closely coordinated so that seepage and surface runoff are not allowed to collect and stand in open trenches for prolonged periods, as this will result in rapid permafrost degradation.

Sidewalls of excavations above the water table may stand relatively steep initially but fail suddenly, without warning. Extensive sidewall caving was observed in test pits where significant thicknesses of unfrozen soils were encountered. As the in-situ soils thaw or dry, they will tend to ravel and slough to their natural angle of response, which we estimate to be about 2.0H:1V (horizontal to vertical). If surface water is allowed to enter the excavation, in

situ soils may soften, squeeze, slump over time or due to disturbance, to slopes of 3.0 to 4.0H:1V or flatter. We do note that sidewalk instability was observed in several of the test pits.

We recommend that excavations be performed with equipment that minimizes disturbance of the subgrade soils. We also recommend that the excavation bottom be evaluated by a qualified geotechnical engineer or trained inspector to identify unsuitable soils. If unsuitable soils, such as soft silts, debris-laden materials, or organics are encountered, they should be over-excavated and replaced with classified or unclassified fill, depending on excavation intent. Any soils that are disturbed, pumped, or rutted by construction activity shall be re-compacted or removed prior to placement of any classified or unclassified fill.

6.7.5 Dewatering

Excavations may experience seepage due to shallow groundwater encountered on the site and should be monitored during construction. The area around the excavation should have gradients away from the excavation and toward drainage structures.

Groundwater conditions will vary with environmental and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as man-made influences, such as road grades, curbs, and storm sewers. We recommend the contractor evaluate groundwater levels at the time of construction to determine groundwater impacts on the construction procedures, as necessary.

Presuming the groundwater at the time of construction is consistent with observed depths in our exploration, we anticipate dewatering not being required during excavations less than approximately 15 feet. Deeper excavations may require dewatering.

6.7.6 Insulation

Insulation should be transported, handled, and placed with care to ensure it is not damaged prior to fill placement. The boards should be placed flat, on a smooth, level surface to minimize dimpling of the insulation. The adjoining ends should be butted closely together, and any vertical joints should be staggered where more than one layer of insulation is used.

6.7.7 General Recommendations for Fill and Compaction

All fill material should be free from lumps, organics, debris, or other deleterious material and should be durable and sound. We recommend classified fill be clean, well-graded sand and

gravel with a frost classification of non-frost susceptible (NFS). Unclassified fill can be the local mineral soils free of debris, organics, and other deleterious material.

A vibratory steel drum roller should be utilized to compact classified fill; however, lightweight or hand-operated compactors may be used when compacting near existing structures, utilities and/or new footings to avoid distressing and/or causing settlement below the structure.

No hauling or grading equipment should be used in place of appropriate compaction equipment. Any loosening of fill material by hauling or other equipment should be repaired and recompacted as needed. The number of passes required to meet the compaction requirement will depend on the size of the compaction equipment used. Each layer should be compacted as recommended in this report and field verification of compaction requirements is recommended.

Foundation soil should be protected from freezing during construction, except where permafrost is known. No frozen soil should be used as fill, nor should any fill be placed over frozen soil except for permafrost. Aside from permafrost, any frozen soil should be removed and replaced with appropriate fill prior to construction.

6.7.8 Classified Fill and Compaction

Classified fill should be placed in loose lifts not exceeding 12 inches in thickness and decreased in thickness based on the compaction equipment used. Each lift of classified fill shall be compacted to at least 95 percent of the Modified Proctor Maximum Density per ASTM D1557.

7.0 Limitations and Closure

The information submitted in this report is based on our interpretation of data from a field geotechnical exploration conducted in July 2025 for this project. Effort was made to obtain information which is representative of the actual conditions at the site. However, actual subsurface conditions will vary, and additional information may be discovered that could warrant changes to our recommendations. If conditions differ from those indicated in this report are encountered by subsequent explorations or during construction, the recommendations of this report should be reviewed with Devise.

This report was prepared by Devise Engineering, Inc. for use on this project only, and may not be used in any manner that would constitute a detriment to Devise. Devise is not responsible for conclusions, opinions, or recommendations made by others based on data presented in this report.

8.0 References

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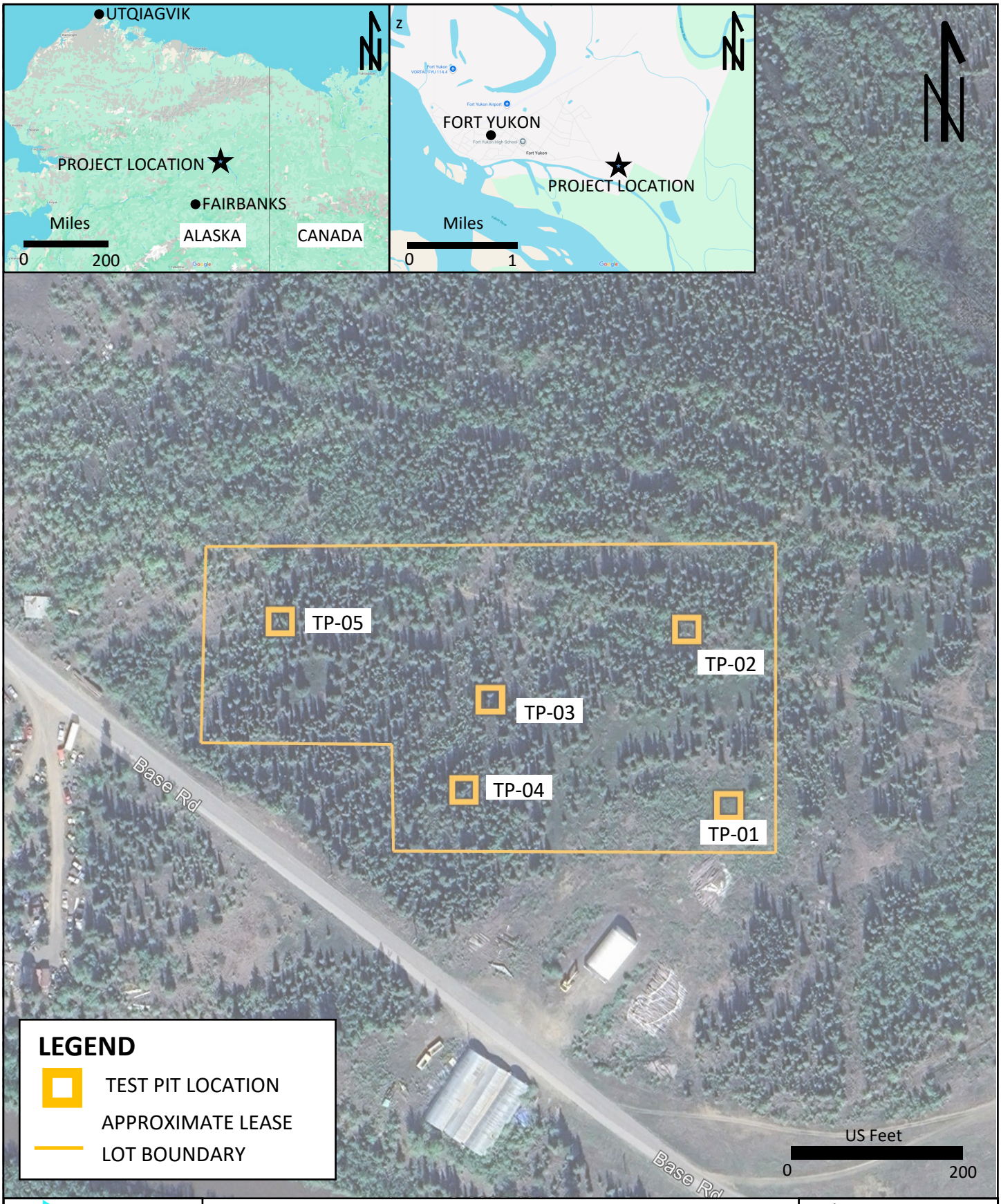
Appendix A

Figures

Included in this section:

1) Vicinity Map and Test Pit Locations



DEVISE ENGINEERING
8301 SCHOON STREET STE 200
ANCHORAGE, ALASKA 99518
PHONE 907-302-0455
www.devise-eng.com

FORT YUKON SOLAR
GEOTECHNICAL REPORT
VICINITY MAP AND TEST PIT LOCATIONS
FORT YUKON, ALASKA

Project:	25.214
Drawn By:	AFS
Scale:	Graphical
Date:	NOV 2025
Figure:	1

Appendix B

Devise Test Pit Logs

Included in this section:

1) Test Pit Log Legend
2) Test Pit Logs (TP-01 and 05)

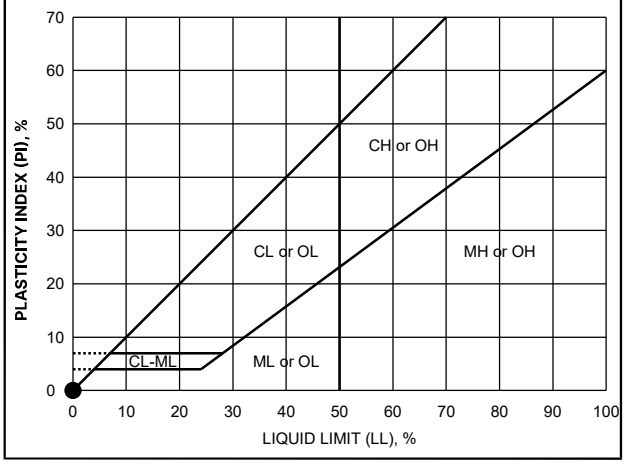
SOIL CLASSIFICATION CHART PER ASTM D 2488

PRIMARY DIVISIONS			SECONDARY DIVISIONS	
			GROUP SYMBOL	GROUP NAME
COARSE-GRAINED SOILS more than 50% retained on No. 200 sieve	GRAVEL more than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVEL less than 5% fines	GW	well-graded GRAVEL
			GP	poorly-graded GRAVEL
		GRAVEL with DUAL CLASSIFICATIONS 5% to 12% fines	GW-GM	well-graded GRAVEL with silt
			GP-GM	poorly-graded GRAVEL with silt
			GW-GC	well-graded GRAVEL with clay
			GP-GC	poorly-graded GRAVEL with clay
		GRAVEL with FINES more than 12% fines	GM	silty GRAVEL
			GC	clayey GRAVEL
			GC-GM	silty, clayey GRAVEL
	SAND 50% or more of coarse fraction retained on No. 4 sieve	CLEAN SAND less than 5% fines	SW	well-graded SAND
			SP	poorly-graded SAND
		SAND with DUAL CLASSIFICATIONS 5% to 12% fines	SW-SM	well-graded SAND with silt
			SP-SM	poorly-graded SAND with silt
			SW-SC	well-graded SAND with clay
			SP-SC	poorly-graded SAND with clay
		SAND with FINES more than 12% fines	SM	silty SAND
			SC	clayey SAND
			SC-SM	silty, clayey SAND
FINE-GRAINED SOILS 50% or more passes No. 200 sieve	SILT and CLAY liquid limit less than 50%	INORGANIC	CL	lean CLAY
			ML	SILT
			CL-ML	silty CLAY
		ORGANIC	OL (PI > 4)	organic CLAY
			OL (PI < 4)	organic CLAY
	SILT and CLAY liquid limit 50% or more	INORGANIC	CH	fat CLAY
			MH	elastic SILT
		ORGANIC	OH (plots on or above 'A'-line)	organic CLAY
			OH (plots below 'A'-line)	organic SILT
	Highly Organic Soils		PT	Peat

GRAIN SIZE

DESCRIPTION		SIEVE SIZE	GRAIN SIZE	APPROXIMATE SIZE
Boulders		> 12"	> 12"	Larger than basketball-sized
Cobbles		3 - 12"	3 - 12"	Fist-sized to basketball-sized
Gravel	Coarse	3/4 - 3"	3/4 - 3"	Thumb-sized to fist-sized
	Fine	#4 - 3/4"	0.19 - 0.75"	Pea-sized to thumb-sized
Sand	Coarse	#10 - #4	0.079 - 0.19"	Rock-salt-sized to pea-sized
	Medium	#40 - #10	0.017 - 0.079"	Sugar-sized to rock-salt-sized
	Fine	#200 - #40	0.0029 - 0.017"	Flour-sized to sugar-sized
Fines		Passing #200	< 0.0029"	Flour-sized and smaller

PLASTICITY CHART



APPARENT DENSITY - COARSE-GRAINED SOIL

APPARENT DENSITY	SPOOLING CABLE OR CATHEAD		AUTOMATIC TRIP HAMMER	
	SPT (blows/foot)	MODIFIED SPLIT BARREL (blows/foot)	SPT (blows/foot)	MODIFIED SPLIT BARREL (blows/foot)
Very Loose	≤ 4	≤ 8	≤ 3	≤ 5
Loose	5 - 10	9 - 21	4 - 7	6 - 14
Medium Dense	11 - 30	22 - 63	8 - 20	15 - 42
Dense	31 - 50	64 - 105	21 - 33	43 - 70
Very Dense	> 50	> 105	> 33	> 70

CONSISTENCY - FINE-GRAINED SOIL

CONSISTENCY	SPOOLING CABLE OR CATHEAD		AUTOMATIC TRIP HAMMER	
	SPT (blows/foot)	MODIFIED SPLIT BARREL (blows/foot)	SPT (blows/foot)	MODIFIED SPLIT BARREL (blows/foot)
Very Soft	< 2	< 3	< 1	< 2
Soft	2 - 4	3 - 5	1 - 3	2 - 3
Firm	5 - 8	6 - 10	4 - 5	4 - 6
Stiff	9 - 15	11 - 20	6 - 10	7 - 13
Very Stiff	16 - 30	21 - 39	11 - 20	14 - 26
Hard	> 30	> 39	> 20	> 26

DEVISE ENGINEERING

Fort Yukon Solar

Fort Yukon, Alaska

TP-01

Drilling Co.:	City of Fort Yukon	Project No.:	25.214	Remarks:
Driller:	City of Fort Yukon	Date Drilled:	07/29/2025	
Logged By:	AS	Boring Depth:	13'	
Equipment:	CAT 324DL	Boring Elevation:	~426.5'	
Hammer Type:	-	Coordinates:	66.560687, -145.217052	
Drilling Method:	Track-Mounted Excavator	▽ Water Level At Time Of Drilling	N/A	▼ Delayed Water Level N/A
		Cave-in At Time Of Drilling	N/A	Delayed Water Observation Date N/A

Depth (ft)	Graphic Log	Visual Classification and Remarks		Samples: Sample Number	Samples: Sample Interval (ft)	Lab: Sample Specimen ID	Lab: Moisture Content (%)	Lab: Atterberg Limits (LL-PL-PI)	Lab: % Gravel	Lab: % Sand	Lab: % Fines	Lab: Salinity (ppt)
		Surface Organics	0.5									
		Soft, orange, non plastic, dry to moist, **Silt** (ML), no odor. Frost classification F2.	2.0	01	1.5-2	01	5	NP	0	5	95	
		Gray, moist, **Poorly Graded Sand** with **Silt** (SP-SM), fine sand, no odor.		02	3-3.5	02	4		0	88	12	
5				03A	8-8.3	03	11		0	82	18	
				03B	8.3-8.5	04	24		0	70	30	
10			11.5	04	11-11.5	05	25		0	79	21	
		Gray, moist, **Silty Sand** (SM), no odor, moderately to poorly bonded, frozen										
		Well bonded, temp about 31F.	13.0	05	12.5-13	06	24					0.2

Hole collapsing between 4 and 10 feet. Backfilled with spoils.

