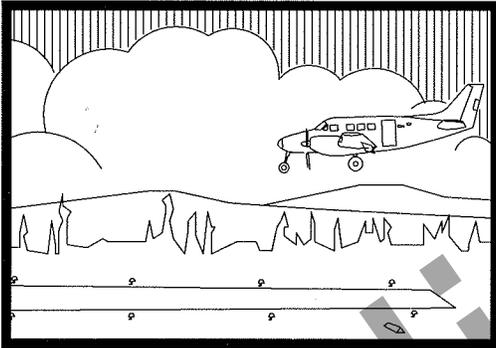


SUPPLEMENTAL MATERIAL SITE REPORT

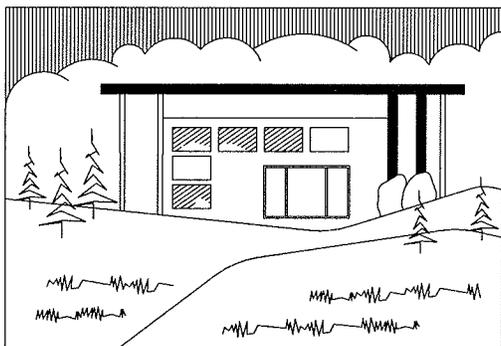
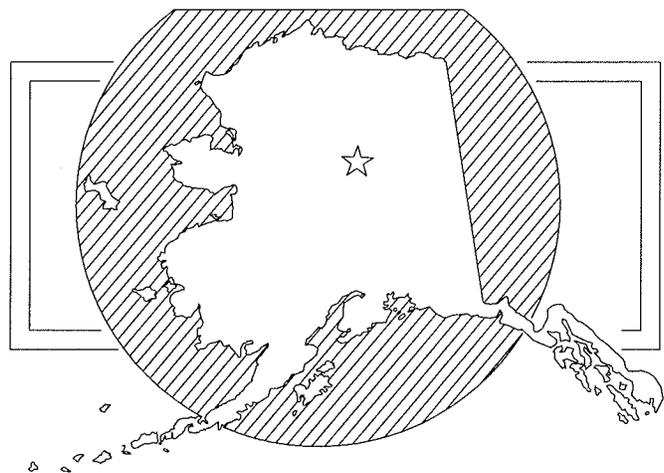
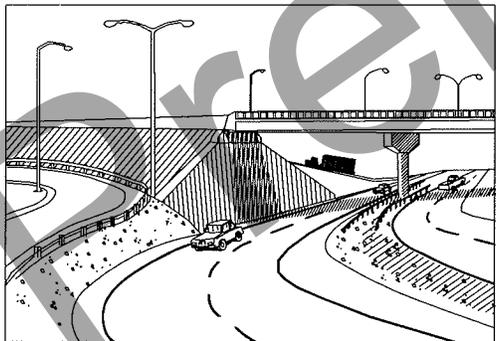
PARKS HWY MP 194 BROAD PASS RAILROAD CROSSING

FEDERAL PROJECT NO. REH-HHE-OA4-3(16) / STATE PROJECT NO. 61277



STATE OF ALASKA

Department of Transportation
and Public Facilities

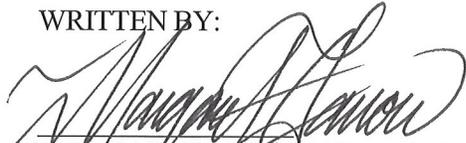


NORTHERN REGION

JULY 2008

SUPPLEMENTAL MATERIAL SITE REPORT
PARKS HIGHWAY MP 194 BROAD PASS RAILROAD OVERCROSSING
FEDERAL PROJECT NO. REH-HHE-0A4-3(16)
STATE PROJECT NO. 61277
NORTHERN REGION

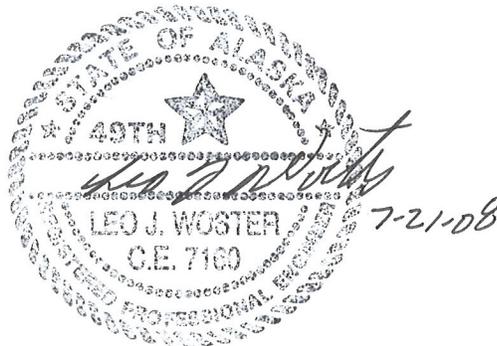
WRITTEN BY:


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APPROVED BY:



LEO J. WOSTER, P.E.
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Preliminary

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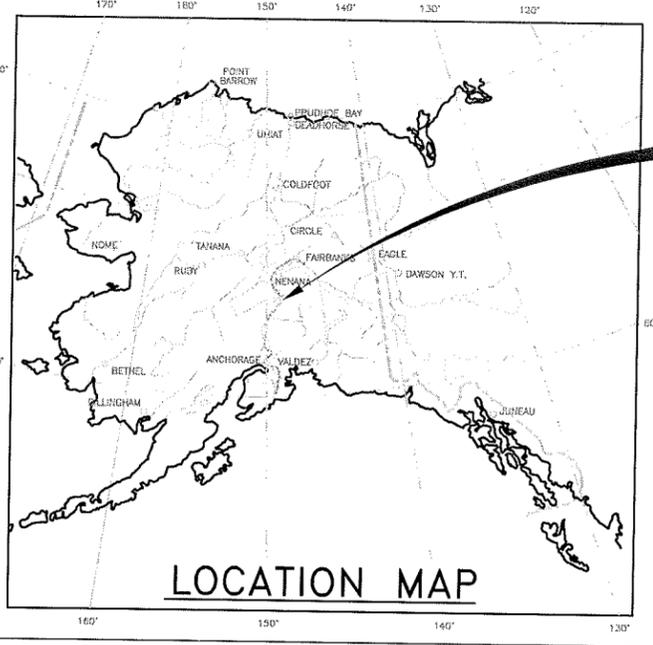
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Preliminary



PROJECT LOCATION
 REH-HHE-OA4-3(16)/61277

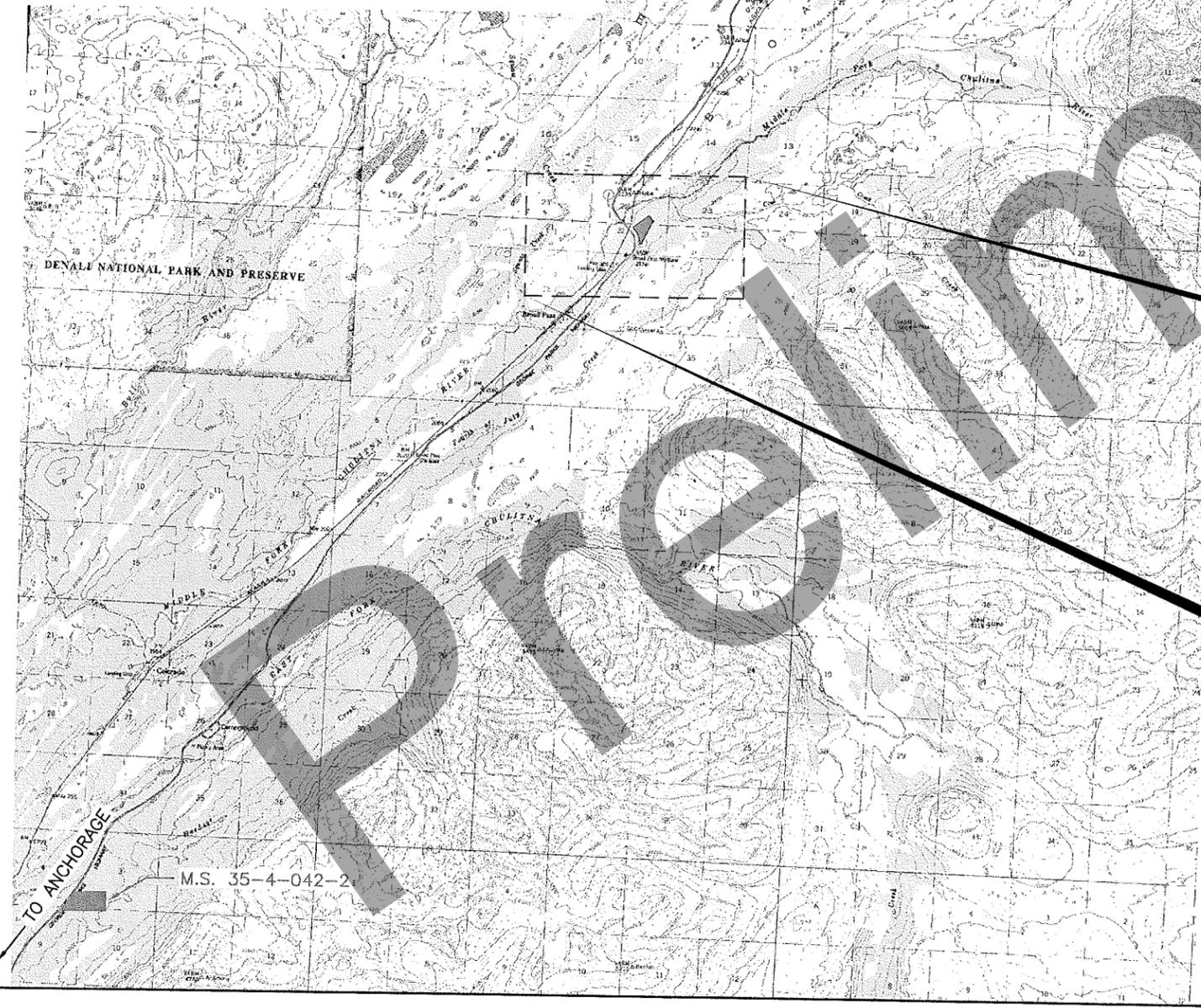
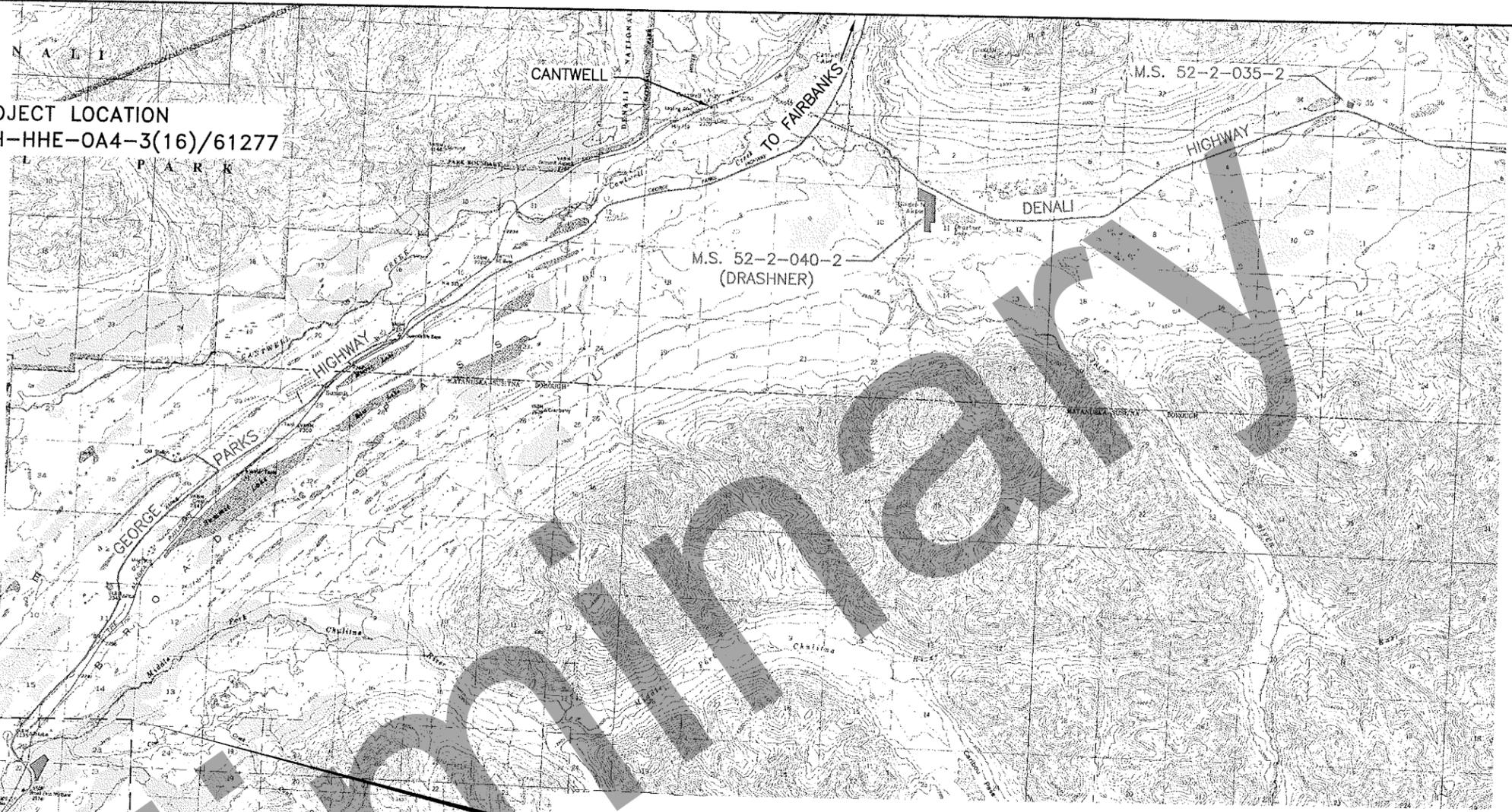
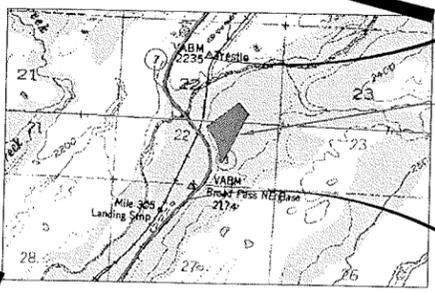


FIGURE 1
 VICINITY MAP
 TAKEN FROM USGS QUADRANGLES HEALY A-5, B-4 & B-5



EOP STA. 1603+00

M.S. 35-4-104-2

BOP STA. 1532+50

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES ENGINEERING GEOLOGY UNIT	
DATA: MD	PARKS HWY MP 194 BROAD PASS RAILROAD CROSSING MATERIAL SITES - VICINITY MAP
DRAWN: RP	
APPROVED: SM	PROJECT NO. REH-OA4-3(16)
DATE: Jul 2008	C:\Geo\61277 Broad Pass\Drafting\61277-Vicinity

Jul 22, 2008 - 8:22am - Tab: Layout1

**SUPPLEMENTAL MATERIAL SITE REPORT
PARKS HIGHWAY MP 194 BROAD PASS RAILROAD OVERCROSSING
FEDERAL PROJECT NO. REH-HHE-0A4-3(16)
STATE PROJECT NO. 61277
NORTHERN REGION**

Summary

The Alaska Department of Transportation and Public Facilities (DOT&PF) proposes to realign approximately 1.5 miles of the Parks Highway from about Mile 193.6 to Mile 195.1. The proposed improvements include a new bridge over the Middle Fork of the Chulitna River, a railroad overcrossing, and surfacing with crushed aggregate base course and hot asphalt.

This project requires a considerable amount of borrow for the proposed fills. Because the material sites closest to the project location were not adequately explored, Northern Region Materials Section (NRMS) personnel conducted explorations in 2007 in four material site areas to better define the materials present in these sites.

MS 52-2-035-2, Denali Highway, ~Mile 125.5

This material site is located on AHTNA Inc. land, which is subject to DOT&PF's non-expiring use permit from BLM for the site, i.e., Right of Way Grant, F-026073. Two types of bedrock are present within this material site, hard igneous rock to the east, and weathered, soft sedimentary rock to the west. Access is directly from the highway right of way. The site contains an established working area. Laboratory testing indicates that the igneous rock meets Standard Specifications for use as crushed aggregates and base course.

MS 52-2-040-2 (Drashner), Denali Highway, ~Mile 131.7

This material site is located on AHTNA Inc. land and also a portion of the Nome Stickivan Native Allotment, both subject to DOT&PF's non-expiring use permit from BLM for the site, i.e., Right of Way Grant, F-026125. An access road provides entry to the site, and continues to the southeast to the newly created pit located in the center portion of the permitted site. The site is located immediately to the west of a subdivision, and an airstrip obliquely crosses the southern portion of the permitted area. This site contains alluvial deposits composed of sand and gravel, with cobbles and boulders throughout. Some of the material tested from this site did not meet Standard Specifications for Degradation values or Sodium Sulfate Loss.

MS 35-4-104-2 and adjacent areas, Parks Highway, ~Mile 194.2

MS 35-4-104-2 is located on AHTNA Inc. land, which is subject to DOT&PF's non-expiring use permit from BLM for the site, i.e., Right of Way Grant, F-058899. This grant authorized the removal of 325,000 cubic yards of material. That entire amount has been extracted. For the 2007 investigation, we located borings and trenches in the adjacent University of Alaska land to the east, and in the adjacent AHTNA land to the north and east of MS 35-4-104-2. This site is located in areas of ground moraine and glacial outwash. The soils have been reworked in some areas by the fluvial action of the Middle Fork Chulitna River. Hence, the soils vary from well-graded gravel with sand to silty gravel and elastic silt. Degradation

results from laboratory testing indicate that material coming from this site does not meet the Standard Specifications for use as crushed aggregates, base course, and subbase products. Additionally, the results of laboratory testing indicate that the natural moisture of the tested material in the area often is above its optimum moisture content, indicating that the soils in this area may require complicated mining, processing, and handling techniques and procedures in order to meet standard specifications for compaction.

MS 35-4-042-2, Parks Highway, MP 183

The Department of Natural Resources issued a Negotiated Material Sale contract, ADL No. 224961, to the DOT&PF for the removal of 200,000 cubic yards of material. This contract expires on December 31, 2018. MS 35-4-042-2 is approximately 66 acres in size. The soils present in the developed portion of MS 35-4-042-2, which is approximately 350 ft by 550 ft and located in the northwest portion of the site, are alluvial deposits composed of sand and gravel, with cobbles and boulders throughout. Borings indicate that the sandy and gravelly soils extend to the east, south, and southwest of the developed area into the area vegetated by large spruce trees. Degradation results from laboratory testing indicate that some of the material coming from this site does not meet the Standard Specifications for use as crushed aggregates, base course, and subbase products.

Introduction

The project is located about 16 miles south of Cantwell on the Parks Highway. Fairbanks is about 168 road miles north of the project, and Anchorage is about 194 road miles south. See Figure 1 for a location map.

Field investigation

Exploration

At the request of Tiff Vincent, then engineering manager, Northern Region Materials Section (NRMS) personnel conducted a geotechnical investigation for the Parks Hwy MP 194 Broad Pass Railroad Overcrossing project. We conducted investigations of four material site areas (MS 52-2-035-2, MS 52-2-040-2, MS 35-4-104-2, and MS 35-4-042-2 / 35-4-021-2), in order to locate suitable materials to meet the project's needs. M. Darrow, geotechnical engineering assistant, and T. Johnson and S. Parker, drillers, conducted the investigation from July 25 through August 5, 2007.

Drilling and sampling

M. Darrow located, sampled, and logged a total of 38 holes and trenches. T. Johnson and S. Parker operated a Central Mine Equipment (CME) 45B rotary drill mounted onto a Bombardier track carrier and equipped with a front stabilizer to advance all borings in the material sites. We also used a Case 1150 Excavator with a Henley Frost Bucket to dig trenches and as a general support vehicle in MS 35-4-104-2 and MS 35-4-042-2 / 35-4-021-2. The core in MS 52-2-035-2 was procured with a B series bedrock-coring tool. The remaining holes were advanced using a 6-in. diameter solid-stem auger system. The techniques employed to collect samples consisted of taking samples from auger cuttings,

trenches, and off of the surface. We also conducted cobble and boulder counts in several of the test trenches. All borings and trenches were logged using the Unified Soil Classification System (USCS). This report also contains the results of older geotechnical investigations. As a result, both the USCS and the previously used Alaska DOT Textural Soil Description system will be used in the presentation of borings. We transported 46 samples to the DOT&PF laboratory in Fairbanks for testing.

Each material site drawing contains the locations of the borings for that site, and the boring logs and laboratory are included within the respective material site discussion.

Laboratory testing

NRMS personnel transported samples to the DOT&PF laboratory in Fairbanks for testing. Table 1 is a list of the laboratory testing performed for this project.

Expected physical site conditions

Based on the data retrieved from the exploration detailed in this report, and on the geology and local climate of the project location, the following physical site conditions should be expected:

- 1) Expect intermittent permafrost throughout the project area and within the material sites.
- 2) Frozen ground may be present within the seasonally frozen layer within the project limits and material sites at any time of the year.
- 3) Expect cobbles and/or boulders throughout the project area and within the material sites.
- 4) Expect the silty gravel in the general area of MS 35-4-104-2 to require complicated mining, processing, and handling techniques and procedures, including drying, in order to meet standard specifications for quality and compaction.
- 5) Expect variation in the water table in the general area of MS 35-4-104-2.
- 6) Expect to have to drill and blast the bedrock in MS 52-2-035-2.

Table 1. Summary of the relevant laboratory test methods

Test Name (short description or common identifier)	Test Number	
	AASHTO	ASTM
Sieve Analysis of Fine and Coarse Aggregates (<i>Gradation</i>)	T27/T11	C126/C117
Determining the Liquid Limit of Soils (<i>Liquid Limit</i>)	T89	D4318
Determining the Plastic Limit and Plasticity Index of Soils (<i>Plastic Limit / PI</i>)	T90	D4318
Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes (<i>Classification</i>)	M145-91	D3282
Moisture Content of Soils (<i>Natural Moisture</i>)	T265	D2216
Organic Content of Soils by Ignition (<i>Organic Content</i>)	T267	D2974
Moisture-Density Relations of Soils... (<i>Proctor Test</i>)	T99/T180	D698/D1557
Specific Gravity and Absorption of Coarse Aggregate (<i>Coarse Specific Gravity</i>)	T85	C127
Specific Gravity of Soils (<i>Fine Specific Gravity</i>)	T100	D854
Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate (<i>Quality – SSc, SSf</i>)	T104	C88
Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine (<i>Quality – LA</i>)	T96	C131
Standard Method of Test for Determining the Degradation Value of Aggregates (<i>Quality – DEG</i>)	Alaska Test Method (ATM) 313	
Nordic Abrasion Value of Aggregate	ATM 312	

Material sites

The Materials Source information included in this section is for the purpose of assisting in the project design process. It does not signify that the sources are available or suitable for use during the construction of any current or future project. This Geotechnical Report does not determine source availability or suitability for any construction project; it only provides information that can be used to make that determination during the project design process. Sources available or suitable for use for a construction project will be specified in the appropriate section of the Plans and Specifications of the Contract Documents for the construction project.

MS 52-2-035-2

This site was previously explored in 1988 for the Denali Highway Mile 104 West Rehabilitation project. While test hole and laboratory data from that project are presented again in this report, we refer the reader to the 1992 geotechnical report (Grahek, 1992) for a complete description of the previous work.

An attempt was made during the 2007 exploration to locate and mark previous borings. For those that were located, GPS readings were taken using a Garmin Etrex Venture with an accuracy of <49.2 ft (95% typical), and the corresponding geographic coordinates are presented here on the boring logs and on the laboratory data summary sheets. It should be noted that the locations of the older borings that were not found in 2007, shown on the material site drawing, are approximate.

Location and access

This material site is located north of the Denali Highway at approximately Mile 125.5. There is an existing pit within the permitted area and directly adjacent to the highway right of way; however, a rocky berm has been placed along the highway shoulder to restrict access.

Description

The site is situated in an area of bedrock exposure among three lakes referred to locally as the "Gas Lakes." The existing pit is approximately 190 ft by 300 ft, with overburden placed to the east and to the west. The last use of this site was around 1994, when the material in the site was used for fills along the Denali Highway.

Two types of bedrock are present within this material site. To the east, hard igneous rock forms outcrops with steep cliff faces (see Figure 2). To the west, up to 15 ft of silty soil overlies weathered, soft, sedimentary rock (see Figure 3).

In 2007, we drilled one core hole (TC07-1601) into the sedimentary rock, which consisted of highly fractured, interbedded siltstone, sandstone, shale, limestone, and chert. The Rock Quality Designation (RQD) from this test core ranged from 0 to 46, with an average RQD of 19 and the longest piece length of 7.5 in. We drilled core holes at two different locations into the igneous rock, which we identified as basalt. At the first location (TC07-1600), drilling rates indicated the bedrock was soft between 12.5 ft and 16.0 ft, becoming hard below 16.0 ft. The bedrock was highly fractured, with iron staining on joint faces and infilling in joints up to ¼-in. thick. The RQD varied from 13 to 52, with an average RQD of 35 and the longest piece length of 6.5 in. At the second of these locations, we had difficulty in seating the casing due to the shallow soil depth. We made three attempts (TC07-1603, TH07-1604, and TC07-1604b), and were successful on the third try. Drilling rates indicated that the basalt bedrock at this location was hard. It was highly fractured, with the RQD ranging from 0 to 50, with an average RQD of 30 and the longest piece length of 8 in.

Land Status

This material site is located on AHTNA Inc. land, which is subject to DOT&PF's non-expiring use permit from the Bureau of Land Management for the site, i.e., Right of Way Grant, F-026073.

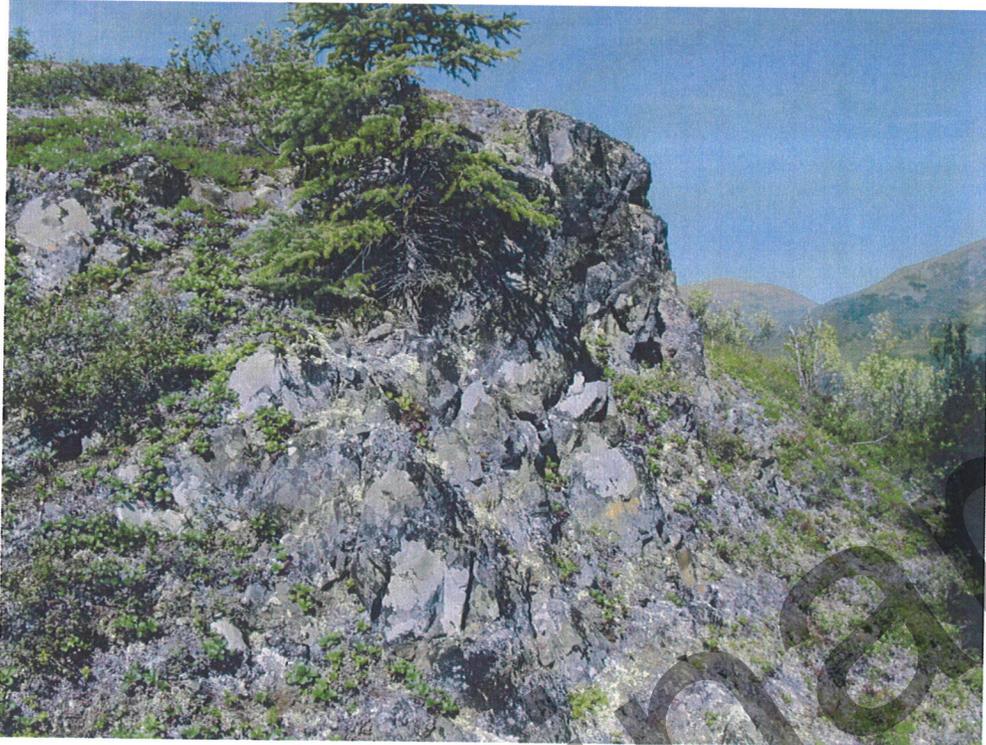


Figure 2. Cliff face of basalt bedrock exposed in the eastern portion of MS 52-2-035-2.



Figure 3. Completely weathered sedimentary bedrock in the western portion of MS 52-2-035-2 (TH07-1602).

