SUBMITTED TO:
Municipality of Anchorage
Department of Public Works
4700 Elmore Road
Anchorage, Alaska 99507

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GEOTECHNICAL ENGINEERING REPORT

Basher Trailhead Overflow Parking

ANCHORAGE, ALASKA

February 2026

Shannon & Wilson No: 116384-001

SHANNON & WILSON

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Submitted To: Municipality of Anchorage Department of Public Works
4700 Elmore Road
Anchorage, Alaska 99507
Attn: Mr. Timothy Huntting, PE

Subject: GEOTECHNICAL ENGINEERING REPORT, BASHER TRAILHEAD OVERFLOW PARKING, ANCHORAGE, ALASKA

Shannon & Wilson prepared this report and participated in this project as a subconsultant to the Municipality of Anchorage (MOA). Our scope of services was specified via our proposal dated October 9, 2025, which was approved and authorized via Purchase Order 2025003499 under contract 4400002004 dated October 29, 2025. This report presents the results of subsurface explorations, laboratory testing, and geotechnical engineering studies conducted by Shannon & Wilson, Inc. for the proposed overflow parking area in Anchorage, Alaska. This geotechnical engineering report was prepared by the undersigned.

We appreciate the opportunity to be of service to you on this project. If you have questions concerning this report, or we may be of further service, please contact us.

Sincerely,

SHANNON & WILSON, INC.

Russell Hepner, EIT
Senior Professional II

STATE OF ALASKA
49TH
Kyle Brennan
CE - 11122
2-6-2026
REGISTERED PROFESSIONAL ENGINEER

NEG:RCH/KLB

Kyle Brennan, PE
Vice President

CONTENTS

Exhibits

Figures

Appendices

1 INTRODUCTION

This report presents the results of subsurface explorations, laboratory testing, and geotechnical engineering studies conducted by Shannon & Wilson, Inc. for an overflow parking lot for Basher Trailhead in Anchorage, Alaska. The purpose of this geotechnical study was to explore subsurface conditions and provide geotechnical engineering recommendations needed to design and construct the proposed improvements. To accomplish this, three borings were advanced near or within the proposed area of development to evaluate and characterize the subsurface soil conditions. Soil samples recovered from the borings were tested in our geotechnical laboratory. Presented in this report are descriptions of the site and project, subsurface explorations and laboratory test procedures, an interpretation of subsurface conditions, and conclusions and recommendations from our engineering studies. This report is intended for use by the project design engineering staff, Municipality of Anchorage (MOA) Department of Public Works (DPW), and their representatives.

2 SITE AND PROJECT DESCRIPTION

The project is located along Basher Drive, approximately 250 feet west of the existing Basher Trailhead parking area. The proposed parking area is located on Parks and Recreation (Parks & Rec) property. At the time of our explorations, the site had been mostly cleared of trees, but was otherwise undeveloped with sparse stands of birch and spruce trees. The ground surface was generally covered with grass, moss, and small shrubbery. The overall topography at the site is undulating and generally slopes gently down to the west. A vicinity map showing the general project area is included as Figure 1. Figure 2 includes a site plan showing boring locations and other prominent site features.

We understand the proposed improvements generally consist of constructing a new paved parking area near the Basher Trailhead that will serve as overflow parking for the trailhead. Based on preliminary information provided by MOA DPW and Professional & Technical Services, Inc. (PTS), the new parking area will hold approximately 30 vehicles and will be finished with asphalt pavements. We assume that the finish elevation of the proposed improvements will be maintained at or near the existing site grade. It is our understanding that modifications to the parking area layout and design may be made during final design.

3 SUBSURFACE EXPLORATIONS

Subsurface explorations for the project consisted of advancing and sampling three borings, designated Borings B-1 through B-3, at the site on December 4, 2025. The borings were drilled by Denali Drilling of Anchorage, Alaska using a track mounted CME-850 drill rig. The approximate boring locations were selected by PTS and Shannon & Wilson to provide relatively even coverage of the project area. The boring locations were recorded using a handheld global positioning system (GPS) that is generally considered accurate to within 20 feet horizontally. It should be noted that GPS accuracy may be affected by tree canopies, geographic features, and other atmospheric anomalies. Elevations were extrapolated from 2025 topographic contours provided by PTS. Therefore, the boring locations shown on the site plan and elevations shown on the boring logs should be considered approximate. An experienced representative from Shannon & Wilson was present during drilling to locate the borings, observe drill action, collect samples, log subsurface conditions, and observe groundwater conditions.

The borings were advanced with 4 1/4-inch inner diameter (ID), continuous flight, hollow-stem augers to a depth of approximately 16.5 feet below the ground surface (bgs). As borings were advanced, samples were generally recovered using Modified Penetration Test (MPT) methods at 2.5-foot intervals to 10 feet bgs and 5-foot intervals thereafter to the bottom of the borings. With the MPT method, samples are recovered by driving a 3-inch outer diameter (OD) split-spoon sampler into the bottom of the advancing hole with blows of a 340-pound hammer free falling 30-inches onto the drill rods. For each sample, the number of blows required to drive the sampler the final 12-inches of an 18-inch penetration into undisturbed soil is recorded. Blow counts are shown graphically on the boring logs as penetration resistance and are displayed adjacent to sample depth. Where the sampler did not penetrate the full 18 inches, our log reports the blow count and corresponding penetration in inches. The penetration resistance values give a measure of the relative density (compactness) or consistency (stiffness) of cohesionless or cohesive soils, respectively. In addition to the split spoon samples, a grab sample of the near-surface soils was collected from the auger cuttings in the upper 2 feet of each boring.

The soils encountered during drilling were observed and described in the field in general accordance with the classification system described by ASTM International (ASTM) D2488. Selected samples were tested in our laboratory to refine our soil descriptions in general accordance with the Unified Soil Classification System (USCS) included in the Log Key (2 sheets) in Appendix A. Frost classifications were also estimated for samples based on laboratory testing (sieve analyses and percent passing the No. 200 sieve [P-200]) and are shown on the boring logs. The frost classification legend is presented in Appendix A. Summary logs of the borings are presented in Appendix A.

At the completion of drilling, a 1-inch polyvinyl chloride (PVC) casing with a hand-slotted tip was inserted into Boring B-1 to facilitate observation of groundwater levels after drilling. The annular space around the casing was backfilled using the auger cuttings removed during drilling. The casing was left with a stickup of about 2 feet above the ground surface and subsequently backfilled with cuttings. The casing was cut off below the ground surface after final water level measurements were taken, in accordance with our MOA Parks & Rec permit. Borings B-2 and B-3 were backfilled with auger cuttings produced during drilling.

4 LABORATORY TESTING

Laboratory tests were performed on soil samples recovered from the borings to confirm our field classifications and to estimate the index properties of the typical materials encountered at the site. The laboratory testing was formulated with emphasis on determining gradation properties, natural water content, and frost characteristics.

Water content tests were performed on each sample recovered from the borings. The tests were generally conducted according to procedures described in ASTM D2216. The results of the water content measurements are presented graphically on the boring logs presented in Appendix A.

Grain size classification (gradation) tests were conducted on selected samples to confirm the field classification of the soils encountered. The gradation testing generally followed the procedures described in ASTM C117/C136. The grain size testing results are presented in the Grain Size Distribution Test Results figure in Appendix A and summarized on the boring logs as percent gravel, percent sand, and percent fines. Note that percent fines on the boring log are equal to the sum of the silt and clay fractions indicated by the percent passing the No. 200 sieve (P200). Plasticity characteristics (Atterberg Limits results) are required to differentiate between silt and clay soils under USCS.

