


MEMORANDUM

State of Alaska
Department of Transportation & Public Facilities
Northern Region Design and Engineering Services

TO: Chris Johnston, P.E.
Engineering Manager
Northern Region


DATE: May 10, 2019

THRU: Garrett Speeter 
Regional Geologist
Northern Region

FILE NO: G:\Projects\WORKING\RURAL
AREAS\Selawik\memo

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FROM: Jocelyn Simpson 
Engineering Geologist
Northern Region

SUBJECT: Selawik Barge Landing Access Rd
and Boardwalk Improvements: Spud
Farm Material Site Reconnaissance
Investigation
Z637720000
Final Geotechnical Memorandum

Introduction

This memorandum documents physical site and subsurface conditions, provides interpretation of anticipated site conditions, and recommends design and construction criteria for the project. This memorandum is intended to serve as a geotechnical guide during project design and a geotechnical reference during construction.

At the request of Engineering Manager Chris Johnston, P.E., Northern Region Materials Section (NRMS) personnel conducted a reconnaissance level geotechnical investigation of the Spud Farm Material Site (MS 206-08-02) (Figure 1). The purpose of this investigation was to prove out 15,000 cubic yards of material for the Barge Landing Access Road project and develop a large-scale drill plan for future projects.

The investigation took place in September 2018 and involved shallow test hole drilling with a hand-held, gasoline-powered auger and digging shallow test pits. These test holes and pits were located in three areas: 1) inside the existing pit; 2) within an area adjacent to the existing pit; and 3) in an undisturbed area around the site. The purpose of this effort was to collect samples for analyses and determine potential for expansion. Laboratory analyses have been conducted on collected samples; results of which are included in this memorandum.

Collaboration: Please contact NRMS personnel if a meeting to discuss the data and recommendations presented in this memorandum is desired.

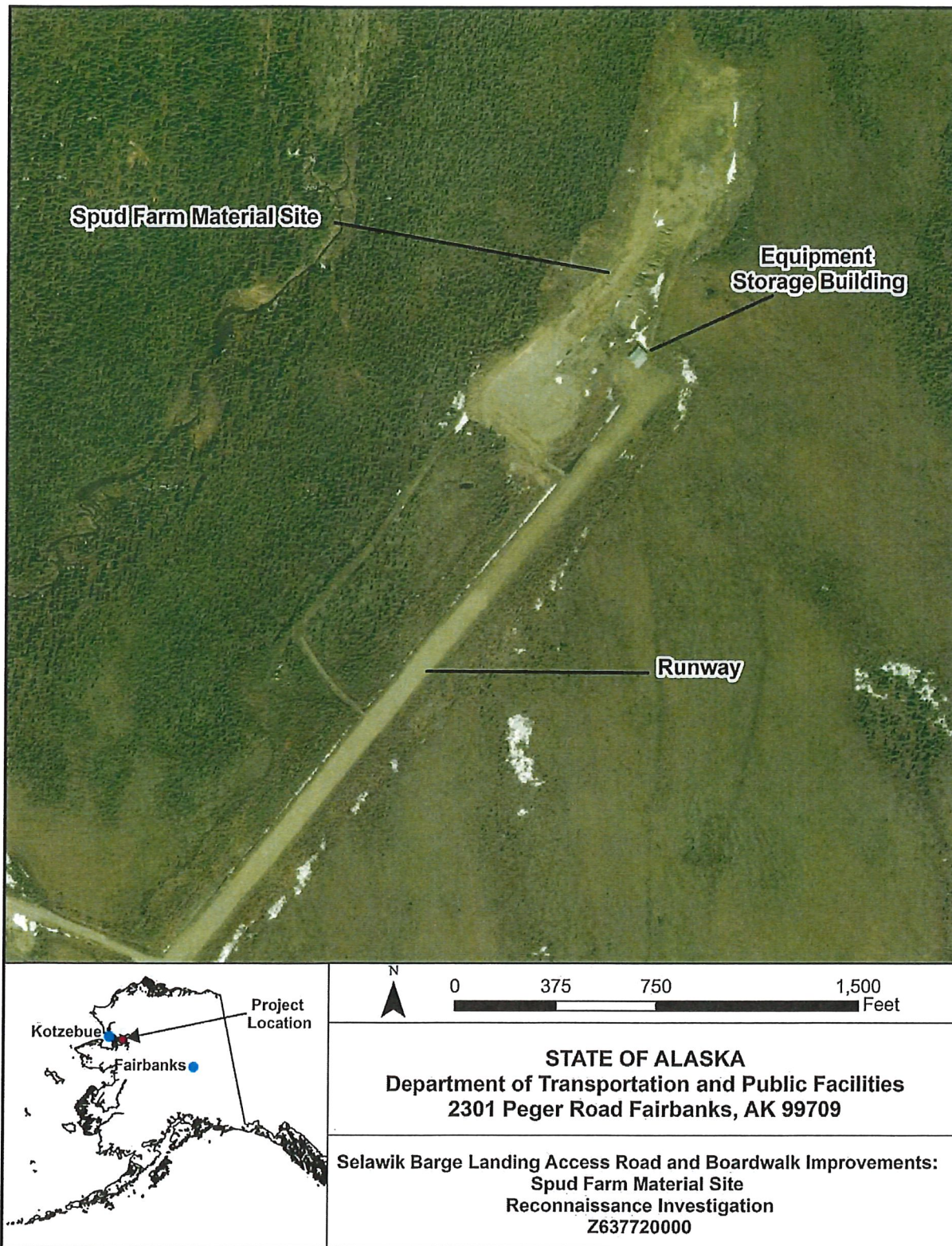


Figure 1. Project Location

Summary

A reconnaissance geotechnical investigation of the Spud Farm Material Site (MS 206-08-02) was performed in September 2018 to assess the amount of remaining material in the active pit and access the potential for future expansion at this site. We understand this project is in need of 15,000 cubic yards of various types of material and future airport construction projects in Selawik will require 150,000 cubic yards of material.

The investigation involved shallow test hole drilling with a hand-held, gasoline-powered auger and digging shallow test pits. These efforts occurred within the existing pit and adjacent to the existing pit where vegetation and overburden has been stripped. The undisturbed area around this site was also investigated to determine the possibility of expanding this material site. These areas are illustrated in Figure 2.

Samples taken from these areas were analyzed for classification, LA Abrasion, Degradation Value, Sodium Sulfate Loss and Moisture-Density Relations. The material sampled and observed included well-graded gravel with sand, well- and poorly-graded gravel with sand and silt, silty gravel with sand, well- and poorly-graded sand with silt and gravel, gravelly silt, silty clayey gravel with sand, and sandy silt with gravel.

Our findings suggest the potential to extract 15,000 cubic yards from the existing site; however, surface material sampled in the stripped area of the site resulted in higher silt contents than those in the existing pit. Further investigation would be needed to determine if these siltier soils persist to greater depths and to define the quality and quantity of material in the existing site.

We believe areas either northeast or southwest of the existing pit have the greatest aggregate potential. These areas are in line with the general northeast trend of the existing pit. Expansion by widening the area showed lower potential with thicker, silty overburden and less gravelly soil. However, the overall potential for the expansion of this site would need further investigation.

The equipment that has been stored at the Spud Farm was determined to be unusable. In addition, the small size of the runway at the Spud Farm prohibits equipment to be flown to and from the site. Therefore, future drilling at this site would require barging equipment to Selawik during the summer season and transporting it to the site by the winter road for winter season drilling.

Location and Access

The Spud Farm is located approximately 12 miles north of Selawik. The area lies within the Selawik Quadrangle, Kateel River Meridian, T16N, R7W, SE ¼ of SE ¼ of Sec. 22 and NE ¼ of NE ¼ of Sec. 27. It is accessible by small aircraft or from Selawik by a winter trail/road that continues north to Kiana.

Field Investigation

The field investigation was conducted between September 7th and September 10th, 2018. NRMS field personnel included Engineering Geologist J. Simpson and Driller P. Lanigan. Eight test holes were drilled using a hand-held, gasoline-powered auger and 21 test pits were dug by hand. Test hole conditions were logged in the field in accordance to the Unified Soil Classification System (USCS). Test hole locations were recorded with a handheld Garmin GPS 62st, using the North American Datum (NAD) 83, with an accuracy of 50 feet.

Frozen Soil

Frozen ground was encountered in 3 test holes at depths between 3 and 7 feet. Most test holes and pits were shallow in depth and may not have been deep enough to encounter frozen material. Also, assessing whether soil is frozen while drilling with the hand held auger can be difficult. Frozen soil, therefore, should be expected anywhere in the undisturbed area around the existing site.

Groundwater

Groundwater was not encountered in any test holes during this investigation.