DEVISE ENGINEERING

Fort Yukon Solar

Fort Yukon, Alaska

TP-02

Drilling Co.:	City of Fort Yukon	Project No.:	25.214	Remarks:
Driller:	City of Fort Yukon	Date Drilled:	07/29/2025	
Logged By:	AS	Boring Depth:	12'	
Equipment:	CAT 324DL	Boring Elevation:	~426.5'	
Hammer Type:	-	Coordinates:	66.561313, -145.217365	
Drilling Method:	Track-Mounted Excavator	▽ Water Level At Time Of Drilling	N/A	▼ Delayed Water Level N/A
		Cave-in At Time Of Drilling	N/A	Delayed Water Observation Date N/A

Depth (ft)	Graphic Log	Visual Classification and Remarks	Samples: Sample Number	Samples: Sample Interval (ft)	Lab: Sample Specimen ID	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines	Lab: Salinity (ppt)
		Surface Organics 0.5								
		Soft, tan, non plastic, moist, **Silt** with **Sand** (ML), no odor. Frost classification F4.	01	1.3-1.8	07	4	0	16	84	
		2.0								
		Gray, moist, **Silty Sand** (SM), no odor. Frost classification F2.	02	2-2.5	08	4				
5			03	5-5.5						
			04	7.5-8	09	24	0	56	44	
10			05	10-10.5	10	9				
		11.0								
		Gray, moist, **Silty Sand** (SM), no odor, moderately to poorly bonded, frozen	06	11-11.5	11	26	0	81	19	
		Temp about 30.5F	07	11.5-12	12	25				0.2
		Well bonded, temp about 31.5F 12.0								
		Backfilled with spoils.								

DEVISE ENGINEERING

Fort Yukon Solar

Fort Yukon, Alaska

TP-03

Drilling Co.:	City of Fort Yukon	Project No.:	25.214	Remarks:
Driller:	City of Fort Yukon	Date Drilled:	07/29/2025	
Logged By:	AS	Boring Depth:	6'	
Equipment:	CAT 324DL	Boring Elevation:	~426.5'	
Hammer Type:	-	Coordinates:	66.561102, -145.219141	
Drilling Method:	Track-Mounted Excavator	▽ Water Level At Time Of Drilling	N/A	▼ Delayed Water Level N/A
		Cave-in At Time Of Drilling	N/A	Delayed Water Observation Date N/A

Depth (ft)	Graphic Log	Visual Classification and Remarks		Samples: Sample Number	Samples: Sample Interval (ft)	Lab: Sample Specimen ID	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines	Lab: Salinity (ppt)
		Surface Organics	0.5								
		Peat (PT), Disturbed.	1.0								
		Moist, **Silty Sand** (SM), mottled gray and orange, no odor, disturbed.	1.5	01A	1-1.5	01A	6	0	66	34	
				01B	1.5-2	01B	11	0	31	69	
		Soft, non plastic, moist, **Sandy Silt** (ML), mottled gray and orange, no odor.	2.0								
		Gray, moist, **Silty Sand** (SM), no odor. Frost classification F2.									
				02	4-4.5	02	10	0	70	30	
5											
			6.0	03	5.5-6	03	17				0.2

Refusal at 6 ft due to frozen soils. Backfilled with spoils.

DEVISE ENGINEERING

Fort Yukon Solar

Fort Yukon, Alaska

TP-04

Drilling Co.:	City of Fort Yukon	Project No.:	25.214	Remarks:
Driller:	City of Fort Yukon	Date Drilled:	07/29/2025	
Logged By:	AS	Boring Depth:	5.5'	
Equipment:	CAT 324DL	Boring Elevation:	~426.5'	
Hammer Type:	-	Coordinates:	66.560818, -145.219574	
Drilling Method:	Track-Mounted Excavator	▽ Water Level At Time Of Drilling	N/A	▼ Delayed Water Level N/A
		Cave-in At Time Of Drilling	N/A	Delayed Water Observation Date N/A

Depth (ft)	Graphic Log	Visual Classification and Remarks		Samples: Sample Number	Samples: Sample Interval (ft)	Lab: Sample Specimen ID	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines	Lab: Salinity (ppt)
		Surface Organics	0.5								
		Soft, non plastic, moist, **Silt** (ML), mottled orange and gray, contains roots, no odor.		01	2-2.5	05	7				
			3.0								
		Gray, moist, **Silty Sand** (SM), loose, no odor.		02	4-4.5	06	14				
			5.0								
5		Gray, moist, **Silty Sand** (SM), no odor, frozen	5.5	03	5-5.5	07	23	0	79	21	0.2

Refusal at 5.5 ft due to frozen soils. Backfilled with spoils.

DEVISE ENGINEERING

Fort Yukon Solar

Fort Yukon, Alaska

TP-05

Drilling Co.:	City of Fort Yukon	Project No.:	25.214	Remarks:
Driller:	City of Fort Yukon	Date Drilled:	07/29/2025	
Logged By:	AS	Boring Depth:	15.5'	
Equipment:	CAT 324DL	Boring Elevation:	~426.5'	
Hammer Type:	-	Coordinates:	66.561405, -145.220848	
Drilling Method:	Track-Mounted Excavator	▽ Water Level At Time Of Drilling	N/A	▼ Delayed Water Level N/A
		Cave-in At Time Of Drilling	N/A	Delayed Water Observation Date N/A

Depth (ft)	Graphic Log	Visual Classification and Remarks	Samples: Sample Number	Samples: Sample Interval (ft)	Lab: Sample Specimen ID	Lab: Moisture Content (%)	Lab: Atterberg Limits (LL-PL-PI)	Lab: % Gravel	Lab: % Sand	Lab: % Fines	Lab: Salinity (ppt)
		Surface Organics 0.3									
		Soft, orangish brown, low plasticity, moist, **Silt** (ML), contains roots and a brown organic layer with irregular thickness at 2 ft BGS (not sampled), no odor.	01	1-1.5	08	5					
			02	2.5-3	09	8	29-2 6-3				
		4.0									
5		Gray, moist, **Silty Sand** (SM), very fine sand, no odor.	03	7.5-8	10	6					
		minor sidewall caving 6 to 12 ft									
10			04	11.5-12	11	3		0	51	49	
15		15.3	05	15-15.3	12	9					
		Soft, gray, non plastic, moist, **Sandy Silt** (ML), poorly bonded, frozen 15.5	06	15.3-15.5	13	15		0	31	69	
		Refusal due to massive caving reaching up to 2 ft BGS. Backfilled with spoils.									

Appendix C

Soil Laboratory Results

Included in this section:

1) Laboratory Results from Alaska Testlab

Alaska Testlab - Anchorage
1020 W International Airport Rd
Anchorage, AK 99518
Phone: 907-205-1987
Fax: 907-782-4409
info@alaskatestlab.com

Material Test Report

Report No: ASM:25-04823
Issue No: 1

Client: Devise Engineering
8301 Schoon St
Anchorage, AK

Project Code: 251662

CC: Devise Engineering
Maria Kampsen
Steven Halcomb

Project: FYU Solar

25.214

Reviewed By: Cindy Zickefoose
Title: Laboratory Supervisor
Date: 8/14/2025

Sample Details

Sample ID	25-04823-S01	25-04823-S02	25-04823-S03	25-04823-S04	25-04823-S05
Field Sample ID					
Client Sample ID	TP-01 Sa1	TP-01 Sa2	TP-01 Sa3A	TP-01 Sa3B	TP-01 Sa4
Date Sampled					

Particle Size Distribution

Method:
ASTM D 422

Description:
Analysis of Particle Size Distribution in Soils. Sieving for Particles >75µm, Hydrometer

Washed:
Sample Washed

Sieve Size	% Passing	Limits
3in	100	
2½in	100	
2in	100	
1½in	100	
1in	100	
¾in	100	
½in	100	
3/8in	100	
No.4	100	
No.10	100	
No.20	100	
No.40	100	
No.60	97	
No.100	75	
No.200	30	
Finer No.200 (75µm)	23.3	

Other Test Results

Description	Method	Results					Limits
Water Content (%)	ASTM D2216	5	4	11	24	25	
Date Tested		8/8/2025	8/8/2025	8/8/2025	8/8/2025	8/8/2025	
Tested By		Monika Rezic	Monika Rezic	Monika Rezic	Monika Rezic	Monika Rezic	
Group Code	ASTM D2487	ML	SP-SM	SM	SM	SM	
Group Name		Silt	Poorly graded sand with silt	Silty sand	Silty sand	Silty sand	
Atterberg Limits Estimated			Yes				
Liquid Limit				0	0	0	
Plasticity Index				0	0	0	
Material Proportions Estimated	ASTM D2487	Yes					
Gravel (%)		0	0	0	0	0	
Sand (%)		5	88	82	70	79	
Fines (%)		95	12	18	30	21	
Tested By	ASTM D2487	Cindy Zickefoose	Jason Brennan	Jason Brennan	Cindy Zickefoose	Jason Brennan	
Liquid Limit	ASTM D4318	18					
Plastic Limit		18					
Plasticity Index		NP (Non-Plastic)					
As-Received Water Content (%)		5.0					
Preparation Method		Air Dry					
Oversize Removed By		Dry Sieving over No. 40 sieve					

Comments

Soil Classification of Fines (-#200) in LMAs Assumed Unless Verified by Additional Testing
No Plasticity Index Test Performed

Alaska Testlab - Anchorage
1020 W International Airport Rd
Anchorage, AK 99518
Phone: 907-205-1987
Fax: 907-782-4409
info@alaskatestlab.com

Material Test Report

Report No: ASM:25-04823
Issue No: 1

Client: Devise Engineering
8301 Schoon St
Anchorage, AK

Project Code: 251662

CC: Devise Engineering
Maria Kampsen
Steven Halcomb

Project: FYU Solar

25.214

Reviewed By: Cindy Zickefoose
Title: Laboratory Supervisor
Date: 8/14/2025

Sample Details

Sample ID	25-04823-S01	25-04823-S02	25-04823-S03	25-04823-S04	25-04823-S05
Field Sample ID					
Client Sample ID	TP-01 Sa1	TP-01 Sa2	TP-01 Sa3A	TP-01 Sa3B	TP-01 Sa4
Date Sampled					

Other Test Results

Description	Method	Results	Limits
Liquid Limit Apparatus	ASTM D4318	Mechanical	
Grooving Tool		Plastic	
Rolling		Hand	
Tested By		Monika Rezic	
Date Tested		8/8/2025	
Dispersion device	ASTM D 422	Dispersant by hand	
Dispersion time (min)			
Shape			
Hardness			

Comments

Soil Classification of Fines (-#200) in LMAs Assumed Unless Verified by Additional Testing
No Plasticity Index Test Performed

Alaska Testlab - Anchorage
1020 W International Airport Rd
Anchorage, AK 99518
Phone: 907-205-1987
Fax: 907-782-4409
info@alaskatestlab.com

Material Test Report

Report No: ASM:25-04823
Issue No: 1

Client: Devise Engineering
8301 Schoon St
Anchorage, AK

Project Code: 251662

CC: Devise Engineering
Maria Kampsen
Steven Halcomb

Project: FYU Solar

25.214

Reviewed By: Cindy Zickefoose
Title: Laboratory Supervisor
Date: 8/14/2025

Sample Details

Sample ID	25-04823-S06	25-04823-S07	25-04823-S08	25-04823-S09	25-04823-S10
Field Sample ID					
Client Sample ID	TP-01 Sa5	TP-02 Sa1	TP-02 Sa2	TP-02 Sa4	TP-02 Sa5
Date Sampled					

Particle Size Distribution

Method:
ASTM D 422

Description:
Analysis of Particle Size Distribution in Soils. Sieving for Particles >75µm, Hydrometer

Washed:
Sample Washed

Sieve Size	% Passing	Limits
3in	100	
2½in	100	
2in	100	
1½in	100	
1in	100	
¾in	100	
½in	100	
3/8in	100	
No.4	100	
No.10	100	
No.20	100	
No.40	100	
No.60	97	
No.100	81	
No.200	44	
Finer No.200 (75µm)	24.7	

Other Test Results

Description	Method	Results					Limits
Water Content (%)	ASTM D2216	24	4	4	24	9	
Date Tested		8/8/2025	8/8/2025	8/8/2025	8/8/2025	8/8/2025	
Tested By		Monika Rezic	Monika Rezic	Monika Rezic	Monika Rezic	Monika Rezic	
Salinity (ppt)	In-House Method	0.2					
Tested By		Ardella Hopman					
Dispersion device	ASTM D 422		Dispersant by hand		Dispersant by hand		
Dispersion time (min)							
Shape							
Hardness							
Group Code	ASTM D2487		ML		SM		
Group Name			Silt with sand		Silty sand		
Liquid Limit			0		0		
Plasticity Index			0		0		
Gravel (%)			0		0		
Sand (%)			16		56		
Fines (%)			84		44		
Tested By	ASTM D2487		Cindy Zickefoose		Cindy Zickefoose		

Comments

Soil Classification of Fines (-#200) in LMAs Assumed Unless Verified by Additional Testing
No Plasticity Index Test Performed

Alaska Testlab - Anchorage
1020 W International Airport Rd
Anchorage, AK 99518
Phone: 907-205-1987
Fax: 907-782-4409
info@alaskatestlab.com