5 SUBSURFACE CONDITIONS

The subsurface conditions encountered in our explorations are depicted graphically on the boring logs in Appendix A. In general, our explorations encountered a relatively thin organic mat (less than about 1 foot) underlain by silty sands and gravels. Based on our laboratory testing, moisture contents in these soils typically ranged from about 4 to 10 percent and fines content ranged from 15 to 40 percent. In Borings B-1 and B-2, fine-grained soils were encountered beneath the organic mat to depths of approximately 2 and 4.5 feet bgs, respectively. These soils consisted of sandy silt in Boring B-1 and silt with sand to sandy clay with gravel in Boring B-2. Based on our laboratory testing, moisture contents in these soils typically ranged from about 16 to 45 percent and a P200 test on the sandy clay with gravel indicated a fines content of approximately 55 percent. Cobbles were inferred based on drill action in Boring B-2 from a depth of approximately 10 feet bgs to the bottom of the boring. In general, the granular soils encountered by our borings were generally considered medium dense to very dense based on typical penetration resistance values. Note, the ground surface was snow covered at the time of our explorations in December and seasonal frost penetration extended about 2 to 2.5 feet into the ground. Penetration resistance values from MPT samples in frozen soils, reported on the boring logs, may be biased high due to frost bonding.

Groundwater was not encountered in Borings B-1 and B-2 during drilling. In Boring B-3, groundwater was noted at 7.2 feet bgs, but it was estimated that this was only a seep perched within the formation as soils below this layer were not wet. A temporary monitoring well was installed in Boring B-1 and was checked on December 12, 2025, with no water measured in the well. Note that water levels may fluctuate by several feet seasonally and may vary during periods of high precipitation and rapid snow melt.

6 ENGINEERING RECOMMENDATIONS

Geotechnical considerations associated with this project consist of site preparation, developing pavement structural sections, structural fill and compaction, reuse of existing materials, and site drainage. Based on the conditions encountered by our borings, the soils in the project area generally consist of less than about 1 foot of organic soils overlying native, predominantly granular soils. Additional fine-grained soils were encountered in Borings B-1 and B-2 to approximately 2 and 4.5 feet bgs, respectively. The native soils below the organics and fine-grained soils are generally moderately to highly frost susceptible with typical frost classifications of F2 to F3. In our opinion, these soils should be adequate to support the proposed parking and access roadway improvements if the pavement structural section is designed to accommodate the expected frost conditions. Proper control of excavation, fill quality, and fill placement will also be paramount in achieving a well-constructed project.

6.1 Site Preparation and Subgrade Development

Given that the project area slopes gently down to the west, we assume that the new parking area will be constructed at or near the existing grade and that some cuts and fills may need to be made to achieve design elevations across the site. To prepare the site for construction, trees and shrubs should be cleared and grubbed and organic-rich material should be scraped from the ground surface. Based on our borings, organic soils were typically less than about 1 foot thick. Organic and silty/clayey materials should not be re-used as fill beneath the structural section to be developed at the site. These materials should be stockpiled outside the footprint of the new parking area for removal from the site or re-used for landscaping. We recommend that the prepared area should be defined by a line extending down and out from the outer edge of pavement at a slope of 1 horizontal (H) to 1 vertical (V) or to a minimum of 4 feet beyond the outer edge of the area to be paved.

Once these unsuitable soils are removed, the area should be graded, as needed, to the design elevation of the bottom of the structural section. The base of the excavation should then be observed and proof rolled to identify loose or unsuitable subgrade materials. If loose zones or other unsuitable conditions are observed, these spots should be re-compacted or removed and replaced with Type II/IIA fill, as defined by the Municipality of Anchorage Standard Specifications (MASS). The goal of this process is to attain a relatively uniform, firm and unyielding subgrade upon which to construct the pavement system.

We then recommend that a woven geofabric (Mirafi® RS380i, or equivalent) be placed across the prepared subgrade soils, as described in Section 6.3, prior to placing backfill for the parking area embankment and/or pavement structural section. Where areas of the site need to be filled prior to developing the pavement structural section, the fill beneath the structural section may consist of granular soils excavated from other portions of the site that meet MOA Type IV specifications, provided that the contractor is able to properly compact the material with moisture density control. Where backfill soils need to be imported, it should consist of Type II/IIA classified fill. MOA gradation requirements are presented in Figure 3. All fill soils should be placed and compacted as described in Section 6.5.

Note that native soils beneath the proposed parking area will likely have elevated fines contents and may be sensitive to moisture and disturbance. If existing soils become disturbed and/or wet, construction could be difficult if the contractor is not able to control and compact fills that are placed. Care should be taken to minimize disturbance of the excavation bottom by digging or excessive tracking by equipment. If moisture sensitive materials are encountered, flat-nosed excavator buckets should be used at the excavation bottom. Additionally, equipment should not be operated on the exposed subgrade prior to fill placement to the extent practicable, and excavation and backfilling on native subgrade soils should not be conducted during periods of wet weather.

6.2 Asphalt Pavement Structural Section

New asphalt pavements must be able to support the anticipated applied loads from vehicles and should provide protection from frost-related distress. We assume that traffic in the parking area will generally consist of relatively light, slow moving, cars and trucks with occasional traffic by snow removal and maintenance equipment. Design of the pavement section requires consideration of the density of soils, site drainage, and frost susceptibility of the existing and subgrade soils in the parking area.

We assume that the new pavements will not need to meet the design requirements established by MOA standards for street design. Such a design would include conducting thermal analyses to determine the required structural section thickness needed to limit seasonal frost penetration into frost susceptible subgrade soils. Developing a structural section that would adhere to MOA standards and is not susceptible to seasonal movements would require non-frost susceptible soil thicknesses on the order of 8 to 10 feet. Alternatively, the design could incorporate insulation into the structural section, which typically results in sections between 4 and 6 feet thick. Given this assumption, the encountered soil conditions, and an apparently deep groundwater table; we have developed a structural section based on our engineering judgement and experience with similar developments in the Anchorage area, that in our opinion will support the anticipated traffic loads. Our recommended structural sections (paved and unpaved) are included in the following exhibits.

Exhibit 7-1: Recommended Paved Structural Section

Thickness (inches)	Material
2	Asphalt
2	Leveling Course
6	Type IIA Base
24	Type II/IIA Subbase
-	Non-woven geofabric

Exhibit 7-2: Recommended Unpaved Structural Section

Thickness (inches)	Material
4	Leveling Course/E-1*
4	Type IIA Base
16	Type II/IIA Subbase
-	Non-woven geofabric

* From DOT&PF Specifications

Subgrade soils encountered by our borings in the anticipated zone of frost penetration generally consisted of moderately frost susceptible soils with a frost classification of F2 to F3 were by our borings at the site. Therefore, our recommended section should be anticipated to experience some vertical displacement during freezing and thawing cycles and minor subgrade strength loss may occur during the spring thawing cycle. Our recommended structural section for asphalt pavements can generally be applied to rigid concrete pavements if sidewalks or curbs and gutters are used for the project. The thickness of the concrete layer above the structural section should be designed depending on the structural requirements to accommodate expected loading and assuming a subgrade reaction modulus of 150 pounds per cubic inch (pci). Structural section materials should conform to the gradation requirements presented in the MASS and should be placed in accordance with the recommendations included in Section 6.5. MOA gradation requirements are presented in Figure 3.

The performance of the pavement section is controlled by the details of construction and will depend on the quality (gradation characteristics) of the materials used to develop the needed structural section, drainage details, and the extent to which seasonal frost action causes softening of the subgrade during breakup. Quality control inspection is strongly recommended, with subgrade probing, support soil compaction, and asphalt testing at regular intervals to be sure that the intent of the specification is met. Our recommended sections assume that site improvements will maintain appropriate drainage (minimum crown or slope of 2 percent) to direct surface waters away from the area and not into the subsurface pavement section. The owner should be aware that some contingency will be necessary for future maintenance to remediate pavement distress from aging and seasonal movements.