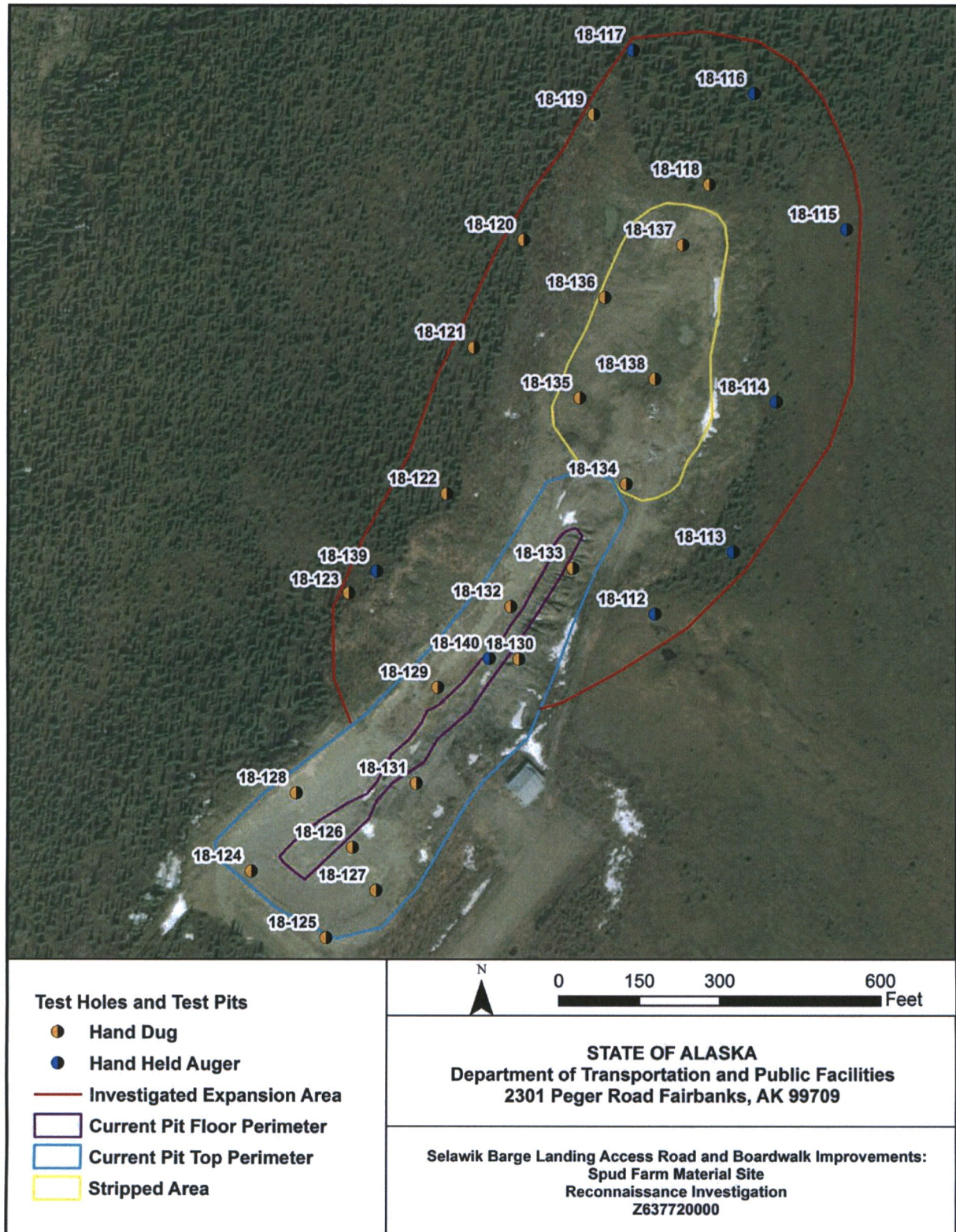


Figure 2. Reconnaissance Investigation Areas and Test Hole/Pit Locations.

Laboratory Testing

Seventeen samples were collected and submitted to the Northern Region Materials Laboratory (NRML) for testing. Testing included USCS classification, moisture and organic contents, LA Abrasion, Degradation Value, Sodium Sulfate Loss, and Moisture-Density Relations. Table 1 describes NRML’s laboratory tests and standards.

Table 1. Laboratory Tests and Standards.

Test Method	AASHTO	ASTM
<i>Index Tests</i>		
Gradation	T27	C136
Minus #200 Gradation	T11	C117
Hydrometer	T88	D422
Liquid Limit	T89	D4318
Plastic Limit	T90	D4318
Moisture Content – Aggregate Soil	T255 T265	C566 D2216
Organic Content (Burn)	T267	
Proctor	T180	D1557
USCS Classification	D2487	
Fine Specific Gravity	T100	D854
Coarse Specific Gravity	T85	D127
<i>Quality Tests</i>		
Degradation	T13	
Los Angeles Abrasion	T96	C131
Sodium Soundness	T104	C88
Nordic Abrasion	ATM 312	

Site Conditions and Findings

The developed portion of this site contains an excavated area approximately 1,000 feet long by up to 400 feet wide. The depth of the excavation ranges from 15 to 40 feet. Adjacent to the excavated pit is an area measuring approximately 13,000 square yards. This area was previously stripped of vegetation and overburden with a gravel surface now exposed. Surrounding the majority of the perimeter of the site are waste berms from previous overburden removal and excavation. The undisturbed area surrounding the site consists mainly of spruce, blueberry bushes and moss. Spruce trees are very sparse to the east of the site and become denser to the north and west. The terrain gently slopes down towards a creek on the western side of the site, while little relief exists to the east.

An expansion area was chosen to explore during this reconnaissance investigation based upon information from a previous investigation of this site in the 1980s. This expansion area follows the general trend of the current site to the north east, but also extends out to the east and northwest.

The following describes the findings in the three areas described above:

Expansion Area

Seven test holes were drilled using a hand held auger and 6 shallow test pits were dug by hand in the expansion area.

- Test holes 18-112 through 18-115 encountered 6 to 10 feet of organic mat and silty soil before the drill reaction indicated the presence of gravel.
- Test holes and test pits 18-116 through 18-120 encountered only 5” to 9” of organic mat and overburden before encountering gravel. The soil in this area was generally sandy silt with gravel, silty gravel with sand, and gravelly silt.

- Test holes and test pits 18-121 through 18-123 and 18-139 encountered smaller amounts of gravel at shallow depths with the last test hole (TH 18-139) not encountering any gravel until 4.5 feet bgs.

Developed Area

One test hole was drilled in the floor of the developed pit and nine test pits were dug near the top perimeter or in the side walls of the pit.

- Test pits 18-124 through 18-133 encountered well-graded gravel with sand, well- and poorly-graded gravel with silt and sand, silty gravel with sand, and poorly-graded sand with silt and gravel.
- Silty soil covers a portion of the floor of the pit, most likely run-off from the surface above. Test hole 18-140 was drilled to determine the thickness of the silt layer and to confirm the presence of gravel beneath it. Approximately 1.5 feet of silty soil was encountered before drill reaction indicated gravel.

Stripped Area

Five test pits were dug in this area which lies to the northeast of the developed pit.

- Test pits 18-134 through 18-138 encountered poorly-graded gravel with silt and sand, silty gravel with sand, silty clayey gravel with sand, and well-graded sand with silt and gravel.
- Siltier soils were encountered in the western portion of this area.
- Some test pits encountered pockets and layers of silt.

Laboratory Results

Seventeen samples were submitted to NRML for testing. Table 2 summarizes the laboratory results. The testing performed included 17 classifications, 3 LA Abrasion, Degradation, and Sodium Sulfate Loss tests, and 3 Moisture-Density Relations. The laboratory results show that:

- 13 of the 17 samples failed to meet specifications for Select Type A material;
- 11 of the 17 samples failed to meet specifications for Select Type B material;
- All 17 samples meet specifications for Select Type C material;
- 2 of the 3 samples failed to meet quality specifications for Subbase material;
- Maximum dry densities and optimum moisture contents in the 3 tests performed were as follows:
 - 140.1 lb/ft³; 5.5%
 - 132.5 lb/ft³; 9.7%
 - 132.2 lb/ft³; 8.4%

Table 2. Summary of Laboratory Results (# of analyses).

% Gravel (+#4)	% Sand (-#4 to +#200)	% Fines (-#200)	Liquid Limit/Plastic Index	USCS Classification	LA Abrasion (%)	Degradation	Sodium Sulfate Loss Coarse (%)	Sodium Sulfate Loss Fine (%)	Max Dry Density (lb/ft ³)	Optimum Moisture (%)
22-66 (17)	11.7-52.7 (17)	3.8-66.3 (17)	NV-7/ NP-4 (17)	GW (3), GM (5), GW-GM (1), GP-GM (4), GC-GM (1), SW-SM (1), SP-SM (1) ML (1)	31-32 (3)	6-59 (3)	19-24 (3)	21-24 (3)	132.2-140.1 (3)	5.5-9.7 (3)

Expected Physical Site Conditions

The following conditions can be expected either in the developed material site or in the undisturbed area around the site:

- Cobbles and boulders throughout the area;
- Seasonally and/or perennially frozen ground;
- Silty overburden documented by this investigation in the undisturbed areas was found to be up to 10 feet thick, but could possibly be thicker;
- Trash littered throughout the site to include barrels, cans, old appliances, etc. Clusters of trash were found in the existing pit and the stripped area adjacent to the pit;
- Groundwater was not observed in any test hole; however, expect groundwater conditions to change seasonally.

