



**GEOTECHNICAL ENGINEERING REPORT**  
for the proposed  
**MAUD ROAD HOUSING  
DEVELOPMENT  
PALMER, ALASKA**

**Prepared for:**

Eklutna, Inc.

16515 Centerfield Drive, Suite 201

Eagle River, AK 99577

**Prepared by:**

Northern Geotechnical Engineering, Inc. *d.b.a.* Terra Firma Testing

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**MARCH 2022**



March 25, 2022

NGE-TFT Project #6273-22

Eklutna, Inc.  
16515 Centerfield Drive, Suite 201  
Eagle River, AK 99577

Attn: Noel Aspiras – Real Estate & Land Development Specialist

**RE: GEOTECHNICAL ENGINEERING ASSESSMENT OF THE PLANNED MAUD ROAD HOUSING DEVELOPMENT – PALMER, ALASKA**

Noel,

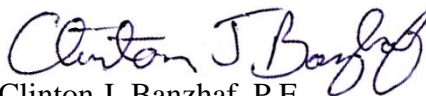
We (Northern Geotechnical Engineering, Inc. *d.b.a.* Terra Firma Testing) have completed a geotechnical engineering assessment of the aforementioned project. Our assessment suggests that the subgrade soils located across the project site are suitable for supporting the proposed improvements.

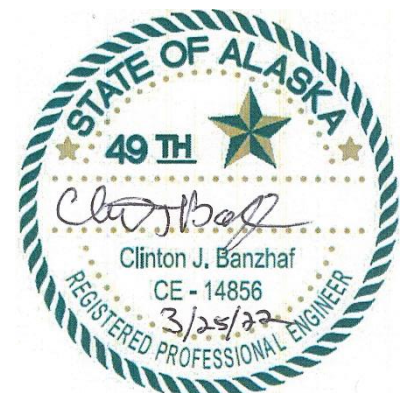
The project site is underlain by medium dense to dense well-graded gravel with sand that varies in thickness and depth however it consistently was encountered across the project site. The well-graded gravel with sand is typically interbedded with layers of high fines content material. Generally, the well-graded gravel with sand layer is thicker on the south side of Maud Road with less interbedded layers. Some explorations on the northern side of Maud Road encountered large wood debris.

Per Matanuska-Susitna Borough Code, the minimum building and useable wastewater disposal area is a contiguous 10,000 square feet per lot. Based on the findings of geotechnical engineering assessment, it is our conclusion that the gravel with sand deposits meet the Matanuska-Susitna Borough Code for minimum building and useable wastewater disposal area for each lot of the preliminary plat provided. The depth and thickness of the gravel with sand deposits will vary across the project site along with the quantity of higher fine content layers.

We greatly appreciate the opportunity to provide you with our professional service. Please contact us directly with any questions or comments you may have regarding the information that we present in this report, or if you have any other questions, comments, and/or requests.

Sincerely,  
Northern Geotechnical Engineering, Inc. *d.b.a.* Terra Firma Testing

  
Clinton J. Banzhaf, P.E.  
Senior Project Engineer



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## 1.0 INTRODUCTION

In this report, we (Northern Geotechnical Engineering, Inc. *d.b.a.* Terra Firma Testing) present the results of a geotechnical engineering assessment that we conducted for the proposed Maud Road Housing Development in Palmer, Alaska; which we hereafter refer to as “the project site”. We provided our professional service in accordance with our service fee proposal #22-023 which we submitted to our client, Eklutna, Inc. (EI), on February 3, 2022. EI authorized our proposed scope of service on February 10, 2022 via signature of the authorization block located within service fee proposal #22-023.

EI contracted us to characterize the subsurface conditions along the alignment of the proposed streets and 27 residential lots to address Comment #11 from the preliminary plat application conference held on January 12, 2022, between the Matanuska-Susitna Borough Platting Department and S4 Group, LLC (representing Eklutna, Inc.), the MSB requires the following geotechnical site characterization for final plat approval:

*11. Test holes and a geotechnical report by professional engineer of 10,000 s/f contiguous useable septic area required per MSB 43.20.281. Provide professional engineer statement of 10,000 s/f buildable area. Minimum number of test holes is to be determined by the engineer, pursuant to MSB 43.20.281 (A)0(c).....*

## 2.0 PROJECT OVERVIEW

As we detail in Figure 1 of this report, the project site is located on E. Maud Road, just south of its intersection with N. Yeti Street in Palmer, Alaska. The legal description of the project site (as we understand it to be) is a portion of Lot A1 of SEC7, T17N, R3W. The project site is approximately 75 acres in total area and is situated on sloping terrain with approximately 200 feet of vertical relief across the project site. The project site generally slopes down to the west and is currently undeveloped and vegetated with mature stands of hardwood and evergreen trees.

Proposed residential development of the project site includes the replating of the project site into approximately 27 individual residential lots ranging in size from 2.1 to 4.4 acres each. The proposed lots will be access via two planned residential streets which will run north and south from E. Maud Road and terminate into cul-de-sac turnarounds; for a total length of approximately 2,700 lineal feet of street to be constructed. The proposed streets are to be paved with hot mix asphalt. We have included a copy of the preliminary subdivision plat drawing in Figure 2 of this report.

## **3.0 SITE CHARACTERIZATION ACTIVITIES**

### **3.1 Subsurface Exploration**

We conceived, coordinated and directed a subsurface exploration program at the project site in an effort to characterize the subsurface conditions of the project site as they currently exist. We directed Dirtworks, Inc. (DIRTWORKS) to complete the necessary geotechnical explorations, which was contracted by EI to provide the services. EI contracted S4 Group to stake the proposed front lot corners and the centerline of the proposed road prior to our exploration activities. A qualified representative from our office was present on-site during the entire exploration program to direct the exploration activities, log the geology of each exploration, and collect representative samples for further identification and laboratory analysis. Under our direction DIRTWORKS advanced a total of 30 test pit explorations at the project site during exploration activities on February 11 and February 21-24, 2022 to depths ranging from approximately 12 to 15 feet below the existing ground surface (bgs) using an excavator. The locations of the explorations were collected using both GPS and DGPS are presented on the preliminary subdivision plat drawing in Figure 2 of this report.

Our field representative sealed each sample that they collected during our subsurface exploration program inside of an air-tight bag and/or container, to help preserve the moisture content of each sample, and then submitted each sample to our laboratory for further identification and analysis.

Once the exploration activities were complete, we assisted DIRTWORKS to install one-inch diameter, closed-ended PVC pipe from the ground surface down to the bottom of all the exploration in order to provide a conduit (i.e., monitoring wells) for future groundwater level monitoring. We hand-slotted the bottom 5-10 feet of the monitoring well casing prior to installation and then backfilled the explorations with the spoils. Construction diagrams for each groundwater monitoring well are presented on the graphical borehole logs contained in Appendix A of this report.

We also installed four-inch diameter, open-ended PVC pipe from the ground surface down to the bottom of the exploration in the explorations (NR-1, NR-2, SR-1, SR-2) located within the proposed road alignments in order to provide a conduit for future percolation tests.

### **3.2 Groundwater Level Monitoring**

We conducted groundwater level monitoring efforts at the project site on February 25 and 28, 2022 to check for the presence of groundwater. We used an electronic water level meter (with 0.01-foot increments) to measure the relative depth of the groundwater surface (below the existing ground surface) at each monitoring well location. We did not encounter groundwater in any of the explorations.

### **3.3 Infiltration Testing**

We conducted infiltration testing at explorations NR1, NR2, SR1, and SR2 on February 22, 2022. We conducted our infiltration testing in general conformance with the falling head percolation test procedure outlined in Table 3.9 of the EPA On-site Water Treatment & Disposal Systems Manual. The results of our infiltration testing are included in Appendix B of this report, and all the tests were less than 2 min/in.

## **4.0 LABORATORY TESTING**

We collected a total of 40 soil samples from the 30 explorations that were advanced at the project site and submitted all of the soil samples to our laboratory for further identification and geotechnical analysis. We tested select soil samples in accordance with the respective ASTM standard test methods including:

- moisture content analysis (ASTM D-2216);
- determination of fines content (a.k.a. P200 – ASTM D-1140); and
- grain size sieve and hydrometer analysis (ASTM D-6913 & D-7928).

The laboratory test results, along with the observations we made during our subsurface exploration efforts, aid in our evaluation of the subsurface conditions at the project site and help us to assess the suitability of the subsurface materials located at the project site to support the proposed improvements. We have included the results of our geotechnical laboratory analyses on the graphical exploration logs contained in Appendix A of this report and on the laboratory data sheets contained in Appendix C of this report.

## **5.0 DESCRIPTION OF SUBSURFACE CONDITIONS**

We compiled our field observations with the results from our laboratory analyses to produce graphical logs of each subsurface exploration (Appendix A). The graphical exploration logs depict the subsurface conditions that we identified at each exploration location and help us to interpret/extrapolate the subsurface conditions for areas adjacent to, and immediately surrounding, each exploration location across the project site.

### **5.1 General Subsurface Profile**

The project site is underlain by a medium dense to dense well-graded gravel with sand layer that is as thin as 3 feet and up to at least 15 feet in thickness. While the size and location of the well-graded gravel with sand layer varies, it was encountered at each exploration. The well-graded gravel with sand is typically interbedded with layers of material with a high fines content. This high fine content material varies from a silty gravel/sand to silt. Generally, the well-graded gravel with sand layer is thicker on the south side of Maud Road with less interbedded layers. Some explorations on the northern side of Maud Road encountered larger wood debris.

## **5.2 Groundwater**

During our field efforts, we did not encounter any indications of groundwater in any of the explorations.

## **5.3 Frozen Soils**

We observed indications of seasonally frozen soils at all the explorations to depths ranging from approximately 0.5 to 1.5 feet bgs during our subsurface exploration program. We do not expect permafrost to occur anywhere across the project site.

# **6.0 ENGINEERING CONCLUSIONS**

## **6.1 General Site Conclusions**

Based on the findings of our subsurface exploration, field and laboratory testing efforts, and engineering analysis efforts, it is our conclusion that the gravel with sand deposits meet the Matanuska-Susitna Borough Code for minimum building and useable wastewater disposal area. It is our professional opinion that each preliminary lot, presented in Figure 2 of this report, will have a minimum of 10,000 square feet of medium dense to dense gravel with sand subgrade materials for usable building and wastewater disposal area. The depth and thickness of the gravel with sand deposits will vary across the project site along with the quantity of higher fine content layers.

## **7.0 CLOSURE**

We (Northern Geotechnical Engineering, Inc. d.b.a. Terra Firma Testing) prepared this report exclusively for the use EI and their consultants/contractors/etc. for use in the design and construction of the proposed improvements. We should be notified if significant changes are to occur in the nature, design, or lot/street locations of the proposed improvements in order that we may review our conclusions and recommendations that we present in this report and, if necessary, modify them to satisfy the proposed changes.

This report should always be read and/or distributed in its entirety (including all figures, exploration logs, appendices, etc.) so that all of the pertinent information contained within is effectively disseminated. Otherwise, an incomplete or misinterpreted understanding of the site conditions and/or our engineering recommendations may occur. Our recommended best practice is to make this report accessible, in its entirety, to any design professional and/or contractor working on the project. Any part of this report (e.g., exploration logs, calculations, material values, etc.) which is presented in the design/construction plans and/or specifications for the project should have an adequate reference which clearly identifies where the report can be obtained for further review.

Due to the natural variability of earth materials, variations in the subsurface conditions across the project site may exist other than those we identified during the course of our geotechnical

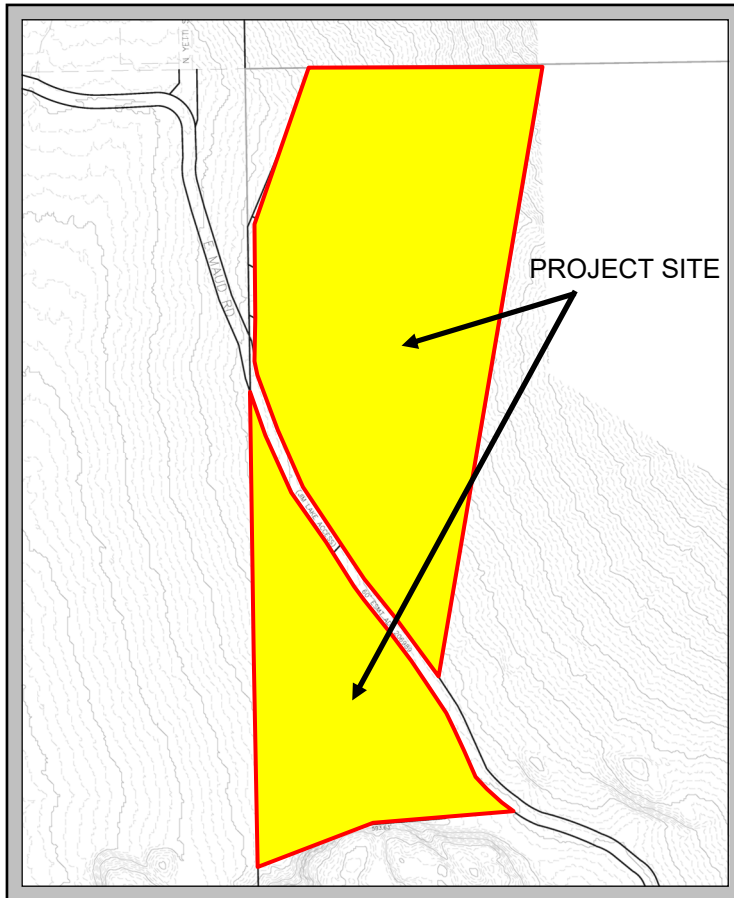
assessment. Therefore, a qualified geotechnical engineer, geologist, and/or special inspector be on-site during construction activities to provide corrective recommendations for any unexpected conditions revealed during construction (see our discussion of the Observational Method in Section 10.0 of this report for more detail). Furthermore, the construction budget should allow for any unanticipated conditions that may be encountered during construction activities.

We conducted this evaluation following the standard of care expected of professionals undertaking similar work in the State of Alaska under similar conditions. No warranty, expressed or implied, is made.





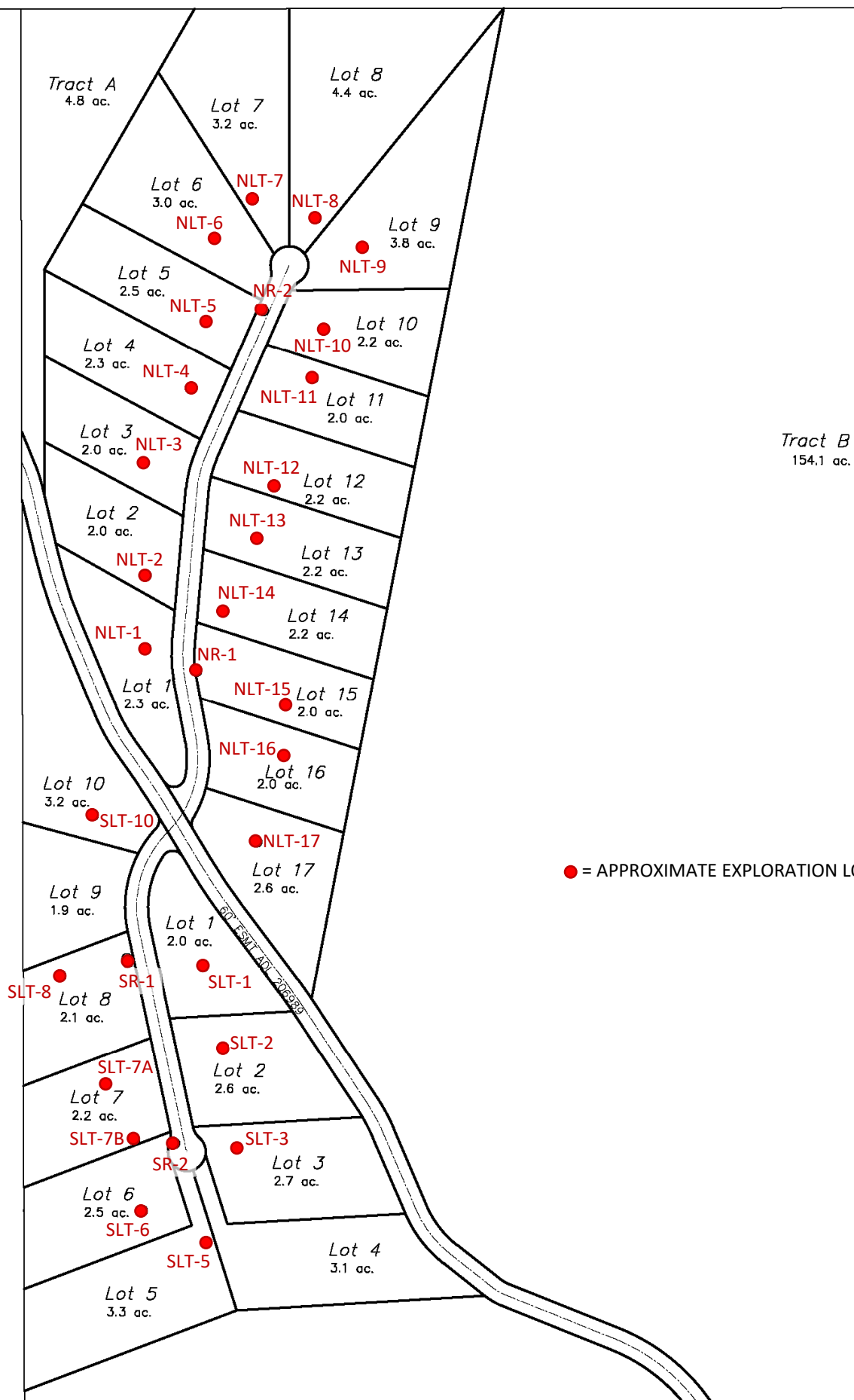
# **REPORT FIGURES**



**NORTHERN GEOTECHNICAL ENGINEERING, INC.**  
**TERRA FIRMA TESTING**

FIGURE TITLE:  
**PROJECT SITE LOCATION MAP**  
PROJECT NAME:  
**MAUD ROAD HOUSING DEVELOPMENT**  
PROJECT LOCATION:  
**PALMER, ALASKA**

PROJECT ID:  
**6273-22**  
FIGURE NUMBER:  
**1**



● = APPROXIMATE EXPLORATION LOCATION



**NORTHERN GEOTECHNICAL ENGINEERING, INC.**  
**TERRA FIRMA TESTING**

FIGURE TITLE:  
**SITE LAYOUT AND EXPLORATION LOCATIONS**

PROJECT NAME:  
**MAUD ROAD HOUSING DEVELOPMENT**

PROJECT LOCATION:  
**PALMER, ALASKA**

PROJECT ID:  
**6273-22**

FIGURE NUMBER:  
**2**



**APPENDIX A**

**GRAPHICAL EXPLORATION LOGS**



Northern Geotechnical Engineering, Inc.  
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11301 Olive Lane  
Anchorage, AK 99515  
Telephone: 907-344-5934