6.3 Geotextile Fabric

We have included recommendations for incorporation of a geotextile fabric for reinforcement and separation purposes in the proposed parking area. This geofabric layer will increase the stability or strength of the subgrade and should prevent intermixing of the subgrade soils with structural fill thereby maintaining the fill quality and improving fill placement/compaction efficiency. The geofabric will also provide additional support during springtime thaw weakening. After the area to be treated with geofabric has been prepared within the fill limits as described previously, the geofabric should be placed over the subgrade material before the first lifts of structural section fill are placed. We recommend a woven geotextile material such as Mirafi® RS380i, or equivalent. When selecting an equivalent geofabric for the project, it should consist of a woven geotextile having the following minimum material properties for this application in the project based on Minimum Average Roll Values (MARV):

Exhibit 8-1: Woven Geotextile Properties (Mirafi® RS380i)

Mechanical Properties	Minimum Average Roll Value
Tensile Strength at 2% Strain (MD/CD) by ASTM D4595	600/1020 lbs.
Tensile Strength at 5% Strain (MD/CD) by ASTM D4595	1800/2256 lbs.
Flow Rate by ASTM D4491	75 gal/min/ft2
Permittivity by ASTM D4491	0.9 sec^{-1}
Pore Size 095/050 by ASTM D6767	392/195 microns
Apparent Opening Size by ASTM 4751	U.S. Sieve 40 max.
Interaction Coefficient by ASTM D6706	0.89

The manufacturer's recommendations should be used for placement of geofabric. Additional guidelines and specifications are provided in the MASS.

6.4 Drainage

Site drainage should be considered during design and construction. While groundwater was not explicitly encountered in our explorations, a seep was noted at approximately 7.2 feet bgs in Boring B-3. Therefore, excavations to prepare the site for the pavement structural section are not anticipated to encounter groundwater. In our opinion, dewatering with sumps and pumping equipment will likely be sufficient to control potential isolated pockets of groundwater or surface water, if encountered, during excavation.

In general, excavation and backfill work should be closely coordinated such that seepage and surface runoff is not allowed to collect and stand in open excavations. Likewise, the ground surface around excavations should be contoured to drain away from the excavation and the excavation bottoms should be graded to drain to a sump or topographic low. If excavations remain open for an extended duration or during periods of high rainfall or rapid snow melting, shoring and/or dewatering with sumps and pumps in the excavation bottom may be necessary to maintain stable slope and bottom conditions. It should be noted that groundwater levels are subject to variation and may fluctuate by several feet seasonally.

Drainage around the new pavement should be provided to reduce the effects of seasonal frost in the new paved surfaces. Positive drainage should be maintained such that surface water is directed off the pavement surface and away from the structural section.

6.5 Structural Fill and Compaction

Structural fill will be needed to develop the structural section and raise portions of the site for the improvements. Structural fill that is placed should be clean, well-graded, granular soil to provide drainage and frost protection. Generally, Type II/IIA structural fill, as defined by the MASS, meets these requirements and works well for this application and as the base and subbase layer. Gradation requirements for the classified materials mentioned above are included in Figure 3.

Based on laboratory test results from our borings in the project area, the existing granular soils generally consisted of sand and gravel with fines contents ranging between about 15 and 40 percent. Therefore, it appears that the materials encountered in our explorations do not meet the gradation requirements for Type II/IIA classified fill as shown on Figure 3. However, we believe that native soils meeting the gradation requirements for Type IV fill may be re-used as fill below the structural sections given in Exhibits 7-1 and 7-2 provided that they are approved by the project engineer and the contractor is able to place and compact the silty soils with moisture density control. If the contractor is not able to accomplish this, these materials may be re-used as backfill for landscaping in nonstructural areas. Pockets of material that could meet the specifications for Type II/IIA classified may be encountered during construction, but these soils were not found during our explorations. Therefore, we do not recommend relying on on-site soils as the source of these materials.

Structural fills beneath the new pavement area or in other structural applications should be placed in lifts not to exceed 12 inches loose thickness and compacted to 95 percent of the maximum density as determined by the Modified Proctor compaction procedure (ASTM D1557). During fill placement, we recommend that large cobbles or boulders with dimensions in excess of 8 inches be removed from any structural fills. Non-structural fills should be placed in similar lifts and compacted to at least 90 percent of the Modified Proctor maximum density. We recommend that our services be retained to inspect the quality of fill compaction during construction.

7 CLOSURE AND LIMITATIONS

This report was prepared for the exclusive use of our client and their representatives for evaluating the site as it relates to the geotechnical aspects discussed herein. The conclusions and interpretation contained in this report are based on site conditions as they presently exist. It is assumed that the exploratory borings are representative of the subsurface conditions throughout the site, i.e., the subsurface conditions everywhere are not significantly different from those disclosed by the explorations.

If, during construction, subsurface conditions different from those encountered in these explorations are observed or appear to be present, Shannon & Wilson, Inc. should be advised at once so that these conditions can be reviewed. If there is a substantial lapse of time between the submittal of this report and the start of work at the site, or if conditions have changed due to natural causes or construction operations at or adjacent to the site, it is recommended that this report be reviewed to determine the applicability of the conclusions considering the changed conditions and time lapse.

Unanticipated soil conditions are commonly encountered and cannot fully be determined by merely taking soil samples or advancing test holes. Such unexpected conditions frequently require that additional expenditures be made to attain a properly constructed project. Therefore, some contingency fund is recommended to accommodate such potential extra costs. Please read the Important Information section at the back of this report to reduce your project risks.

We recommend that we be retained to review those portions of the plans and specifications pertaining to earthwork to determine if they are consistent with our recommendations. In addition, we should be retained to observe construction, particularly the installation of piles and/or site excavations, preparation of subgrade, compaction of structural fill, and also to make field measurements of ground displacements and other such field observations as may be necessary.

Copies of documents that may be relied upon by our client are limited to the printed copies (also known as hard copies) that are signed or sealed by Shannon & Wilson with a wet, blue ink signature. Files provided in electronic media format are furnished solely for the convenience of the client. Any conclusion or information obtained or derived from such electronic files shall be at the user’s sole risk. If there is a discrepancy between the electronic files and the hard copies, or you question the authenticity of the report please contact us.