Material Test Report

Report No: ASM:25-04823
Issue No: 1

Client: Devise Engineering
8301 Schoon St
Anchorage, AK

Project Code: 251662

CC: Devise Engineering
Maria Kampsen
Steven Halcomb

Project: FYU Solar

25.214

Reviewed By: Cindy Zickefoose
Title: Laboratory Supervisor
Date: 8/14/2025

Sample Details

Sample ID	25-04823-S11	25-04823-S12
Field Sample ID		
Client Sample ID	TP-02 Sa6	TP-02 Sa7
Date Sampled		

Other Test Results

Description	Method	Results		Limits
Water Content (%)	ASTM D2216	26	25	
Date Tested		8/8/2025	8/8/2025	
Tested By		Monika Rezic	Monika Rezic	
Group Code	ASTM D2487	SM		
Group Name		Silty sand		
Liquid Limit		0		
Plasticity Index		0		
Gravel (%)		0		
Sand (%)		81		
Fines (%)		19		
Tested By	ASTM D2487	Jason Brennan		
Salinity (ppt)	In-House Method		0.2	
Tested By			Ardella Hopman	

Comments

Soil Classification of Fines (-#200) in LMAs Assumed Unless Verified by Additional Testing
No Plasticity Index Test Performed

Alaska Testlab - Anchorage
1020 W International Airport Rd
Anchorage, AK 99518
Phone: 907-205-1987
Fax: 907-782-4409
info@alaskatestlab.com

Material Test Report

Report No: MAT:25-04823-S04
Issue No: 1

Client: Devise Engineering
8301 Schoon St
Anchorage, AK

Project Code: 251662

CC: Devise Engineering
Maria Kampsen
Steven Halcomb

Project: FYU Solar

25.214

Reviewed By: Cindy Zickefoose
Title: Laboratory Supervisor
Date: 8/14/2025

Sample Details

Sample ID	25-04823-S04
Client Sample ID	TP-01 Sa3B
Specification	Soil Stack

Other Test Results

Description	Method	Result	Limits
	ASTM D 422		
Dispersion device		Dispersant by hand	
Dispersion time (min)			
Shape			
Hardness			
Water Content (%)	ASTM D2216	24	
Date Tested		8/8/2025	
Tested By		Monika Rezic	
Group Code	ASTM D2487	SM	
Group Name		Silty sand	
Liquid Limit		0	
Plasticity Index		0	
Gravel (%)		0	
Sand (%)		70	
Fines (%)		30	
	ASTM D2487		
Tested By		Cindy Zickefoose	
Date Tested		8/14/2025	

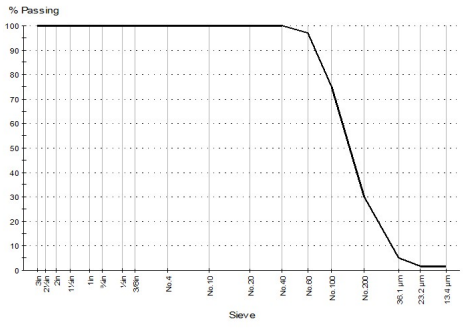
Particle Size Distribution

Method: ASTM D 422

Date Tested: 8/8/2025
Tested By: Monika Rezic

Sieve Size	% Passing	Limits
3in	100	
2½in	100	
2in	100	
1½in	100	
1in	100	
¾in	100	
½in	100	
3/8in	100	
No.4	100	
No.10	100	
No.20	100	
No.40	100	
No.60	97	
No.100	75	
No.200	30	
Finer No.200 (75µm)	23.3	
36.1 µm	4.9	
23.2 µm	1.6	
13.4 µm	1.6	

Chart



Comments

N/A

Alaska Testlab - Anchorage
1020 W International Airport Rd
Anchorage, AK 99518
Phone: 907-205-1987
Fax: 907-782-4409
info@alaskatestlab.com

Material Test Report

Report No: MAT:25-04823-S07
Issue No: 1

Client: Devise Engineering
8301 Schoon St
Anchorage, AK

Project Code: 251662

CC: Devise Engineering
Maria Kampsen
Steven Halcomb

Project: FYU Solar

25.214

Reviewed By: Cindy Zickefoose
Title: Laboratory Supervisor
Date: 8/14/2025

Sample Details

Sample ID	25-04823-S07
Client Sample ID	TP-02 Sa1
Specification	Soil Stack

Other Test Results

Description	Method	Result	Limits
	ASTM D 422		
Dispersion device		Dispersant by hand	
Dispersion time (min)			
Shape			
Hardness			
Water Content (%)	ASTM D2216	4	
Date Tested		8/8/2025	
Tested By		Monika Rezic	
Group Code	ASTM D2487	ML	
Group Name		Silt with sand	
Liquid Limit		0	
Plasticity Index		0	
Gravel (%)		0	
Sand (%)		16	
Fines (%)		84	
	ASTM D2487		
Tested By		Cindy Zickefoose	
Date Tested		8/14/2025	

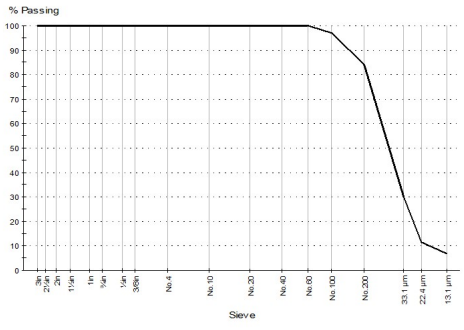
Particle Size Distribution

Method: ASTM D 422

Date Tested: 8/8/2025
Tested By: Monika Rezic

Sieve Size	% Passing	Limits
3in	100	
2½in	100	
2in	100	
1½in	100	
1in	100	
¾in	100	
½in	100	
3/8in	100	
No.4	100	
No.10	100	
No.20	100	
No.40	100	
No.60	100	
No.100	97	
No.200	84	
Finer No.200 (75µm)	77.2	
33.1 µm	29.9	
22.4 µm	11.6	
13.1 µm	6.6	

Chart



Comments

N/A

Alaska Testlab - Anchorage
1020 W International Airport Rd
Anchorage, AK 99518
Phone: 907-205-1987
Fax: 907-782-4409
info@alaskatestlab.com

Material Test Report

Report No: MAT:25-04823-S09
Issue No: 1

Client: Devise Engineering
8301 Schoon St
Anchorage, AK

Project Code: 251662

CC: Devise Engineering
Maria Kampsen
Steven Halcomb

Project: FYU Solar

25.214

Reviewed By: Cindy Zickefoose
Title: Laboratory Supervisor
Date: 8/14/2025

Sample Details

Sample ID	25-04823-S09
Client Sample ID	TP-02 Sa4
Specification	Soil Stack

Other Test Results

Description	Method	Result	Limits
	ASTM D 422		
Dispersion device		Dispersant by hand	
Dispersion time (min)			
Shape			
Hardness			
Water Content (%)	ASTM D2216	24	
Date Tested		8/8/2025	
Tested By		Monika Rezic	
Group Code	ASTM D2487	SM	
Group Name		Silty sand	
Liquid Limit		0	
Plasticity Index		0	
Gravel (%)		0	
Sand (%)		56	
Fines (%)		44	
	ASTM D2487		
Tested By		Cindy Zickefoose	
Date Tested		8/14/2025	

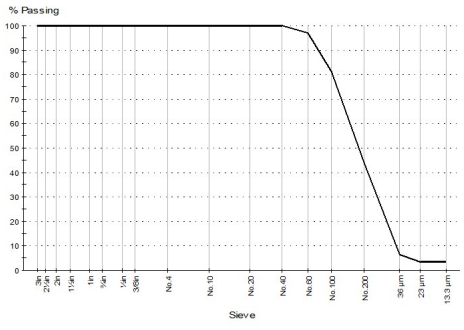
Particle Size Distribution

Method: ASTM D 422

Date Tested: 8/12/2025
Tested By: Cindy Zickefoose

Sieve Size	% Passing	Limits
3in	100	
2½in	100	
2in	100	
1½in	100	
1in	100	
¾in	100	
½in	100	
3/8in	100	
No.4	100	
No.10	100	
No.20	100	
No.40	100	
No.60	97	
No.100	81	
No.200	44	
Finer No.200 (75µm)	24.7	
36.0 µm	6.5	
23.0 µm	3.3	
13.3 µm	3.3	

Chart



Comments

N/A

Alaska Testlab - Anchorage
1020 W International Airport Rd
Anchorage, AK 99518
Phone: 907-205-1987
Fax: 907-782-4409
info@alaskatestlab.com

Material Test Report

Report No: ASM:25-04824
Issue No: 1

Client: Devise Engineering
8301 Schoon St
Anchorage, AK

Project Code: 251662

CC: Devise Engineering
Maria Kampsen
Steven Halcomb

Project: FYU Solar

25.214

Reviewed By: Cindy Zickefoose
Title: Laboratory Supervisor
Date: 8/14/2025

Sample Details

Sample ID	25-04824-S01	25-04824-S02	25-04824-S03	25-04824-S04	25-04824-S05
Field Sample ID					
Client Sample ID	TP-03 Sa1A	TP-03 Sa1B	TP-03 Sa2	TP-03 Sa3	TP-04 Sa1A
Date Sampled					

Particle Size Distribution

Method:
ASTM D 422

Description:
Analysis of Particle Size Distribution in Soils. Sieving for Particles >75µm, Hydrometer

Washed:
Sample Washed

Sieve Size	% Passing	Limits
3in	100	
2½in	100	
2in	100	
1½in	100	
1in	100	
¾in	100	
½in	100	
3/8in	100	
No.4	100	
No.10	100	
No.20	100	
No.40	100	
No.60	97	
No.100	81	
No.200	30	
Finer No.200 (75µm)	17.9	

Other Test Results

Description	Method	Results					Limits
Water Content (%)	ASTM D2216	6	11	10	17	7	
Date Tested		8/8/2025	8/8/2025	8/8/2025	8/8/2025	8/8/2025	
Tested By		Monika Rezic	Monika Rezic	Monika Rezic	Monika Rezic	Monika Rezic	
Group Code	ASTM D2487	SM	ML	SM			
Group Name		Silty sand	Sandy silt	Silty sand			
Liquid Limit		0	0	0			
Plasticity Index		0	0	0			
Gravel (%)		0	0	0			
Sand (%)		66	31	70			
Fines (%)		34	69	30			
Tested By	ASTM D2487	Jason Brennan	Jason Brennan	Cindy Zickefoose			
Dispersion device	ASTM D 422			Dispersant by hand			
Dispersion time (min)							
Shape							
Hardness							
Salinity (ppt)	In-House Method				0.2		
Tested By					Ardella Hopman		

Comments

Soil Classification of Fines (-#200) in LMAs Assumed Unless Verified by Additional Testing
No Plasticity Index Test Performed

Alaska Testlab - Anchorage
1020 W International Airport Rd
Anchorage, AK 99518
Phone: 907-205-1987
Fax: 907-782-4409
info@alaskatestlab.com

Material Test Report

Report No: ASM:25-04824
Issue No: 1

Client: Devise Engineering
8301 Schoon St
Anchorage, AK

Project Code: 251662

CC: Devise Engineering
Maria Kampsen
Steven Halcomb

Project: FYU Solar

25.214

Reviewed By: Cindy Zickefoose
Title: Laboratory Supervisor
Date: 8/14/2025

Sample Details

Sample ID	25-04824-S06	25-04824-S07	25-04824-S08	25-04824-S09	25-04824-S10
Field Sample ID					
Client Sample ID	TP-04 Sa2	TP-04 Sa3	TP-05 Sa1	TP-05 Sa2	TP-05 Sa3
Date Sampled					

Other Test Results

Description	Method	Results					Limits
Water Content (%)	ASTM D2216	14	23	5	8	6	
Date Tested		8/8/2025	8/8/2025	8/8/2025	8/8/2025	8/8/2025	
Tested By		Monika Rezic	Monika Rezic	Monika Rezic	Monika Rezic	Monika Rezic	
Group Code	ASTM D2487		SM				
Group Name			Silty sand				
Liquid Limit			0				
Plasticity Index			0				
Gravel (%)			0				
Sand (%)			79				
Fines (%)			21				
Tested By	ASTM D2487		Jason Brennan				
Salinity (ppt)	In-House Method		0.2				
Tested By			Ardella Hopman				
Liquid Limit	ASTM D4318				29		
Plastic Limit					26		
Plasticity Index					3		
As-Received Water Content (%)					8.2		
Preparation Method					Air Dry		
Oversize Removed By					Dry Sieving over No. 40 sieve		
Liquid Limit Apparatus					Mechanical		
Grooving Tool					Plastic		
Rolling					Hand		
Tested By					Monika Rezic		
Date Tested					8/8/2025		

Comments

Soil Classification of Fines (-#200) in LMAs Assumed Unless Verified by Additional Testing
No Plasticity Index Test Performed

Alaska Testlab - Anchorage
1020 W International Airport Rd
Anchorage, AK 99518
Phone: 907-205-1987
Fax: 907-782-4409
info@alaskatestlab.com

Material Test Report

Report No: ASM:25-04824
Issue No: 1

Client: Devise Engineering
8301 Schoon St
Anchorage, AK

Project Code: 251662

CC: Devise Engineering
Maria Kampsen
Steven Halcomb

Project: FYU Solar

25.214

Reviewed By: Cindy Zickefoose
Title: Laboratory Supervisor
Date: 8/14/2025

Sample Details

Sample ID	25-04824-S11	25-04824-S12	25-04824-S13
Field Sample ID			
Client Sample ID	TP-05 Sa4	TP-05 Sa5	TP-05 Sa6
Date Sampled			

Other Test Results

Description	Method	Results			Limits
Water Content (%)	ASTM D2216	3	9	15	
Date Tested		8/8/2025	8/8/2025	8/8/2025	
Tested By		Monika Rezic	Monika Rezic	Monika Rezic	
Group Code	ASTM D2487	SM		ML	
Group Name		Silty sand		Sandy silt	
Liquid Limit		0		0	
Plasticity Index		0		0	
Gravel (%)		0		0	
Sand (%)		51		31	
Fines (%)		49		69	
Tested By	ASTM D2487	Cindy Zickefoose		Jason Brennan	

Comments

Soil Classification of Fines (-#200) in LMAs Assumed Unless Verified by Additional Testing
No Plasticity Index Test Performed

Alaska Testlab - Anchorage
1020 W International Airport Rd
Anchorage, AK 99518
Phone: 907-205-1987
Fax: 907-782-4409
info@alaskatestlab.com