# EXPLORATION NLT-1

**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/23/2022 @ 9:25:00 AM      **DATE/TIME COMPLETED:** 2/23/2022 @ 9:45:00 AM  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▽ GROUNDWATER ():** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0			<b>ORGANICS</b>						
			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist, cobbles up to 8" in diameter						
5			<b>SILT (ML)</b> , trace rootlets, brown / gray, moist <b>SILTY GRAVEL (GM)</b> , dense, brown, moist, boulders up to 2' in diameter	Hand	S1		S1	S1 MC = 1.7% 80.8% gravel, 18.4% sand, 0.8% silt	
10			<b>WELL GRADED GRAVEL (GW)</b> , medium dense, brown, moist	Hand	S2		S2	S2 MC = 6.2%	
			<b>SILTY GRAVEL (GM)</b> , dense, brown, moist, boulders up to 2' in diameter						

Bottom of borehole at 14.0 ft bgs.  
Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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# EXPLORATION NLT-2

**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/23/2022 @ 10:00:00 AM      **DATE/TIME COMPLETED:** 2/23/2022 @ 10:25:00 AM  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▼ GROUNDWATER ():** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0			<b>ORGANICS</b>						
			<b>SILT WITH ORGANICS (ML)</b> , soft, brown						
			<b>POORLY GRADED GRAVEL WITH SAND (GP)</b> , medium dense, brown, moist, with few interbedded 2" silt lenses						
5			<b>SILTY GRAVEL TO POORLY GRADED GRAVEL (GM)</b> , medium dense, brown, moist		S1		S1	S1 MC = 3.1% 77.7% gravel, 20.8% sand, 1.5% silt P0.02 = 0.7% FC = NFS	
10			<b>SILT (ML)</b> , soft, brown, moist						

Bottom of borehole at 14.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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# EXPLORATION NLT-3

**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/24/2022 @ 9:30:00 AM      **DATE/TIME COMPLETED:** 2/24/2022 @ 10:00:00 AM  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▽ GROUNDWATER ():** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0									
			<b>ORGANICS</b>						
			<b>SILTY SAND (SM)</b> , loose, brown, moist						
			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist						
5					S1		S1	S1 MC = 4.5% P200 = 7.2%	
			<b>SILTY GRAVEL (GM)</b> , dense, brown, moist						
10									
			Very dense						

Bottom of borehole at 13.0 ft bgs.  
 Set two 1" PVC to BOH. One hand slot bottom 5' of casing. One sealed casing. Backfilled with spoils



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# EXPLORATION NLT-4

**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/23/2022 @ 12:40:00 PM      **DATE/TIME COMPLETED:** 2/23/2022 @ 1:00:00 PM  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▽ GROUNDWATER ():** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0									
			<b>ORGANICS</b>						
			<b>SILT WITH ORGANICS (ML)</b> , soft, brown, moist						
			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist						
5					S1		S1	S1 MC = 3.0% P200 = 1.4%	
10									

Bottom of borehole at 12.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.





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# EXPLORATION NLT-5

**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/23/2022 @ 1:10:00 PM      **DATE/TIME COMPLETED:** 2/23/2022 @ 1:35:00 PM  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▼ GROUNDWATER ():** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0			<b>ORGANICS</b>						
			<b>POORLY GRADED GRAVEL (GP)</b> , medium dense, brown, moist						
			<b>SILTY SAND (SM)</b> , loose to medium dense, brown, moist						
5			<b>SILTY SAND (SM)</b> , loose to medium dense, brown, moist						
			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist	☞	S1		S1	S1 MC = 2.2% 69.3% gravel, 29.4% sand, 1.3% silt	
10			<b>SILTY SAND (SM)</b> , medium dense, brown, moist						
			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , dense, brown, moist						
15									

Bottom of borehole at 15.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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# EXPLORATION NLT-6

**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/23/2022 @ 2:40:00 PM      **DATE/TIME COMPLETED:** 2/23/2022 @ 3:00:00 PM  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▽ GROUNDWATER (I):** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	REMARKS/NOTES	WELL DIAGRAM
0			<b>ORGANICS</b>						Stump from approx. 2.5 to 5 ft bgs.	
			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist							
			<b>SILTY SAND (SM)</b> , loose, brown, moist							
5			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist							
					S1		S1	S1 MC = 3.1% P200 = 1.5%		
10			<b>SILT (ML)</b> , medium stiff, brown, moist							

Bottom of borehole at 14.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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# EXPLORATION NLT-7

**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/23/2022 @ 3:10:00 PM      **DATE/TIME COMPLETED:** 2/23/2022 @ 3:30:00 PM  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▼ GROUNDWATER ():** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	REMARKS/NOTES	WELL DIAGRAM
0										
			<b>ORGANICS</b>							
			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist							
5					S1		S1	S1 MC = 3.1% P200 = 2.3%	Vertical tree burried to 4 ft bgs.	
			<b>SILT (ML)</b> , medium stiff, brown, moist							
10			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist							

Bottom of borehole at 13.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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 Telephone: 907-344-5934

# EXPLORATION NLT-8

**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/23/2022 @ 3:40:00 PM      **DATE/TIME COMPLETED:** 2/23/2022 @ 3:55:00 PM  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▽ GROUNDWATER ():** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0									
			<b>ORGANICS</b>						
			<b>WELL GRADED GRAVEL WITH SAND (GW), medium dense, brown, moist</b>						
5				←	S1		S1	S1 MC = 2.4% P200 = 1.5%	
10									

Bottom of borehole at 12.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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# EXPLORATION NLT-9

<b>NGE-TFT PROJECT NAME:</b> <u>Maud Road Housing Development</u>	<b>NGE-TFT PROJECT NUMBER:</b> <u>6273-22</u>
<b>PROJECT LOCATION:</b> <u>Palmer, AK</u>	<b>EXPLORATION CONTRACTOR:</b> <u>Alaska Dirtworks</u>
<b>EXPLORATION EQUIPMENT:</b> <u>Hitachi 135</u>	<b>EXPLORATION METHOD:</b> <u>Test Pit Excavation</u>
<b>SAMPLING METHOD:</b> <u>Grab Sample</u>	<b>LOGGED BY:</b> <u>C. Banzhaf</u>
<b>DATE/TIME STARTED:</b> <u>2/23/2022 @ 4:05:00 PM</u>	<b>DATE/TIME COMPLETED:</b> <u>2/23/2022 @ 4:25:00 PM</u>
<b>EXPLORATION LOCATION:</b> <u>See report Figure 2</u>	<b>GROUND ELEVATION:</b> <u>Not Known</u>
<b>▽ GROUNDWATER (ATD):</b> <u>N/E</u>	<b>▽ GROUNDWATER ():</b> <u>N/E</u>
<b>EXPLORATION COMPLETION:</b> <u>See comments at end of log</u>	<b>WEATHER CONDITIONS:</b> _____

DEPTH (ft bgs)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0								
		<b>ORGANICS</b>						
		<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , some rootlets, medium dense, brown, moist						
5				S1		S1	S1 MC = 3.0% 70.0% gravel, 28.4% sand, 1.6% silt	
		<b>POORLY GRADED GRAVEL (GP)</b> , dense, brown, moist, boulders up to 2' in diameter						
10								

Bottom of borehole at 12.0 ft bgs.  
Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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# EXPLORATION NLT-10

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**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/23/2022 @ 2:05:00 PM      **DATE/TIME COMPLETED:** 2/23/2022 @ 2:25:00 PM  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▽ GROUNDWATER ():** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0									
			<b>ORGANICS</b>						
			<b>SILTY GRAVEL TO SILTY SAND (GM)</b> , trace organics, loose, brown, moist						
			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist						
5					S1		S1	S1 MC = 2.2% P200 = 0.7%	
10									

Bottom of borehole at 12.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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# EXPLORATION NLT-11

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**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/23/2022 @ 1:35:00 PM      **DATE/TIME COMPLETED:** 2/23/2022 @ 2:00:00 PM  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▼ GROUNDWATER ():** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0									
			<b>ORGANICS</b>						
			<b>SILTY SAND WITH ORGANICS (SM)</b> , loose, brown, moist						
			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist						
			2" lense of dark brown organics						
5			<b>SILT (ML)</b> , medium stiff, brown, moist		S1		S1	S1 MC = 2.4% 72.3% gravel, 25.9% sand, 1.8% silt	
			<b>SILTY GRAVEL (GM)</b> , trace rootlets, medium dense, brown, moist						
10			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist						

Bottom of borehole at 13.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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# EXPLORATION NLT-12

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<b>NGE-TFT PROJECT NAME:</b> <u>Maud Road Housing Development</u>	<b>NGE-TFT PROJECT NUMBER:</b> <u>6273-22</u>
<b>PROJECT LOCATION:</b> <u>Palmer, AK</u>	<b>EXPLORATION CONTRACTOR:</b> <u>Alaska Dirtworks</u>
<b>EXPLORATION EQUIPMENT:</b> <u>Hitachi 135</u>	<b>EXPLORATION METHOD:</b> <u>Test Pit Excavation</u>
<b>SAMPLING METHOD:</b> <u>Grab Sample</u>	<b>LOGGED BY:</b> <u>C. Banzhaf</u>
<b>DATE/TIME STARTED:</b> <u>2/23/2022 @ 11:55:00 AM</u>	<b>DATE/TIME COMPLETED:</b> <u>2/23/2022 @ 12:30:00 PM</u>
<b>EXPLORATION LOCATION:</b> <u>See report Figure 2</u>	<b>GROUND ELEVATION:</b> <u>Not Known</u>
<b>▽ GROUNDWATER (ATD):</b> <u>N/E</u>	<b>▽ GROUNDWATER ():</b> <u>N/E</u>
<b>EXPLORATION COMPLETION:</b> <u>See comments at end of log</u>	<b>WEATHER CONDITIONS:</b> _____

DEPTH (ft bgs)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0		<b>ORGANICS</b>						
		<b>POORLY GRADED GRAVEL WITH SILT (GP-GM)</b> , medium dense, brown, moist, boulders up to 1' in diameter						
5		<b>SILTY GRAVEL (GM)</b> , medium dense, brown, moist						
		<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist						
10			Hand	S1		S1	S1 MC = 2.6% P200 = 1.0%	

Bottom of borehole at 14.0 ft bgs.  
Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.





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# EXPLORATION NLT-13

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<b>NGE-TFT PROJECT NAME:</b> <u>Maud Road Housing Development</u>	<b>NGE-TFT PROJECT NUMBER:</b> <u>6273-22</u>
<b>PROJECT LOCATION:</b> <u>Palmer, AK</u>	<b>EXPLORATION CONTRACTOR:</b> <u>Alaska Dirtworks</u>
<b>EXPLORATION EQUIPMENT:</b> <u>Hitachi 135</u>	<b>EXPLORATION METHOD:</b> <u>Test Pit Excavation</u>
<b>SAMPLING METHOD:</b> <u>Grab Sample</u>	<b>LOGGED BY:</b> <u>C. Banzhaf</u>
<b>DATE/TIME STARTED:</b> <u>2/23/2022 @ 11:15:00 AM</u>	<b>DATE/TIME COMPLETED:</b> <u>2/23/2022 @ 11:45:00 AM</u>
<b>EXPLORATION LOCATION:</b> <u>See report Figure 2</u>	<b>GROUND ELEVATION:</b> <u>Not Known</u>
<b>▽ GROUNDWATER (ATD):</b> <u>N/E</u>	<b>▼ GROUNDWATER ():</b> <u>N/E</u>
<b>EXPLORATION COMPLETION:</b> <u>See comments at end of log</u>	<b>WEATHER CONDITIONS:</b> _____

DEPTH (ft bgs)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0		<b>ORGANICS</b>						
		<b>SILTY GRAVEL (GM)</b> , loose, brown, moist						
		<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist						
		<b>SILT (ML)</b> , trace rootlets, medium stiff, brown, moist						
5		<b>POORLY GRADED GRAVEL WITH SILT (GP-GM)</b> , medium dense, brown, moist						
		<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist						
10			Hand	S1		S1	S1 MC = 5.1% 66.6% gravel, 31.1% sand, 2.3% silt	
		<b>SILT (ML)</b> , medium stiff, brown, moist						

Bottom of borehole at 14.0 ft bgs.  
Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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# EXPLORATION NLT-14

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**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/23/2022 @ 10:35:00 AM      **DATE/TIME COMPLETED:** 2/23/2022 @ 11:00:00 AM  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▼ GROUNDWATER ():** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0								
		<b>ORGANICS</b>						
		<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist						
5		<b>SILT (ML)</b> , trace rootlets, medium stiff, brown, moist		S1		S1	S1 MC = 2.2% P200 = 0.8%	
		<b>POORLY GRADED GRAVEL (GP)</b> , medium dense, brown, moist						
		<b>SILT (ML)</b> , trace rootlets, medium stiff, brown, moist						
		<b>SILTY GRAVEL (GM)</b> , dense, brown, moist						
10								
		<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist						
15		<b>SILT (ML)</b> , medium stiff, brown, moist						

Bottom of borehole at 15.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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# EXPLORATION NLT-15

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**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/21/2022 @ 12:50:00 PM      **DATE COMPLETED:** 2/21/2022  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▼ GROUNDWATER ():** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0									
			<b>ORGANICS</b>						
			<b>SILTY GRAVEL WITH ORGANICS (GM)</b> , loose, brown, moist						
			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist						
5			Organic lens		S1		S1	S1 MC = 2.8% P200 = 1.1%	
			<b>SILTY GRAVEL (GM)</b> , medium dense, brown, moist						
10			Dense						

Bottom of borehole at 12.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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# EXPLORATION NLT-16

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**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/22/2022 @ 12:15:00 PM      **DATE/TIME COMPLETED:** 2/22/2022 @ 12:45:00 PM  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▽ GROUNDWATER (I):** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0		<b>ORGANICS</b>						
		<b>SILTY GRAVEL WITH ORGANICS (GM)</b> , loose, brown, moist						
		<b>SILTY GRAVEL (GM)</b> , loose, brown, moist						
5		<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist	☞	S1	█	S1	S1 MC = 3.7%	
10			☞	S2	█	S2	S2 MC = 5.2% 65.5% gravel, 31.1% sand, 3.4% silt	

Bottom of borehole at 14.0 ft bgs.  
Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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# EXPLORATION NLT-17

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**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/22/2022 @ 11:25:00 AM      **DATE/TIME COMPLETED:** 2/22/2022 @ 12:10:00 PM  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▼ GROUNDWATER ():** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0			<b>ORGANICS</b> SILT WITH ORGANICS (ML), soft, brown, moist						
			SILTY GRAVEL (GM), medium dense, brown, moist						
5			WELL GRADED GRAVEL WITH SAND (GW), medium dense, brown, moist	←	S1		S1	S1 MC = 6.5% P200 = 5.0%	
10			SILTY GRAVEL (GM), medium dense, brown, moist, boulders up to 2' in diameter						

Bottom of borehole at 12.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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# EXPLORATION NR-1

**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/23/2022 @ 4:36:00 PM      **DATE COMPLETED:** 2/23/2022  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▽ GROUNDWATER (I):** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0									
			<b>ORGANICS</b>						
			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist						
			<b>SILT (ML)</b> , trace rootlets, dark brown, moist						
5			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , trace rootlets, medium dense, brown, moist		S1		S1	S1 MC = 3.0% 64.1% gravel, 34.3% sand, 1.6% silt P0.02 = 0.6% FC = NFS	
			<b>SILT (ML)</b> , dark brown, moist, trace rootlets						
			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist						
10									

Bottom of borehole at 12.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils. Set 4" PVC to 4.5 ft bgs open-ended.



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# EXPLORATION NR-2

**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/24/2022 @ 10:15:00 AM      **DATE COMPLETED:** 2/24/2022  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▼ GROUNDWATER ():** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0			<b>ORGANICS</b>						
			<b>SILTY GRAVEL TO WELL GRADED GRAVEL WITH SILT (GM)</b> , medium dense, brown, moist						
5			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist	☞	S1		S1	S1 MC = 3.7% 68.9% gravel, 28.5% sand, 2.6% silt	
10			<b>SILTY GRAVEL (GM)</b> , dense, brown, moist						

Bottom of borehole at 14.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils. Set 4" PVC to 6.55 ft bgs open-ended.



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# EXPLORATION SLT-1

**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/21/2022 @ 10:30:00 AM      **DATE/TIME COMPLETED:** 2/21/2022 @ 11:15:00 AM  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▽ GROUNDWATER ():** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0			<b>ORGANICS</b> brown						
			<b>POORLY GRADED GRAVEL (GP)</b> , loose, brown, moist						
			<b>SILT (ML)</b> , soft, brown, moist						
			<b>SILTY GRAVEL (GM)</b> , medium dense, brown, moist						
5									
			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist	Hand	S1		S1	S1 MC = 3.6%	
10									

Bottom of borehole at 14.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.