Future Access for Drilling Program

The equipment currently stored at the Spud Farm was determined unusable for any future investigation. Due to the small size of the runway at the Spud Farm, it is not possible to transport the equipment we would need by aircraft to conduct a more in depth geotechnical investigation. Equipment would have to be barged into Selawik during the summer and brought to the site by the winter road for winter season drilling. NRMS personnel would stay in Selawik during this time and make a daily commute to the site along the winter road.

Comments and Recommendations

Based upon this reconnaissance investigation, comments and recommendations for the future extraction of material from the Spud Farm are as follows:

- There remains usable material in the developed area of this site if the existing pit sides were cut back and steepened. Deepening of the existing pit may also be possible, but this would have to be determined with a more in-depth investigation.
- Given the size of the stripped area and assuming an average depth of usable material similar to the existing pit, along with material available in the existing pit, it is believed the material needs for the Selawik Barge Landing Access Road and Boardwalk Improvement project would be met. However, due to the low Degradation values, subbase specifications may need to be modified for this project.
- Some areas in the existing site showed the presence of siltier soil. The extent and depth of these areas would be better defined by future drilling. Depending on future material needs, silty material may need processing.
- Assessing future material extraction beyond this project would require a more in-depth investigation. Such an investigation would assess the quantity and quality of material beneath the existing floor, along the margins of the existing pit, underlying the stripped areas, and within the proposed expansion area.
- Figure 3 illustrates possible expansion areas that would be investigated based upon this preliminary work.

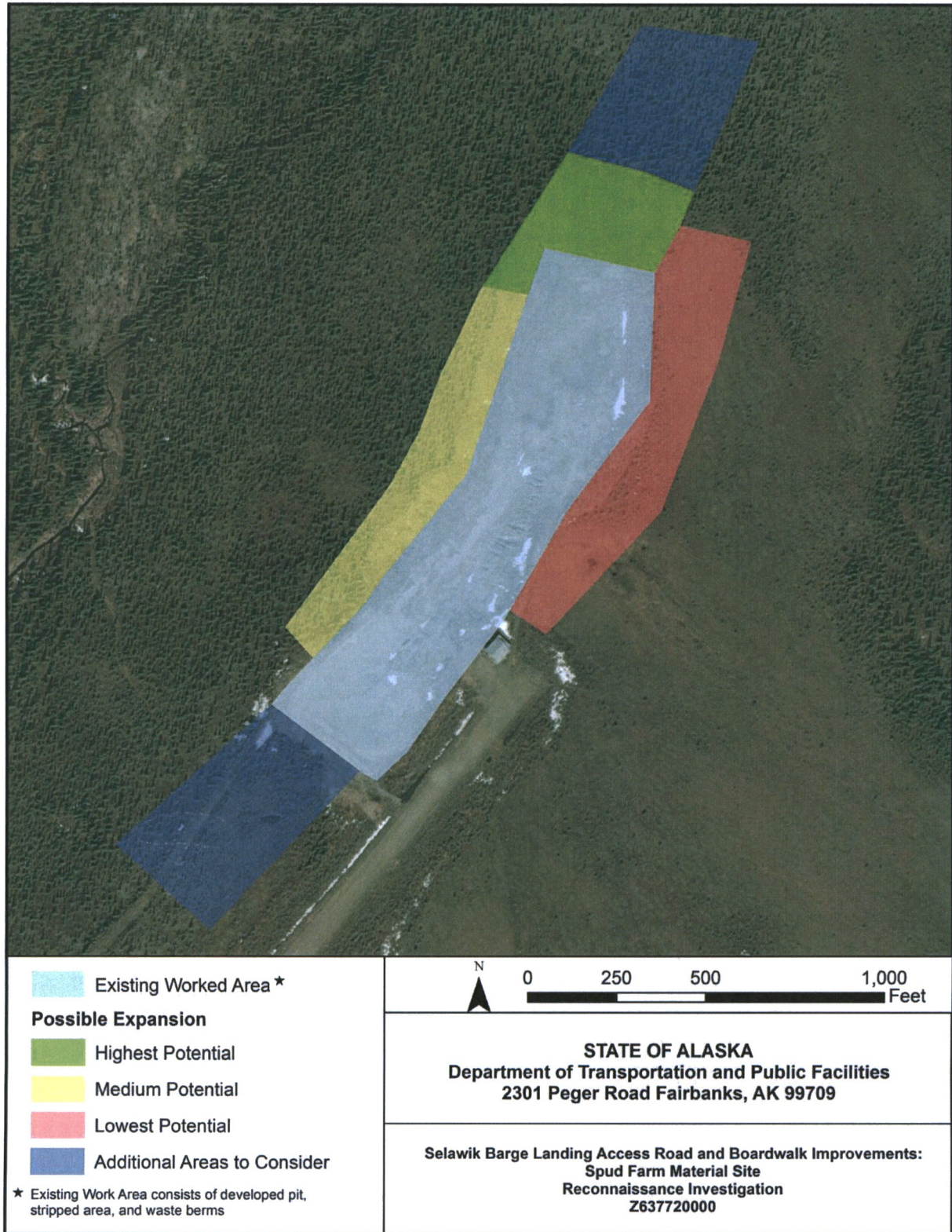


Figure 3. Areas of Possible Expansion of the Spud Farm.

Attachments:

- Field Photographs; Figures 4 through 13
- Test Hole Logs
- Laboratory Results
- Symbols and Definitions
- Classification of Soils for Engineering Purposes
- Description and Classification of Frozen Soils



Figure 4. Aerial View of Material Site.



Figure 5. Developed Pit Looking Northeast.



Figure 6. Developed Pit Looking Southwest.



Figure 7. Stripped Area Looking Southwest.



Figure 8. View Looking East of Material Site
(Lowest Potential for Expansion).



Figure 9. North of Material Site (Highest
Potential for Expansion).



Figure 10. Test Pit 18-118; Silty Gravel with Sand.



Figure 11. Test Pit 18-122; Silt with Trace Gravel.



Figure 12. Test Pit 18-124; Poorly-graded Gravel with Silt and Sand.



Figure 13. Typical Cobbles Seen at Site.



STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-112
 Project Number Z637720000 Total Depth 10.5 feet
 Field Geologist J. SIMPSON Equipment Type Hand Auger Dates Drilled 9/8/2018
 Field Crew P. Lanigan Weather 50F, sunny, clear Station, Offset _____
 TH Finalized By J. Simpson Vegetation spruce, blueberry bushes, moss Latitude, Longitude N66.76434°, W160.13722°
 Elevation 366.0

Drilling Method	Depth in (Feet)	Casting Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Expansion Area
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value		Frozen	While Drilling	
	0										SUBSURFACE MATERIAL
	0										ORG MAT
	1										Bn SILT moist
	2										
	3										trace gravel, 1/2"-
	4										moist to wet
	5										
	6										
	7										
	8										
	9										
	10										SILT w/ Gravel gravel BODR, no soil recovery but augers showed silty soil when removed from test hole
											BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



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Northern Region Materials
Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-113
 Project Number Z637720000 Total Depth 8 feet
 Field Geologist J. SIMPSON Equipment Type Hand Auger Dates Drilled 9/8/2018
 Field Crew P. Lanigan Weather 50F, sunny, clear Station, Offset _____
 TH Finalized By J. Simpson Vegetation spruce, blueberry bushes, moss Latitude, Longitude N66.76464°, W160.1362°
 Elevation 357.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Expansion Area
			Method	Number	Blow Count	Sample Interval	Unconnected N-Value		Frozen	White Drilling	
Hand Auger	0										SUBSURFACE MATERIAL
											ORG MAT
											Bn SILT moist, may be silt with sand
		1									
		2									small pebbles
		3									
		4									
		5									trace gravel 1/2"-
	6										
	7									Bn SILT w/ Gravel moist, gravel BODR	
	8									BOH	

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



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Northern Region Materials
Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-114
 Project Number Z637720000 Total Depth 10 feet
 Field Geologist J. SIMPSON Dates Drilled 9/8/2018
 Field Crew P. Lanigan Equipment Type Hand Auger Station, Offset _____
 Weather 50F, sunny, clear Latitude, Longitude N66.76539°, W160.13559°
 TH Finalized By J. Simpson Vegetation spruce, blueberry bushes, moss Elevation 369.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS: Expansion Area
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value			While Drilling	After Drilling	
Hand Auger	0											SUBSURFACE MATERIAL
	1											ORG MAT
	2											Bn SILT moist
	3											Bn SILT w/ Sand trace gravel
	4											
	5											
	6											
	7											
	8											
	9											
	10											BOH

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 5/10/19

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



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Northern Region Materials
Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-115
 Project Number Z637720000 Total Depth 8 feet
 Field Geologist J. SIMPSON Dates Drilled 9/8/2018
 Field Crew P. Lanigan Equipment Type Hand Auger Station, Offset _____
 Weather 50F, sunny, clear Latitude, Longitude N66.76626°, W160.13463°
 TH Finalized By J. Simpson Vegetation spruce, blueberry bushes, moss Elevation 370.0

Drilling Method	Depth In (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Expansion Area
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value		Frozen	While Drilling	
Hand Auger	0										SUBSURFACE MATERIAL
											ORG MAT
	1										Bn SILT moist
	2										
	3										
	4										
	5										trace gravel, 1/2"-
	6										Bn Sandy SILT w/ Gravel gravel BODR, 1/2"-, Minor soil returns, soil seems slightly sandier with depth
	7										
8										BOH	