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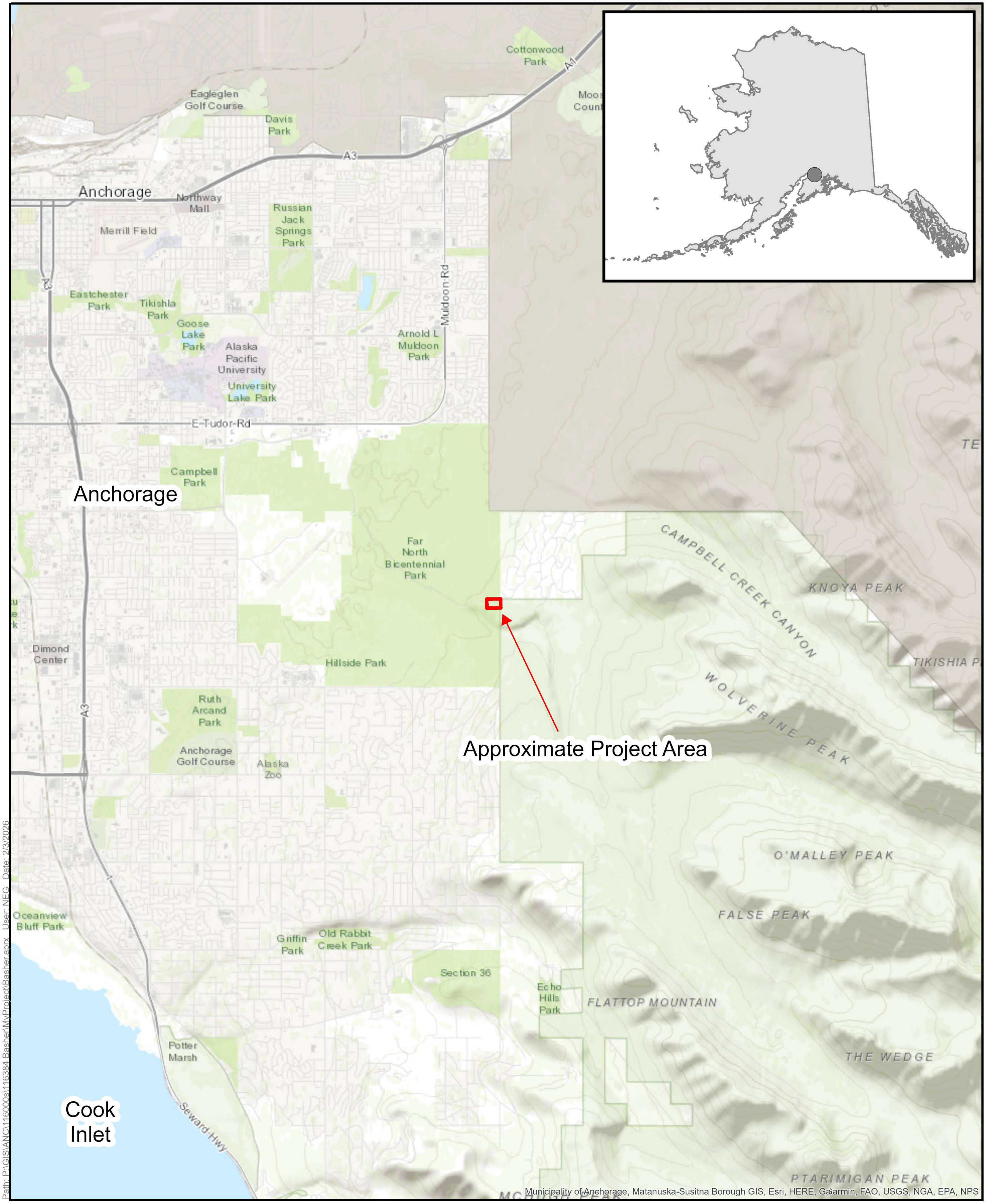
Job Number: 116384-001

Basher Trailhead Overflow Parking
Anchorage, Alaska



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VICINITY MAP

February 2026

FIGURE 1

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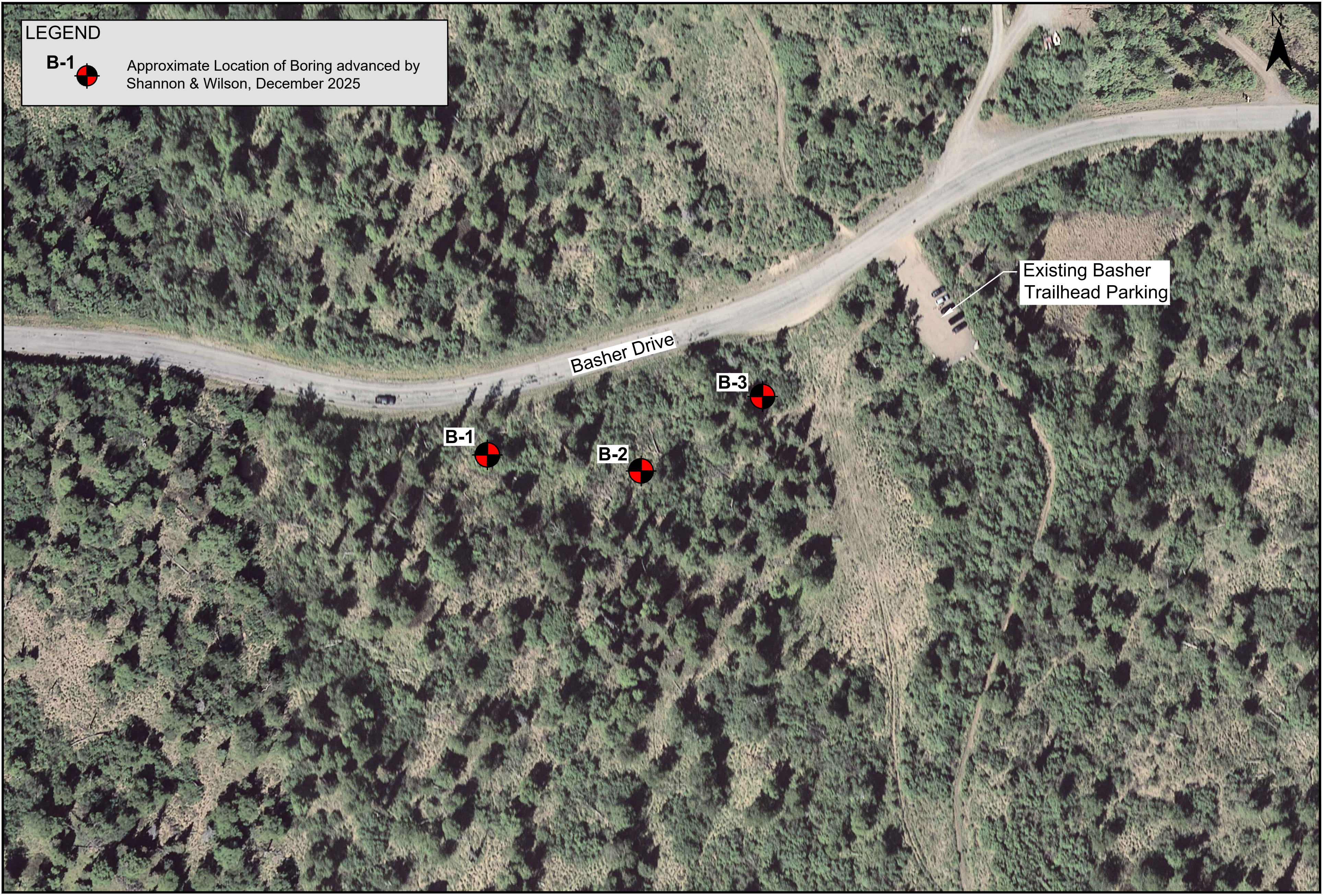
Basher Trailhead Overflow Parking
Anchorage, Alaska



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NOTES

1. Aerial imagery provided courtesy of the Municipality of Anchorage (MOA).

SITE PLAN

February 2026

FIGURE 2

GRADATION REQUIREMENTS

(Adapted from Municipality of Anchorage Standard Specifications, 2015)

LEVELING COURSE

U.S. STANDARD SIEVE SIZE English	Metric	PERCENT PASSING BY WEIGHT
1 in.	25.0 mm	100
3/4 in.	19.0 mm	70 - 100
3/8 in.	9.5 mm	50 - 80
No. 4	4.75 mm	35 - 65
No. 8	2.36 mm	20 - 50
No. 50	0.30 mm	8 - 28
No. 200	0.075 mm	2 - 6*

* The fraction passing the No. 200 sieve shall not exceed 75 percent of the fraction passing the No. 50 sieve.