Material Test Report

Report No: MAT:25-04824-S03
Issue No: 1

Client: Devise Engineering
8301 Schoon St
Anchorage, AK

Project Code: 251662

CC: Devise Engineering
Maria Kampsen
Steven Halcomb

Project: FYU Solar

25.214

Reviewed By: Cindy Zickefoose
Title: Laboratory Supervisor
Date: 8/14/2025

Sample Details

Sample ID	25-04824-S03
Client Sample ID	TP-03 Sa2
Specification	Soil Stack

Other Test Results

Description	Method	Result	Limits
	ASTM D 422		
Dispersion device		Dispersant by hand	
Dispersion time (min)			
Shape			
Hardness			
Water Content (%)	ASTM D2216	10	
Date Tested		8/8/2025	
Tested By		Monika Rezic	
Group Code	ASTM D2487	SM	
Group Name		Silty sand	
Liquid Limit		0	
Plasticity Index		0	
Gravel (%)		0	
Sand (%)		70	
Fines (%)		30	
	ASTM D2487		
Tested By		Cindy Zickefoose	
Date Tested		8/14/2025	

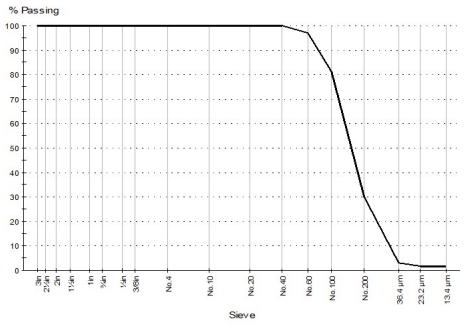
Particle Size Distribution

Method: ASTM D 422

Date Tested: 8/8/2025
Tested By: Monika Rezic

Sieve Size	% Passing	Limits
3in	100	
2½in	100	
2in	100	
1½in	100	
1in	100	
¾in	100	
½in	100	
3/8in	100	
No.4	100	
No.10	100	
No.20	100	
No.40	100	
No.60	97	
No.100	81	
No.200	30	
Finer No.200 (75µm)	17.9	
36.4 µm	3.1	
23.2 µm	1.6	
13.4 µm	1.6	

Chart



Comments

N/A

HDL ENGINEERING Consultants LLC

November 6, 2025

Alexander Sievers
Tanana Chiefs Conference
122 1st Avenue
Fairbanks, Alaska 99701

Subject: Geotechnical Engineering Services
Tok Photovoltaic Array

Civil Engineering

Geotechnical Engineering

Transportation Engineering

Aviation Engineering

W/WW Engineering

Environmental Services

Surveying & Mapping

Construction Administration

Material Testing

In accordance with the request of the Tanana Chiefs Conference (TCC), HDL Engineering Consultants, LLC (HDL) conducted a geotechnical engineering evaluation for the proposed development in Tok, Alaska. This letter report (Report) provides the findings, conclusions, and recommendations that HDL derived from the geotechnical evaluation. This Report includes a description of the project, description and results of the subsurface exploration and laboratory testing, and geotechnical recommendations. This Report is subject to the attached limitations.

BACKGROUND

The proposed development is located east of the Glenn Highway approximately 2 miles south of the intersection of the Glenn Highway and the Alaska Highway in Tok, Alaska (Site). The Site consists of an inactive, grass- and gravel-surfaced aircraft landing strip. HDL understands the proposed development consists of a 1.5 mega-watt photovoltaic (PV) system consisting of solar panels, racking, transformers, and battery storage system. TCC informed HDL that based on preliminary subsurface information, the racking manufacturers prefer to support the proposed racking system with ground screws or concrete ballast foundations.

SETTING

The following section provides information about the geologic and climatic setting for the Site.

General Geology

The project area is located within the Northway-Tanacross Lowland subprovince of the Northern Plateaus Province of Alaska. The region is bordered by the Yukon-Tanana Uplands to the north and the Alaska Range to the west and south. The relatively flat region is drained by the Tanana River and thaw lakes characterize the area (Wahrhaftig, 1965). Statewide mapping produced by the Institute of Northern Engineering indicates Tok and the surrounding area is underlain by discontinuous permafrost (INE/UAF, 2008).

The University of Alaska Fairbanks (UAF) Scenarios Network for Arctic Planning (SNAP) characterizes the permafrost conditions in Tanacross, approximately 12 miles west of Tok, as

discontinuous with mean annual ground temperatures ranging from approximately 28.4°F to 32°F. The community profile characterizes the massive ice potential in Tanacross as absent (UAF, 2025). Subsurface temperatures collected by UAF Geophysical Institute Permafrost Laboratory near the intersection of the Alaska Pipeline and the Robertson River indicated an active layer between 7 feet and 13 feet thick. Based on the surface conditions at the Site, we generally anticipate a seasonal active layer between 7 feet and 10 feet.

The project is located in a region of low seismicity. Based on the United States Geologic Survey (USGS) earthquake catalog, there were 18 events above Richter Magnitude 5 within 100 miles of the Site from 1899 through 2024, none of which were above Richter Magnitude 6.

Climatology

The project area is located in a continental climatic zone, characterized by extreme temperature differences (Division of Community and Regional Affairs, 2025). The average January temperatures in the area range between -20.0°F and -3.7°F, while average July temperatures range between 46.0°F and 72.2°F. Average annual precipitation is 10.6 inches, and average annual snowfall is 37.6 inches (Alaska Climate Research Center, 2020). The data provided is for the Tok monitoring station and conditions at the Site may vary.

SUBSURFACE EXPLORATION

HDL evaluated the subsurface conditions at the Site between August 28 and August 29, 2025. The subsurface evaluation consisted of five (5) borings, designated HDL-01 through HDL-05. HDL located the borings in the field using recreational-grade GPS. Boring elevations were approximated using elevation data from Google Earth. The attached Boring Location Map illustrates the approximate boring locations.

Discovery Drilling, Inc. provided drilling services using a truck-mounted CME 75 and hollow stem augers to drill the borings to a maximum depth of 32 feet bgs. We conducted split-spoon sampling (designated by LSS, Large Split Spoon on the boring logs) using the Modified Penetration Test procedure. In the Modified Penetration Test, blows of a 340-pound hammer free-falling 30 inches onto the drill rod drive a 24-inch-long, 3-inch outside diameter split spoon sampler into the bottom of the advancing hole to recover samples. The number of blows required to advance the sampler the second and third 6-inch interval is termed the Penetration Resistance, or N-value. Onsite personnel recorded the N-value for each sample. The N-values give a measure of the relative density (compactness) or consistency (stiffness) of cohesionless and cohesive soils, respectively.

HDL performed fieldwork in general accordance with the procedures outlined in the Alaska Department of Transportation and Public Facilities (DOT&PF) "Alaska Geotechnical Procedures Manual". An experienced HDL geotechnical engineering assistant located the borings, collected samples, and logged

subsurface conditions. We described the subsurface conditions in accordance with the following methods and standards:

- ASTM International Standard (ASTM) D2488 for field description of soils;
- Frost Design Soil Classification using the United States Army Corp of Engineers (USACE) methodology; and,
- Unified Soil Classification System (ASTM D2487).

The attached Boring Log Key, Frost Design Soil Classification Key, and boring logs provide further reference.

LABORATORY TESTING

HDL conducted the following laboratory tests on select soil samples at our AASHTO accredited and USACE validated laboratory:

- Forty-seven (47) natural moisture content tests (ASTM D2216);
- Seven (7) grain size distribution tests (ASTM D6913); and,
- Three (3) hydrometer tests (ASTM D7928).

Upon completion of the subsurface exploration, HDL confirmed with TCC that they would like to proceed with pH and resistivity testing of select soil samples. HDL sent five (5) select samples to SGS for the following testing:

- pH (SW-846 Test Method 9045D); and,
- Resistivity (SM19 Test Method 2510-A).

The attached boring logs, grain size distribution curves, and SGS Laboratory Analysis Report present the results of the laboratory tests.

SUBSURFACE CONDITIONS

In general, the borings encountered a thin organic mat underlain by gravel with sand, trace to little silt, and cobbles extending to the boring termination depths.

Organic Mat

Borings performed outside of the inactive landing strip encountered a thin organic mat ranging from 2 inches to 3 inches thick.

Silty Sand

Boring HDL-03 encountered a thin layer of silty sand beneath the organic mat extending to a depth of approximately 7 inches bgs.

Gravel

The borings generally encountered gravel with sand and trace to little silt at the ground surface or beneath the thin organic mat extending to the boring termination depths. The borings encountered cobbles throughout the gravel layer and occasional layers of interbedded sand. The N-values of the gravel ranged from 9 to 94, indicating loose to very dense soils, with most of the soils classifying as medium dense to dense. This soil generally classified as possibly frost susceptible (PFS). Further laboratory testing is required to determine if the soil classifies as non-frost susceptible (NFS) or slightly frost susceptible (S1). Table 1 provides a summary of laboratory testing results in this layer.

Table 1: Sand and Gravel Laboratory Results Summary

Boring	Depth	Grain Size Distribution				Resistivity	pH
	(ft)	% Gravel	% Sand	% P200	% P0.02mm	ohm-m	
HDL-01	2.5	--	--	--	--	83.5	8.80
HDL-01	5.0	68.4	28.1	3.5	2.0	--	--
HDL-02	2.5	75.5	21.1	3.4	2.1	--	--
HDL-02	5.0	--	--	--	--	117	9.00
HDL-02	10.0	68.8	27.9	3.3	--	--	--
HDL-03	2.5	70.7	25.1	4.1	--	--	--
HDL-03	5.0	--	--	--	--	111	8.70
HDL-04	3.0	--	--	--	--	105	9.00
HDL-04	5.0	64.5	31.2	4.3	--	--	--
HDL-04	10.0	68.5	28.8	2.6	--	--	--
HDL-05	2.5	65.2	30.9	4.0	2.4	--	--
HDL-05	7.5	--	--	--	--	159	9.20

Groundwater

HDL did not encounter groundwater during drilling. Groundwater levels at the Site may fluctuate depending on the season, temperature, and precipitation. Groundwater levels during construction may be higher or lower than those encountered.

Frozen Soils

The borings did not encounter frozen soil at the time of the subsurface exploration.

ENGINEERING ANALYSIS & RECOMMENDATIONS

Design of the proposed development must consider the bearing support capabilities of the supporting soils as well as seismic loading, expected settlements, and effects of seasonal frost action. We have provided a summary of the geotechnical considerations below based on our current understanding of the proposed development.

Site Preparation and Fill

Clear and grub the Site prior to the onset of construction. Remove and replace soft or unstable soils or other deleterious materials encountered during excavation with compacted fill. We recommend proof-rolling the exposed subgrade to provide a level, firm, uniform, and unyielding surface prior to the placement of fill or construction.

Structural Fill placed within the footprint of the proposed PV array and within the foundation influence zone of proposed structures should be a reasonably well graded mixture of sand and gravel meeting the DOT&PF requirements of Selected Material, Type A, or better, as detailed in Section 703-2.07 of the DOT&PF Standard Specifications for Highway Construction (Specifications). The onsite gravel generally meets these requirements. The foundation influence zone is the area defined by extending a line outward and downward from the bottom edges of the footing on a slope of 1 (horizontal) to 1 (vertical).

Fill placed outside of the PV array footprint and outside of the foundation influence zone should be granular and meet the DOT&PF Specifications requirements for Selected Material, Type C or better. The onsite soils generally meet these requirements.

Place fill in lifts with a maximum loose thickness of 10 to 12 inches, and compact the lifts to a density of at least 95 percent of the maximum dry density as determined by ASTM D1557. During fill placement, remove cobbles and boulders with dimensions in excess of 2/3 the lift thickness.

Foundations

Design of the proposed racking foundations must consider the bearing capability of the supporting soils, behavior during a seismic event, the effects of seasonal frost action, and the expected total and differential settlements. The foundation system must also consider the risk of failure and the cost of construction. In addition to the considerations listed above, selection and design of the foundations should consider the presence of cobbles and boulders in the subsurface.

Several foundation types are capable of supporting the proposed solar array based on the subsurface conditions encountered. HDL understands that the racking manufactures prefer to support the proposed PV array with concrete ballast foundations or ground screws.

Concrete Ballast Foundations

If the design and construction of the proposed PV array meets the assumptions outlined in this Report, a concrete ballast foundation will support the proposed development.

Subgrade Preparation

Compact exposed subgrade soils and Structural Fill placed within the foundation influence zone to a density of at least 95 percent of the maximum density as determined by the Modified Proctor compaction procedure (ASTM D1557). Construct foundations immediately after subgrade preparation to protect the

soil bearing surface and, if applicable, backfill foundation excavations as soon as possible after foundation construction. Dewater excavations if needed and protect them from adjacent runoff.

Foundation Recommendations

Construct foundations immediately after subgrade preparation to protect the soil bearing surface and, if applicable, backfill foundation excavations as soon as possible after foundation construction. The concrete ballast foundations should be a minimum of 16 inches wide. Table 2 presents the assumed engineering properties of the in-situ gravel encountered in the borings.

Table 2: Engineering Properties of In-Situ Gravel

EARTH PRESSURE CONDITIONS	COEFFICIENT FOR BACKFILL TYPE	EQUIVALENT FLUID PRESSURE (pcf)	SURCHARGE PRESSURE, P_1 (psf)	EARTH PRESSURE, P_2 (psf)	Coefficient of Friction
Active (Ka)	Structural Fill – 0.31	41.9	(0.31)S	(41.9)H	0.45
At-Rest (Ko)	Structural Fill – 0.47	63.5	(0.47)S	(63.5)H	
Passive (Kp)	Structural Fill – 3.3	445.5	---	---	

Conditions applicable to the values presented above include:

- For active earth pressure, the foundation must rotate about base, with top lateral movements 0.002 Z to 0.004 Z, where Z is the foundation height.
- For passive earth pressure, the foundation must move horizontally to mobilize resistance.
- Uniform surcharge, where S is surcharge pressure.
- Native soil backfill weight is approximately 135 pcf with a friction angle of 32 degrees.
- Native soil backfill compacted to at least 95% of the ASTM D1557 maximum dry density.
- Loading from heavy compaction equipment not included.
- No groundwater acting on wall.
- No safety factor included.
- Ignore passive pressure in frost zone.

Bearing Capacity

HDL assumes that he proposed racking foundations will bear upon the in-situ gravel meeting the specifications for Selected Material, Type A. If the soils beneath the proposed foundations are consistent with and prepared in accordance with the requirements provided in this Report, we recommend using the allowable soil bearing capacities provided in Table 3. The allowable soil bearing capacities presented in Table 3 assume a Factor-of-Safety of 3.