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



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FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-116
 Project Number Z637720000 Total Depth 3.5 feet
 Field Geologist J. SIMPSON Dates Drilled 9/8/2018
 Field Crew P. Lanigan Equipment Type Hand Auger Station, Offset _____
 Weather 60F, sunny, clear Latitude, Longitude N66.76696°, W160.13576°
 TH Finalized By J. Simpson Vegetation spruce, blueberry bushes, moss Elevation 371.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Expansion Area
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value		Frozen	While Drilling	
Hand Auger	0										SUBSURFACE MATERIAL
											ORG MAT
											Tn Sandy SILT moist, trace gravel, 1/2"-
											Tn Gravelly SILT moist, 2"-
	1		GS	18-4380							SAMPLE 18-4380 (1.0-1.5): ML, 66.3% -200, LL 27, NP
	2										
	3										
											BOH

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_08_28_07.GDT 5/10/19

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



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Northern Region Materials
Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-117
 Project Number Z637720000 Total Depth 3 feet
 Field Geologist J. SIMPSON Dates Drilled 9/8/2018
 Field Crew P. Lanigan Equipment Type Hand Auger Station, Offset _____
 Weather 60F, sunny, clear Latitude, Longitude N66.7672°, W160.13731°
 TH Finalized By J. Simpson Vegetation spruce, blueberry bushes, moss Elevation 355.0

Drilling Method	Depth In (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Expansion Area
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value		Frozen	While Drilling	
Hand Auger	0										SUBSURFACE MATERIAL
											ORG MAT
											Bn SILT moist
	1										Bn SILT w/ Gravel moist, gravel BODR, 1/2"-, low soil returns, refusal on gravel
	2										
	3										BOH

Drilling Notes: BODR: Based on drill reaction

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 5/10/18

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



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Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-118
 Project Number Z637720000 Total Depth 1.5 feet
 Field Geologist J. SIMPSON Dates Drilled 9/9/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 50F, sunny, clear Latitude, Longitude N66.7665°, W160.13638°
 TH Finalized By J. Simpson Vegetation spruce, blueberry bushes, moss Elevation 384.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Expansion Area
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value		Frozen	While Drilling	
	0										SUBSURFACE MATERIAL
Hand-dug	1		GS	18-4382							ORG MAT
											Bn-Tn Silty GRAVEL w/ Sand moist, 1" SAMPLE 18-4382 (0.5-1.5): GM, 28.4% -200, NV, NP
											3" RPH

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_08_28_07.GDT 5/10/18

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



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Northern Region Materials
Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-119
 Project Number Z637720000 Total Depth 1 feet
 Field Geologist J. SIMPSON Dates Drilled 9/9/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 50F, sunny, clear Latitude, Longitude N66.76688°, W160.13785°
 TH Finalized By J. Simpson Vegetation spruce, blueberry bushes, moss Elevation 363.0

Drilling Method	Depth In (Feet)	Casing Blows / ft	Sample Data						Graphic Log	Ground Water Data		GENERAL COMMENTS: Expansion Area
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value	Frozen		White Drilling	After Drilling	
	0											
Hand-dug												
	1											

SUBSURFACE MATERIAL 0

ORG MAT

Tn-Bn Sandy SILT
w/ Gravel
moist, 2"-

BOH 1

NR.AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR.AKDOT_PRECON_USCS_06_28_07.GDT 5/10/18

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 Northern Region Materials
 Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-120
 Project Number Z637720000 Total Depth 1.5 feet
 Field Geologist J. SIMPSON Dates Drilled 9/9/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 50F, sunny, clear Latitude, Longitude N66.76625°, W160.13879°
 TH Finalized By J. Simpson Vegetation spruce, blueberry bushes, moss Elevation 355.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Expansion Area
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value		Frozen	While Drilling	
Hand-dug	0										SUBSURFACE MATERIAL 0 ORG MAT Bn SILT moist Bn-Tn Sandy SILT moist, trace gravel, 2.5"- 1 BOH
	1										

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_08_28_07.GDT 5/10/19

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



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FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-121
 Project Number Z637720000 Total Depth 1 feet
 Field Geologist J. SIMPSON Dates Drilled 9/9/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 50F, sunny, clear Latitude, Longitude N66.76572°, W160.13948°
 TH Finalized By J. Simpson Vegetation spruce, blueberry bushes, moss Elevation 351.0

Drilling Method	Depth In (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Expansion Area
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value		Frozen	While Drilling	
	0										
											SUBSURFACE MATERIAL
											ORG MAT
											Bn-Tn SILT w/ Gravel moist to wet
Hand-dug	1										BOH

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 5/10/18

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FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-122
 Project Number Z637720000 Total Depth 1.5 feet
 Field Geologist J. SIMPSON Dates Drilled 9/9/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 50F, sunny, clear Latitude, Longitude N66.76498°, W160.13988°
 TH Finalized By J. Simpson Vegetation spruce, blueberry bushes, moss Elevation 349.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Expansion Area
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value		Frozen	While Drilling	
	0										
											SUBSURFACE MATERIAL
											ORG MAT
											Bn SILT w/ Cobbles trace gravel (increases with depth)
Hand-dug	1										Gy-Bn Sandy SILT w/ Gravel 2"-
											BOH

NR AKDOT TEST HOLE LOG - USCS - SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 5/10/19

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-123
 Project Number Z637720000 Total Depth 2.5 feet
 Field Geologist J. SIMPSON Dates Drilled 9/9/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 55F, sunny, clear Latitude, Longitude N66.76449°, W160.14119°
 TH Finalized By J. Simpson Vegetation spruce, blueberry bushes, moss Elevation 319.0

Drilling Method	Depth In (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Expansion Area
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value		Frozen	While Drilling	
Hand-dug	0										SUBSURFACE MATERIAL
	0										ORG MAT Bn SILT moist to wet, very trace amounts of gravel
	1										
	2										
											BOH

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 5/10/19

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-124
 Project Number Z637720000 Total Depth 1 feet
 Field Geologist J. SIMPSON Dates Drilled 9/9/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 55F, sunny, clear Latitude, Longitude N66.76308°, W160.14255°
 TH Finalized By J. Simpson Vegetation _____ Elevation 320.0

Drilling Method	Depth In (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Top of existing pit
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value		Frozen	While Drilling	
Hand-dug	0		GS	18-4383							
	1										

SUBSURFACE MATERIAL

Bn Poorly-graded GRAVEL
w/ Silt & Sand
w/ Cobbles
dry to moist, 3"-, siltier with depth
SAMPLE 18-4383 (0.0-1.0): GP-GM, 10.4% -200, SSc 19.4, SSf 21.7, LA 31, DEG 59, NV, NP

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR AKDOT_PRECON_USCS_08_28_07.GDT 5/10/18

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-125
 Project Number Z637720000 Total Depth 0.75 feet
 Field Geologist J. SIMPSON Dates Drilled 9/9/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 55F, sunny, clear Latitude, Longitude N66.76273°, W160.1416°
 TH Finalized By J. Simpson Vegetation _____ Elevation 326.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Top of existing pit
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value		Frozen	While Drilling	
Hand-dug	0		GS	18-4384							SUBSURFACE MATERIAL 0 Bn Poorly-graded GRAVEL w/ Silt & Sand w/ Cobbles dry to moist, 3" SAMPLE 18-4384 (0.0-0.8): GP-GM, 5.6% -200, NV, NP

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_08_28_07.GDT 5/10/19

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-126
 Project Number Z637720000 Total Depth 1 feet
 Field Geologist J. SIMPSON Dates Drilled 9/9/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 55F, sunny, clear Latitude, Longitude N66.76319°, W160.14124°
 TH Finalized By J. Simpson Vegetation _____ Elevation 309.0

Drilling Method	Depth In (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Benched area in existing pit
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value		Frozen	While Drilling	
Hand-dug	0		GS	18-4385							
	1										

SUBSURFACE MATERIAL 0

Bn Poorly-graded GRAVEL
w/ Silt & Sand
moist, 3"
SAMPLE 18-4385 (0.0-1.0): GP-GM, 10.7% -200, NV, NP

BOH 1

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT_5/10/19

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-127
 Project Number Z637720000 Total Depth 1 feet
 Field Geologist J. SIMPSON Dates Drilled 9/9/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 60F, sunny, clear Latitude, Longitude N66.76297°, W160.14095°
 TH Finalized By J. Simpson Vegetation _____ Elevation 311.0

Drilling Method	Depth in (Feet)	Casting Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value		Frozen	While Drilling	
Hand-dug	0		GS	18-4386							Bench area in existing pit
	1										SUBSURFACE MATERIAL Bn Well-graded GRAVEL w/ Sand w/ Cobbles moist SAMPLE 18-4386 (0.0-1.0): GW, 3.8% -200, NV, NP, Max. Density 140.1 pcf, Opt. Moisture 5.5%