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# EXPLORATION SLT-2

**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/21/2022 @ 4:55:00 PM      **DATE/TIME COMPLETED:** 2/21/2022 @ 5:15:00 PM  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▼ GROUNDWATER ():** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0								
		ORGANICS medium dense, moist						
		SILTY GRAVEL (GM), medium dense, brown, moist						
		WELL GRADED GRAVEL WITH SAND (GW), medium dense, brown, moist						
5				S1		S1	S1 MC = 3.7% 61.3% gravel, 36.3% sand, 2.4% silt	
		SILT (ML), trace rootlets, medium stiff, brown, moist						
10								
		WELL GRADED GRAVEL WITH SAND (GW), medium dense, brown, moist						
		SILT (ML), medium stiff, brown, moist						

Bottom of borehole at 14.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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# EXPLORATION SLT-3

**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/21/2022 @ 3:10:00 PM      **DATE/TIME COMPLETED:** 2/21/2022 @ 3:35:00 PM  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▼ GROUNDWATER ():** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0									
			<b>ORGANICS</b>						
			<b>POORLY GRADED GRAVEL (GP)</b> , medium dense, brown, moist						
			<b>SILT WITH ORGANICS (ML)</b> , medium stiff, brown, moist						
			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist						
5				Hand	S1		S1	S1 MC = 6.1%	
			<b>SILT (ML)</b> , medium stiff, brown, moist						
10				Hand	S2		S2	S2 MC = 4.2% P200 = 1.7%	
			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist						
15									
			<b>SILT (ML)</b> , medium stiff, brown, moist						

Bottom of borehole at 15.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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# EXPLORATION SLT-5

**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/21/2022 @ 2:40:00 PM      **DATE/TIME COMPLETED:** 2/21/2022 @ 3:00:00 PM  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▽ GROUNDWATER (I):** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0								
		<b>ORGANICS</b>						
		<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , trace organics, loose to medium dense, brown, moist						
		<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist						
		<b>SILTY GRAVEL (GM)</b> , medium dense, brown, moist						
5		<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist						
		<b>SILT (ML)</b> , medium stiff, brown, moist						
		<b>POORLY GRADED GRAVEL WITH SILT (GP-GM)</b> , medium dense, brown, moist						
10		<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist	Hand	S1		S1	S1 MC = 7.9% 62.8% gravel, 36.0% sand, 1.2% silt	
		<b>SILT (ML)</b> , medium stiff, brown, moist						
		<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist	Hand	S2		S2	S2 MC = 9.9%	

Bottom of borehole at 14.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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# EXPLORATION SLT-6

**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/21/2022 @ 1:15:00 PM      **DATE/TIME COMPLETED:** 2/21/2022 @ 1:40:00 PM  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▽ GROUNDWATER ():** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0									
			<b>ORGANICS</b>						
			<b>SILT WITH ORGANICS (ML)</b> , soft, brown, moist						
			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist						
			<b>SILT (ML)</b> , medium stiff, brown, moist						
5			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist	☞	S1		S1	S1 MC = 5.8%	
10				☞	S2		S2	S2 MC = 3.5% P200 = 1.4%	
15			<b>SILT (ML)</b> , medium stiff, brown, moist						

Bottom of borehole at 15.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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# EXPLORATION SLT-7A

PAGE 1 OF 1

**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/21/2022 @ 12:35:00 PM      **DATE/TIME COMPLETED:** 2/21/2022 @ 1:00:00 PM  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▼ GROUNDWATER ():** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0			<b>ORGANICS</b> SILT WITH ORGANICS (ML), soft, brown						
5			WELL GRADED GRAVEL WITH SAND (GW), medium dense, brown, moist	Hand	S1		S1	S1 MC = 11.1% 73.3% gravel, 24.0% sand, 2.7% silt	
			SILT (ML), medium stiff, brown, moist						
10			WELL GRADED GRAVEL WITH SAND (GW), medium dense, brown, moist	Hand	S2		S2	S2 MC = 5.9%	
			SILT (ML), medium stiff, brown, moist						

Bottom of borehole at 14.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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# EXPLORATION SLT-7B

PAGE 1 OF 1

**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/21/2022 @ 12:10:00 PM      **DATE/TIME COMPLETED:** 2/21/2022 @ 12:30:00 PM  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▼ GROUNDWATER ():** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0									
			<b>ORGANICS</b>						
			<b>SILTY GRAVEL WITH ORGANICS (GM)</b> , loose, brown, moist						
			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist						
5			<b>SILT (ML)</b> , soft, brown, moist	Hand	S1		S1	S1 MC = 8.4%	
			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist						
10			<b>SILT (ML)</b> , soft to medium dense, brown, moist						
			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist	Hand	S2		S2	S2 MC = 5.3% P200 = 2.1%	

Bottom of borehole at 14.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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# EXPLORATION SLT-8

**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22  
**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks  
**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation  
**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf  
**DATE/TIME STARTED:** 2/11/2022 @ 12:05:00 PM      **DATE COMPLETED:** 2/11/2022  
**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known  
**▽ GROUNDWATER (ATD):** N/E      **▼ GROUNDWATER ():** N/E  
**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** Cloudy, 24°F

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0			ORGANIC MAT brown						
			SILTY GRAVEL (GM), trace organics, loose, brown, moist						
			WELL GRADED GRAVEL WITH SAND (GW), medium dense, brown, moist						
5			SILTY GRAVEL (GM), medium dense, brown, moist						
			SILT (ML), soft, brown / dark brown, moist		S1		S1	S1 MC = 4.6% 83.7% gravel, 15.5% sand, 0.8% silt	
			WELL GRADED GRAVEL WITH SAND (GW), medium dense, brown, moist						
10			SILT (ML), soft, brown / dark brown, moist						

Bottom of borehole at 14.0 ft bgs.  
Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.



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# EXPLORATION SLT-10

PAGE 1 OF 1

<b>NGE-TFT PROJECT NAME:</b> <u>Maud Road Housing Development</u>	<b>NGE-TFT PROJECT NUMBER:</b> <u>6273-22</u>
<b>PROJECT LOCATION:</b> <u>Palmer, AK</u>	<b>EXPLORATION CONTRACTOR:</b> <u>Alaska Dirtworks</u>
<b>EXPLORATION EQUIPMENT:</b> <u>Hitachi 135</u>	<b>EXPLORATION METHOD:</b> <u>Test Pit Excavation</u>
<b>SAMPLING METHOD:</b> <u>Grab Sample</u>	<b>LOGGED BY:</b> <u>C. Banzhaf</u>
<b>DATE/TIME STARTED:</b> <u>2/11/2022 @ 10:55:00 AM</u>	<b>DATE/TIME COMPLETED:</b> <u>2/11/2022 @ 11:30:00 AM</u>
<b>EXPLORATION LOCATION:</b> <u>See report Figure 2</u>	<b>GROUND ELEVATION:</b> <u>Not Known</u>
<b>▽ GROUNDWATER (ATD):</b> <u>N/E</u>	<b>▽ GROUNDWATER ():</b> <u>N/E</u>
<b>EXPLORATION COMPLETION:</b> <u>See comments at end of log</u>	<b>WEATHER CONDITIONS:</b> <u>Cloudy, 29°F</u>

DEPTH (ft bgs)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0		<b>ORGANIC MAT</b>						
		<b>POORLY GRADED GRAVEL (GP)</b> , trace organics, medium dense, brown, moist						
		<b>SILTY GRAVEL (GM)</b> , medium dense, brown, moist						
5		<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense to dense, brown, moist, some cobbles						
10		<b>SILTY GRAVEL (GM)</b> , medium dense, moist	Hand	S1		S1	S1 MC = 3.8%	
		<b>SILT (ML)</b> , soft, brown and gray, moist	Hand	S2		S2	S2 MC = 15.2% P200 = 16.3%	
Bottom of borehole at 13.5 ft bgs. Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils.								





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# EXPLORATION SR-1

**NGE-TFT PROJECT NAME:** Maud Road Housing Development      **NGE-TFT PROJECT NUMBER:** 6273-22

**PROJECT LOCATION:** Palmer, AK      **EXPLORATION CONTRACTOR:** Alaska Dirtworks

**EXPLORATION EQUIPMENT:** Hitachi 135      **EXPLORATION METHOD:** Test Pit Excavation

**SAMPLING METHOD:** Grab Sample      **LOGGED BY:** C. Banzhaf

**DATE/TIME STARTED:** 2/21/2022 @ 3:55:00 PM      **DATE/TIME COMPLETED:** 2/21/2022 @ 4:30:00 PM

**EXPLORATION LOCATION:** See report Figure 2      **GROUND ELEVATION:** Not Known

**▽ GROUNDWATER (ATD):** N/E      **▼ GROUNDWATER ():** N/E

**EXPLORATION COMPLETION:** See comments at end of log      **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0									
			<b>ORGANICS</b> SILT (ML), some organics, soft, brown, moist						
			<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist	Hand	S1	█	S1	S1 MC = 8.1% 59.4% gravel, 36.5% sand, 4.1% silt P0.02 = 1.7% FC = PFS	
5		SILT (ML), trace rootlets, medium stiff, brown, moist							
		<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist	Hand	S2	█	S2	S2 MC = 4.4%		
10		SILT (ML), medium stiff, brown, moist							
		<b>WELL GRADED GRAVEL WITH SAND (GW)</b> , medium dense, brown, moist							
15									

Bottom of borehole at 15.0 ft bgs.  
Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils. Set 4" PVC to 9.35 ft bgs open-ended.



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# EXPLORATION SR-2

<b>NGE-TFT PROJECT NAME:</b> <u>Maud Road Housing Development</u>	<b>NGE-TFT PROJECT NUMBER:</b> <u>6273-22</u>
<b>PROJECT LOCATION:</b> <u>Palmer, AK</u>	<b>EXPLORATION CONTRACTOR:</b> <u>Alaska Dirtworks</u>
<b>EXPLORATION EQUIPMENT:</b> <u>Hitachi 135</u>	<b>EXPLORATION METHOD:</b> <u>Test Pit Excavation</u>
<b>SAMPLING METHOD:</b> <u>Grab Sample</u>	<b>LOGGED BY:</b> <u>C. Banzhaf</u>
<b>DATE/TIME STARTED:</b> <u>2/21/2022 @ 5:25:00 PM</u>	<b>DATE/TIME COMPLETED:</b> <u>2/21/2022 @ 6:00:00 PM</u>
<b>EXPLORATION LOCATION:</b> <u>See report Figure 2</u>	<b>GROUND ELEVATION:</b> <u>Not Known</u>
<b>▽ GROUNDWATER (ATD):</b> <u>N/E</u>	<b>▼ GROUNDWATER ():</b> <u>N/E</u>
<b>EXPLORATION COMPLETION:</b> <u>See comments at end of log</u>	<b>WEATHER CONDITIONS:</b> _____

DEPTH (ft bgs)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0									
			<b>ORGANICS</b>						
			<b>WELL GRADED GRAVEL WITH SAND TO POORLY GRADED GRAVEL WITH SAND (GW),</b> medium dense, brown, moist, boulder up to 2' in diameter						
5				Hand	S1		S1	S1 MC = 4.8% 70.0% gravel, 25.2% sand, 4.8% silt P0.02 = 2.1% FC = PFS	
10				Hand	S2		S2	S2 MC = 4.1%	
15									

Bottom of borehole at 15.0 ft bgs.  
 Set 1" PVC to BOH. Hand slot bottom 5' of casing. Backfilled with spoils. Set 4" PVC to 3.2 ft bgs open-ended.



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# EXPLORATION LEGEND

CLIENT Eklutna, Inc.

NGE-TFT PROJECT NAME Maud Road Housing Development

NGE-TFT PROJECT NUMBER 6273-22

PROJECT LOCATION Palmer, AK

## LITHOLOGIC SYMBOLS (Unified Soil Classification System)



GM: USCS Silty Gravel



GP: USCS Poorly-graded Gravel



GP-GM: USCS Poorly-graded Gravel with Silt



GPS: Sandy Gravel



GW: USCS Well-graded Gravel



GWS: USCS Well-graded Sandy Gravel



ML: USCS Silt



OH: USCS High Plasticity Organic silt or clay



SM: USCS Silty Sand

## SAMPLER SYMBOLS



Grab Sample

## WELL CONSTRUCTION SYMBOLS



Slough Backfill



Slotted Pipe  
Backfilled with  
Slough

## ABBREVIATIONS

LL - LIQUID LIMIT (%)  
PI - PLASTIC INDEX (%)  
MC - MOISTURE CONTENT (%)  
DD - DRY DENSITY (PCF)  
NP - NON PLASTIC  
P200 - PERCENT PASSING NO. 200 SIEVE  
P0.02- PERCENT PASSING 0.02mm SIEVE  
PP - POCKET PENETROMETER (tons/ft<sup>2</sup>)  
S/U - CASING STICK-UP

▽ Water Level at Time  
Drilling, or as Shown

▼ Water Level After 24  
Hours, or as Shown

TV - TORVANE  
PID - PHOTOIONIZATION DETECTOR  
UC - UNCONFINED COMPRESSION  
ppm - PARTS PER MILLION  
N/E - NOT ENCOUNTERED  
N/R - NOT REPRESENTATIVE  
N/A - NOT APPLICABLE



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# SOIL CLASSIFICATION CHART

CLIENT Eklutna, Inc.

PROJECT NAME Maud Road Housing Development

NGE-TFT PROJECT NUMBER 6273-22

PROJECT LOCATION Palmer, AK

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS	
			GRAPH	LETTER		
<p>COARSE GRAINED SOILS</p> <p>MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE</p>	<p>GRAVEL AND GRAVELLY SOILS</p> <p>MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE</p>	<p>CLEAN GRAVELS</p> <p>(LITTLE OR NO FINES)</p>		<b>GW</b>	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES	
		<p>GRAVELS WITH FINES</p> <p>(APPRECIABLE AMOUNT OF FINES)</p>		<b>GP</b>	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES	
		<p>GRAVELS WITH FINES</p> <p>(APPRECIABLE AMOUNT OF FINES)</p>		<b>GM</b>	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES	
		<p>GRAVELS WITH FINES</p> <p>(APPRECIABLE AMOUNT OF FINES)</p>		<b>GC</b>	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES	
	<p>SAND AND SANDY SOILS</p> <p>MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE</p>	<p>CLEAN SANDS</p> <p>(LITTLE OR NO FINES)</p>		<b>SW</b>	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
		<p>CLEAN SANDS</p> <p>(LITTLE OR NO FINES)</p>		<b>SP</b>	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES	
		<p>SANDS WITH FINES</p> <p>(APPRECIABLE AMOUNT OF FINES)</p>		<b>SM</b>	SILTY SANDS, SAND - SILT MIXTURES	
		<p>SANDS WITH FINES</p> <p>(APPRECIABLE AMOUNT OF FINES)</p>		<b>SC</b>	CLAYEY SANDS, SAND - CLAY MIXTURES	
		<p>FINE GRAINED SOILS</p> <p>MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE</p>	<p>SILTS AND CLAYS</p> <p>LIQUID LIMIT LESS THAN 50</p>		<b>ML</b>	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
					<b>CL</b>	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	<b>OL</b>			ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY		
<p>SILTS AND CLAYS</p> <p>LIQUID LIMIT GREATER THAN 50</p>	<p>SILTS AND CLAYS</p> <p>LIQUID LIMIT GREATER THAN 50</p>		<b>MH</b>	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS		
			<b>CH</b>	INORGANIC CLAYS OF HIGH PLASTICITY		
			<b>OH</b>	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS		
<p>HIGHLY ORGANIC SOILS</p>				<b>PT</b>	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS. DIAGONAL LINES INDICATE UNKNOWN DEPTH OF SOIL TRANSITION.



Northern Geotechnical Engineering, Inc.  
and Terra Firma Testing  
11301 Olive Lane  
Anchorage, AK 99515  
Telephone: 907-344-5934

# EXPLORATION LOG KEY








CLIENT Eklutna, Inc.

PROJECT NAME Maud Road Housing Development

NGE-TFT PROJECT NUMBER 6273-22

PROJECT LOCATION Palmer, AK

## SAMPLER SYMBOLS

-  SPT w/ 140# Hammer  
30" Drop and 2.0" O.D. Sampler
-  Modified SPT w/ 340# Hammer  
30" Drop and 3.0 O.D. Sampler
-  Grab Sample
-  Shelby Tube Sample
-  Rock Core Sample
-  Direct Push Sample
-  No Recovery
- N/E** Not Encountered





## COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No. 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No. 4 (4.5 mm)
Sand	No. 4 (4.5 mm) to No. 200
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074 mm)

## COMPONENT PROPORTIONS

DESCRIPTIVE TERMS	RANGE OF PROPORTION
Trace	1-5%
Few	5-10%
Little	10-20%
Some	20-35%
And	35-50%

## WELL SYMBOLS

-  1" Slotted Pipe  
Backfilled with Silica Sand
-  1" PVC Pipe  
Backfilled with Auger Cuttings
-  1" PVC Pipe  
with Bentonite Seal
-  Capped Riser

## MOISTURE CONTENT

DRY	Absence of moisture, dusty, dry to the touch
DAMP	Some perceptible moisture; below optimum
MOIST	No visible water; near optimum moisture content
WET	Visible free water, usually soil is below water table

## RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALUE

COHESIONLESS SOILS			COHESIVE SOILS		
DENSITY	N (BLOWS/FT)	APPROXIMATE RELATIVE DENSITY (%)	CONSISTENCY	N (BLOWS/FT)	APPROXIMATE UNDRAINED SHEAR STRENGTH (PSF)
VERY LOOSE	0-4	0-15	VERY SOFT	0-1	< 250
LOOSE	5-10	15-35	SOFT	2-4	250-500
MEDIUM DENSE	11-25	35-65	MEDIUM STIFF	5-8	500-1000
DENSE	26-50	65-85	STIFF	9-15	1000-2000
VERY DENSE	> 50	85-100	VERY STIFF	16-30	2000-4000
			HARD	> 30	> 4000



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# EXPLORATION LOG KEY

CLIENT Eklutna, Inc. PROJECT NAME Maud Road Housing Development  
 NGE-TFT PROJECT NUMBER 6273-22 PROJECT LOCATION Palmer, AK

## FROST DESIGN SOIL CLASSIFICATION

FROST GROUP (USACOE)	FROST GROUP (M.O.A.)	SOIL TYPE	% FINER THAN 0.02mm BY MASS	TYPICAL SOIL TYPES UNDER UNIFIED SOIL CLASSIFICATION SYSTEM
NFS*	NFS*	(A) GRAVELS CRUSHED STONE CRUSHED ROCK	0 - 1.5	GW, GP
		(B) SANDS	0 - 3	SW, SP
PFS*	NFS*	(A) GRAVELS CRUSHED STONE CRUSHED ROCK	1.5 - 3	GW, GP
	F2	(B) SANDS	3 - 10	SW, SP
S1	F1	GRAVELLY SOILS	3 - 6	GW, GP, GW-GM, GP-GM
S2	F2	SANDY SOILS	3 - 6	SW, SP, SW-SM, SP-SM
F1	F1	GRAVELLY SOILS	6 - 10	GM, GW-GM, GP-GM
F2	F2	(A) GRAVELLY SOILS	10 - 20	GM, GW-GM, GP-GM SM, SW-SM, SP-SM
		(B) SANDS	6 - 15	
F3	F3	(A) GRAVELLY SOILS	Over 20	GM, GC SM, SC CL, CH
		(B) SANDS, EXCEPT VERY FINE SILTY SANDS	Over 15	
		(C) CLAYS, PI>12	-----	
F4	F4	(A) ALL SILTS	-----	ML, MH SM CL, CL-ML  CL & ML; CL, ML, & SM; CL, CH, & ML; CL, CH, ML, & SM
		(B) VERY FINE SILTY SANDS	Over 15	
		(C) CLAYS, PI<12	-----	
		(D) VARVED CLAYS AND OTHER FINE GRAINED, BANDED SEDIMENTS	-----	
*Non-frost susceptible				
*Possibly frost susceptible, but requires lab testing to determine frost design soils classification.				