Table 3: Concrete Ballast Foundation Bearing Capacity

Ballast Width (in)	Footing Depth (in)	Allowable Bearing Capacity (psf)
18	6	1,400
18	12	2,000
36	6	2,000
36	12	2,800

Increase the above bearing values by one-third for seismic or wind loading conditions

Ground Screws

If the design and construction of the proposed solar array meets the assumptions outlined in this Report, ground screws can support the proposed development. Cobbles encountered in the subsurface may present challenges during ground screw installation.

Follow the manufacturer's recommendations when determining the size, depth, and number of ground screws needed to support the proposed PV array.

Seismic Analysis

HDL recommends the use of the site characterization criteria found in the 2021 International Building Code (IBC) for design. Chapter 16, Section 1613 of the IBC holds the seismic design criteria. The IBC requires that soil and rock parameters determine the site characterization. Based on the subsurface conditions encountered, we considered the site to be Seismic Site Class "D". We obtained the maximum considered earthquake ground motion spectral response accelerations for short period and for one-second peaks using the Seismic Design Maps created by Structural Engineers Association of California and California's Office of Statewide Health Planning and Development. Seismic Design Maps is a web interface that uses USGS web services to retrieve seismic design data; results of which we have summarized in Table 4.

Table 4: Seismic Design Criteria

IBC 2021 Seismic Design Criteria	Value
Spectral Response at Short Periods, S_S	0.527
Spectral Response at 1-Second Period, S_1	0.335
Site Modified Peak Ground Acceleration, PGA_m	0.275
Site Class	D
Site Coefficient F_a	1.379
Site Coefficient F_v	1.965
Site Adjusted Spectral Response at Short Periods, S_{MS}	0.726
Site Adjusted Spectral Response at 1-Second Periods, S_{M1}	0.658

Liquefaction Potential and Cyclic Softening

The extent of liquefaction and potential for cyclic softening is dependent on the groundwater elevation which fluctuates depending on the season, temperature, and precipitation. Generally, the risk of seismically induced settlement or seismically induced cyclic softening decreases as the groundwater lowers and increases as it raises. The borings did not encounter groundwater during the subsurface exploration, therefore we do not anticipate seismically induced settlement or cyclic softening to impact the proposed development.

Static Settlement

The total settlements experienced by the proposed improvements are dependent upon the actual loads that are applied and the care of the placement and compaction of Structural Fill. For the foundations designed as recommended above, we estimate that total settlements of approximately ½-inch could be realized and differential settlements will be approximately one-half the total.

Frost Susceptibility

The Site is in a region of moderate freeze and thaw cycles. Borings encountered possibly frost susceptible (PFS) soils in the shallow subsurface. If the design and construction of the proposed PV array meets the assumptions outlined in this Report, we generally do not anticipate significant frost related movement of the proposed racking systems.

Drainage and Dewatering

The borings did not encounter free groundwater; however, the groundwater level will likely vary from that encountered during HDL's exploration. Based on the drilling conducted, groundwater is not likely to be encountered during typical foundation construction. The need for dewatering will depend on the time of year for construction and the depth of the excavation.

HDL recommends grading the Site to promote positive drainage away from the racking foundations and compacting the near surface soils to reduce permeability.

Permafrost

HDL did not encounter permafrost in the borings performed during the subsurface investigation. However, Tok and the surrounding area is generally underlain by discontinuous permafrost and permafrost may be encountered during construction depending on the depth of excavations and construction in undisturbed areas.

Excavations and Shoring

HDL assumes the need for temporary excavations to support the foundation construction. We recommend that the contractor be responsible for the trench side slopes, trench bottom conditions, and dewatering efforts as they are present on a day-to-day basis and can adjust efforts to obtain the needed

stability and meet the applicable Alaska and Federal Occupational Safety and Health Administration (OSHA) safety regulations. Deviation from the OSHA stipulations requires the approval of a licensed Professional Geotechnical Engineer.

Shoring may be required if unstable soils are encountered. Account for additional loads from adjacent equipment, hydrostatic pressure, and structures in the pressure distribution for shoring design.

Heavy precipitation may cause soils to become saturated and less stable. The contractor should phase construction to minimize exposure of the subgrade and direct surface water away from the excavations.

LIMITATIONS

This Report is subject to the attached limitations.

We appreciate the opportunity to assist you with this important project. If you have any questions, please contact Jeremy Dvorak at jdvorak@HDLalaska.com or 907.564.2121.

Prepared by:

HDL Engineering Consultants, LLC

Kayla Taylor, EIT
Geotechnical Engineering Assistant
e: ktaylor@HDLalaska.com | d: 907.761.1220

HDL Engineering Consultants, LLC

Jason McKee, P.E.
Geotechnical Engineer
e: jmckee@HDLalaska.com | d: 907.564.2178

Reviewed By:

HDL Engineering Consultants, LLC

Jeremy Dvorak, P.E.
Geotechnical Services Manager
e: jdvorak@HDLalaska.com | d: 907.564.2121

Attach: Limitations – 2 Pages
Boring Location Map – 1 Page
Boring Log Key – 1 Page
Frost Design Soil Classification – 1 Page
Boring Logs – 10 Pages
Grain Size Distribution Test Results – 1 Page
SGS Laboratory Analysis Report – 9 Pages

GEOTECHNICAL LIMITATIONS

Use of Report

1. HDL Engineering Consultants, LLC (HDL) prepared this report on behalf of, and for the exclusive use of our Client for the stated purpose(s) and location(s) identified in the Proposal for Services and/or Report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not expressly identified in the agreement, for any use, without our prior written permission, shall be at that party's sole risk, and without any liability to HDL.

2. If substantial time has elapsed between submission of this report and the start of work at the site, or if conditions have changed because of natural causes or construction operations at or adjacent to the site, we recommend that HDL be retained to review this report to determine the applicability of the conclusions considering the time lapse or changed conditions.

Standard of Care

3. HDL's findings and conclusions are based on the work conducted as part of the Scope of Services set forth in the Proposal for Services and/or Report, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the limited data gathered during the course of our work. If conditions other than those described in this report are found at the subject location(s), or the design has been altered in any way, HDL shall be so notified and afforded the opportunity to revise the report, as appropriate, to reflect the unanticipated changed conditions.

4. HDL's services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services, at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.

Subsurface Conditions

5. The generalized soil profile(s) provided in our Report are based on widely-spaced subsurface explorations and are intended only to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized, and were based on our assessment of subsurface conditions. The composition of strata, and the transitions between strata, may be more variable and more complex than indicated. For more specific information on soil conditions at a specific location refer to the exploration logs.

6. Unanticipated soil conditions are commonly encountered and cannot be fully determined by merely taking soil samples or advancing borings. Such unexpected conditions frequently require additional expenditure to attain a properly constructed project. Therefore, some contingency fund is recommended to accommodate such potential extra costs.

7. In preparing this report, HDL relied on certain information provided by the Client, state

and local officials, and other parties referenced therein which were made available to HDL at the time of our evaluation. HDL did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this evaluation.

8. Water level readings have been made in test holes (as described in the Report) and monitoring wells at the specified times and under the stated conditions. These data have been reviewed and interpretations have been made in this Report. Fluctuations in the level of the groundwater occur due to temporal or spatial variations in areal recharge rates, soil heterogeneities, the presence of subsurface utilities, and/or natural or artificially induced perturbations. The water encountered in the course of the work may differ from that indicated in the Report.

9. HDL's services did not include an assessment of the presence of oil or hazardous materials at the property. Consequently, we did not consider the potential impacts (if any) that contaminants in soil or groundwater may have on construction activities, or the use of structures on the property.

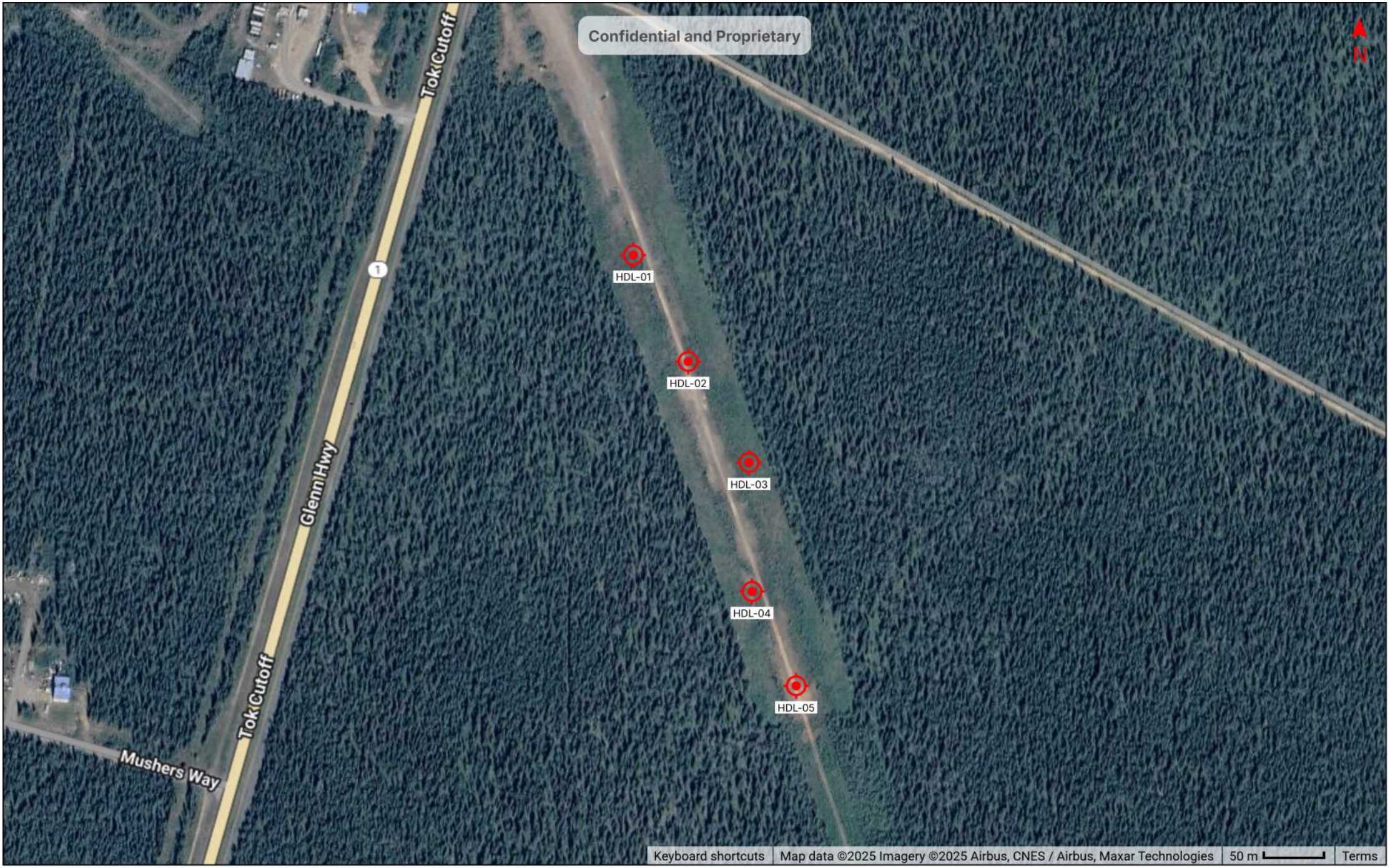
10. Recommendations for foundation drainage, waterproofing, and moisture control address the conventional geotechnical engineering aspects of seepage control. These recommendations may not preclude an environment that allows the infestation of mold or other biological pollutants.

Compliance with Codes and Regulations

11. We used reasonable care in identifying and interpreting applicable codes and regulations. These codes and regulations are subject to various, and possibly contradictory, interpretations. Compliance with codes and regulations by other parties is beyond our control.

Additional Services

12. HDL recommends that we be retained to provide services during any future: site observations, design, implementation activities, construction and/or property development/redevelopment. This will allow us the opportunity to: i) observe conditions and compliance with our design concepts and opinions; ii) allow for changes in the event that conditions are other than anticipated; iii) provide modifications to our design; and iv) assess the consequences of changes in technologies and/or regulations.



HDL ENGINEERING Consultants LLC

PREPARED BY
HDL Engineering Consultants, LLC
Anchorage, AK

PROJECT
Name: Tok Photovoltaic Array
Number: 25-106

LOCATION
63.303760, -143.001270
Tok, AK

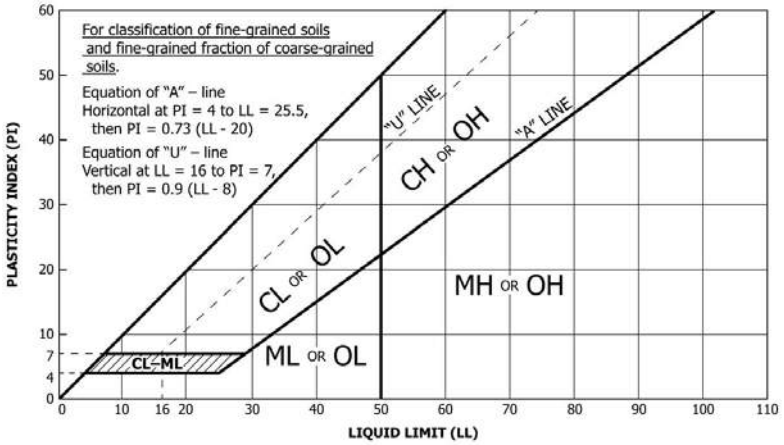
SYMBOL KEY
Soil Boring

BORING LOG KEY

Summary of the Unified Soil Classification System (from ASTM International Standard D2487)[A]				Soil Classification	
				Group Symbol	Group Name[B]
Coarse-grained Soils (*More than 50% retained on No. 200 sieve*)	Gravels (*More than 50% of coarse fraction retained on No. 4 sieve*)	Gravels with < 5% fines[C]	$C_u \geq 4$ and $1 \leq C_c \leq 3$[D]	GW	Well-graded gravel[E]
			$C_u < 4$ and/or [$C_c < 1$ or $C_c > 3$][D]	GP	Poorly graded gravel[E]
		Gravels with > 12% fines[C]	Fines classify as ML or MH	GM	Silty gravel[E,F,G]
			Fines classify as CL or CH	GC	Clayey gravel[E,F,G]
	Sands (*50% or more of coarse fraction passes No. 4 sieve*)	Sands with < 5% fines[H]	$C_u \geq 6$ and $1 \leq C_c \leq 3$[D]	SW	Well-graded sand[I]
			$C_u < 6$ and/or [$C_c < 1$ or $C_c > 3$][D]	SP	Poorly graded sand[I]
		Sands with > 12% fines[H]	Fines classify as ML or MH	SM	Silty sand[F,G,I]
			Fines classify as CL or CH	SC	Clayey sand[F,G,I]
Fine-grained Soils (*More than 50% passes the No. 200 sieve*)	Silts and Clays (*LL<50*)	Inorganic	PI>7 and plots on or above "A" line[J]	CL	Lean clay[K,L,M]
			PI<4 or plots below "A" line[J]	ML	Silt[K,L,M]
		Organic	LL - Oven dried/LL - Not dried <0.75	OL	Organic clay/silt[K,L,M,N/O]
	Silts and Clays (*LL≥50*)	Inorganic	PI plots on or above "A" line	CH	Fat clay[K,L,M]
			PI plots below "A" line	MH	Elastic silt[K,L,M]
		Organic	LL - Oven dried/LL - Not dried <0.75	OH	Organic clay/silt[K,L,M,P/Q]
Highly Organic Soils	Primarily organic matter, dark in color, and organic odor			PT	Peat