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_08_28_07.GDT 5/10/18

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-128
 Project Number Z637720000 Total Depth 1 feet
 Field Geologist J. SIMPSON Dates Drilled 9/9/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 60F, sunny, clear Latitude, Longitude N66.76348°, W160.14194°
 TH Finalized By J. Simpson Vegetation _____ Elevation 314.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Sample taken from side of wall. Height of wall calculated at approximately 35 feet.
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value		Frozen	While Drilling	
Hand-dug	0		GS	18-4387							
	1										



Bn Well-graded GRAVEL
w/ Sand
w/ Cobbles
moist, 3"
SAMPLE 18-4387 (0.0-1.0): GW, 4.7% -200, NV, NP

SUBSURFACE MATERIAL

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 5/10/18

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-129
 Project Number Z637720000 Total Depth 1 feet
 Field Geologist J. SIMPSON Dates Drilled 9/9/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 60F, sunny, clear Latitude, Longitude N66.76399°, W160.14008°
 TH Finalized By J. Simpson Vegetation _____ Elevation 306.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Sample taken from side of wall. Height of wall calculated at approximately 31 feet.
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value		Frozen	While Drilling	
Hand-dug	0		GS	18-4388							
	1										

SUBSURFACE MATERIAL

Tn-Bn Silty GRAVEL
w/ Sand
moist, less gravel with depth
SAMPLE 18-4388 (0.0-1.0): GM, 36.9% -200, SSc 19.4, SSf 23.9, LA 32,
DEG 6, LL 25, NP, Max. Density 132.5 pcf, Opt. Moisture 9.7%

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT_5/10/19

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-130
 Project Number Z637720000 Total Depth 1 feet
 Field Geologist J. SIMPSON Dates Drilled 9/9/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 60F, sunny, clear Latitude, Longitude N66.76412°, W160.13901°
 TH Finalized By J. Simpson Vegetation _____ Elevation 313.0

Drilling Method	Depth In (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Sample taken from side of wall. Height of wall calculated at approximately 35 feet.
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value		Frozen	While Drilling	
Hand-dug	0		CS	18-4389							
	1										



Bn Well-graded GRAVEL
w/ Sand
w/ Cobbles
moist
SAMPLE 18-4389 (0.0-1.0): GW, 4.1% -200, NV, NP

SUBSURFACE MATERIAL

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 5/10/18

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-131
 Project Number Z637720000 Total Depth 1 feet
 Field Geologist J. SIMPSON Dates Drilled 9/10/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 50F, sunny, clear Latitude, Longitude N66.76351°, W160.14038°
 TH Finalized By J. Simpson Vegetation _____ Elevation 334.0

Drilling Method	Depth in (Feet)	Casting Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Sample taken from side of wall.
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value		Frozen	While Drilling	
Hand-dug	0		GS	18-4390							SUBSURFACE MATERIAL
	1										Bn Poorly-graded SAND w/ Silt & Gravel moist, 2" SAMPLE 18-4390 (0.0-1.0): SP-SM, 8.3% -200, NV, NP

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 5/10/19

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-132
 Project Number Z637720000 Total Depth 1 feet
 Field Geologist J. SIMPSON Dates Drilled 9/10/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 50F, sunny, clear Latitude, Longitude N66.7644°, W160.1391°
 TH Finalized By J. Simpson Vegetation _____ Elevation 317.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Sample taken from side of wall. Height of wall calculated at approximately 15 feet.
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value		Frozen	While Drilling	
Hand-dug	0		GS	18-4391							
	1										

SUBSURFACE MATERIAL 0

Bn Well-graded GRAVEL
w/ Silt & Sand
w/ Cobbles
moist, 3"
SAMPLE 18-4391 (0.0-1.0): GW-GM, 10.2% -200, NV, NP

BOH 1

NR AKDOT TEST HOLE LOG - USCS - SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 5/10/19

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-133
 Project Number Z637720000 Total Depth 1 feet
 Field Geologist J. SIMPSON Dates Drilled 9/10/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 50F, sunny, clear Latitude, Longitude N66.76458°, W160.13828°
 TH Finalized By J. Simpson Vegetation _____ Elevation 318.0

Drilling Method	Depth In (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Sample taken from side of wall. Height of wall calculated at approximately 41 feet.
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value		Frozen	While Drilling	
H-S Auger	0		GS	18-4392							SUBSURFACE MATERIAL 0
	1										

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_08_28_07.GDT 5/10/19

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



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Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-134
 Project Number Z637720000 Total Depth 1 feet
 Field Geologist J. SIMPSON Dates Drilled 9/10/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 50F, sunny, clear Latitude, Longitude N66.765°, W160.13756°
 TH Finalized By J. Simpson Vegetation _____ Elevation 340.0

Drilling Method	Depth In (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Stripped area adjacent to pit.
			Method	Number	Blow Count	Sample Interval	Unconnected N-Value		Frozen	While Drilling	
Hand-dug	0		GS	18-4393							
	1										

SUBSURFACE MATERIAL 0

Bn Well-graded SAND
w/ Silt & Gravel
moist, 2"-, pockets/layers of silt
SAMPLE 18-4393 (0.0-1.0): SW-SM, 11.5% -200, SS_c 23.8, SS_f 20.9, LA
31, DEG 6, NV, NP, Max. Density 132.2 pcf, Opt. Moisture 8.4%

BOH 1

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 5/10/18

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-135
 Project Number Z637720000 Total Depth 1 feet
 Field Geologist J. SIMPSON Dates Drilled 9/10/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 55F, sunny, clear Latitude, Longitude N66.76544°, W160.13812°
 TH Finalized By J. Simpson Vegetation _____ Elevation 351.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Stripped area adjacent to pit.
			Method	Number	Blow Count	Sample Interval	Unconnected N-Value		Frozen	While Drilling	
Hand-dug	0		GS	18-4394							
	1										

SUBSURFACE MATERIAL

Bn SILT
moist

Bn Silty GRAVEL
w/ Sand
w/ Cobbles
moist

SAMPLE 18-4394 (0.1-1.0): GM, 33.9% -200, NV, NP

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_08_28_07.GDT 5/10/19

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



STATE OF ALASKA DOT/PF
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Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-136
 Project Number Z637720000 Total Depth 1 feet
 Field Geologist J. SIMPSON Dates Drilled 9/10/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 55F, sunny, clear Latitude, Longitude N66.76595°, W160.13776°
 TH Finalized By J. Simpson Vegetation _____ Elevation 360.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Stripped area adjacent to pit.
			Method	Number	Blow Count	Sample Interval	Unconnected N-value		Frozen	While Drilling	
Hand-dug	0										SUBSURFACE MATERIAL Bn Silty SAND moist Bn Silty Clayey GRAVEL w/ Sand moist SAMPLE 18-4395 (0.1-1.0): GC-GM, 38.7% -200, LL 23, PI 4
	1		GS	18-4395							

NR_AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 6/10/18

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



STATE OF ALASKA DOT/PF
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Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-137
 Project Number Z637720000 Total Depth 1 feet
 Field Geologist J. SIMPSON Dates Drilled 9/10/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 55F, sunny, clear Latitude, Longitude N66.7662°, W160.13673°
 TH Finalized By J. Simpson Vegetation _____ Elevation 365.0

Drilling Method	Depth In (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Stripped area adjacent to pit.
			Method	Number	Blow Count	Sample Interval	Unconnected N-Value		Frozen	While Drilling	
Hand-dug	0		GS	18-4396							
	1										

SUBSURFACE MATERIAL
 Bn Silty GRAVEL
 w/ Sand
 moist, 3"-, silty pockets/layers
 SAMPLE 18-4396 (0.0-1.0): GM, 24.3% -200, NV, NP

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_08_28_07.GDT 5/10/19

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



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Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-138
 Project Number Z637720000 Total Depth 1 feet
 Field Geologist J. SIMPSON Dates Drilled 9/10/2018
 Field Crew P. Lanigan Equipment Type _____ Station, Offset _____
 Weather 60F, sunny, clear Latitude, Longitude N66.76553°, W160.13715°
 TH Finalized By J. Simpson Vegetation _____ Elevation 350.0

Drilling Method	Depth In (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Stripped area adjacent to pit.
			Method	Number	Blow Count	Sample Interval	Uncorrected N-Value		Frozen	While Drilling	
	0										
Hand-dug	1		GS	18-4397							SUBSURFACE MATERIAL 0 Bn SILT moist Bn Poorly-graded GRAVEL w/ Silt & Sand moist SAMPLE 18-4397 (0.2-1.0): GP-GM, 7.1% -200, NV, NP BOH 1

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_08_28_07.GDT 5/10/19

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



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Northern Region Materials
Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-139
 Project Number Z637720000 Total Depth 4.5 feet
 Field Geologist J. SIMPSON Dates Drilled 9/10/2018
 Field Crew P. Lanigan Equipment Type Hand Auger Station, Offset _____
 Weather 60F, sunny, clear Latitude, Longitude N66.7646°, W160.14081°
 TH Finalized By J. Simpson Vegetation spruce, blueberry bushes, moss Elevation 330.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data						Graphic Log	Ground Water Data		GENERAL COMMENTS: Expansion Area
			Method	Number	Blow Count	Sample Interval	Unconnected N-Value	Frozen		While Drilling	After Drilling	
	0											SUBSURFACE MATERIAL
												ORG MAT
												Bn SILT moist, trace gravel
	1											
	2											sandier with depth
	3											
	4											gravel BODR
												BOH