## ICE CLASSIFICATION SYSTEM

GROUP	ICE VISIBILITY	DESCRIPTION	SYMBOL
N	SEGREGATED ICE NOT VISIBLE BY EYE	POORLY BONDED OR FRIABLE	Nf
		WELL BONDED	Nb
		NO EXCESS ICE	
V	SEGREGATED ICE IS VISIBLE BY EYE AND IS ONE INCH OR LESS IN THICKNESS	EXCESS MICROSCOPIC ICE	Nbe
		INDIVIDUAL ICE CRYSTALS OR INCLUSIONS	Vx
		ICE COATINGS ON PARTICLES	Vc
		RANDOM OR IRREGULARLY ORIENTED ICE	Vr
		STRATIFIED OR DISTINCTLY ORIENTED ICE	Vs
ICE	ICE IS GREATER THAN ONE INCH IN THICKNESS	UNIFORMLY DISTRIBUTED ICE	Vu
		ICE WITH SOILS INCLUSIONS	ICE + Soil Type
		ICE WITHOUT SOILS INCLUSIONS	ICE



**APPENDIX B**

**INFILTRATION TEST RESULTS**



### PERCOLATION TEST DATA FORM

Location: Maud Rd. Housing Development  
 Borehole/Test Pit ID: NR1  
 Depth to BOH - measured from GS (inches): 52.8   Stickup Height (inches): 0  
 Diameter of Casing (inches): 4   Borehole Diameter (inches): 6  
 Percolation test conducted by: Clinton Banzhaf  
 Date of Test: 2/25/2022

Measurement Time	Elapsed Time	Water Level BTOC (inches)	Drop in Water Level (inches)	Percolation Rate (min/inch)	Remarks
15:24		40.8			Twelve (12) inches of water seeped away in less than 10 minutes twice, test may proceed immediately without soaking
15:34	0:09:28	52.8	12		
15:35		40.8			
15:45	0:09:40	52.8	12		
15:45		46.8	-		Test Start
15:53	0:07:37	52.8	6	1.3	
15:54		46.8	-		
16:05	0:11:30	52.8	6	1.9	
16:16		46.8	-		
16:27	0:11:20	52.8	6	1.9	
					Test End

Percolation Rate = 1.9 minutes per inch





### PERCOLATION TEST DATA FORM

Location: Maud Rd. Housing Development  
 Borehole/Test Pit ID: NR2  
 Depth to BOH - measured from GS (inches): 78.6   Stickup Height (inches): 0  
 Diameter of Casing (inches): 4   Borehole Diameter (inches): 6  
 Percolation test conducted by: Clinton Banzhaf  
 Date of Test: 2/25/2022

Measurement Time	Elapsed Time	Water Level BTOC (inches)	Drop in Water Level (inches)	Percolation Rate (min/inch)	Remarks
13:56		66.6			Twelve (12) inches of water seeped away in less than 10 minutes twice, test may proceed immediately without soaking
14:06	0:09:55	78.6	12		
14:01		66.6			
14:11	0:09:55	78.6	12		
14:12		72.6	-		Test Start
14:18	0:05:38	78.6	6	0.9	
14:18		72.6	-		
14:27	0:08:50	78.6	6	1.5	
14:28		72.6	-		
14:37	0:09:08	78.6	6	1.5	
					Test End

Percolation Rate = 1.5 minutes per inch



### PERCOLATION TEST DATA FORM

Location: Maud Rd. Housing Development  
 Borehole/Test Pit ID: SR1  
 Depth to BOH - measured from GS (inches): 112.2   Stickup Height (inches): 0  
 Diameter of Casing (inches): 4   Borehole Diameter (inches): 6  
 Percolation test conducted by: Clinton Banzhaf  
 Date of Test: 2/25/2022

Measurement Time	Elapsed Time	Water Level BTOC (inches)	Drop in Water Level (inches)	Percolation Rate (min/inch)	Remarks
11:25		100.2			Twelve (12) inches of water seeped away in less than 10 minutes twice, test may proceed immediately without soaking
11:26	0:00:50	112.2	12		
11:27		100.2			
11:28	0:01:03	112.2	12		
11:29		106.2	-		Test Start
11:30	0:00:29	112.2	6	0.1	
11:30		106.2	-		
11:31	0:00:31	112.2	6	0.1	
11:32		106.2	-		
11:32	0:00:32	112.2	6	0.1	
					Test End

Percolation Rate = Less than one minute per inch



**PERCOLATION TEST DATA FORM**

Location: Maud Rd. Housing Development  
 Borehole/Test Pit ID: SR2  
 Depth to BOH - measured from GS (inches): 37.6 Stickup Height (inches): 0  
 Diameter of Casing (inches): 4 Borehole Diameter (inches): 6  
 Percolation test conducted by: Clinton Banzhaf  
 Date of Test: 2/25/2022

Measurement Time	Elapsed Time	Water Level BTOC (inches)	Drop in Water Level (inches)	Percolation Rate (min/inch)	Remarks
11:45		25.6			Twelve (12) inches of water seeped away in less than 10 minutes twice, test may proceed immediately without soaking
11:46	0:01:20	37.6	12		
11:48		25.6			
11:52	0:03:24	37.6	12		
11:52		31.6	-		Test Start
11:54	0:01:23	37.6	6	0.2	
11:54		31.6	-		
11:56	0:01:35	37.6	6	0.3	
11:58		31.6	-		
11:59	0:01:37	37.6	6	0.3	
					Test End

Percolation Rate = Less than one minute per inch



**APPENDIX C**

**LABORATORY TEST RESULTS**

# Summary of Laboratory Test Results

Maud Rd. Subd. - Palmer, AK

NGE-TFT Project #:6273-22

Exploration ID	Sample Number	Depth Interval		Moisture Content ASTM D2216 (% By Dry Mass)	Particle Size Analysis ASTM C136/D7928/D6913 (% By Mass)			Passing #200 ASTM D1140 (% By Mass)	Passing 0.02mm ASTM D7928 (% By Mass)	Frost Class.	Unified Soil Classification ASTM D2487
		(ft) Top	(ft) Bottom		Gravel	Sand	Silt/Clay				
SLT1	S1	8.0	8.5	3.6							
SLT2	S1	5.0	5.5	3.7	61.3	36.3	2.4		N/A	N/A	(GW) Well-graded gravel w/ sand
SLT3	S1	6.0	6.5	6.1							
SLT3	S2	9.0	9.5	4.2				1.7			
SLT5	S1	5.5	6.0	7.9	62.8	36.0	1.2		N/A	N/A	(GW) Well-graded gravel w/ sand
SLT5	S2	9.0	9.5	9.9							
SLT6	S1	5.0	5.5	5.8							
SLT6	S2	9.0	9.5	3.5				1.4			
SLT7A	S1	4.0	4.5	11.1	73.3	24.0	2.7		N/A	N/A	(GW) Well-graded gravel w/ sand
SLT7A	S2	10.0	10.5	5.9							
SLT7B	S1	4.0	4.5	8.4							
SLT7B	S2	11.5	12.0	5.3				2.1			
SLT8	S1	5.0	5.5	4.6	83.7	15.5	0.8		N/A	N/A	(GW) Well-graded gravel w/ sand
SLT10	S1	8.0	8.5	3.8							
SLT10	S2	12.5	13.0	15.2				16.3			
NLT1	S1	4.0	4.5	1.7	80.8	18.4	0.8		N/A	N/A	(GW) Well-graded gravel w/ sand
NLT1	S2	8.5	9.0	6.2							
NLT2	S1	4.0	4.5	3.1	77.7	20.8	1.5		0.7	NFS	(GP) Poorly-graded gravel w/ sand
NLT3	S1	4.0	4.5	4.5				7.2			
NLT4	S1	5.0	5.5	3.0				1.4			
NLT5	S1	6.0	6.5	2.2	69.3	29.4	1.3		N/A	N/A	(GW) Well-graded gravel w/ sand
NLT6	S1	6.0	6.5	3.1				1.5			
NLT7	S1	6.0	6.5	3.1				2.3			
NLT8	S1	5.5	6.0	2.4				1.5			
NLT9	S1	4.0	4.5	3.0	70.0	28.4	1.6		N/A	N/A	(GW) Well-graded gravel w/ sand
NLT10	S1	5.0	5.5	2.2				0.7			
NLT11	S1	4.0	4.5	2.4	72.3	25.9	1.8		N/A	N/A	(GW) Well-graded gravel w/ sand
NLT12	S1	8.0	8.5	2.6				1.0			
NLT13	S1	7.0	7.5	5.1	66.6	31.1	2.3		N/A	N/A	(GW) Well-graded gravel w/ sand
NLT14	S1	3.0	3.5	2.2				0.8			
NLT15	S1	4.0	4.5	2.8				1.1			
NLT16	S1	5.0	5.5	3.7							
NLT16	S2	10.0	10.5	5.2	65.5	31.1	3.4		N/A	N/A	(GW) Well-graded gravel w/ sand
NLT17	S1	5.0	5.5	6.5				5.0			
SR1	S1	4.0	4.5	8.1	59.4	36.5	4.1		1.7	PFS	(GW) Well-graded gravel w/ sand
SR1	S2	9.5	10.0	4.4							
SR2	S1	4.0	4.5	4.8	70.0	25.2	4.8		2.1	PFS	(GW) Well-graded gravel w/ sand
SR2	S2	10.0	10.5	4.1							
NR1	S1	4.0	4.5	3.0	64.1	34.3	1.6		0.6	NFS	(GW) Well-graded gravel w/ sand
NR2	S1	6.0	6.5	3.7	68.9	28.5	2.6		N/A	N/A	(GP) Poorly-graded gravel w/ sand



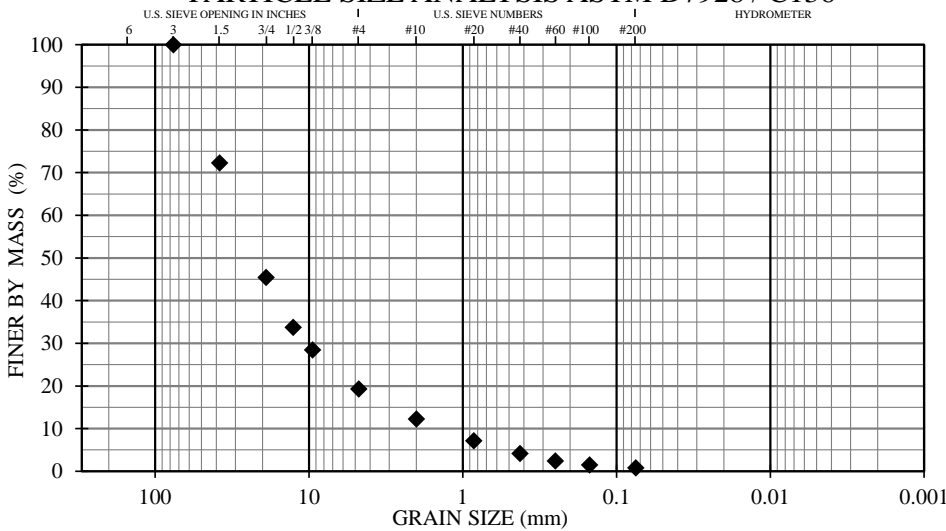
# NORTHERN GEOTECHNICAL ENGINEERING, INC. / TERRA FIRMA TESTING

Laboratory Testing   Geotechnical Engineering   Instrumentation   Construction Monitoring Services   Thermal Analysis

PROJECT CLIENT:	<b>Eklutna, Inc.</b>
PROJECT NAME:	<b>Maud Rd. Subd. - Palmer, AK</b>
PROJECT NO.:	<b>6273-22</b>
SAMPLE LOC.:	<b>NLT1</b>
NUMBER/ DEPTH:	<b>S1 / 4 - 4.5'</b>
DESCRIPTION:	<b>Well-graded gravel w/ sand</b>
DATE RECEIVED:	<b>2/28/2022</b>
TESTED BY:	<b>Erik Boatwright</b>
REVIEWED BY:	<b>CJB</b>

% GRAVEL	<b>80.8</b>	USCS	<b>GW</b>
% SAND	<b>18.4</b>	USACOE FC	<b>N/A</b>
% SILT/CLAY	<b>0.8</b>	% PASS. 0.02 mm	<b>N/A</b>
% MOIST. CONTENT	<b>1.7</b>	% PASS. 0.002 mm	<b>N/A</b>
UNIFORMITY COEFFICIENT ( $C_u$ )		<b>19.7</b>	
COEFFICIENT OF GRADATION ( $C_c$ )		<b>2.5</b>	
ASTM D1557 (uncorrected)		<b>N/A</b>	
ASTM D4718 (corrected)		<b>N/A</b>	
OPTIMUM MOIST. CONTENT. (corrected)		<b>N/A</b>	

## PARTICLE SIZE ANALYSIS ASTM D7928 / C136



COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

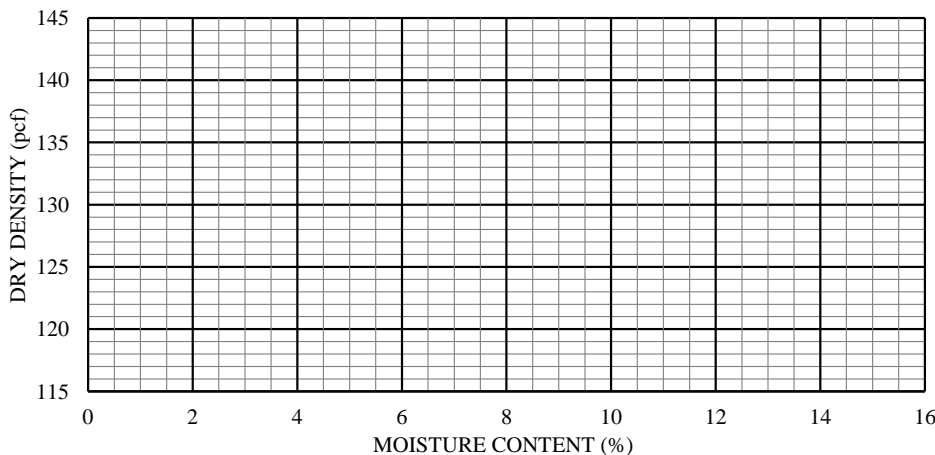
## SIEVE ANALYSIS RESULT

SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
152.40	6"		
76.20	3"	<b>100</b>	
38.10	1.5"	<b>72</b>	
19.00	3/4"	<b>45</b>	
12.70	1/2"	<b>34</b>	
9.50	3/8"	<b>28</b>	
4.75	#4	<b>19</b>	
2.00	#10	<b>12</b>	
0.85	#20	<b>7</b>	
0.43	#40	<b>4</b>	
0.25	#60	<b>2</b>	
0.15	#100	<b>1</b>	
0.075	#200	<b>0.8</b>	

## HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

## MOISTURE-DENSITY RELATIONSHIP ASTM D1557



<b>HYDRAULIC COND.</b> (ASTM D2434)	<b>N/A</b>
<b>DEGRADATION</b> (ATM T-313)	<b>N/A</b>
<b>PLASTICITY INDEX</b> ASTM 4318	<b>N/A</b>

The testing services reported herein have been performed to recognized industry standards, unless otherwise noted. No other warranty is made. Should engineering interpretation or opinion be required, NGE-TFT will provide upon written request.

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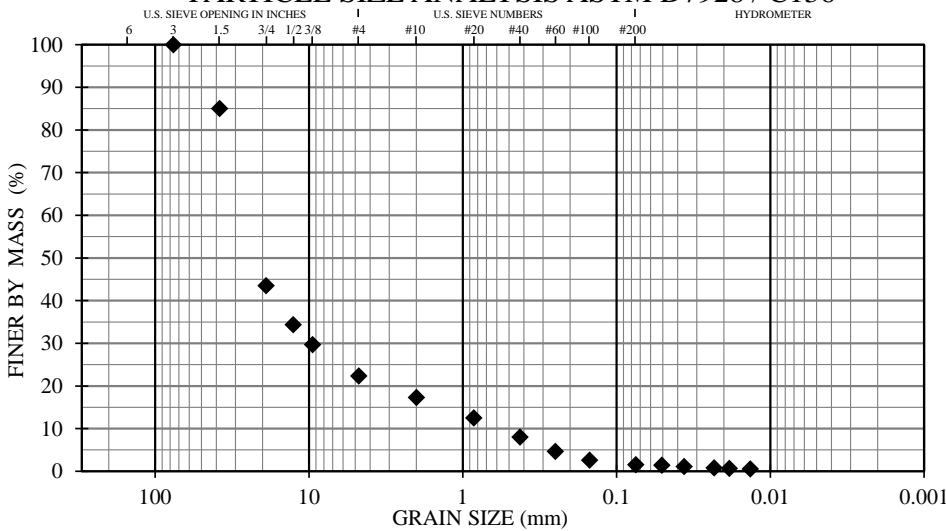
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Laboratory Testing   Geotechnical Engineering   Instrumentation   Construction Monitoring Services   Thermal Analysis

PROJECT CLIENT:	<b>Eklutna, Inc.</b>
PROJECT NAME:	<b>Maud Rd. Subd. - Palmer, AK</b>
PROJECT NO.:	<b>6273-22</b>
SAMPLE LOC.:	<b>NLT2</b>
NUMBER/ DEPTH:	<b>S1 / 4 - 4.5'</b>
DESCRIPTION:	<b>Poorly-graded gravel w/ sand</b>
DATE RECEIVED:	<b>2/28/2022</b>
TESTED BY:	<b>Erik Boatwright</b>
REVIEWED BY:	<b>CJB</b>

% GRAVEL	<b>77.7</b>	USCS	<b>GP</b>
% SAND	<b>20.8</b>	USACOE FC	<b>NFS</b>
% SILT/CLAY	<b>1.5</b>	% PASS. 0.02 mm	<b>0.7</b>
% MOIST. CONTENT	<b>3.1</b>	% PASS. 0.002 mm	<b>N/A</b>
UNIFORMITY COEFFICIENT ( $C_u$ )		<b>43.4</b>	
COEFFICIENT OF GRADATION ( $C_c$ )		<b>5.8</b>	
ASTM D1557 (uncorrected)		<b>N/A</b>	
ASTM D4718 (corrected)		<b>N/A</b>	
OPTIMUM MOIST. CONTENT. (corrected)		<b>N/A</b>	