NOTES:
Visual soil descriptions performed in accordance with ASTM D2488
Lowercase USCS abbreviation indicates field classification
Uppercase USCS abbreviation indicates laboratory classification

[A]Based on the material passing the 3-in. (75-mm) sieve
[B]If field sample contained cobble or boulders, or both, add "with cobbles or boulders, or both" to group name
[C]Gravels with 5 to 12% fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC Well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay
[D] $C_u = D_{60}/D_{10}$, $C_c = (D_{30})^2/(D_{10} \times D_{60})$
[E]If soil contains ≥ 15% sand, add "with sand" to group name
[F]If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM
[G]If fines are organic, add "with organic fines" to group name
[H]Sands with 5 to 12% fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay
[I]If soil contains ≥15% gravel, add "with gravel" to group name
[J]If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay
[K]If soil contains 15 to < 30% plus No. 200, add "with sand" or "with gravel", whichever is predominant
[L]If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name
[M]If soil contains ≥ 30% plus No. 200, predominatly gravel, add "gravelly" to group name
[N]PI ≥ 4 and plots on or above "A" line
[O]PI < 4 or plots below "A" line
[P]PI plots on or above "A" line
[Q]PI plots below "A" line



GRAIN SIZE		
Size Class	Inches	mm
Boulders	>12 inches	>300
Cobbles	3 to 12	75 - 300
Gravel		
Coarse	3/4 - 3	19.0 - 75
Fine	3/16 - 3/4	4.76 - 19.0
Sand		
Coarse	1/16 - 3/16	2.0 - 4.76
Medium	1/64 - 1/16	0.42 - 2.0
Fine	1/256 - 1/64	0.074 - 0.42
Silt and Clay	<1/256	<0.074

SOIL CONSISTENCY*		
Description	N-Value	Pocket Pen.
Very Soft	<2	<0.25
Soft	2 - 4	0.25 - 0.5
Medium	5 - 8	0.5 - 1.0
Stiff	9 - 15	1.0 - 2.0
Very Stiff	16 - 30	2.0 - 4.0
Hard	>30	>4.0

RELATIVE SOIL DENSITY*	
Description	N-Value
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	>50

*Soil Consistency and Relative Soil Density Tables based on values provided in the Alaska Geotechnical Procedures Manual

FROST DESIGN SOIL CLASSIFICATION

US Army Corps of Engineers (USACE) Methodology

The following frost design soil classification was developed by the USACE for describing the potential frost susceptibility of soils. The standard is published in USACE, EM 1110-3-138, "Pavement Criteria for Seasonal Frost Conditions," April 1984.

FROST GROUP	GENERAL SOIL TYPE	% FINER THAN 0.02 mm BY WEIGHT	TYPICAL USCS SOIL CLASS
NFS(1)	(a) Gravels Crushed Stone Crushed Rock (b) Sands	0-1.5 0-3	GW, GP SW, SP
PFS(2)	(a) Gravels Crushed Stone Crushed Rock (b) Sands	1.5 -3 3-10	GW, GP SW, SP
S1	Gravelly Soils	3-6	GW, GP, GW-GM, GP-GM, GW-GC, GP-GC
S2	Sandy Soils	3-6	SW, SP, SW-SM, SP-SM, SW-SC, SP-SC
F1	Gravelly Soils	6-10	GM, GC, GW-GM, GP-GM, GW-GC, GP-GC
F2	(a) Gravelly Soils (b) Sands	10-20 6-15	GW, GP, GW-GM, GP-GM, GW-GC, GP-GC SM, SW-SM, SP-SM, SC, SW-SC, SP-SC, SM-SC
F3	(a) Gravelly Soils (b) Sands, except very fine silty sands (c) Clays, PI>12	Over 20 Over 15 --	GM, GC, GM-GC SM, SC, SM-SC CL, CH
F4	(a) Silts (b) Very fine silty sands (c) Clays, PI<12 (d) Varied clays or other fine-grained banded sediments	-- Over 15 -- --	ML, MH, ML-CL SM, SC, SM-SC CL, ML-CL CL or CH layered with ML, MH, ML-CL, SM, SC, or SM-SC

(1) Non-frost susceptible

(2) Possibly frost susceptible, requires lab test for void ratio to determine frost design soil classification. Gravel with void ratio > 0.25 would be NFS; Gravel with void ratio < 0.25 would be S1; Sands with void ratio > 0.30 would be NFS; Sands with void ratio < 0.30 would be S2 or F2

Municipality of Anchorage (MOA) and Federal Aviation Administration (FAA) Methodology

MOA and FAA use simplifications of the USACE methodology noted above. The Design Criteria Manual details the MOA method and Section 207 of FAA Advisory Circular 150/5320-6G details the FAA method. Both are summarized below.

FROST GROUP	SOIL TYPE	PERCENTAGE FINER THAN 0.02 mm BY WEIGHT	TYPICAL SOIL TYPES UNDER UNIFIED SOIL CLASSIFICATION SYSTEM
NFS[a]	a. Gravels b. Sands	0 to 3 0 to 3	GW, GP SW, SP
F-1[a] or FG-1[b]	Gravelly soils	3 to 10	GW, GP, GW-GM, GP-GM
F-2[a] or FG-2[b]	a. Gravelly soils b. Sands	10 to 20 3 to 15	GM, GW-GM, GP-GM SW, SP, SM, SW-SM, SP
F-3[a] or FG-3[b]	a. Gravelly soils b. Sands, except very fine silty sands c. Clays, PI>12	Over 20 Over 15 --	GM, GC SM, SC CL, CH
F-4[a] or FG-4[b]	a. All silts b. Very fine silty sands c. Clays, PI<12 d. Varved clays and other fine-grained, banded sediments	-- Over 15 -- -- --	ML, MH SM, SC CL, CL-ML CL, CL-ML CL, CH, ML, SM

[a] Municipality of Anchorage, Project Management & Engineering Department, Design Criteria Manual, January 2007.

[b] Federal Aviation Authority, FAA Advisory Circular 150/5320-6G.

SOIL BORING: HDL-01

Project Name: Tok Photovoltaic Array
Project Number: 25-106
Client: Tanana Chiefs Conference
Date Drilled: 08/29/2025
Total Depth: 32 ft

Drilling Firm: Discovery Drilling, Inc.
Equipment: CME-75
Hammer Type: Auto
Hammer Weight: 340 lbs
Field Staff: K. Taylor

Station/Offset: - /
Lat/Long: 63.30545, -143.00283
Boring Elevation: 1670.8 ft
Location: Northern portion of Site, west of inactive landing strip

Comments

Depth (ft)	Water Levels	Drilling Method	Sample Number	Sample Graphic	Recovery Length (ft)	Blow Counts	N-Value	USCS	Bonded	Graphic Log	USCS Description	% Gravel	% Sand	% Fines	% Finer than 0.02mm	Moisture Content (%)	% Organic Material	Atterberg Limits
1		Hollow Stem Auger	S-1		1.1	2 4 5 12	9	gp-gm			**ORGANIC MAT** 0.2 Poorly Graded **GRAVEL WITH SILT AND SAND** (gp-gm), fine to coarse grained, angular to rounded; brown, dry to moist, loose, trace root hairs					3.0		
2											2.5							
3			S-2		1.1	6 16 14 12	30	GW			Well-graded **GRAVEL WITH SAND** (GW), fine to coarse grained, angular to rounded; gray, dry, medium dense, fractured cobbles in spoon; pH=8.80; resistivity=83.5 ohm-m					1.5		
4																		
5			S-3		1.3	8 15 22 10	37				dense, dry to moist, decrease in fractured cobbles, PFS	68.4	28.1	3.5	2	1.6		
6																		
7			S-4		1	4 5 10 12	15				medium dense					2.0		
8																		
9			S-5		1.2	7 11 12 10	23									1.6		
10																		
11			S-6		1.1	4 11 14 17	25									1.4		
12																		
13			S-7		1.1	6 15 14 10	29									1.4		
14																		
15																		
16																		

Graphics Legend

- organic mat
- GW
- gp-gm
- LSS - Large Split Spoon

Water Levels

- No free groundwater encountered.
- -

SOIL BORING: HDL-01

Project Name: Tok Photovoltaic Array
Project Number: 25-106
Client: Tanana Chiefs Conference
Date Drilled: 08/29/2025
Total Depth: 32 ft

Drilling Firm: Discovery Drilling, Inc.
Equipment: CME-75
Hammer Type: Auto
Hammer Weight: 340 lbs
Field Staff: K. Taylor

Station/Offset: - /
Lat/Long: 63.30545, -143.00283
Boring Elevation: 1670.8 ft
Location: Northern portion of Site, west of inactive landing strip

Comments

Depth (ft)	Water Levels	Drilling Method	Samples: Sample Number	Sample Graphic	Recovery Length (ft)	Blow Counts	N-Value	USCS	Bonded	Graphic Log	USCS Description	Lab: % Gravel	% Sand	% Fines	% Finer than 0.02mm	Moisture Content (%)	% Organic Material	Atterberg Limits
18								GW			Well-graded **GRAVEL WITH SAND** (GW), fine to coarse grained, angular to rounded; gray, dry, medium dense, fractured cobbles in spoon; pH=8.80; resistivity=83.5 ohm-m							
19																		
20																		
21			S-8		0	11 20 35 41	55				very dense; no recovery. Hammer bouncing during sampling, suggesting cobble or boulder at sample depth. Same as above based on drilling action and cuttings.							
22																		
23																		
24																		
25		Hollow Stem Auger									25.0							
26			S-9		1.5	2 7 16 17	23	sp gw			Poorly Graded **SAND** (sp), medium grained; gray, dry to moist 25.7 Well-graded **GRAVEL WITH SAND** (gw), fine to coarse grained, angular to rounded; gray, dry to moist, fractured cobbles in spoon					3.7 1.3		
27																		
28																		
29																		
30																		
31			S-10		0.8	6 14 17 29	31				dense					2.4		
32											32.0							

Terminated at 32.0 feet bgs.

Graphics Legend

sp

GW

LSS - Large Split Spoon

Water Levels

No free groundwater encountered.

-

SOIL BORING: HDL-02

Project Name: Tok Photovoltaic Array
Project Number: 25-106
Client: Tanana Chiefs Conference
Date Drilled: 08/28/2025
Total Depth: 22 ft

Drilling Firm: Discovery Drilling, Inc.
Equipment: CME-75
Hammer Type: Auto
Hammer Weight: 340 lbs
Field Staff: K. Taylor

Station/Offset: - /
Lat/Long: 63.30465, -143.00191
Boring Elevation: 1671.6 ft
Location: Northern portion of Site, on inactive landing strip

Comments

Depth (ft)	Water Levels	Drilling Method	Samples: Sample Number	Sample Graphic	Recovery Length (ft)	Blow Counts	N-Value	USCS	Bonded	Graphic Log	USCS Description	Lab: % Gravel	% Sand	% Fines	% Finer than 0.02mm	Moisture Content (%)	% Organic Material	Atterberg Limits
1		Hollow Stem Auger	S-1		1.1	8 11 11 8	22	gp-gm			Poorly Graded **GRAVEL WITH SILT AND SAND** (gp-gm), fine to coarse grained, angular to subrounded; brown, dry, medium dense, fractured cobbles in spoon					2.9		
2											2.5							
3			S-2		1.2	7 11 14 18	25	GP			Poorly Graded **GRAVEL WITH SAND** (GP), fine to coarse grained, angular to rounded; light gray, dry, medium dense, fractured cobbles in spoon, PFS	75.5	21.1	3.4	2.1	1.5		
4																		
5			S-3		1.4	11 16 15 17	31				dense, gray, dry to moist; pH=9.00; resistivity=117 ohm-m					1.6		
6																		
7			S-4		1.5	14 16 16 14	32				decrease in fractured cobbles					1.7		
8																		
9																		
10			S-5		1.3	10 11 12 10	23				medium dense	68.8	27.9	3.3		1.4		
11																		
12			S-6		1.7	6 10 13 12	23									1.6		
13																		
14																		
15			S-7		1.7	8 11 9 10	20									1.4		
16								sp			15.8 Poorly Graded **SAND** (sp), medium grained; gray, dry to moist					2.1		

Graphics Legend

- gp-gm
- GP
- sp
- LSS - Large Split Spoon

Water Levels

- No free groundwater encountered.
- -

SOIL BORING: HDL-02

Project Name: Tok Photovoltaic Array
Project Number: 25-106
Client: Tanana Chiefs Conference
Date Drilled: 08/28/2025
Total Depth: 22 ft

Drilling Firm: Discovery Drilling, Inc.
Equipment: CME-75
Hammer Type: Auto
Hammer Weight: 340 lbs
Field Staff: K. Taylor

Station/Offset: - /
Lat/Long: 63.30465, -143.00191
Boring Elevation: 1671.6 ft
Location: Northern portion of Site, on inactive landing strip

Comments

Depth (ft)	Water Levels	Drilling Method	Samples: Sample Number	Samples: Sample Graphic	Samples: Recovery Length (ft)	Samples: Blow Counts	Samples: N-Value	Samples: USCS	Bonded	Graphic Log	USCS Description	Lab: % Gravel	Lab: % Sand	Lab: % Fines	Lab: % Finer than 0.02mm	Lab: Moisture Content (%)	Lab: % Organic Material	Lab: Atterberg Limits
18		Hollow Stem Auger						sp			Poorly Graded **SAND** (sp), medium grained; gray, dry to moist							
19																		
20											20.4					2.4		
21			S-8		1.4	8 9 16 26	25	gp			Poorly Graded **GRAVEL WITH SAND** (gp), fine to coarse grained, angular to subrounded; gray, dry to moist, medium dense, fractured cobbles in spoon					1.3		
22											22.0							

Terminated at 22.0 feet bgs.