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 5/10/19

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method



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Geology Section

FINAL TEST HOLE LOG

Project Selawik Barge Landing Access Road Test Hole Number 18-140
 Project Number Z637720000 Total Depth 2 feet
 Field Geologist J. SIMPSON Dates Drilled 9/10/2018
 Field Crew P. Lanigan Equipment Type Hand Auger Station, Offset _____
 Weather 60F, sunny, clear Latitude, Longitude N66.76414°, W160.13939°
 TH Finalized By J. Simpson Vegetation _____ Elevation 303.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Graphic Log	Ground Water Data		GENERAL COMMENTS: Drilled in pit floor to assess the thickness of silt run-off
			Method	Number	Blow Count	Sample Interval	Unconnected N-Value		Frozen	While Drilling	
Hand Auger	0										SUBSURFACE MATERIAL
	1										
	2										

Bn SILT wet

Bn SILT w/ Gravel gravel BODR

BOH

Drilling Notes: BODR: Based on drill reaction

NR AKDOT TEST HOLE LOG - USCS SPUD FARM RECON.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 6/10/19

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. CME Auto Hammer Cathead Rope Method

**STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT**

PROJECT NAME: Selawik Barge Landing Access Road
 PROJECT NUMBER: Z637720000
 AKSAS NUMBER: J. SIMPSON
 SAMPLED BY:
 MATERIAL SOURCE:

TEST HOLE NUMBER	18-116	18-118	18-124	18-125	18-126	18-127	18-128
DEPTH (feet)	1.0-1.5	0.5-1.5	0.0-1.0	0.0-0.8	0.0-1.0	0.0-1.0	0.0-1.0
LATITUDE	N66.76696°	N66.7665°	N66.76308°	N66.76273°	N66.76319°	N66.76297°	N66.76348°
LONGITUDE	W160.13576°	W160.13638°	W160.14255°	W160.1416°	W160.14124°	W160.14095°	W160.14194°
LAB NUMBER	18-4380	18-4382	18-4383	18-4384	18-4385	18-4386	18-4387
DATE SAMPLED	8-Sep-18	9-Sep-18	9-Sep-18	9-Sep-18	9-Sep-18	9-Sep-18	9-Sep-18
% Passing							
3"				97	97	88	
2"			99	97	95	81	95
1.5"	94	95	88	92	93	79	92
1.0"	91	78	80	80	86	71	84
0.75"	89	68	74	71	80	65	78
0.5"	86	59	62	60	71	54	67
0.375"	83	54	56	54	66	48	60
#4	78	46	41	39	52	34	44
#8	77	41	32	28	43	25	32
#10	77	41	32	27	41	24	31
#16	75	38	26	22	35	19	22
#30	73	35	21	17	29	12	15
#40	72	34	19	15	25	10	12
#50	71	33	16	13	22	9	9
#60	70	32	15	12	20	7	8
#80	69	31	13	10	16	6	7
#100	69	30	13	8	15	6	6
Silt/Clay #200	66.3	28.4	10.4	5.6	10.7	3.8	4.7
Hydro 0.02							
0.005							
0.002							
0.001							
LIQUID LIMIT	27	NV	NV	NV	NV	NV	NV
PLASTIC INDEX	NP	NP	NP	NP	NP	NP	NP
USCS CLASSIFICATION	ML	GM	GP-GM	GP-GM	GP-GM	GW	GW
USCS SOIL DESCRIPTION	GrSi	SiGr w/Sa	PGGr w/Si&Sa	PGGr w/Si&Sa	PGGr w/Si&Sa	WGGr w/Sa	WGGr w/Sa
NATURAL MOISTURE							
ORGANICS							
SP. GR. (FINE)						2.69	
SP. GR. (COARSE)						2.71	
MAX. DRY DENSITY						140.1	
OPTIMUM MOISTURE						5.5	
L.A. ABRASION			31				
DEGRAD. FACTOR			59				
SODIUM SULF. (CRSE)			19				
SODIUM SULF. (FINE)			22				
NORDIC ABRASION							
REMARKS							
GENERAL COMMENTS	Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7. * Organic content determination is based on the results of the ATM T-6 test method. (Soil descriptions shown in parentheses are based on field determinations.) USCS Soil Description Abbreviations: WG = Well-graded; PG = Poorly-graded; E = Elastic; L = Lean; F = Fat						

**STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT**

PROJECT NAME: Selawik Barge Landing Access Road
 PROJECT NUMBER: 2637720000
 AKSAS NUMBER: J. SIMPSON
 SAMPLED BY:
 MATERIAL SOURCE:

TEST HOLE NUMBER	18-129	18-130	18-131	18-132	18-133	18-134	18-135
DEPTH (feet)	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.1-1.0
LATITUDE	N66.76399°	N66.76412°	N66.76351°	N66.7644°	N66.76458°	N66.765°	N66.76544°
LONGITUDE	W160.14008°	W160.13901°	W160.14038°	W160.1391°	W160.13828°	W160.13756°	W160.13812°
LAB NUMBER	18-4388	18-4389	18-4390	18-4391	18-4392	18-4393	18-4394
DATE SAMPLED	9-Sep-18	9-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18
% Passing							
3"							
2"	98	94		94	96		93
1.5"	90	90	99	89	92	95	92
1.0"	82	82	97	84	87	90	87
0.75"	76	74	93	81	81	85	82
0.5"	68	63	84	72	71	78	76
0.375"	63	56	78	67	65	72	72
#4	54	40	61	51	51	56	58
#8	49	30	48	39	42	45	54
#10	49	28	47	39	41	45	53
#16	46	22	40	31	36	37	50
#30	43	16	34	25	32	29	47
#40	42	13	30	21	30	25	45
#50	41	10	25	18	28	20	43
#60	41	9	22	16	27	18	42
#80	39	7	17	14	24	16	39
#100	39	6	15	13	23	14	38
Silt/Clay #200	36.9	4.1	8.3	10.2	17.8	11.5	33.9
Hydro							
0.02							
0.005							
0.002							
0.001							
LIQUID LIMIT	25	NV	NV	NV	NV	NV	NV
PLASTIC INDEX	NP	NP	NP	NP	NP	NP	NP
USCS CLASSIFICATION	GM	GW	SP-SM	GW-GM	GM	SW-SM	GM
USCS SOIL DESCRIPTION	SiGr w/Sa	WGGr w/Sa	WGSa w/Si&Gr	WGGr w/Si&Sa	SiGr w/Sa	WGSa w/Si&Gr	SiGr w/Sa
NATURAL MOISTURE							
ORGANICS							
SP. GR. (FINE)	2.79					2.68	
SP. GR. (COARSE)	2.71					2.72	
MAX. DRY DENSITY	132.5					132.2	
OPTIMUM MOISTURE	9.7					8.4	
L.A. ABRASION	32					31	
DEGRAD. FACTOR	6					6	
SODIUM SULF. (CRSE)	19					24	
SODIUM SULF. (FINE)	24					21	
NORDIC ABRASION							
REMARKS							
GENERAL COMMENTS	Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7 1 Organic content determination is based on the results of the ATM T-6 test method. (Soil descriptions shown in parentheses are based on field determinations.) USCS Soil Description Abbreviations: WG = Well-graded; PG = Poorly-graded; E = Elastic; L = Lean; F = Fat						

**STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT**

PROJECT NAME: Selawik Barge Landing Access Road
 PROJECT NUMBER: Z637720000
 AKSAS NUMBER: J. SIMPSON
 SAMPLED BY:
 MATERIAL SOURCE:

TEST HOLE NUMBER	18-136	18-137	18-138				
DEPTH (feet)	0.1-1.0	0.0-1.0	0.2-1.0				
LATITUDE	N66.76595°	N66.7662°	N66.76553°				
LONGITUDE	W160.13776°	W160.13673°	W160.13715°				
LAB NUMBER	18-4395	18-4396	18-4397				
DATE SAMPLED	10-Sep-18	10-Sep-18	10-Sep-18				
% Passing							
3" ⁷⁵	97		90				
2" ⁵⁰	96	94	88				
1.5" ^{37.5}	90	93	85				
Gravel 1.0" ²⁵	86	84	78				
0.75" ¹⁹	83	79	74				
0.5" ¹⁵	77	71	65				
0.375" ¹⁰	73	66	58				
#4 ^{4.75}	62	54	43				
Sand #8	57	47	28				
#10	57	47	26				
#16	53	42	20				
#30	50	37	17				
#40	48	35	15				
#50	46	33	13				
#60	45	31	12				
#80	44	29	10				
#100	42	28	9				
Silt/Clay #200 ⁷⁵	38.7	24.3	7.1				
Hydro 0.02							
0.005							
0.002							
0.001							
LIQUID LIMIT	23	NV	NV				
PLASTIC INDEX	4	NP	NP				
USCS CLASSIFICATION	GC-GM	GM	GP-GM				
USCS SOIL DESCRIPTION	SiClGr w/Sa	SiGr w/Sa	PGGr w/Si&Sa				
NATURAL MOISTURE							
ORGANICS							
SP. GR. (FINE)							
SP. GR. (COARSE)							
MAX. DRY DENSITY							
OPTIMUM MOISTURE							
L.A. ABRASION							
DEGRAD. FACTOR							
SODIUM SULF. (CRSE)							
SODIUM SULF. (FINE)							
NORDIC ABRASION							
REMARKS							
GENERAL COMMENTS	Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7. * Organic content determination is based on the results of the ATM T-6 test method. (Soil descriptions shown in parentheses are based on field determinations.) USCS Soil Description Abbreviations: WG = Well-graded; PG = Poorly-graded; E = Elastic; L = Lean; F = Fat						