## PARTICLE SIZE ANALYSIS ASTM D7928 / C136



COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

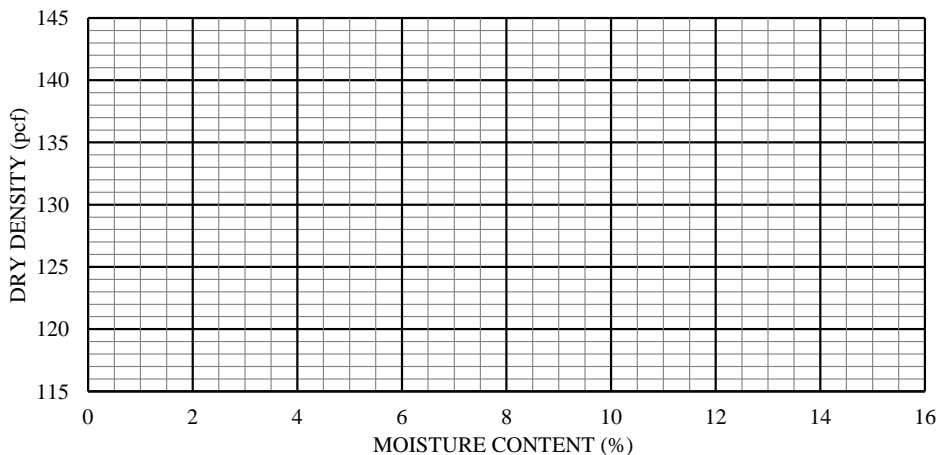
## SIEVE ANALYSIS RESULT

SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
152.40	6"		
76.20	3"	<b>100</b>	
38.10	1.5"	<b>85</b>	
19.00	3/4"	<b>44</b>	
12.70	1/2"	<b>34</b>	
9.50	3/8"	<b>30</b>	
4.75	#4	<b>22</b>	
2.00	#10	<b>17</b>	
0.85	#20	<b>12</b>	
0.43	#40	<b>8</b>	
0.25	#60	<b>5</b>	
0.15	#100	<b>3</b>	
0.075	#200	<b>1.5</b>	

## HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1	0.0509	1.4
2	0.0364	1.1
5	0.0232	0.8
8	0.0185	0.7
15	0.0135	0.5
30		
60		
250		
1440		

## MOISTURE-DENSITY RELATIONSHIP ASTM D1557



<b>HYDRAULIC COND.</b> (ASTM D2434)	<b>N/A</b>
<b>DEGRADATION</b> (ATM T-313)	<b>N/A</b>
<b>PLASTICITY INDEX</b> ASTM 4318	<b>N/A</b>

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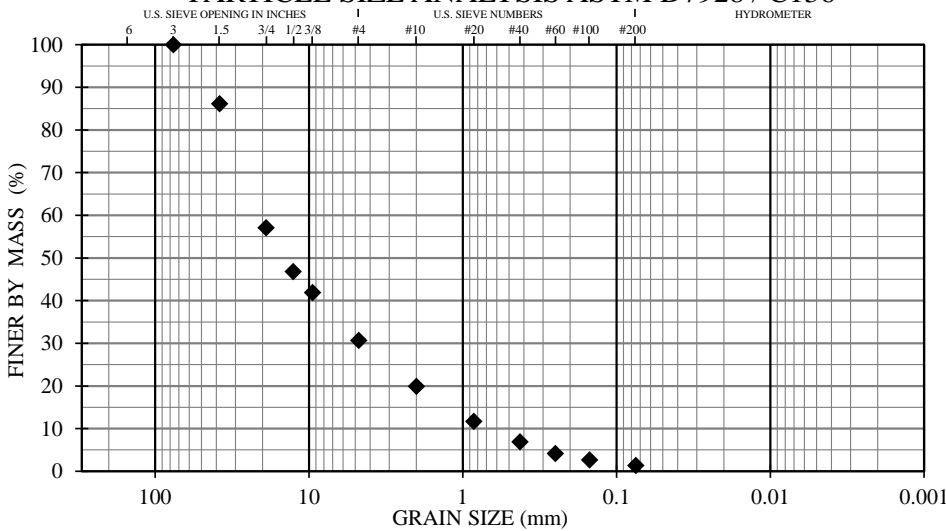
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Laboratory Testing   Geotechnical Engineering   Instrumentation   Construction Monitoring Services   Thermal Analysis

PROJECT CLIENT:	<b>Eklutna, Inc.</b>
PROJECT NAME:	<b>Maud Rd. Subd. - Palmer, AK</b>
PROJECT NO.:	<b>6273-22</b>
SAMPLE LOC.:	<b>NLT5</b>
NUMBER/ DEPTH:	<b>S1 / 6 - 6.5'</b>
DESCRIPTION:	<b>Well-graded gravel w/ sand</b>
DATE RECEIVED:	<b>2/28/2022</b>
TESTED BY:	<b>Erik Boatwright</b>
REVIEWED BY:	<b>CJB</b>

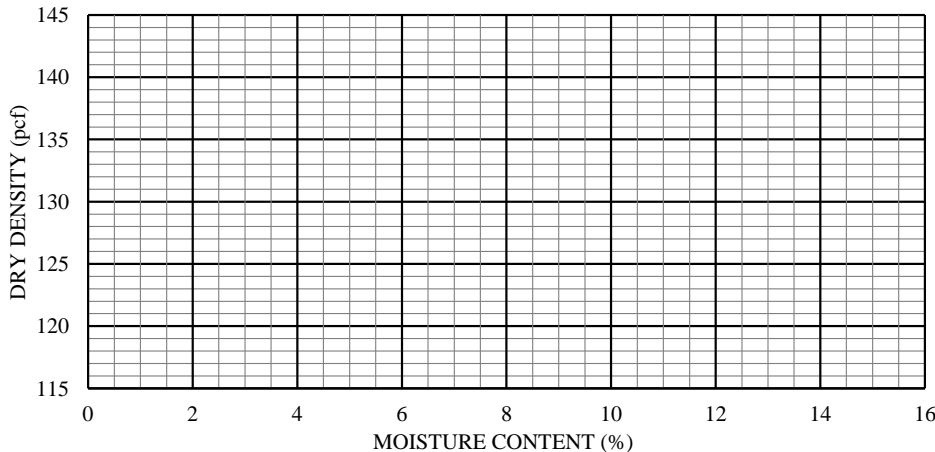
% GRAVEL	<b>69.3</b>	USCS	<b>GW</b>
% SAND	<b>29.4</b>	USACOE FC	<b>N/A</b>
% SILT/CLAY	<b>1.3</b>	% PASS. 0.02 mm	<b>N/A</b>
% MOIST. CONTENT	<b>2.2</b>	% PASS. 0.002 mm	<b>N/A</b>
UNIFORMITY COEFFICIENT ( $C_u$ )		<b>29.9</b>	
COEFFICIENT OF GRADATION ( $C_c$ )		<b>1.4</b>	
ASTM D1557 (uncorrected)		<b>N/A</b>	
ASTM D4718 (corrected)		<b>N/A</b>	
OPTIMUM MOIST. CONTENT. (corrected)		<b>N/A</b>	

## PARTICLE SIZE ANALYSIS ASTM D7928 / C136



COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

## MOISTURE-DENSITY RELATIONSHIP ASTM D1557



## SIEVE ANALYSIS RESULT

SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
152.40	6"		
76.20	3"	<b>100</b>	
38.10	1.5"	<b>86</b>	
19.00	3/4"	<b>57</b>	
12.70	1/2"	<b>47</b>	
9.50	3/8"	<b>42</b>	
4.75	#4	<b>31</b>	
2.00	#10	<b>20</b>	
0.85	#20	<b>12</b>	
0.43	#40	<b>7</b>	
0.25	#60	<b>4</b>	
0.15	#100	<b>3</b>	
0.075	#200	<b>1.3</b>	

## HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

<b>HYDRAULIC COND.</b> (ASTM D2434)	<b>N/A</b>
<b>DEGRADATION</b> (ATM T-313)	<b>N/A</b>
<b>PLASTICITY INDEX</b> ASTM 4318	<b>N/A</b>

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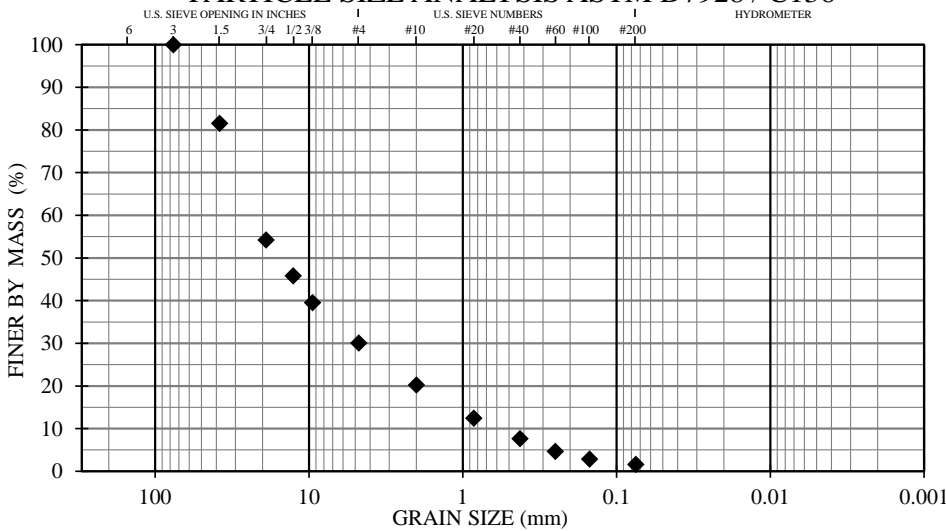
# NORTHERN GEOTECHNICAL ENGINEERING, INC. / TERRA FIRMA TESTING

Laboratory Testing   Geotechnical Engineering   Instrumentation   Construction Monitoring Services   Thermal Analysis

PROJECT CLIENT:	<b>Eklutna, Inc.</b>
PROJECT NAME:	<b>Maud Rd. Subd. - Palmer, AK</b>
PROJECT NO.:	<b>6273-22</b>
SAMPLE LOC.:	<b>NLT9</b>
NUMBER/ DEPTH:	<b>S1 / 4 - 4.5'</b>
DESCRIPTION:	<b>Well-graded gravel w/ sand</b>
DATE RECEIVED:	<b>2/28/2022</b>
TESTED BY:	<b>Erik Boatwright</b>
REVIEWED BY:	<b>CJB</b>

% GRAVEL	<b>70.0</b>	USCS	<b>GW</b>
% SAND	<b>28.4</b>	USACOE FC	<b>N/A</b>
% SILT/CLAY	<b>1.6</b>	% PASS. 0.02 mm	<b>N/A</b>
% MOIST. CONTENT	<b>3.0</b>	% PASS. 0.002 mm	<b>N/A</b>
UNIFORMITY COEFFICIENT ( $C_u$ )		<b>36.5</b>	
COEFFICIENT OF GRADATION ( $C_c$ )		<b>1.5</b>	
ASTM D1557 (uncorrected)		<b>N/A</b>	
ASTM D4718 (corrected)		<b>N/A</b>	
OPTIMUM MOIST. CONTENT. (corrected)		<b>N/A</b>	

## PARTICLE SIZE ANALYSIS ASTM D7928 / C136



COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

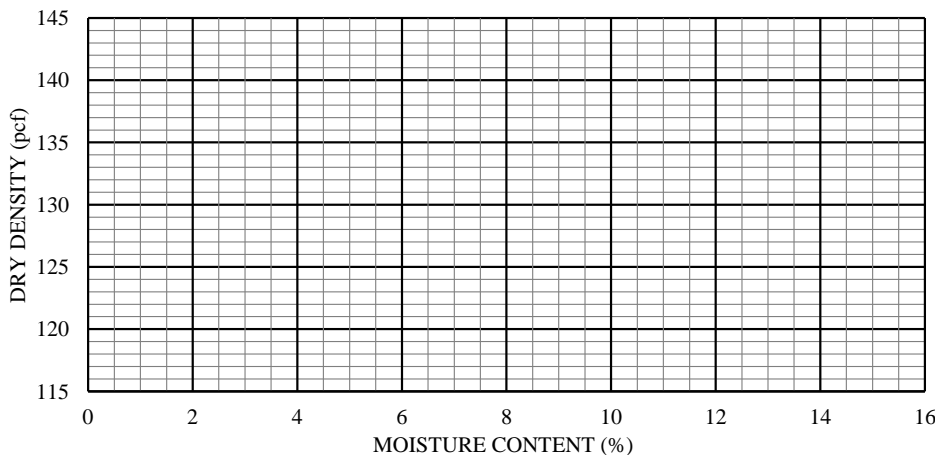
## SIEVE ANALYSIS RESULT

SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
152.40	6"		
76.20	3"	<b>100</b>	
38.10	1.5"	<b>82</b>	
19.00	3/4"	<b>54</b>	
12.70	1/2"	<b>46</b>	
9.50	3/8"	<b>40</b>	
4.75	#4	<b>30</b>	
2.00	#10	<b>20</b>	
0.85	#20	<b>12</b>	
0.43	#40	<b>8</b>	
0.25	#60	<b>5</b>	
0.15	#100	<b>3</b>	
0.075	#200	<b>1.6</b>	

## HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

## MOISTURE-DENSITY RELATIONSHIP ASTM D1557



<b>HYDRAULIC COND.</b> (ASTM D2434)	<b>N/A</b>
<b>DEGRADATION</b> (ATM T-313)	<b>N/A</b>
<b>PLASTICITY INDEX</b> ASTM 4318	<b>N/A</b>

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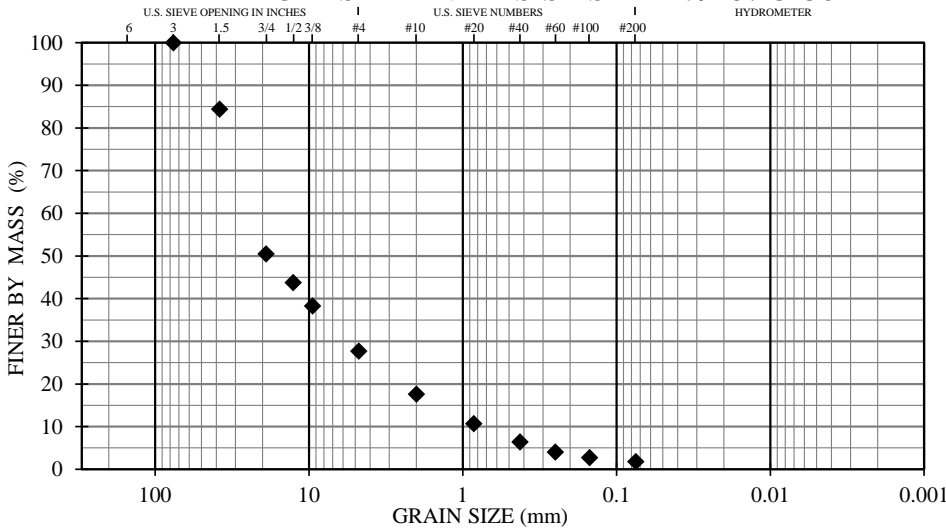
# NORTHERN GEOTECHNICAL ENGINEERING, INC. / TERRA FIRMA TESTING

Laboratory Testing   Geotechnical Engineering   Instrumentation   Construction Monitoring Services   Thermal Analysis

PROJECT CLIENT:	<b>Eklutna, Inc.</b>
PROJECT NAME:	<b>Maud Rd. Subd. - Palmer, AK</b>
PROJECT NO.:	<b>6273-22</b>
SAMPLE LOC.:	<b>NLT11</b>
NUMBER/ DEPTH:	<b>S1 / 4 - 4.5'</b>
DESCRIPTION:	<b>Well-graded gravel w/ sand</b>
DATE RECEIVED:	<b>2/28/2022</b>
TESTED BY:	<b>Erik Boatwright</b>
REVIEWED BY:	<b>CJB</b>

% GRAVEL	<b>72.3</b>	USCS	<b>GW</b>
% SAND	<b>25.9</b>	USACOE FC	<b>N/A</b>
% SILT/CLAY	<b>1.8</b>	% PASS. 0.02 mm	<b>N/A</b>
% MOIST. CONTENT	<b>2.4</b>	% PASS. 0.002 mm	<b>N/A</b>
UNIFORMITY COEFFICIENT (C <sub>u</sub> )		<b>31.2</b>	
COEFFICIENT OF GRADATION (C <sub>c</sub> )		<b>1.8</b>	
ASTM D1557 (uncorrected)		<b>N/A</b>	
ASTM D4718 (corrected)		<b>N/A</b>	
OPTIMUM MOIST. CONTENT. (corrected)		<b>N/A</b>	

## PARTICLE SIZE ANALYSIS ASTM D7928 / C136



## SIEVE ANALYSIS RESULT

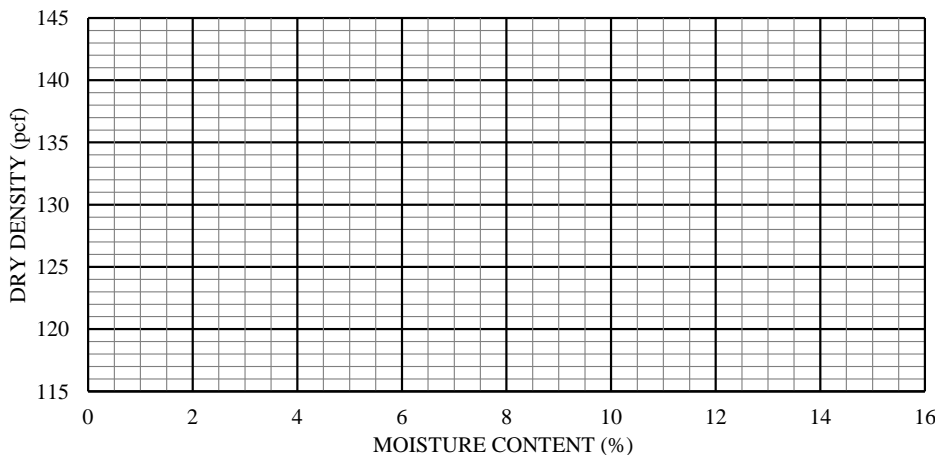
SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
152.40	6"		
76.20	3"	<b>100</b>	
38.10	1.5"	<b>84</b>	
19.00	3/4"	<b>50</b>	
12.70	1/2"	<b>44</b>	
9.50	3/8"	<b>38</b>	
4.75	#4	<b>28</b>	
2.00	#10	<b>18</b>	
0.85	#20	<b>11</b>	
0.43	#40	<b>6</b>	
0.25	#60	<b>4</b>	
0.15	#100	<b>3</b>	
0.075	#200	<b>1.8</b>	

COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

## HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

## MOISTURE-DENSITY RELATIONSHIP ASTM D1557



<b>HYDRAULIC COND.</b> (ASTM D2434)	<b>N/A</b>
<b>DEGRADATION</b> (ATM T-313)	<b>N/A</b>
<b>PLASTICITY INDEX</b> ASTM 4318	<b>N/A</b>

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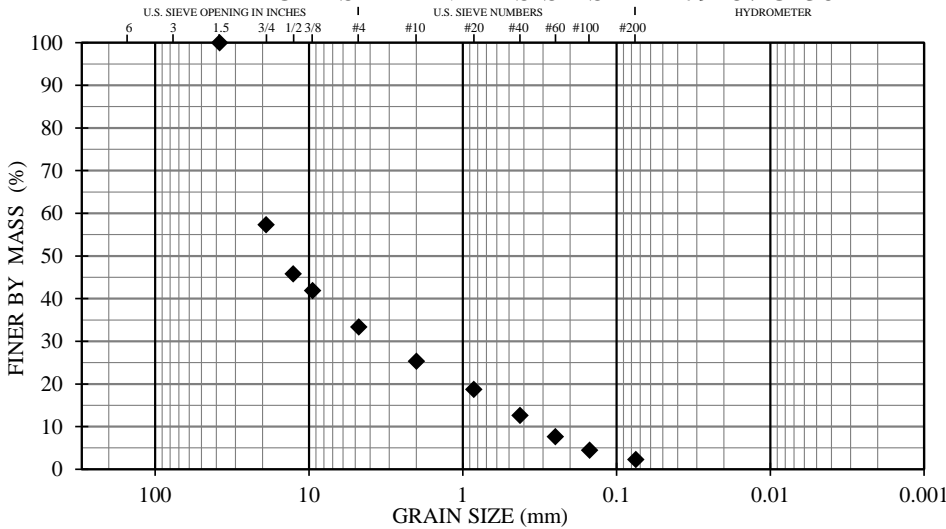
# NORTHERN GEOTECHNICAL ENGINEERING, INC. / TERRA FIRMA TESTING

Laboratory Testing   Geotechnical Engineering   Instrumentation   Construction Monitoring Services   Thermal Analysis

PROJECT CLIENT:	<b>Eklutna, Inc.</b>
PROJECT NAME:	<b>Maud Rd. Subd. - Palmer, AK</b>
PROJECT NO.:	<b>6273-22</b>
SAMPLE LOC.:	<b>NLT13</b>
NUMBER/ DEPTH:	<b>S1 / 7 - 7.5'</b>
DESCRIPTION:	<b>Well-graded gravel w/ sand</b>
DATE RECEIVED:	<b>2/28/2022</b>
TESTED BY:	<b>Erik Boatwright</b>
REVIEWED BY:	<b>CJB</b>

% GRAVEL	<b>66.6</b>	USCS	<b>GW</b>
% SAND	<b>31.1</b>	USACOE FC	<b>N/A</b>
% SILT/CLAY	<b>2.3</b>	% PASS. 0.02 mm	<b>N/A</b>
% MOIST. CONTENT	<b>5.1</b>	% PASS. 0.002 mm	<b>N/A</b>
UNIFORMITY COEFFICIENT ( $C_u$ )		<b>60.6</b>	
COEFFICIENT OF GRADATION ( $C_c$ )		<b>1.9</b>	
ASTM D1557 (uncorrected)		<b>N/A</b>	
ASTM D4718 (corrected)		<b>N/A</b>	
OPTIMUM MOIST. CONTENT. (corrected)		<b>N/A</b>	

## PARTICLE SIZE ANALYSIS ASTM D7928 / C136



COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

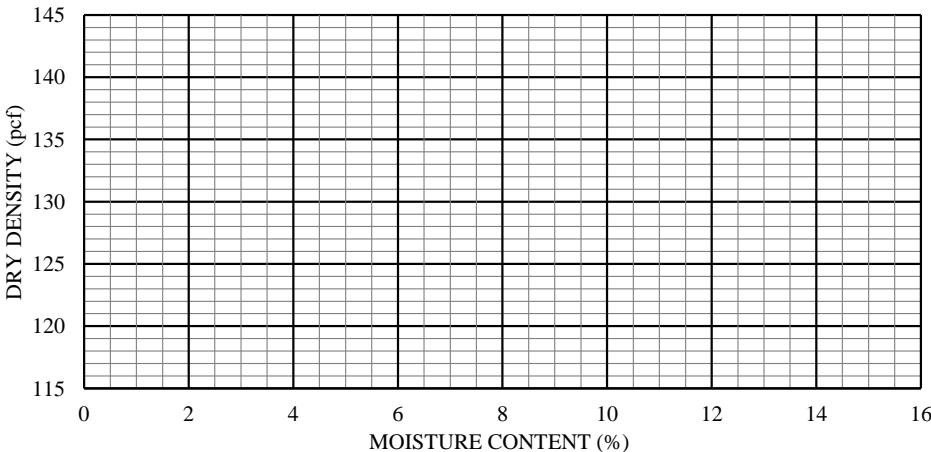
## SIEVE ANALYSIS RESULT

SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
152.40	6"		
76.20	3"		
38.10	1.5"	<b>100</b>	
19.00	3/4"	<b>57</b>	
12.70	1/2"	<b>46</b>	
9.50	3/8"	<b>42</b>	
4.75	#4	<b>33</b>	
2.00	#10	<b>25</b>	
0.85	#20	<b>19</b>	
0.43	#40	<b>13</b>	
0.25	#60	<b>8</b>	
0.15	#100	<b>4</b>	
0.075	#200	<b>2.3</b>	

## HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

## MOISTURE-DENSITY RELATIONSHIP ASTM D1557



<b>HYDRAULIC COND.</b> (ASTM D2434)	<b>N/A</b>
<b>DEGRADATION</b> (ATM T-313)	<b>N/A</b>
<b>PLASTICITY INDEX</b> ASTM 4318	<b>N/A</b>

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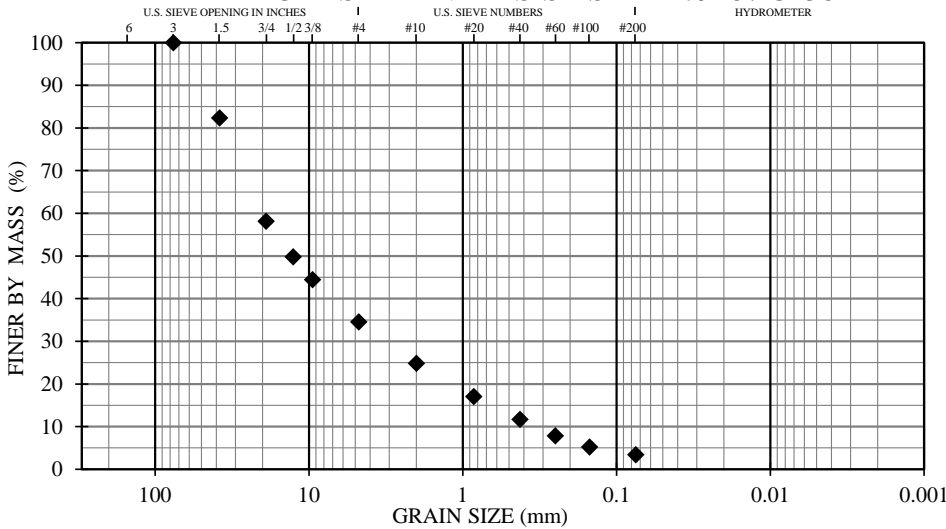
# NORTHERN GEOTECHNICAL ENGINEERING, INC. / TERRA FIRMA TESTING

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PROJECT CLIENT:	<b>Eklutna, Inc.</b>
PROJECT NAME:	<b>Maud Rd. Subd. - Palmer, AK</b>
PROJECT NO.:	<b>6273-22</b>
SAMPLE LOC.:	<b>NLT16</b>
NUMBER/ DEPTH:	<b>S2 / 10 - 10.5'</b>
DESCRIPTION:	<b>Well-graded gravel w/ sand</b>
DATE RECEIVED:	<b>2/28/2022</b>
TESTED BY:	<b>Erik Boatwright</b>
REVIEWED BY:	<b>CJB</b>

% GRAVEL	<b>65.5</b>	USCS	<b>GW</b>
% SAND	<b>31.1</b>	USACOE FC	<b>N/A</b>
% SILT/CLAY	<b>3.4</b>	% PASS. 0.02 mm	<b>N/A</b>
% MOIST. CONTENT	<b>5.2</b>	% PASS. 0.002 mm	<b>N/A</b>
UNIFORMITY COEFFICIENT (C <sub>u</sub> )		<b>58.6</b>	
COEFFICIENT OF GRADATION (C <sub>c</sub> )		<b>1.7</b>	
ASTM D1557 (uncorrected)		<b>N/A</b>	
ASTM D4718 (corrected)		<b>N/A</b>	
OPTIMUM MOIST. CONTENT. (corrected)		<b>N/A</b>	

## PARTICLE SIZE ANALYSIS ASTM D7928 / C136



## SIEVE ANALYSIS RESULT

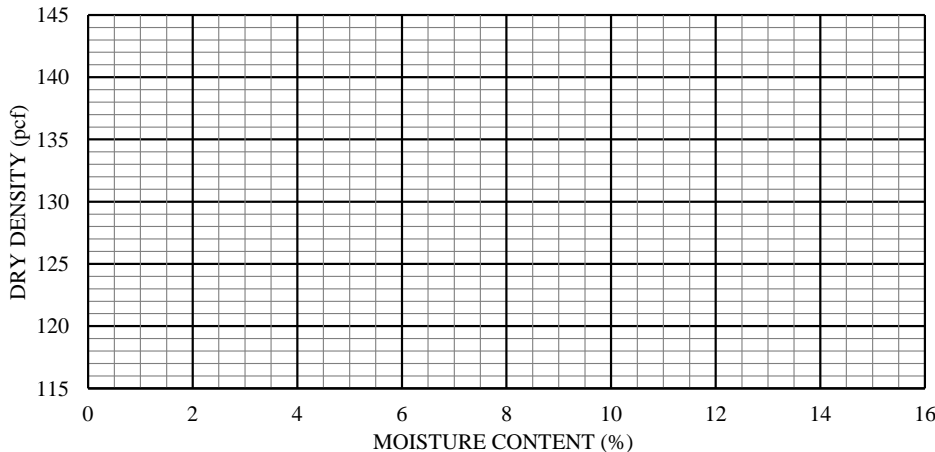
SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
152.40	6"		
76.20	3"	<b>100</b>	
38.10	1.5"	<b>82</b>	
19.00	3/4"	<b>58</b>	
12.70	1/2"	<b>50</b>	
9.50	3/8"	<b>44</b>	
4.75	#4	<b>35</b>	
2.00	#10	<b>25</b>	
0.85	#20	<b>17</b>	
0.43	#40	<b>12</b>	
0.25	#60	<b>8</b>	
0.15	#100	<b>5</b>	
0.075	#200	<b>3.4</b>	

COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

## HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

## MOISTURE-DENSITY RELATIONSHIP ASTM D1557



<b>HYDRAULIC COND.</b> (ASTM D2434)	<b>N/A</b>
<b>DEGRADATION</b> (ATM T-313)	<b>N/A</b>
<b>PLASTICITY INDEX</b> ASTM 4318	<b>N/A</b>

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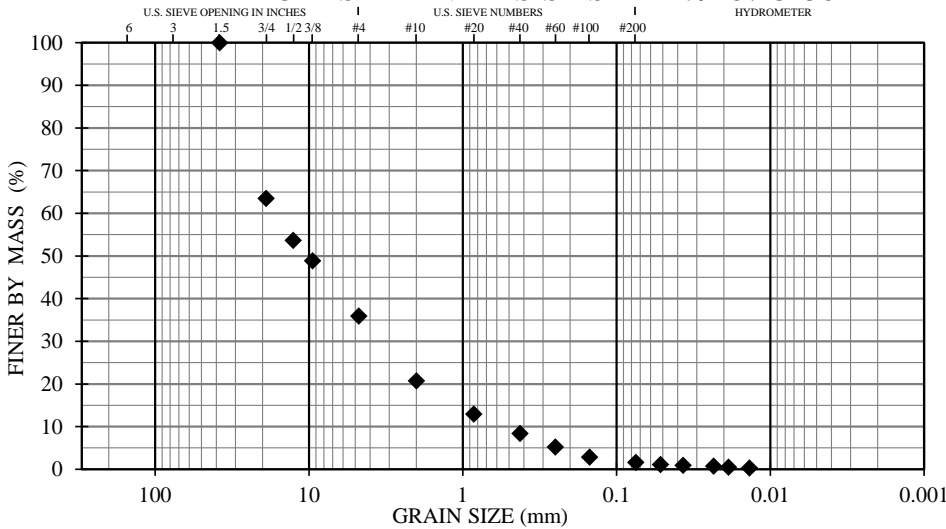
# NORTHERN GEOTECHNICAL ENGINEERING, INC. / TERRA FIRMA TESTING

Laboratory Testing   Geotechnical Engineering   Instrumentation   Construction Monitoring Services   Thermal Analysis

PROJECT CLIENT:	<b>Eklutna, Inc.</b>
PROJECT NAME:	<b>Maud Rd. Subd. - Palmer, AK</b>
PROJECT NO.:	<b>6273-22</b>
SAMPLE LOC.:	<b>NR1</b>
NUMBER/ DEPTH:	<b>S1 / 4 - 4.5'</b>
DESCRIPTION:	<b>Well-graded gravel w/ sand</b>
DATE RECEIVED:	<b>2/28/2022</b>
TESTED BY:	<b>Erik Boatwright</b>
REVIEWED BY:	<b>CJB</b>

% GRAVEL	<b>64.1</b>	USCS	<b>GW</b>
% SAND	<b>34.3</b>	USACOE FC	<b>NFS</b>
% SILT/CLAY	<b>1.6</b>	% PASS. 0.02 mm	<b>0.6</b>
% MOIST. CONTENT	<b>3.0</b>	% PASS. 0.002 mm	<b>N/A</b>
UNIFORMITY COEFFICIENT (C <sub>u</sub> )		<b>29.2</b>	
COEFFICIENT OF GRADATION (C <sub>c</sub> )		<b>1.4</b>	
ASTM D1557 (uncorrected)		<b>N/A</b>	
ASTM D4718 (corrected)		<b>N/A</b>	
OPTIMUM MOIST. CONTENT. (corrected)		<b>N/A</b>	

## PARTICLE SIZE ANALYSIS ASTM D7928 / C136



## SIEVE ANALYSIS RESULT

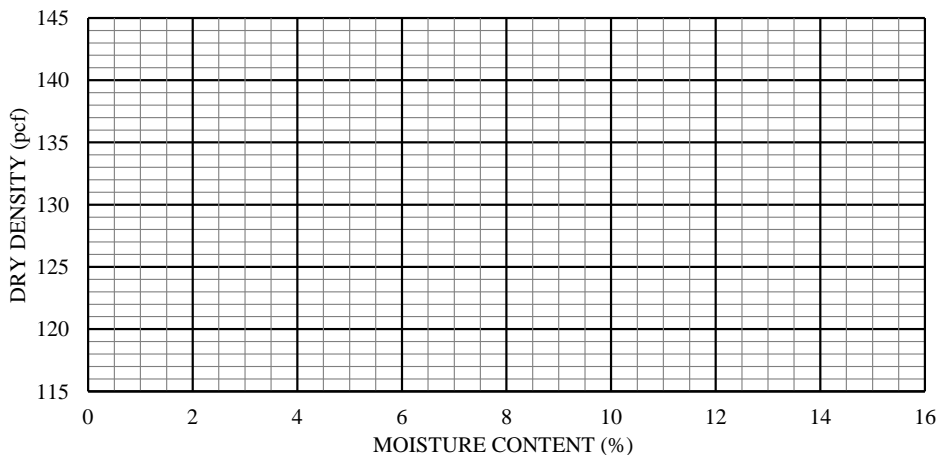
SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
152.40	6"		
76.20	3"		
38.10	1.5"	<b>100</b>	
19.00	3/4"	<b>64</b>	
12.70	1/2"	<b>54</b>	
9.50	3/8"	<b>49</b>	
4.75	#4	<b>36</b>	
2.00	#10	<b>21</b>	
0.85	#20	<b>13</b>	
0.43	#40	<b>8</b>	
0.25	#60	<b>5</b>	
0.15	#100	<b>3</b>	
0.075	#200	<b>1.6</b>	

COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

## HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1	0.0518	1.1
2	0.0370	0.9
5	0.0234	0.7
8	0.0187	0.5
15	0.0137	0.3
30		
60		
250		
1440		

## MOISTURE-DENSITY RELATIONSHIP ASTM D1557



<b>HYDRAULIC COND.</b> (ASTM D2434)	<b>N/A</b>
<b>DEGRADATION</b> (ATM T-313)	<b>N/A</b>
<b>PLASTICITY INDEX</b> ASTM 4318	<b>N/A</b>

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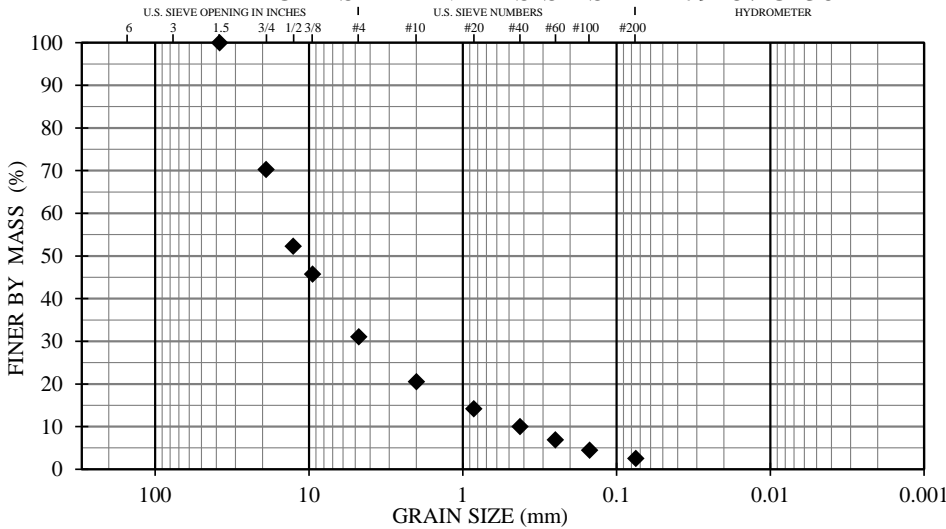
# NORTHERN GEOTECHNICAL ENGINEERING, INC. / TERRA FIRMA TESTING