Graphics Legend

gp

sp

LSS - Large Split Spoon

Water Levels

No free groundwater encountered.

-

SOIL BORING: HDL-03

Project Name: Tok Photovoltaic Array
Project Number: 25-106
Client: Tanana Chiefs Conference
Date Drilled: 08/28/2025
Total Depth: 30.2 ft

Drilling Firm: Discovery Drilling, Inc.
Equipment: CME-75
Hammer Type: Auto
Hammer Weight: 340 lbs
Field Staff: K. Taylor

Station/Offset: - /
Lat/Long: 63.30389, -143.00089
Boring Elevation: 1672.9 ft
Location: Central portion of Site, east of inactive landing strip

Comments

Depth (ft)	Water Levels	Drilling Method	Samples: Sample Number	Sample Graphic	Recovery Length (ft)	Blow Counts	N-Value	USCS	Bonded	Graphic Log	USCS Description	Lab: % Gravel	% Sand	% Fines	% Finer than 0.02mm	Moisture Content (%)	% Organic Material	Atterberg Limits
0											**ORGANIC MAT** 0.3					12.1		
1			S-1		1.1	2 11 11 7	22	sm GP			Silty **SAND** (sm), fine to coarse grained; reddish brown, dry to moist 0.6					1.2		
2											Poorly Graded **GRAVEL WITH SAND** (GP), fine to coarse grained, angular to subrounded; light gray, dry, fractured cobbles in spoon							
3			S-2		1.3	16 14 14 14	28				medium dense, angular to subrounded	70.7	25.1	4.1		1.7		
4																		
5																		
6			S-3		1.2	6 19 22 16	41				dense, decrease in fractured cobbles; pH=8.70; resistivity=111 ohm-m							
7																		
8			S-4		0	50/0.4"					difficult drilling begins at approximately 7.5 feet bgs; no recovery; same as above based on drilling action and cuttings							
9																		
10																		
11			S-5		1.1	8 15 13 10	28				medium dense, gray, dry to moist					1.8		
12																		
13			S-6		0	50/3"					no recovery; same as above based on drilling action and cuttings							
14																		
15																		
16			S-7		1.2	12 13 14 19	27				fractured cobbles in spoon					2.0		

Hollow Stem Auger

Graphics Legend

GP
sm
organic mat
LSS - Large Split Spoon

Water Levels

No free groundwater encountered.
-

SOIL BORING: HDL-03

Project Name: Tok Photovoltaic Array
Project Number: 25-106
Client: Tanana Chiefs Conference
Date Drilled: 08/28/2025
Total Depth: 30.2 ft

Drilling Firm: Discovery Drilling, Inc.
Equipment: CME-75
Hammer Type: Auto
Hammer Weight: 340 lbs
Field Staff: K. Taylor

Station/Offset: - /
Lat/Long: 63.30389, -143.00089
Boring Elevation: 1672.9 ft
Location: Central portion of Site, east of inactive landing strip

Comments

Depth (ft)	Water Levels	Drilling Method	Samples: Sample Number	Sample Graphic	Recovery Length (ft)	Blow Counts	N-Value	USCS	Bonded	Graphic Log	USCS Description	Lab: % Gravel	% Sand	% Fines	% Finer than 0.02mm	Moisture Content (%)	% Organic Material	Atterberg Limits
18		Hollow Stem Auger						GP			Poorly Graded **GRAVEL WITH SAND** (GP), fine to coarse grained, angular to subrounded; light gray, dry, fractured cobbles in spoon							
19																		
20											dense							
21			S-8		1.6	8 14 22 25	36									1.7		
22																		
23																		
24																		
25			S-9		0	50/3"					no recovery; same as above based on drilling action and cuttings							
26																		
27																		
28																		
29																		
30			S-10		0	50/3"					30.2							

Terminated at 30.2 feet bgs.

Graphics Legend

GP

LSS - Large Split Spoon

Water Levels

No free groundwater encountered.

-

SOIL BORING: HDL-04

Project Name: Tok Photovoltaic Array
Project Number: 25-106
Client: Tanana Chiefs Conference
Date Drilled: 08/28/2025
Total Depth: 22 ft

Drilling Firm: Discovery Drilling, Inc.
Equipment: CME-75
Hammer Type: Auto
Hammer Weight: 340 lbs
Field Staff: K. Taylor

Station/Offset: - /
Lat/Long: 63.30292, -143.00084
Boring Elevation: 1674.2 ft
Location: Southern portion of Site, west of inactive landing strip

Comments

Depth (ft)	Water Levels	Drilling Method	Sample Number	Sample Graphic	Recovery Length (ft)	Blow Counts	N-Value	USCS	Bonded	Graphic Log	USCS Description	% Gravel	% Sand	% Fines	% Finer than 0.02mm	Moisture Content (%)	% Organic Material	Atterberg Limits
											ORGANIC MAT 0.2							
1			S-1		1.5	3 5 7 9	12	gp-gm			Poorly Graded **GRAVEL WITH SILT AND SAND** (gp-gm), fine to coarse grained, angular to rounded; brownish gray, dry to moist, medium dense					3.6		
2																		
3			S-2		1.7	9 12 12 10	24				brown 3.0					2.2		
4								GW			Well-graded **GRAVEL WITH SAND** (GW), fine to coarse grained, angular to rounded; gray, dry to moist, medium dense, fractured cobbles in spoon; pH=9.00; resistivity=105 ohm-m					1.7		
5																		
6			S-3		1.4	10 18 17 16	35				dense	64.5	31.2	4.3		1.7		
7																		
8			S-4		1.3	12 17 18 17	35									1.5		
9																		
10																		
11			S-5		1.2	6 13 15 14	28				medium dense, increase in fractured cobbles	68.5	28.8	2.6		1.2		
12																		
13			S-6		1.4	8 10 11 16	21									1.7		
14																		
15																		
16			S-7		1.5	15 17 16 18	33				dense					1.5		

Hollow Stem Auger

Graphics Legend

- organic mat
- GW
- gp-gm
- LSS - Large Split Spoon

Water Levels

- No free groundwater encountered.
- -

SOIL BORING: HDL-04

Project Name: Tok Photovoltaic Array
Project Number: 25-106
Client: Tanana Chiefs Conference
Date Drilled: 08/28/2025
Total Depth: 22 ft

Drilling Firm: Discovery Drilling, Inc.
Equipment: CME-75
Hammer Type: Auto
Hammer Weight: 340 lbs
Field Staff: K. Taylor

Station/Offset: - /
Lat/Long: 63.30292, -143.00084
Boring Elevation: 1674.2 ft
Location: Southern portion of Site, west of inactive landing strip

Comments

Depth (ft)	Water Levels	Drilling Method	Samples: Sample Number	Samples: Sample Graphic	Samples: Recovery Length (ft)	Samples: Blow Counts	Samples: N-Value	USCS	Bonded	Graphic Log	USCS Description	Lab: % Gravel	Lab: % Sand	Lab: % Fines	Lab: % Finer than 0.02mm	Lab: Moisture Content (%)	Lab: % Organic Material	Lab: Atterberg Limits
18		Hollow Stem Auger						GW			Well-graded **GRAVEL WITH SAND** (GW), fine to coarse grained, angular to rounded; gray, dry to moist, medium dense, fractured cobbles in spoon; pH=9.00; resistivity=105 ohm-m							
19																		
20																		
21			S-8		1.7	14 25 23 14	48									1.6		
22											22.0							

Terminated at 22.0 feet bgs.

Graphics Legend

GW

LSS - Large Split Spoon

Water Levels

No free groundwater encountered.

-

SOIL BORING: HDL-05

Project Name: Tok Photovoltaic Array
Project Number: 25-106
Client: Tanana Chiefs Conference
Date Drilled: 08/28/2025
Total Depth: 32 ft

Drilling Firm: Discovery Drilling, Inc.
Equipment: CME-75
Hammer Type: Auto
Hammer Weight: 340 lbs
Field Staff: K. Taylor

Station/Offset: - /
Lat/Long: 63.30221, -143.00010
Boring Elevation: 1675.3 ft
Location: Southern portion of Site, on inactive landing strip

Comments

Depth (ft)	Water Levels	Drilling Method	Sample Number	Sample Graphic	Recovery Length (ft)	Blow Counts	N-Value	USCS	Bonded	Graphic Log	USCS Description	% Gravel	% Sand	% Fines	% Finer than 0.02mm	Moisture Content (%)	% Organic Material	Atterberg Limits
1		Hollow Stem Auger	S-1		1.5	3 4 8 10	12	gp-gm			Poorly Graded **GRAVEL WITH SILT AND SAND** (gp-gm), fine to coarse grained, subangular to rounded; brown, dry 0.8					2.4		
2								GW			Well-graded **GRAVEL WITH SAND** (GW), fine to coarse grained, subangular to rounded; gray, dry, fractured cobbles in spoon					2.5		
3			S-2		1.4	15 12 13 15	25				medium dense, gray, dry to moist, PFS	65.2	30.9	4.0	2.4	2.2		
4																		
5			S-3		0	38 44 50	94				very dense; no recovery; same as above based on drilling action and cuttings							
6																		
7			S-4		1.8	8 10 11 11	21				medium dense, increase in sand, loss of fractured cobbles; pH=9.20; resistivity=159 ohm-m					2.0		
8																		
9																		
10			S-5		1.6	8 8 9 12	17				fractured cobbles in spoon					1.5		
11																		
12			S-6		1.3	17 11 10 8	21									1.4		
13																		
14																		
15			S-7		1.8	6 9 10 8	19				decrease in fractured cobbles					2.1		
16																		

Graphics Legend

gp-gm

GW

LSS - Large Split Spoon

Water Levels

No free groundwater encountered.

-

SOIL BORING: HDL-05

Project Name: Tok Photovoltaic Array
Project Number: 25-106
Client: Tanana Chiefs Conference
Date Drilled: 08/28/2025
Total Depth: 32 ft

Drilling Firm: Discovery Drilling, Inc.
Equipment: CME-75
Hammer Type: Auto
Hammer Weight: 340 lbs
Field Staff: K. Taylor

Station/Offset: - /
Lat/Long: 63.30221, -143.00010
Boring Elevation: 1675.3 ft
Location: Southern portion of Site, on inactive landing strip

Comments

Depth (ft)	Water Levels	Drilling Method	Samples: Sample Number	Sample Graphic	Recovery Length (ft)	Blow Counts	N-Value	USCS	Bonded	Graphic Log	USCS Description	Lab: % Gravel	% Sand	% Fines	% Finer than 0.02mm	Moisture Content (%)	% Organic Material	Atterberg Limits
18		Hollow Stem Auger						GW			Well-graded **GRAVEL WITH SAND** (GW), fine to coarse grained, subangular to rounded; gray, dry, fractured cobbles in spoon							
19																		
20																		
21			S-8		1.6	9 8 11 14	19									1.8		
22																		
23																		
24																		
25											very dense							
26			S-9		1.4	11 36 47	83									1.9		
27																		
28																		
29																		
30																		
31			S-10		1.8	18 20 17 21	37				dense, increase in fractured cobbles					1.6		
32											32.0							

Terminated at 32.0 feet bgs.

Graphics Legend

GW

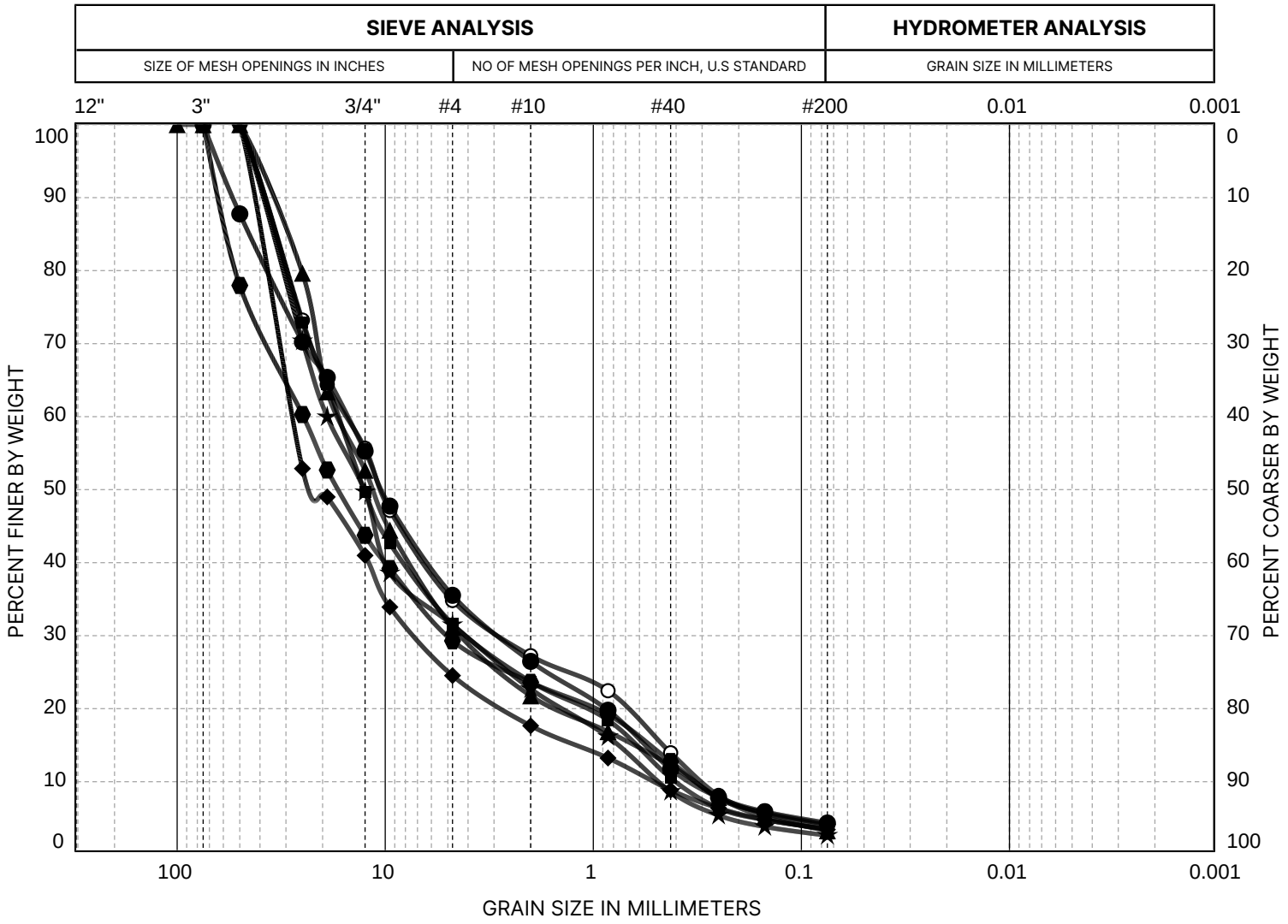
LSS - Large Split Spoon

Water Levels

No free groundwater encountered.