TYPE II-A BACKFILL

U.S. STANDARD SIEVE SIZE		PERCENT PASSING BY WEIGHT
3 in.	75 mm	100
3/4 in.	19.0 mm	50 - 100
No. 4	4.75 mm	25 - 60
No. 10	2.00 mm	15 - 50
No. 40	0.425 mm	4 - 30
No. 200	0.075 mm	2 - 6**

** The fraction passing the No. 200 sieve shall not exceed 20 percent of the fraction passing the No. 4 sieve.

TYPE IV BACKFILL

Materials furnished by the contractor for use as Type IV classified fill and/or backfill shall be an approved material consisting of sand or gravel with a maximum of 25% passing the No. 200 sieve.

E-1

(Adapted from Alaska Department of Transportation Standard Specifications for Highway Construction)

U.S. STANDARD SIEVE SIZE		PERCENT PASSING BY WEIGHT
1 in.	25 mm	100
3/4 in.	19 mm	70 - 100
3/8 in.	9.5 mm	50 - 85
No. 4	4.75 mm	35 - 65
No. 8	2.36 mm	20 - 50
No. 50	0.300 mm	15 - 30
No. 200	0.075 mm	8 - 15

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APPENDIX A: BORING LOGS AND LABORATORY DATA

Appendix A

Boring Logs and Laboratory Data

Figures

SHANNON & WILSON

LOG KEY

SOIL CLASSIFICATION

Shannon & Wilson uses a soil identification system modified from the Unified Soil Classification System (USCS) as described on this Key. Soil descriptions are based on visual-manual procedures (ASTM D2488) and available laboratory index test results (ASTM D2487).

Exhibit A: Unified Soil Classification System (USCS)[1]

Major Divisions			Symbol / Graphic	Typical Identifications (USCS Group Names)[2,4]
COARSE-GRAINED SOILS *(> 50% of soil is retained on the No. 200 sieve[3])*	**GRAVELS** *(> 50% of coarse fraction retained on the No. 4 sieve[3])*	**Gravel** *(< 5% fines[3])*	GW	Well-graded Gravel; Well-Graded Gravel with Sand
			GP	Poorly Graded Gravel; Poorly Graded Gravel with Sand
		Silty or Clayey Gravel *(> 12% fines[3])*	GM	Silty Gravel; Silty Gravel with Sand
			GC	Clayey Gravel; Clayey Gravel with Sand
	SANDS *(≥ 50% of coarse fraction passes the No. 4 sieve[3])*	**Sand** *(< 5% fines[3])*	SW	Well-graded Sand; Well-graded Sand with Gravel
			SP	Poorly Graded Sand; Poorly Graded Sand with Gravel
		Silty or Clayey Sand *(> 12% fines[3])*	SM	Silty Sand; Silty Sand with Gravel
			SC	Clayey Sand; Clayey Sand with Gravel
FINE-GRAINED SOILS *(≥ 50% of soil passes the No. 200 sieve[3])*	**SILTS AND CLAYS** *(liquid limit < 50)*	**Inorganic**	ML	Silt; Silt with Sand or Gravel; Sandy or Gravelly Silt
			CL	Lean Clay; Lean Clay with Sand or Gravel; Sandy or Gravelly, Lean Clay
		Organic	OL	Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly, Organic Silt or Clay
	SILTS AND CLAYS *(liquid limit ≥ 50)*	**Inorganic**	MH	Elastic Silt; Elastic Silt with Sand or Gravel; Sandy or Gravelly, Elastic Silt
			CH	Fat Clay; Fat Clay with Sand or Gravel; Sandy or Gravelly, Fat Clay
		Organic	OH	Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly, Organic Silt or Clay
HIGHLY ORGANIC SOILS	*Primarily organic matter, dark in color, and organic odor*		PT	Peat or other Highly Organic Soils (see ASTM D4427)

***NOTE:** For gravels and sands with 5 to 12% fines[3], the following are added to the Group Name:*
with Silt and/or Clay or Silty Clay.
Dual Symbols are used:
GW-GM, GP-GM, SW-SM, SP-SM
GW-GC, GP-GC, SW-SC, SP-SC

EXHIBIT A NOTES:
1. Adapted, with permission, from USACE Tech Memo 3-357, ASTM D2487, and ASTM D2488.
2. Borderline symbols (symbols separated by a slash) indicate that the soil characteristics are close to the defining boundary between two groups (e.g., CL/ML = Lean Clay to Silt; SP-SM/SM = Sand with Silt to Silty Sand).
3. No. 4 size = 4.75 millimeters (mm) = 0.187 inch; No. 200 sieve size = 0.075 mm = 0.003 inch. Particles smaller 0.075 mm are termed "fines".
4. Poorly graded indicates a narrow range or missing grain sizes. Well-graded indicates a full-range and even distribution of grain sizes.
5. If cobbles and/or boulders are observed, "with cobbles" or "with boulders" or "with cobbles and boulders" is added to the Group Name.

Exhibit B-1: Standard Penetration Test (SPT)

Term	Description
Hammer	140-pound weight with a 30-inch free fall. Hammer types vary (e.g., automatic, rope and cathead). If available, the hammer type and energy ratio (E-ratio) is noted on the boring log.
Sampler	Barrel I.D. / O.D. = 1.5 inches / 2 inches (liner not used) Barrel Length = 30 inches; Shoe I.D. = 1.375 inches
N-Value (N)[1]	Sum of the count of hammer blows to penetrate the second and third 6-inch increments in blows per foot (bpf). **Refusal**: 50 blows for 6 inches or less or 10 blows for 0 inch.

Exhibit B-2: Relative Consistency of Cohesive Soils

Term	N[2] (bpf)	PP[3] (tsf)	TV[3] (tsf)
Very Soft	0 - 2	0 - 0.25	0 - 0.12
Soft	2 - 4	0.25 - 0.5	0.12 - 0.25
Medium Stiff	4 - 8	0.5 - 1	0.25 - 0.5
Stiff	8 - 15	1 - 2	0.5 - 1
Very Stiff	15 - 30	2 - 4	1 - 2
Hard	> 30	> 4	> 2

Exhibit B-3: Relative Density of Cohesionless Soils

Term	N[2] (bpf)
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	> 50

EXHIBIT B NOTES:
1. N-values shown on boring logs are as recorded in the field and have not been corrected for hammer energy, overburden, or other factors. Where the hammer E-ratio is available, the N-value normalized to a ratio of 60% (N_{60}) is listed.
2. Based on ASTM Standard D1586. Relative densities/consistencies noted on the boring logs are based on uncorrected N-values.
3. PP = pocket penetrometer; TV = torvane, tsf = tons per square foot. Correlations based on experience and multiple published references.

Exhibit C: Soil Structure[1]

Term	Description
Blocky	Cohesive soil that can be broken down into small angular lumps that resist further breakdown.
Fissured	Breaks along definite planes or fractures with little resistance.
Homogeneous	Same color and appearance throughout.
Interbedded	Alternating layers at least 1/4 inch thick of varying material or color. *Singular: bed*
Laminated	Alternating layers less than 1/4 inch thick of varying material or color. *Singular: lamination*
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay.
Slickensided	Fracture planes appear polished or glossy, sometimes striated.

EXHIBIT C NOTE:
1. Adapted, with permission, from ASTM D2488.

Exhibit D: Soil Plasticity[1]

Term	Description
Nonplastic	Cannot roll a 1/8-inch thread at any water content.
Low Plasticity	A thread can barely be rolled and a lump cannot be formed when drier than the plastic limit.
Medium Plasticity	A thread is easy to roll and not much time in rolling is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. A lump crumbles when drier than the plastic limit.
High Plasticity	It takes considerable time rolling and kneading to reach the plastic limit. A thread can be rerolled several times after reaching the plastic limit. A lump can be formed without crumbling when drier than the plastic limit.