Clearing and Stripping

Only the existing mined areas have been cleared of vegetation. Vegetation in the undisturbed areas consists of dwarf birch, blueberries, moss, lichen, and occasional spruce. Drilling indicates that overburden ranges from nothing over the exposed bedrock in the eastern portion of the site to up to 15 ft of silty soil in the western and northwestern portions of the site.

Water Table

NRMS personnel did not observe a water table to the depths investigated in any of the 1988 and 2007 borings.

Frozen ground conditions

Frozen soil was intercepted in three of the 1988 test holes, and in three of the 2007 borings. See the boring logs for details. Expect seasonally and perennially frozen ground throughout the site and the general area.

Quality of materials

Table 2 contains a summary of the laboratory testing results of the sandy and/or gravelly soil and the basalt bedrock present in MS 52-2-035-2. The data summarized include: percent passing the No. 200 sieve (% -200), plastic index (PI), natural moisture, LA Abrasion values, Degradation values, Sodium Sulfate loss, both coarse and fine (SSc and SSf, respectively), and Nordic Abrasion values. See the seven column sheets for other laboratory results not included here.

Table 2. Summary of laboratory testing data for MS 52-2-035-2. Numbers in parentheses indicate the number of tests performed.

Material Type	% -200	PI	Natural Moisture (%)	LA Abrasion	Degradation	SSc	SSf	Nordic Abrasion
Bedrock (Basalt)	---	---	---	10 (4)	50 – 78 (4)	1, 3.7 (2)	0 (1)	7.3 (1)
Sandy and/or gravelly soil	27 – 31.6 (3)	NP – 16 (3)	14.4 (1)	---	---	---	---	---

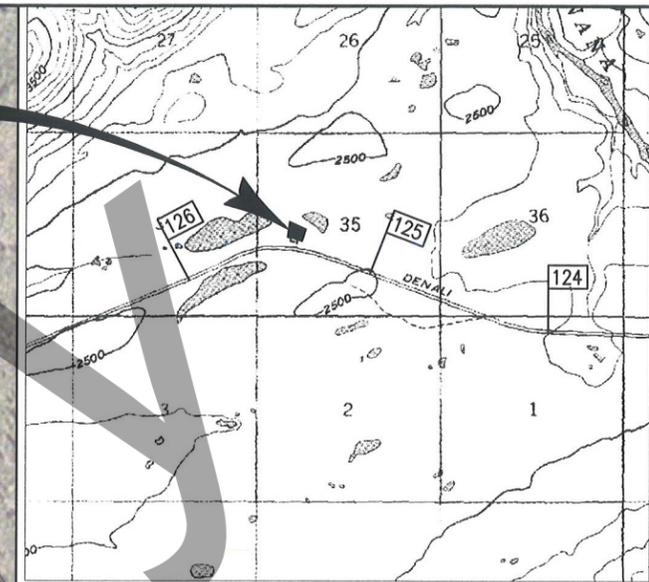
Comments and recommendations

- 1) Two different areas of bedrock exist in this site, i.e., soft sedimentary rock to the west and hard igneous rock to the east. Not enough quantity of the sedimentary rock was recovered for quality testing; however, based on the overburden depth, and the overall fractured and soft character of this rock, we do not recommend its use for crushed aggregates and base course.

- 2) Laboratory testing results on the basalt bedrock indicate that this rock meets the Standard Specifications for use as crushed aggregates and base course.
- 3) Because the permitted area is small, developing this site for crushing will require expansion of the permitted area. We recommend expanding the existing material site to the east and northeast to completely encompass the basalt bedrock outcrops.
- 4) Laboratory testing results indicate that the sandy and/or gravelly soil from this site can be used to produce Selected Material, Type C.
- 5) Blasting will be required for production from this site.
- 6) Acid-base accounting and trace metals analysis data on the basalt from this site are available at NRMS.

Preliminary

M.S. 52-2-035-2



LOCATION MAP
TAKEN FROM USGS QUADRANGLE
HEALY B-4

NOTES:

1. OLDER BORINGS THAT WERE DEFINITELY LOCATED IN 2007 ARE PRESENTED W/GEOGRAPHICAL COORDINATES. OTHERWISE, LOCATIONS OF BORINGS MADE PRIOR TO 2007 ARE APPROXIMATE.
2. A MINING PLAN MAY BE PART OF FUTURE PROJECT(S) UTILIZING THIS MATERIAL SITE. ANY CONCEPTUAL INFORMATION PRESENTED HEREON IS INTENDED FOR PRELIMINARY, ENVIRONMENTAL FUNCTION ONLY. ANY SUCH INFORMATION INDICATED HEREON IS SUPERSEDED BY SPECIFIC PROJECT MINING PLAN(S).

SAMPLE 07-4509 28 JUL (SURFACE) Gy BEDROCK(Basalt) SSc 1, SSf 0 LA 10, DEG 74 NORDIC 7.3	SAMPLE 88-2128 11 AUG (SURFACE) BEDROCK LA 10, DEG 52
--	---

SAMPLE 88-2129 12 AUG (SURFACE) BEDROCK SSc 3.7 LA 10, DEG 50	SAMPLE 88-2131 12 AUG (SURFACE) BEDROCK LA 10, DEG 78
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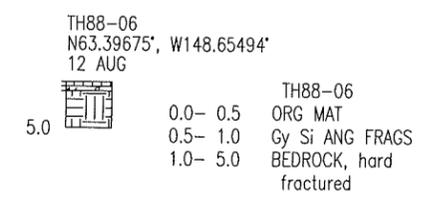
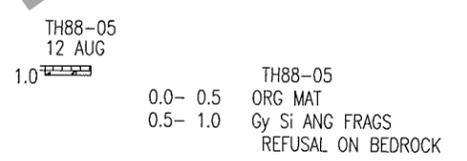
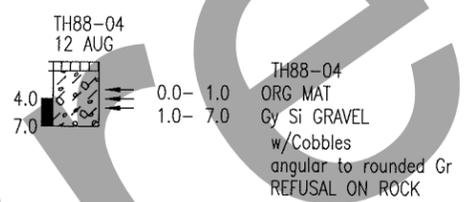
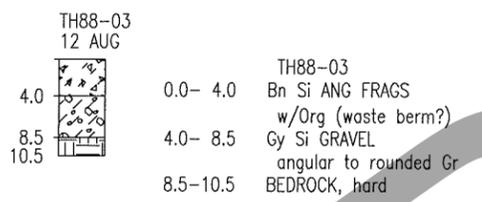
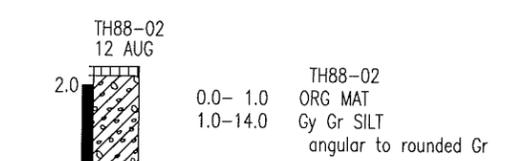
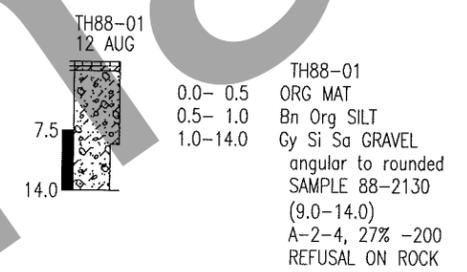
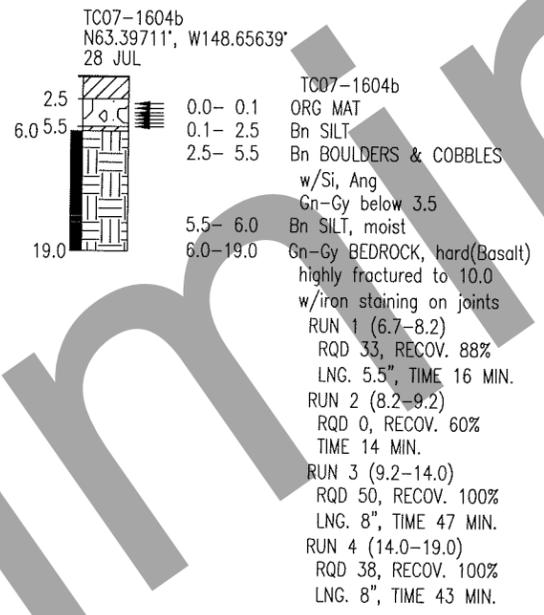
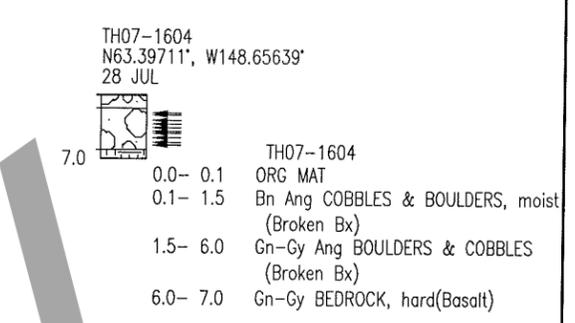
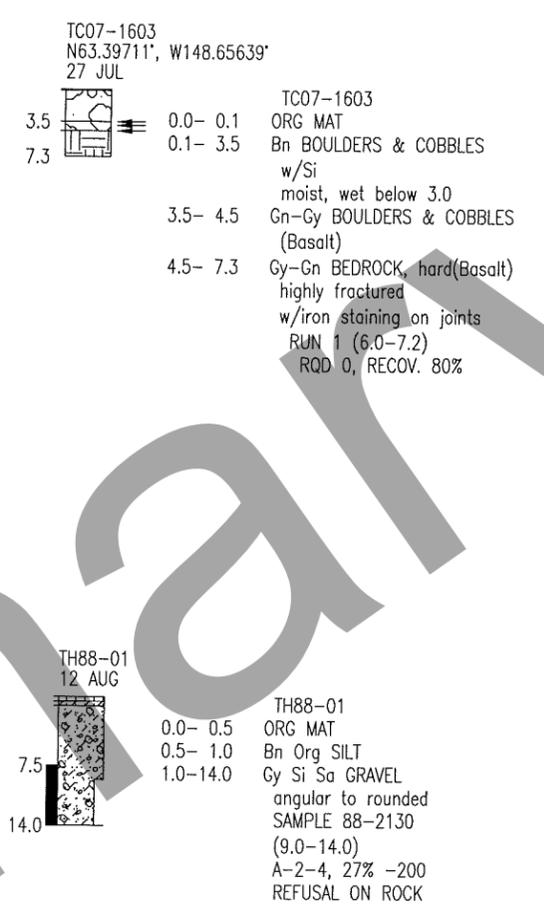
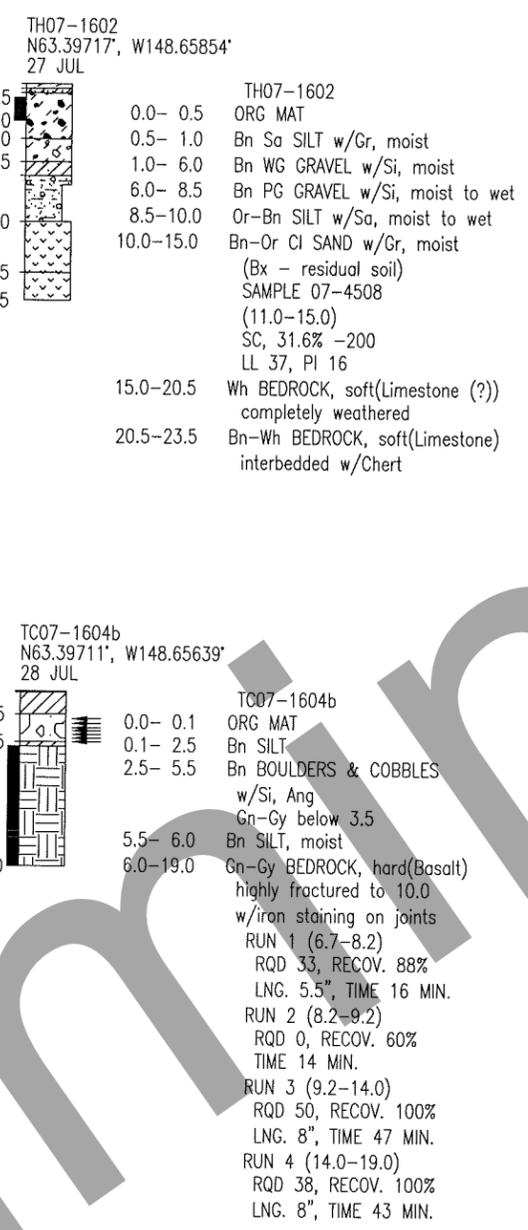
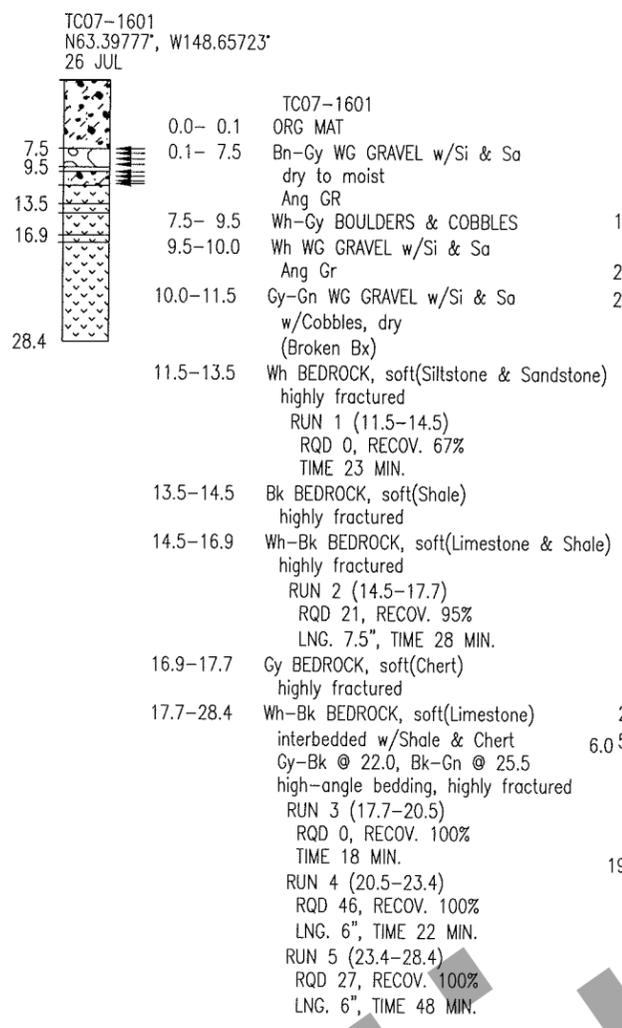
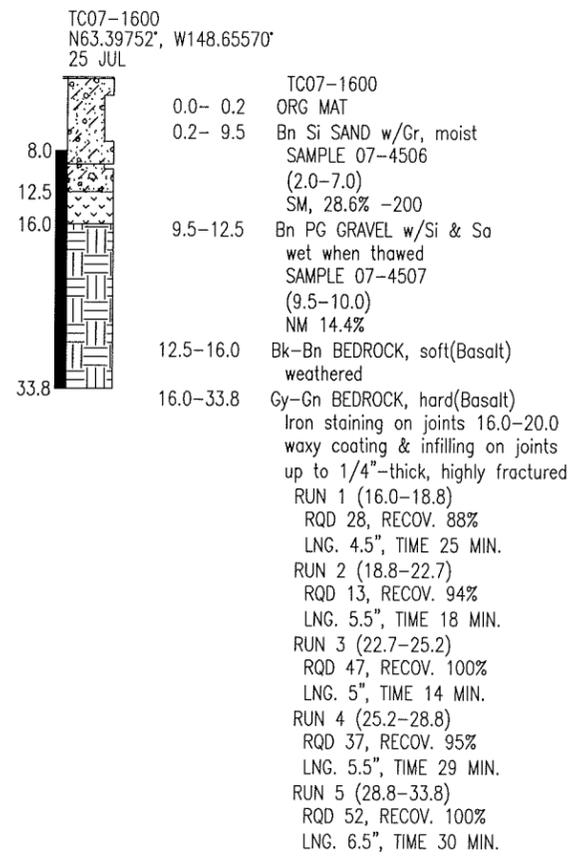
M.S. 52-2-035-2
LOCATED W/IN T17S, R6W,
FAIRBANKS MERIDIAN

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES
ENGINEERING GEOLOGY UNIT

DATA: MD	PARKS HWY MP 194 BROAD PASS RAILROAD OVERCROSSING M.S. 52-2-035-2
DRAWN: RDP	
APPROVED: SM	PROJECT NO. 61277
DATE: NOV 2007	Q:\Geo\61277 Broad Pass\Drafting\ms 52-2-035-2 for Robert



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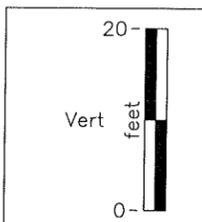


EXPLANATION OF ROCK CORE

RQD - ROCK QUALITY DESIGNATION
(CUMULATIVE LENGTH OF UNFRACTURED
SEGMENTS OF CORE 4" OR LONGER,
% OF TOTAL RUN)

RECOV. - CORE RECOVERY, %

LNG. - MAXIMUM UNFRACTURED LENGTH, INCHES



STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES ENGINEERING GEOLOGY UNIT	
DATA: MD	PARKS HWY MP 194 BROAD PASS RAILROAD OVERCROSSING M.S. 52-2-035-2
DRAWN: RDP	
APPROVED: SM	PROJECT NO. 61277
DATE: Jul 2008	Q:\Geo\61277 Broad Pass\Drafting\ms 52-2-035-2 for Robert-Lopez.dwg

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

PROJECT NAME: Parks Hwy MP 194 Broad Pass RR Overcrossing
 PROJECT NUMBER: REH-HHE-0A4-3(16)
 AKSAS NUMBER: 61277
 SAMPLED BY: M. DARROW
 MATERIAL SOURCE: MS 52-2-035-2

TEST HOLE NUMBER	07-1600	07-1600	07-1602	07-4509			
DEPTH (feet)	2.0-7.0	9.5-10.0	11.0-15.0	0.0-1.0			
LATITUDE	N63.39752°	N63.39752°	N63.39717°	N63.39693°			
LONGITUDE	W148.6557°	W148.6557°	W148.65854°	W148.65701°			
LAB NUMBER	07-4506	07-4507	07-4508	07-4509			
DATE SAMPLED	25-Jul-07	25-Jul-07	27-Jul-07	28-Jul-07			
% Passing							
3"							
2"							
1.5"							
Gravel 1.0"	100		100				
0.75"	93		98				
0.5"	85		95				
0.375"	80		90				
#4	69		73				
#8	64		58				
#10	62		56				
#16	58		50				
Sand #30	52		46				
#40	49		44				
#50	46		42				
#60	44		41				
#80	41		39				
#100	38		37				
Silt/Clay #200	28.6		31.6				
0.02							
Hydro 0.005							
0.002							
0.001							
LIQUID LIMIT	NV		37				
PLASTIC INDEX	NP		16				
USCS CLASSIFICATION	SM		SC				
USCS SOIL DESCRIPTION	SiSa w/Gr	(PGGr w/Si&Sa)	CISa w/Gr	(Bx- hard)			
NATURAL MOISTURE		14.4					
ORGANICS							
SP. GR. (FINE)							
SP. GR. (COARSE)							
MAX. DRY DENSITY							
OPTIMUM MOISTURE							
L.A. ABRASION				10			
DEGRAD. FACTOR				74			
SODIUM SULF. (CRSE)				1			
SODIUM SULF. (FINE)				0			
NORDIC ABRASION				7.3			
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: Parks Hwy MP 194 Broad Pass Railroad Overcrossing
 PROJECT NUMBER: REH-HHE-0A4-3(16)
 AKSAS NUMBER: 61277
 SAMPLED BY: P. Ondra
 SOURCE: MS 52-2-035-2

These samples were originally taken for the following project:
Denali Highway, Mile 104 West; RS-0750(6); AKSAS 63392.

TEST HOLE NO.	Grab Surface	Grab Surface	88-01 9.0-14.0	Grab Surface			
DEPTH (feet)							
LATITUDE							
LONGITUDE							
LAB NO.	88-2128	88-2129	88-2130	88-2131			
DATE SAMPLED	11-Aug-88	12-Aug-88	12-Aug-88	12-Aug-88			
% Passing:							
3"			100				
2"			96				
1.0"			93				
Gravel:							
0.75"			86				
0.5"			80				
0.375"			68				
#4			57				
#10			44				
Sand			40				
#40			33				
#50			27				
#100							
Silt/Clay							
#200							
0.02							
Hydro							
0.005							
0.002							
LIQUID LIMIT			NV				
PLASTIC INDEX			NP				
AASHTO CLASSIFICATION			A-2-4				
SOIL DESCRIPTION	(Bx)	(Bx)	SiSaGr	(Bx)			
NATURAL MOISTURE							
ORGANICS							
SP.GR. (FINE)							
SP.GR. (COARSE)							
MAX DRY DENSITY							
OPTIMUM MOISTURE							
L.A. ABRASION	10	10		10			
DEGRADATION FACTOR	52	50		78			
SODIUM SULF. (CRSE)		3.7					
SODIUM SULF. (FINE)							

REMARKS:

Soil descriptions shown in parentheses are based on field determinations.
 Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

MS 52-2-040-2 (Drashner)

This site was previously explored in 1988, 1990, and 1998 for the Denali Highway Mile 104 West Rehabilitation project. While some test hole, test trench, and laboratory data from that project are presented again in this report, we refer the reader to the 1992 geotechnical report (Grahek, 1992) and to the 2000 material sites supplement (Solie, 2000) for complete descriptions of previous work.

An attempt was made during the 2007 exploration to locate lath marking previous borings. For those that were located, GPS readings were taken using a Garmin Etrex Venture with an accuracy of 49.2 ft (95% typical), and the corresponding geographic coordinates are presented here on the boring logs and on the laboratory data summary sheets. It should be noted that the locations of the older borings that were not found in 2007, shown on the material site drawing, are approximate.

Location and access

This material site is located to the south of the Denali Highway at approximately Mile 131.7, to the west of Drashner Lake. The northern portion of the site adjoins the highway right of way, and an access road provides entry to the site. Spruce trees screen the site from the highway. The site is located immediately to the west of a subdivision (see Figure 4), and an airstrip obliquely crosses the southern portion of the permitted area.

Description

This site contains alluvial deposits composed of sand and gravel, with cobbles and boulders throughout (see Figure 5). There is an old pit in the northwest portion of the site, which is now a rehabilitated dump site. The access road continues to the southeast to the active pit located in the center portion of the permitted site. This pit was developed in 2006 for the Parks Highway Summit Overpass project. During 2006, approximately $300,000\text{ yd}^3$ were hauled from the pit. The local M&O foreman indicated that the sand and gravel coming from this site was so clean that fines needed to be added in order to meet gradation specifications.

Land Status

This material site is located on AHTNA Inc. land and also a portion of the Nome Stickivan Native Allotment, both subject to DOT&PF's non-expiring use permit from the Bureau of Land Management for the site, i.e., Right of Way Grant, F-026125.

Clearing and Stripping

Only the existing developed area has been cleared of vegetation. Overburden typically consists of a 0.5-ft thick organic mat covering 0.5 ft of silt. Vegetation in the undisturbed areas consists of dwarf birch, blueberry, and lichen, with occasional spruce trees roughly 3-in. in diameter.

Water Table

A water table was observed in only one of the borings made in this site (TH88-01), at 9 ft below the ground surface.



Figure 4. View to the east at the south end of the developed portion of MS 52-2-040-2, showing the proximity of the adjacent subdivision.



Figure 5. Variable grain size present in MS 52-2-040-2.

Frozen ground conditions

Frozen ground was not identified in any of the test holes or trenches from any year in this site. However, based on the geology and local climate, expect seasonally frozen ground throughout the site, and discontinuous permafrost throughout the area.

Quality of materials

Table 3 contains a summary of the laboratory testing results of the sandy gravelly soil from MS 52-2-040-2. The data summarized include: percent passing the No. 200 sieve (% -200), plastic index (PI), optimum moisture, LA Abrasion values, Degradation values, Sodium Sulfate loss, both coarse and fine (SSc and SSf, respectively), and Nordic Abrasion values. See the seven column sheets for other laboratory results not included here.

Cobble and boulder counts indicate a range of 1 to 42% cobbles and boulders by weight in 27 samples from the 1998 and 2007 test trenches (see Table 4).

Table 3. Summary of laboratory testing data for MS 52-2-040-2. Numbers in parentheses indicate the number of tests performed.

Material Type	% -200	PI	Optimum Moisture (%)	LA Abrasion	Degradation	SSc	SSf	Nordic Abrasion
Sandy, gravelly soil	0 – 3 (17)	NP (17)	3.9 – 6.7 (3)	15 – 19 (14)	11 – 63 (17)	3.1 – 9.7 (6)	2.7 – 5 (5)	15.6 – 19.0 (5)

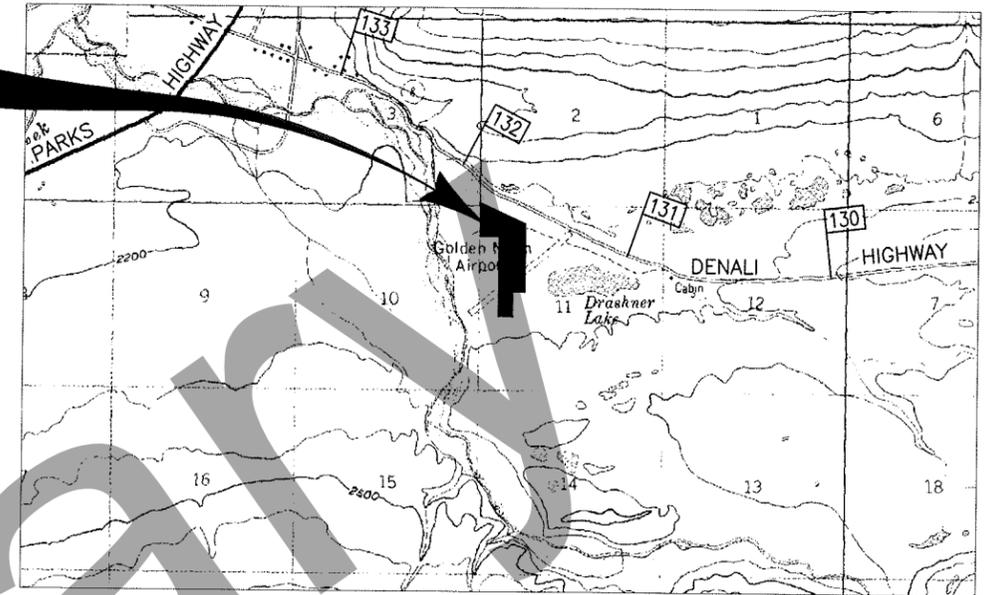
Comments and recommendations

- 1) Degradation results from laboratory testing indicate that some of the material coming from this site does not meet the Standard Specifications for use as crushed aggregates and subbase. Additionally, the result from one Sodium Sulfate Loss test did not meet Standard Specifications for use as crushed aggregates.
- 2) The results of this 2007 investigation indicate that the existing pit could be expanded to the south. The results of previous investigations indicate that the existing pit also could be expanded to the north. Any mining activities should avoid the rehabilitated dump site.
- 3) As indicated by the local M&O foreman, fines may need to be added to the sand and gravel coming from this source to meet gradation specifications, depending on the ultimate use of the material.