Laboratory Testing   Geotechnical Engineering   Instrumentation   Construction Monitoring Services   Thermal Analysis

PROJECT CLIENT:	<b>Eklutna, Inc.</b>
PROJECT NAME:	<b>Maud Rd. Subd. - Palmer, AK</b>
PROJECT NO.:	<b>6273-22</b>
SAMPLE LOC.:	<b>NR2</b>
NUMBER/ DEPTH:	<b>S1 / 6 - 6.5'</b>
DESCRIPTION:	<b>Poorly-graded gravel w/ sand</b>
DATE RECEIVED:	<b>2/28/2022</b>
TESTED BY:	<b>Erik Boatwright</b>
REVIEWED BY:	<b>CJB</b>

% GRAVEL	<b>68.9</b>	USCS	<b>GP</b>
% SAND	<b>28.5</b>	USACOE FC	<b>N/A</b>
% SILT/CLAY	<b>2.6</b>	% PASS. 0.02 mm	<b>N/A</b>
% MOIST. CONTENT	<b>3.7</b>	% PASS. 0.002 mm	<b>N/A</b>
UNIFORMITY COEFFICIENT ( $C_u$ )		<b>36.3</b>	
COEFFICIENT OF GRADATION ( $C_c$ )		<b>3.1</b>	
ASTM D1557 (uncorrected)		<b>N/A</b>	
ASTM D4718 (corrected)		<b>N/A</b>	
OPTIMUM MOIST. CONTENT. (corrected)		<b>N/A</b>	

## PARTICLE SIZE ANALYSIS ASTM D7928 / C136



## SIEVE ANALYSIS RESULT

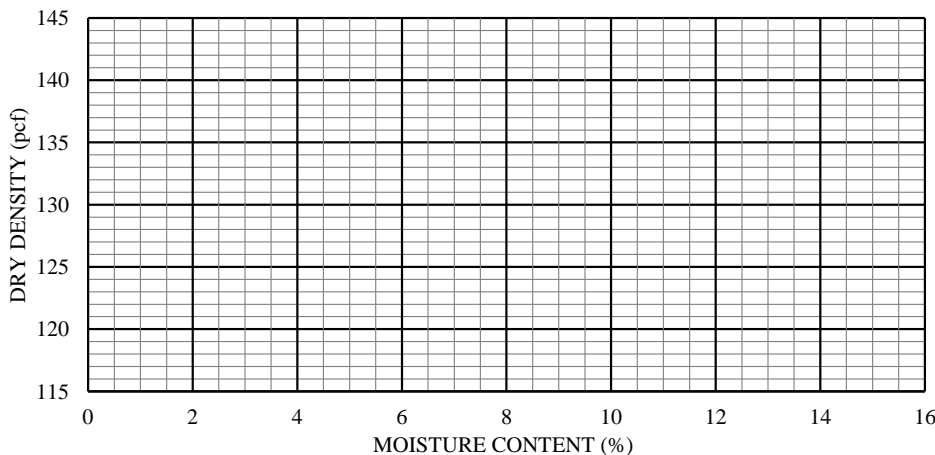
SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
152.40	6"		
76.20	3"		
38.10	1.5"	<b>100</b>	
19.00	3/4"	<b>70</b>	
12.70	1/2"	<b>52</b>	
9.50	3/8"	<b>46</b>	
4.75	#4	<b>31</b>	
2.00	#10	<b>21</b>	
0.85	#20	<b>14</b>	
0.43	#40	<b>10</b>	
0.25	#60	<b>7</b>	
0.15	#100	<b>4</b>	
0.075	#200	<b>2.6</b>	

COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

## HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

## MOISTURE-DENSITY RELATIONSHIP ASTM D1557



<b>HYDRAULIC COND.</b> (ASTM D2434)	<b>N/A</b>
<b>DEGRADATION</b> (ATM T-313)	<b>N/A</b>
<b>PLASTICITY INDEX</b> ASTM 4318	<b>N/A</b>

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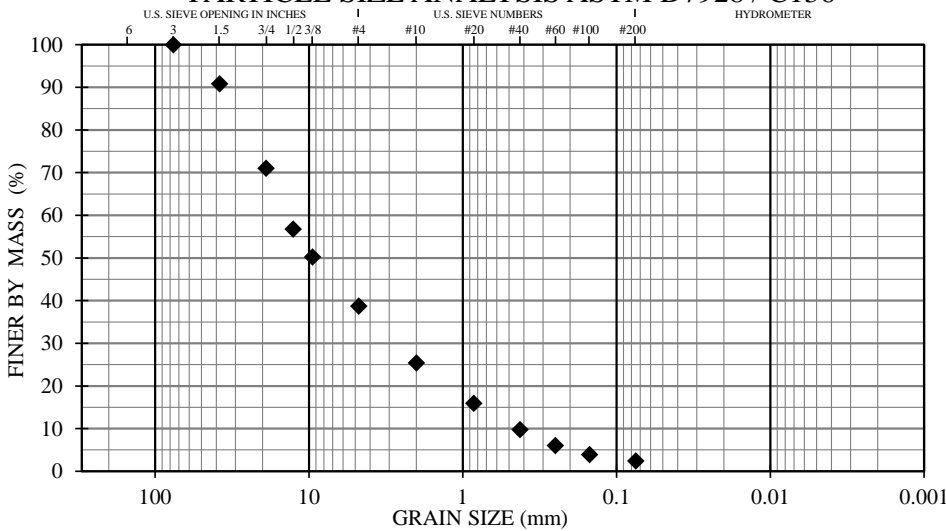
# NORTHERN GEOTECHNICAL ENGINEERING, INC. / TERRA FIRMA TESTING

Laboratory Testing   Geotechnical Engineering   Instrumentation   Construction Monitoring Services   Thermal Analysis

PROJECT CLIENT:	<b>Eklutna, Inc.</b>
PROJECT NAME:	<b>Maud Rd. Subd. - Palmer, AK</b>
PROJECT NO.:	<b>6273-22</b>
SAMPLE LOC.:	<b>SLT2</b>
NUMBER/ DEPTH:	<b>S1 / 5 - 5.5'</b>
DESCRIPTION:	<b>Well-graded gravel w/ sand</b>
DATE RECEIVED:	<b>2/28/2022</b>
TESTED BY:	<b>Erik Boatwright</b>
REVIEWED BY:	<b>CJB</b>

% GRAVEL	<b>61.3</b>	USCS	<b>GW</b>
% SAND	<b>36.3</b>	USACOE FC	<b>N/A</b>
% SILT/CLAY	<b>2.4</b>	% PASS. 0.02 mm	<b>N/A</b>
% MOIST. CONTENT	<b>3.7</b>	% PASS. 0.002 mm	<b>N/A</b>
UNIFORMITY COEFFICIENT ( $C_u$ )		<b>32.1</b>	
COEFFICIENT OF GRADATION ( $C_c$ )		<b>1.4</b>	
ASTM D1557 (uncorrected)		<b>N/A</b>	
ASTM D4718 (corrected)		<b>N/A</b>	
OPTIMUM MOIST. CONTENT. (corrected)		<b>N/A</b>	

## PARTICLE SIZE ANALYSIS ASTM D7928 / C136



## SIEVE ANALYSIS RESULT

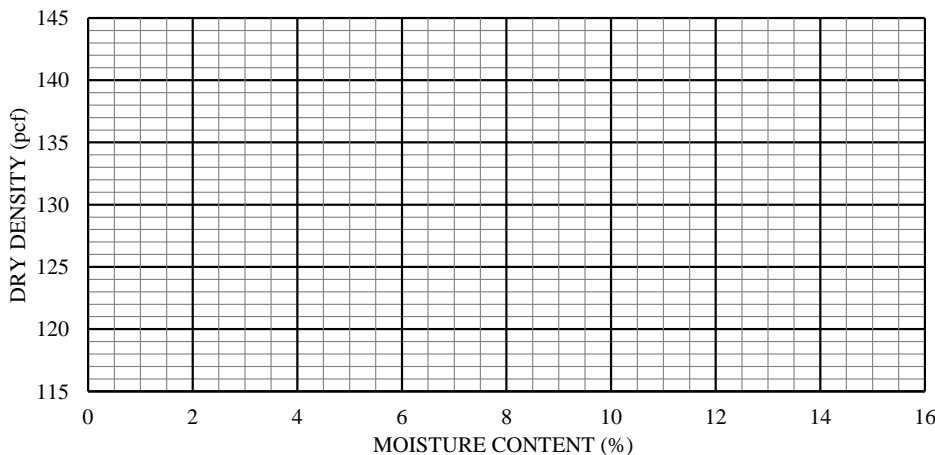
SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
152.40	6"		
76.20	3"	<b>100</b>	
38.10	1.5"	<b>91</b>	
19.00	3/4"	<b>71</b>	
12.70	1/2"	<b>57</b>	
9.50	3/8"	<b>50</b>	
4.75	#4	<b>39</b>	
2.00	#10	<b>25</b>	
0.85	#20	<b>16</b>	
0.43	#40	<b>10</b>	
0.25	#60	<b>6</b>	
0.15	#100	<b>4</b>	
0.075	#200	<b>2.4</b>	

COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

## HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

## MOISTURE-DENSITY RELATIONSHIP ASTM D1557



<b>HYDRAULIC COND.</b> (ASTM D2434)	<b>N/A</b>
<b>DEGRADATION</b> (ATM T-313)	<b>N/A</b>
<b>PLASTICITY INDEX</b> ASTM 4318	<b>N/A</b>

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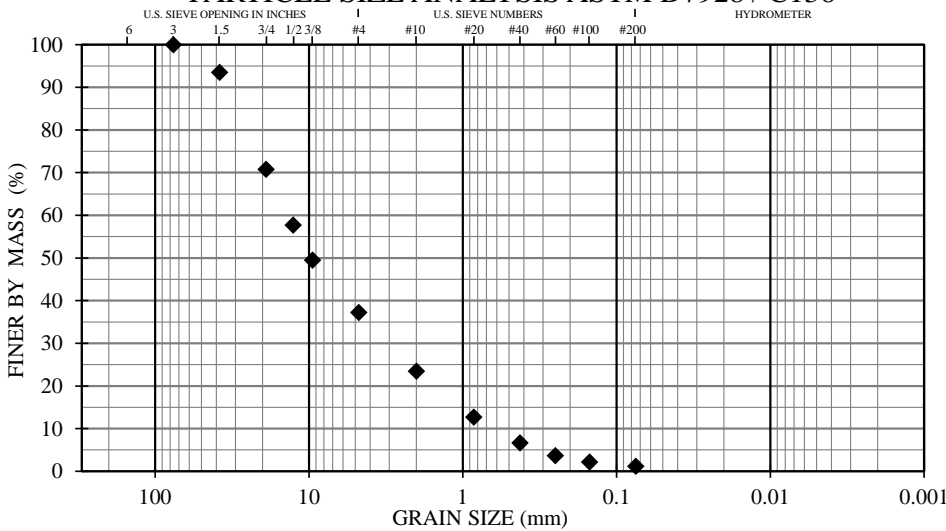
# NORTHERN GEOTECHNICAL ENGINEERING, INC. / TERRA FIRMA TESTING

Laboratory Testing   Geotechnical Engineering   Instrumentation   Construction Monitoring Services   Thermal Analysis

PROJECT CLIENT:	<b>Eklutna, Inc.</b>
PROJECT NAME:	<b>Maud Rd. Subd. - Palmer, AK</b>
PROJECT NO.:	<b>6273-22</b>
SAMPLE LOC.:	<b>SLT5</b>
NUMBER/ DEPTH:	<b>S1 / 5.5 - 6'</b>
DESCRIPTION:	<b>Well-graded gravel w/ sand</b>
DATE RECEIVED:	<b>2/28/2022</b>
TESTED BY:	<b>Erik Boatwright</b>
REVIEWED BY:	<b>CJB</b>

% GRAVEL	<b>62.8</b>	USCS	<b>GW</b>
% SAND	<b>36.0</b>	USACOE FC	<b>N/A</b>
% SILT/CLAY	<b>1.2</b>	% PASS. 0.02 mm	<b>N/A</b>
% MOIST. CONTENT	<b>7.9</b>	% PASS. 0.002 mm	<b>N/A</b>
UNIFORMITY COEFFICIENT (C <sub>u</sub> )		<b>21.0</b>	
COEFFICIENT OF GRADATION (C <sub>c</sub> )		<b>1.2</b>	
ASTM D1557 (uncorrected)		<b>N/A</b>	
ASTM D4718 (corrected)		<b>N/A</b>	
OPTIMUM MOIST. CONTENT. (corrected)		<b>N/A</b>	

## PARTICLE SIZE ANALYSIS ASTM D7928 / C136



## SIEVE ANALYSIS RESULT

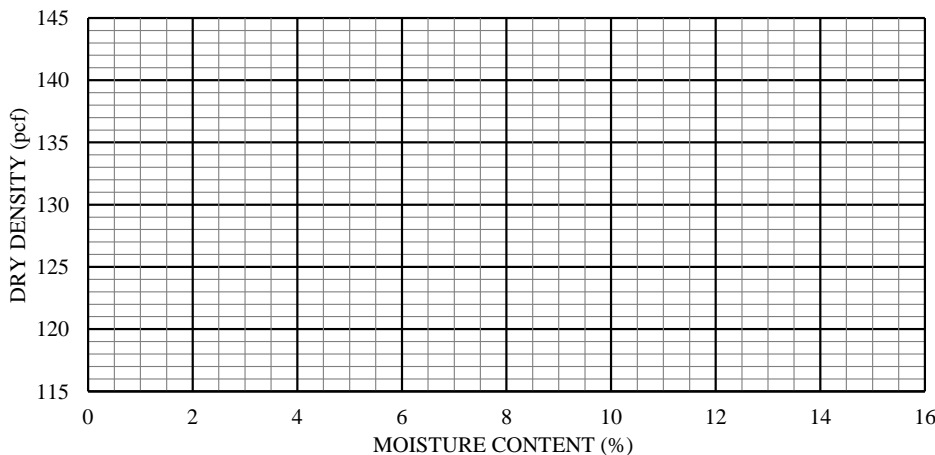
SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
152.40	6"		
76.20	3"	<b>100</b>	
38.10	1.5"	<b>94</b>	
19.00	3/4"	<b>71</b>	
12.70	1/2"	<b>58</b>	
9.50	3/8"	<b>50</b>	
4.75	#4	<b>37</b>	
2.00	#10	<b>23</b>	
0.85	#20	<b>13</b>	
0.43	#40	<b>7</b>	
0.25	#60	<b>4</b>	
0.15	#100	<b>2</b>	
0.075	#200	<b>1.2</b>	

COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

## HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

## MOISTURE-DENSITY RELATIONSHIP ASTM D1557



<b>HYDRAULIC COND.</b> (ASTM D2434)	<b>N/A</b>
<b>DEGRADATION</b> (ATM T-313)	<b>N/A</b>
<b>PLASTICITY INDEX</b> ASTM 4318	<b>N/A</b>

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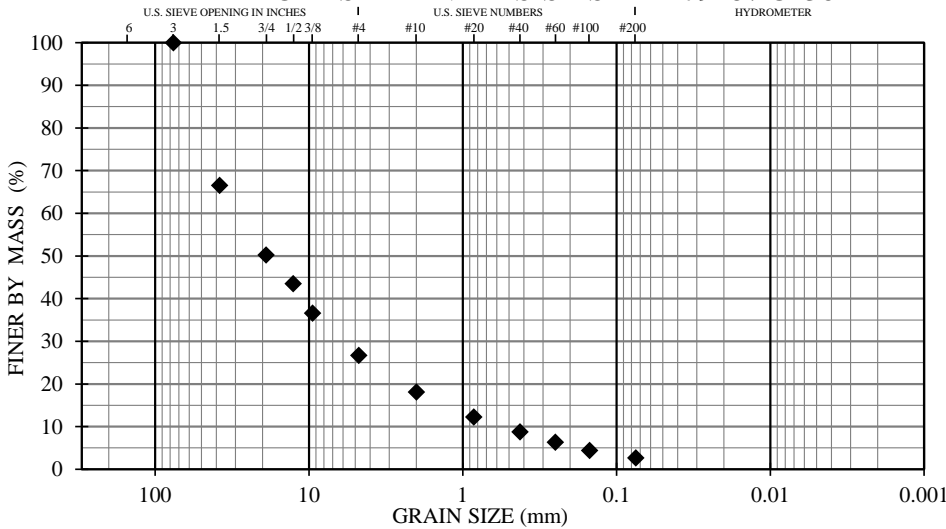
# NORTHERN GEOTECHNICAL ENGINEERING, INC. / TERRA FIRMA TESTING

Laboratory Testing   Geotechnical Engineering   Instrumentation   Construction Monitoring Services   Thermal Analysis

PROJECT CLIENT:	<b>Eklutna, Inc.</b>
PROJECT NAME:	<b>Maud Rd. Subd. - Palmer, AK</b>
PROJECT NO.:	<b>6273-22</b>
SAMPLE LOC.:	<b>SLT7B</b>
NUMBER/ DEPTH:	<b>S1 / 4 - 4.5'</b>
DESCRIPTION:	<b>Well-graded gravel w/ sand</b>
DATE RECEIVED:	<b>2/28/2022</b>
TESTED BY:	<b>Erik Boatwright</b>
REVIEWED BY:	<b>CJB</b>

% GRAVEL	<b>73.3</b>	USCS	<b>GW</b>
% SAND	<b>24.0</b>	USACOE FC	<b>N/A</b>
% SILT/CLAY	<b>2.7</b>	% PASS. 0.02 mm	<b>N/A</b>
% MOIST. CONTENT	<b>11.1</b>	% PASS. 0.002 mm	<b>N/A</b>
UNIFORMITY COEFFICIENT ( $C_u$ )		<b>52.7</b>	
COEFFICIENT OF GRADATION ( $C_c$ )		<b>2.3</b>	
ASTM D1557 (uncorrected)		<b>N/A</b>	
ASTM D4718 (corrected)		<b>N/A</b>	
OPTIMUM MOIST. CONTENT. (corrected)		<b>N/A</b>	