EXHIBIT D NOTE:
1. Adapted, with permission, from ASTM D2488.

Exhibit E: Soil Moisture Content[1]

Term	Description
Dry	Absence of moisture, dusty, dry to the touch.
Moist	Damp but no visible water.
Wet	Visible free water, from below water table.

EXHIBIT E NOTE:
1. Adapted, with permission, from ASTM D2488 (Figure 2).

Exhibit F: Soil Cementation[1]

Term	Description
Weak	Crumbles or breaks with handling or slight finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

EXHIBIT F NOTE:
1. Adapted, with permission, from ASTM D2488.

Exhibit G: Percentages

Term	Percent[1]
Trace	<5
Few	5 to 10
Little	15 to 25
Some	30 to 45
Mostly	>50

EXHIBIT G NOTE:
1. Percent estimated by weight for sand and gravel, and by volume for cobbles, organics, and other non-soil material (e.g., rubble, debris).

SOIL CLASSIFICATION *(continued)*

See Page 1 for Soil Classification Exhibits A through G

Exhibit H: Particle Angularity and Shape[1]

Term	Description
Angular	Sharp edges and unpolished planar surfaces.
Subangular	Similar to angular, but with rounded edges.
Subrounded	Nearly planar sides with well-rounded edges.
Rounded	Smoothly curved sides with no edges.
Flat	Width to thickness ratio > 3.
Elongated	Width to thickness ratio < 3.

EXHIBIT H NOTE:
1. Adapted, with permission, from ASTM D2488.

Exhibit I: Additional Descriptive Terms

Term	Description
Mottled	Irregular patches of different colors.
Bioturbated	Soil disturbance or mixing by plants or animals.
Diamict	Nonsorted sediment; sand and gravel in silt and/or clay matrix.
Cuttings	Material brought to surface by drilling action.
Slough	Material that caved from sides of borehole.
Sheared	Disturbed texture, mix of strengths.

SOIL CLASSIFICATION REFERENCES:

ASTM International, [current edition], Annual book of standards, v. 04.08, soil and rock (I): D420 - D5876, available: www.astm.org.

U.S. Army Corps of Engineers, 1953, The unified soil classification system: Vicksburg, Miss., Waterways Experiment Station, Technical Memorandum 3-357, 2 v., March.

SYMBOLOGY AND GRAPHICS

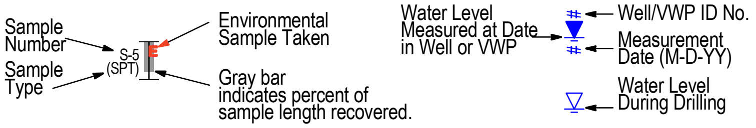
Exhibit J: Sample and Run Graphics

Graphic	Description	Graphic	Description	Graphic	Description
⌶	SPT split spoon (2-inch OD)	⌶	Modified split spoon (MPT) (3-inch OD)	▮	Core run (typically rock)
▱	Grab (GB) from cuttings or excavation	⌶	Modified California (MC) sampler	▯	Sheath (SH) (used for geoprobes)
⌶	Tube (TB) (e.g., Shelby, piston)	⌶	Sonic core (SC) run (typically soil)		

Exhibit K: Hole Backfill and Instrument Graphics

Graphic	Description	Graphic	Description	Graphic	Description
▨	Bentonite-cement grout	▨	Surface cement seal	▥	Blank pipe or instrument casing
▨	Bentonite grout	░	Sand filter pack	▤	Perforated or slotted pipe
▦	Bentonite chips	▨	Slough *(hole caved)*	■	VWP and electric lead

Exhibit L: Other Log Symbols



ROCK CLASSIFICATION

Shannon & Wilson uses a rock classification system modified from the system recommended by the International Society for Rock Mechanics (ISRM). Copyright limitations prevent us from reproducing summary tables from the ISRM system on this Key. General descriptions are provided in Exhibit M.

Exhibit M: General Rock Descriptive Terms - ISRM

Term	General Description
Strength	Ranges from extremely weak (q_u = 36 to 135 psi) to extremely strong (q_u > 36,250 psi), and is based on the ability to break the rock with a hammer or scrape the rock with a knife.
Weathering	Ranges from fresh (no visible signs of weathering) to completely weathered, based on observed degree of discoloration, decomposition, and/or disintegration. When the rock material has completely converted to soil, it is termed a residual soil.
Fabric	Describes the rock structure based on observed layering, tendency to break, and distribution of minerals (e.g., massive, bedded, foliated).
Roughness	For discontinuities: Includes rough, smooth, and slickensided, and includes other descriptive terms (e.g., stepped, undular, irregular, planar).
Spacing	For discontinuities: Ranges from extremely close (< 1 inch) to extremely wide (> 20 feet).
Persistence	For discontinuities: Ranges from very low to very high.
Other	Description of discontinuities (joints, fractures, bedding planes, etc.), observations of potential displacement, gouge, shear, etc.

REFERENCE: Brown, E. T., ed., 1981, Rock characterization, testing & monitoring: International Society of Rock Mechanics (ISRM) suggested methods: Oxford, Pergamon Press, 211 p.

Exhibit N: Rock Name Graphics

No rock names defined for this Project

Exhibit O: Recovery and RQD Equations[1]

Term	Equation
Core Recovery (REC) in %	$100\% \times \frac{\text{Length of Core Recovered}}{\text{Length of Core Run}}$
Rock Quality Designation (RQD) in %	$100\% \times \frac{\text{Length of Core in Pieces > 4 in}}{\text{Length of Core Run}}$

REFERENCE: Loehr, J. E.; Lutenegger, A.; Rosenblad, B.; and Boeckmann, A., 2016, Geotechnical site characterization: U.S. Federal Highway Administration Report FHWA NHI-16-072, Geotechnical Engineering Circular no. 5, 1 v.

ACRONYMS AND ABBREVIATIONS

ATD	at time of drilling
bpf	blows per foot
bpi	blows per 6-inch interval
DD	dry density
dia, diam	diameter
Elev.	elevation
ENV	environmental sample
ETR	energy transfer ratio (hammer)
FC	fines content (< 0.075 mm)
FeO	iron oxide
ft or '	foot or feet
gal	gallons
GP	geoprobe
GWT	groundwater table
HSA	hollow-stem auger
ID	inside diameter or identification
in or "	inch
incl	inclinometer
ksf	kips per square foot
lbs	pounds
LL	liquid limit
mm	millimeter
N	field (uncorrected) SPT N-value
N_{60}	SPT N-value corrected for 60% ETR
NA, n/a	not applicable or not available
NE	northeast
NP	nonplastic
NR	no recovery
NW	northwest
OC	organic content
OD	outside diameter
OW	observation well
pcf	pounds per cubic foot
PI	plasticity index
PID	photoionization detector
PL	plastic limit
PMT	pressuremeter test
PP	pocket penetrometer reading
ppm	parts per million
psi	pounds per square inch
PT	nonstandard penetration test N-value
REC	recovery
REF	refusal
RQD	rock quality designation (ASTM D6032)
SC	sonic core
SE	southeast
SPT	Standard Penetration Test (ASTM D1586)
SW	southwest
TP	test pit
tsf	tons per square foot
TV	tor vane reading
UCS, q_u	unconfined compressive strength
USCS	Unified Soil Classification System
VST	vane shear test
VWP	vibrating wire piezometer
WC	natural water content
WD	wet density
WOH	weight of hammer
WOR	weight of rods

FROST CLASSIFICATION LEGEND

FROST CLASSIFICATION

(after Municipality of Anchorage, 2007)