Table 4. Field weighed samples, MS 52-2-040-2

Test Trench	Depth Interval (ft)	Total Wt. (lbs)	Cobble & Boulder Wt. (lbs)	Wt. % Cobbles & Boulders (%)	Number Cobbles	Number Boulders	Largest Boulders' Dimensions
07-1638	2.0-3.0	272	32	12	14	---	
	4.0-5.0	267	12	4	13	---	15"x10"x11" @ 1.5 ft
	6.0-7.0	267	2	1	7	---	20"x15"x12" @ 3.0 ft
	9.5-10.5	337	67	20	11	1	19"x13"x7" @ 8.5 ft
TOTAL	2.0-10.5	1143	113	10	45	1	
07-1639	4.0-5.0	267	42	16	12	1	15"x20"x9" @ 3.5 ft
	10.0-11.0	342	12	4	8	---	15"x10"x12" @ 7.0 ft
TOTAL	4.0-11.0	609	54	9	20	1	16"x8"x7" @ 7.5 ft
98-01	4.0-5.0	417	53	13	15	---	
	7.5-8.0	412	46	11	9	---	
	9.5-10.0	408	73	18	14	---	
	11.0-11.5	381	42	11	9	---	
TOTAL	4.0-11.5	1618	214	13	47	---	
98-02	4.5-5.0	417	22	5	8	---	
	7.5-8.0	463	66	14	21	---	
	9.5-10.0	421	62	15	11	---	
	11.5-12.0	322	62	19	16	---	
TOTAL	4.5-12.0	1623	212	13	56	---	
98-03	4.5-5.0	362	22	6	8	---	
	7.5-8.0	342	62	18	15	---	
	9.5-10.0	318	77	24	15	---	
	11.5-12.0	282	62	22	13	---	
TOTAL	4.5-12.0	1304	223	17	51	---	
98-04	4.0-5.0	412	172	42	12	1	
	6.0-6.5	408	137	34	27	---	
TOTAL	4.0-6.5	820	309	38	39	1	
98-05	4.5-5.0	373	66	18	20	---	
	6.5-7.0	397	73	18	18	---	
	9.0-9.5	346	7	2	4	---	
	11.5-12.0	397	57	14	15	---	
TOTAL	4.5-12.0	1513	203	13	57	---	
98-06	5.0-5.5	417	77	18	20	---	
	8.5-9.0	432	73	17	12	---	
	10.5-11.0	318	77	24	20	---	
TOTAL	5.0-11.0	1167	227	19	52	---	

M.S. 52-2-040-2



LOCATION MAP
TAKEN FROM USGS QUADRANGLE
HEALY B-4

SAMPLE 07-4503
12 JUNE
(SURFACE)
DEG 63
NORDIC 17.5

SAMPLE 94-1377
2 AUG
(SURFACE)
Sa GRAVEL
A-1-a, 0.7% -200
DEG 15

SAMPLE 07-4504
12 JUNE
(SURFACE)
DEG 56
NORDIC 15.6

SAMPLE 88-2133
15 AUG
(SURFACE)
Sa GRAVEL
A-1-a, 2% -200
LA 17, DEG 35

TT07-1638
N63.37175°, W148.85094°
04 AUG

TT07-1638
0.0- 0.3 ORG MAT
0.3-11.0 Bn PG GRAVEL w/Sa, dry w/Cobbles and Boulders
boulder 15"x10"x11" @ 1.5
Gy-Bn @ 2.5
boulder 20"x15"x12" @ 3.0
moist below 4.0
boulder 19"x13"x7" @ 8.5

TT07-1639
N63.37100°, W148.85100°
05 AUG

TT07-1639
0.0- 0.2 ORG MAT
0.2-11.5 Bn PG GRAVEL w/Sa, dry to moist w/Cobbles and Boulders
Bn-Gy @ 1.5
boulder 15"x20"x9" @ 3.5
Gy-Bn & moist below 5.0
boulder 15"x10"x12" @ 7.0
boulder 16"x8"x7" @ 7.5
SAMPLE 07-4548
(3.0-4.0)
GP, 1.2% -200
LA 18, DEG 26
SSc 7, SSf 4
NORDIC 19.0
SAMPLE 07-4549
(8.0-9.0)
GP, 2.1% -200
LA 18, DEG 45
SSc 6, SSf 5
NORDIC 15.8

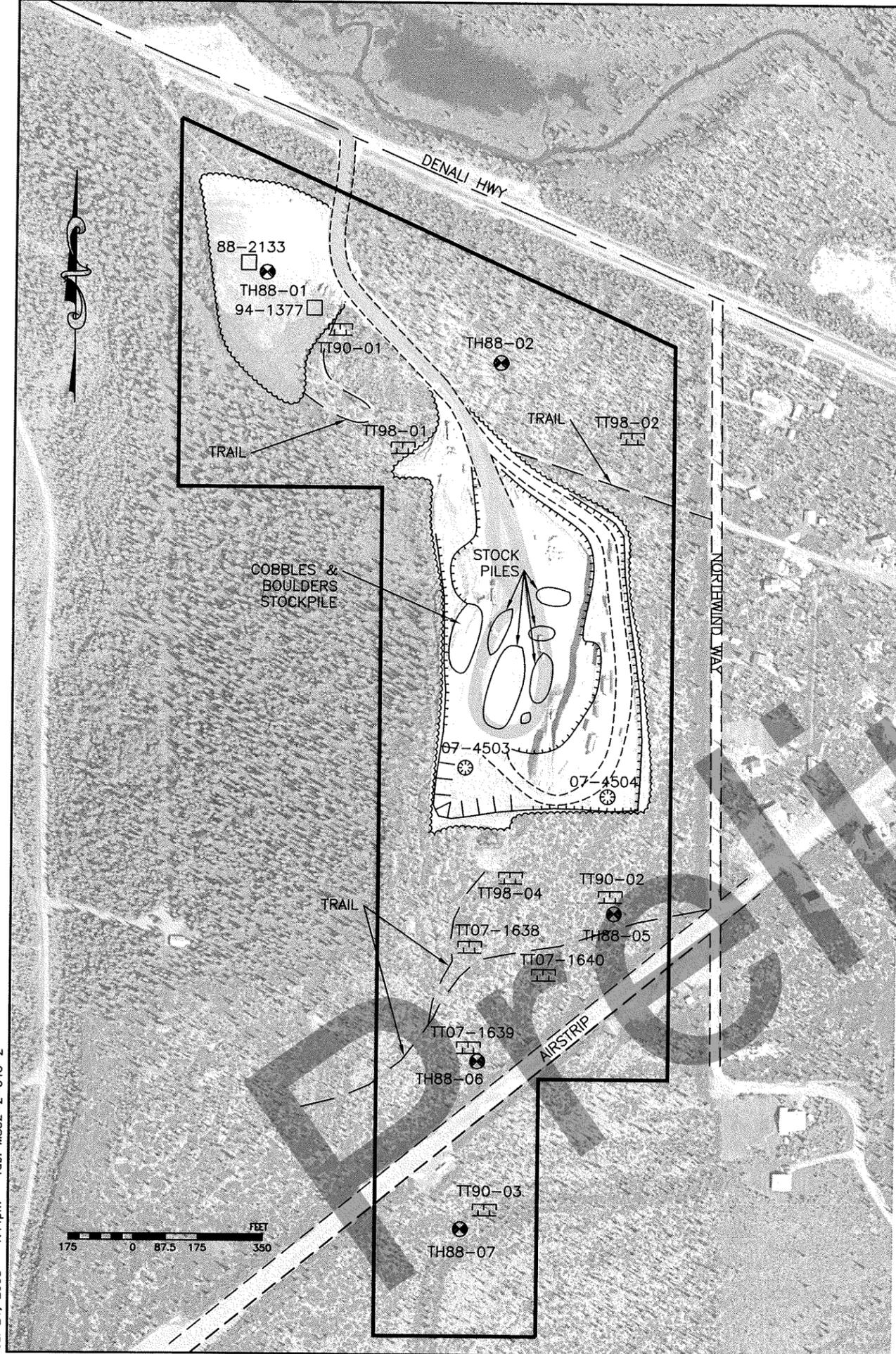
TT07-1640
N63.37154°, W148.84970°
05 AUG

TT07-1640
4.0 0.0- 0.2 ORG MAT
0.2- 0.6 Bn Sa SILT w/Gr dry to moist
11.0 0.6- 1.0 Bn PG GRAVEL w/Si & Sa dry to moist
1.0- 4.0 Gy-Bn PG GRAVEL w/Sa dry to moist
w/Cobbles and Boulders
boulder 15"x11"x10" @ 2.5
4.0- 5.0 Gy-Bn PG SAND w/Gr, moist
5.0-11.0 Gy-Bn PG GRAVEL w/Sa dry to moist
w/Cobbles and Boulders
boulder 20"x12"x8" @ 7.0
boulders 20"x12"x9" & 24"x15"x8" @ 8.0
SAMPLE 07-4550
(5.0-6.0)
GP, 0.9% -200
SAMPLE 07-4551
(6.0-7.0)
GP, 1.0% -200
LA 18, DEG 40
SSc 5, SSf 4
NORDIC 16.7

NOTES:

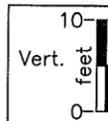
1. OLDER BORINGS THAT WERE DEFINITELY LOCATED IN 2007 ARE PRESENTED W/ GEOGRAPHICAL COORDINATES. OTHERWISE, LOCATIONS OF BORINGS MADE PRIOR TO 2007 ARE APPROXIMATE.
2. AERIAL PHOTOGRAPH WAS TAKEN IN 2006 AND DOES NOT REFLECT CURRENT CONDITIONS.
3. A MINING PLAN MAY BE PART OF FUTURE PROJECT(S) UTILIZING THIS MATERIAL SITE. ANY CONCEPTUAL INFORMATION PRESENTED HEREON IS INTENDED FOR PRELIMINARY, ENVIRONMENTAL FUNCTION ONLY. ANY SUCH INFORMATION INDICATED HEREON IS SUPERSEDED BY SPECIFIC PROJECT MINING PLAN(S).

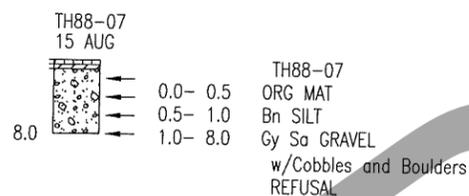
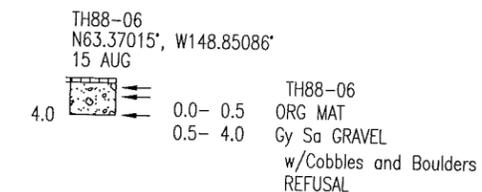
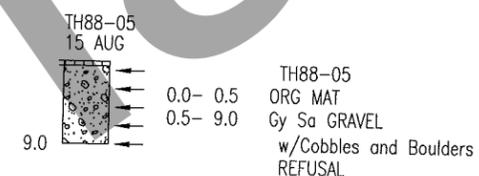
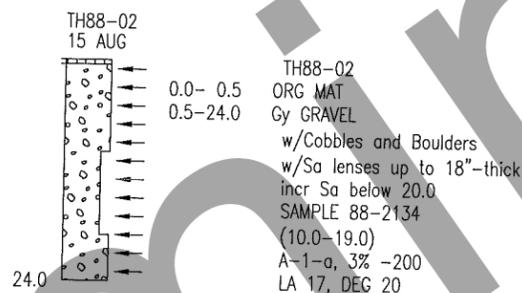
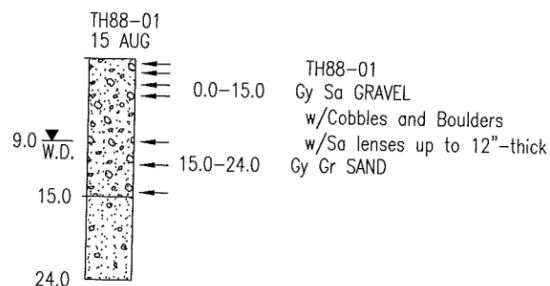
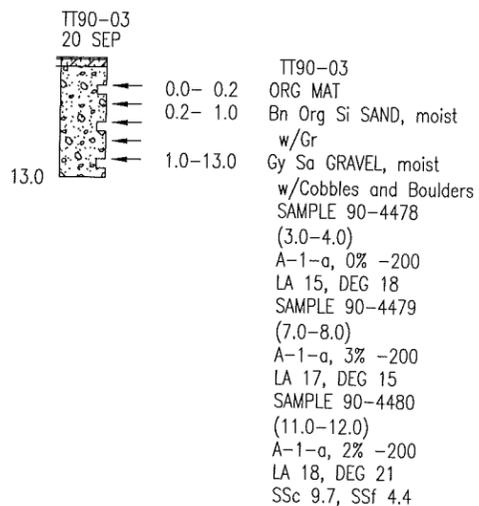
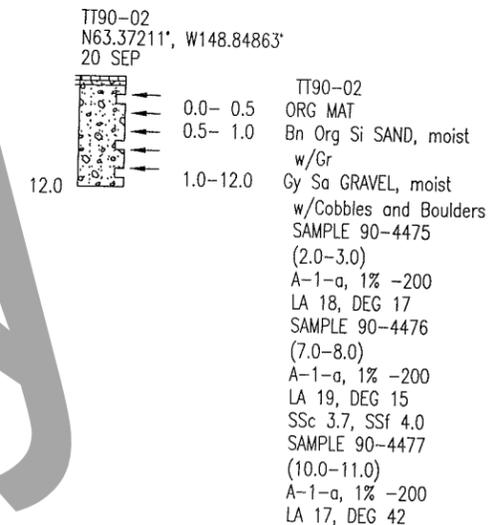
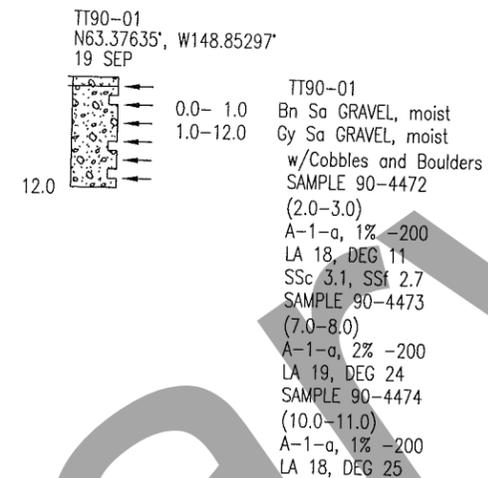
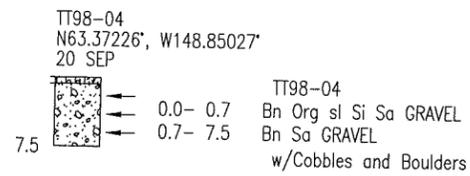
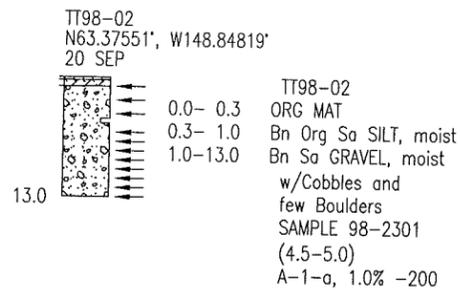
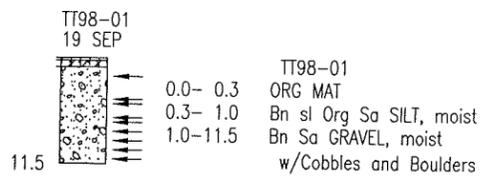
M.S. 52-2-040-2
LOCATED W/IN SEC 2 & 11, T18S, R7W,
FAIRBANKS MERIDIAN



Jul 21, 2008 - 1:44pm - Tab: MS52-2-040-2

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES ENGINEERING GEOLOGY UNIT	
DATA: MD	PARKS HWY MP 194 BROAD PASS RAILROAD OVERCROSSING M.S. 52-2-040-2
DRAWN: RDP	
APPROVED: SM	PROJECT NO. 61277
DATE: NOV 2007	© (2007) (61277) Broad Pass/Overcrossing 52-2-040-2 for Robert

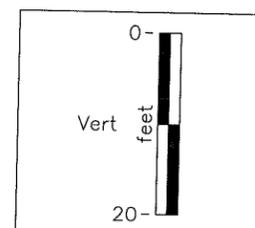




Preliminary

WATER TABLE

- ▼ - WHILE DRILLING
- W.D.
- ▼ - AFTER DRILLING
- A.D.



STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES ENGINEERING GEOLOGY UNIT	
DATA: md	PARKS HWY MP 194 BROAD PASS RAILROAD OVERCROSSING
DRAWN: cat, rdp	M.S. 52-2-040-2
APPROVED: sm	PROJECT NO. : STP-0785(11)/66446
DATE: Jul 2008	Q:\Geo\61277 Broad Pass\Drawings\52-2-040-2 for Robot-11/08-01.dwg

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

PROJECT NAME: Parks Hwy MP 194 Broad Pass RR Overcrossing
 PROJECT NUMBER: REH-HHE-0A4-3(16)
 AKSAS NUMBER: 61277
 SAMPLED BY: M. DARROW
 MATERIAL SOURCE: MS 52-2-040-2

TEST HOLE NUMBER	GRAB	GRAB	07-1639	07-1639	07-1640	07-1640	
DEPTH (feet)	Surface	Surface	3.0-4.0	8.0-9.0	5.0-6.0	6.0-7.0	
LATITUDE			N63.371°	N63.371°	N63.37154°	N63.37154°	
LONGITUDE			W148.851°	W148.851°	W148.8497°	W148.8497°	
LAB NUMBER	07-4503	07-4504	07-4548	07-4549	07-4550	07-4551	
DATE SAMPLED	12-Jun-07	12-Jun-07	5-Aug-07	5-Aug-07	5-Aug-07	5-Aug-07	
% Passing							
3"			100	100	100	100	
2"			89	94	89	88	
1.5"			83	90	83	82	
1.0"			74	80	73	75	
0.75"			68	73	68	69	
0.5"			59	62	60	60	
0.375"			55	55	55	56	
#4			44	40	44	43	
#8			32	29	34	32	
#10			29	27	32	30	
#16			18	20	25	23	
#30			8	11	14	13	
#40			5	8	8	9	
#50			3	5	4	4	
#60			3	4	3	3	
#80			2	3	2	2	
#100			2	3	1	2	
Silt/Clay #200			1.2	2.1	0.9	1.0	
Hydro							
0.02							
0.005							
0.002							
0.001							
LIQUID LIMIT			NV	NV	NV	NV	
PLASTIC INDEX			NP	NP	NP	NP	
USCS CLASSIFICATION			GP	GP	GP	GP	
USCS SOIL DESCRIPTION	(PGGr w/Sa)	(PGGr w/Sa)	PGGr w/Sa	PGGr w/Sa	PGGr w/Sa	PGGr w/Sa	
NATURAL MOISTURE							
ORGANICS							
SP. GR. (FINE)							
SP. GR. (COARSE)	2.67		2.67	2.68		2.68	
MAX. DRY DENSITY							
OPTIMUM MOISTURE							
L.A. ABRASION			18	18		18	
DEGRAD. FACTOR	63	56	26	45		40	
SODIUM SULF. (CRSE)			7	6		5	
SODIUM SULF. (FINE)			4	5		4	
NORDIC ABRASION	17.5	15.6	19.0	15.8		16.7	
REMARKS			14.0% +3"	7.5% +3"		5.3% +3"	
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: Parks Hwy MP 194 Broad Pass Railroad Overcrossing
 PROJECT NUMBER: REH-HHE-0A4-3(16)
 AKSAS NUMBER: 61277
 SAMPLED BY: P. Ondra/M. Grahek/G. Brazo/D. Solie
 SOURCE: MS 52-2-040-2

These samples were originally taken for the following project:
 Denali Highway, Mile 104 West; RS-0750(6); AKSAS 63392.

TEST HOLE NO.	98-02	GRAB	90-01	90-01	90-01	90-02	90-02
DEPTH (feet)	4.5-5.0	Surface	2.0-3.0	7.0-8.0	10.0-11.0	2.0-3.0	7.0-8.0
LATITUDE	N63.37551°		N63.37635°	N63.37635°	N63.37635°	N63.37211°	N63.37211°
LONGITUDE	W148.84819°		W148.85297°	W148.85297°	W148.85297°	W148.84863°	W148.84863°
LAB NO.	98-2301	94-1377	90-4472	90-4473	90-4474	90-4475	90-4476
DATE SAMPLED	20-Sep-98	2-Aug-94	19-Sep-90	19-Sep-90	19-Sep-90	20-Sep-90	20-Sep-90
% Passing							
3"	100	100	100	100	100	100	100
2"	99	91	90	92	92	95	92
1.0"	83	74	72	74	81	71	75
Gravel: 0.75"	75	67	65	68	76	89	68
0.5"	66	59	55	59	69	54	58
0.375"	60	55	50	59	65	49	53
#4	48	44	40	44	55	39	41
Sand #10	37	30	30	34	44	30	27
#40	6	5		11	12	7	
#50	3	3	3	7	7	4	3
#100	1	1	1	4	2	2	1
Silt/Clay #200	1.0	0.7	1	2	1	1	1
Hydro 0.02							
0.005							
0.002							
LIQUID LIMIT	NV						
PLASTIC INDEX	NP						
AASHTO CLASSIFICATION	A-1-a						
SOIL DESCRIPTION	SaGr						
NATURAL MOISTURE							
ORGANICS							
SP.GR. (FINE)				2.66		2.66	
SP.GR. (COARSE)				2.67			
MAX DRY DENSITY				131.1*			
OPTIMUM MOISTURE				6.7*			
L.A. ABRASION			18	19	18	18	19
DEGRADATION FACTOR		15	11	24	25	17	15
SODIUM SULF. (CRSE)			3.1				3.7
SODIUM SULF. (FINE)			2.7				4.0

REMARKS:
 Soil descriptions shown in parentheses are based on field determinations.
 Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.
 Geographical coordinates are provided only for borings that were definitively relocated in the field.
 * moisture/density plot not available

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

PROJECT NAME: Parks Hwy MP 194 Broad Pass Railroad Overcrossing
 PROJECT NUMBER: REH-HHE-0A4-3(16)
 AKSAS NUMBER: 61277
 SAMPLED BY: P. Ondra/M. Grahek/G. Brazo/D. Solie
 SOURCE: MS 52-2-040-2

These samples were originally taken for the following project:
 Denali Highway, Mile 104 West; RS-0750(6); AKSAS 63392.

TEST HOLE NO.	90-02	90-03	90-03	90-03	GRAB	88-02	
DEPTH (feet)	10.0-11.0	3.0-4.0	7.0-8.0	11.0-12.0	Surface	10.0-19.0	
LATITUDE	N63.37211°						
LONGITUDE	W148.84863°						
LAB NO.	90-4477	90-4478	90-4479	90-4480	88-2133	88-2134	
DATE SAMPLED	20-Sep-90	20-Sep-90	20-Sep-90	20-Sep-90	15-Aug-88	15-Aug-88	
% Passing							
3"	100	100	100	100	100	100	
2"	87	95	95	93	99	98	
1.0"	71	82	82	79	92	77	
Gravel 0.75"	66	76	76	72	86	67	
0.5"	56	66	67	63	73	53	
0.375"	50	60	62	57	63	44	
#4	37	48	51	44	43	27	
#10	23	34	39	30	25	18	
Sand #40	4	3	7		4	8	
#50	3	1	5	5	3	6	
#100	1	1	3	3	2	4	
Silt/Clay #200	1	0	3	2	2	3	
0.02							
Hydro 0.005							
0.002							
LIQUID LIMIT	NV	NV	NV	NV	NV	NV	
PLASTIC INDEX	NP	NP	NP	NP	NP	NP	
AASHTO CLASSIFICATION	A-1-a	A-1-a	A-1-a	A-1-a	A-1-a	A-1-a	
SOIL DESCRIPTION	SaGr	SaGr	SaGr	SaGr	SaGr	Gr	
NATURAL MOISTURE							
ORGANICS							
SP.GR. (FINE)	2.66	2.60					
SP.GR. (COARSE)	2.66	2.68					
MAX DRY DENSITY	127.5*	127.4*					
OPTIMUM MOISTURE	5.2*	3.9*					
L.A. ABRASION	17	15	17	18	17	17	
DEGRADATION FACTOR	42	18	15	21	35	20	
SODIUM SULF. (CRSE)				9.7			
SODIUM SULF. (FINE)				4.4			

	2% +3"	12% +3"	6% +3"	2% +3"	5% +3"		
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REMARKS:
 Soil descriptions shown in parentheses are based on field determinations.
 Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.
 Geographical coordinates are provided only for borings that were definitively relocated in the field.
 * moisture/density plot not available

MS 35-4-104-2 and adjacent areas

This area was previously explored in 1971 for the Cantwell to Hurricane Gulch paving project, in 1984 for the Little Coal Creek to the Middle Fork of the Chulitna River rehabilitation and resurfacing project, and in 2003 for the current project. While some test hole, test trench, and laboratory data from those projects are presented again in this report, we refer the reader to the 1971, 1985, and 2005 reports for complete descriptions of the previous work (Saunders, 1971; Brazo, 1985; Bergstrom and Darrow, 2005).

Location and access

This material site adjoins the right of way on the east side of the Parks Highway at approximately Mile 194.2. An existing road provides access to the area from the highway right of way, and continues past the material site, accessing the mountains to the east. No vegetation screens the developed pit from the highway.

An attempt was made during the 2007 exploration to locate lath marking previous borings. For those that were located, GPS readings were taken using a Garmin Etrex Venture with an accuracy of <49.2 ft (95% typical), and the corresponding geographic coordinates are presented here on the boring logs and on the laboratory data summary sheets. It should be noted that the locations of the older borings that were not found in 2007, shown on the material site drawing, are approximate.

Description

This site is located in ground moraine and glacial outwash that carpets the Broad Pass Depression (Wahrhaftig, 1965). The soils have been reworked in some areas by the fluvial action of the Middle Fork Chulitna River. The use permit for MS 35-4-104-2 encompasses 30 acres, most of which has been developed into the existing pit. The site was used as a source of gravel during construction of the highway and for resurfacing projects.

For the 2007 investigation, we located borings and trenches in the adjacent University of Alaska land to the east, and in the adjacent AHTNA land to the north and east of MS 35-4-104-2.

Land Status

This material site is located on AHTNA Inc. land, which is subject to DOT&PF's non-expiring use permit from the Bureau of Land Management for the site, i.e., Right of Way Grant, F-058899. This grant authorized the removal of 325,000 cubic yards of material. That entire amount has been extracted.

Clearing and Stripping

The existing pit has been cleared and stripped, with waste placed around the periphery of the material site. Immediately to the northeast of MS 35-4-104-2 is an area that is crossed by several long, ~10-ft deep trenches. The areas in between these trenches appear to have been disturbed, as the surface is covered with berms and thick vegetation. To the north of MS 35-4-104-2 and next to the Middle Fork Chulitna River is a previously used pit on AHTNA land. A large waste berm runs along the southeastern border of this old pit. The area between the trenches and the old AHTNA pit has been disturbed in the past, and consists of steep berms placed haphazardly throughout the area. In all of the disturbed areas, the

vegetation consists of extremely dense willow thickets up to 8-ft high. The vegetation obscures the landscape, making the configuration of the berms difficult to determine.

Vegetation in the undisturbed areas to the east of MS 35-4-104-2 and to the northeast of the trenched area typically consists of spruce up to 14-in. in diameter, dwarf birch and willow up to 8-ft high, blueberry, and moss.

Water Table

We intercepted a water table in most of the borings, ranging between 3.0 ft and 23.8 ft below the ground surface. Typically, the water level in the borings became deeper farther away from the Middle Fork Chulinta River. See the boring logs for details.

Frozen ground conditions

We intercepted frozen soil in several of the 2007 borings, as well as in the older test holes and test trenches. See the boring logs for details. Expect seasonally frozen ground throughout the site, and discontinuous permafrost throughout the area.

Quality of materials

Table 5 contains a summary of the laboratory testing results of the sandy soil, gravelly soil, and silty or clayey soil from MS 35-4-104-2. The data summarized include: percent passing the No. 200 sieve (% -200), plastic index (PI), natural moisture, organic content, optimum moisture, LA Abrasion values, Degradation values, and Sodium Sulfate loss, both coarse and fine (SSc and SSf, respectively). See the seven column sheets for other laboratory results not included here.