SYMBOLS AND DEFINITIONS

BASIC MATERIAL SYMBOLS



- ASPHALT
- PEAT
- CLAY (Cl)
- ICE
- SILT (Si)
- POORLY GRADED SAND (Sa)
- POORLY GRADED GRAVEL (Gr)
- WELL GRADED SAND
- WELL GRADED GRAVEL
- BEDROCK (Bx), soft(Type)
- BEDROCK (Bx), hard(Type)

SOFT OR HARD BEDROCK BASED ON DRILLING RATE

NOTE

MAIN COMPONENT (UPPER CASE ... SOLID LINES)

MINOR COMPONENT (Title Case ... DASHED LINES OR SPARSER PATTERN)

USCS SIZE DEFINITIONS

BOULDERS (Boulders)	12"+
COBBLES (Cobbles)	3" TO 12"
GRAVEL	#4 TO 3"
ANGULAR FRAGMENTS	#10 +
SAND	#200 TO #4
SILT	#200 TO 0.005 mm
CLAY	MINUS 0.005 mm

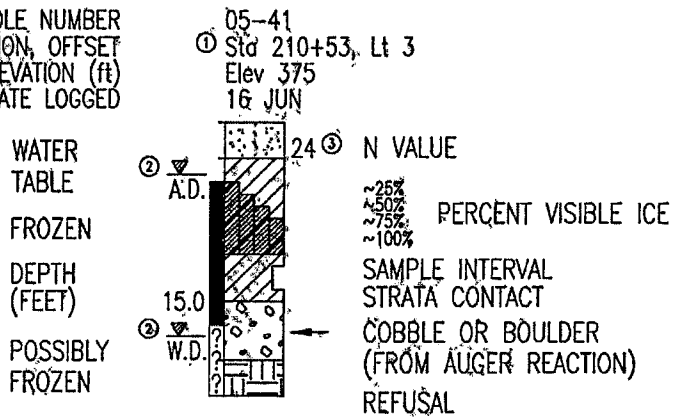
TEST RESULTS

...%-200	= % PASSING #200 SIEVE
NM ...%	= NATURAL MOISTURE
ORG ...%	= ORGANIC CONTENT
SSc _	= SODIUM SULFATE LOSS (coarse)
SSf _	= SODIUM SULFATE LOSS (fine)
LA _	= LOS ANGELES ABRASION
DEG _	= DEGRADATION
LL _	= LIQUID LIMIT (NV = no value)
PI _	= PLASTIC INDEX (NP = non-plastic)

MISC.

Tr	= TRACE
sl	= SLIGHTLY
hi	= HIGHLY
w/_	= WITH UNSPECIFIED AMOUNT
X'tls	= CRYSTALS
TH	= TEST HOLE
TT	= TEST TRENCH
TP	= TEST PIT

TYPICAL LOG



- ① Station value may also be on centerline e.g. Sta 210+53, CL or lat-long format e.g. N64.56789°, W145.67890°
- ② W.D.= WHILE DRILLING, A.D.= AFTER DRILLING
- ③ "N VALUE" INDICATES STANDARD PENETRATION TEST (1.4" I.D., 2.0" O.D. SAMPLER DRIVEN WITH 140 LB. HAMMER, 30" FREE FALL) AND IS SUM OF 2nd AND 3rd 6" OF PENETRATION.

PLAN VIEW SYMBOLS

- POWER AUGER TEST HOLE (TH)
- HAND AUGER TEST HOLE (TH)
- EXPOSED MATERIAL
- PROBE
- HAND DUG TEST PIT (TP)
- DOZER/BACKHOE TEST TRENCH (TT)
- BODY OF WATER
- FLOW DIRECTION
- WASTE BERM
- BANK
- SWAMP
- TREELINE

SOIL DENSITY/CONSISTENCY DESCRIPTORS

NON-COHESIVE		COHESIVE	
RELATIVE DENSITY	BLOWS/FOOT (N) VALUE	CONSISTENCY	BLOWS/FOOT (N) VALUE
VERY LOOSE	< 4	VERY SOFT	< 2
LOOSE	5-10	SOFT	2-4
MEDIUM DENSE	11-30	FIRM	5-8
DENSE	31-50	STIFF	9-15
VERY DENSE	> 50	VERY STIFF	16-30
		HARD	> 30

COLOR

Bk = BLACK	Gy = GRAY	Tn = TAN
Bl = BLUE	Or = ORANGE	Wh = WHITE
Bn = BROWN	Rd = RED	Yw = YELLOW
Gn = GREEN		

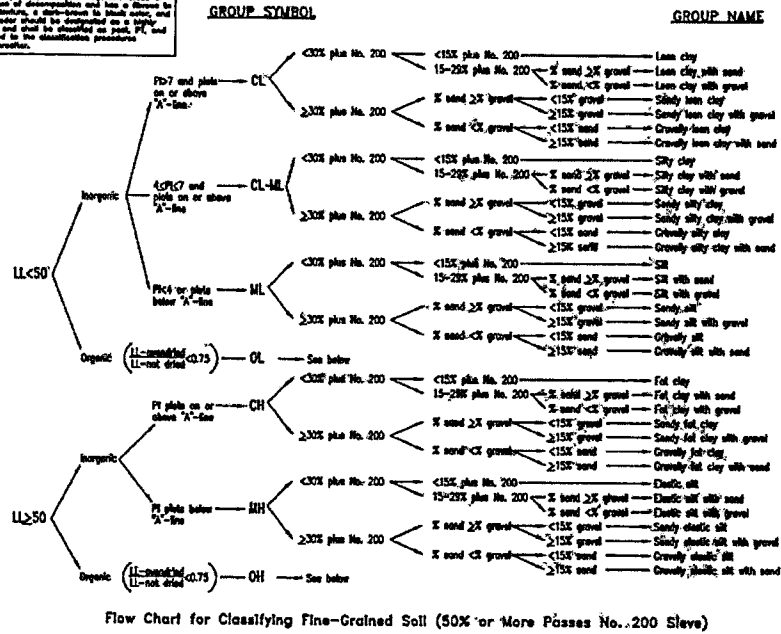
MOISTURE

dry	= < OPTIMUM*	DUSTY, DRY TO THE TOUCH
moist	= ~ OPTIMUM*	DAMP, NO VISIBLE WATER
wet	= > OPTIMUM*	VISIBLE FREE WATER

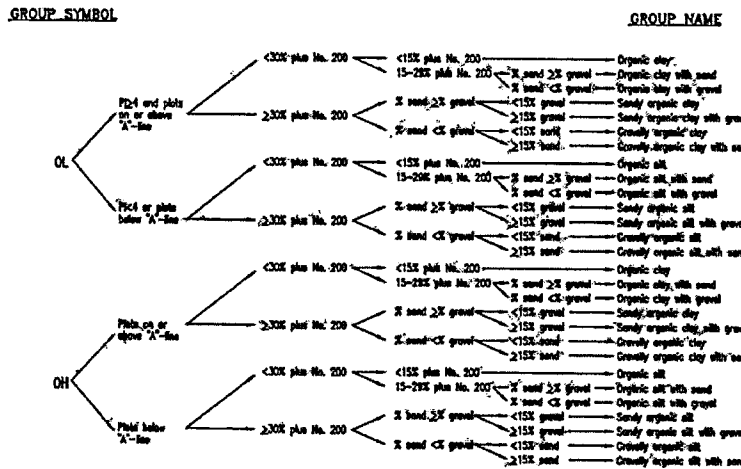
* OPTIMUM MOISTURE FOR MAXIMUM DENSITY

Classification of Soils for Engineering Purposes (Unified Soil Classification System)

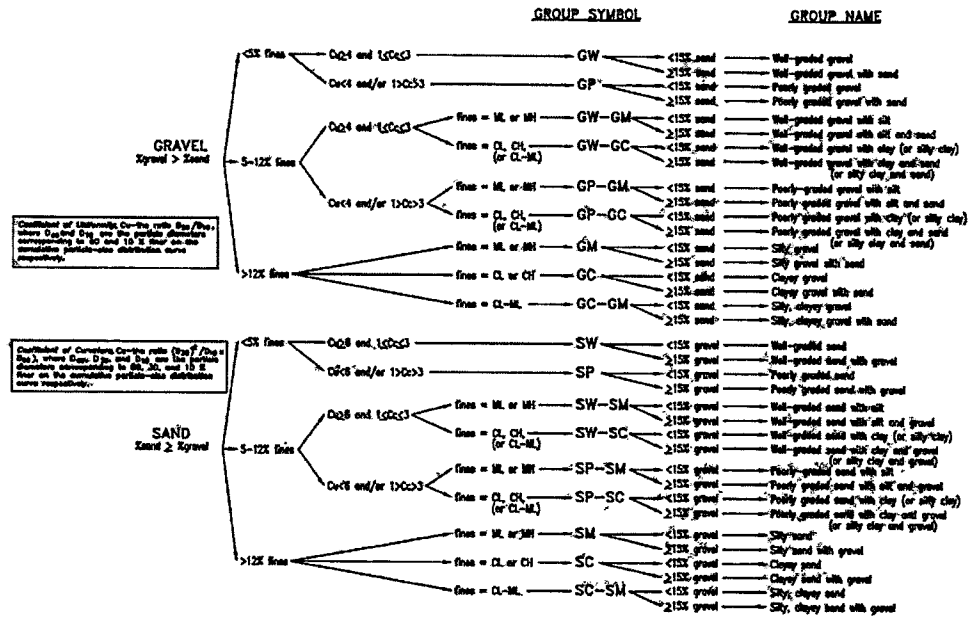
A sample universal plasticity chart is shown in Figure 2. The chart is divided into regions for classification of soils. A soil is classified as a clay, silt, or sand based on its liquid limit (LL) and plasticity index (PI). The classification is based on the Unified Soil Classification System (USCS).