GROUP		0.02 Mil.	P-200*	USC SYSTEM (based on P-200 results)
NFS	Sandy Soils	0 to 3	0 to 6	SW, SP, SW-SM, SP-SM
	Gravelly Soils	0 to 3	0 to 6	GW, GP, GW-GM, GP-GM
F1	Gravelly Soils	3 to 10	6 to 13	GM, GW-GM, GP-GM
F2	Sandy Soils	3 to 15	6 to 19	SP-SM, SW-SM, SM
	Gravelly Soils	10 to 20	13 to 25	GM
F3	Sands, except very fine silty sands**	Over 15	Over 19	SM, SC
	Gravelly Soils	Over 20	Over 25	GM, GC
	Clays, PI>12			CL, CH
F4	All Silts			ML, MH
	Very fine silty sands**	Over 15	Over 19	SM, SC
	Clays, PI<12			CL, CL-ML
	Varved clays and other fined grained, banded sediments			CL and ML CL, ML, and SM; SL, SH, and ML; CL, CH, ML, and SM

PI = Plasticity Index
P-200 = Percent passing the number 200 sieve
0.02 Mil. = Percent material below 0.02 millimeter grain size

*Approximate P-200 value equivalent for frost classification. Value range based on typical, well-graded soil curves.

** Very fine sand : greater than 50% of sand fraction passing the number 100 sieve

SOIL BORING LOG

Basher Trailhead Overflow Parking
Anchorage, Alaska

B-1
Page 1 of 1

EXPLORATION INFORMATION

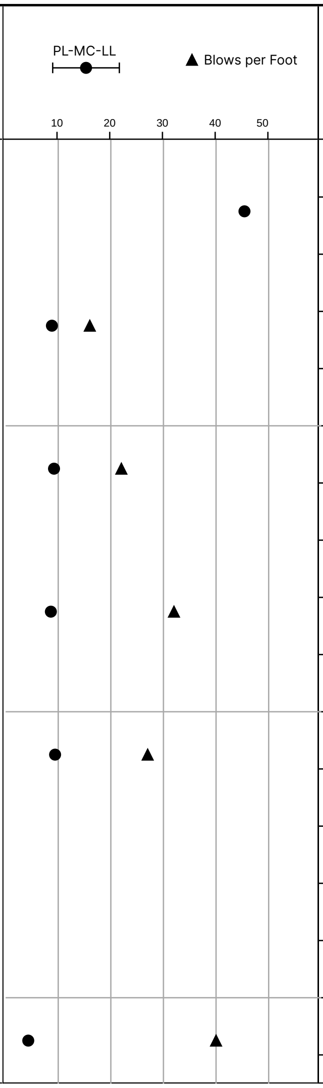
Total Depth: 16.5 feet
Top Elevation: 796 feet
Date Completed: 12/04/2025
Latitude: 61.15112
Longitude: -149.71696
Horizontal Datum: WGS 84

DRILLING INFORMATION

Drilling Company: Denali Drilling
Drilling Equipment: CME-850X
Drilling Method: Auger
Drill Bit Size/Type: 4-1/4" Hollow Stem Auger
Hammer Wt. / Drop: 340 lbs / 30 inches
Sampler Type: 3-inch OD split-spoon (MPT)

Depth (ft)	Frozen	Material Description and Other Observations	Sample ID	Field Data	Lab Data
0–0.5	■	***ORGANIC SOIL***; frozen; dark brown; moist.			
0.5–2.3	■	***SANDY SILT*** (ML); frozen to medium dense; light brown; moist; few organics.	S1 MPT Grab		
2.3–16		***SILTY SAND WITH GRAVEL*** (SM); medium dense to dense; light brown to gray-brown; moist.	S2 MPT	PT = 5-8-8	%G: 25 %S: 40 %F: 35 Frost: F3
			S3 MPT	PT = 5-11-11	%F: 32.6 Frost: F3
			S4 MPT	PT = 4-17-15	
			S5 MPT	PT = 8-10-17	
			S6 MPT	PT = 6-18-22	
16–16.5		***POORLY GRADED GRAVEL WITH SILT AND SAND*** (GP-GM); dense; gray-brown; moist.			

End of Boring



NOTES:
- Refer to LOG KEY for explanation of symbols, codes, abbreviations, and definitions.
- Groundwater level, if indicated above, is for the date specified and may vary.
- Group symbol is based on visual-manual identification and selected lab testing.
- Report text contains limitations and information needed to contextually understand this log.

Project	116384-001
Logged By:	RCH
Version:	complete

SOIL BORING LOG

Basher Trailhead Overflow Parking
Anchorage, Alaska

B-2

Page 1 of 1

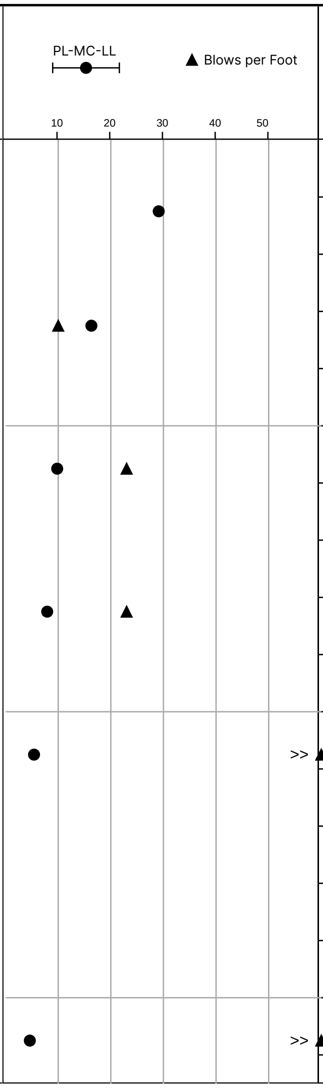
EXPLORATION INFORMATION

Total Depth: 16.5 feet
Top Elevation: 804 feet
Date Completed: 12/04/2025
Latitude: 61.15100
Longitude: -149.71600
Horizontal Datum: WGS 84

DRILLING INFORMATION

Drilling Company: Denali Drilling
Drilling Equipment: CME-850X
Drilling Method: Auger
Drill Bit Size/Type: 4-1/4" Hollow Stem Auger
Hammer Wt. / Drop: 340 lbs / 30 inches
Sampler Type: 3-inch OD split-spoon (MPT)

Frozen	Material Description and Other Observations	Sample ID	Field Data	Lab Data
■	***ORGANIC SOIL***; frozen; dark brown; moist. 0.5			
■	***SILT WITH SAND*** (ML); frozen; brown; moist; few organics. 2.3	S1 MPT Grab		
	SANDY LEAN CLAY WITH GRAVEL (CL); stiff; brown; moist. 4.5	S2 MPT	PT = 3-4-6	%F: 55.1 Frost: F4
	SILTY SAND WITH GRAVEL (SM); medium dense to very dense; brown; moist; trace cobbles below approximately 10 feet bgs.	S3 MPT	PT = 3-9-14	%G: 27 %S: 34 %F: 40 Frost: F3
		S4 MPT	PT = 3-12-11	
	S5: Blow counts likely biased high due to gravel particle in sampler 12.5	S5 MPT	PT = 8-42-44	
	SILTY GRAVEL WITH SAND (GM); very dense; brown; moist; trace cobbles.			
	S6: Blow counts likely biased high due to gravel particle in sampler 16.5	S6 MPT	PT = 5-34-39	



End of Boring

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Project	116384-001
Logged By:	RCH
Version:	complete