-

Tok Photovoltaic Array
Tok, Alaska



	EXPLORATION NUMBER	SAMPLE NUMBER	DEPTH	USCS SYMBOL	GRAVEL (%)	SAND (%)	FINES (%)	D10	D30	D60	CU	CC
■	HDL-01	S-3	5	GW	68.39	28.10	3.51	0.4	4.12	16.73	41.83	2.54
◆	HDL-02	S-2	2.5	GP	75.47	21.09	3.44	0.52	7.59	28.95	55.67	3.83
▲	HDL-02	S-5	10	GP	68.84	27.88	3.28	0.33	4.37	17.13	51.91	3.38
⬣	HDL-03	S-2	2.5	GP	70.71	25.14	4.15	0.33	5.09	24.74	74.97	3.17
●	HDL-04	S-3	5	GW	64.47	31.20	4.34	0.35	2.93	15.02	42.91	1.63
★	HDL-04	S-5	10	GW	68.53	28.83	2.63	0.49	4.12	19.02	38.82	1.82
○	HDL-05	S-2	2.5	GW	65.18	30.85	3.97	0.31	2.91	15.41	49.71	1.77

Laboratory Analysis Report

Jeremy Dvorak
HDL Engineering Constultants
3335 Arctic Blvd St. 100
Anchorage, Anchorage AK 99503

Justin Nelson

Digitally signed by Justin Nelson
DN: cn=Justin Nelson, o=SGS North America Inc., ou=EHS, email=Justin.Nelson@sgs.com, c=US
Date: 2025.09.22 16:34:22 -08'00'

Work Order:	1254860
	Tok Solar PV
Client:	Hattenburg, Dilley & Linnell, LLC (HDL)
Report Date:	September 22, 2025

Enclosed are the analytical results associated with the above work order. The results apply to the samples as received. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. If you have any questions regarding this report, or if we can be of any other assistance, please contact your SGS Project Manager at 907-562-2343. This document is issued by the Company under its General Conditions of Service accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & 17-021 (CS) for ADEC and 2944.01 for DOD ELAP/ISO 17025 (RCRA methods: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020B, 7470A, 7471B, 8015C, 8021B, 8082A, 8260D, 8270E, 8270E-SIM, 9040C, 9045D, 9056A, 9060A, AK101 and AK102/103). SGS is only certified for the analytes listed on our Drinking Water Certification (DW methods: 200.8, 2130B, 2320B, 2510B, 300.0, 4500-CN-C,E, 4500-H-B, 4500-NO3-F, 4500-P-E and 524.2) and only those analytes will be reported to the State of Alaska for compliance. Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.

*	The analyte has exceeded allowable regulatory or control limits.
!	Surrogate out of control limits.
B	Indicates the analyte is found in a blank associated with the sample.
CCV/CVA/CVB	Continuing Calibration Verification
CCCV/CVC/CVCA/CVCB	Closing Continuing Calibration Verification
CL	Control Limit
DF	Analytical Dilution Factor
DL	Detection Limit (i.e., maximum method detection limit)
E	The analyte result is above the calibrated range.
GT	Greater Than
ICV	Initial Calibration Verification
J	The quantitation is an estimation.
LCS(D)	Laboratory Control Spike (Duplicate)
LLQC/LLIQC	Low Level Quantitation Check
LOD	Limit of Detection (i.e., 3/4 of the LOQ)
LOQ	Limit of Quantitation (i.e., reporting or practical quantitation limit)
LT	Less Than
MB	Method Blank
MS(D)	Matrix Spike (Duplicate)
ND	Indicates the analyte is not detected.
RPD	Relative Percent Difference
TNTC	Too Numerous To Count
U	Indicates the analyte was analyzed for but not detected.

Note: Sample summaries which include a result for "Total Solids" have already been adjusted for moisture content.

SGS Ref.#	1254860001		
Client Name	Hattenburg, Dilley & Linnell, LLC (HDL)	**Printed Date/Time**	09/22/2025 16:14
Project Name/#	Tok Solar PV	**Collected Date/Time**	08/28/2025 17:00
Client Sample ID	HDL-02 S-3	**Received Date/Time**	09/10/2025 10:23
Matrix	Solid/Soil (Wet Weight)	**Technical Director**	**Stephen C. Ede**

Sample Remarks:

Parameter	Results	LOQ	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
Characterization									
pH	9.00	0.00100	pH units	SW9045D	A			09/21/25	APS
Waters Department									
Resistivity	117	0.0200	ohm-m	SM19 2510A	A		09/18/25	09/18/25	DAT

SGS Ref.#	1254860002		
Client Name	Hattenburg, Dilley & Linnell, LLC (HDL)	**Printed Date/Time**	09/22/2025 16:14
Project Name/#	Tok Solar PV	**Collected Date/Time**	08/28/2025 10:45
Client Sample ID	HDL-03 S-3	**Received Date/Time**	09/10/2025 10:23
Matrix	Solid/Soil (Wet Weight)	**Technical Director**	**Stephen C. Ede**

Sample Remarks:

Parameter	Results	LOQ	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
Characterization									
pH	8.70	0.00100	pH units	SW9045D	A			09/21/25	APS
Waters Department									
Resistivity	111	0.0200	ohm-m	SM19 2510A	A		09/18/25	09/18/25	DAT

SGS Ref.#	1254860003		
Client Name	Hattenburg, Dilley & Linnell, LLC (HDL)	**Printed Date/Time**	09/22/2025 16:14
Project Name/#	Tok Solar PV	**Collected Date/Time**	08/28/2025 12:30
Client Sample ID	HDL-04 S-2B	**Received Date/Time**	09/10/2025 10:23
Matrix	Solid/Soil (Wet Weight)	**Technical Director**	**Stephen C. Ede**

Sample Remarks:

Parameter	Results	LOQ	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
Characterization									
pH	9.00	0.00100	pH units	SW9045D	A			09/21/25	APS
Waters Department									
Resistivity	105	0.0200	ohm-m	SM19 2510A	A		09/18/25	09/18/25	DAT

SGS Ref.#	1254860004		
Client Name	Hattenburg, Dilley & Linnell, LLC (HDL)	**Printed Date/Time**	09/22/2025 16:14
Project Name/#	Tok Solar PV	**Collected Date/Time**	08/28/2025 15:10
Client Sample ID	HDL-05 S-4	**Received Date/Time**	09/10/2025 10:23
Matrix	Solid/Soil (Wet Weight)	**Technical Director**	**Stephen C. Ede**

Sample Remarks:

Parameter	Results	LOQ	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
Characterization									
pH	9.20	0.00100	pH units	SW9045D	A			09/21/25	APS
Waters Department									
Resistivity	159	0.0200	ohm-m	SM19 2510A	A		09/18/25	09/18/25	DAT

SGS Ref.#	1254860005		
Client Name	Hattenburg, Dilley & Linnell, LLC (HDL)	**Printed Date/Time**	09/22/2025 16:14
Project Name/#	Tok Solar PV	**Collected Date/Time**	08/29/2025 9:45
Client Sample ID	HDL-01 S-2	**Received Date/Time**	09/10/2025 10:23
Matrix	Solid/Soil (Wet Weight)	**Technical Director**	**Stephen C. Ede**

Sample Remarks:

Parameter	Results	LOQ	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
Characterization									
pH	8.80	0.00100	pH units	SW9045D	A			09/21/25	APS
Waters Department									
Resistivity	83.5	0.0200	ohm-m	SM19 2510A	A		09/18/25	09/18/25	DAT

1254860

SGS North America Inc.
CHAIN OF CUSTODY RECORD

SGS North America Inc.
200 West Potter Drive
Anchorage, AK 99518
engage.sgs.com
www.us.sgs.com

Profile #: 43977 Int.: GW

Instructions: Sections 1 - 5 must be filled out.
Omissions may delay the onset of analysis.

Section 1

CLIENT: HDL Engineering Consultants, LLC
CONTACT: Jason McKee
PHONE #: 907-564-2178
PROJECT NAME: Tok Solar PV
Project/Permit Number: 25-106
NPDL Number(DOD):
REPORTS TO: Jeremy Dvorak
E-MAIL: jmckee@hdlalaska.com
INVOICE TO: HDL Engineering Consultants, LLC
QUOTE #:
P.O. #: 25-106

Section 2

RESERVED for lab use	SAMPLE IDENTIFICATION		DATE mm/dd/yy	TIME HH:MM	MATRIX/ MATRIX CODE	# CONTAINERS	Sample Type (Comp / Grab / MI)	Analysis* Corrosivity	Analysis* Resistivity
1 A	HDL-02	S-3	8/28/25	5:00 PM		1	Grab	X	X
2 A	HDL-03	S-3	8/28/25	10:45 AM		1	Grab	X	X
3 A	HDL-04	S-2B	8/28/25	12:30 PM		1	Grab	X	X
4 A	HDL-05	S-4	8/28/25	3:10 PM		1	Grab	X	X
5 A	HDL-01	S-2	8/29/25	9:45 AM		1	Grab	X	X
6 (28)									

Section 3 — Preservative

NOTE: *The following analyses require specific method and/or compound list: BTEX, Metals, PFAS

REMARKS/LOC ID

Comments:

Section 4

DOD Project? YES (NO)
Data Deliverables Requested
DataView SEDD EQUIS
Level 4 ERPIMS Other:_____

Turnaround Time Requested
(Standard) Rush
Requested Rush Report Date:_____

Section 5

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:
Nicole Perani	9/10/25		
	9/10/25	1023	

Laboratory Use Only

SGS Sample Receipt (Lab Use Only)

Delivery Method: (Client) Commercial
Did each cooler have a corresponding COC? (Yes) No
Chain of Custody Seal Condition: INTACT BROKEN (ABSENT)
COC Seal Location(s):

Cooler ID	Temperature (°C)	Therm. ID
1.	ambient	
2.		
3.		

If more than three coolers are received, or for documentation of non-compliant coolers, use form FS 0029.

Note: If temp. is outside 0-6° and samples were not taken <8 hours ago OR are waste samples, Client or PM should initial here or attach an email change order to proceed with analysis. If ice is present, note on form F102B.

Intials:_____

http://www.sgs.com/terms-and-conditions

F083-Blank_COC_20181228

1254860

SGS

SAMPLE RECEIPT FORM

Project Manager Completion				
Was all necessary information recorded on the COC upon receipt? (Temperature, COC seals, etc.?)	(Yes)	No	N/A	
Was temperature between 0-6° C?	Yes	No	(N/A)	If "No", are the samples either exempt* or sampled <8 hours prior to receipt?
Were all analyses received within holding time*?	Yes	(No)	N/A	Proceed (pH/corrosivity)
Was a method specified for each analysis, where applicable? If no, please note correct methods.	(Yes)	No	N/A	
Are compound lists specified, where applicable? For project specific or special compound lists please note correct analysis code.	Yes	No	(N/A)	
If rush was requested by the client, was the requested TAT approved?	Yes	No	(N/A)	If "NO", what is the approved TAT?
If SEDD Deliverables are required, were Location ID's and an NPDL Number provided?	Yes	No	(N/A)	*If "NO", contact client for information.*
Sample Login Completion				
Do ID's on sample containers match COC?	(Yes)	No	N/A	
If provided on containers, do dates/times collected match COC?	(Yes)	No	N/A	Note: If times differ <1 hr., record details below and login per COC.
Were all sample containers received in good condition?	(Yes)	No	N/A	
Were proper containers (type/mass/volume/preservative) received for all samples? **See form F-083 "Sample Guide"*	(Yes)	No	N/A	*Note: If 200.8/6020 Total Metals are received unpreserved, preserve, and note HNO3 lot here:* *If 200.8/6020 Dissolved Metals are received unpreserved, log in for LABFILTER and do not preserve.* *For all non-metals methods, inform Project Manager.*
Were Trip Blanks (VOC, GRO, Low-Level Hg, etc.) received with samples, where applicable*?	Yes	No	(N/A)	
Were all VOA vials free of headspace >6mm?	Yes	No	(N/A)	
Were all soil VOA samples received field extracted with Methanol?	Yes	No	(N/A)	
Did all soil VOA samples have an accompanying unpreserved container for % solids?	Yes	No	(N/A)	
If special handling is required, were containers labelled appropriately? e.g. MI/ISM, foreign soils, lab filter, Ref Lab, limited volume	Yes	No	(N/A)	
For Rush/Short Holding time, was the lab notified?	Yes	No	(N/A)	
For any question answered "NO", was the Project Manager notified?	Yes	No	(N/A)	PM Initials:
Was Peer Review of sample numbering/labelling completed?	(Yes)	No	N/A	Reviewer Initials: VJB
Additional Notes/Clarification where Applicable, including resolution of "No" answers when a change order is not attached:				

Sample Containers and Preservatives

Container Id	Preservative	Container Condition	Container Id	Preservative	Container Condition
1254860001-A	No Preservative Required	OK			
1254860002-A	No Preservative Required	OK			
1254860003-A	No Preservative Required	OK			
1254860004-A	No Preservative Required	OK			
1254860005-A	No Preservative Required	OK			

Container Condition Glossary

Containers for bacteriological, low level mercury and VOA vials are not opened prior to analysis and will be assigned condition code OK unless evidence indicates than an inappropriate container was submitted.

OK - The container was received at an acceptable pH for the analysis requested.
BU - The container was received with headspace greater than 6mm.
DM - The container was received damaged.
FR - The container was received frozen and not usable for Bacteria or BOD analyses.
IC - The container provided for microbiology analysis was not a laboratory-supplied, pre-sterilized container and therefore was not suitable for analysis.
NC- The container provided was not preserved or was under-preserved. The method does not allow for additional preservative added after collection.
PA - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt and the container is now at the correct pH. See the Sample Receipt Form for details on the amount and lot # of the preservative added.
PH - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt, but was insufficient to bring the container to the correct pH for the analysis requested. See the Sample Receipt Form for details on the amount and lot # of the preservative added.
QN - Insufficient sample quantity provided.