## PARTICLE SIZE ANALYSIS ASTM D7928 / C136



## SIEVE ANALYSIS RESULT

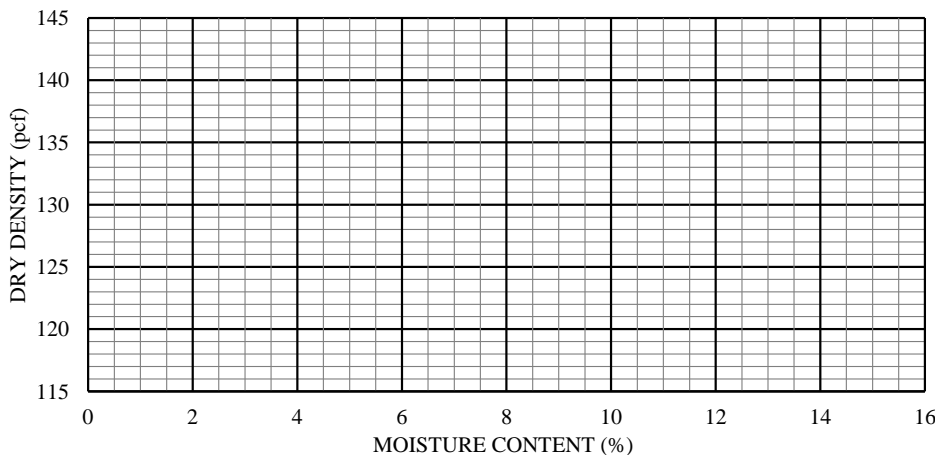
SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
152.40	6"		
76.20	3"	<b>100</b>	
38.10	1.5"	<b>67</b>	
19.00	3/4"	<b>50</b>	
12.70	1/2"	<b>44</b>	
9.50	3/8"	<b>37</b>	
4.75	#4	<b>27</b>	
2.00	#10	<b>18</b>	
0.85	#20	<b>12</b>	
0.43	#40	<b>9</b>	
0.25	#60	<b>6</b>	
0.15	#100	<b>4</b>	
0.075	#200	<b>2.7</b>	

COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

## HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

## MOISTURE-DENSITY RELATIONSHIP ASTM D1557



<b>HYDRAULIC COND.</b> (ASTM D2434)	<b>N/A</b>
<b>DEGRADATION</b> (ATM T-313)	<b>N/A</b>
<b>PLASTICITY INDEX</b> ASTM 4318	<b>N/A</b>

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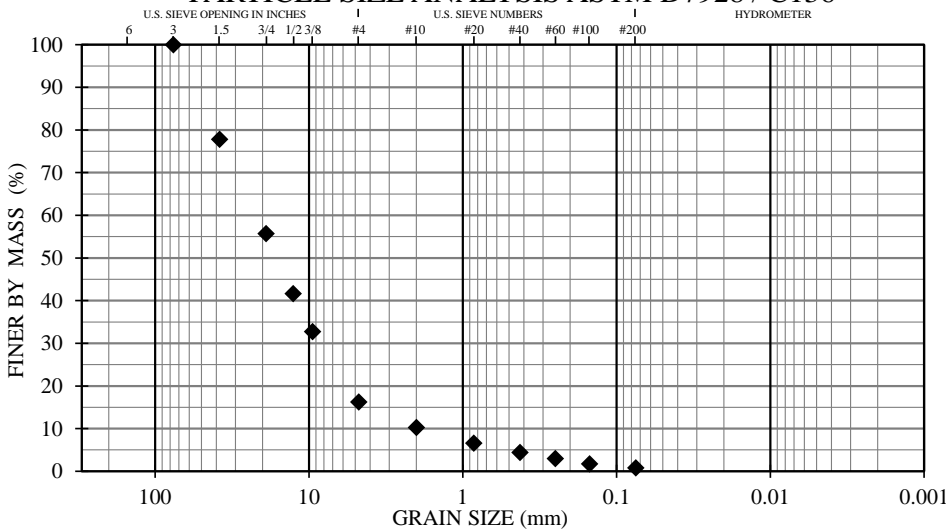
# NORTHERN GEOTECHNICAL ENGINEERING, INC. / TERRA FIRMA TESTING

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PROJECT CLIENT:	<b>Eklutna, Inc.</b>
PROJECT NAME:	<b>Maud Rd. Subd. - Palmer, AK</b>
PROJECT NO.:	<b>6273-22</b>
SAMPLE LOC.:	<b>SLT8</b>
NUMBER/ DEPTH:	<b>S1 / 5 - 5.5'</b>
DESCRIPTION:	<b>Well-graded gravel w/ sand</b>
DATE RECEIVED:	<b>2/28/2022</b>
TESTED BY:	<b>Erik Boatwright</b>
REVIEWED BY:	<b>CJB</b>

% GRAVEL	<b>83.7</b>	USCS	<b>GW</b>
% SAND	<b>15.5</b>	USACOE FC	<b>N/A</b>
% SILT/CLAY	<b>0.8</b>	% PASS. 0.02 mm	<b>N/A</b>
% MOIST. CONTENT	<b>2.4</b>	% PASS. 0.002 mm	<b>N/A</b>
UNIFORMITY COEFFICIENT (C <sub>u</sub> )		<b>11.8</b>	
COEFFICIENT OF GRADATION (C <sub>c</sub> )		<b>1.7</b>	
ASTM D1557 (uncorrected)		<b>N/A</b>	
ASTM D4718 (corrected)		<b>N/A</b>	
OPTIMUM MOIST. CONTENT. (corrected)		<b>N/A</b>	

## PARTICLE SIZE ANALYSIS ASTM D7928 / C136



COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

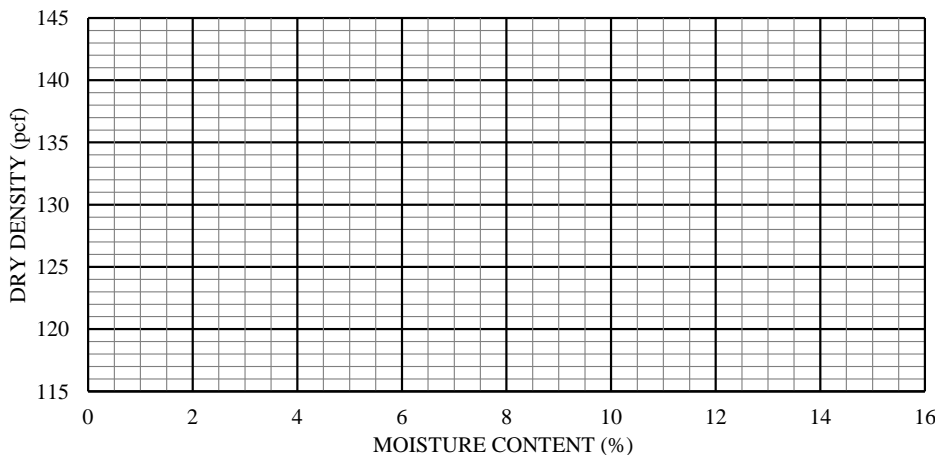
## SIEVE ANALYSIS RESULT

SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
152.40	6"		
76.20	3"	<b>100</b>	
38.10	1.5"	<b>78</b>	
19.00	3/4"	<b>56</b>	
12.70	1/2"	<b>42</b>	
9.50	3/8"	<b>33</b>	
4.75	#4	<b>16</b>	
2.00	#10	<b>10</b>	
0.85	#20	<b>7</b>	
0.43	#40	<b>4</b>	
0.25	#60	<b>3</b>	
0.15	#100	<b>2</b>	
0.075	#200	<b>0.8</b>	

## HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

## MOISTURE-DENSITY RELATIONSHIP ASTM D1557



<b>HYDRAULIC COND.</b> (ASTM D2434)	<b>N/A</b>
<b>DEGRADATION</b> (ATM T-313)	<b>N/A</b>
<b>PLASTICITY INDEX</b> ASTM 4318	<b>N/A</b>

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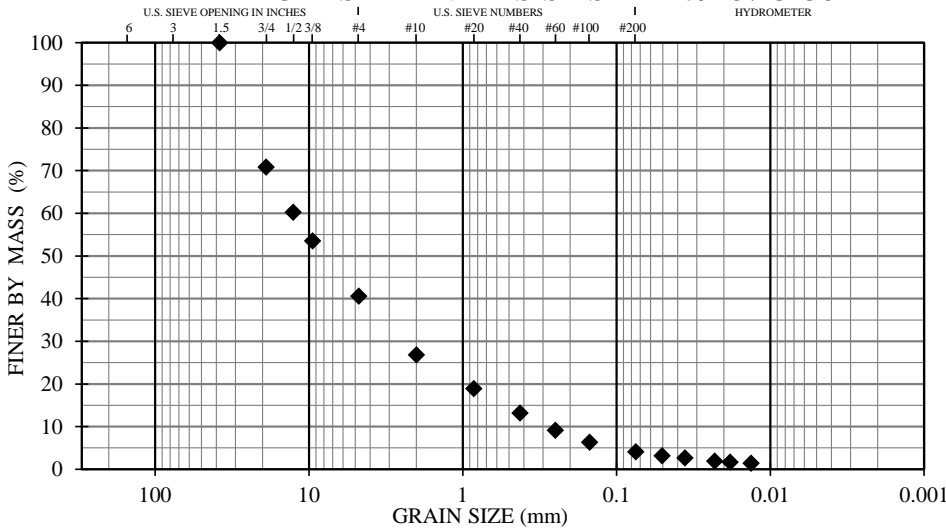
# NORTHERN GEOTECHNICAL ENGINEERING, INC. / TERRA FIRMA TESTING

Laboratory Testing   Geotechnical Engineering   Instrumentation   Construction Monitoring Services   Thermal Analysis

PROJECT CLIENT:	<b>Eklutna, Inc.</b>
PROJECT NAME:	<b>Maud Rd. Subd. - Palmer, AK</b>
PROJECT NO.:	<b>6273-22</b>
SAMPLE LOC.:	<b>SR1</b>
NUMBER/ DEPTH:	<b>S1 / 4 - 4.5'</b>
DESCRIPTION:	<b>Well-graded gravel w/ sand</b>
DATE RECEIVED:	<b>2/28/2022</b>
TESTED BY:	<b>Erik Boatwright</b>
REVIEWED BY:	<b>CJB</b>

% GRAVEL	<b>59.4</b>	USCS	<b>GW</b>
% SAND	<b>36.5</b>	USACOE FC	<b>PFS</b>
% SILT/CLAY	<b>4.1</b>	% PASS. 0.02 mm	<b>1.7</b>
% MOIST. CONTENT	<b>8.1</b>	% PASS. 0.002 mm	<b>N/A</b>
UNIFORMITY COEFFICIENT (C <sub>u</sub> )		<b>43.8</b>	
COEFFICIENT OF GRADATION (C <sub>c</sub> )		<b>1.9</b>	
ASTM D1557 (uncorrected)		<b>N/A</b>	
ASTM D4718 (corrected)		<b>N/A</b>	
OPTIMUM MOIST. CONTENT. (corrected)		<b>N/A</b>	

## PARTICLE SIZE ANALYSIS ASTM D7928 / C136



COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

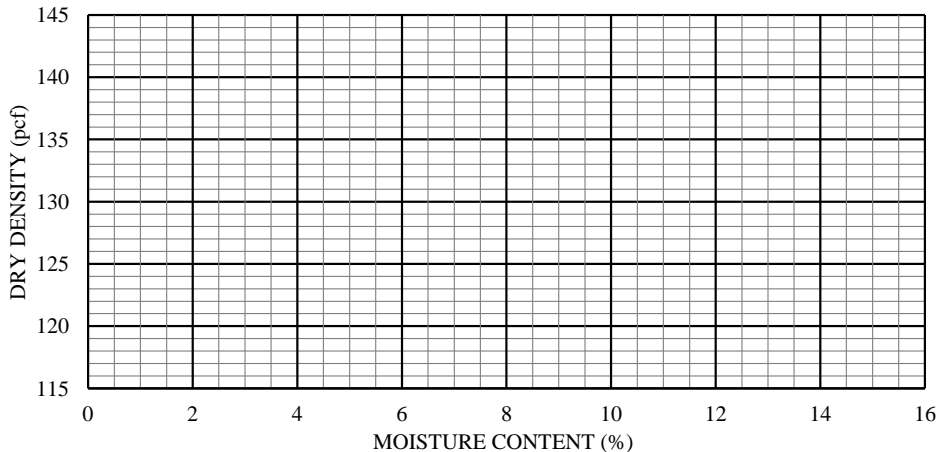
## SIEVE ANALYSIS RESULT

SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
152.40	6"		
76.20	3"		
38.10	1.5"	<b>100</b>	
19.00	3/4"	<b>71</b>	
12.70	1/2"	<b>60</b>	
9.50	3/8"	<b>54</b>	
4.75	#4	<b>41</b>	
2.00	#10	<b>27</b>	
0.85	#20	<b>19</b>	
0.43	#40	<b>13</b>	
0.25	#60	<b>9</b>	
0.15	#100	<b>6</b>	
0.075	#200	<b>4.1</b>	

## HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1	0.0505	3.1
2	0.0360	2.6
5	0.0230	1.9
8	0.0183	1.6
15	0.0134	1.4
30		
60		
250		
1440		

## MOISTURE-DENSITY RELATIONSHIP ASTM D1557



<b>HYDRAULIC COND.</b> (ASTM D2434)	<b>N/A</b>
<b>DEGRADATION</b> (ATM T-313)	<b>N/A</b>
<b>PLASTICITY INDEX</b> ASTM 4318	<b>N/A</b>

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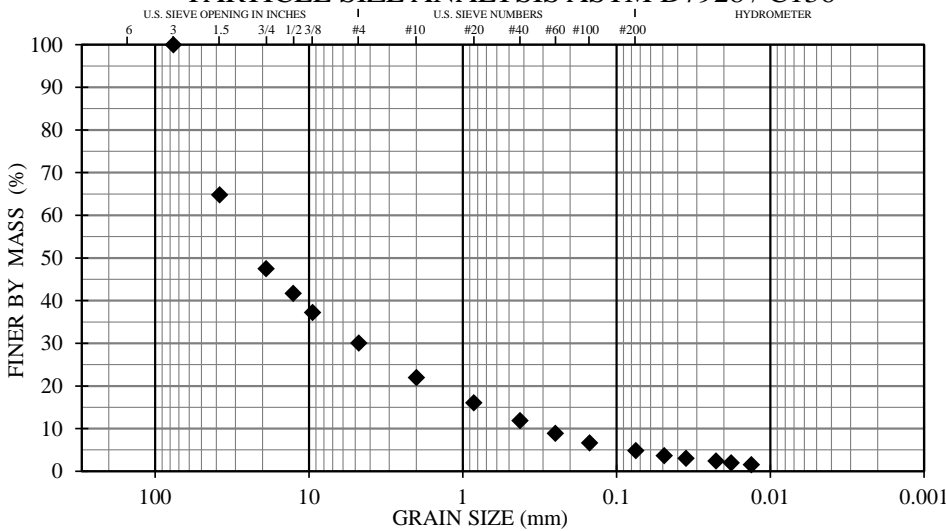
# NORTHERN GEOTECHNICAL ENGINEERING, INC. / TERRA FIRMA TESTING

Laboratory Testing   Geotechnical Engineering   Instrumentation   Construction Monitoring Services   Thermal Analysis

PROJECT CLIENT:	<b>Eklutna, Inc.</b>
PROJECT NAME:	<b>Maud Rd. Subd. - Palmer, AK</b>
PROJECT NO.:	<b>6273-22</b>
SAMPLE LOC.:	<b>SR2</b>
NUMBER/ DEPTH:	<b>S1 / 4 - 4.5'</b>
DESCRIPTION:	<b>Well-graded gravel w/ sand</b>
DATE RECEIVED:	<b>2/28/2022</b>
TESTED BY:	<b>Erik Boatwright</b>
REVIEWED BY:	<b>CJB</b>

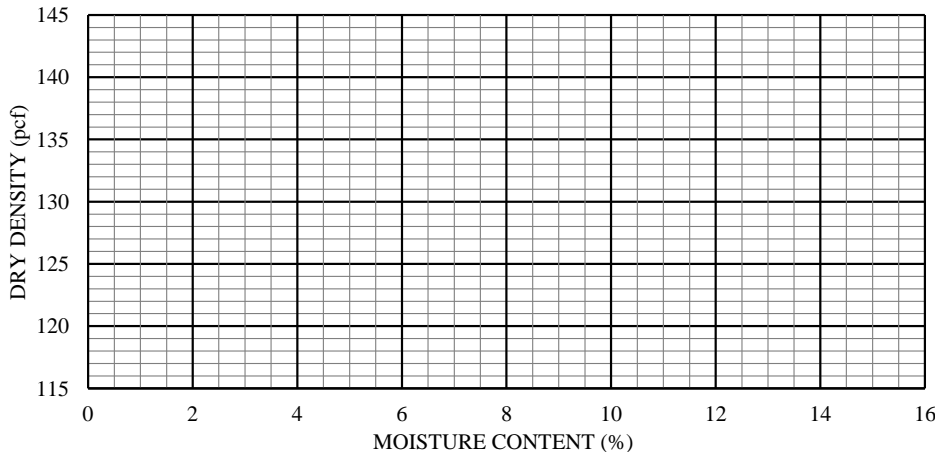
% GRAVEL	<b>70.0</b>	USCS	<b>GW</b>
% SAND	<b>25.2</b>	USACOE FC	<b>PFS</b>
% SILT/CLAY	<b>4.8</b>	% PASS. 0.02 mm	<b>2.1</b>
% MOIST. CONTENT	<b>4.8</b>	% PASS. 0.002 mm	<b>N/A</b>
UNIFORMITY COEFFICIENT ( $C_u$ )		<b>104.0</b>	
COEFFICIENT OF GRADATION ( $C_c$ )		<b>2.2</b>	
ASTM D1557 (uncorrected)		<b>N/A</b>	
ASTM D4718 (corrected)		<b>N/A</b>	
OPTIMUM MOIST. CONTENT. (corrected)		<b>N/A</b>	

## PARTICLE SIZE ANALYSIS ASTM D7928 / C136



COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

## MOISTURE-DENSITY RELATIONSHIP ASTM D1557



## SIEVE ANALYSIS RESULT

SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
152.40	6"		
76.20	3"	<b>100</b>	
38.10	1.5"	<b>65</b>	
19.00	3/4"	<b>47</b>	
12.70	1/2"	<b>42</b>	
9.50	3/8"	<b>37</b>	
4.75	#4	<b>30</b>	
2.00	#10	<b>22</b>	
0.85	#20	<b>16</b>	
0.43	#40	<b>12</b>	
0.25	#60	<b>9</b>	
0.15	#100	<b>7</b>	
0.075	#200	<b>4.8</b>	

## HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1	0.0490	3.6
2	0.0353	3.0
5	0.0226	2.4
8	0.0180	2.0
15	0.0133	1.6
30		
60		
250		
1440		

<b>HYDRAULIC COND.</b> (ASTM D2434)	<b>N/A</b>
<b>DEGRADATION</b> (ATM T-313)	<b>N/A</b>
<b>PLASTICITY INDEX</b> ASTM 4318	<b>N/A</b>

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