Cobble and boulder counts indicate a range of 5 to 20% cobbles and boulders by weight in seven samples from the 2007 test trenches (see Table 6).

Table 5. Summary of laboratory testing data for MS 35-4-104-2 and adjacent areas. Numbers in parentheses indicate the number of tests performed.

Material Type	% -200	PI	Natural Moisture (%)	Organic Content (%)	Optimum Moisture (%)	LA Abrasion	Degradation	SSc	SSf
Sandy, gravelly soil	2.4 – 23 (23)	NP (23)	2.6 – 11.3 (11)	---	4.5 – 6.5 (6)	21, 23 (4)	15 - 32 (4)	4.8 (1)	5.3 (1)
Silty or clayey soil	7.8 – 34.6 (5)	NP – 5 (5)	7.0 – 41.4 (8)	9.6 (1)	---	---	---	---	---

Table 6. Field weighed samples, MS 35-4-104-2

Test Trench	Depth Interval (ft)	Total Wt. (lbs)	Cobble & Boulder Wt. (lbs)	Wt. % Cobbles & Boulders (%)	Number Cobbles	Number Boulders	Largest Boulders' Dimensions
07-1619	6.0-7.0	242	37	15	12	---	15"x8"x7" @ 6.0 ft
	7.0-8.0	352	72	20	15	2	18"x9"x8" @ 8.0 ft
	9.0-10.0	337	17	5	11	---	13"x8"x10" @ 8.0 ft
TOTAL	6.0-10.0	931	126	14	38	2	
07-1622	7.0-8.0	347	37	11	12	---	11"x6"x5" @ 5.0 ft
	8.0-9.0	287	47	16	12	---	18"x10"x9" @ 8.0 ft
	TOTAL	7.0-9.0	634	84	27	24	---
07-1624	4.0-5.0	312	37	12	13	---	
	6.5-7.5	312	57	18	15	---	
	TOTAL	4.0-7.5	624	94	15	28	---

Comments and recommendations

- 1) Degradation results from laboratory testing indicate that material coming from this site does not meet the Standard Specifications for use as crushed aggregates, base course, and subbase products.
- 2) The results of laboratory testing indicate that the natural moisture of the tested material in this area often is above its optimum moisture content. Additionally, the moisture/density curve from the material tested typically exhibits a narrow peak, indicating that the material is sensitive to moisture content. Saunders (1971) indicated that the soils in this area were difficult to handle due to the water retention characteristics of the gravel. Expect the soils from this material site and adjacent areas to require complicated mining, processing, and handling techniques and procedures in order to meet standard specifications for compaction.
- 3) Four test holes intercepted sandy silt, elastic silt, and/or coal beneath gravel. Depth to silty soil or coal varied from 11 ft to 18 ft.
- 4) Production of adequate quantities may require mining from below the water table.

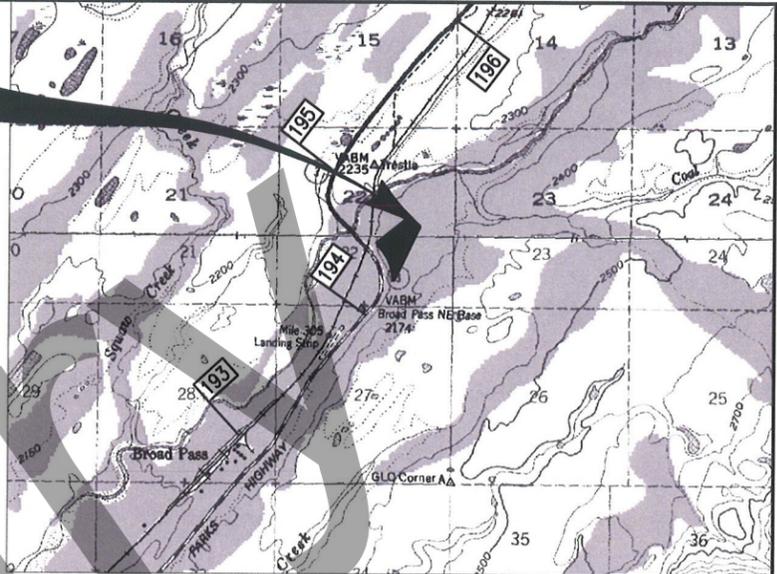
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M.S. 35-4-104-2

M.S. 35-4-104-2
 LOCATED W/IN SEC. 22, T19S, R9W
 FAIRBANKS MERIDIAN

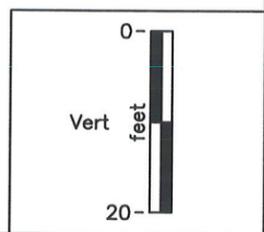
M.S. 35-4-104-2



LOCATION MAP
 TAKEN FROM USGS QUADRANGLES
 HEALY A-5, B-5

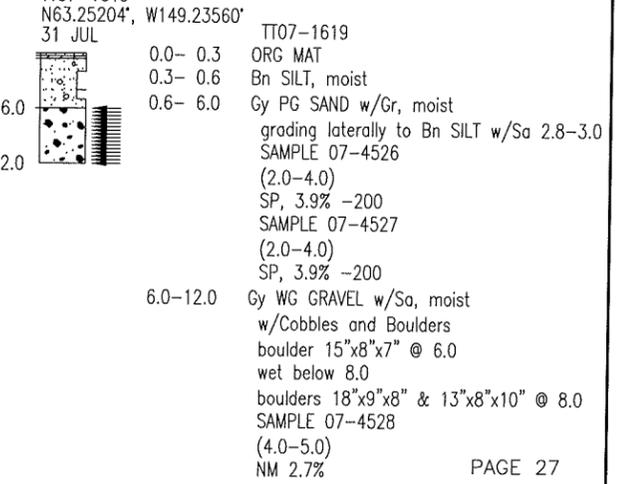
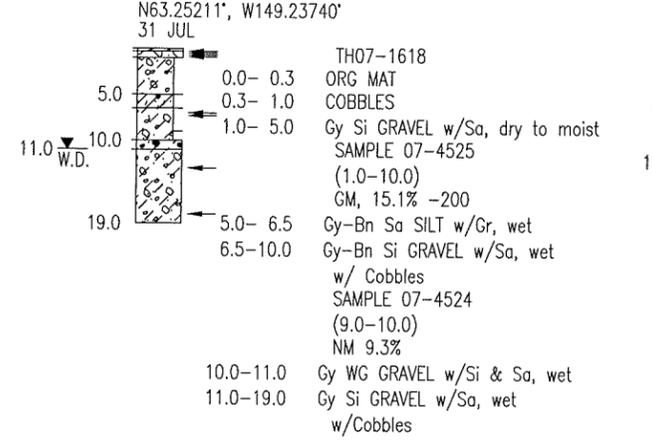
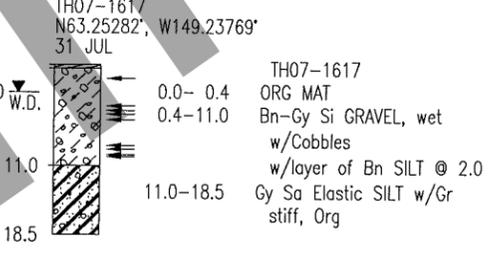
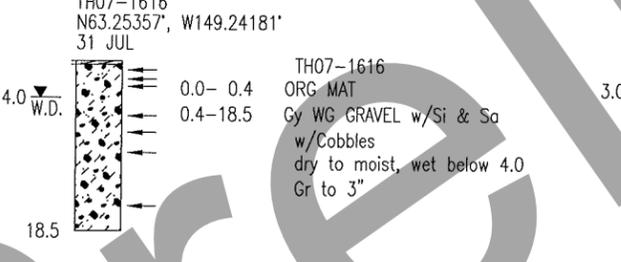
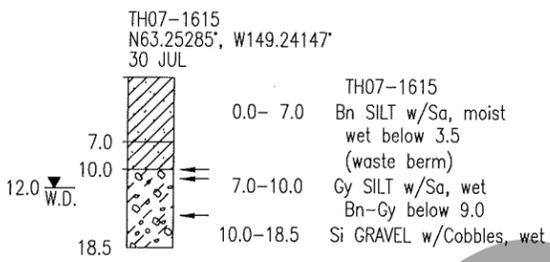
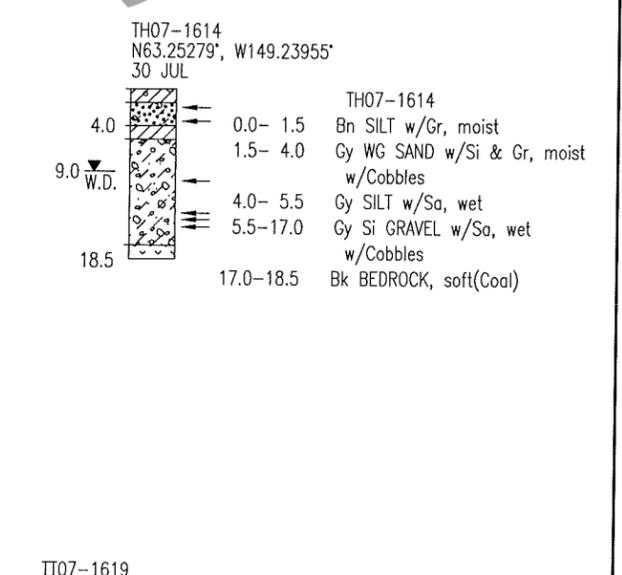
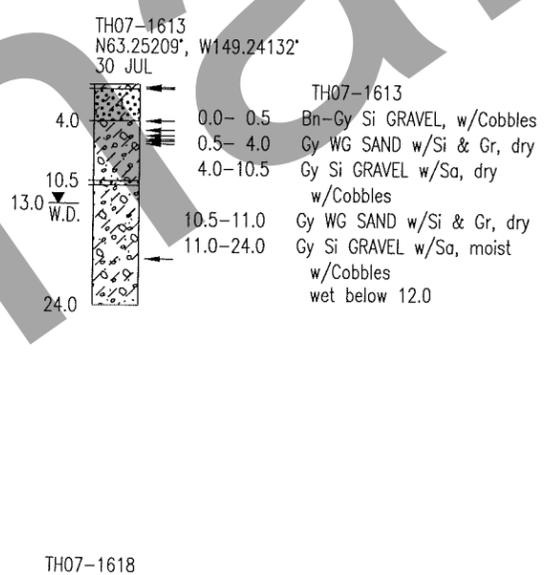
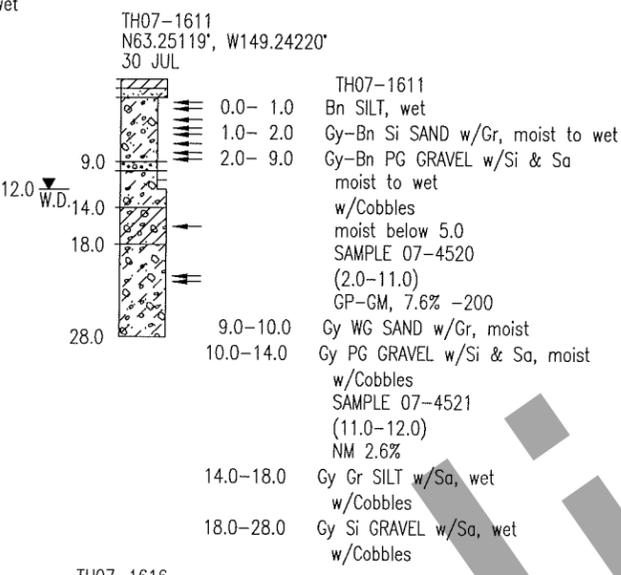
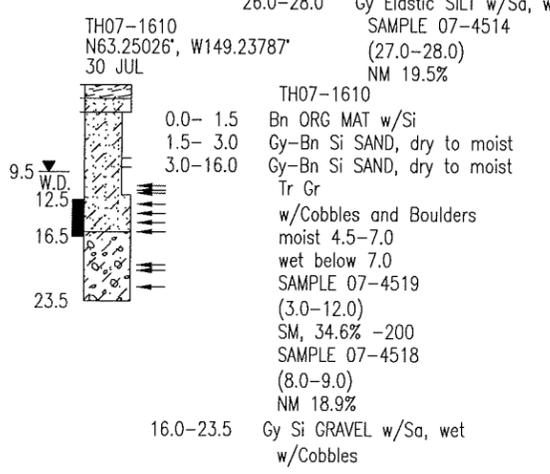
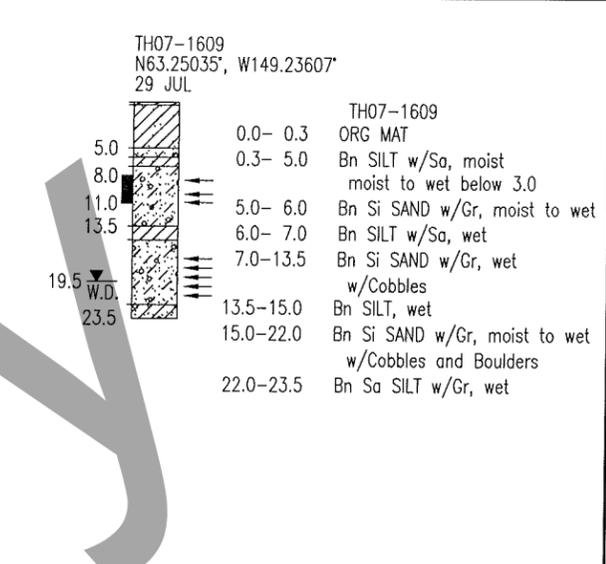
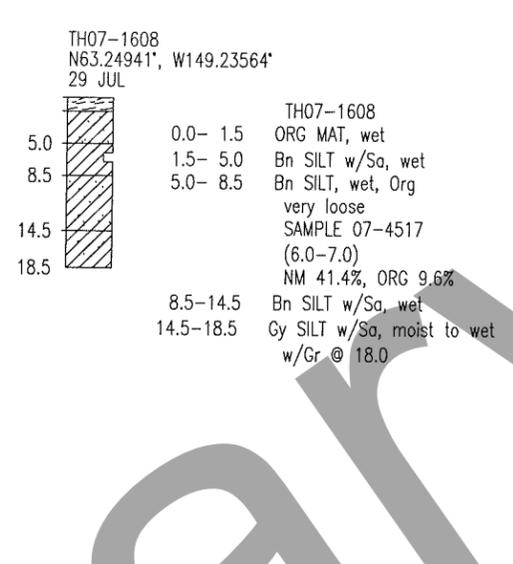
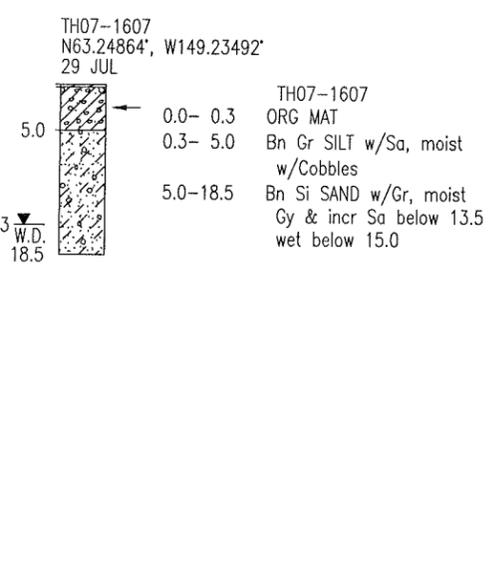
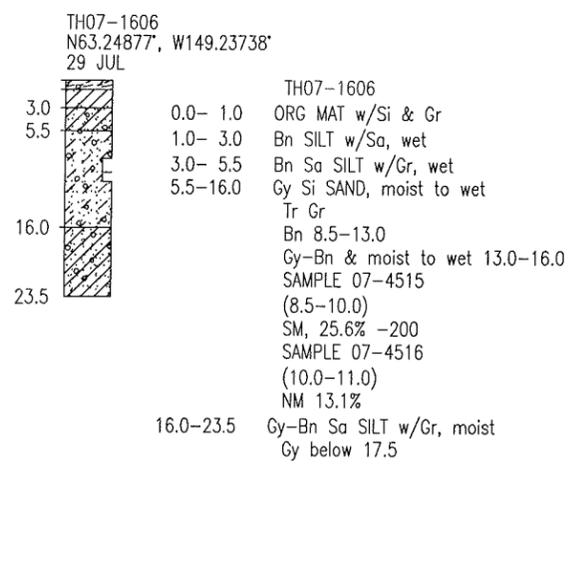
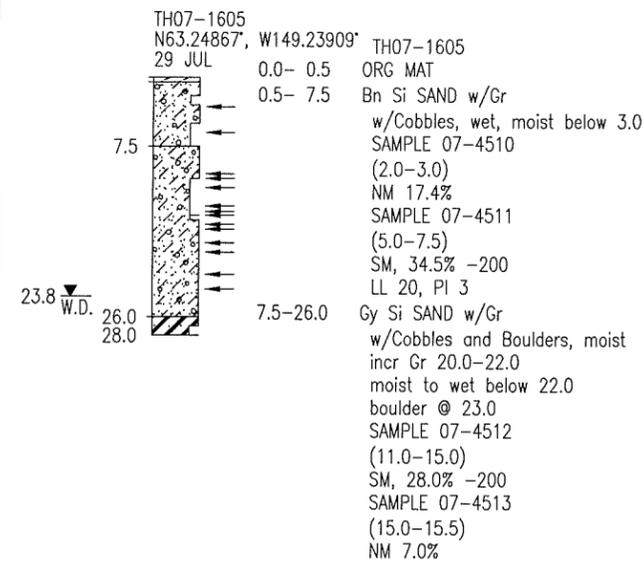
NOTES:

1. OLDER BORINGS THAT WERE DEFINITELY LOCATED IN 2007 ARE PRESENTED W/GEOGRAPHICAL COORDINATES. OTHERWISE, LOCATIONS OF BORINGS MADE PRIOR TO 2007 ARE APPROXIMATE.
2. A MINING PLAN MAY BE PART OF FUTURE PROJECT(S) UTILIZING THIS MATERIAL SITE. ANY CONCEPTUAL INFORMATION PRESENTED HEREON IS INTENDED FOR PRELIMINARY, ENVIRONMENTAL FUNCTION ONLY. ANY SUCH INFORMATION INDICATED HEREON IS SUPERCEDED BY SPECIFIC PROJECT MINING PLAN(S).

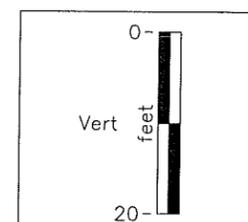


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Jul 21, 2008 - 2:17pm

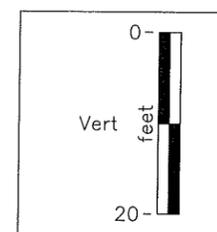
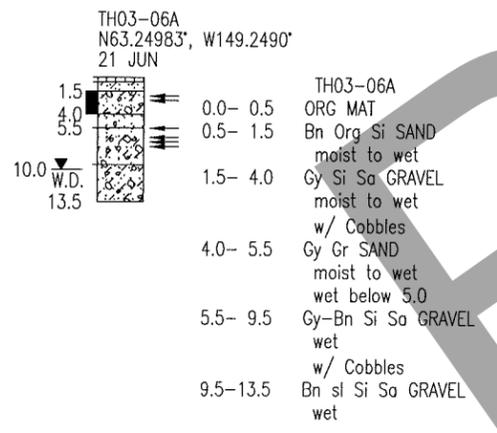
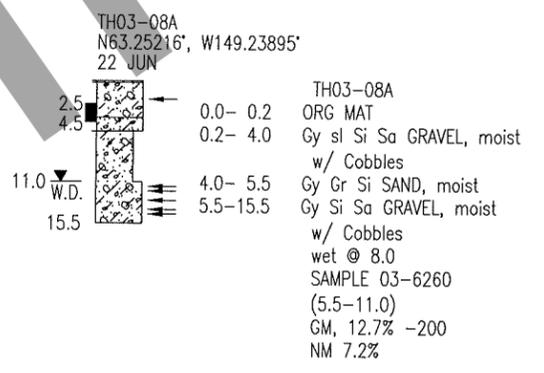
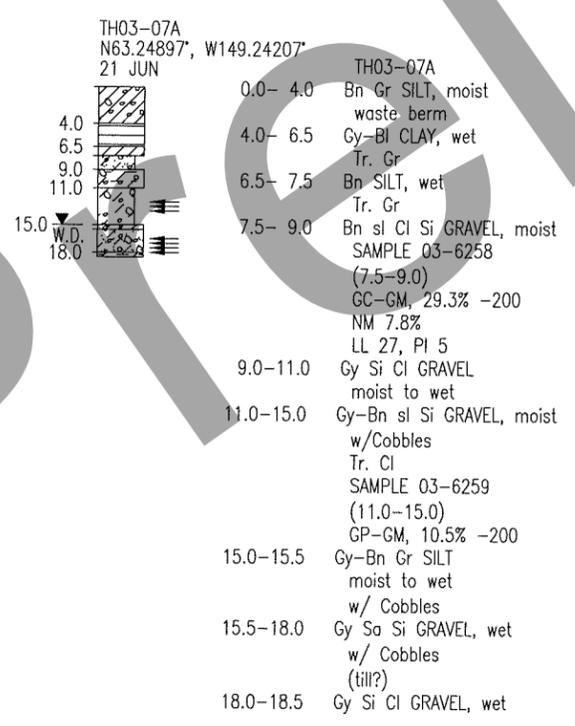
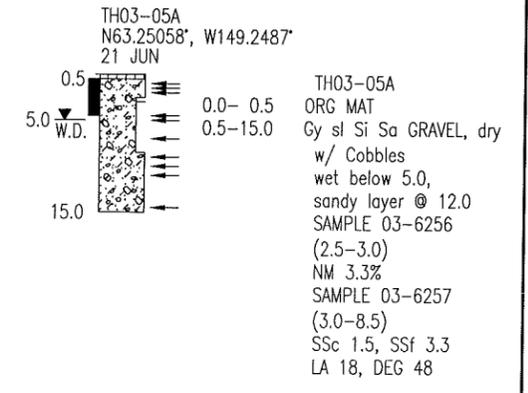
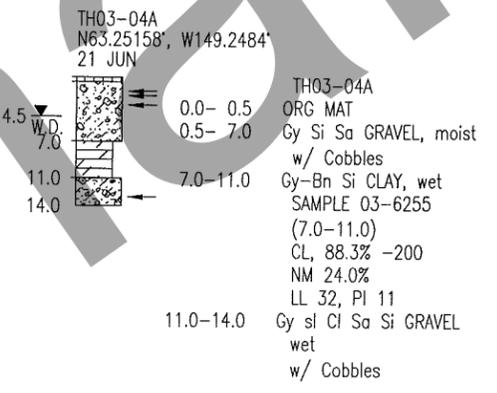
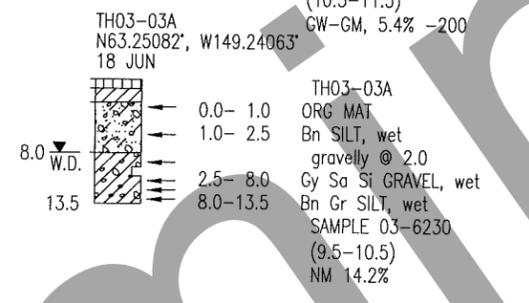
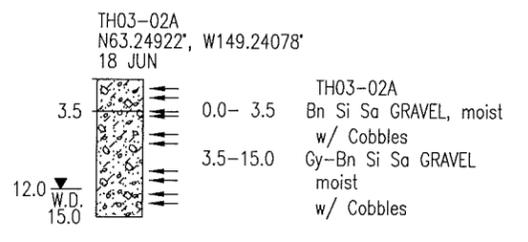
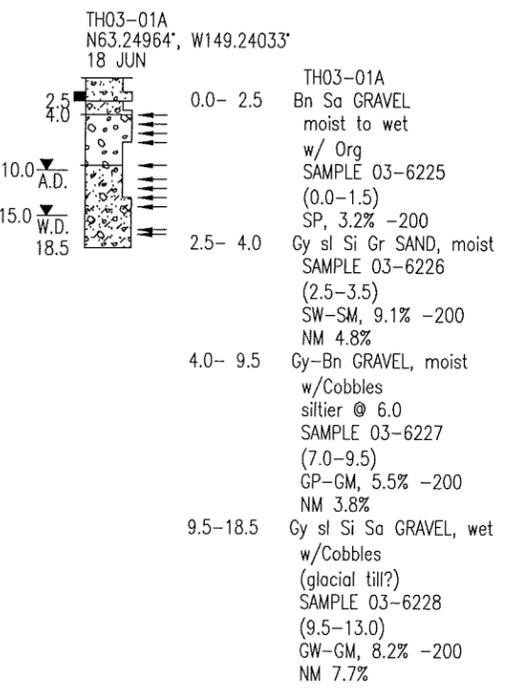
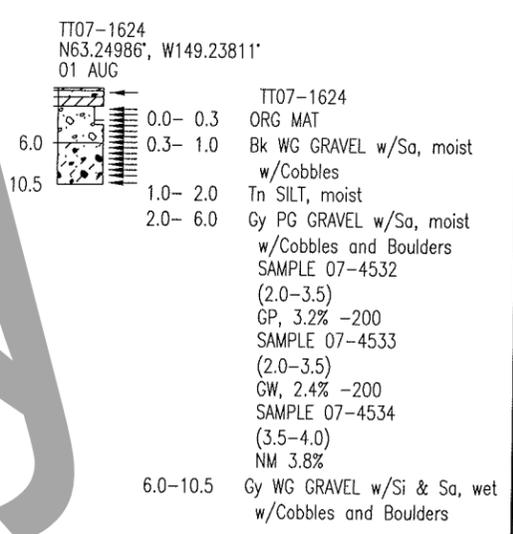
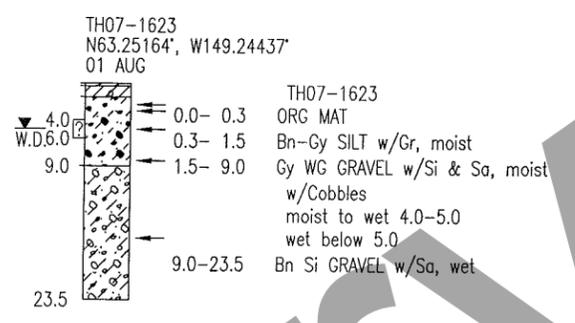
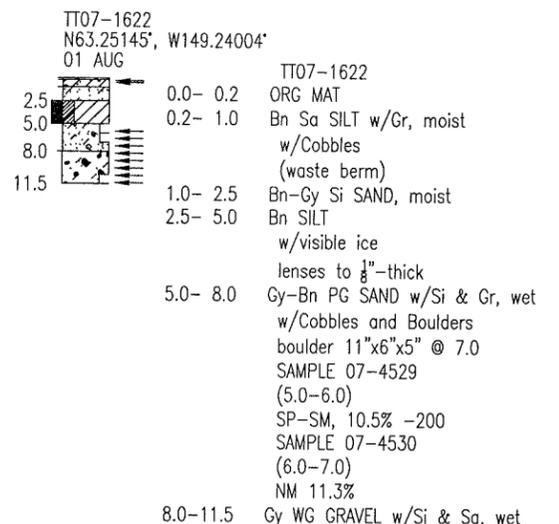
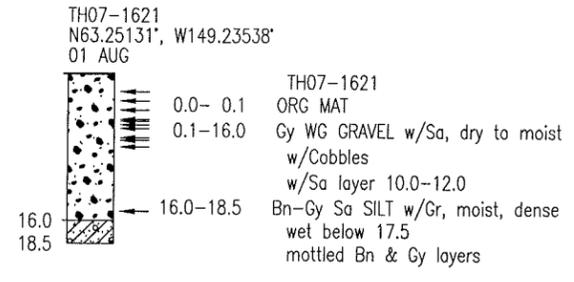
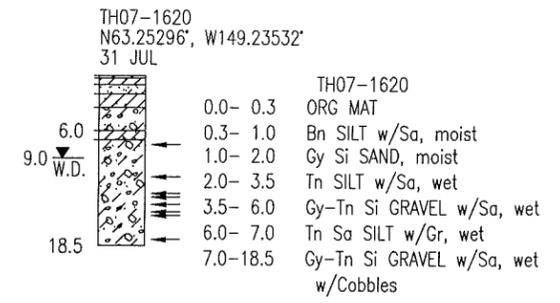


PRELIMINARY



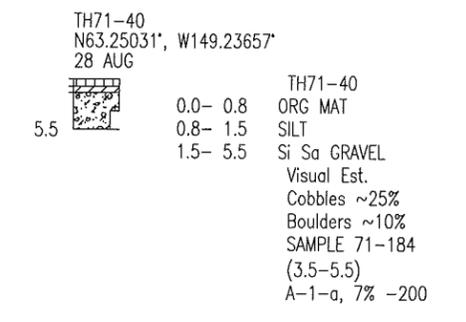
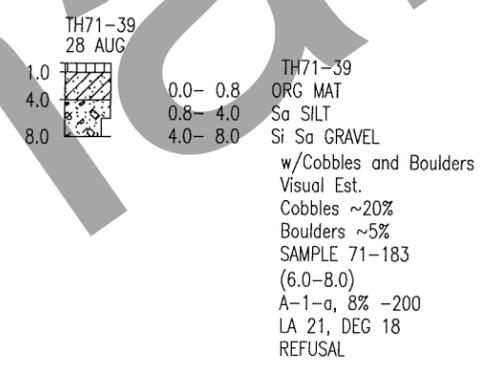
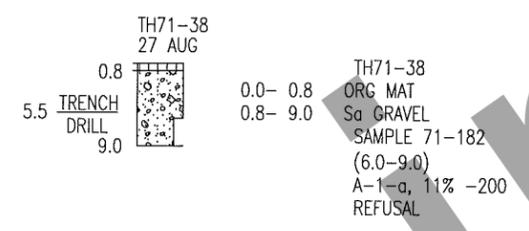
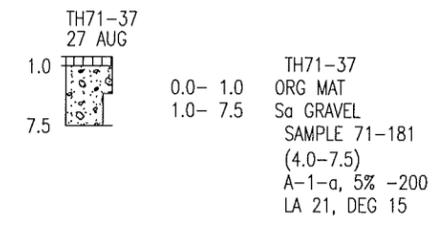
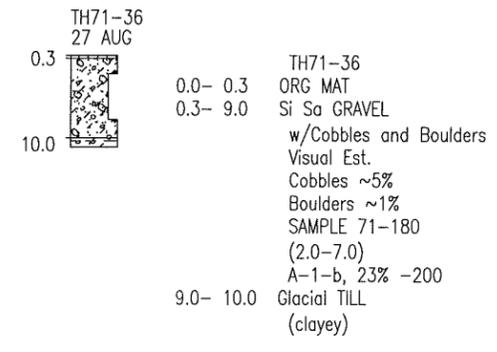
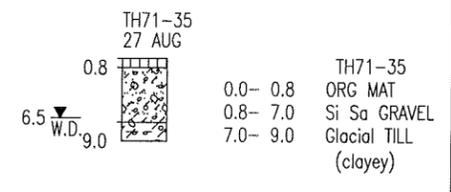
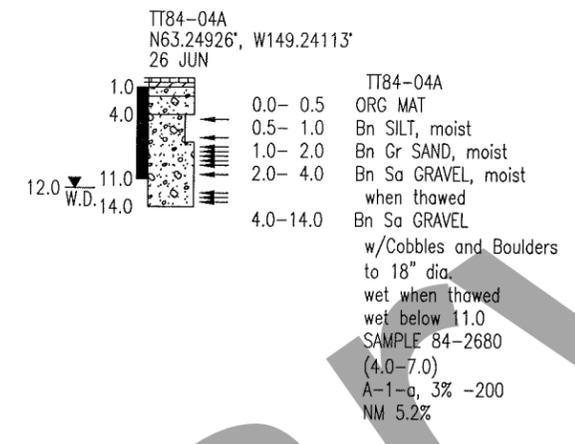
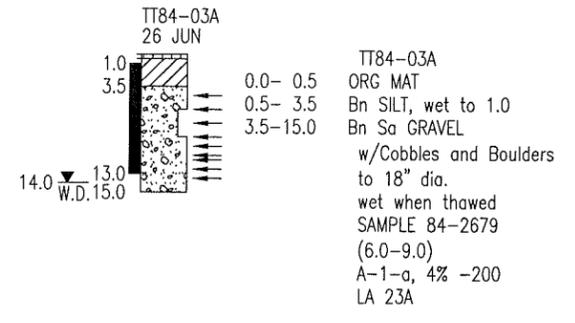
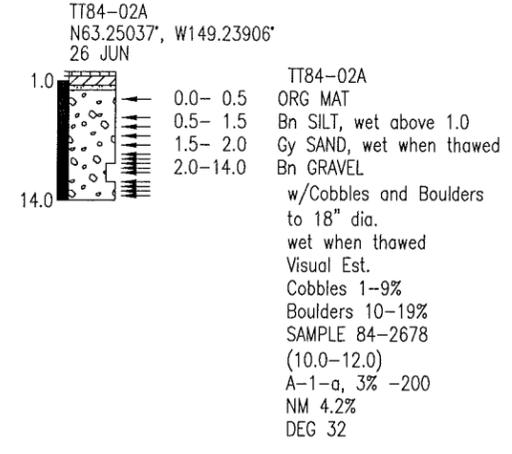
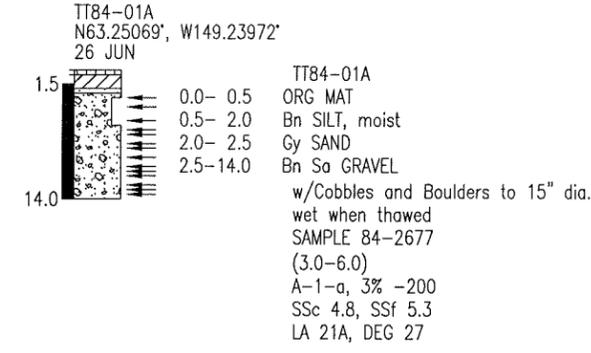
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DRAWN: RDP	M.S. 35-4-104-2
APPROVED: SM	PROJECT NO. 61277
DATE: Jul 2008	Q:\Geo\61277 (Broad Pass)\drafting\ms 35-4-104-2 for Robert-Lopez(07)

Jul 21, 2008 - 2:17pm

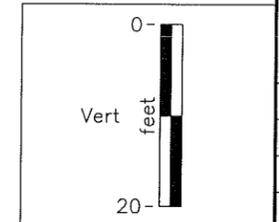


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Jul 21, 2008 - 2:18pm



Preliminary



STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES ENGINEERING GEOLOGY UNIT	
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DATE: Jul 2008	Q:\Geo\61277 Broad Pass\Drilling\ms 35-4-104-2 for Robert-Lopez\8

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

PROJECT NAME: Parks Hwy MP 194 Broad Pass RR Overcrossing
 PROJECT NUMBER: REH-HHE-0A4-3(16)
 AKSAS NUMBER: 61277
 SAMPLED BY: M. DARROW
 MATERIAL SOURCE: MS 35-4-104-2

TEST HOLE NUMBER	07-1605	07-1605	07-1605	07-1605	07-1605	07-1606	07-1606
DEPTH (feet)	2.0-3.0	5.0-7.5	11.0-15.0	15.0-15.5	27.0-28.0	8.5-10.0	10.0-11.0
LATITUDE	N63.24867°	N63.24867°	N63.24867°	N63.24867°	N63.24867°	N63.24877°	N63.24877°
LONGITUDE	W149.23909°	W149.23909°	W149.23909°	W149.23909°	W149.23909°	W149.23738°	W149.23738°
LAB NUMBER	07-4510	07-4511	07-4512	07-4513	07-4514	07-4515	07-4516
DATE SAMPLED	29-Jul-07	29-Jul-07	29-Jul-07	29-Jul-07	29-Jul-07	29-Jul-07	29-Jul-07
% Passing							
3"			100				
2"							
1.5"		100	99			100	
1.0"		98	97			99	
0.75"		97	92			95	
0.5"		92	85				
0.375"		87	81				
#4		79	71				
#8		70	63			91	
#10		69	61			90	
#16		64	55			86	
#30		57	49			80	
#40		55	46			74	
#50		51	43			58	
#60		49	41			50	
#80		45	38			39	
#100		42	36			35	
Silt/Clay #200		34.5	28.0			25.6	
Hydro							
0.02							
0.005							
0.002							
0.001							
LIQUID LIMIT		20	NV			NV	
PLASTIC INDEX		3	NP			NP	
USCS CLASSIFICATION		SM	SM			SM	
USCS SOIL DESCRIPTION	(SiSa w/Gr)	SiSa w/Gr	SiSa w/Gr	SiSa w/Gr	(ESi w/Sa)	SiSa	SiSa
NATURAL MOISTURE	17.4			7.0	19.5		13.1
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. 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: Parks Hwy MP 194 Broad Pass RR Overcrossing
 PROJECT NUMBER: REH-HHE-0A4-3(16)
 AKSAS NUMBER: 61277
 SAMPLED BY: M. DARROW
 MATERIAL SOURCE: MS 35-4-104-2

TEST HOLE NUMBER	07-1608	07-1610	07-1610	07-1611	07-1611	07-1612	07-1612
DEPTH (feet)	6.0-7.0	8.0-9.0	3.0-12.0	2.0-11.0	11.0-12.0	6.5-18.0	13.0-14.0
LATITUDE	N63.24941°	N63.25026°	N63.25026°	N63.25119°	N63.25119°	N63.25121°	N63.25121°
LONGITUDE	W149.23564°	W149.23787°	W149.23787°	W149.2422°	W149.2422°	W149.23923°	W149.23923°
LAB NUMBER	07-4517	07-4518	07-4519	07-4520	07-4521	07-4522	07-4523
DATE SAMPLED	29-Jul-07	30-Jul-07	30-Jul-07	30-Jul-07	30-Jul-07	30-Jul-07	30-Jul-07
% Passing							
3"				100		100	
2"				99		99	
1.5"			100	99		97	
1.0"			99	92		85	
0.75"			98	80		74	
0.5"			96	59		56	
0.375"			95	48		46	
#4			92	29		26	
#8			88	22		17	
#10			87	21		16	
#16			83	18		14	
#30			76	16		11	
#40			72	15		10	
#50			65	13		9	
#60			62	12		9	
#80			55	11		8	
#100			50	10		8	
Silt/Clay #200			34.6	7.6		6.1	
Hydro							
0.02							
0.005							
0.002							
0.001							
LIQUID LIMIT			NV	NV		20	
PLASTIC INDEX			NP	NP		NP	
USCS CLASSIFICATION			SM	GP-GM		GP-GM	
USCS SOIL DESCRIPTION	(Si)	SiSa	SiSa	PGGr w/Si&Sa	PGGr w/Si&Sa	PGGr w/Si&Sa	PGGr w/Si&Sa
NATURAL MOISTURE	41.4	18.9			2.6		3.8
ORGANICS	9.6						
SP. GR. (FINE)						2.72	
SP. GR. (COARSE)						2.71	
MAX. DRY DENSITY						144.0	
OPTIMUM MOISTURE						5.4	
L.A. ABRASION							
DEGRAD. FACTOR							
SODIUM SULF. (CRSE)							
SODIUM SULF. (FINE)							
NORDIC ABRASION							
REMARKS	Org ¹						
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						

COMPACTION REPORT

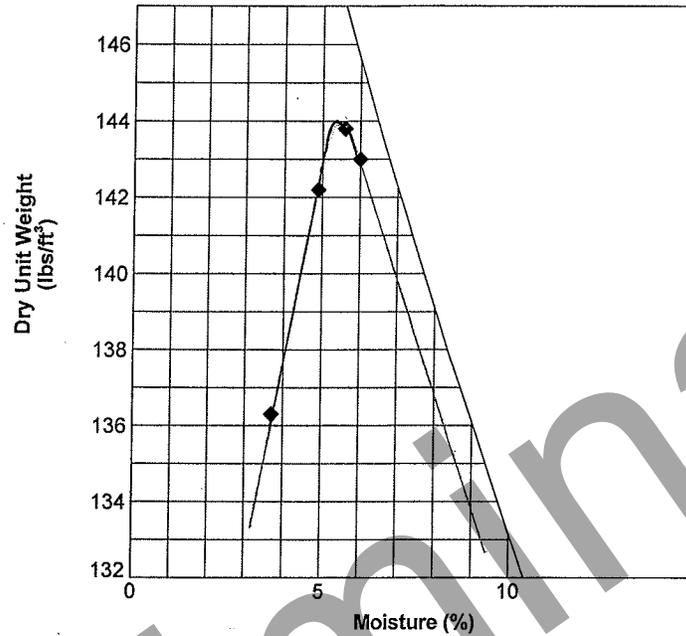
Lab Number: 07-4522

Project: Parks Hwy MP 194 Broad Pass RR Overcrossing

Test Hole: 07-1612

Material Site: CENTERLINE

MOISTURE / DENSITY RELATIONSHIP



NOTE: The upper right portion of the graph may be clipped at the ZAV.

Dry Unit Wt	1	2	3	4	5	6
lbs/ft ³	136.3	142.2	143.8	143.0		
kg/m ³	2183	2278	2303	2291		
% Moisture	3.7	4.9	5.6	6.0		

REMARKS:

ASTM D-1557 AASHTO T-180D	Regional Lab.		Field
	lbs/ft ³	kg/m ³	
Max. Density	144.0		
Opt. Moisture	5.4		

Signature: _____

Tonya Knopke
Regional Lab Supervisor

Date: 12/12/07

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

PROJECT NAME: Parks Hwy MP 194 Broad Pass RR Overcrossing
 PROJECT NUMBER: REH-HHE-0A4-3(16)
 AKSAS NUMBER: 61277
 SAMPLED BY: M. DARROW
 MATERIAL SOURCE: MS 35-4-104-2

TEST HOLE NUMBER	07-1618	07-1618	07-1619	07-1619	07-1619	07-1622	07-1622
DEPTH (feet)	9.0-10.0	1.0-10.0	2.0-4.0	2.0-4.0	4.0-5.0	5.0-6.0	6.0-7.0
LATITUDE	N63.25211°	N63.25211°	N63.25204°	N63.25204°	N63.25204°	N63.25145°	N63.25145°
LONGITUDE	W149.2374°	W149.2374°	W149.2356°	W149.2356°	W149.2356°	W149.24004°	W149.24004°
LAB NUMBER	07-4524	07-4525	07-4526	07-4527	07-4528	07-4529	07-4530
DATE SAMPLED	31-Jul-07	31-Jul-07	31-Jul-07	31-Jul-07	31-Jul-07	1-Aug-07	1-Aug-07
% Passing							
3"			100			100	
2"			98		100	96	
1.5"		100	98		97	94	
1.0"		98	96		93	85	
Gravel		91	90		88	79	
0.75"		84	84		78	73	
0.5"		71	74		71	68	
0.375"		64	69		54	57	
#4		49	54		43	50	
#8		41	41		42	48	
#10		39	39		36	43	
#16		35	32		26	36	
Sand		31	22		20	32	
#30		29	17		14	26	
#40		25	12		12	23	
#50		24	10		8	18	
#60		21	8		7	16	
#80		19	7				
#100							
Silt/Clay		15.1	3.9	3.9		10.5	
#200							
0.02							
Hydro							
0.005							
0.002							
0.001							
LIQUID LIMIT		NV	NV	NV		NV	
PLASTIC INDEX		NP	NP	NP		NP	
USCS CLASSIFICATION		GM	SP	SP		SP-SM	
USCS SOIL DESCRIPTION	SiGr w/Sa	SiGr w/Sa	PGSa w/Gr	PGSa w/Gr	PGSa w/Gr	PGSa w/Si&Gr	(SiGr w/Sa)
NATURAL MOISTURE	9.3				2.7		11.3
ORGANICS							
SP. GR. (FINE)		2.66	2.72			2.72	
SP. GR. (COARSE)		2.72	2.70			2.71	
MAX. DRY DENSITY		0.0	139.0			139.0	
OPTIMUM MOISTURE		5.2	6.1			6.4	
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						

COMPACTION REPORT

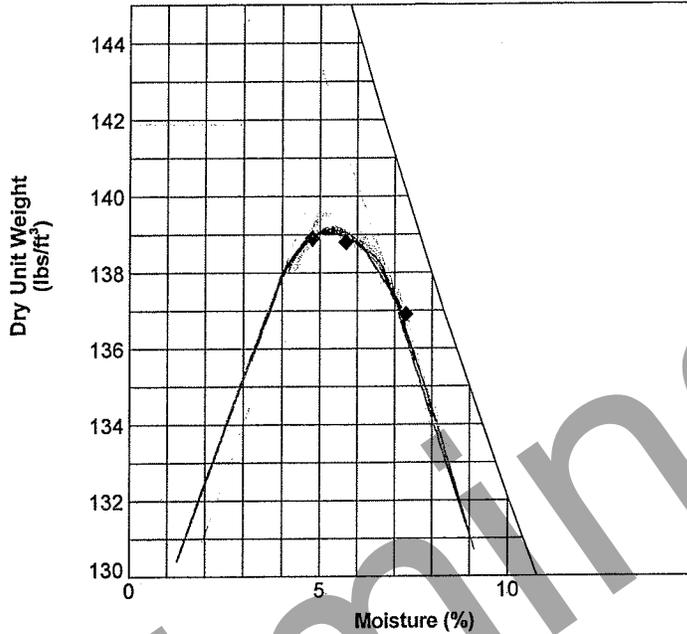
Lab Number: 07-4525

Project: Parks Hwy MP 194 Broad Pass RR Overcrossing

Test Hole: 07-1618

Material Site: CENTERLINE

MOISTURE / DENSITY RELATIONSHIP



NOTE: The upper right portion of the graph may be clipped at the ZAV.

Dry Unit Wt	1	2	3	4	5	6
lbs/ft ³	138.9	138.8	136.9			
kg/m ³	2225	2223	2193			
% Moisture	4.8	5.7	7.3			

REMARKS:

ASTM D-1557 AASHTO T-180D	Regional Lab.		Field
	lbs/ft ³	kg/m ³	
Max. Density	139.0		
Opt. Moisture	5.2		

Signature: _____

Tonya Knopke
Regional Lab Supervisor

Date: 12/27/07

COMPACTION REPORT

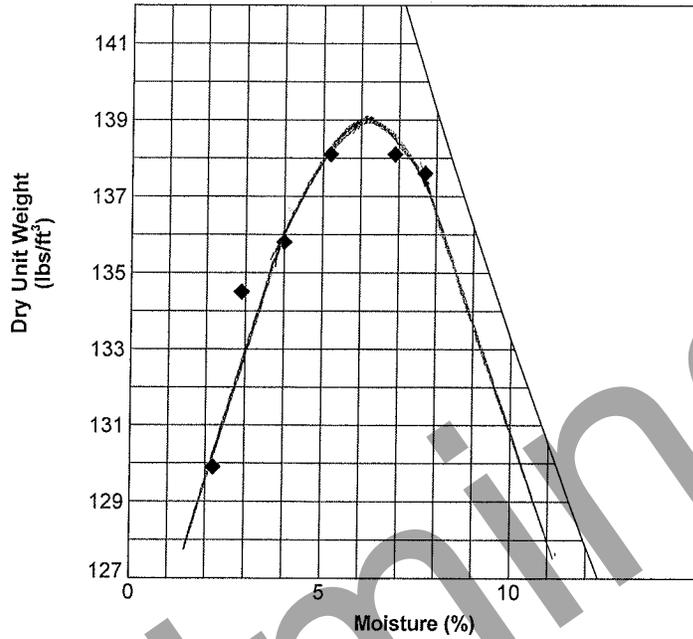
Lab Number: 07-4526

Project: Parks Hwy MP 194 Broad Pass RR Overcrossing

Test Hole: 07-1619

Material Site: CENTERLINE

MOISTURE / DENSITY RELATIONSHIP



NOTE: The upper right portion of the graph may be clipped at the ZAV.

Dry Unit Wt	1	2	3	4	5	6
lbs/ft ³	129.9	134.5	135.8	138.1	138.1	137.6
kg/m ³	2081	2154	2175	2212	2212	2204
% Moisture	2.2	2.9	4.0	5.2	6.9	7.7

REMARKS:

ASTM D-1557 AASHTO T-180D	Regional Lab.		Field
	lbs/ft ³	kg/m ³	
Max. Density	139.0		
Opt. Moisture	6.1		

Signature: _____

T.K.
Tonya Knopke
Regional Lab Supervisor

Date: 1/22/08

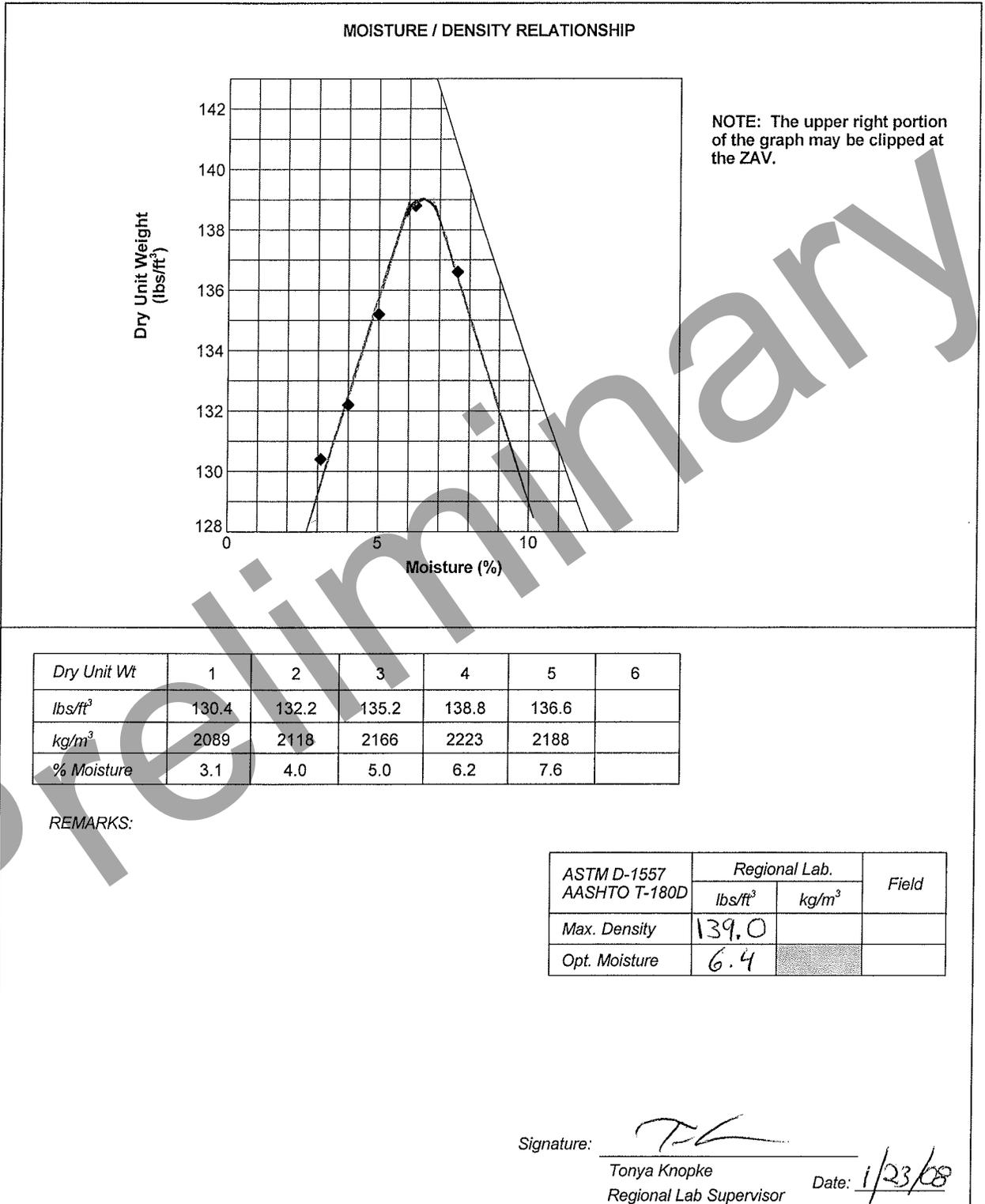
COMPACTION REPORT

Lab Number: 07-4529

Project: Parks Hwy MP 194 Broad Pass RR Overcrossing

Test Hole: 07-1622

Material Site: CENTERLINE



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

PROJECT NAME: Parks Hwy MP 194 Broad Pass RR Overcrossing
 PROJECT NUMBER: REH-HHE-0A4-3(16)
 AKSAS NUMBER: 61277
 SAMPLED BY: M. DARROW
 MATERIAL SOURCE: MS 35-4-104-2

TEST HOLE NUMBER	07-1622	07-1624	07-1624	07-1624			
DEPTH (feet)	10.5-11.5	2.0-3.5	2.0-3.5	3.5-4.0			
LATITUDE	N63.25145°	N63.24986°	N63.24986°	N63.24986°			
LONGITUDE	W149.24004°	W149.23811°	W149.23811°	W149.23811°			
LAB NUMBER	07-4531	07-4532	07-4533	07-4534			
DATE SAMPLED	1-Aug-07	1-Aug-07	1-Aug-07	1-Aug-07			
% Passing							
3"		100	100				
2"	100	90	93				
1.5"	90	87	89				
1.0"	79	76	78				
0.75"	71	71	71				
0.5"	61	61	61				
0.375"	56	56	55				
#4	43	43	42				
Sand							
#8	33	34	30				
#10	31	32	28				
#16	25	25	21				
#30	18	16	13				
#40	15	13	10				
#50	12	10	7				
#60	11	8	6				
#80	8	6	5				
#100	8	5	4				
Silt/Clay							
#200	5.4	3.2	2.4				
Hydro							
0.02							
0.005							
0.002							
0.001							
LIQUID LIMIT	NV	NV	NV				
PLASTIC INDEX	NP	NP	NP				
USCS CLASSIFICATION	GW-GM	GP	GW				
USCS SOIL DESCRIPTION	WGGr w/Si&Sa	PGGr w/Sa	WGGr w/Sa	PGGr w/Sa			
NATURAL MOISTURE ORGANICS				3.8			
SP. GR. (FINE)			2.72				
SP. GR. (COARSE)			2.69				
MAX. DRY DENSITY			139.2				
OPTIMUM MOISTURE			6.5				
L.A. ABRASION							
DEGRAD. FACTOR							
SODIUM SULF. (CRSE)							
SODIUM SULF. (FINE)							
NORDIC ABRASION							
REMARKS		3.0% +3"	2.1% +3"				
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						

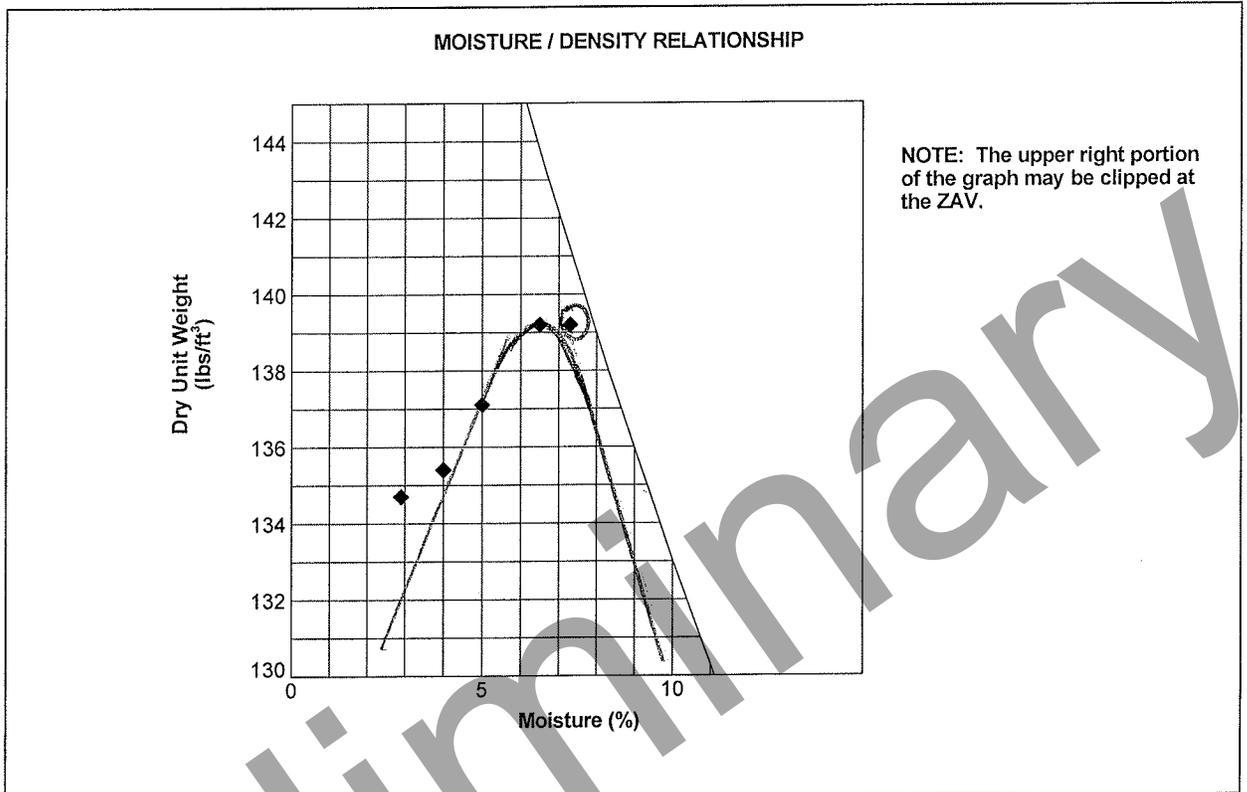
COMPACTION REPORT

Lab Number: 07-4533

Project: Parks Hwy MP 194 Broad Pass RR Overcrossing

Test Hole: 07-1624

Material Site: CENTERLINE



Dry Unit Wt	1	2	3	4	5	6
lbs/ft ³	134.7	135.4	137.1	139.2	139.2	
kg/m ³	2158	2169	2196	2230	2230	
% Moisture	2.9	4.0	5.0	6.5	7.3	

Bleed

REMARKS:

ASTM D-1557 AASHTO T-180D	Regional Lab.		Field
	lbs/ft ³	kg/m ³	
Max. Density	139.2		
Opt. Moisture	6.5		

Signature:

Tonya Knopke
Regional Lab Supervisor

Date: 1/22/08

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

PROJECT NAME: Parks Hwy MP 194 Broad Pass Railroad Overcrossing
 PROJECT NUMBER: REH-HHE-0A4-3(16)
 AKSAS NUMBER: 61277
 SAMPLED BY: T. Bergstrom
 SOURCE: MS 35-4-104-2

TEST HOLE NO.	03-1A	03-1A	03-1A	03-1A	03-3A	03-4A	03-05A
DEPTH (feet)	0.0-1.5	2.5-3.5	7.0-9.5	9.5-13.0	9.5-10.5	7.0-11.0	2.5-3.0
LATITUDE	N63.24964°	N63.24964°	N63.24964°	N63.24964°	N63.25082°	N63.25158°	N63.25058°
LONGITUDE	W149.24033°	W149.24033°	W149.24033°	W149.24033°	W149.24063°	W149.2484°	W149.2487°
LAB NO.	03-6225	03-6226	03-6227	03-6228	03-6230	03-6255	03-6256
DATE SAMPLED	18-Jun-03	18-Jun-03	18-Jun-03	18-Jun-03	18-Jun-03	21-Jun-03	21-Jun-03
% Passing:							
3"			100	100			
2"			100	99			
1.0"	100		90	86			
Gravel 0.75"	98	100	81	78			
0.5"	91	99	64	68			
0.375"	85	98	54	63			
#4	65	91	35	47			
Sand #10	45	72	24	35		100	
#40	25	25	13	20		97	
#50	20	19	12	17		96	
#100	10	13	8	12		92	
Silt/Clay #200	3.2	9.1	5.5	8.2		88.3	
Hydro 0.02						79.2	
0.005						48.7	
0.002						30.3	
0.001						20.5	
LIQUID LIMIT	NV	NV	NV	NV		32	
PLASTIC INDEX	NP	NP	NP	NP		11	
USCS CLASSIFICATION	SP	SW-SM	GP-GM	GW-GM		CL	
AASHTO CLASSIFICATION	A-1-a	A-1-b	A-1-a	A-1-a		A-6(9)	
SOIL DESCRIPTION	SaGr	slSiGrSa	Gr	slSiSaGr	(GrSi)	SiCl	(slSiSaGr)
NATURAL MOISTURE		4.8	3.8	7.7	14.2	24.0	3.3
ORGANICS							
SP.GR. (FINE)						2.76	
SP.GR. (COARSE)							
MAX DRY DENSITY							
OPTIMUM MOISTURE							
L.A. ABRASION							
DEGRADATION FACTOR							
SODIUM SULF. (CRSE)							
SODIUM SULF. (FINE)							
REMARKS:	Soil descriptions shown in parentheses are based on field determinations. Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7. Geographical coordinates are provided only for borings that were definitively relocated in the field.						

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

PROJECT NAME: Parks Hwy MP 194 Broad Pass Railroad Overcrossing
 PROJECT NUMBER: REH-HHE-0A4-3(16)
 AKSAS NUMBER: 61277
 SAMPLED BY: T. Bergstrom
 SOURCE: MS 35-4-104-2

TEST HOLE NO.	03-5A	03-7A	03-7A	03-8A			
DEPTH (feet)	3.0-8.5	7.5-9.0	11.0-15.0	5.5-11.0			
LATITUDE	N63.25058°	N63.24897°	N63.24897°	N63.25216°			
LONGITUDE	W149.2487°	W149.24207°	W149.24207°	W149.23895°			
LAB NO.	03-6257	03-6258	03-6259	03-6260			
DATE SAMPLED	20-Jun-03	20-Jun-03	20-Jun-03	20-Jun-03			
% Passing							
3"							
2"		100	100	100			
1.0"		99	96	95			
Gravel 0.75"		91	89	88			
0.5"		77	75	76			
0.375"		69	65	68			
#4		52	42	52			
Sand #10		41	30	41			
#40		36	22	27			
#50		35	20	23			
#100		32	15	17			
Silt/Clay #200		29.3	10.5	12.7			
0.02							
Hydro 0.005							
0.002							
0.001							
LIQUID LIMIT		27	NV	NV			
PLASTIC INDEX		5	NP	NP			
USCS CLASSIFICATION		GC-GM	GP-GM	GM			
AASHTO CLASSIFICATION		A-2-4	A-1-a	A-1-a			
SOIL DESCRIPTION	(slSiSaGr)	slClSiGr	slSiGr	SiSaGr			
NATURAL MOISTURE		7.8		7.2			
ORGANICS							
SP.GR. (FINE)							
SP.GR. (COARSE)				2.73			
MAX DRY DENSITY				141.5			
OPTIMUM MOISTURE				5.8			
L.A. ABRASION	18						
DEGRADATION FACTOR	48						
SODIUM SULF. (CRSE)	1.5						
SODIUM SULF. (FINE)	3.3						

REMARKS:

Soil descriptions shown in parentheses are based on field determinations.
 Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.
 Geographical coordinates are provided only for borings that were definitively relocated in the field.

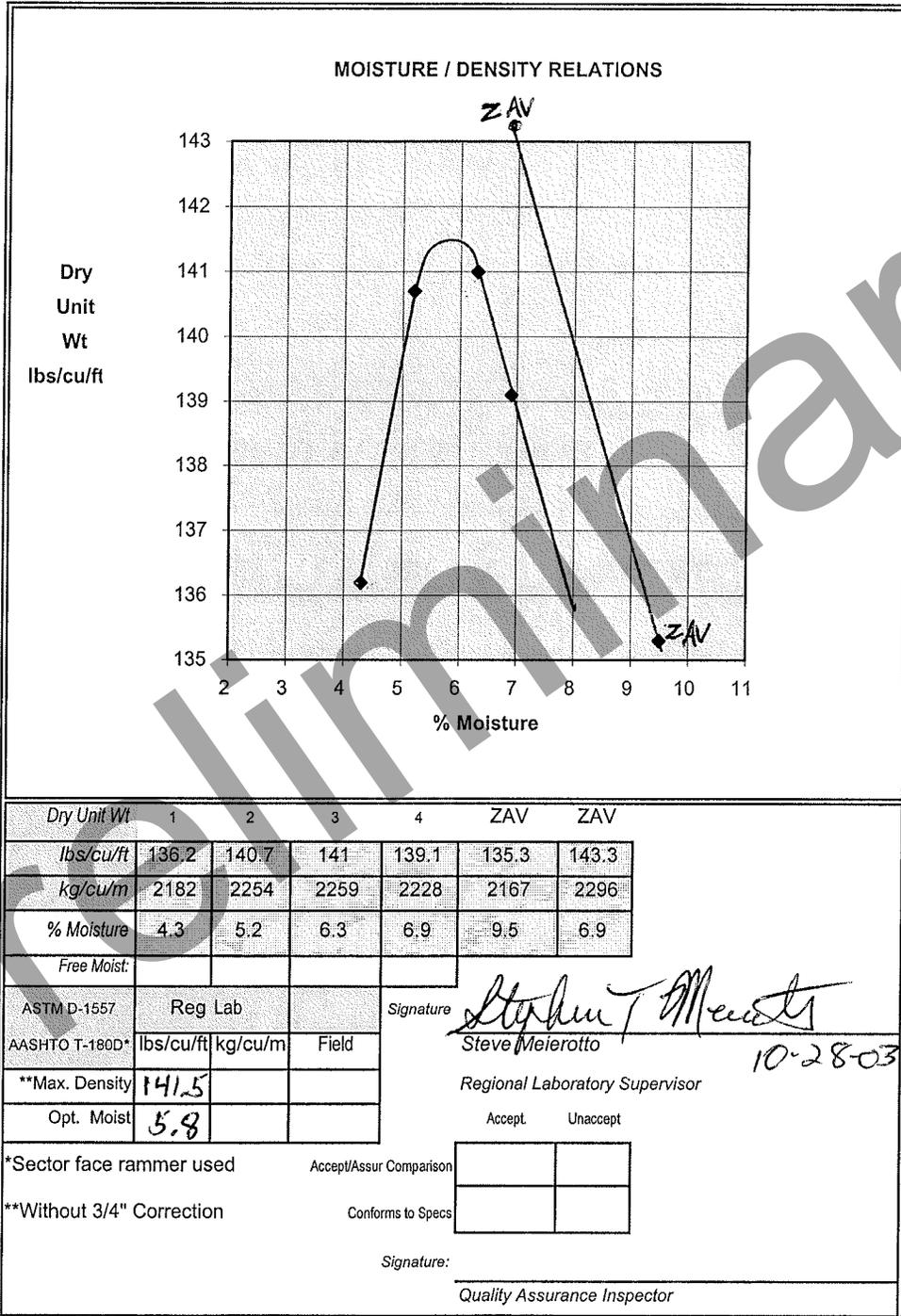
COMPACTION REPORT

Lab Number: 03-6260

Project: PARKS HWY MP 194 BROAD PASS RR OVERCROSSING

Source: 35-4-104-2

Field #:



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

PROJECT NAME: Parks Hwy MP 194 Broad Pass Railroad Overcrossing
 PROJECT NUMBER: REH-HHE-0A4-3(16)
 AKSAS NUMBER: 61277
 SAMPLED BY: G. Brazo
 SOURCE: MS 35-4-104-2

These samples were originally taken for the following project:
 Parks Highway Rehabilitation and Resurfacing, Little Coal
 Creek to the Middle Fork of the Chulitna River,
 I-R-OA-3(2), A-46732.

TEST HOLE NO.	84-1A	84-2A	84-3A	84-4A			
DEPTH (feet)	3.0-6.0	10.0-12.0	6.0-9.0	4.0-7.0			
LATITUDE	N63.25069°	N63.25037°		N63.24926°			
LONGITUDE	W149.23972°	W149.23906°		W149.24113°			
LAB NO.	84-2677	84-2678	94-2679	84-2680			
DATE SAMPLED	26-Jun-84	26-Jun-84	26-Jun-84	26-Jun-84			
% Passing							
3"	100	100	100	100			
2"	87	94	98	92			
1.0"	68	75	80	75			
Gravel 0.75"	62	67	72	67			
0.5"	53	57	63	57			
0.375"	47	50	56	50			
#4	34	35	42	36			
#10	23	22	30	24			
Sand #40		8	11	12			
#50	7						
#100	5	4	5	5			
Silt/Clay #200	3	3	4	3			
0.02							
Hydro 0.005							
0.002							
LIQUID LIMIT	NV	NV	NV	NV			
PLASTIC INDEX	NP	NP	NP	NP			
AASHTO CLASSIFICATION	A-1-a	A-1-a	A-1-a	A-1-a			
SOIL DESCRIPTION	SaGr	Gr	SaGr	SaGr			
NATURAL MOISTURE		4.2		5.2			
ORGANICS							
SP.GR. (FINE)				2.69			
SP.GR. (COARSE)							
MAX DRY DENSITY				137.4*			
OPTIMUM MOISTURE				4.5*			
L.A. ABRASION	21A		23A				
DEGRADATION FACTOR	27	32					
SODIUM SULF. (CRSE)	4.8						
SODIUM SULF. (FINE)	5.3						

REMARKS:
 Soil descriptions shown in parentheses are based on field determinations.
 Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.
 Geographical coordinates are provided only for borings that were definitively relocated in the field.
 * moisture/density plot not available

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

PROJECT NAME: Parks Hwy MP 194 Broad Pass Railroad Overcrossing
 PROJECT NUMBER: REH-HHE-0A4-3(16)
 AKSAS NUMBER: 61277
 SAMPLED BY: Saunders
 SOURCE: MS 35-4-104-2

These samples were originally taken for the following project:
Cantwell to Hurricane Gulch Paving; F-035-4(1).

TEST HOLE NO.	71-36	71-37	71-38	71-39	71-40		
DEPTH (feet)	2.0-7.0	4.0-7.5	6.0-9.0	6.0-8.0	3.5-5.5		
LATITUDE					N63.25031°		
LONGITUDE					W149.23657°		
LAB NO.	71-180	71-181	71-182	71-183	71-184		
DATE SAMPLED	27-Aug-71	27-Aug-71	27-Aug-71	28-Aug-71	28-Aug-71		
% Passing							
3"	100	100	100	100	100		
2"	99	99	97	96	96		
1.0"	93	87	85	80	81		
Gravel 0.75"	90	79	79	72	73		
0.5"	85	68	70	61	61		
0.375"	80	61	63	55	53		
#4	69	46	49	44	39		
Sand #10	62	35	37	34	28		
#40	47	18	21	22	17		
#50	41	13	18	18	14		
#100	31	7	14	13	10		
Silt/Clay #200	23	5	11	8	7		
0.02	16	4	9	6	6		
Hydro 0.005	5	1	4	3	2		
0.002							
LIQUID LIMIT	NV	NV	NV	NV	NV		
PLASTIC INDEX	NP	NP	NP	NP	NP		
AASHTO CLASSIFICATION	A-1-b	A-1-a	A-1-a	A-1-a	A-1-a		
SOIL DESCRIPTION	SiSaGr	SaGr	SaGr	SiSaGr	SiSaGr		
NATURAL MOISTURE							
ORGANICS							
SP.GR. (FINE)	2.67	2.70	2.64	2.70	2.69		
SP.GR. (COARSE)	2.74	2.67	2.74	2.70	2.71		
MAX DRY DENSITY							
OPTIMUM MOISTURE							
L.A. ABRASION		21		21			
DEGRADATION FACTOR		15		18			
SODIUM SULF. (CRSE)							
SODIUM SULF. (FINE)							

REMARKS:

Soil descriptions shown in parentheses are based on field determinations.
 Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.
 Geographical coordinates are provided only for borings that were definitively relocated in the field.

MS 35-4-042-2

This area was previously explored in 1971 for the Cantwell to Hurricane Gulch paving project, and in 1984 for the Little Coal Creek to the Middle Fork of the Chulitna River rehabilitation and resurfacing project. Material from MS 35-4-021-2, which is now closed, was used to produce base course and asphalt aggregate for a variety of projects, and was last used for the Little Coal Creek to Middle Fork paving project in 1985 (Brazo, 1985). While some test hole, test trench, and laboratory data from those projects are presented again in this report, we refer the reader to the 1971 and 1985 reports for complete descriptions of the previous work (Saunders, 1971; Brazo, 1985). As of the time of this writing, MS 35-4-042-2 is currently being used for the Parks Highway MP 185-192 Resurfacing project.

It should be noted that the locations of the 1984 test trenches, as shown on the material site drawing, are approximate.

Location and access

This material site is located to the east of the Parks Highway at MP 183. Access to the site is from the highway right of way just north of the MP 183 marker, through the closed MS 35-4-021-2 (see the material site drawing). The developed area is screened from the highway by spruce and dwarf birch, although the natural vegetation is sparse in a few areas.

Description

MS 35-4-042-2, which is approximately 66 acres in size, overlaps a portion of the closed MS 35-4-021-2. The overlapping area is the only portion of MS 35-4-042-2 that has been developed, with the approximate dimensions of 350 ft by 550 ft.

The soils present in the developed portion of MS 35-4-042-2 are alluvial deposits composed of sand and gravel, with cobbles and boulders throughout. The deposit is situated on a bench roughly 100 ft above the elevation of the E. Fork Chulitna River; further to the north, there are exposures of gravel for most of the bench height down to the river. The cobbles and boulders within the material site vary among chert, conglomerate, arkose, andesite, and granite, as well as others. Borings from 2007 and trenching from 1984 indicate that the sandy and gravelly soils extend to the east, south, and southwest into the area vegetated by large spruce trees.

Land Status

The Department of Natural Resources issued a Negotiated Material Sale contract, ADL No. 224961, to the DOT&PF for the removal of 200,000 cubic yards of material. This contract expires on December 31, 2018.

Clearing and Stripping

Overburden from MS 35-4-021-2 was bermed to the south and to the east of the existing pit. Most of MS 35-4-042-2 has not been developed. Vegetation in the undisturbed portion of MS 35-4-042-2 varies. The dominant vegetational feature in the center of the site is a large grassy area with grass growing up to 5-ft high. Dense stands of willows, to 10-ft high, surround the grassy area. At the time of the 2007 exploration, there was no standing water in these areas. The remaining undisturbed area is vegetated by spruce up to 24-in. in diameter on 5-ft to 15-ft centers, with willows up to 10-ft high. Poplars up to 12-in. in diameter grow

along the overburden berm to the east of the developed area. Wet silt overburden ranges from 2-ft to 9-ft deep in the undisturbed areas, and is deepest in the grassy area.

Water Table

NRMS personnel intercepted a water table in TH07-1630, at 4.0 ft below the surface. The water table appeared to be perched on top of the permafrost table at 6.0 ft below the ground surface. No water table was intercepted within the existing pit to the depths drilled (48.5 ft).

Frozen ground conditions

In 2007, we did not intercept frozen ground within the existing pit to the depths drilled. In the undisturbed area, however, NRMS personnel intercepted the permafrost table between 0.5 ft and 10.0 ft below the surface in both 2007 and 1984. See the test hole logs for details. Expect seasonally frozen ground throughout the site, and discontinuous permafrost throughout the area.

Quality of materials

Table 7 contains a summary of the laboratory testing results of the gravelly soil and the silty soil from MS 35-4-042-2 / MS 35-4-021-2. The data summarized include: percent passing the No. 200 sieve (% -200), plastic index (PI), natural moisture, optimum moisture, LA Abrasion values, Degradation values, and Sodium Sulfate loss, both coarse and fine (SSc and SSf, respectively). See the seven column sheets for other laboratory results not included here.

Cobble and boulder counts indicate a range of 8 to 26% cobbles and boulders by weight in five samples from the 2007 test trenches (see Table 8).

Table 7. Summary of laboratory testing data for MS 35-4-042-2 / MS 35-4-021-2. Numbers in parentheses indicate the number of tests performed.

Material Type	% -200	PI	Natural Moisture (%)	Optimum Moisture (%)	LA Abrasion	Degradation	SSc	SSf
Gravelly soil	0.9 – 10.9 (15)	NP (15)	2.8 – 5.7 (5)	6.8 (1)	18 – 21 (5)	20 – 50 (5)	2 – 5 (4)	3 – 6 (4)
Silty soil	89.2 (1)	4 (1)	33.8 (1)	---	---	---	---	---

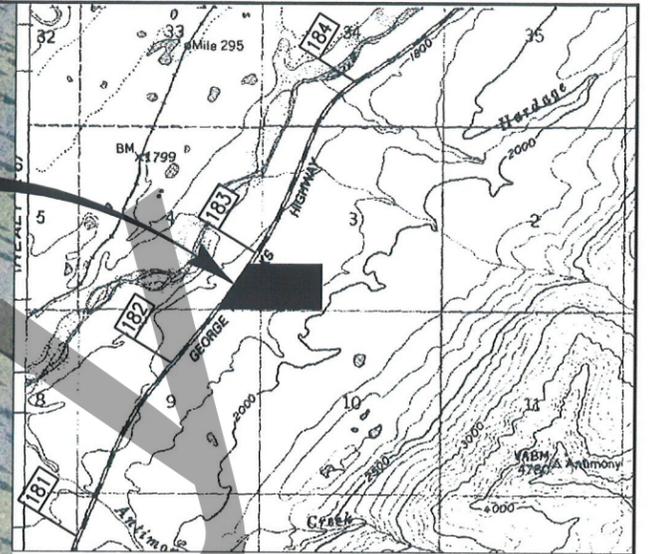
Table 8. Field weighed samples, MS 35-4-042-2 / MS 35-4-021-2

Test Trench	Depth Interval (ft)	Total Wt. (lbs)	Cobble & Boulder Wt. (lbs)	Wt. % Cobbles & Boulders (%)	Number Cobbles	Number Boulders	Largest Boulders' Dimensions
07-1627	2.5-3.5	237	62	26	18	---	
	6.0-7.0	297	37	12	3	1	22"x15"x12" @ 1.0 ft
	8.0-9.0	372	62	17	16	---	16"x9"x10" @ 5.0 ft
TOTAL	2.5-9.0	906	161	18	37	1	
07-1633	4.0-5.0	327	27	8	6	---	19"x10"x9" @ 7.0 ft
	7.5-8.5	272	37	14	10	---	19"x11"x6" @ 11.0 ft
TOTAL	4.0-8.5	599	64	11	16	---	

Comments and recommendations

- 1) The borings located within the existing pit demonstrated the presence of gravel and/or sand with silt to at least 48.5 ft below the pit floor. As no water table was present in any of these borings, the existing excavation in MS 35-4-042-2 can be deepened considerably, limited only by its areal extent and backslopes necessary to stay within the permitted area.
- 2) Results from the 2007 and 1984 explorations indicate that the southern portion of the existing excavation can be expanded into MS 35-4-042-2 to the south, southwest, and southeast. Expansion to the south and southeast will require moving the existing waste berms.
- 3) Degradation results from laboratory testing indicate that some of the material coming from this site does not meet the Standard Specifications for use as crushed aggregates, base course, and subbase products.

Jul 22, 2008 - 8:40am - Tab: MS21-42



LOCATION MAP
 TAKEN FROM USGS QUADRANGLE
 HEALY A-5

07-4013 16 MAY (STOCKPILE) WG GRAVEL w/Si & So GW-GM, 5.0% -200 LA 18, DEG 50 SSc 2, SSf 3	07-4014 16 MAY (STOCKPILE) WG SAND w/Si & Gr SW-SM, 7.8% -200 LA 21, DEG 48 SSc 5, SSf 6
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NOTES:

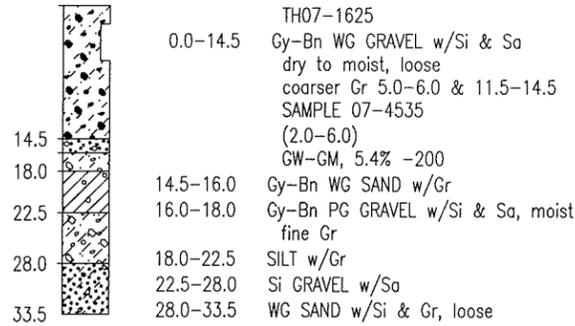
1. LOCATIONS OF 1984 TEST TRENCHES ARE APPROXIMATE.
2. AERIAL PHOTOGRAPH WAS TAKEN IN 2006 AND DOES NOT REFLECT CURRENT CONDITIONS.
3. A MINING PLAN MAY BE PART OF FUTURE PROJECT(S) UTILIZING THIS MATERIAL SITE. ANY CONCEPTUAL INFORMATION PRESENTED HEREON IS INTENDED FOR PRELIMINARY, ENVIRONMENTAL FUNCTION ONLY. ANY SUCH INFORMATION INDICATED HEREON IS SUPERSEDED BY SPECIFIC PROJECT MINING PLAN(S).

M.S. 35-4-021-2 & M.S. 35-4-042-2
 LOCATED W/IN SEC. 3 & 4,
 T21S, R10W,
 FAIRBANKS MERIDIAN PAGE 47

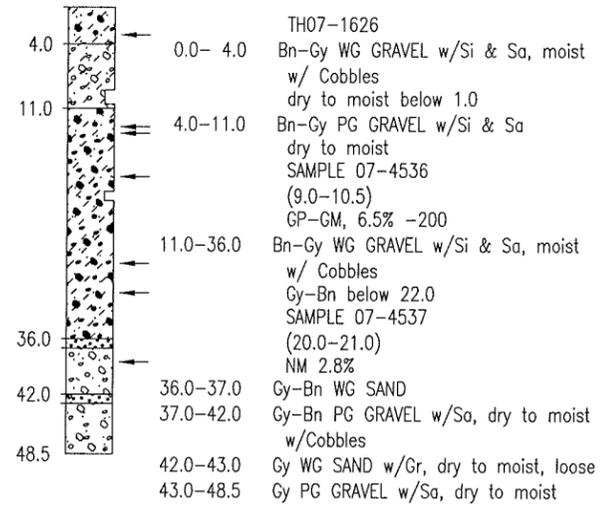
STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES ENGINEERING GEOLOGY UNIT	
DATA: MD	PARKS HWY MP 194 BROAD PASS RAILROAD OVERCROSSING M.S. 35-4-042-2
DRAWN: RDP	
APPROVED: SM	PROJECT NO. 61277
DATE: NOV 2007	C:\Geo\61277 Broad Pass\Drawings\ms 35-4-042-2 for Robert



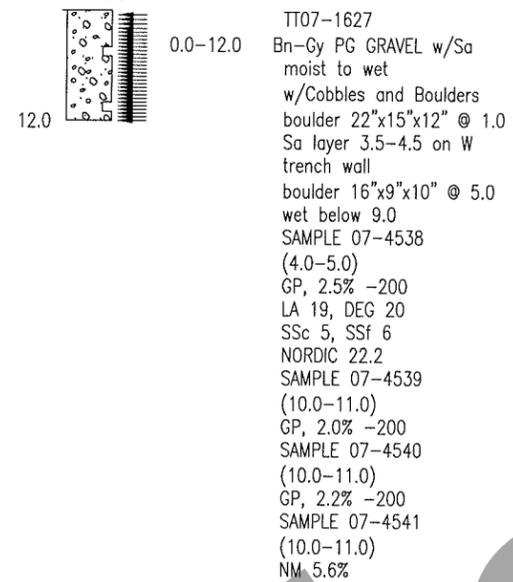
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02 AUG



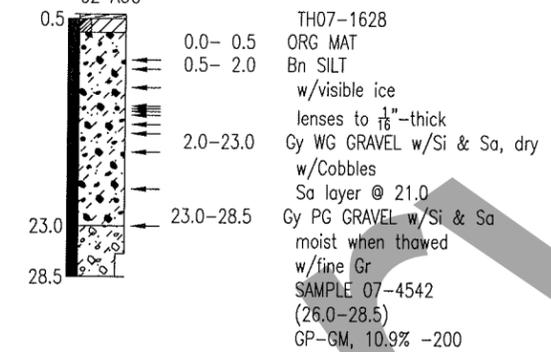
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02 AUG



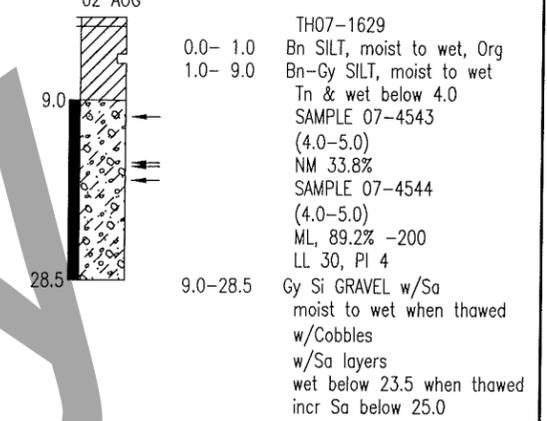
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02 AUG



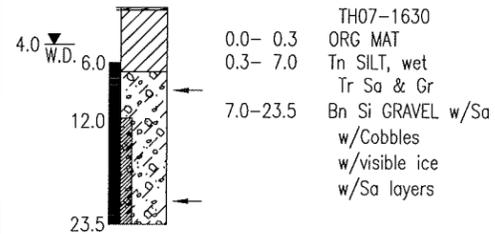
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02 AUG



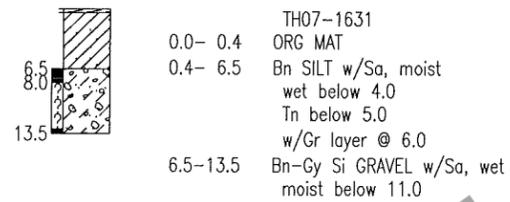
TH07-1629
N63.11781', W149.46327'
02 AUG



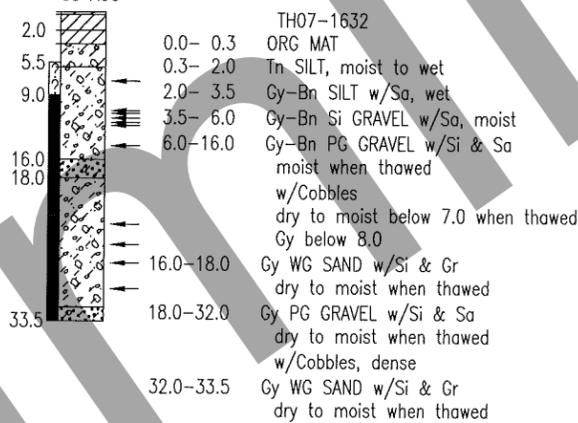
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03 AUG



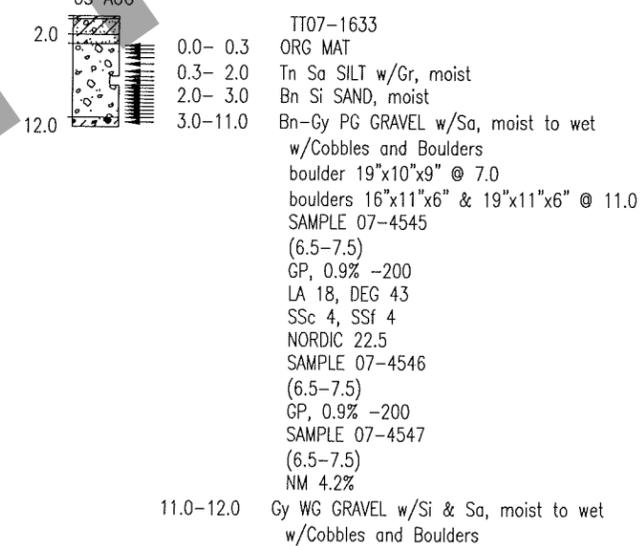
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03 AUG



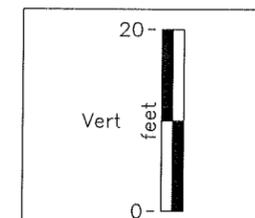
TH07-1632
N63.11928', W149.46048'
03 AUG



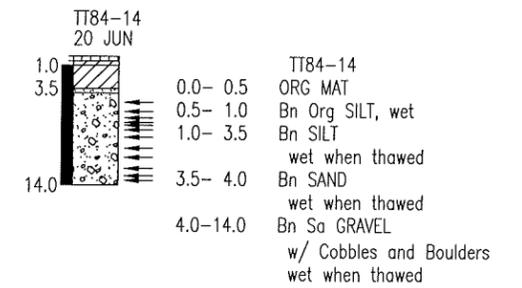
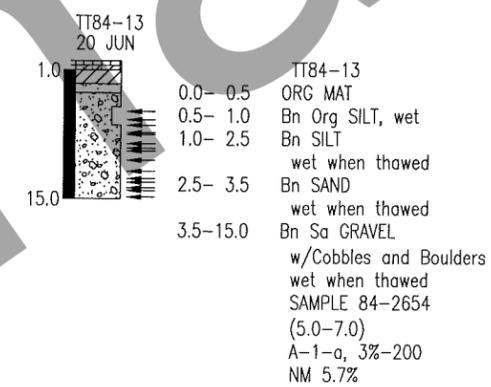
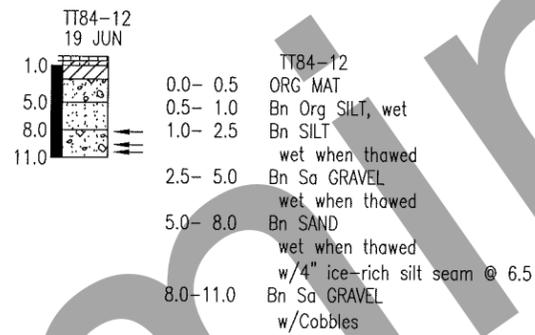
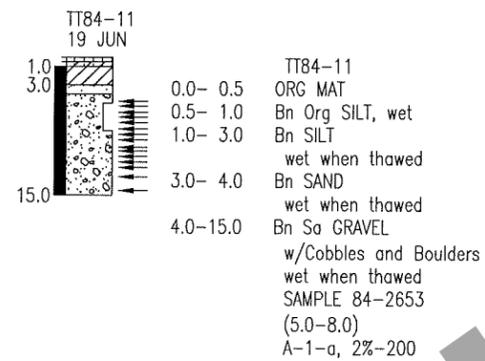
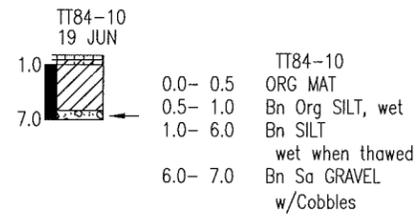
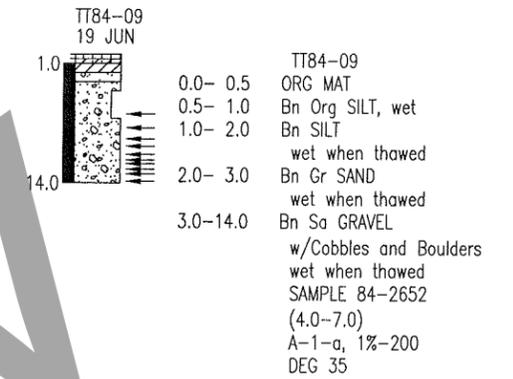
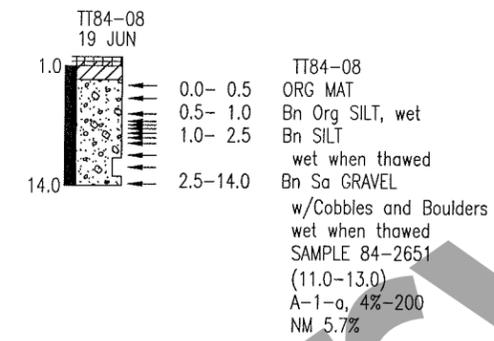
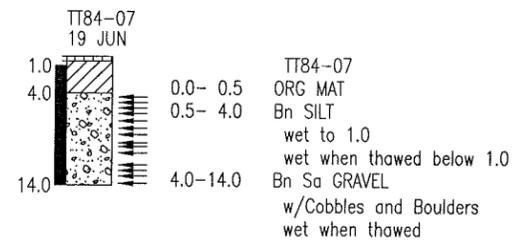
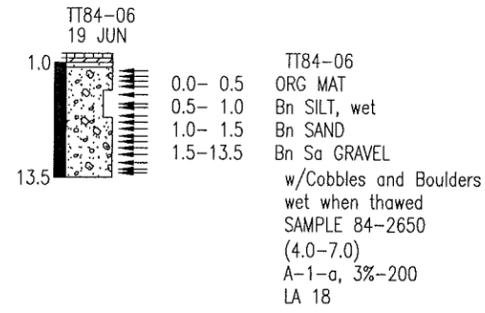
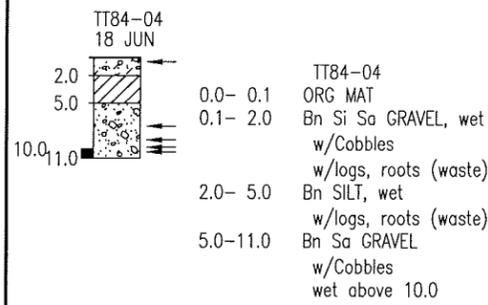
TT07-1633
N63.12042', W149.46002'
03 AUG



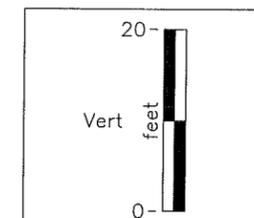
Preliminary



STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES ENGINEERING GEOLOGY UNIT	
DATA: MD	PARKS HWY MP 194 BROAD PASS RAILROAD OVERCROSSING
DRAWN: RDP	M.S. 35-4-021-2/M.S. 35-4-042-2
APPROVED: SM	PROJECT NO. 61277
DATE: Jul 2008	C:\Geo\61277 Broad Pass\Drafting\res_35-4-042-2 for Robert-Layout1(07)



Preliminary



STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES ENGINEERING GEOLOGY UNIT	
DATA: MD	PARKS HWY MP 194 BROAD PASS RAILROAD OVERCROSSING
DRAWN: RDP	M.S. 35-4-021-2/M.S. 35-4-042-2
APPROVED: SM	PROJECT NO. 61277
DATE: Jul 2008	Q:\Geo\61277 Broad Pass\Drilling\res 35-4-042-2 for Robert-Loyd\3(84)

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

PROJECT NAME: Parks Hwy MP 194 Broad Pass RR Overcrossing
 PROJECT NUMBER: REH-HHE-0A4-3(16)
 AKSAS NUMBER: 61277
 SAMPLED BY: M. DARROW
 MATERIAL SOURCE: MS 35-4-042-2

TEST HOLE NUMBER	GRAB	GRAB	07-1625	07-1626	07-1626	07-1627	07-1627
DEPTH (feet)	Surface	Surface	2.0-6.0	9.0-10.5	20.0-21.0	4.0-5.0	10.0-11.0
LATITUDE			N63.12089°	N63.12032°	N63.12032°	N63.11967°	N63.11967°
LONGITUDE			W149.46057°	W149.46176°	W149.46176°	W149.46202°	W149.46202°
LAB NUMBER	07-4013	07-4014	07-4535	07-4536	07-4537	07-4538	07-4539
DATE SAMPLED	16-May-07	17-May-07	2-Aug-07	2-Aug-07	2-Aug-07	2-Aug-07	2-Aug-07
% Passing							
3"	100	100				100	100
2"	91	99				91	96
1.5"	86	96	100	100		84	91
1.0"	75	93	96	94		73	82
Gravel 0.75"	66	89	90	86		68	76
0.5"	56	81	75	71		59	68
0.375"	50	74	67	64		54	62
#4	38	55	47	50		40	46
#8	28	38	35	41		26	32
#10	27	35	33	40		24	30
#16	20	27	27	35		17	21
Sand #30	14	18	19	27		10	11
#40	11	15	15	23		7	8
#50	9	12	11	16		5	5
#60	8	11	10	14		5	4
#80	7	10	8	11		4	3
#100	7	9	7	9		3	3
Silt/Clay #200	5.0	7.8	5.4	6.5		2.5	2.0
Hydro 0.02							
0.005							
0.002							
0.001							
LIQUID LIMIT	NV	NV	NV	NV		NV	NV
PLASTIC INDEX	NP	NP	NP	NP		NP	NP
USCS CLASSIFICATION	GW-GM	SW-SM	GW-GM	GP-GM		GP	GP
USCS SOIL DESCRIPTION	WGGr w/Si&Sa	WGSa w/Si&Gr	WGGr w/Si&Sa	PGGr w/Si&Sa	WGGr w/Si&Sa	PGGr w/Sa	PGGr w/Sa
NATURAL MOISTURE ORGANICS					2.8		
SP. GR. (FINE)							
SP. GR. (COARSE)						2.70	
MAX. DRY DENSITY							
OPTIMUM MOISTURE							
L.A. ABRASION	18	21				19	
DEGRAD. FACTOR	50	48				20	
SODIUM SULF. (CRSE)	2	5				5	
SODIUM SULF. (FINE)	3	6				6	
NORDIC ABRASION						22.2	
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: Parks Hwy MP 194 Broad Pass RR Overcrossing
 PROJECT NUMBER: REH-HHE-0A4-3(16)
 AKSAS NUMBER: 61277
 SAMPLED BY: M. DARROW
 MATERIAL SOURCE: MS 35-4-042-2

TEST HOLE NUMBER	07-1627	07-1627	07-1628	07-1629	07-1629	07-1633	07-1633
DEPTH (feet)	10.0-11.0	10.0-11.0	26.0-28.5	4.0-5.0	4.0-5.0	6.5-7.5	6.5-7.5
LATITUDE	N63.11967°	N63.11967°	N63.11889°	N63.11781°	N63.11781°	N63.12042°	N63.12042°
LONGITUDE	W149.46202°	W149.46202°	W149.46278°	W149.46327°	W149.46327°	W149.46002°	W149.46002°
LAB NUMBER	07-4540	07-4541	07-4542	07-4543	07-4544	07-4545	07-4546
DATE SAMPLED	2-Aug-07	2-Aug-07	2-Aug-07	2-Aug-07	2-Aug-07	3-Aug-07	3-Aug-07
% Passing							
3"	100					100	100
2"	97					95	93
1.5"	92		100			87	80
Gravel 1.0"	84		91			77	72
0.75"	78		80			71	64
0.5"	69		66			61	54
0.375"	63		59			56	49
#4	47		42			42	36
Sand #8	33		33			28	25
#10	31		31		100	26	23
#16	20		26		99	17	15
#30	11		21		97	8	7
#40	7		19		96	5	5
#50	5		17		95	3	3
#60	4		16		95	3	2
#80	3		14		94	2	2
#100	3		13		94	2	1
Silt/Clay #200	2.2		10.9		89.2	0.9	0.9
Hydro 0.02							
0.005							
0.002							
0.001							
LIQUID LIMIT	NV		NV		30	NV	NV
PLASTIC INDEX	NP		NP		4	NP	NP
USCS CLASSIFICATION	GP		GP-GM		ML	GP	GP
USCS SOIL DESCRIPTION	PGGr w/Sa	PGGr w/Sa	PGGr w/Si&Sa	Si	Si	PGGr w/Sa	PGGr w/Sa
NATURAL MOISTURE		5.6		33.8			
ORGANICS							
SP. GR. (FINE)	2.75						
SP. GR. (COARSE)	2.71					2.70	
MAX. DRY DENSITY	140.1						
OPTIMUM MOISTURE	6.8						
L.A. ABRASION						18	
DEGRAD. FACTOR						43	
SODIUM SULF. (CRSE)						4	
SODIUM SULF. (FINE)						4	
NORDIC ABRASION						22.5	
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						

COMPACTION REPORT

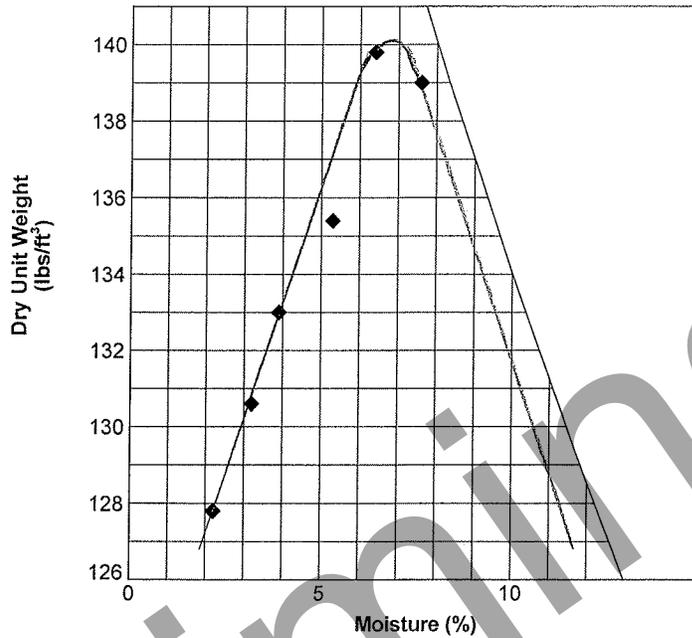
Lab Number: 07-4540

Project: Parks Hwy MP 194 Broad Pass RR Overcrossing

Test Hole: 07-1627

Material Site: CENTERLINE

MOISTURE / DENSITY RELATIONSHIP



NOTE: The upper right portion of the graph may be clipped at the ZAV.

Dry Unit Wt	1	2	3	4	5	6
lbs/ft ³	127.8	130.6	133.0	135.4	139.8	139.0
kg/m ³	2047	2092	2130	2169	2239	2227
% Moisture	2.2	3.2	3.9	5.3	6.4	7.6

REMARKS:

ASTM D-1557 AASHTO T-180D	Regional Lab.		Field
	lbs/ft ³	kg/m ³	
Max. Density	140.1		
Opt. Moisture	6.8		

Signature: T.K.
 Tonya Knopke
 Regional Lab Supervisor
 Date: 1/22/08

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

PROJECT NAME: Parks Hwy MP 194 Broad Pass RR Overcrossing
 PROJECT NUMBER: REH-HHE-0A4-3(16)
 AKSAS NUMBER: 61277
 SAMPLED BY: M. DARROW
 MATERIAL SOURCE: MS 35-4-042-2

TEST HOLE NUMBER	07-1633						
DEPTH (feet)	6.5-7.5						
LATITUDE	N63.12042°						
LONGITUDE	W149.46002°						
LAB NUMBER	07-4547						
DATE SAMPLED	3-Aug-07						
% Passing	3"						
	2"						
	1.5"						
Gravel	1.0"						
	0.75"						
	0.5"						
	0.375"						
	#4						
	#8						
	#10						
	#16						
Sand	#30						
	#40						
	#50						
	#60						
	#80						
	#100						
Silt/Clay	#200						
	0.02						
Hydro	0.005						
	0.002						
	0.001						
LIQUID LIMIT							
PLASTIC INDEX							
USCS CLASSIFICATION							
USCS SOIL DESCRIPTION	PGGr w/Sa						
NATURAL MOISTURE	4.2						
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. 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: Parks Hwy MP 194 Broad Pass Railroad Overcrossing
 PROJECT NUMBER: REH-HHE-0A4-3(16)
 AKSAS NUMBER: 61277
 SAMPLED BY: G. Brazo
 SOURCE: MS 35-4-042-2

These samples were originally taken for the following project:
 Parks Highway, rehabilitation and resurfacing, Little Coal Creek
 to the Middle Fork of the Chulitna River,
 I-R-0A4-3(2), A-46732

TEST HOLE NO.	84-06	84-08	84-09	84-11	84-13		
DEPTH (feet)	4.0-7.0	11.0-13.0	4.0-7.0	5.0-8.0	5.0-7.0		
LATITUDE							
LONGITUDE							
LAB NO.	84-2650	84-2651	84-2652	84-2653	84-2654		
DATE SAMPLED	19-Jun-84	19-Jun-84	19-Jun-84	19-Jun-84	20-Jun-84		
% Passing							
3"	100	100	100	100	100		
2"	85	88	91	91	89		
1.0"	70	67	78	72	72		
Gravel							
0.75"	65	61	72	66	66		
0.5"	57	52	61	58	57		
0.375"	52	46	54	52	52		
#4	41	35	39	40	39		
Sand							
#10	30	24	27	29	28		
#40	10	8	7	12	12		
#50							
#100	5	5	2	4	5		
Silt/Clay							
#200	3	4	1	2	3		
0.02							
Hydro							
0.005							
0.002							
LIQUID LIMIT	NV	NV	NV	NV	NV		
PLASTIC INDEX	NP	NP	NP	NP	NP		
AASHTO CLASSIFICATION	A-1-a	A-1-a	A-1-a	A-1-a	A-1-a		
SOIL DESCRIPTION	SaGr	SaGr	SaGr	SaGr	SaGr		
NATURAL MOISTURE		5.7			5.7		
ORGANICS							
SP.GR. (FINE)							
SP.GR. (COARSE)							
MAX DRY DENSITY							
OPTIMUM MOISTURE							
L.A. ABRASION	18						
DEGRADATION FACTOR			35				
SODIUM SULF. (CRSE)							
SODIUM SULF. (FINE)							

	10% +3"				4.1% +3"		
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REMARKS:
 Soil descriptions shown in parentheses are based on field determinations.
 Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

Selected references

- Bergstrom, T. and Darrow, M., 2005, Parks Highway MP 194 Broad Pass railroad overcrossing, federal project no. REH-0A4-3(16), state project no. 61277: Northern Region, Alaska Department of Transportation and Public Facilities, 40 p.
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- Saunders, R., 1971, Material source investigation, Cantwell to Hurricane Gulch paving, project no. F-035-4(1): Alaska Department of Highway, Materials Division, Engineering Geology Section, 27 p.
- Solie, D. N., 2000, Denali Highway MP 104 west rehabilitation, material sites supplement, federal project no. STP-RS-0750(6), state project no. 63392: Northern Region Technical Services – Geology, Alaska Department of Transportation and Public Facilities, 21 p.
- Staff, 2003, Alaska Geotechnical Report Preparation Guidelines: Alaska Department of Transportation and Public Facilities, 13 p.
- Wahrhaftig, C., 1965, Physiographic divisions of Alaska: U.S. Geological Survey Professional Paper 482, 52 p., 6 pl.

Appendix A:

Symbols and definitions

Textural soils descriptions

AASHTO soils classification

USCS soils classification

Frozen soil classification

SYMBOLS AND DEFINITIONS

BASIC MATERIAL SYMBOLS

	ASPHALT
	ORGANICS (Org)
	CLAY (Cl)
	ICE
	SILT (Si)
	SAND (Sa)
	GRAVEL (Gr)
	ANGULAR FRAGMENTS (Ang Frags)
	COLLUVIUM (Coll) ***
	BEDROCK (Bx), soft(Type)
	BEDROCK (Bx), hard(Type)

TYPICAL LOG

YEAR LOGGED	88-69
STATION, OFFSET	Sta 210+53, Lt 3
ELEVATION	Elev 375
DATE LOGGED	16 JUN MONTH
WATER TABLE	* A.D. 24** BLOW COUNT PER FOOT
FROZEN	~25% PERCENT ICE
DEPTH (FEET)	~50% SHOWN
	~75%
	~100%
	SAMPLE INTERVAL
	STRATA CONTACT
	← COBBLE OR BOULDER (FROM AUGER REACTION)
POSSIBLY FROZEN	REFUSAL

* W.D.= WHILE DRILLING, A.D.= AFTER DRILLING
 ** "BLOW COUNT" INDICATES STANDARD PENETRATION TEST (1.4" I.D., 2.0" O.D. SAMPLER DRIVEN WITH 140 LB. HAMMER, 30" FREE FALL) "PER FOOT" IS SUM OF 2nd AND 3rd 6" OF PENETRATION.

PLAN VIEW SYMBOLS

	POWER AUGER TEST HOLE (T.H.)
	HAND AUGER TEST HOLE (T.H.)
	EXPOSED MATERIAL
	PROBE
	HAND DUG TEST PIT (T.P.)
	DOZER/BACKHOE TEST TRENCH (T.T.)
	BODY OF WATER
	FLOW DIRECTION
	WASTE BERM
	BANK
	SWAMP
	TREELINE

SOFT OR HARD BASED ON DRILLING RATE

NOTE

MAIN COMPONENT (UPPER CASE..SOLID LINES)
 MINOR COMPONENT (lower case..DASHED LINES)

*** MIXTURE OF ROCK FRAGMENTS IN SILT & SAND MATRIX

AASHTO SIZE DEFINITIONS

BOULDERS (Boulders)	12"+
COBBLES (Cobbles)	3" TO 12"
GRAVEL	#10 TO 3"
ANGULAR FRAGMENTS	#10 +
SAND	#200 TO #10
SILT	.002 mm TO #200
CLAY	MINUS .002 mm

TEST RESULTS

__% -200	= % PASSING
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
PI __	= PLASTIC INDEX(NP=non-plastic)

MISC.

Tr	= TRACE (0-6%)
sl	= SLIGHTLY
hi	= HIGHLY
w/_	= WITH UNSPECIFIED AMOUNT
X'tls	= CRYSTALS

DENSITY/CONSISTENCY DESCRIPTORS

Granular/Non-Cohesive		Clayery/Cohesive	
Relative Density	Blows/foot (N) value	Consistency	Blows/foot (N) value
Very Loose	0-4	Very Soft	0-1
Loose	5-10	Soft	2-4
Firm	11-20	Medium	5-8
Compact	21-35	Stiff	9-15
Dense	36-50	Very Stiff	16-30
Very Dense	51-70	Hard	31-60
Very Very Dense	71-more	Very Hard	61-more

COLOR

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

MOISTURE

dry	= < OPTIMUM*	
moist	~ OPTIMUM*	* OPTIMUM MOISTURE FOR MAXIMUM DENSITY
wet	= > OPTIMUM*	

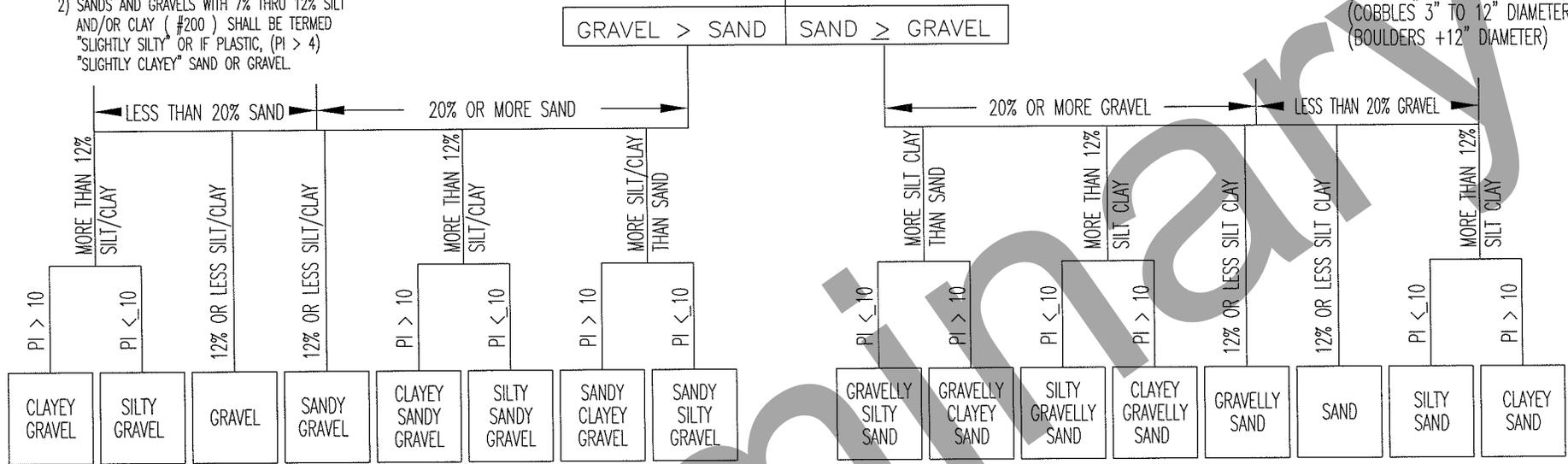
ALASKA DEPARTMENT OF TRANSPORTATION TEXTURAL SOIL DESCRIPTION

REV. APRIL 1998

- NOTES: 1) ALL SILTS WITH A PLASTIC INDEX > 4 SHALL BE TERMED "SLIGHTLY CLAYEY."
 2) SANDS AND GRAVELS WITH 7% THRU 12% SILT AND/OR CLAY (#200) SHALL BE TERMED "SLIGHTLY SILTY" OR IF PLASTIC, ($PI > 4$) "SLIGHTLY CLAYEY" SAND OR GRAVEL.

COARSE-GRAINED SOILS 35% OR LESS SILT/CLAY

(SILT/CLAY $< \#200$)
 (SAND $\#200$ TO $\#10$)
 (GRAVEL $\#10$ TO 3" DIAMETER)
 (COBBLES 3" TO 12" DIAMETER)
 (BOULDERS $+12$ " DIAMETER)



FINE-GRAINED SOILS MORE THAN 35% SILT/CLAY

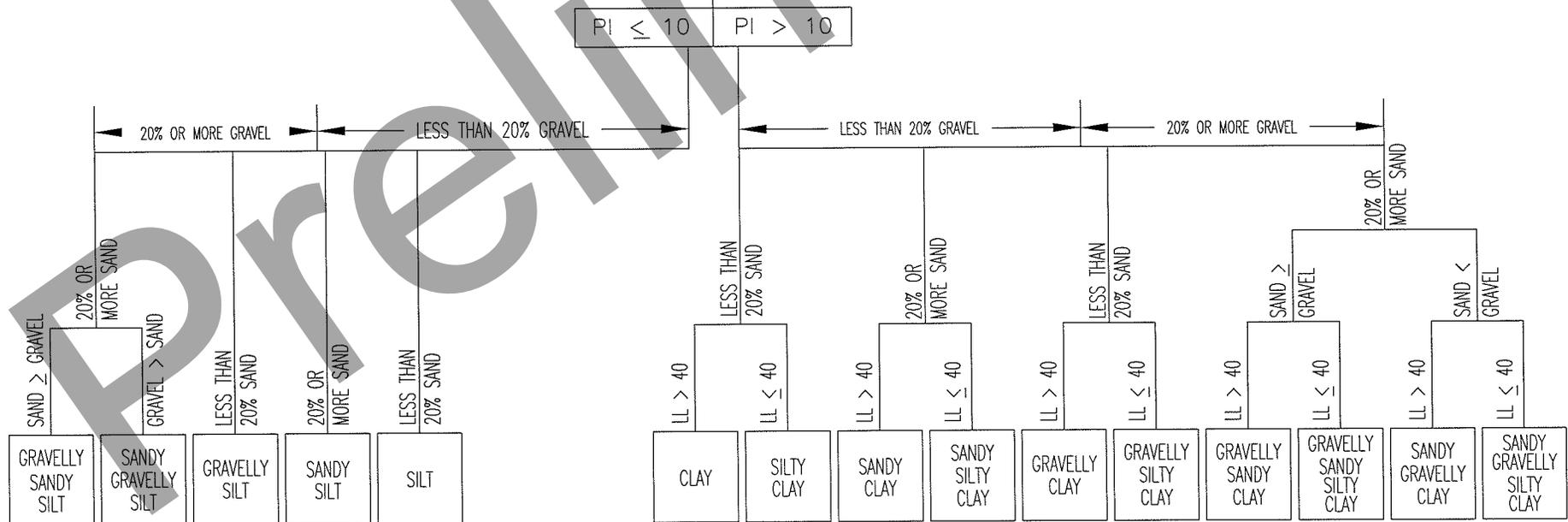


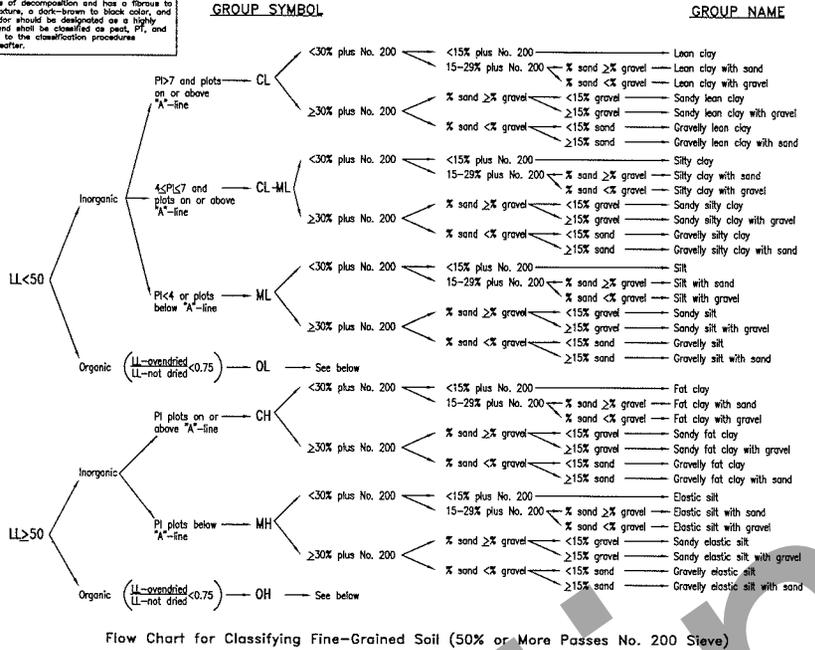
TABLE E-1. CLASSIFICATION OF SOILS AND SOIL AGGREGATE MIXTURES (AASHTO, 1991)

GENERAL CLASSIFICATION	GRANULAR MATERIALS (35% OR LESS PASSING 0.075 mm)							SILT-CLAY MATERIALS (MORE THAN 35% PASSING 0.075 mm)			
	A-1		A-3	A-2				A-4	A-5	A-6	A-7
GROUP CLASSIFICATION	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5
SIEVE ANALYSIS: % PASSING											
2.00 mm (No. 10)	50 MAX.	—	—	—	—	—	—	—	—	—	—
0.425 mm (No. 40)	30 MAX.	50 MAX.	51 MAX.	—	—	—	—	—	—	—	—
0.075 mm (No. 200)	15 MAX.	25 MAX.	10 MAX.	35 MAX.	35 MAX.	35 MAX.	35 MAX.	36 MIN.	36 MIN.	36 MIN.	36 MIN.
CHARACTERISTICS OF FRACTION PASSING 0.425 mm (No. 40)											
LIQUID LIMIT	—	—	—	40 MAX.	41 MIN.	40 MAX.	41 MIN.	40 MAX.	41 MIN.	40 MAX.	41 MIN.
PLASTICITY INDEX	6 MAX.	N.P.	N.P.	10 MAX.	10 MAX.	11 MIN.	11 MIN.	10 MAX.	10 MAX.	11 MIN.	11 MIN. ¹
USUAL TYPES OF SIGNIFICANT CONSTITUENT MATERIAL	STONE FRAGMENTS, GRAVEL, & SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS	
GENERAL RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR			

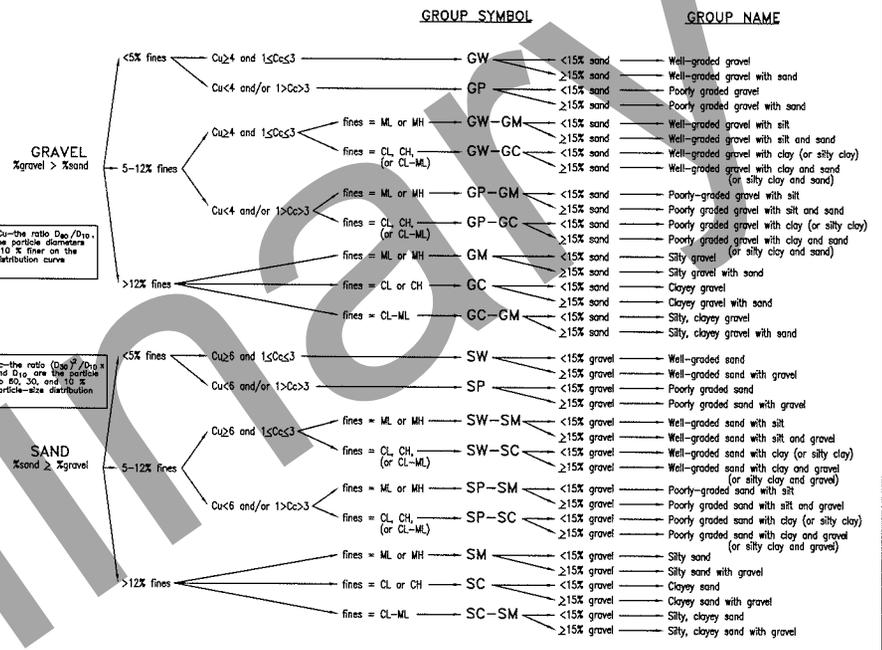
¹ PLASTICITY INDEX OF A-7-5 SUBGROUP IS EQUAL TO OR LESS THAN LL MINUS 30.
 PLASTICITY INDEX OF A-7-6 SUBGROUP IS GREATER THAN LL MINUS 30.

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

A sample composed primarily of vegetable tissue in various stages of decomposition and has a fibrous to amorphous texture, a dark-brown to black color, and an organic odor should be designated as a highly organic soil and shall be classified as peat, Pt, and not subjected to the classification procedures described hereafter.



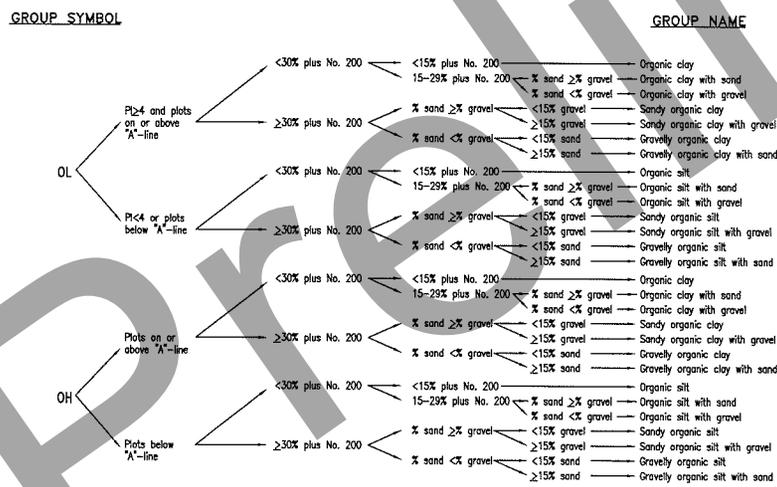
Flow Chart for Classifying Fine-Grained Soil (50% or More Passes No. 200 Sieve)



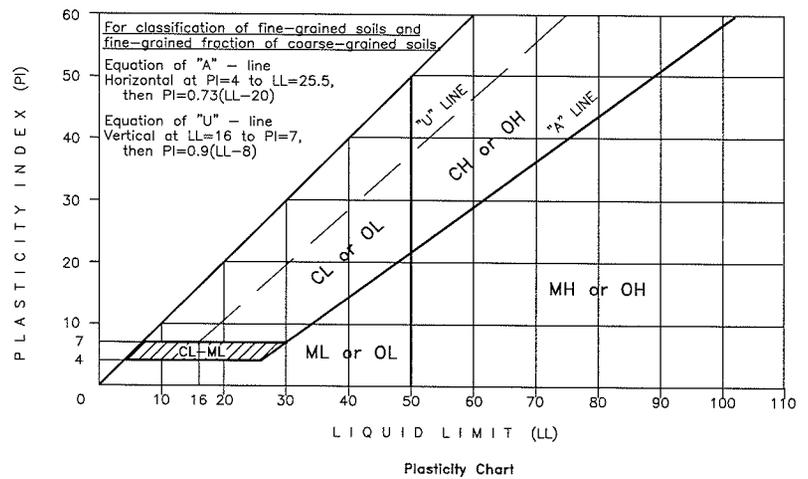
Coefficient of Uniformity, U_u - the ratio D_{60}/D_{10} , where D_{60} and D_{10} are the particle diameters corresponding to 60 and 10 % finer on the cumulative particle-size distribution curve respectively.

Coefficient of Curvature, C_c - the ratio $(D_{30})^2 / (D_{10} \cdot D_{60})$, where D_{30} , D_{60} , and D_{10} are the particle diameters corresponding to 30, 60, and 10 % finer on the cumulative particle-size distribution curve respectively.

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



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



Description and Classification of Frozen Soils (After ASTM D4083)

DESCRIPTION AND CLASSIFICATION OF FROZEN SOILS											
Part I Description of Soil Phase (a) (Independent of Frozen State)	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	Usually Thaw-Unstable	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. 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.		
			No excess ice	n						Well Bonded	Nb
Part III Description of Substantial Ice Strata	Ice (Greater than 1 inch in thickness)	Ice	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 } Estimate volume of visible segregated ice present as percent of total sample volume	Hardness Structure Color Admixtures Hard Clear e.g.: e.g.: Soft Cloudy Color- Contains (mass, Porous less Thin Silt not indi- Canded Gray Inclusions crystals) Granular Blue Stratified	Usually Thaw-Unstable	Usually Thaw-Unstable	In permafrost areas, ice wedges, pockets, veins, or other ice bodies may be found whose mode of origin is different from that described above. Such ice may be the result of long-time surface expansion and contraction phenomena or may be glacial or other ice which has been buried under a protective earth cover.		
			Ice coatings on particles	Vc						Ice with soil inclusions	Ice - Soil Type
			Random or irregularly oriented ice formations	Vr						Ice without soil inclusions	Ice
			Stratified or distinctly oriented ice formations	Vs							

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 Crystals 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. (a)

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.

Canded 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.

Preliminary

Appendix B:

Photographs of core boxes

MS 52-2-035-2

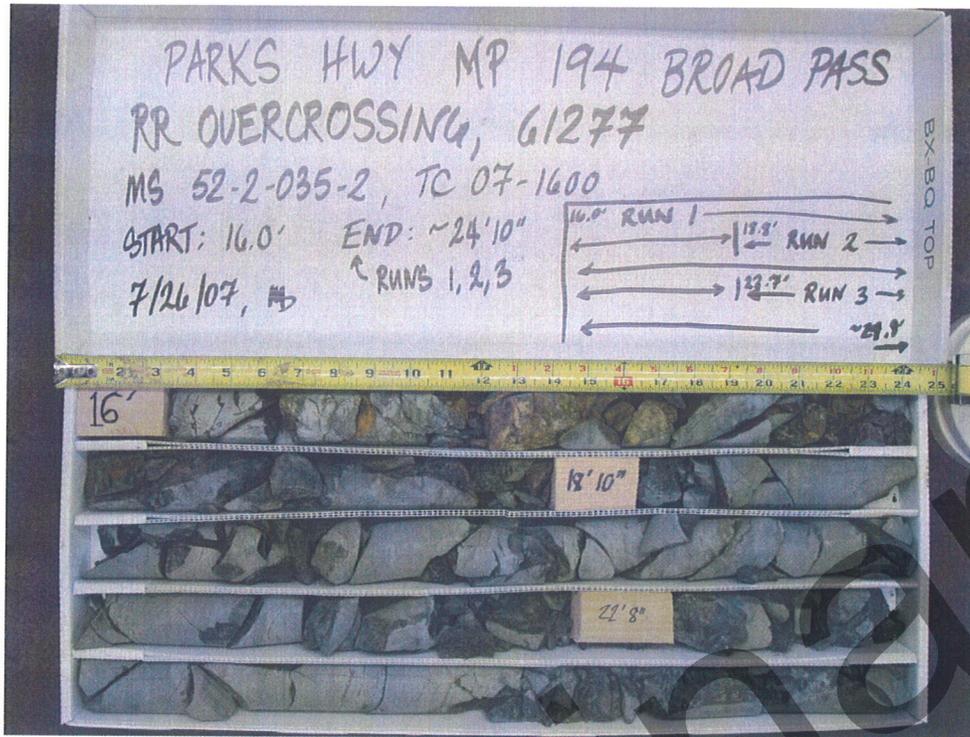


Figure B-1. Photograph of core taken from TC07-1600, in MS 52-2-035-2. Core in photograph was taken from between 16.0 ft and ~22.8 ft below the surface.



Figure B-2. Photograph of core taken from TC07-1600, in MS 52-2-035-2. Core in photograph was taken from between ~22.8 ft and 33.8 ft below the surface.

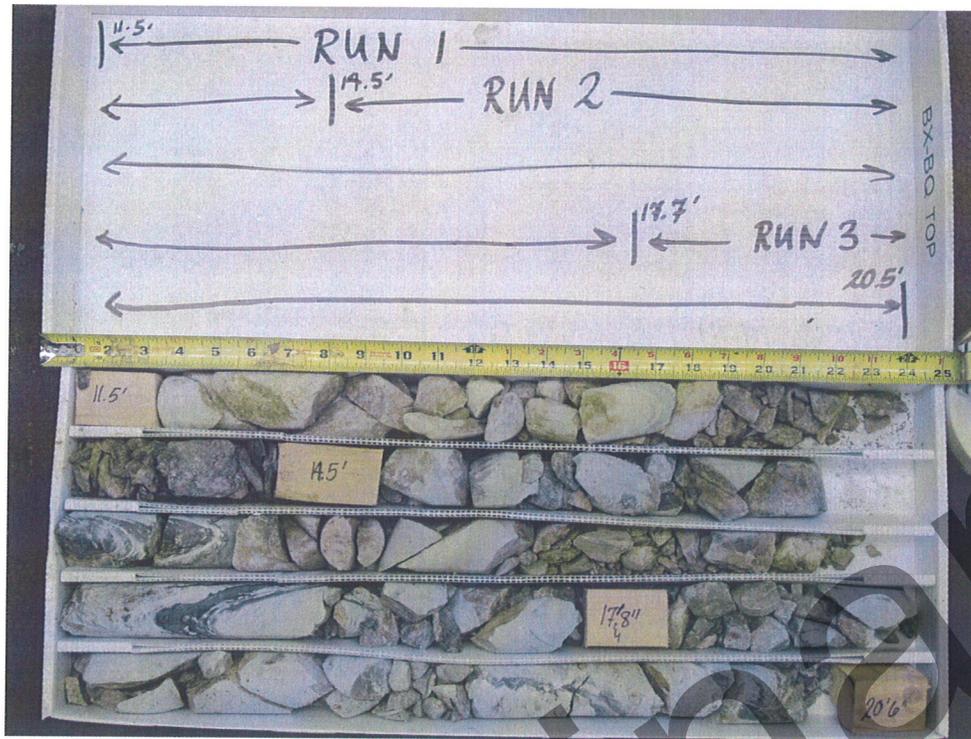


Figure B-3. Photograph of core taken from TC07-1601, in MS 52-2-035-2. Core in photograph was taken from between 11.5 ft and 20.5 ft below the surface.

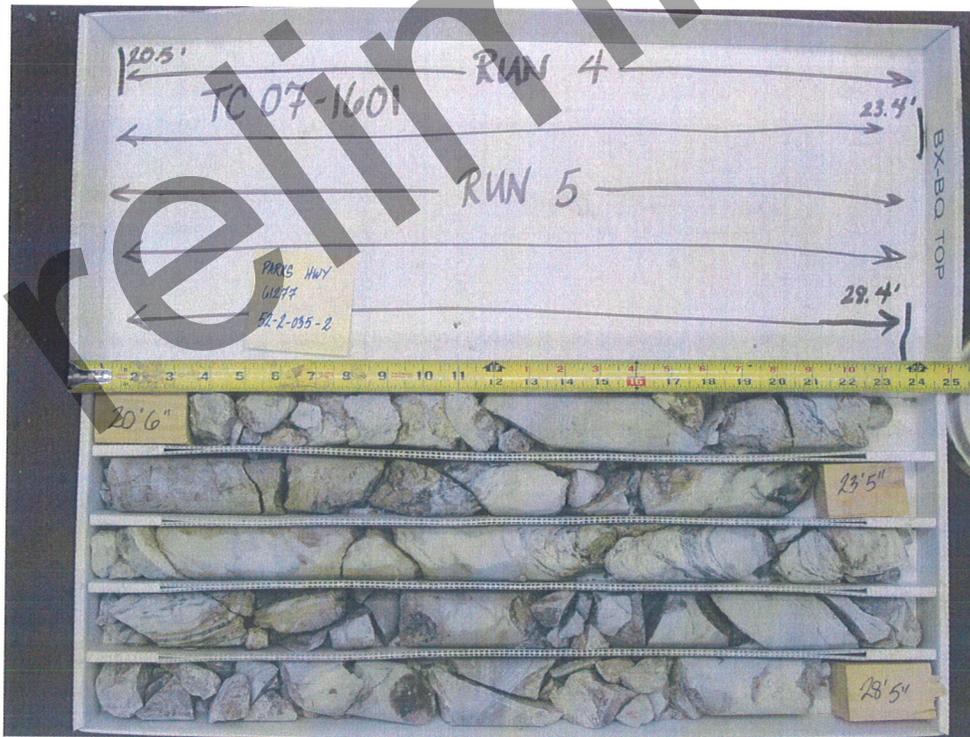


Figure B-4. Photograph of core taken from TC07-1601, in MS 52-2-035-2. Core in photograph was taken from between 20.5 ft and 28.4 ft below the surface.

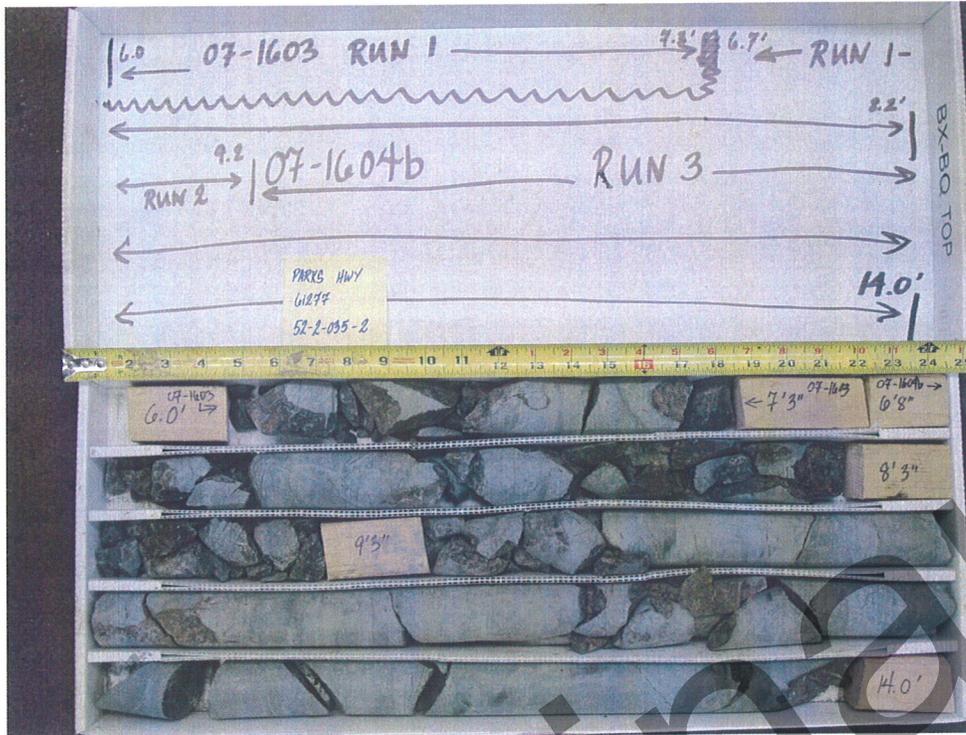


Figure B-5. Photograph of core taken from TC07-1603 and TC07-1604b, in MS 52-2-035-2. Core in photograph was taken from between 6.0 ft and 7.3 ft below the surface in TC07-1603, and between 6.7 ft and 14.0 ft below the surface in TC07-1604b.

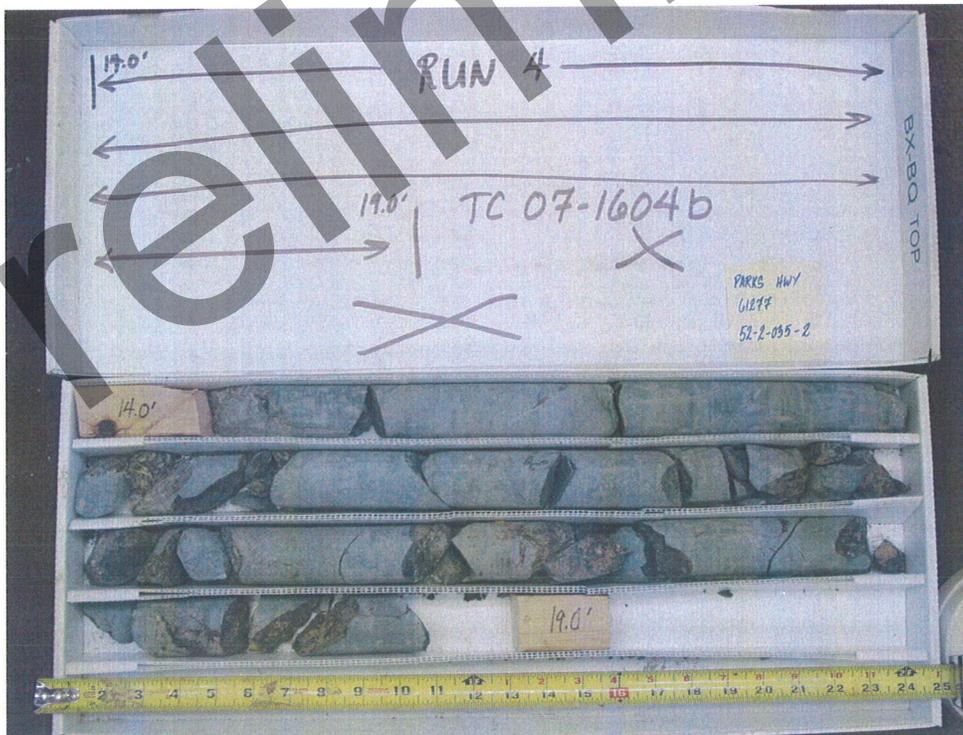


Figure B-6. Photograph of core taken from TC07-1604b, in MS 52-2-035-2. Core in photograph was taken from between 14.0 ft and 19.0 ft below the surface.