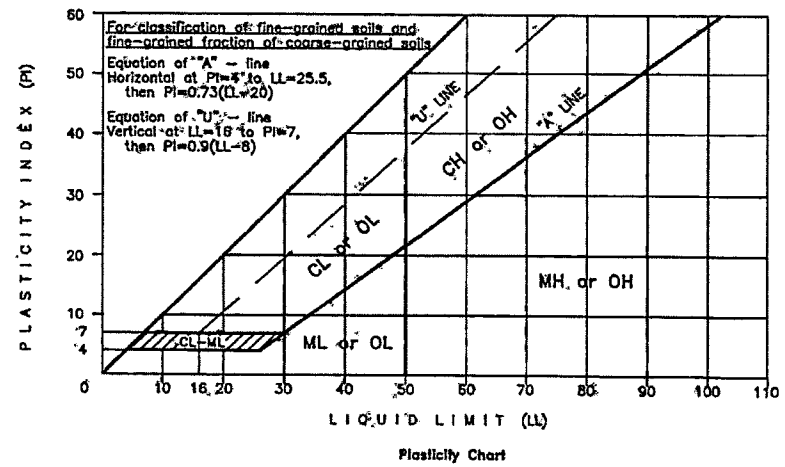
Flow Chart for Classifying Fine-Grained Soil (50% or More Passes No. 200 Sieve)



Flow Chart for Classifying Organic Fine-Grained Soil (50% or More Passes No. 200 Sieve)



Flow Chart for Classifying Coarse-Grained Soil (More Than 50% Retained on No. 200 Sieve)



Plasticity Chart

DESCRIPTION AND CLASSIFICATION OF FROZEN SOILS

Part I Description of Soil Phase (a) (Independent of Frozen State)		DESCRIPTION AND CLASSIFICATION OF FROZEN SOILS								
Part II Description of Frozen Soil		Major Group		Sub-Group		Field Identification (6)	Pertinent Properties of Frozen Materials which may be measured by physical tests to supplement field identification. (7)	Guide for Construction on Soils Subject to Freezing and Thawing		
		Description (2)	Designation (3)	Description (4)	Designation (5)			Thaw Characteristics (8)	Criteria (9)	
Part II Description of Frozen Soil	Segregated ice is not visible by eye (b)	N	Poorly Bonded or Friable	Nf	Identify by visual examination. To determine presence of excess ice, use procedure under note (c) below and hand magnifying lens as necessary. For soils not fully saturated, estimate degree of ice saturation: Medium, Low. Note presence of crystals, or of ice coatings around larger particles.	In-Place Temperature Density and Void Ratio a) In Frozen State b) After Thawing in Place Water Content (Total H ₂ O, including ice) a) Average b) Distribution Strength a) Compressive b) Tensile c) Shear d) Adfreeze Elastic Properties Plastic Properties Thermal Properties Ice Crystal Structure (using optional instruments.) a) Orientation of Axes b) Crystal size c) Crystal shape d) Pattern of Arrangement	Usually Thaw-Stable	↑	The potential intensity of ice segregation in a soil is dependent to a large degree on its void sizes and may be expressed as an empirical function of grain size as follows: Most inorganic soils containing 3 percent or more of grains finer than 0.02 mm in diameter by weight are frost-susceptible. Gravels, well-graded sands and silty sands, especially those approaching the theoretical maximum density curve, which contain 1.5 to 3 percent finer than 0.02 mm by weight without being frost-susceptible. However, their tendency to occur interbedded with other soils usually makes it impractical to consider them separately. Soils classed as frost-susceptible under the above criteria are likely to develop significant ice segregation and frost heave if frozen at normal rates with free water readily available. Soils so frozen will fall into the thaw-unstable category. However, they may also be classed as thaw-stable if frozen with insufficient water to permit ice segregation.	
			No excess ice	n						
	Well Bonded	Nb								
	Excess ice	e								
Part II Description of Frozen Soil	Segregated ice is visible by eye. (Ice 1 inch or less in thickness) (b)	V	Individual ice crystals or inclusions	Vx	For ice phase, record the following as applicable: Location Size Orientation Shape Thickness Spacing Pattern of arrangement Length Hardness } Structure } per part III Below Color }	Usually Thaw-Unstable	↓	Soils classed as non-frost-susceptible (*NFS) under the above criteria usually occur without significant ice segregation and are not exact and may be inadequate for some structure applications; exceptions may also result from minor soil variations.		
			Ice coatings on particles	Vc						
			Random or irregularly oriented ice formations	Vr						
			Stratified or distinctly oriented ice formations	Vs						
Part III Description of Substantial Ice Strata	Ice (Greater than 1 inch in thickness)	Ice	Ice with soil inclusions	Ice + Soil Type	Designate material as ICE (d) and use descriptive terms as follows, usually one item from each group, as applicable: Hardness Structure Color Admixtures Hard Clear e.g.: e.g.: Soft Cloudy Color- Contains (mass, Porous less Thin Silt not indi- Candled Gray Inclusions crystals) Granular Blue Stratified	Same as Part II above, as applicable, with special emphasis on Ice Crystal Structure.				
			Ice without soil inclusions	Ice						

DEFINITIONS:

Ice Coatings on Particles are discernible layers of ice found on or below the larger soil particles in a frozen soil mass. They are sometimes associated with hoarfrost crystals, which have grown into voids produced by the freezing action.

Ice Crystal is a very small individual ice particle visible in the face of a soil mass. Crystals may be present alone or in a combination with other ice formations.

Clear ice is transparent and contains only a moderate number of air bubbles. (e)

Cloudy ice is translucent, but essentially sound and non-pervious

Porous ice contains numerous voids, usually interconnected and usually resulting from melting at air bubbles or along crystal interfaces from presence of salt or other materials in the water, or from the freezing of saturated snow. Though porous, the mass retains its structural unity.

Candled ice is ice which has rotted or otherwise formed into long columnar crystals, very loosely bonded together.

Granular ice is composed of coarse, more or less equidimensional, ice crystals weakly bonded together.

Ice Lenses are lenticular ice formations in soil occurring essentially parallel to each other, generally normal to the direction of heat loss and commonly in repeated layers.

Ice Segregation is the growth of ice as distinct lenses, layers, veins and masses in soils, commonly but not always oriented normal to direction of heat loss.

Well-bonded signifies that the soil particles are strongly held together by the ice and that the frozen soil possesses relatively high resistance to chipping or breaking.

Poorly-bonded signifies that the soil particles are weakly held together by the ice and that the frozen soil consequently has poor resistance to chipping or breaking.

Friable denotes a condition in which material is easily broken up under light to moderate pressure.

Thaw-Stable frozen soils do not, on thawing, show loss of strength below normal, long-time thawed values nor produce detrimental settlement.

Thaw-Unstable frozen soils show on thawing, significant loss of strength below normal, long-time thawed values and/or significant settlement, as a direct result of the melting of the excess ice in the soil.

Modified from: Linell, K. A. and Kaplar, C. W., 1966, *Description and Classification of Frozen Soils*, Proc. International Conference on Permafrost (1963), Lafayette, IN, U.S. National Academy of Sciences, Publ. 1287, pp 481-487.

NOTES:

(a) When rock is encountered, standard rock classification terminology should be used.

(b) Frozen soils in the N group may on close examination indicate presence of ice within the voids of the material by crystalline reflections or by a sheen on fractured or trimmed surfaces. However, the impression to the unaided eye is that none of the frozen water occupies space in excess of the original voids in the soil. The opposite is true of frozen soils in the V group.

(c) When visual methods may be inadequate, a simple field test to aid evaluation of volume of excess ice can be made by placing some frozen soil in a small jar, allowing it to melt and observing the quantity of supernatant water as a percent of total volume.

(d) Where special forms of ice, such as hoarfrost, can be distinguished, more explicit description should be given.

(e) Observer should be careful to avoid being misled by surface scratches or frost coating on the ice.