SHANNON & WILSON

SOIL BORING LOG

Basher Trailhead Overflow Parking
Anchorage, Alaska

B-3
Page 1 of 1

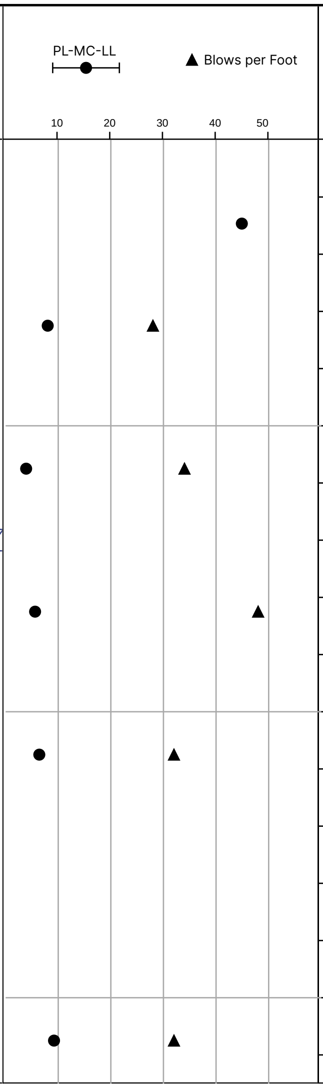
EXPLORATION INFORMATION

Total Depth: 16.5 feet
Top Elevation: 813 feet
Date Completed: 12/04/2025
Latitude: 61.15130
Longitude: -149.71553
Horizontal Datum: WGS 84

DRILLING INFORMATION

Drilling Company: Denali Drilling
Drilling Equipment: CME-850X
Drilling Method: Auger
Drill Bit Size/Type: 4-1/4" Hollow Stem Auger
Hammer Wt. / Drop: 340 lbs / 30 inches
Sampler Type: 3-inch OD split-spoon (MPT)

Material Description and Other Observations	Depth (ft)	Sample ID	Field Data	Lab Data	Water Levels
ORGANIC SOIL; frozen; dark brown; moist.	0.8				
SILTY SAND WITH GRAVEL (SM); frozen to medium dense; red-brown to gray- brown; moist; trace organics.	3.2	S1 MPT Grab			
SILTY GRAVEL WITH SAND (GM); dense; red-brown to gray-brown; moist to wet.	9	S2 MPT	PT = 2-9-19		
		S3 MPT	PT = 4-19-15	%G: 52 %S: 34 %F: 15 Frost: F2	
		S4 MPT	PT = 1-30-18		12-4-25
SILTY SAND WITH GRAVEL (SM); dense; gray-brown; moist.	16.5	S5 MPT	PT = 10-14-18	%G: 37 %S: 39 %F: 24 Frost: F3	
		S6 MPT	PT = 9-14-18		



End of Boring

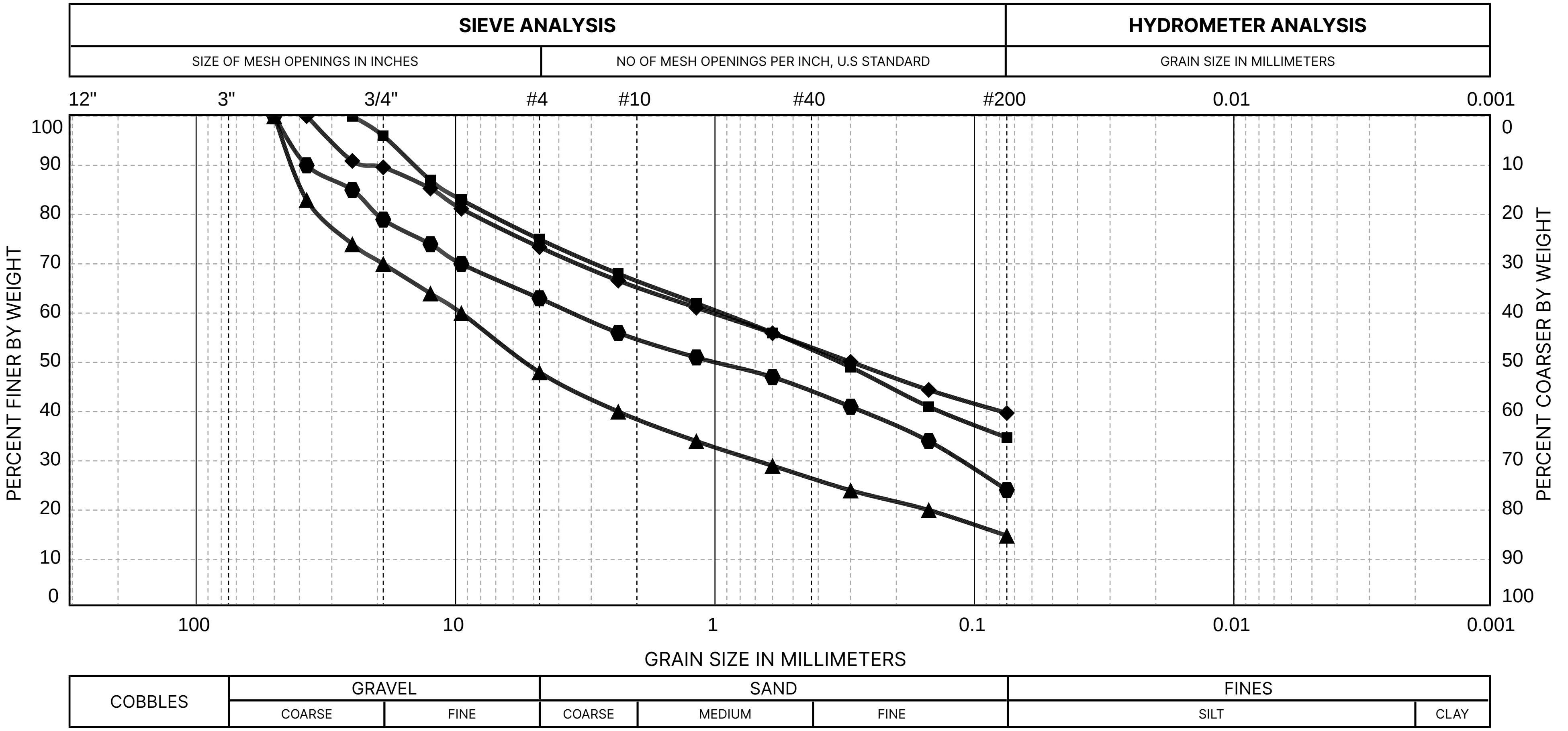
NOTES:
- Refer to LOG KEY for explanation of symbols, codes, abbreviations, and definitions.
- Groundwater level, if indicated above, is for the date specified and may vary.
- Group symbol is based on visual-manual identification and selected lab testing.
- Report text contains limitations and information needed to contextually understand this log.

Project	116384-001
Logged By:	RCH
Version:	complete

Date Printed: February 03, 2026 | Project #: 116384-001

GRAIN SIZE DISTRIBUTION TEST RESULTS

Basher Trailhead Overflow Parking
Anchorage, Alaska



	EXPLORATION NUMBER	SAMPLE NUMBER	DEPTH	USCS GROUP NAME	USCS SYMBOL	GRAVEL (%)	SAND (%)	FINES (%)	D10	D30	D60	D100
■	B-1	S2	2.5	SILTY SAND with Gravel	SM	25	40	35			0.94	
◆	B-2	S3	5	SILTY SAND with Gravel	SM	27	34	40			1.02	37.5
▲	B-3	S3	5	SILTY GRAVEL with Sand	GM	52	33	15		0.69	9.5	50
⬢	B-3	S5	10	SILTY SAND with Gravel	SM	37	39	24		0.11	3.56	50

IMPORTANT INFORMATION

Important Information

About Your Geotechnical/Environmental Report

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors that were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland