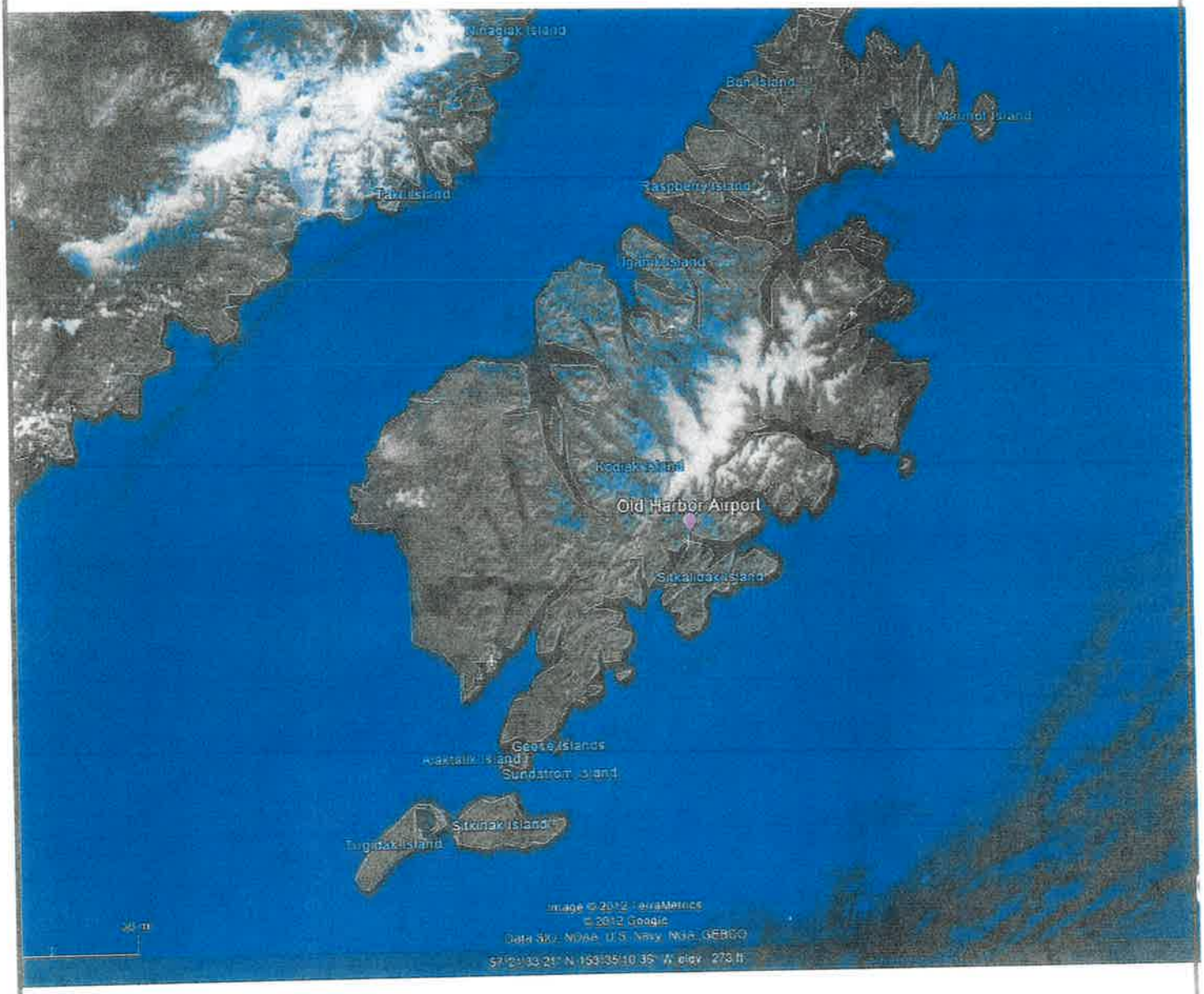


Location of Old Harbor Airport

File No: POA-1986-95

WATERWAY: Sitkalidak Strait

PROPOSED ACTIVITY: Cut slopes on both sides of existing airport runway to meet FAA 7:1 Transitional Surface

Sec. 21, T. 34S, R. 25W

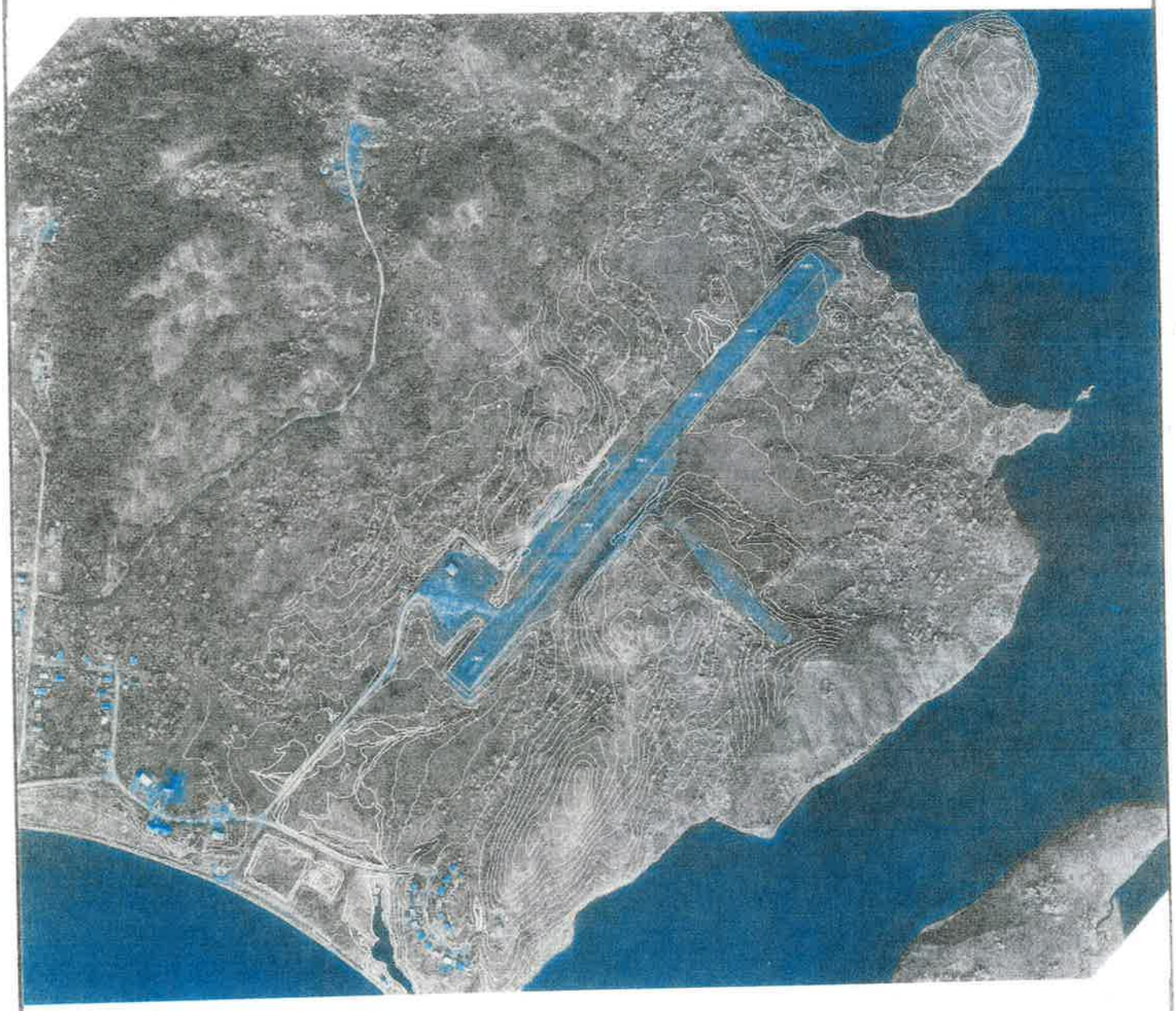
Lat: 57°13'8.98"N **Long: 153°16'5.95"W**

Date: 03/30/21012

Sheet _2_ of _13_

Project Vicinity Area

File No: POA-1986-95
WATERWAY: Sitkalidak Strait
PROPOSED ACTIVITY: Cut slopes on both sides of existing airport runway to meet FAA 7:1 Transitional Surface
Sec. 21, T. 34S, R. 25W
Lat: 57°13'8.98"N **Long: 153°16'5.95"W**
Sheet _3_ of _13_ **Date: 03/30/21012**



Project Vicinity Area

File No: POA-1986-95

WATERWAY: Sitkalidak Strait

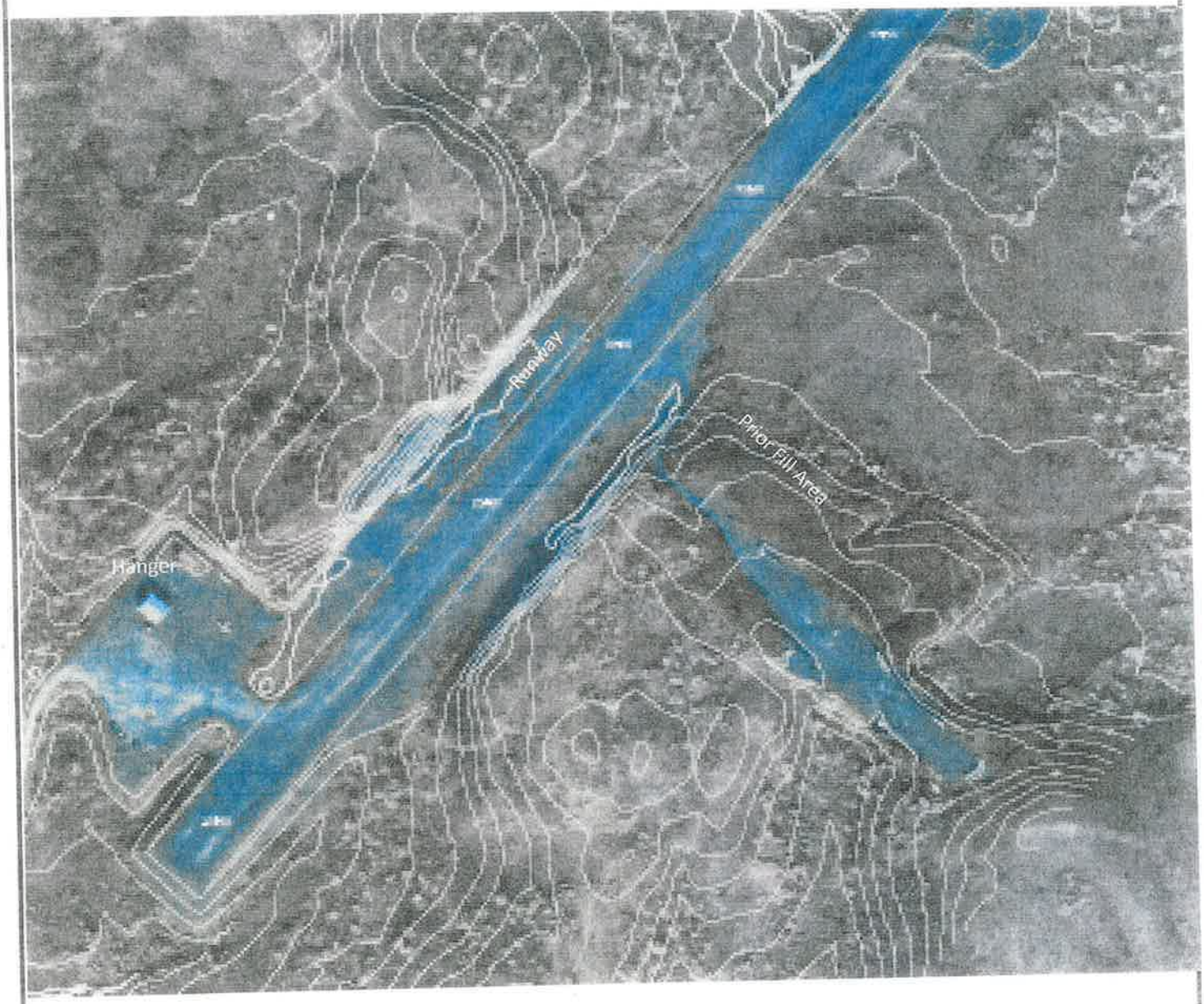
PROPOSED ACTIVITY: Cut slopes on both sides of existing airport runway to meet FAA 7:1 Transitional Surface

Sec. 21, T. 34S, R. 25W

Lat: 57°13'8.98"N Long: 153°16'5.95"W

Date: 03/30/21012

Sheet 4 of 13



General Work Areas

File No: POA-1986-95

WATERWAY: Sitkalidak Strait

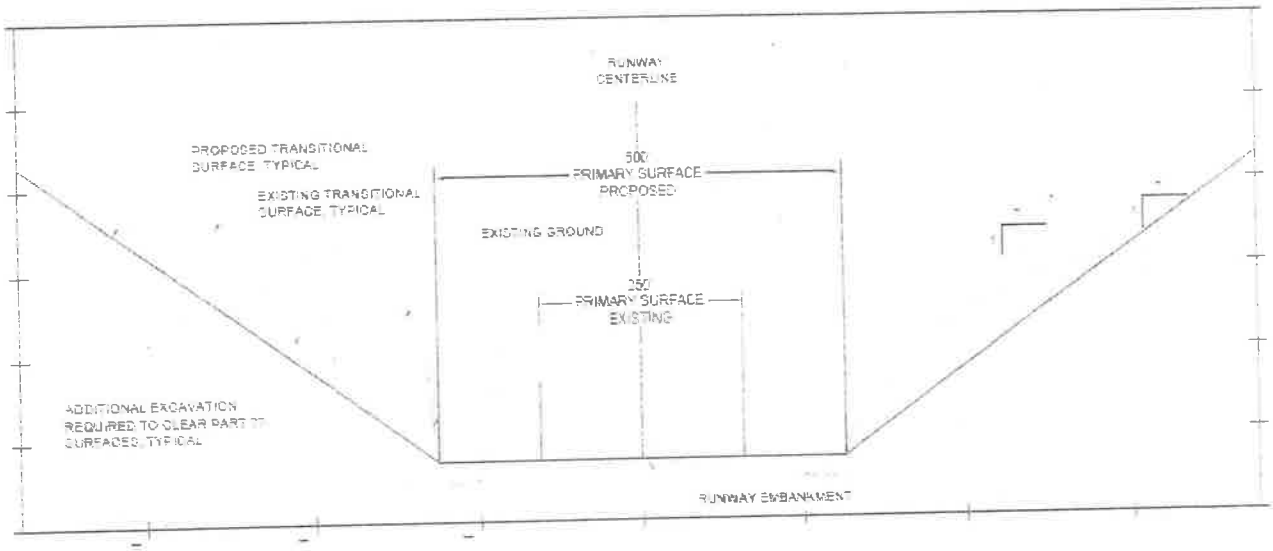
PROPOSED ACTIVITY: Cut slopes on both sides of existing airport runway to meet FAA 7:1 Transitional Surface

Sec. 21, T. 34S, R. 25W

Lat: 57°13'8.98"N Long: 153°16'5.95"W

Date: 03/30/21012

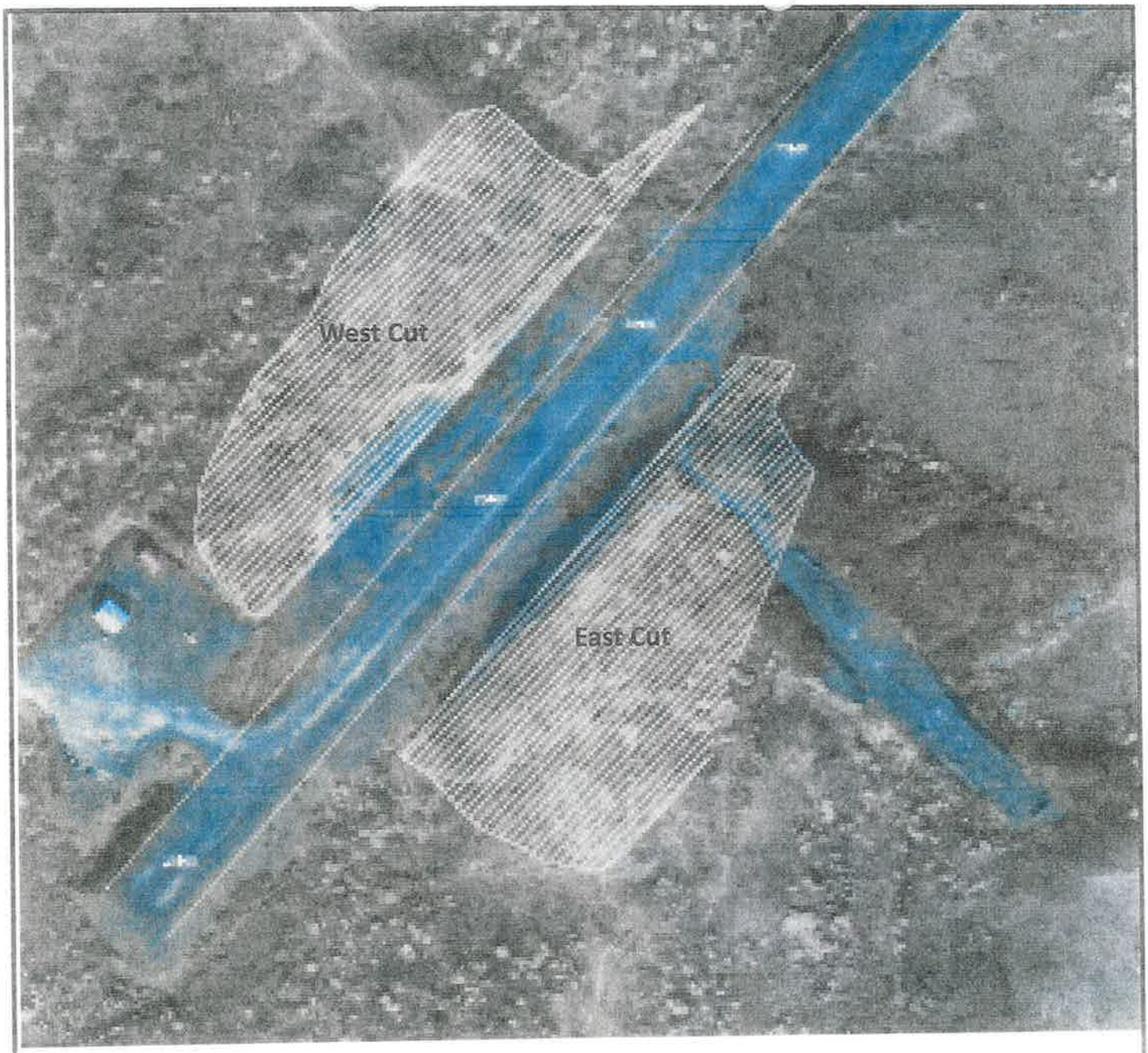
Sheet _5_ of _13_



FAR PART 77 TYPICAL SECTION

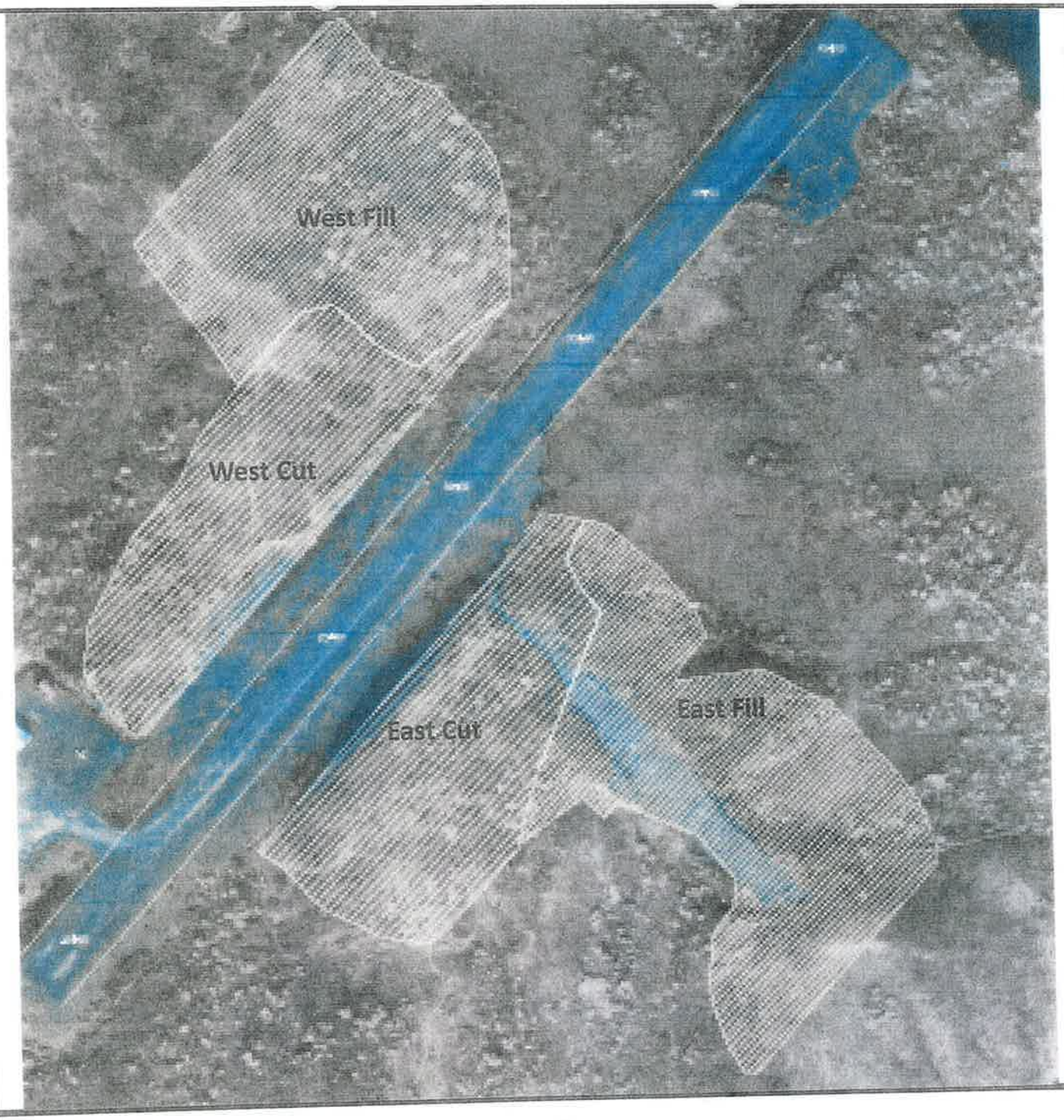
Typical Cross Section

File No: POA-1986-95
WATERWAY: Sitkalidak Strait
PROPOSED ACTIVITY: Cut slopes on both sides of existing airport runway to meet FAA 7:1 Transitional Surface
Sec. 21, T. 34S, R. 25W
Lat: 57°13'8.98"N **Long: 153°16'5.95"W**
Date: 03/30/21012
Sheet _6_ of _13_



Cut Areas

File No: POA-1986-95
WATERWAY: Sitkalidak Strait
PROPOSED ACTIVITY: Cut slopes on both sides of existing airport runway to meet FAA 7:1 Transitional Surface
Sec. 21, T. 34S, R. 25W
Lat: 57°13'8.98"N **Long: 153°16'5.95"W**
Sheet _7_ of _13_ **Date: 03/30/21012**



Cut and Fill Areas

File No: POA-1986-95

WATERWAY: Sitkalidak Strait

PROPOSED ACTIVITY: Cut slopes on both sides of existing airport runway to meet FAA 7:1 Transitional Surface

Sec. 21, T. 34S, R. 25W

Lat: 57°13'8.98"N Long: 153°16'5.95"W

Date: 03/30/21012

Sheet _8_ of _13_

Fill Areas

File No: POA-1986-95

WATERWAY: Sitkalidak Strait

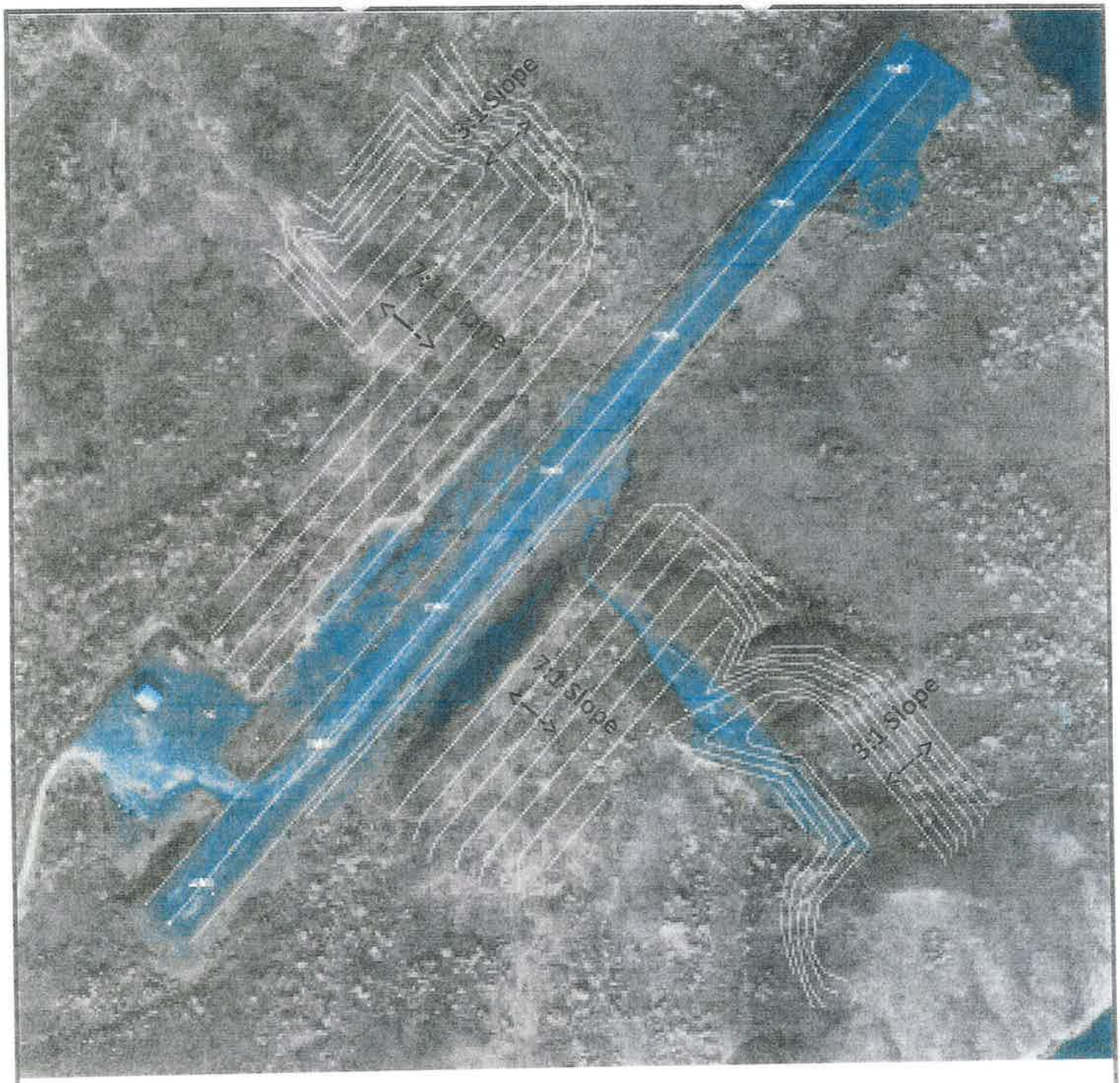
PROPOSED ACTIVITY: Cut slopes on both sides of existing airport runway to meet FAA 7:1 Transitional Surface

Sec. 21, T. 34S, R. 25W

Lat: 57°13'8.98"N Long: 153°16'5.95"W

Date: 03/30/21012

Sheet _9_ of _13_



Proposed 10 Foot Contours (Runway is at Elev. ≈ 55)

File No: POA-1986-95

WATERWAY: Sitkalidak Strait

PROPOSED ACTIVITY: Cut slopes on both sides of existing airport runway to meet FAA 7:1 Transitional Surface

Sec. 21, T. 34S, R. 25W

Lat: 57°13'8.98"N Long: 153°16'5.95"W

Sheet _10_ of _13_ Date: 03/30/21012

Estimate of Cut and Fill Volumes

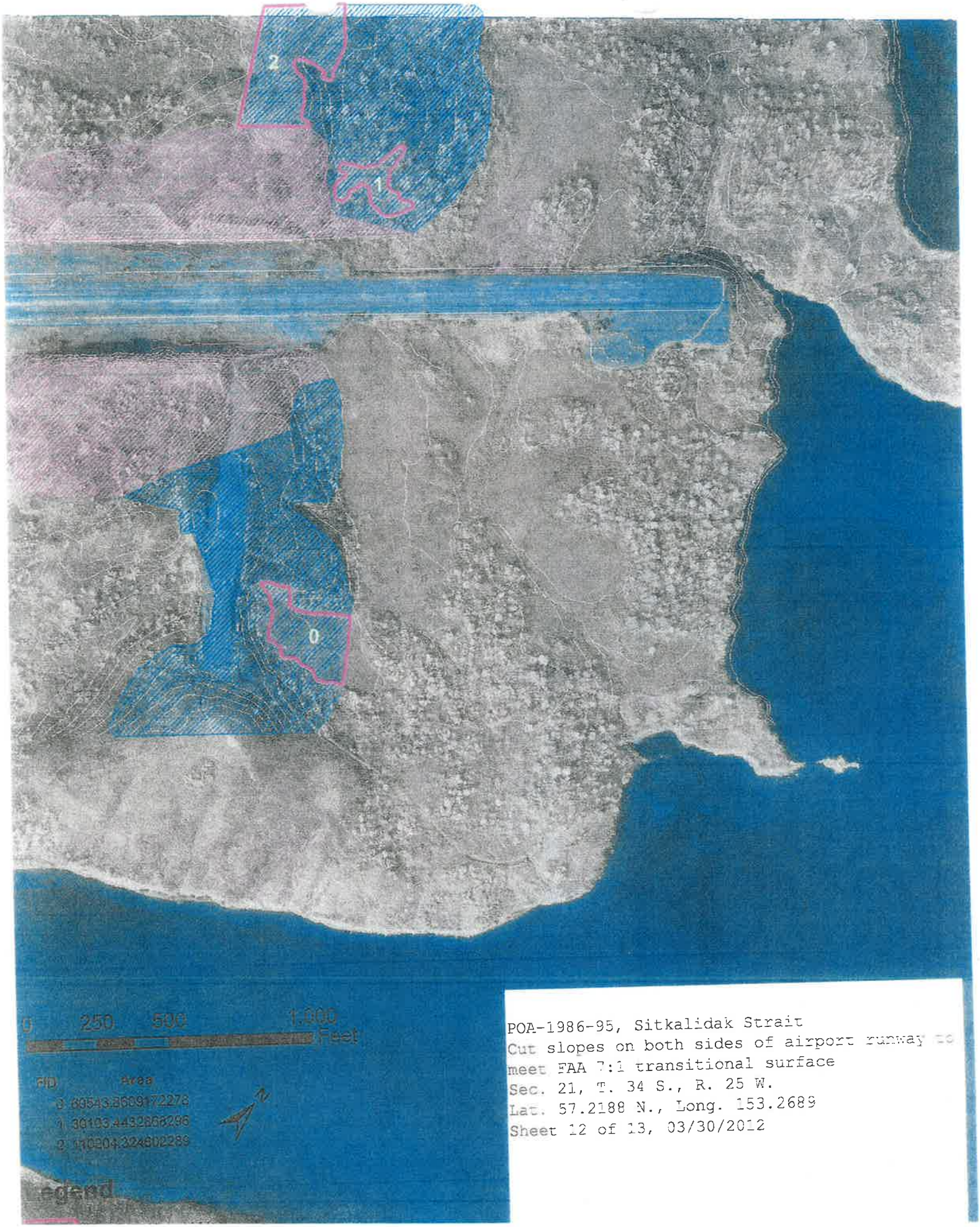
	West			East			Total		
	Cubic Yards Range (from/to)			Cubic Yards Range (from/to)			Cubic Yards Range (from/to)		
Over Bur-den	112,717	to	124,221	122,685	to	146,847	235,402	to	271,068
Rock	780,594	to	792,098	497,778	to	595,813	1,278,372	to	1,387,910
Total	**893,311**	to	916,319	**620,462**	to	**742,659**	**1,513,773**	to	1,658,978

Estimate of Cut and Fill Areas

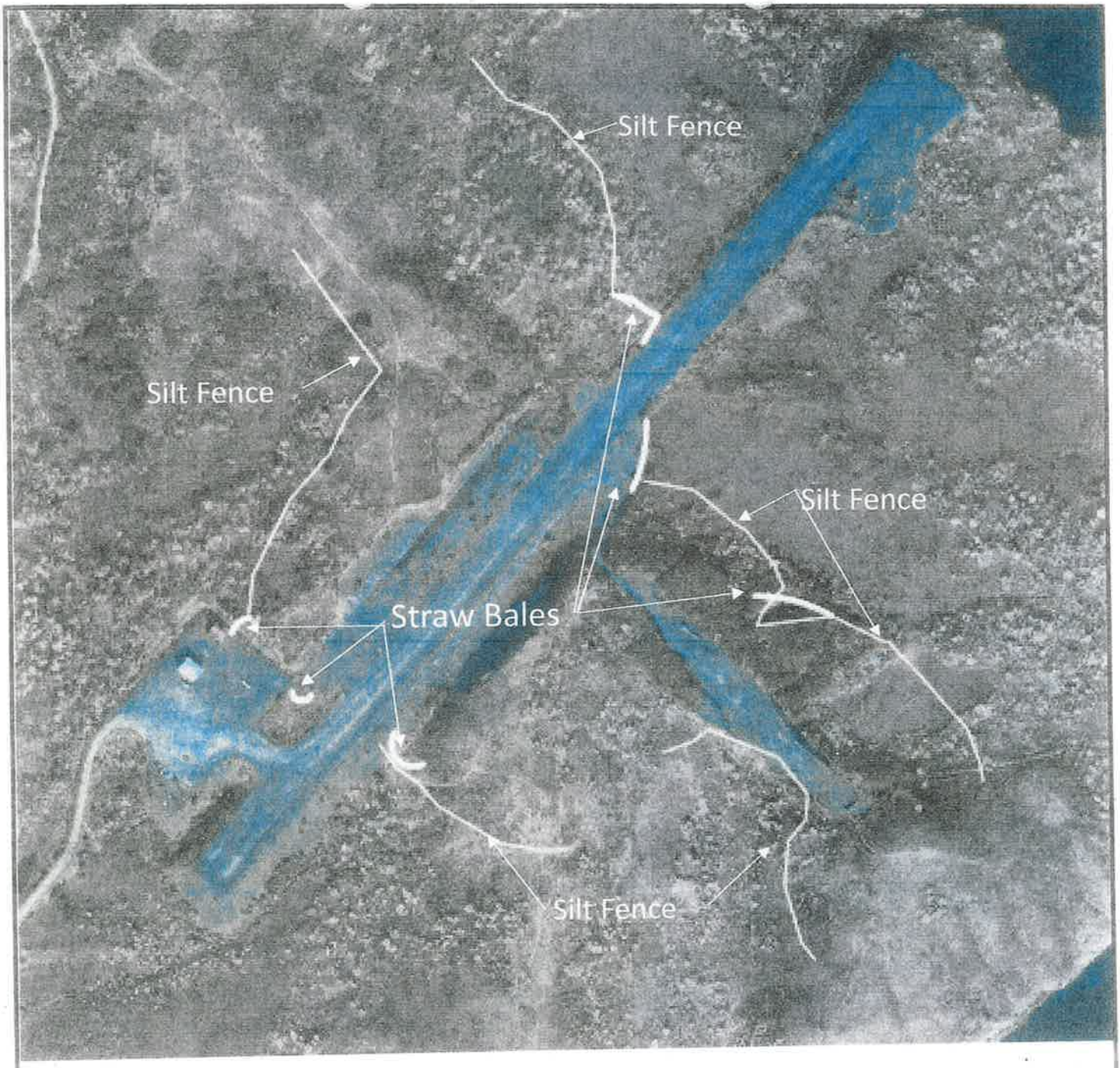
	Cut Area		Fill Area		Total Area	
	Square Feet	Acres	Square Feet	Acres	Square Feet	Acres
West	418,044	9.60	546,606	12.55	964,650	22.15
East	455,012	10.45	463,526	10.64	918,538	21.09
Total	**873,056**	**20.04**	**1,010,132**	**23.19**	**1,883,188**	43.23

Cut and Fill Estimates

File No: POA-1986-95
WATERWAY: Sitkalidak Strait
PROPOSED ACTIVITY: Cut slopes on both sides of existing airport runway to meet FAA 7:1 Transitional Surface
Sec. 21, T. 34S, R. 25W
Lat: 57°13'8.98"N **Long: 153°16'5.95"W**
Date: 03/30/21012
Sheet 11 of 13



POA-1986-95, Sitkalidak Strait
Cut slopes on both sides of airport runway to
meet FAA 7:1 transitional surface
Sec. 21, T. 34 S., R. 25 W.
Lat. 57.2188 N., Long. 153.2689
Sheet 12 of 13, 03/30/2012



Preliminary Erosion Control Plan

File No: POA-1986-95
WATERWAY: Sitkalidak Strait
PROPOSED ACTIVITY: Cut slopes on both sides of existing airport runway to meet FAA 7:1 Transitional Surface
Sec. 21, T. 34S, R. 25W
Lat: 57°13'8.98"N **Long: 153°16'5.95"W**
Sheet _13_ of _13_ **Date: 03/30/21012**

LAND USE AGREEMENT REGARDING ENTRY ONTO

OLD HARBOR AIRPORT

This access agreement is entered into by and between the State of Alaska, Department of Transportation and Public Facilities, hereinafter referred to as the "State", and the City of Old Harbor, hereinafter referred to as "Old Harbor", for the purpose of entering onto the Old Harbor Airport property owned by the State, in order to perform work on the Old Harbor Runway Extension Project (hereinafter referred to as "the Project".)

It is understood by the State and by Old Harbor that this agreement is subject to the following conditions:

1. Old Harbor may allow contractors, subcontractors, voluntary workers and specifically members of the Innovative Readiness Training team of the Department of Defense to participate in the Project as agents of Old Harbor;

2. If the State determines it is not in the best interests of the State to permit access to the airport property, or if the Project, or access to the Project, interferes with the present or future operations objectives of the State, the State reserves the right to cancel this agreement with 30 days written notice to Old Harbor;

3. This agreement grants only Old Harbor and its agents access to the property and is not transferable;

4. Old Harbor agrees to protect, indemnify and save harmless the State, its agents and employees, from and against all claims, demands, suits, liability and expense, by reason of loss or damage to any property or bodily injury to any person whatsoever that may arise from Old Harbor or its' agents activities arising from the Project .

Marc A. Luiken
Commissioner, Alaska Department of
Transportation and Public Facilities

Date: 26 July 12

For the City of Old Harbor

Date:

DRAFT SUBMITTAL

GEOTECHNICAL INVESTIGATION REPORT

AIRPORT RUNWAY EXTENSION

OLD HARBOR, ALASKA

Prepared for:

Shearwater Systems, LLC
215B Main Street
Milford, Ohio 45150

Prepared by:

R&M CONSULTANTS, INC.
9101 Vanguard Drive
Anchorage, Alaska 99507

January 4, 2013

GEOTECHNICAL INVESTIGATION

AIRPORT RUNWAY EXTENSION
OLD HARBOR, ALASKA

This report presents the results of R&M Consultants' geotechnical investigation which is to be used for planning and design of the proposed runway improvements in Old Harbor, Alaska. This report includes both factual and interpretative information, and is intended solely for use by Shearwater Systems, LLC and its design consultants; and presuming the reader possesses a basic understanding of physical geology, and geotechnical principals.

R&M Consultants, Inc. has performed this work in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions. No warranty, express or implied, beyond exercise of reasonable care and professional diligence, is made.

BRIAN M. MULLEN, E.I.T.
Staff Geotechnical Engineer

ROBERT M. PINTNER, P.E.
Senior Geotechnical Engineer

REVIEWED BY:

CHARLES H. RIDDLE, C.P.G.
Senior Vice President

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APPENDIX E – ROCK CORE PHOTOGRAPHS

LIST OF ABBREVIATIONS AND ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
AFI	Air Freezing Index
ASTM	American Society for Testing and Materials
ATM	Alaska Test Methods
DOT&PF	Department of Transportation and Public Facilities (Alaska)
°F	Degree Fahrenheit
ft.	Feet
GPS	Global Positioning System
I.D.	Inside Diameter
in.	Inch
No.	Number
NP	Non-plastic
P200	Percent passing the No. 200 sieve
RQD	Rock Quality Designation
R&M	R&M Consultants, Inc.
Shearwater	Shearwater Sytems, LLC
SPT	Standard Penetration Test
WSO	Weather Station Office
%	Percent
°	Degree
2:1	Horizontal to Vertical

GEOTECHNICAL INVESTIGATION

AIRPORT RUNWAY EXTENSION
OLD HARBOR, ALASKA

1.0 INTRODUCTION

1.1 Background

The City of Old Harbor, Alaska is planning an expansion of the existing airport runway (Figure 1). Shearwater Systems, LLC, (Shearwater) an Old Harbor Company, contracted R&M Consultants, Inc. (R&M) to provide geotechnical services associated with the project. This report summarizes the results of that geotechnical investigation.

1.2 Contract Authorization

This study has been conducted under the terms of the Work Authorization Agreement between Shearwater and R&M, dated August 29, 2012.

1.3 Scope-of-Work

This effort involved a geotechnical investigation consisting of assessing soil and bedrock conditions, for the proposed runway extension. The investigation included the following:

- Obtaining permits for the drilling program from the Alaska Department of Fish and Game, and the U.S. Army Corps of Engineers.
- Drilling a total of six boreholes in the area of proposed cutslopes to the north and south of the runway.
- Drilling ten boreholes in the proposed runway extension area. Two of these boreholes were drilled offshore in the intertidal zone.
- Laboratory index testing to characterize the soil and bedrock conditions.
- Reporting results of this investigation.

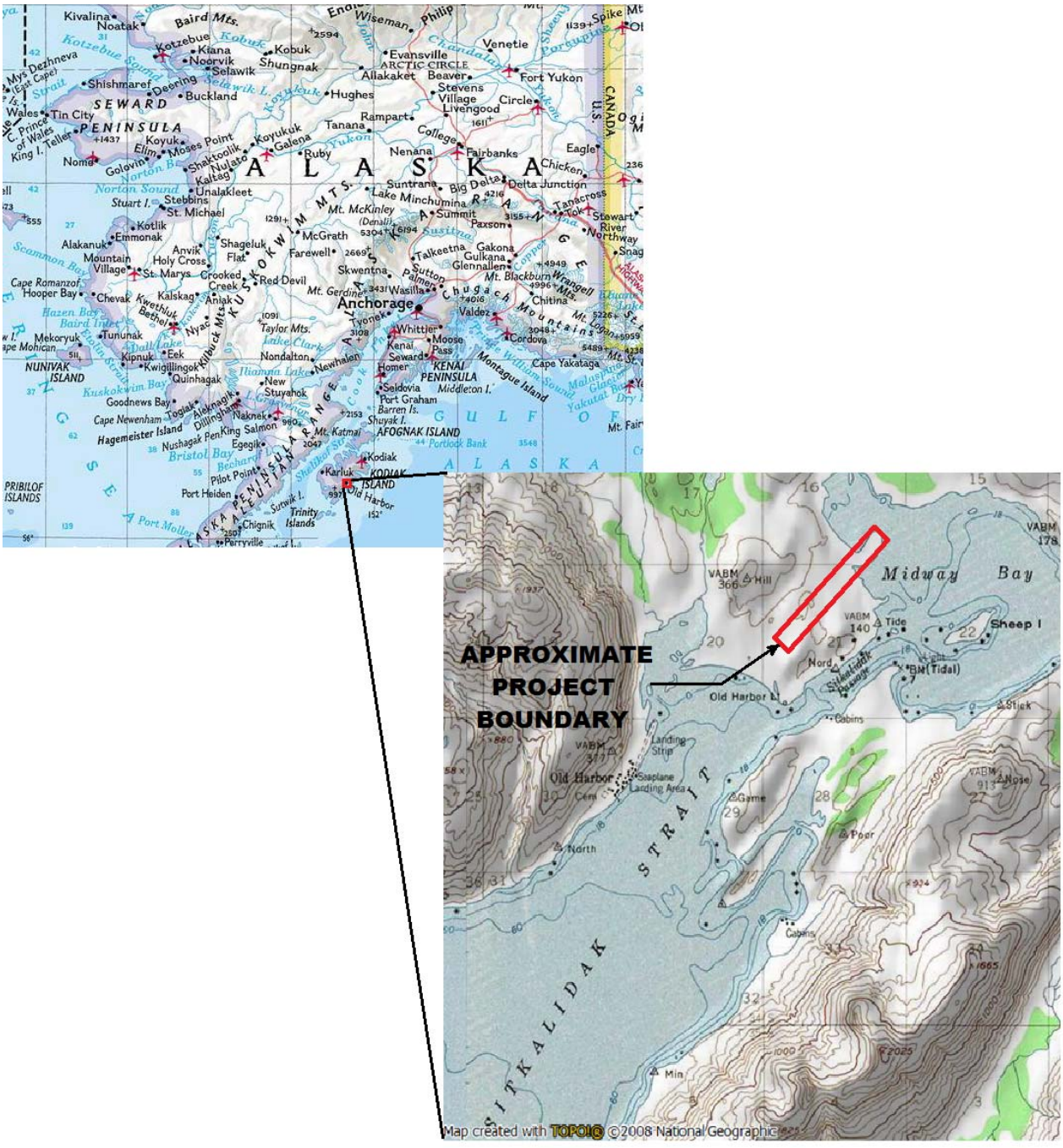
1.4 Proposed Development

We understand the proposed improvements will include:

- Extending the existing runway to the northeast (approximately 2,000 feet) onto the undeveloped peninsula and intertidal mudflat areas
- Blasting and excavating the rock cuts adjacent to the existing runway to provide a 7:1 (H:V) cutslope away from the runway surface
- Diverting the drainage directly north of the existing runway around the proposed runway extension fill area

An overview of the project area is presented as Drawing A-01, within Appendix A.

Figure 1 – Project Location Map



1.5 Previous Geotechnical Investigation

In 1984, the Alaska Department of Transportation and Public Facilities (DOT&PF) performed a geotechnical investigation for the relocation of the Old Harbor Airport to the current location, with investigation boundaries roughly paralleling the current project area. The investigation included the digging of 11 test pits to bedrock refusal and 81 test borings to various depths. The logs were included in a report dated August 1992 (DOT&PF, 1992). Logs, a site map, and laboratory testing results from this report have been referenced to support our interpretation of the geotechnical conditions in the area and are included as Appendix D.

2.0 METHODS

2.1 Boring Location Survey

Test boring locations RM12-01 through RM12-06 were surveyed by a Shearwater survey party using standard survey techniques. Test boring locations RM12-07 through RM12-16 were determined by the R&M geotechnical engineer using a Garmin 60CSx recreational grade GPS unit. The accuracy of recreational grade GPS units is limited to a maximum of about 15 feet. Elevations for boring locations RM12-07 through RM12-16 were extrapolated from the contour plan provided by Shearwater (OH Airport ext 4_09_2012-v.5.pdf) and are approximate. Approximate test boring locations are illustrated on Drawings A-02 and A-03 of Appendix A, Test Boring Location Maps. Logs of the R&M test borings are provided as Drawings B-01 through B-30, in Appendix B. A key to the test hole log general notes, and an example of a typical log are illustrated on Drawings C-01 and C-02 of Appendix C. Table 1 provides a summary of the test borings performed for the project.

Table 1 - Test Boring Summary

Location	Boring Method	ID	Surface Elevation (ft.)	Total Depth (ft.)	Bedrock Depth (ft.)	Bedrock Elevation (ft.)	Latitude*	Longitude*
Cutslope Investigation Area	Auger and Core Drilling	RM12-01	135	64.6	0	135	57.21769	-153.27297
		RM12-02	148	51.5	0	148	57.21871	-153.27245
		RM12-03	111	45.9	0	111	57.21848	-153.27122
		RM12-04	126	52.3	0	126	57.21580	-153.27048
		RM12-05	114	51.6	0	114	57.21667	-153.27056
		RM12-06	110	26.6	0	110	57.21671	-153.26943
Stream Diversion**	Auger Drilling	RM12-07	~ 35	30.3	16	~ 19	57.22288	-153.26435
Onshore Runway Extension Area**		RM12-08	~ 12	13.0	9	~ 3	57.22319	-153.26268
		RM12-09	~ 14	26.3	17	~ -3	57.22336	-153.26156
		RM12-10	~ 16	25.4	21	~ -5	57.22403	-153.26122
		RM12-11	~ 65	23.0	10	~ 55	57.22457	-153.25942
		RM12-12	~ 80	37.0	11	~ 69	57.22453	-153.25879
		RM12-13	~ 20	20.5	15	~ 5	57.22344	-153.26055
		RM12-14	~ 20	20.1	15	~ 5	57.22284	-153.26193
Offshore Runway Extension Area**		RM12-15	~ -1	14.5	11	~ -12	57.22195	-153.26239
		RM12-16	~ 0	20.4	16	~ -16	57.22368	-153.26206

*Coordinates are presented in WGS 84
**Elevations shown were extrapolated from provided contour maps and are approximate

2.2 Drilling Program

The field portion of the geotechnical subsurface investigation program consisted of drilling and logging a total of 16 test borings to depths of 13.0 to 64.6 feet. Six test borings were drilled in the cutslope investigation area (RM12-01 through RM12-06), eight test borings were drilled onshore within the runway extension area (RM12-07 through RM12-14), and two borings were drilled offshore within the runway extension area (RM12-15 and RM12-16). All field work was supervised by an experienced R&M geotechnical engineer who maintained logs of the borings and samples. Test borings were logged in accordance with standard engineering practices and the data obtained were utilized for geologic interpretations.

Soil and rock boring and sampling operations were performed on 23 October through 1 November, 2012 by Discovery Drilling, Inc. of Anchorage, using a track-mounted CME-850 drill rig. The borings were advanced using continuous flight, 8-inch hollow-stem auger. Grab samples of the surficial materials were obtained at each test boring location and disturbed samples were collected at depth using a split-spoon sampler. Modified penetration tests were performed in Test Borings RM12-01 through RM12-12. Standard penetration tests were performed in Test Borings RM12-13 through RM12-16. The standard penetration test was performed by driving a 1.4–inch inside-diameter (I.D.), split-spoon sampler a distance of 18 inches ahead of the auger using a 140-pound automatic drop-hammer falling 30 inches in accordance with ASTM D 1586. The modified penetration test is a variation of the standard penetration test and is often used to improve sample recovery volumes in coarse-grained soils. The modified penetration test was performed using a 2.5-inch I.D. split-spoon sampler advanced with a 340-pound automatic drop-hammer and a fall of 30 inches. The penetration resistance, defined as the number of blows required to drive the sampler the last 12 inches of an 18-inch interval, gives an indication of the in-place consistency of unfrozen soils. The blows for each 6-inch interval are recorded on the logs. Test Borings RM12-01 through RM12-06 were continued beyond auger or sampler refusal to reach proposed cutslope excavation depths using Nx-size double tube rock coring methods with wire-line barrel retrieval (ASTM D 2113). Discontinuity Reports detailing the occurrence and characteristics of breaks observed within the core are provided in Appendix B on Drawings B-32 through B-41.

All soils recovered in the field were visually described following ASTM D 2488 and sealed in double plastic bags. Rock core samples were logged in the field and packaged in plastic core boxes. All samples were returned to R&M's laboratory in Anchorage for further examination, testing and storage.

2.3 Laboratory Testing

Select samples were submitted for analysis at R&M's material testing laboratory in Anchorage. Samples were tested to measure key index properties for the purpose of classification following ASTM (2012) procedures:

- D 422 – Particle Size of Soils (Sieve and hydrometer);
- D 2216 – Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass;
- D 4318 – Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

Results of the soil tests are provided in Appendix B on Drawing B-31, Summary of Laboratory Soils Data. For clarification of soil unit call outs, Drawing C-03 defines the classification of soils for engineering purposes. Drawing C-04 provides further definition for the classification of soils with organic matter. Drawing C-05 describes the frost design soil classification used for this project. Rock core descriptors are provided as Drawings C-06 through C-07.

All rock core boxes were inspected and photographed in the laboratory under both wet and dry conditions. Select photographs of the rock core highlighting the observed rock conditions have been included within Section 4 of this report. A complete set of rock core photos are provided as Appendix E.

3.0 REGIONAL SETTING

3.1 Location

Old Harbor is located along Sitkalidak Strait on the west coast of Kodiak Island, Alaska, approximately 50 air miles southwest of the town of Kodiak. The airport is located on a peninsula of land between Sitkalidak Strait and Midway Bay (Figure 1).

3.2 General Geology

The project is located within the Kodiak Mountains portion of the Pacific Border Ranges Physiographic Province of Alaska (Wahrhaftig, 1965). The area is characterized by glaciated peaks with summit altitudes between 2,000 and 4,000 feet.

Bedrock over most of the island, including the Old Harbor area, is composed of Mesozoic-age argillite and graywacke variations, with the "backbone" of the island underlain by a granitic batholith. This portion of Southcentral Alaska was covered with glacial ice during glacial advances of late Pleistocene age (Coulter et al., 1965), as evidenced by local topography and soil stratigraphy. This region is considered to be generally free of permafrost except where isolated masses of permafrost may occur at high altitudes and in lowland areas where ground insulation is high, such as peat bogs and swamps (Ferrains, 1965).

Preliminary geologic mapping (an open-file report) has been published at a scale of 1:250,000 (1" = 4 miles) by the U.S. Geological Survey for Kodiak Island and vicinity (Moore, 1967). Although quite dated, Capps (1937) provides general geologic information for Kodiak Island and adjacent areas. Nokleberg, Plafker and Wilson (1994) present regional geology of South-central Alaska.

3.3 General Seismicity

Southcentral Alaska – including the Kodiak Island area – is located in an area of active seismicity caused by the subduction of the Pacific Plate of the earth's crust under the North American Plate. The line of contact between the two plates at the earth's surface is called the Megathrust Zone, which is topographically represented by the Aleutian Trench with an axis located approximately 100 to 125 miles southeast of Kodiak Island. The extension of the surface of contact between the two plates is termed the Benioff Zone, which is a planar contact zone between the subducted Pacific Plate and the overlying North American Plate. These two zones constitute the greatest source of seismicity in Southcentral Alaska, and events generated near the plate contact zone dominate seismic risk evaluations.

The collision of the North American and Pacific Plates produces compressive, counter clockwise, rotational forces in the North American Plate. These forces are accommodated (produce motion) in Southcentral Alaska along several active faults. The Contact Fault which trends northeast to southwest is present within 10 miles of the project (Moore, 1967). This fault is part of a major system which crosses the southeast coast of Kodiak Island (Plafker et al., 1994).

Estimated losses of private and public property at Old Harbor due to the effects of the 1964 Great Alaska Earthquake totaled $707,000 in replacement cost (Plafker and Kachadoorian, 1964). Local differential subsidence of unconsolidated beach deposits relative to nearby bedrock amounted to an estimated 1 to 2 feet at Old Harbor.

3.4 Climate

The regional climate of Kodiak Island is categorized as maritime, due to its close proximity to the Pacific Ocean. The weather is characterized by heavy precipitation, cool summers, and relatively warm winters (AEIDC, 1976). The mean annual air temperature at Kodiak is approximately 41°F, with an average annual air temperature variation of about 11.2°F. Mean annual precipitation is approximately 79.4 inches (including equivalent snow water content), with about 79.6 inches of snow. Strong surface winds generally persist year round. The prevailing winds are from the northwest, and the average annual wind speed is about 10.4 knots (WRCC). The design freezing index, or degree days below freezing, is about 1,800 degree days (Hartman and Johnson, 1984).

A summary of climatological data obtained from the Western Regional Climate Center for the Kodiak WSO Airport weather station is presented in Table 1. Additional data are available from other Kodiak recording stations but not referenced herein, as their shorter and/or less recent periods of record were considered less useful for analysis and design.

Table 2 - Climatological Data

Location (Station)	Kodiak WSO Airport
Period of Record (mm/yy)	01/73-12/10
Elevation (ft.)	20
Mean Annual Temperature (°F)	41.0
Mean Maximum Temperature (°F)	58.6
Mean Minimum Temperature (°F)	21.0
Record High Temperature (°F)	86.0
Record Low Temperature (°F)	-16.0
Mean Annual Precipitation (in.)	79.4
Maximum Monthly Precipitation (in.)	19.8 (Dec. 1985)
Mean Annual Snowfall (in.)	79.6
Maximum Monthly Snowfall (in.)	52.0 (Feb. 2002)

After http://www.wrcc.dri.edu/summary/Climsmak.html

4.0 INTERPRETED GEOTECHNICAL CONDITIONS

For the purpose of this report, the project area has been generalized into three units within the project area; cutslope investigation area, onshore extension area, offshore extension area.

4.1 Cutslope Investigation Area

Topography
The cutslope investigation area consisted of gentle to moderately sloping rolling hill topography bisected by a sharp rockcut constructed for the existing runway. The runway surface is oriented from the northeast to the southwest at an approximate elevation of 50 ft. and width of 330 ft. The existing rock cuts were approximately 1,000 ft. in length, rising 20 to 70 ft. away from the base of the cut at a steep to near vertical angle. The existing surface above the rock cuts had generally been heavily graded and excavated of soft weathered rock in preparation for the current project. Excess soil and rock fill materials produced during the construction of the existing runway were apparently stockpiled at the eastern extent of the southern rock cut, evidenced by the irregular surficial topography in this area.

Surface Drainage
Surface drainage generally consisted of sheet flow across the rock surface off of the rock cut or to low points above the rock cuts, where several shallow ponds were observed during the investigation.

Vegetative Cover
Generally, the cutslope investigation area had been cleared of vegetation.

Soils
The cutslope investigation area had been mostly cleared of native soils. The majority of the surface consisted of exposed weathered bedrock to a thin cover of rock pulverized by construction equipment.

Groundwater
Groundwater depth was not determined within the cutslope test borings. Perched water may be encountered, as several small ponds were observed within the cutslope investigation area.

Bedrock
Bedrock in the cutslopes was interpreted to consist of various grades of interbedded phyllite and graywacke, and appears highly folded and twisted. A well-developed foliation and associated cleavage was observed, trending near vertical. Generally, the rock in the area consisted of closely spaced dark gray phyllite bands and clasts within a gray, very fine-grained graywacke.

A moderately to highly weathered surficial rock unit, of variable thickness, was observed at each boring location in the cutslope area, with the exception of Test Boring RM12-02. This unit was generally interpreted to be a more weathered, soft, highly fractured phyllite. The gradation of the soft, surficial rock unit was tested using traditional sieve methods for soil materials (ASTM D 422) to determine the product material soil classification produced as a result of the breakdown of the weathered rock. The P200 values for this material ranged from 5.2 to 23 percent.

A less fractured, harder rock zone was observed at each boring location, generalized into two main rock units presented on the logs. The two rock units are based on the percentage of phyllite within the graywacke determined by visual inspection. Discontinuity reports detailing the occurrence and characteristics of breaks observed within the core are provided in Appendix B on Drawings B-32 through B-41. Selected photos of the rock core are provided as Figure 2. A complete set of rock core photographs is provided as Appendix E.

Phyllitic Graywacke: The phyllitic graywacke unit is interpreted as very fine sandstone with less than 50 percent by volume phyllite by visual examination. This rock generally splits along the foliation. Rock mass strength for this unit is interpreted to be primarily a function of the foliation and the percentage of the phyllitic material present in the rock mass. This unit tends to be hard, fresh to slightly weathered, less fractured and generally more competent than the phyllite unit. RQD within this unit ranged from 15 percent to 100 percent, with an average RQD of 66 percent.

Phyllite: The phyllite unit is interpreted as more than 50 percent banded phyllite and generally ranges from medium to hard, slightly to moderately weathered, with frequent zones of soft rock along major bands. The rock generally splits readily along the foliation, with a varying degree of slatey cleavage (graphitic "greasy" feel) along the majority of splits. The rock appears to be more layered, soft to hard, and moderately to highly fractured. RQD within this unit ranged from 0 percent to 83 percent, with an average RQD of 25 percent.

Rock Structure

The rock generally appeared to have been twisted, folded, and highly altered. The foliation trended near vertically. Due to the apparent cataclastic nature of the rock, it was not possible to determine with any certainty the bedding angle of the parent rock. Zones of rock were interpreted as a consistent phyllitic graywacke with variable banded phyllite content. In opposing zones, the rock appeared to be highly altered with clasts of intact graywacke to several inches in diameter within a fine grained phyllitic unit with no apparent orientation. Several general observations were made about the variability of rock composition, structure, and quality across the cutslope area based on our limited investigation:

- Some extent of a softer, more weathered, phyllitic rock unit appeared extending from the surface at each boring location, with the exception of Test Boring RM12-02. This unit appears to increase in thickness closer to the existing face and away from the central portions of both the north and south cut. The interpreted depth of this unit at each boring location is presented on the test boring logs with a "hatched" graphic.
- Rock quality appears to increase in the vicinity of boring locations RM12-02 and RM12-04. The rock observed in these areas was typically harder and less fractured in contrast to the other boring locations. Graywacke concentration within the rock was typically higher.
- Fractures generally trend vertically at each boring location. Intersecting fracture planes were observed in portions of core. Both plane and wedge failure of rock is expected.

Figure 2 - Select Rock Core Box Photographs

RM12-03, Box 2, 26.1 to 37.2 feet, Dry. Core box highlighting the highly fractured recovery and vertical trending foliation observed within many zones of the phyllite unit

RM12-04, Box 2, 25.1 to 32.3 feet, Dry. Core box highlighting the higher rock quality and visible carbonate veins observed within the phyllitic graywacke unit

Figure 3 - Cutslope Investigation Area Photographs

The existing northern runway rock cut, as viewed from the east, 26 October 2012

The existing southern runway rock cut, as viewed from the northwest, 26 October 2012

4.2 Onshore Runway Extension Investigation Area

Topography
The onshore investigation area consisted of a secondary peninsula extending into Midway Bay parallel to the proposed extension. The peninsula connects to the mainland with a lowland area just below a steep (approximately 35 ft.) fill and the northern edge of the runway. The lowland generally has elevations between 10 and 20 feet with a mostly level to rolling topography. The terrain rises gently to moderately to a maximum elevation of approximately 80 ft. at the northeastern portion of the peninsula, bounded by steep sloping cliffs into the ocean to the north and east.

Surface Drainage
The most significant drainage feature was a tide affected, low to moderate gradient stream which drains the basin to the north of the existing runway and flows southeast into Midway Bay, directly beneath the northern terminus of the existing runway. Drainage across the peninsula typically consisted of surface infiltration into the tundra with several wet, poorly draining muskeg areas.

Vegetative Cover
The onshore investigation area was typically grass covered with areas of dense alder and willow thicket and patchy cottonwood growth in areas. The central portion of the peninsula exhibited some muskeg cover. The elevated portion of the peninsula is typically open tundra with grass cover.

Soils
Generally, the onshore investigation area exhibited a variable thickness of surficial organic soils over glacial till deposits. The surficial organic soils varied from 1.5 feet of moist organic soil at test boring location RM12-14 to 6 feet of saturated fibrous peat (PT) at RM12-13. A thin gray ash layer was observed near the surface within the organic soils at several of the boring locations in the onshore investigation area. Tested moisture contents within the lens of organic soils ranged from 100 to 550 percent.

The glacial till unit was observed varying in classification from poorly graded gravel with silt and sand to silty gravel with sand (GP-GM, SM, GM). This unit contained cobbles and boulders in some locations. The consistency of the till unit was typically medium dense but ranged from loose to dense across the onshore investigation area. Tested P200 values ranged from a minimum of 5.7 percent to a maximum of 30 percent, with an average P200 of 17 percent. Tested moisture content within the till unit ranged from a minimum of 4.3 percent at RM12-07 to a maximum of 33 percent at RM12-13, with an average of 9.3 percent. Hydrometer testing within this unit showed P0.02 values ranging from 6.3 to 16 percent. The thickness of the till unit varied from a minimum of 5.5 feet at RM12-08 to a maximum of 18.1 feet at RM12-10.

Groundwater
Groundwater depth was variable across the onshore investigation area. The observed groundwater elevations are presented in Table 3.

Table 3 - Observed Groundwater Conditions, Onshore Investigation Area

ID	Surface Elevation (ft.)	Total Depth (ft.)	Groundwater Depth* (ft.)	Groundwater Elevation** (ft.)	Latitude***	Longitude***
RM12-07	~ 35	30.3	18	~ 17	57.22288	-153.26435
RM12-08	~ 12	13.0	6	~ 6	57.22319	-153.26268
RM12-09	~ 14	26.3	11	~ 3	57.22336	-153.26156
RM12-10	~ 16	25.4	17	~ -1	57.22403	-153.26122
RM12-11	~ 65	23.0	Not Observed	Not Observed	57.22457	-153.25942
RM12-12	~ 80	37.0	Not Observed	Not Observed	57.22453	-153.25879
RM12-13	~ 20	20.5	1	~ 19	57.22344	-153.26055
RM12-14	~ 20	20.1	Not Observed	Not Observed	57.22284	-153.26193

*Groundwater depths were observed while drilling and are approximate
**Elevations shown were extrapolated from provided contour maps and are approximate
***Coordinates are presented in WGS 84, in survey feet

Bedrock

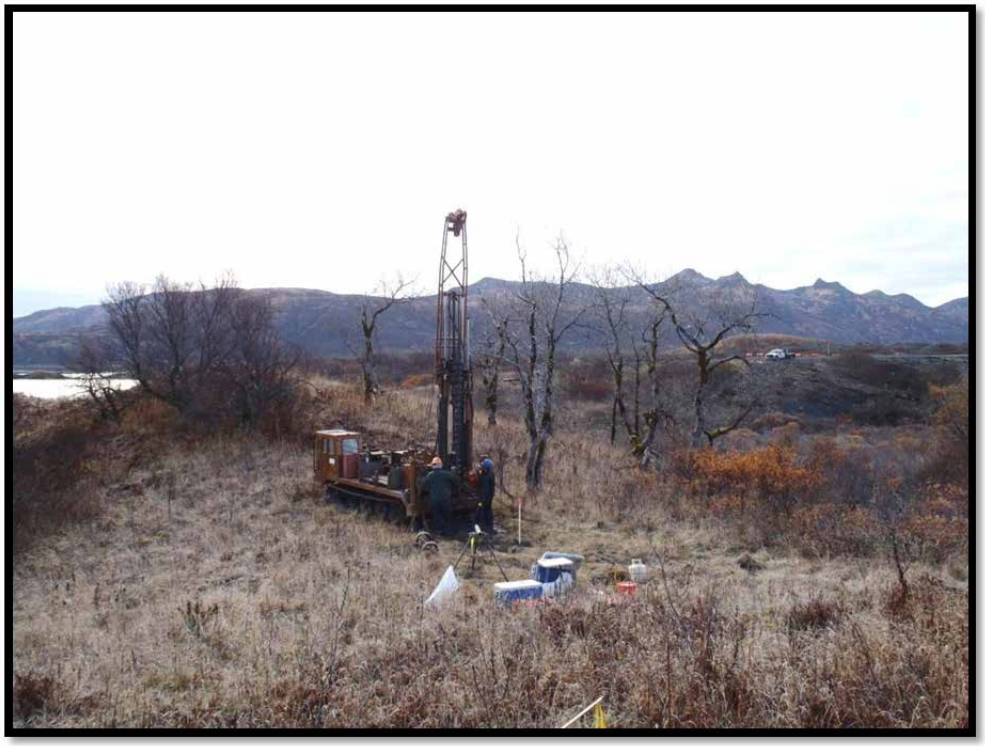
Bedrock underlying the onshore investigation area was generally interpreted to be a zone of moderately to highly weathered, soft, highly fractured phyllitic rock over harder, less fractured rock. Although the rock could typically be drilled and sampled with auger methods, auger refusal on presumably hard rock was encountered in several of the boring locations before the target depth was achieved. In particular, the harder rock zone is expected at an elevation of 15 feet at the proposed stream diversion cut (RM12-07) and at an elevation of 45 to 65 feet at the proposed runway extension cut at the north extent of the peninsula.

Figure 4 – Split-Spoon Sample Photographs

Test boring RM12-11, Sample 2, 5.0 to 6.5 feet, Sample within the glacial till unit

Test Boring RM12-09, Sample 5, 20.0 to 21.3 feet, Sample within the weathered bedrock unit

Figure 5 - Onshore Runway Extension Area Photographs



Test boring location RM12-07, as viewed from the north, 24 October 2012

The extension area peninsula, as viewed from the southwest, 24 October 2012

4.3 Offshore Runway Extension Investigation Areas

Topography

The offshore investigation areas consisted of intertidal mudflats sloping very gradually to the northwest and south away from the extension area peninsula. The mudflats were typically bounded by a sharp, 2 to 7-foot drop-off from the shoreline to the tide affected areas.

Soils

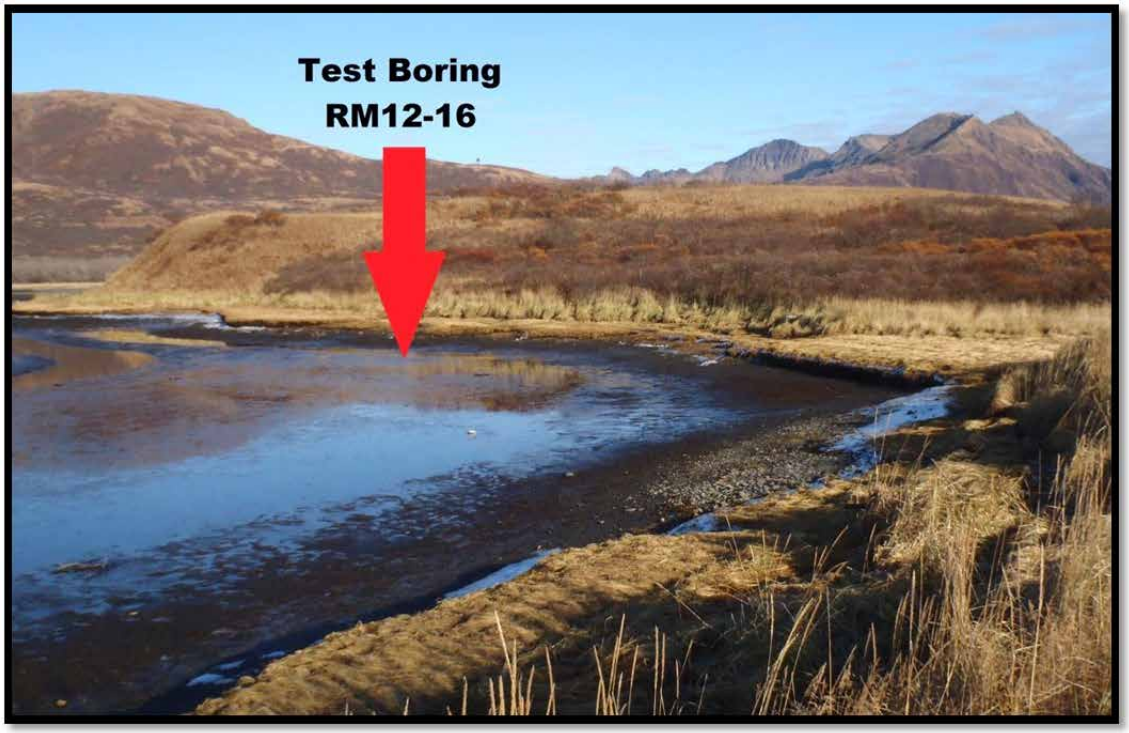
The offshore investigation areas exhibited a variable thickness of marine soils grading to marine affected glacial till deposits. The soils classified as silty sand with gravel (SM), with tested P200 values ranging from a minimum of 22 percent to a maximum of 32 percent, with an average P200 of 25 percent. The consistency of the soils ranged from loose in the upper five feet to medium dense below. Both atterberg limit tests performed on soils within this unit provided non-plastic results with liquid limits of 23 and 29. Moisture contents observed within the unit ranged from a minimum of 7.0 percent to a maximum of 32 percent. Slight organic content was observed throughout RM12-15 in the south offshore area. Cobbles were interpreted at various depths within RM12-16 in the north offshore area.

Bedrock

Bedrock immediately underlying the offshore investigation area soils was interpreted to be similar to that of the onshore investigation area; shallow, moderately to highly weathered, soft, highly fractured phyllitic rock. Rock was encountered at 11 feet and 16 feet below the mudline at Test Borings RM12-15 and RM12-16, respectively.

Figure 6 - Offshore Runway Extension Area Photographs

Southern Intertidal Zone, as viewed from the north, 24 October 2012



Northern Intertidal Zone, as viewed from the west, 24 October 2012

5.0 GEOTECHNICAL DESIGN RECOMMENDATIONS AND CONSTRUCTION CONSIDERATIONS

The conclusions and geotechnical recommendations contained within this section are based on our understanding of the geotechnical data and of the proposed improvements. It is emphasized that our understanding of the design is limited to only preliminary design information regarding the proposed airport improvements. It is anticipated that as the final design progresses, we will have the opportunity to provide more specificity and assistance, as required.

5.1 Climate and Seasonal Frost

Thermal evaluations of civil works should use the following climate parameters. These parameters are based on the mean monthly air temperatures recorded at the Kodiak Airport weather station between 1973 and 2010 (Table 4).

Table 4 – Climate Parameters

MODEL	MEAN ANNUAL AIR TEMP[(a)] (T_{MA}), °F	AIR FREEZE INDEX (AFI), °F-DAYS
Mean	41.0	1,000[(b)]
Design		1,800[(c)]

(a) 1973 to 2010
(b) Mean of annual AFIs calculated based on mean monthly temperatures, 1973 to 2010
(c) Average three coldest annual AFIs, 1973 to 2010

Based on the above climate parameters the estimated potential depth of maximum annual frost penetration (following Army TM 5-852-4, 1983) expected at the project site is 3 to 4 feet below turf and 4 to 5 feet beneath gravel surfaced embankments.

5.2 Earthwork Materials

The following definitions pertain solely to the material designations used in this report; the construction plans and specifications may contain different material designations:

Surface Course, conforms to the particle gradation, quality and crushing requirements for "Surface Course Grading E-1 or F-1" in section 703-2.03 of DOT&PF (2004).

Subbase, consists of well-graded (as defined in ASTM D 4287) sand and gravel, with a maximum particle size of 3 inches, with a minimum of 20 percent and a maximum of 65 percent by weight passing the No. 4 sieve, and no more than 6 percent by weight passing the No. 200 sieve.

General Fill, primarily used to form embankments, is soil that conforms to the requirements of "Select Material Type C" in section 703-2.07 of DOT&PF (2004). Materials excavated on-site may be used as general fill if it meets the above criteria, is stockpiled separately, and is kept free of organics, other debris, and excess moisture.

Shot Rock, is fractured rock pieces produced during rock blasting and excavation. Shot rock produced during rock excavations and blasting at this site may be reused during construction if it can be processed to meet the requirements of the various fill types defined in this section.

Rip-Rap, is large diameter rock pieces used for embankment construction, often used in marine environments for protection against erosion. Rock quality specifications and size requirements for rip-rap in Alaska tend to be project specific and depend on a number of factors including the wave climate, ice, and natural sediments under the development. Specifications often require that the smallest dimension of a rip-rap piece be no less than 1/3 of the largest dimension. Typical rip-rap requirements are as follows:

LABORATORY TEST	TYPICAL SPECIFICATION
L.A. Abrasion	Maximum of 20 to 50%
ATM Degradation	Minimum of 30 to 50
Specific Gravity (Bulk SSD)	Minimum of 2.4 to 2.7
Specific Gravity (Absorption)	Maximum of 2.5%
Sodium Sulfate Soundness	Maximum of 5 to 10% loss

Seperation Geotextile, is a fabric placed between opposing construction material units to prevent the transfer of mineral particles. Where specified in the embankment section for this project, use a separation geotextile meeting the separation property requirements and minimum strength and drainage requirements for a Class 2 geotextile presented in AASHTO M 288-00, Geotextile Specification for Highway Applications (AASHTO, 2000).

5.3 Excavation and Blasting

All excavation slopes should conform to Federal and State standards as a function of the depth, exposed soil type, moisture/groundwater condition, time left open, and adjacent surface loads, foundations, or traffic. Blasting operations should conform to Federal and State standards, and be designed and carried out by a licensed blaster. Blast designs shall consider appropriate safety zone management given active airport operations and the proximity of residential areas.

5.3.1 Cutslope Investigation Area

Runway upgrades include constructing 7:1(H:V) slopes away from the proposed safety area to either side of the runway. Provided grading plans and contour maps show excavation depths of as much as 80 feet will be required.

- Although much of the material composing the cutslope walls is rippable to a degree, we recommend a blasting program be established based on the required thickness of the excavations and the large quantity of material to be handled.

- A wide variation in rock quality and strength was observed between the boring locations and, in particular, within each boring. Variability of the rock materials is explained within Section 4.1, presented graphically on the test boring logs, and tabulated within the Drilling Reports, Drawings B-32 through B-41 within Appendix
- Rock quality intervals achieved while drilling represent, to a degree, the quality and size of materials that can be produced during blasting. It is expected that the large majority of material produced during the blasting program will meet the classification of *shot rock* and *general fill* defined herein. Some material meeting the classifications for *rip-rap* may be achieved. However, a test blast and large diameter rock testing program should be established to better determine the quantity and quality of rip-rap that can be produced on-site.

5.3.2 Stream Diversion Area

Construction of the runway extension requires diversion of a drainage around the embankment to the northeast in the area shown on the Runway Extension Area Test Boring Location Map, Drawing A-03, in Appendix A. The stream diversion must conform to the applicable stream diversion permits, allowing for fish passage, etc. As a result, the required excavation will reach depths of as much as 40 feet.

- Test Boring RM12-07 indicates 14 feet of mineral soil over rock in the highpoint of the proposed excavation area. Hard rock was interpreted at an elevation of 5 to 10 feet above sea level. Blasting may be required to reach design depths in the stream diversion area.
- Prepared **soil slopes** should be constructed with side-slopes no steeper than 3:1(H:V). Prepared side-slopes that will be exposed to flood currents or wave action should be armored to protect against erosion. Other prepared side-slopes should be vegetated to protect against long-term erosion.
- Prepared **rock slopes** above the stream diversion should be set back to a maximum of 2:1(H:V) slopes. Although definitive rock structure mapping was not performed in this area, this setback is considered safe for long term performance. A steeper setback may be constructed, pending results of slope stability inspection by a geotechnical engineer during construction.

5.3.3 Runway Extension Area

Grading plans in the northeast portion of the runway extension area propose the removal of up to 40 feet of material. The approximate boundaries of the peninsula runway cut area are shown on the Runway Extension Area Test Boring Location Map, Drawing A-03, in Appendix A.

- Test Borings RM12-11 and RM12-12 indicate approximately 10 feet of mineral soil over rock in the cut area. Hard rock was interpreted at an elevation of approximately 40 to 60 feet above sea level. Blasting may be required to reach design depths in the peninsula runway cut area.

- Prepared soil slopes should be constructed with side-slopes no steeper than 3:1(H:V). The prepared side-slopes that will be exposed to flood currents or wave action should be armored to protect against erosion. Other prepared side-slopes should be vegetated to protect against long-term erosion.

5.4 Embankment Construction

5.4.1 Clearing and Grubbing

- Clear all surface vegetation and organic soils within the onshore embankment footprint to expose mineral soils (glacial till). This could be accomplished in many phases in order to minimize disturbance and weather exposure to the exposed subgrade.
- The surficial organic materials are not suitable for reuse as fill material; however, it may be desirable to stockpile excess excavated organic materials for reuse, such as vegetation aid for embankments.

5.4.2 Surface Preparation

- Exposed mineral soils within the **onshore** embankment footprint should be proof-rolled and compacted to at least 95 percent of ASTM D 1557. The embankment fill section may be placed directly on the exposed and properly compacted mineral soils. Low areas should be drained before compaction and placement of fill materials to the extent possible.
- In tide-affected **offshore** areas, a *separation geotextile* should be placed directly on the exposed marine surface before placement of the embankment fill section. An attempt should be made to eliminate excess moisture within the native marine soils to the extent possible during construction. Embankment construction activities in offshore areas should take place at low tide when the marine soils are exposed and drained. This could be accomplished in many phases, constructing away from the existing embankment in small sections with each low tide cycle. The placed portion of the embankment should be protected from the entrance of additional moisture and marine materials to the extent possible during the high tide cycle, possibly by wrapping the excess *separation geotextile* protruding from the edge of the embankment onto the constructed portion of the embankment.

5.4.3 General Embankment Section Design and Compaction

- Construct all of the airport embankments up to the grade of the traffic section using suitable materials meeting the classification for *general fill* over undisturbed mineral soil (glacial till), bedrock subgrade, or separation geotextile in marine areas. Runway embankments should be constructed with side-slopes no steeper than 3:1(H:V). The embankment side-slopes exposed to flood currents or wave action should be armored to protect against erosion. Other embankment side-slopes should be vegetated to protect against long-term erosion.

- Embankment materials should be compacted to a minimum of 95 percent of ASTM D 1557. Alternatively, a performance criteria may be used to control the compaction of *shot rock* fill which may be too coarse-grained for accurate maximum density determination and in-place density testing. The performance specification may be determined following the Control Strip Method, presented in the Alaska Test Methods (ATM) Manual in section ATM 309, Relative Standard Density of Soils by the Control Strip Method (DOT&PF, 2009). The Control Strip Method is an alternative to traditional compaction control methods, used to verify compaction when site conditions make determining the standard density difficult.
- Lift thickness of the embankment section should be controlled by the maximum particle size within the embankment fill (*general fill*). It is recommended that the maximum particle size within fill be limited to $\leq$ ½ of the lift thickness.
- The final runway surfacing section design should be based on the expected aircraft traffic loading on the runway. The recommended minimum runway surface traffic section consists of six inches *Surface Course*, over 24 inches *subbase*. The traffic section should be placed in maximum 12 inch lifts and be compacted to at least 95 percent of ASTM D 1557.

5.5 Embankment Performance

5.5.1 Short-Term Settlements (Embankment Stabilization)

With the use of the construction methods described, slight differential settlement of the embankment is expected to occur over time, reflected at the runway surface in some areas at a diminishing rate. A stockpile of excess fill and surfacing material and a grading maintenance schedule should be planned to account for any differential settlement.

5.5.2 Long-Term Performance

It is expected that the new airport surface will be relatively stable within a few seasons of construction, given adequate slope protection is achieved. Minimal long-term settlement could be treated through routine grading by airport maintenance.

6.0 CLOSURE

The engineering recommendations presented in this report have been based on the pertinent information listed herein. Significant alteration of any design concepts could alter the foregoing engineering recommendations. We would, therefore, appreciate having the opportunity to review future design plans and evaluate any such design changes and, where necessary, present any required changes to our present recommendations. Additionally, because subsurface characteristics can change significantly within a given area and with the passing of time, the possibility exists that important subsurface conditions not disclosed by this field investigation may be discovered during future design-level investigations or construction. Should this situation occur, the influence of the new information on the present recommendations should be evaluated without delay.

R&M Consultants, Inc. performed this work in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions. No warranty, express or implied, beyond exercise of reasonable care and professional diligence, is made. This report is intended for use only in accordance with the purposes of study described within.

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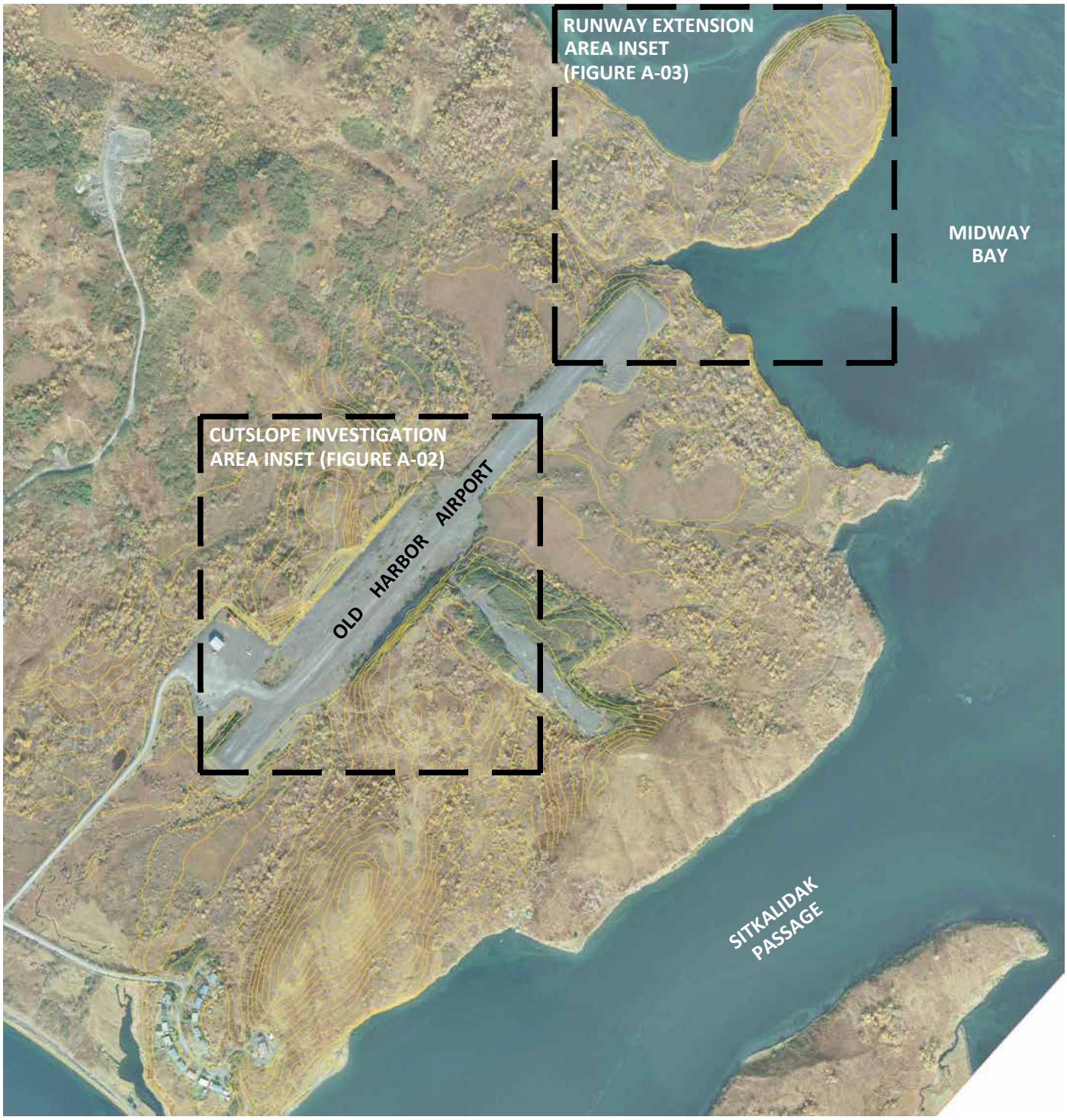
APPENDIX A

PROJECT CORRIDOR MAPS



CONTOUR INTERVAL = 10 FEET

0 750' 1500'

SCALE IN FEET
(APPROXIMATE)

SHEARWATER SYSTEMS, LLC
(OLD HARBOR NATIVE CORPORATION)

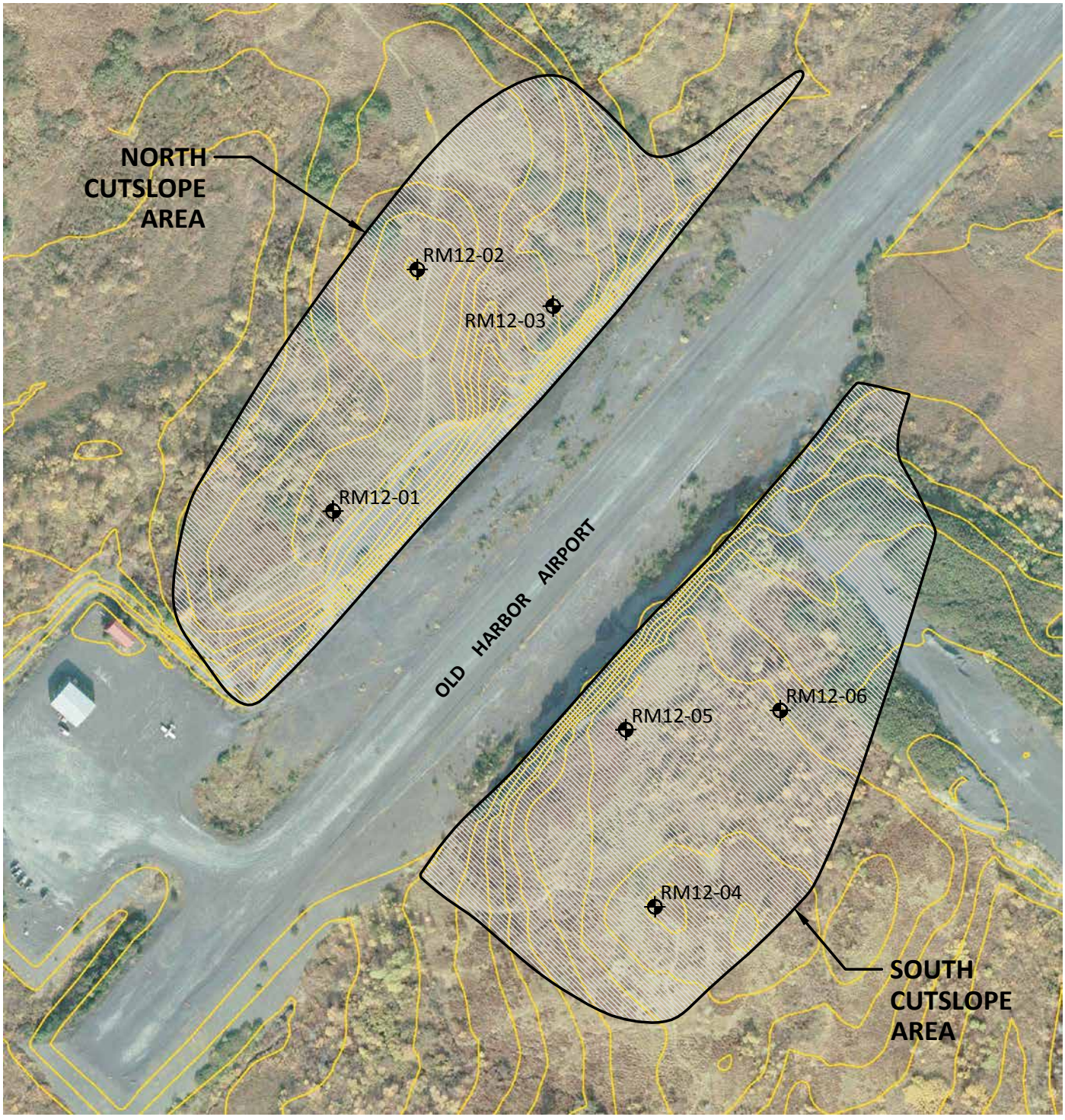
GEOTECHNICAL INVESTIGATION
OLD HARBOR RUNWAY EXTENSION
OLD HARBOR – KODIAK ISLAND, ALASKA

WATERBODY: MIDWAY BAY

T34S, R25W, SEC 16/21, KODIAK A-4
SEWARD MERIDIAN

PROJECT OVERVIEW

JANUARY 2013 DWG. NO. A-01



CONTOUR INTERVAL = 10 FEET

LEGEND

TEST BORINGS

0 250' 500'

SCALE IN FEET
(APPROXIMATE)

SHEARWATER SYSTEMS, LLC
(OLD HARBOR NATIVE CORPORATION)

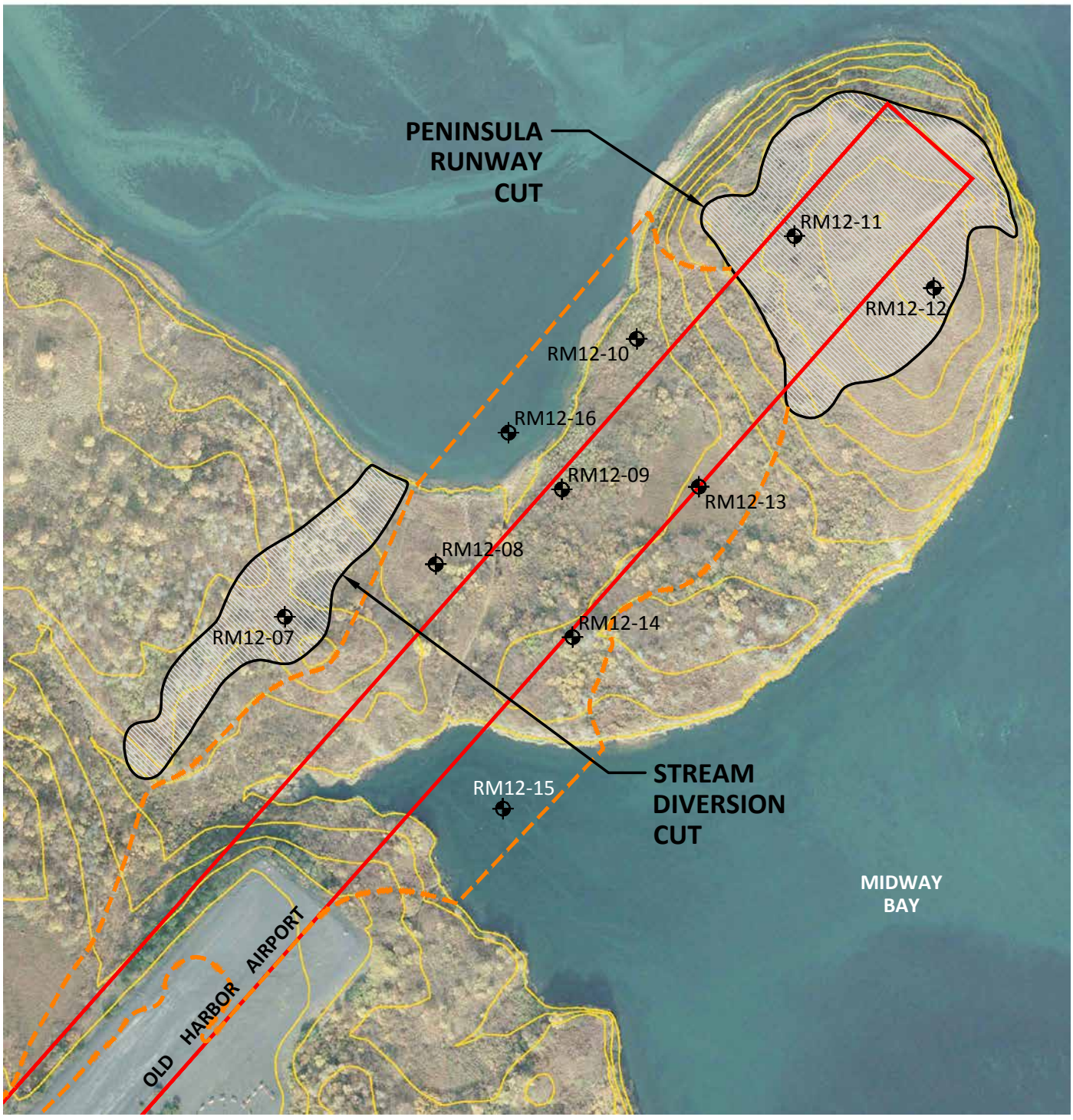
GEOTECHNICAL INVESTIGATION
OLD HARBOR RUNWAY EXTENSION
OLD HARBOR – KODIAK ISLAND, ALASKA

WATERBODY: MIDWAY BAY

T34S, R25W, SEC 16/21, KODIAK A-4
SEWARD MERIDIAN

CUTSLOPE INVESTIGATION AREA
TEST BORING LOCATION MAP

JANUARY 2013 DWG. NO. A-02



CONTOUR INTERVAL = 10 FEET

LEGEND

- TEST BORINGS
- FILL AREA BOUNDARY
- RUNWAY EXTENSION SURFACE BOUNDARY

0 250' 500'

SCALE IN FEET
(APPROXIMATE)

SHEARWATER SYSTEMS, LLC
(OLD HARBOR NATIVE CORPORATION)

GEOTECHNICAL INVESTIGATION
OLD HARBOR RUNWAY EXTENSION
OLD HARBOR – KODIAK ISLAND, ALASKA

WATERBODY: MIDWAY BAY

T34S, R25W, SEC 16/21, KODIAK A-4
SEWARD MERIDIAN

RUNWAY EXTENSION AREA TEST BORING LOCATION MAP

JANUARY 2013 DWG. NO. A-03

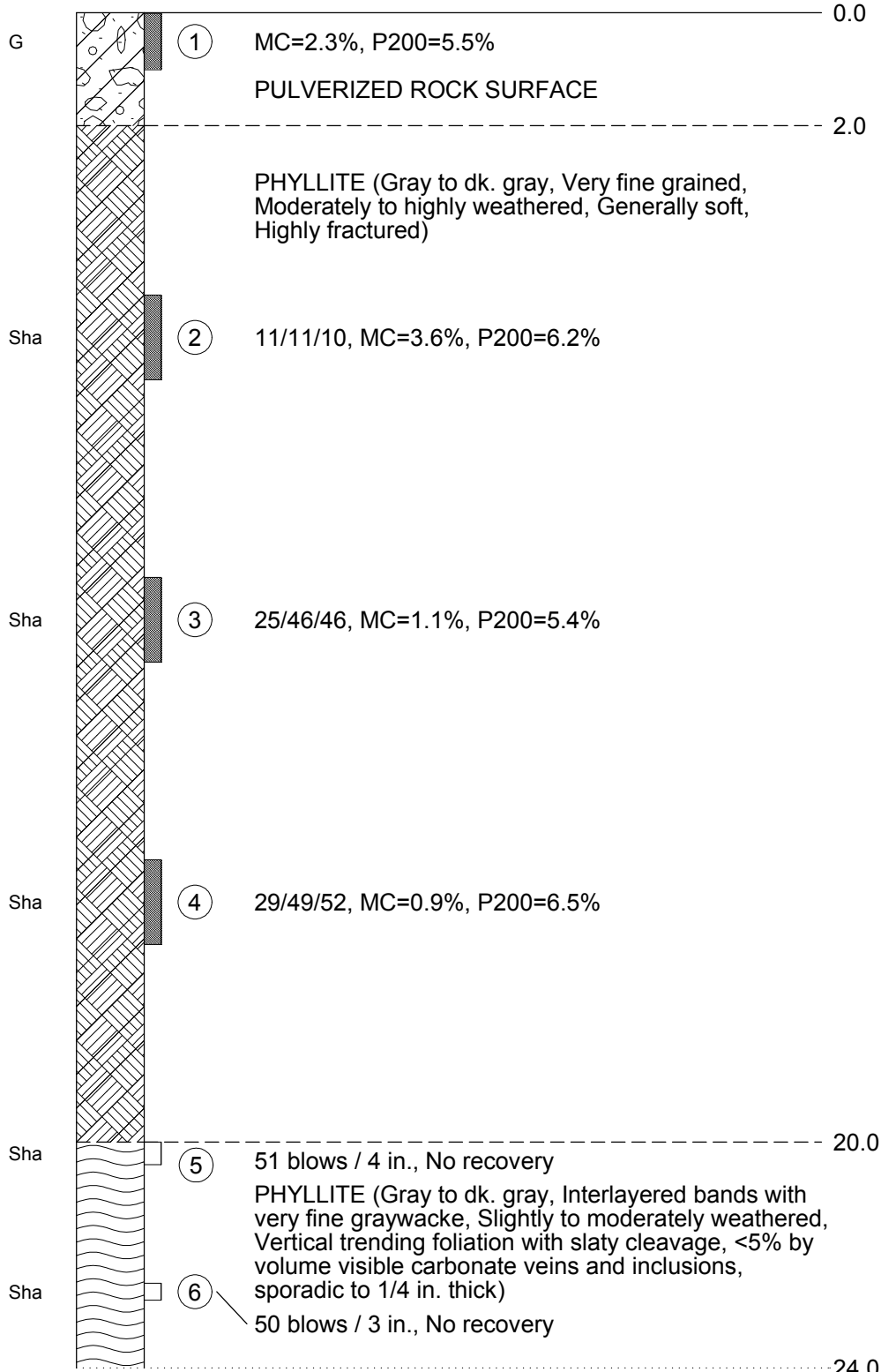
APPENDIX B

GEOTECHNICAL DATA

RM12-01

LAT. 57.21769*
LON. 153.27297*
10/23/12, 10/28/12

Surface Elevation 135 ft.*



(Continued on Next Page)

Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

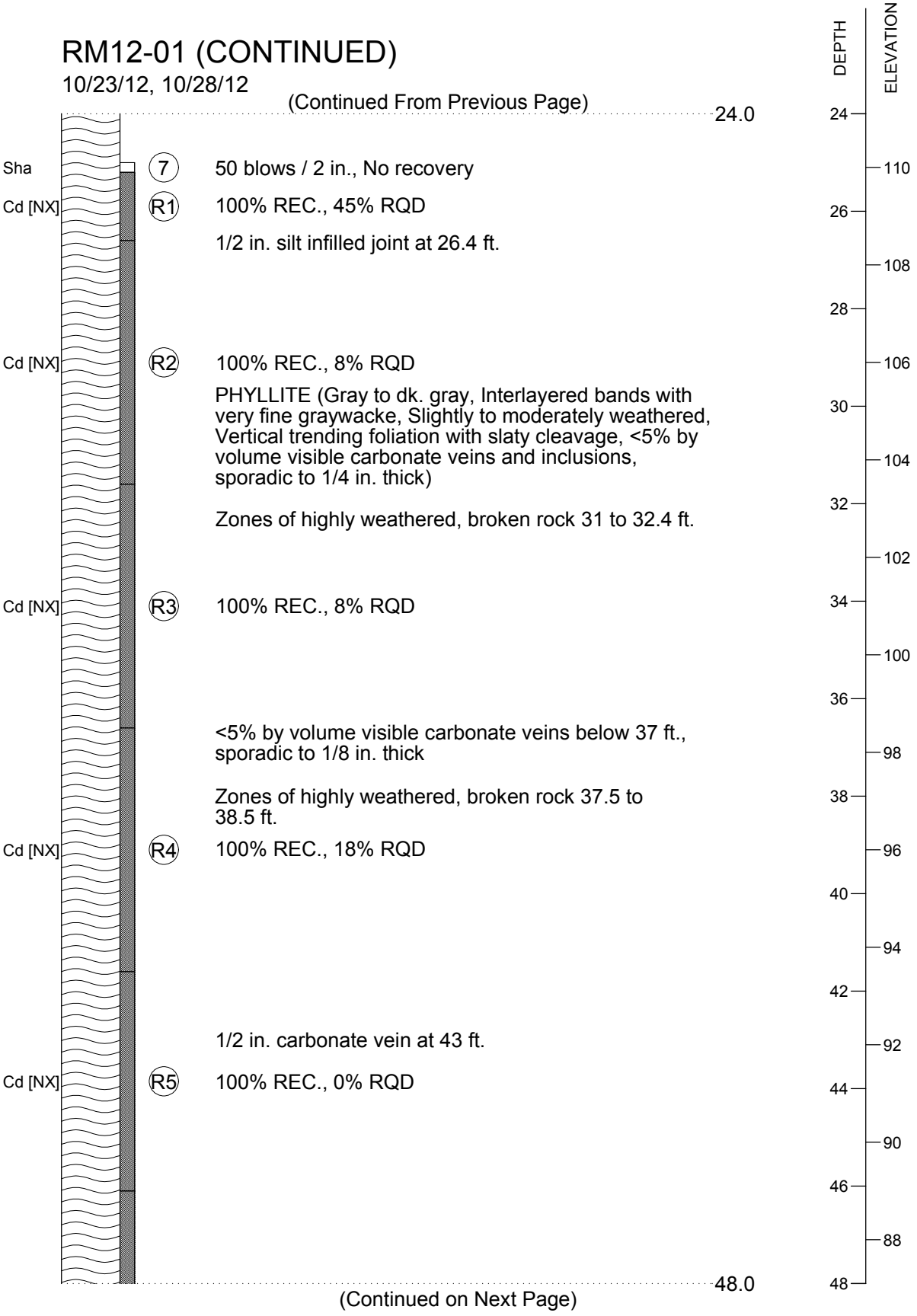
AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-01

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-01

RM12-01 (CONTINUED)

10/23/12, 10/28/12

(Continued From Previous Page)



Sha	7		50 blows / 2 in., No recovery
Cd [NX]	R1		100% REC., 45% RQD
			1/2 in. silt infilled joint at 26.4 ft.
Cd [NX]	R2		100% REC., 8% RQD
			PHYLLITE (Gray to dk. gray, Interlayered bands with very fine graywacke, Slightly to moderately weathered, Vertical trending foliation with slaty cleavage, <5% by volume visible carbonate veins and inclusions, sporadic to 1/4 in. thick)
			Zones of highly weathered, broken rock 31 to 32.4 ft.
Cd [NX]	R3		100% REC., 8% RQD
			<5% by volume visible carbonate veins below 37 ft., sporadic to 1/8 in. thick
			Zones of highly weathered, broken rock 37.5 to 38.5 ft.
Cd [NX]	R4		100% REC., 18% RQD
			1/2 in. carbonate vein at 43 ft.
Cd [NX]	R5		100% REC., 0% RQD

(Continued on Next Page)

Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-01

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-02

RM12-01 (CONTINUED)

10/23/12, 10/28/12

(Continued From Previous Page)

48.0

Cd [NX] R6 80% REC., 0% RQD

Zones of highly weathered, broken rock 49.0 to 50.8 ft.

PHYLLITE (Gray to dk. gray, Interlayered bands with very fine graywacke, Slightly to moderately weathered, Vertical trending foliation with slaty cleavage, <5% by volume visible carbonate veins and inclusions, sporadic to 1/8 in. thick)

Cd [NX] R7 100% REC., 15% RQD

Zones of highly weathered, broken rock 53.5 to 55.1 ft.

Cd [NX] R8 100% REC., 0% RQD

Cd [NX] R9 100% REC., 32% RQD

Cd [NX] R10 100% REC., 0% RQD

1/2 in. carbonate inclusions at 63 ft.

Cd [NX] R11 100% REC., 13% RQD

64.6

DEPTH: 48, 50, 52, 54, 56, 58, 60, 62, 64

ELEVATION: 86, 84, 82, 80, 78, 76, 74, 72

*Coordinates and elevation data were obtained by Shearwater Systems, LLC, using standard survey techniques

Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION

OLD HARBOR, ALASKA

LOG OF TEST BORING

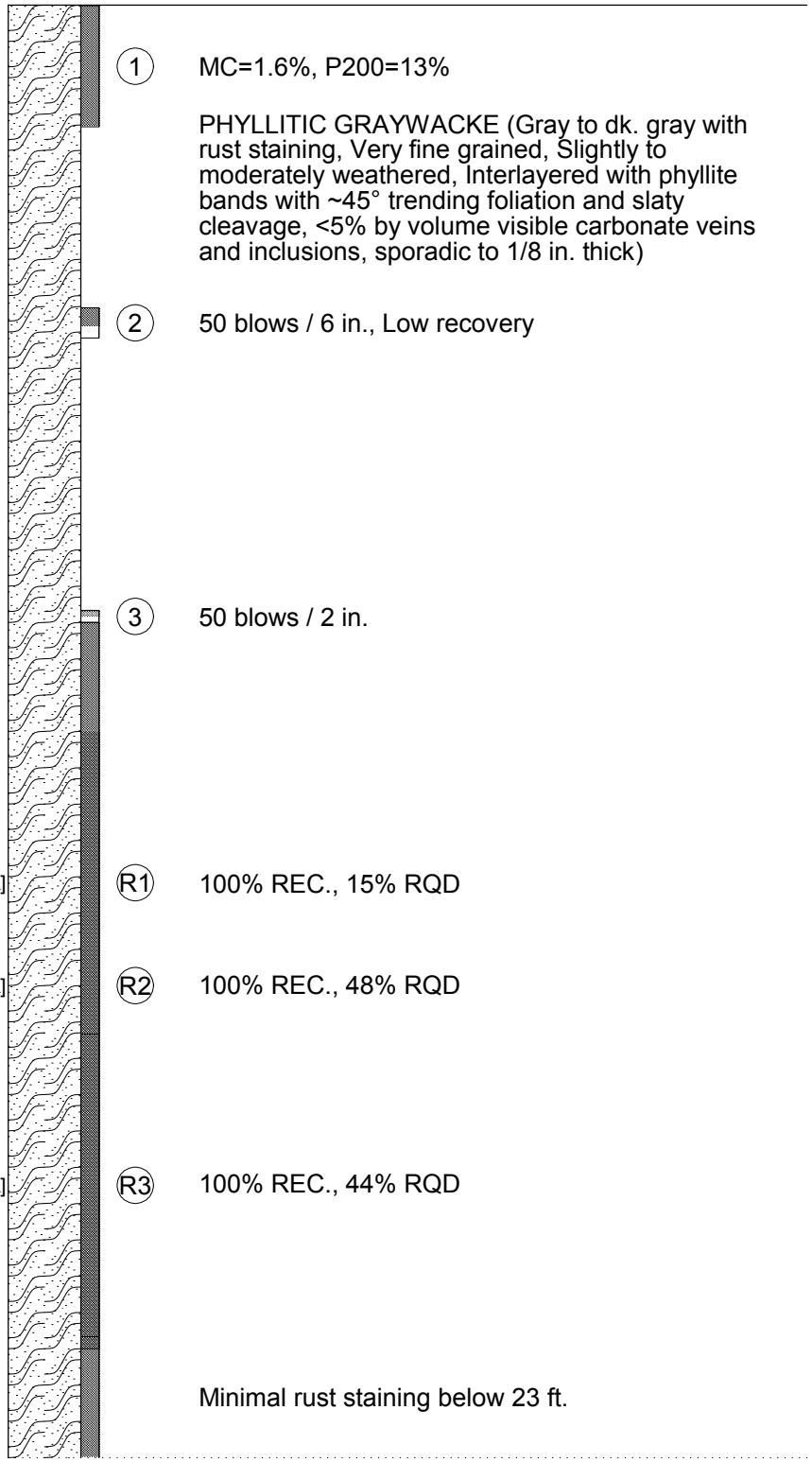
RM12-01

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-03

RM12-02

LAT. 57.21871*
LON. 153.27245*
10/28/12 - 10/29/12

Surface Elevation 148*



			DEPTH	ELEVATION
		0.0	0	148
G	1	MC=1.6%, P200=13% PHYLLITIC GRAYWACKE (Gray to dk. gray with rust staining, Very fine grained, Slightly to moderately weathered, Interlayered with phyllite bands with ~45° trending foliation and slaty cleavage, <5% by volume visible carbonate veins and inclusions, sporadic to 1/8 in. thick)	2	146
Sha	2	50 blows / 6 in., Low recovery	4	144
			6	142
			8	140
Sha	3	50 blows / 2 in.	10	138
			12	136
Cd [NX]	R1	100% REC., 15% RQD	14	134
Cd [NX]	R2	100% REC., 48% RQD	16	132
			18	130
Cd [NX]	R3	100% REC., 44% RQD	20	128
			22	126
		Minimal rust staining below 23 ft.		
		24.0	24	

(Continued on Next Page)

Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

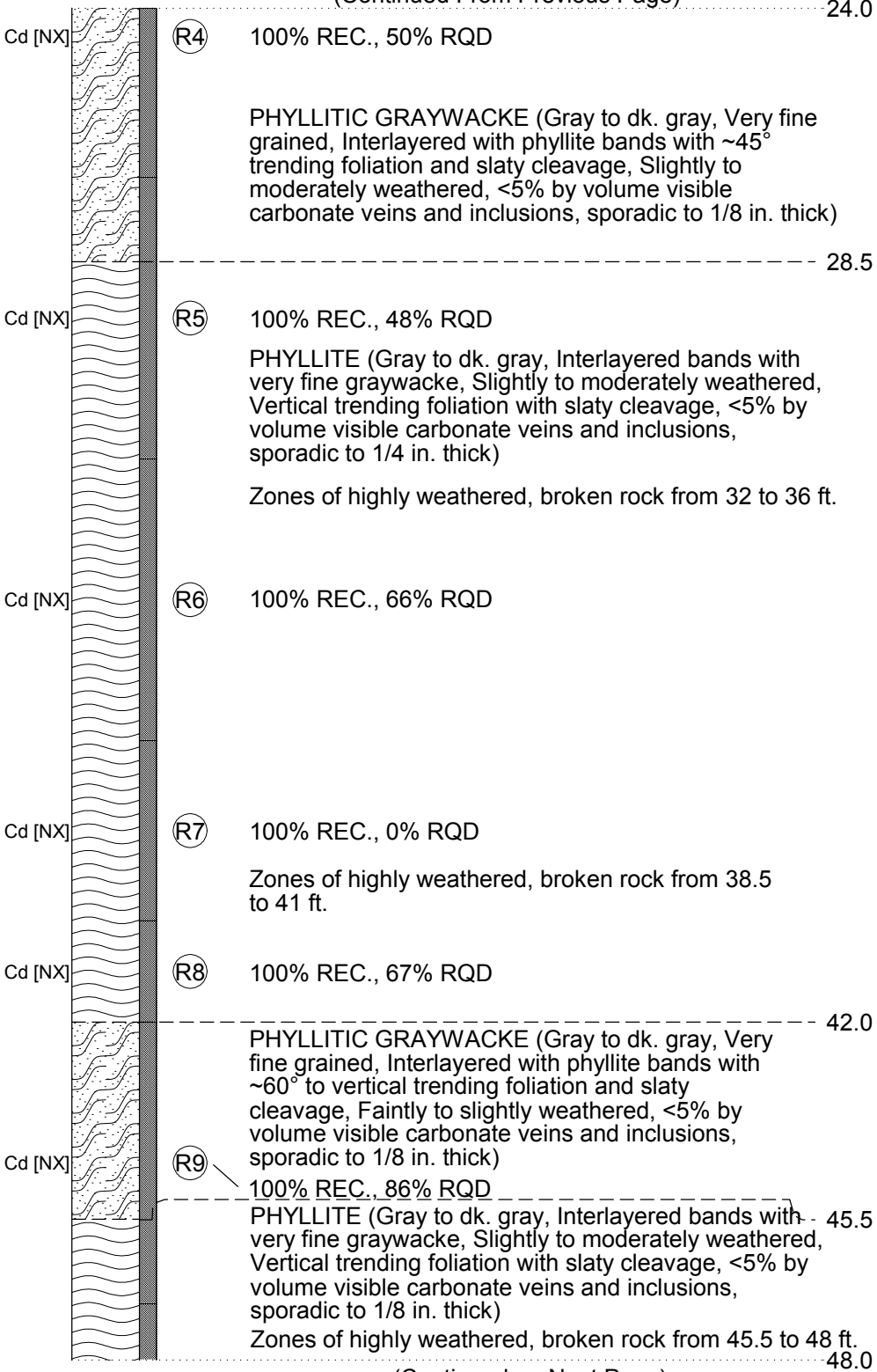
AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-02

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-04

RM12-02 (CONTINUED)

10/28/12 - 10/29/12

(Continued From Previous Page)



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Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

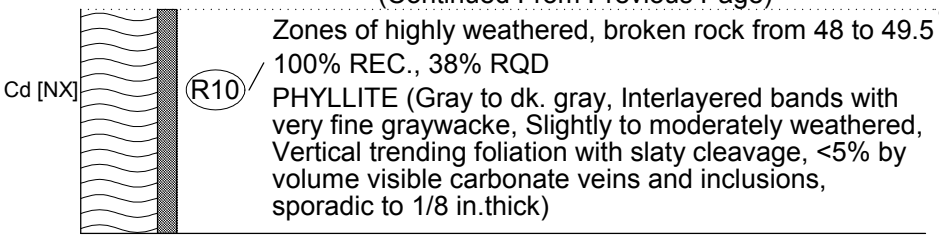
AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-02

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-05

RM12-02 (CONTINUED)

10/28/12 - 10/29/12

(Continued From Previous Page)



48.0

Zones of highly weathered, broken rock from 48 to 49.5 ft.

100% REC., 38% RQD

PHYLLITE (Gray to dk. gray, Interlayered bands with very fine graywacke, Slightly to moderately weathered, Vertical trending foliation with slaty cleavage, <5% by volume visible carbonate veins and inclusions, sporadic to 1/8 in.thick)

51.5

DEPTH	ELEVATION
48	100
50	98

*Coordinates and elevation data were obtained by Shearwater Systems, LLC using standard survey techniques

Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION

OLD HARBOR, ALASKA

LOG OF TEST BORING

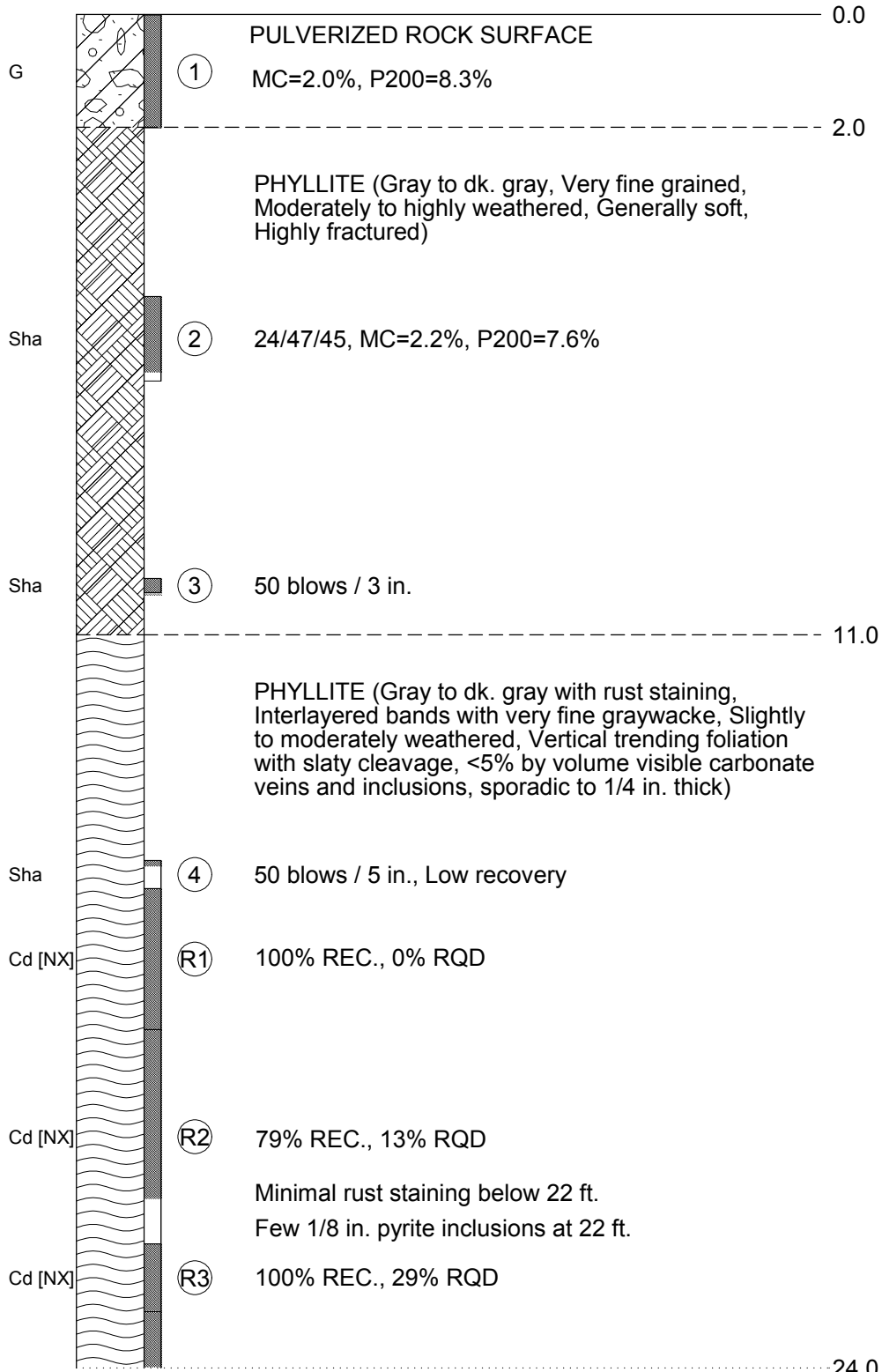
RM12-02

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-06

RM12-03

LAT. 57.21848*
LON. 153.27122*
10/29/12 - 10/30/12

Surface Elevation 111 ft.*



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MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-03

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-07

RM12-03 (CONTINUED)

10/29/12 - 10/30/12

(Continued From Previous Page)

24.0

Cd [NX] R4 100% REC., 0% RQD

Cd [NX] R5 100% REC., 0% RQD

PHYLLITE (Gray to dk. gray, Interlayered bands with very fine graywacke, Slightly to moderately weathered, Vertical trending foliation with slaty cleavage, <5% by volume visible carbonate veins and inclusions, sporadic to 1/4 in. thick)

Zones of highly weathered, broken rock 28 to 28.5 ft.

Cd [NX] R6 100% REC., 9% RQD

Zones of highly weathered, broken rock along joints from 31 to 35 ft.

Cd [NX] R7 100% REC., 0% RQD

Cd [NX] R8 100% REC., 0% RQD

Increasing carbonate content below 39 ft.

Cd [NX] R9 100% REC., 23% RQD

Cd [NX] R10 100% REC., 28% RQD

45.9

DEPTH	ELEVATION
24	86
26	84
28	82
30	80
32	78
34	76
36	74
38	72
40	70
42	68
44	66

*Coordinates are presented in WGS84 and were obtained by Shearwater Systems, LLC using standard survey techniques

Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-03

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-08

RM12-04

LAT. 57.21580*
LON. 153.27048*
10/30/12

Surface Elevation 126 ft.*

			DEPTH	ELEVATION
		0.0	0	126
G	(1)	PULVERIZED ROCK SURFACE MC=3.0, P200=17%		
		2.0	2	124
		PHYLLITE (Dk. gray, Very fine grained, Moderately to highly weathered, Generally soft, Highly fractured)	4	122
Sha	(2)	20/50 blows / 3 in., Low recovery	6	120
			8	118
Sha	(3)	34/50 blows / 4 in., Low recovery	10	116
			12	114
		14.0	14	112
Sha	(4)	50 blows / 4 in., No recovery		
		Zones of highly weathered, broken rock from 16.5 to 20.6 ft.	16	110
Cd [NX]	(R1)	100% REC., 24% RQD		
		PHYLLITE (Gray to dk. gray, Interlayered bands with very fine graywacke, Slightly to moderately weathered, Vertical trending foliation with slaty cleavage, 5 to 10% by volume visible carbonate veins and inclusions, sporadic to 1/4 in. thick)	18	108
Cd [NX]	(R2)	100% REC., 15% RQD		
		10% by volume visible carbonate veins and inclusions, sporadic to 1 in. thick below 20 ft.	20	106
Cd [NX]	(R3)	100% REC., 35% RQD		
			22	104
		24.0	24	

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Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-04

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-09

RM12-04 (CONTINUED)

10/30/12

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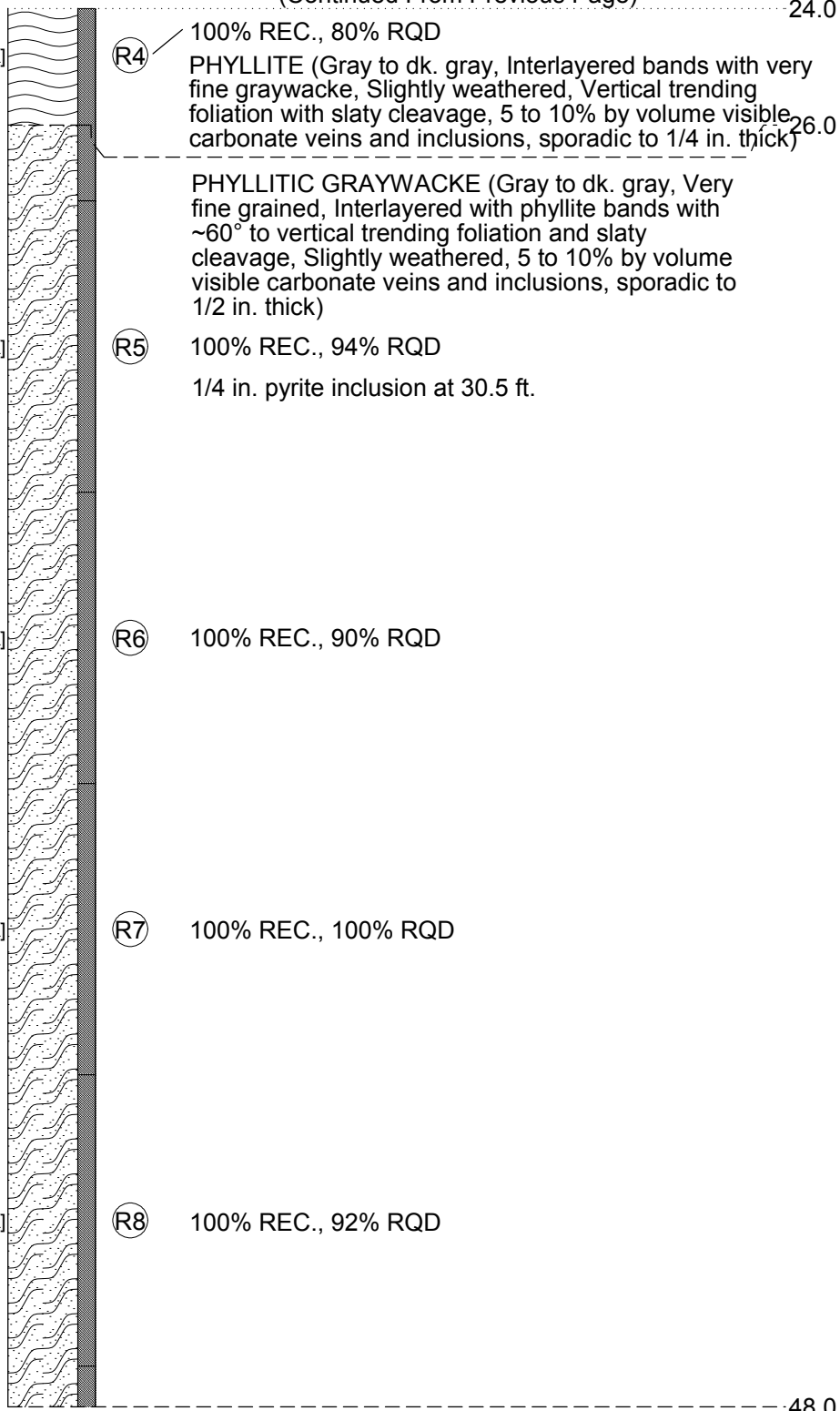

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DEPTH	ELEVATION
24	102
26	100
28	98
30	96
32	94
34	92
36	90
38	88
40	86
42	84
44	82
46	80
48	

Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

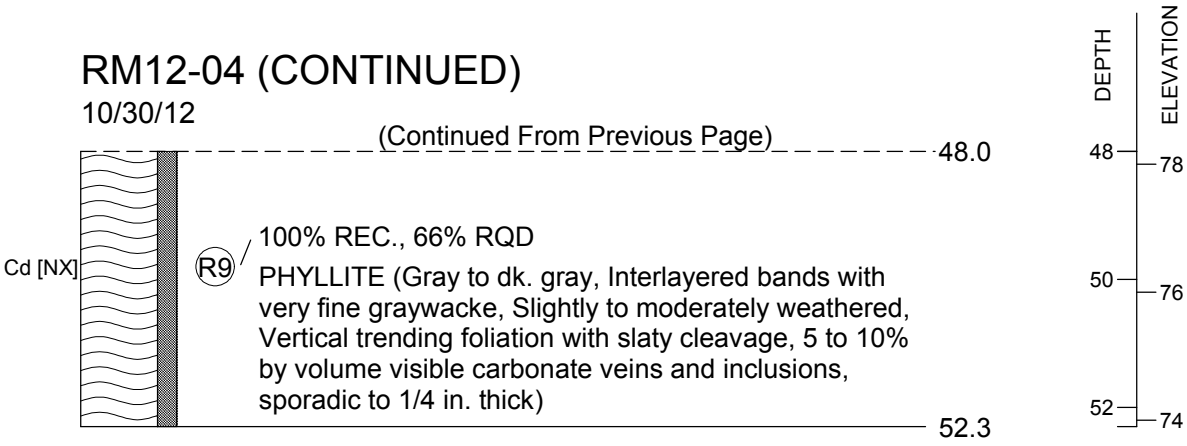
PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-04

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-10

RM12-04 (CONTINUED)

10/30/12



*Coordinates and elevation data were obtained by Shearwater Systems, LLC using standard survey techniques

Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION

OLD HARBOR, ALASKA

LOG OF TEST BORING

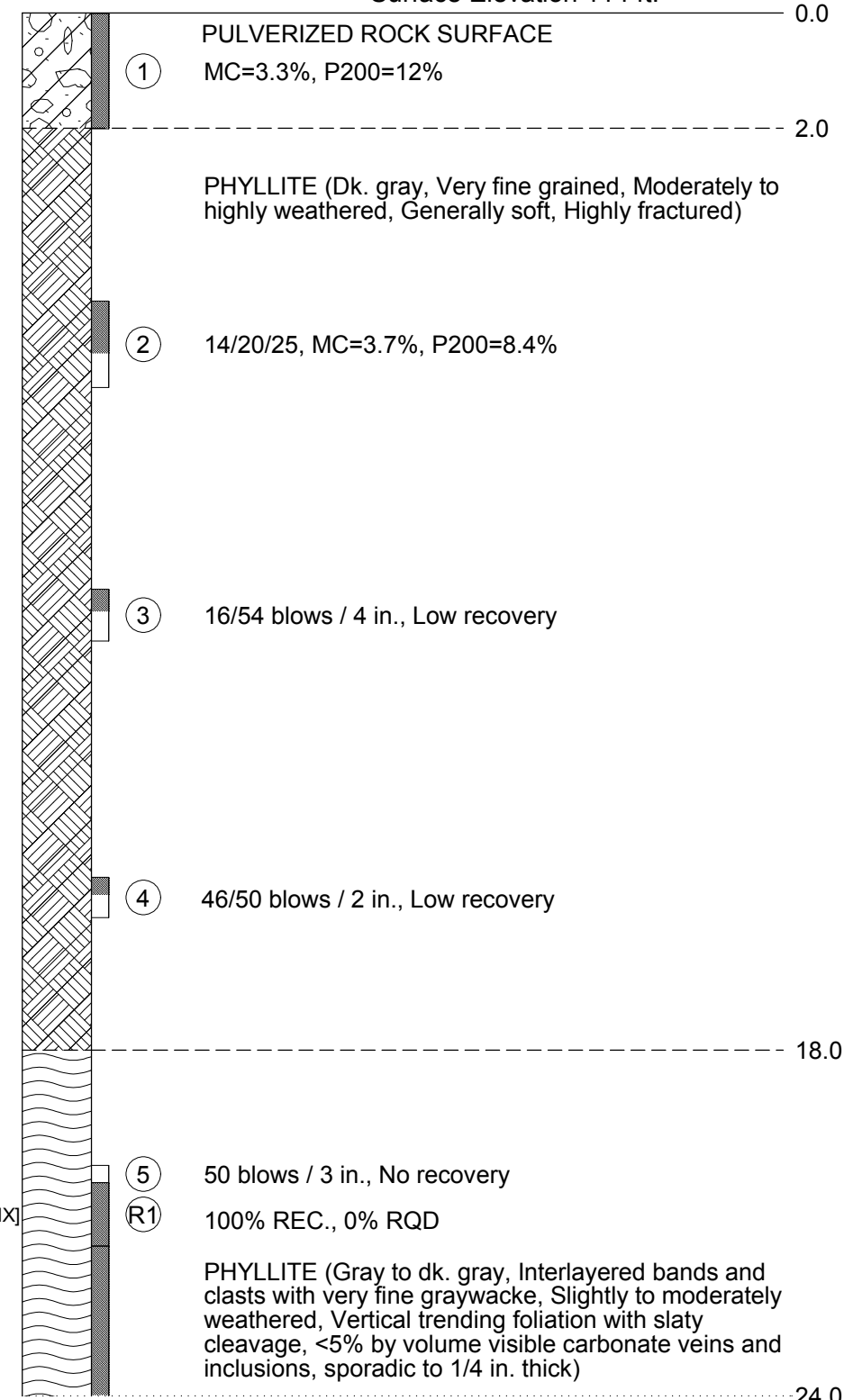
RM12-04

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-11

RM12-05

LAT. 57.21667*
LON. 153.27056*
10/31/12

Surface Elevation 114 ft.*



DEPTH: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24

ELEVATION: 112, 110, 108, 106, 104, 102, 100, 98, 96, 94, 92, 90

(Continued on Next Page)

Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

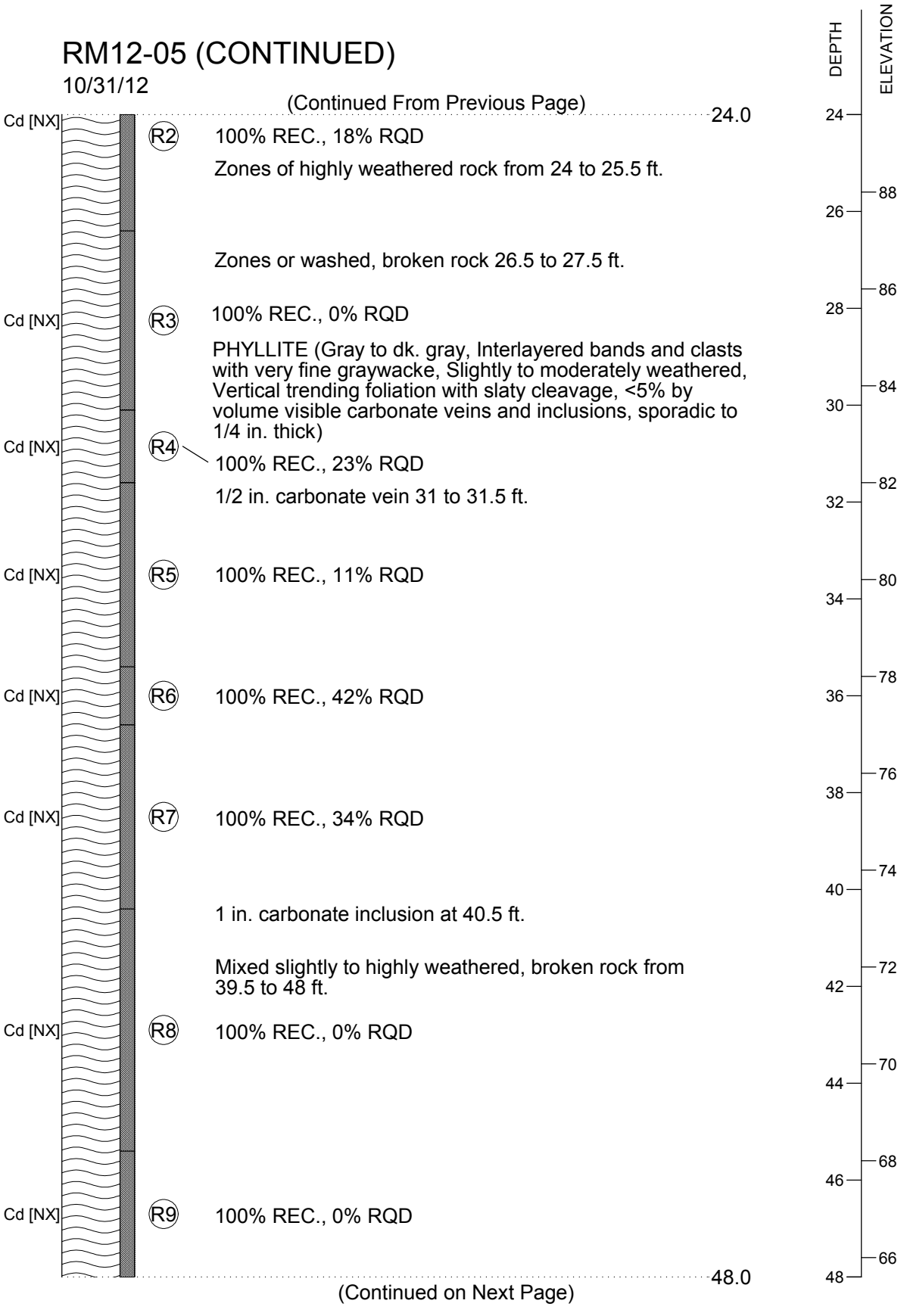
PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-05

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-12

RM12-05 (CONTINUED)

10/31/12



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MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION

OLD HARBOR, ALASKA

LOG OF TEST BORING

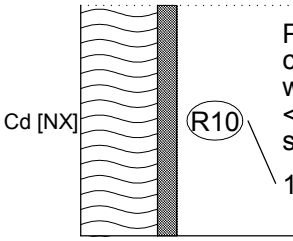
RM12-05

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-13

RM12-05 (CONTINUED)

10/31/12

(Continued From Previous Page) 48.0



PHYLLITE (Gray to dk. gray, Interlayered bands and clasts with very fine graywacke, Slightly to moderately weathered, Vertical trending foliation with slaty cleavage, <5% by volume visible carbonate veins and inclusions, sporadic to 1/4 in. thick)

100% REC., 81% RQD

51.6

DEPTH	ELEVATION
48	
	64
50	
	62

*Coordinates and elevation data were obtained by Shearwater Systems, LLC using standard survey techniques

Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION

OLD HARBOR, ALASKA

LOG OF TEST BORING

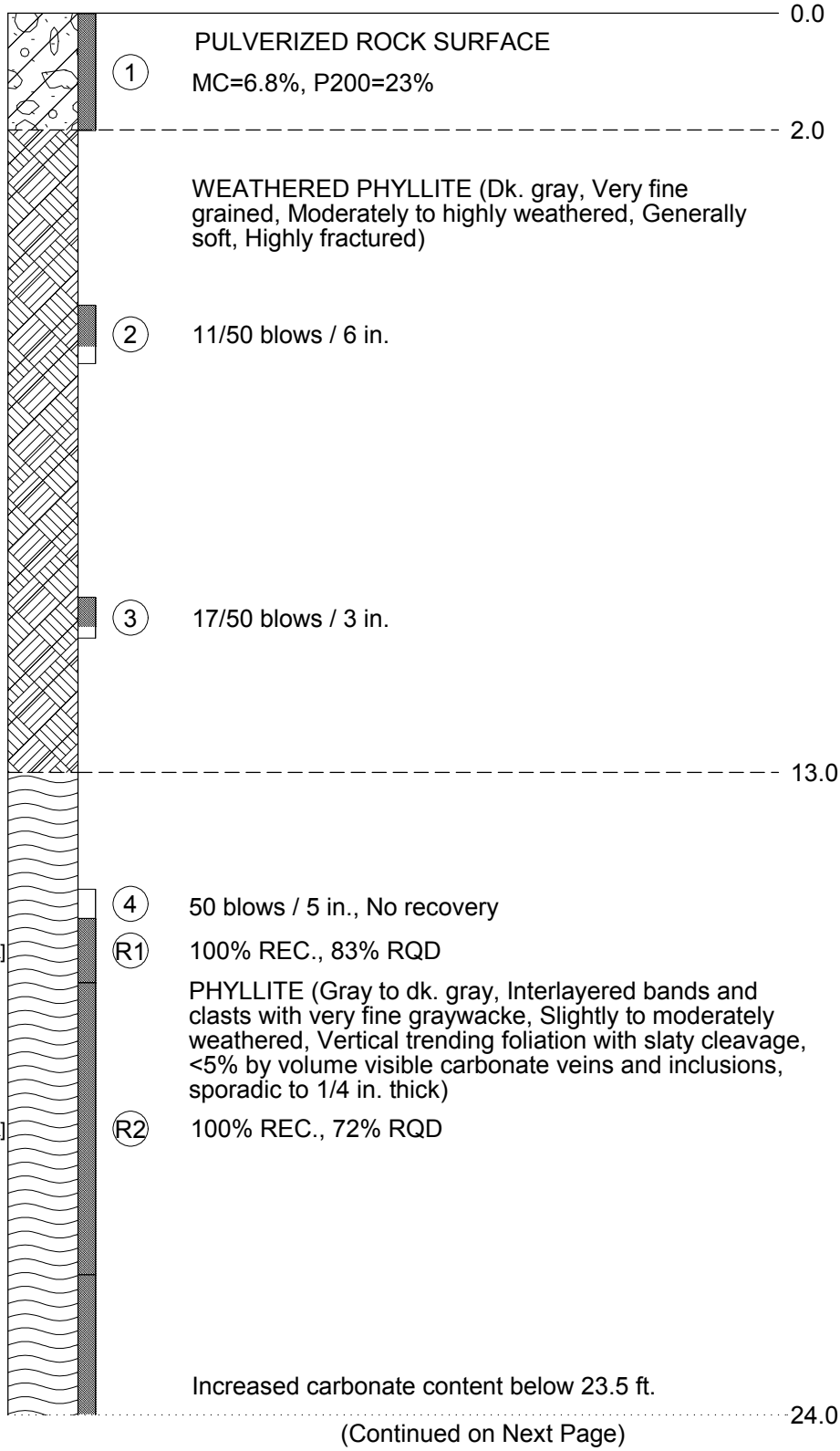
RM12-05

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-14

RM12-06

LAT. 57.21671*
LON. 153.26943*
11/1/12

Surface Elevation 110 ft.*



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DEPTH / ELEVATION

DEPTH	ELEVATION
0	
2	108
4	106
6	104
8	102
10	100
12	98
14	96
16	94
18	92
20	90
22	88
24	86

Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

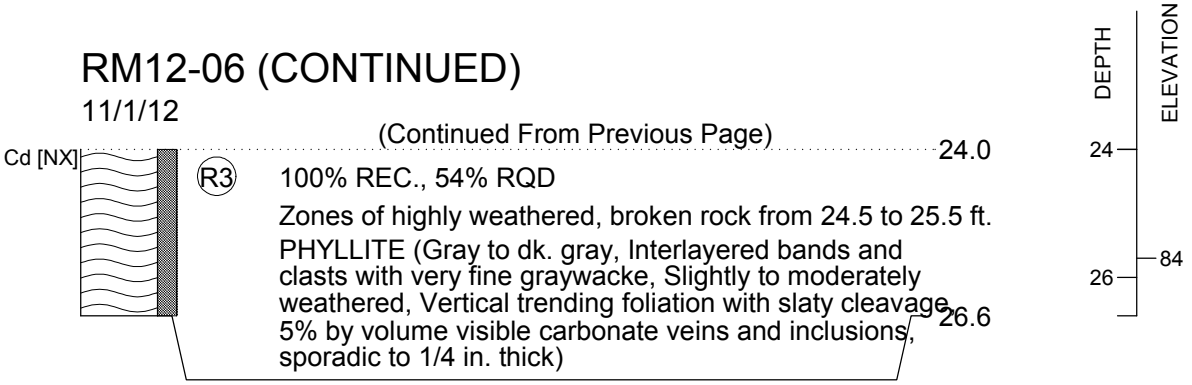
PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-06

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-15

RM12-06 (CONTINUED)

11/1/12



*Coordinates and elevation data were obtained by Shearwater Systems, LLC using standard survey techniques

Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

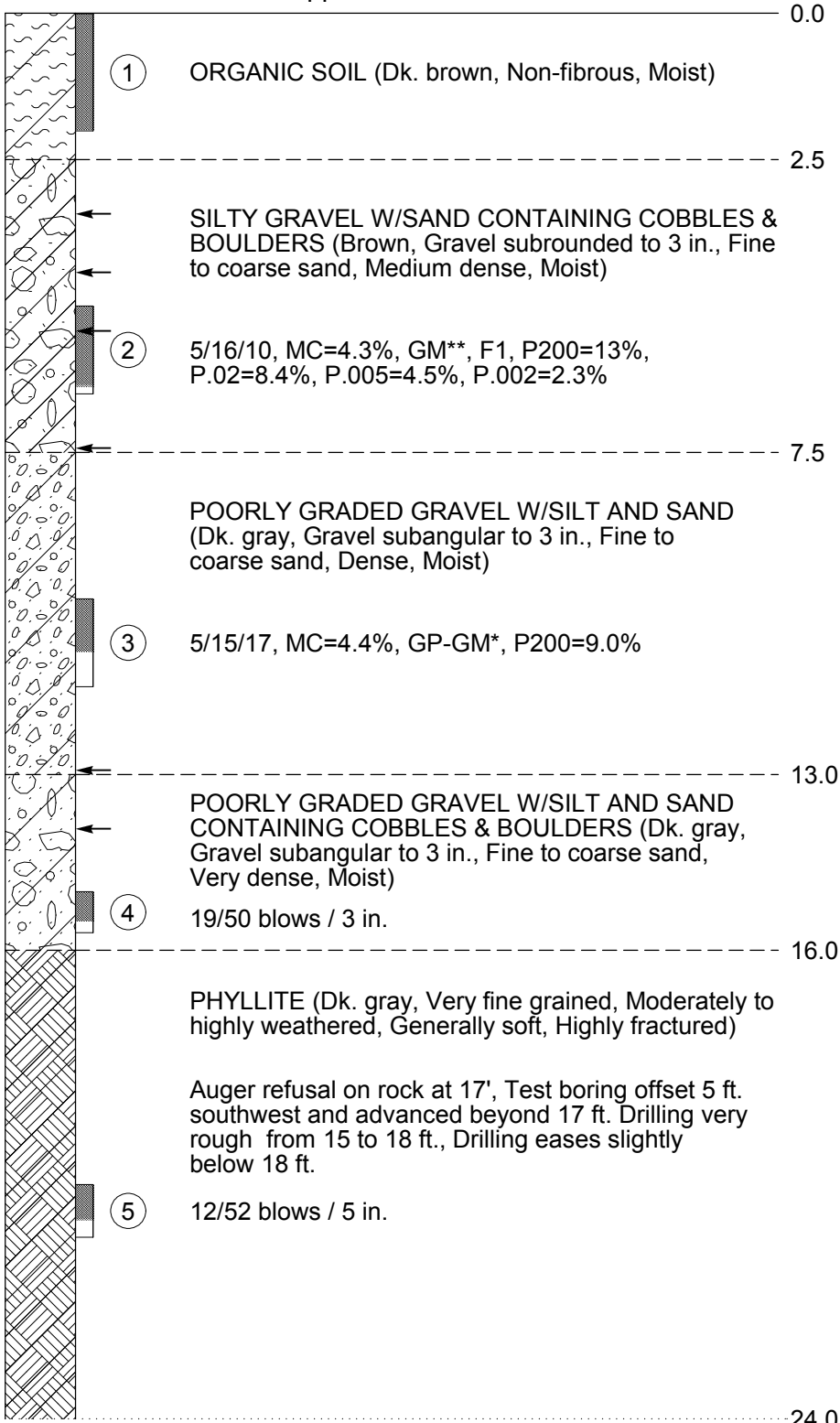
AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-06

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-16

RM12-07

LAT. 57.22288*
LON. 153.26435*
10/23/12 - 10/24/12

Approximate Surface Elevation 35 ft.



			DEPTH	ELEVATION
		0.0	0	34
G	1	ORGANIC SOIL (Dk. brown, Non-fibrous, Moist)		
		2.5	2	32
		SILTY GRAVEL W/SAND CONTAINING COBBLES & BOULDERS (Brown, Gravel subrounded to 3 in., Fine to coarse sand, Medium dense, Moist)	4	30
Sha	2	5/16/10, MC=4.3%, GM**, F1, P200=13%, P.02=8.4%, P.005=4.5%, P.002=2.3%	6	28
		7.5	8	26
		POORLY GRADED GRAVEL W/SILT AND SAND (Dk. gray, Gravel subangular to 3 in., Fine to coarse sand, Dense, Moist)	10	24
Sha	3	5/15/17, MC=4.4%, GP-GM*, P200=9.0%	12	22
		13.0	14	20
		POORLY GRADED GRAVEL W/SILT AND SAND CONTAINING COBBLES & BOULDERS (Dk. gray, Gravel subangular to 3 in., Fine to coarse sand, Very dense, Moist)		
Sha	4	19/50 blows / 3 in.	16	18
		16.0	18	16
		PHYLLITE (Dk. gray, Very fine grained, Moderately to highly weathered, Generally soft, Highly fractured)	20	14
18 ft. W.D.		Auger refusal on rock at 17', Test boring offset 5 ft. southwest and advanced beyond 17 ft. Drilling very rough from 15 to 18 ft., Drilling eases slightly below 18 ft.	22	12
Sha	5	12/52 blows / 5 in.		
		24.0	24	

(Continued on Next Page)

Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

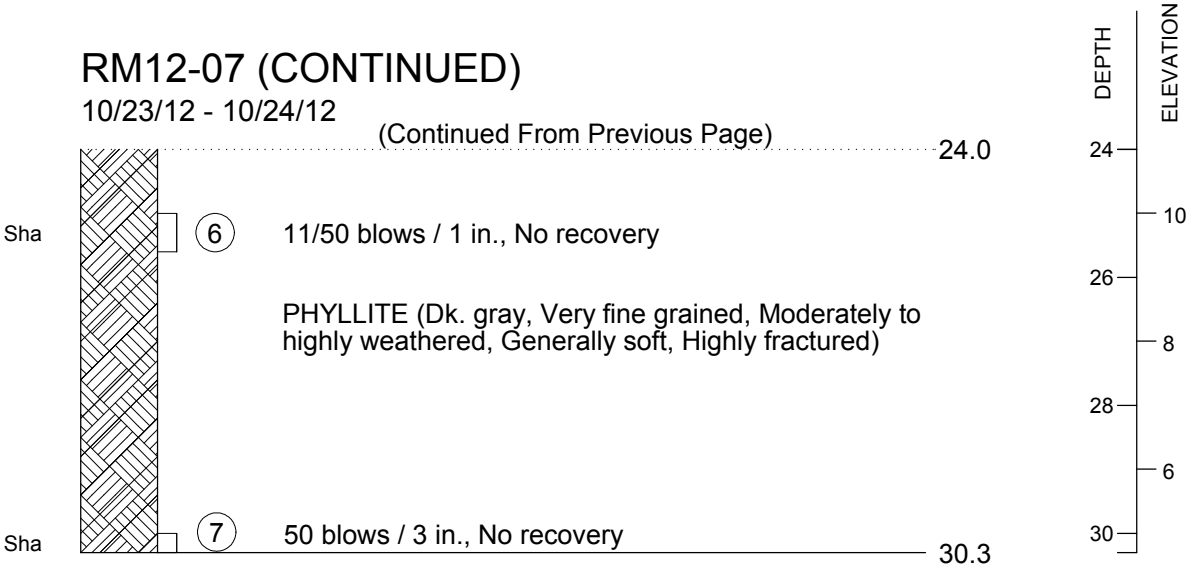
PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-07

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-17

RM12-07 (CONTINUED)

10/23/12 - 10/24/12



*Coordinates are presented in WGS84 and were obtained with a Garmin 60CSx GPS unit

**Estimated classification based in part on ASTM D 2488

Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

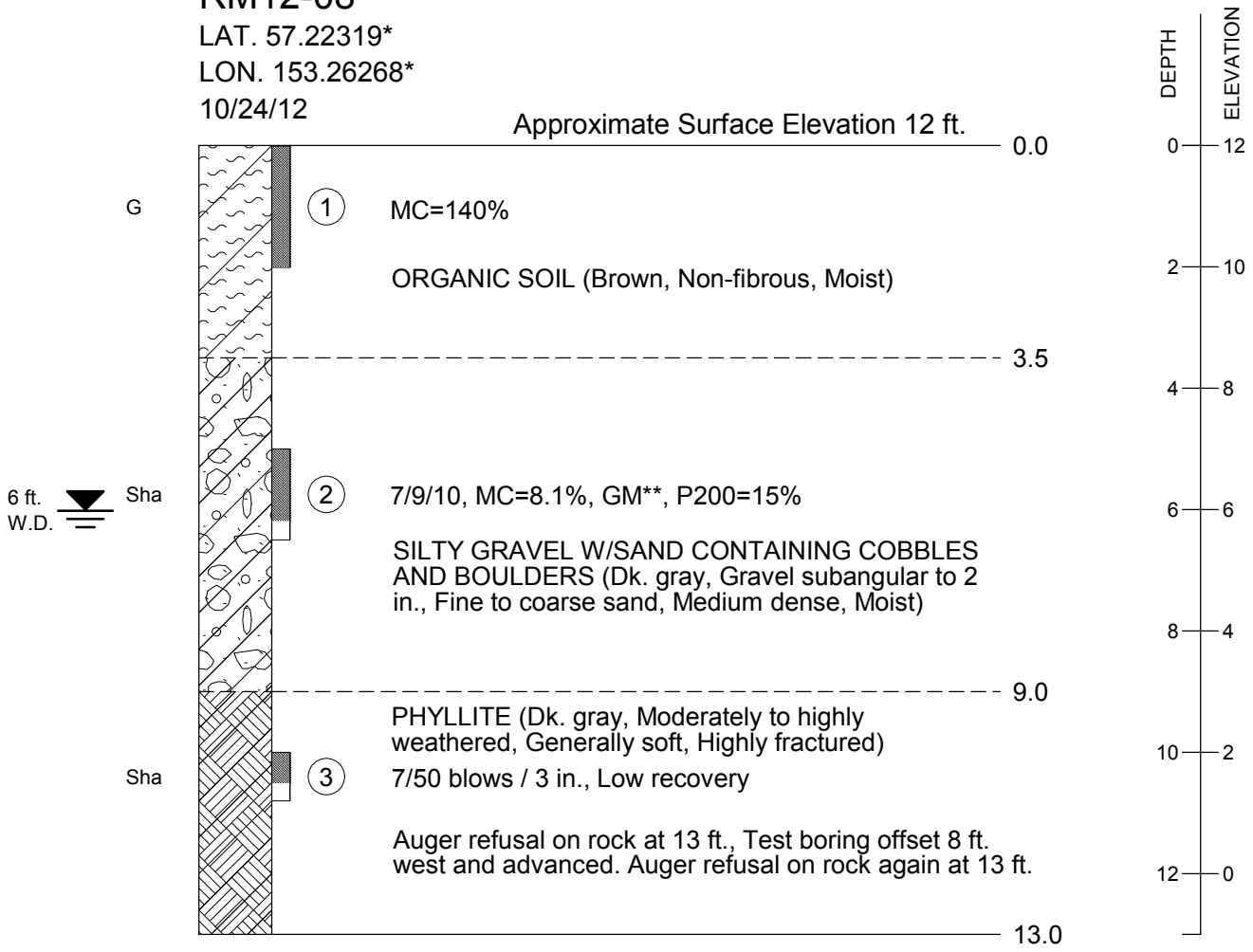
PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-07

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-18

RM12-08

LAT. 57.22319*
LON. 153.26268*
10/24/12



*Coordinates are presented in WGS84 and were obtained with a Garmin 60CSx GPS unit

**Estimated classification based in part on ASTM D 2488

Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

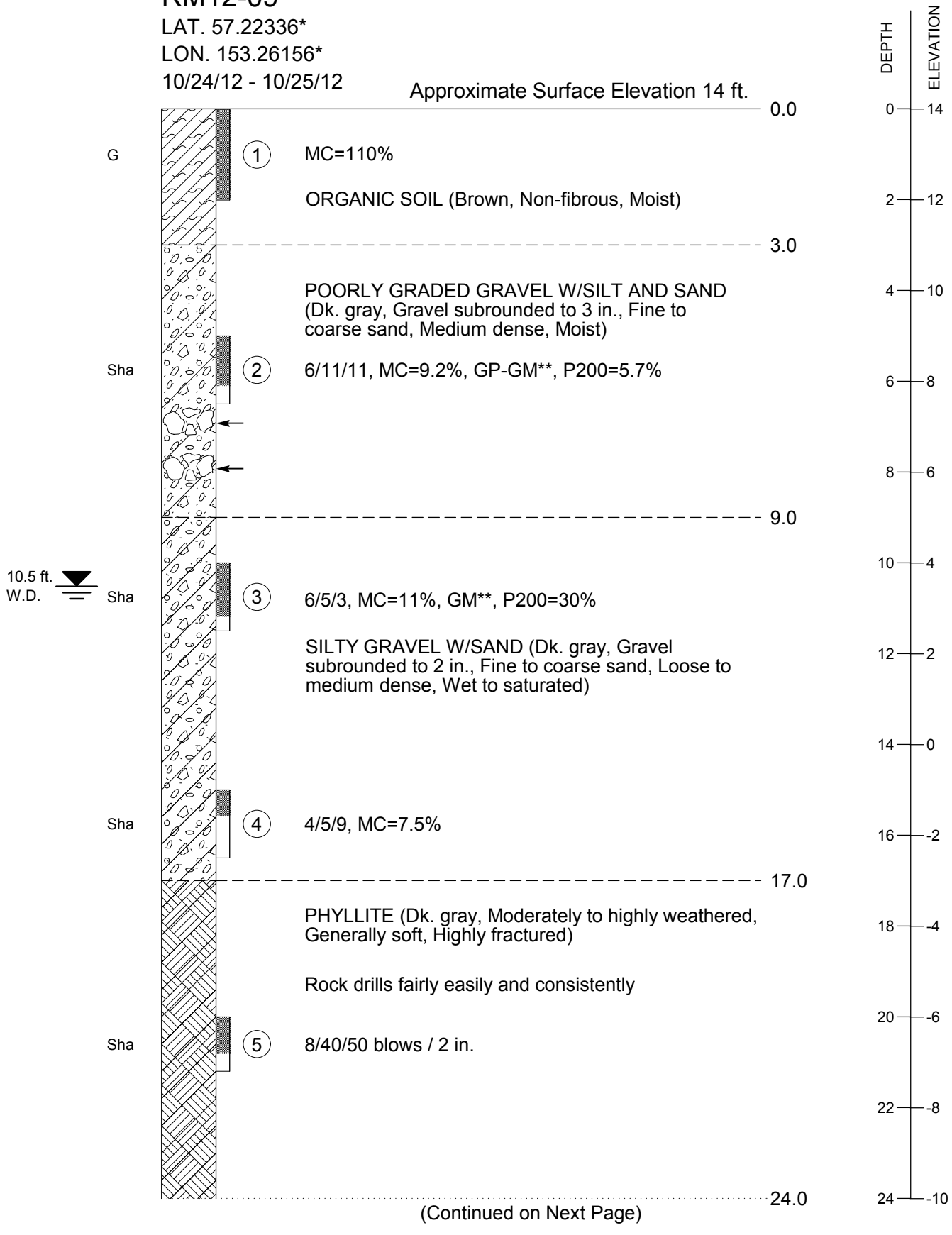
PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-08

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-19

RM12-09

LAT. 57.22336*
LON. 153.26156*
10/24/12 - 10/25/12



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Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-09

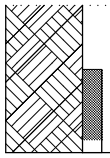
FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-20

RM12-09 (CONTINUED)

10/24/12 - 10/25/12

DEPTH / ELEVATION

(Continued From Previous Page) 24.0 / 24 / -10



PHYLLITE (Dk. gray, Moderately to highly weathered, Generally soft, Highly fractured)

Sha (6) 9/30/50 blows / 3 in.

26.3 / 26 / -12

*Coordinates are presented in WGS84 and were obtained with a Garmin 60CSx GPS unit

**Estimated classification based in part on ASTM D 2488

Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION

OLD HARBOR, ALASKA

LOG OF TEST BORING

RM12-09

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-21

RM12-10

LAT. 57.22403*
LON. 153.26122*
10/25/12

Approximate Surface Elevation 16 ft.

DEPTH	ELEVATION
0	16
2	14
4	12
6	10
8	8
10	6
12	4
14	2
16	0
18	-2
20	-4
22	-6
24	-8

0.0

G ① MC=100%

ORGANIC SOIL (Brown, Moist)

2.5

SILTY GRAVEL W/SAND (Dk. gray, Gravel subrounded to 2.5 in., Fine to coarse sand, Medium dense, Moist)

Sha ② 3/12/12, MC=8.2%, GM**, P200=15%

7.0

SILTY GRAVEL W/SAND CONTAINING COBBLES & BOULDERS (Dk. gray, Gravel subrounded to 3 in., Fine to coarse sand, Medium dense, Moist)

Sha ③ 4/12/12, MC=4.9%, GM**, P200=13%

13.0

SILTY GRAVEL W/SAND (Brown to gray, Gravel subrounded to 2 in., Fine to coarse sand, Moist to saturated)

Sha ④ 3/6/6, MC=7.5%

17 ft. W.D.

Sha ⑤ 6/50 blows / 2 in.

20.6

PHYLLITE (Dk. gray, Moderately to highly weathered, Generally soft, Highly fractured)

Rock drills consistantly slowly with slight auger action.

24.0

(Continued on Next Page)

Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-10

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-22

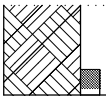
RM12-10 (CONTINUED)

10/25/12

DEPTH / ELEVATION

24 / -8

(Continued From Previous Page) 24.0



PHYLLITE (Dk. gray, Moderately to highly weathered, Generally soft, Highly fractured)

Sha (6) 50 blows / 5 in. 25.4

*Coordinates are presented in WGS84 and were obtained with a Garmin 60CSx GPS unit

**Estimated classification based in part on ASTM D 2488

Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION

OLD HARBOR, ALASKA

LOG OF TEST BORING

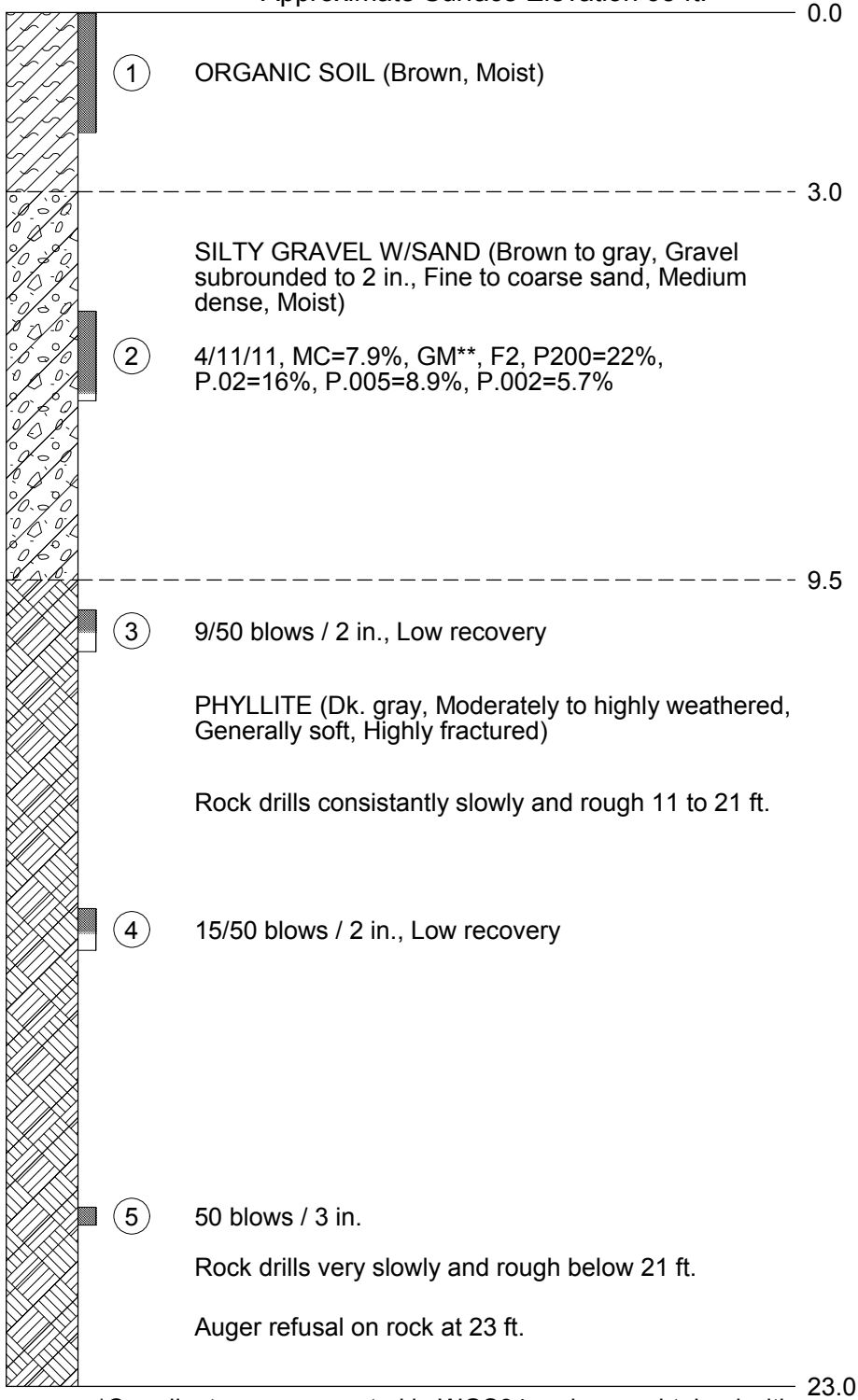
RM12-10

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-23

RM12-11

LAT. 57.22457*
LON. 153.25942*
10/25/12

Approximate Surface Elevation 65 ft.



G ① ORGANIC SOIL (Brown, Moist)

SILTY GRAVEL W/SAND (Brown to gray, Gravel subrounded to 2 in., Fine to coarse sand, Medium dense, Moist)

Sha ② 4/11/11, MC=7.9%, GM**, F2, P200=22%, P.02=16%, P.005=8.9%, P.002=5.7%

Sha ③ 9/50 blows / 2 in., Low recovery

PHYLLITE (Dk. gray, Moderately to highly weathered, Generally soft, Highly fractured)

Rock drills consistantly slowly and rough 11 to 21 ft.

Sha ④ 15/50 blows / 2 in., Low recovery

Sha ⑤ 50 blows / 3 in.

Rock drills very slowly and rough below 21 ft.

Auger refusal on rock at 23 ft.

*Coordinates are presented in WGS84 and were obtained with a Garmin 60CSx GPS unit

**Estimated classification based in part on ASTM D 2488

Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-11

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-24

RM12-12

LAT. 57.22453*
LON. 153.25879*
10/25/12

Approximate Surface Elevation 80 ft.

			DEPTH	ELEVATION
		0.0	0	80
G	1	ORGANIC SOIL (Brown, Trace gray ash, Moist)		
			2	78
		3.5	4	76
Sha	2	7/11/12, MC=7.3%, GM**, F2, P200=16%, P.02=12%, P.005=8.0%, P.002=5.9%	6	74
		SILTY GRAVEL W/SAND (Brown to gray, Gravel subrounded to 3 in., Fine to coarse sand, Medium dense, Moist)	8	72
Sha	3	5/50 blows / 2 in., MC=11%	10	70
		10.5		
		PHYLLITE (Dk. gray, Moderately to highly weathered, Generally soft, Highly fractured)	12	68
		Rock drills consistantly slowly and rough 10.5 to 30 ft.	14	66
Sha	4	50 blows / 3 in.	16	64
			18	62
Sha	5	50 blows / 2 in., No recovery	20	60
			22	58
		24.0	24	56

(Continued on Next Page)

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MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

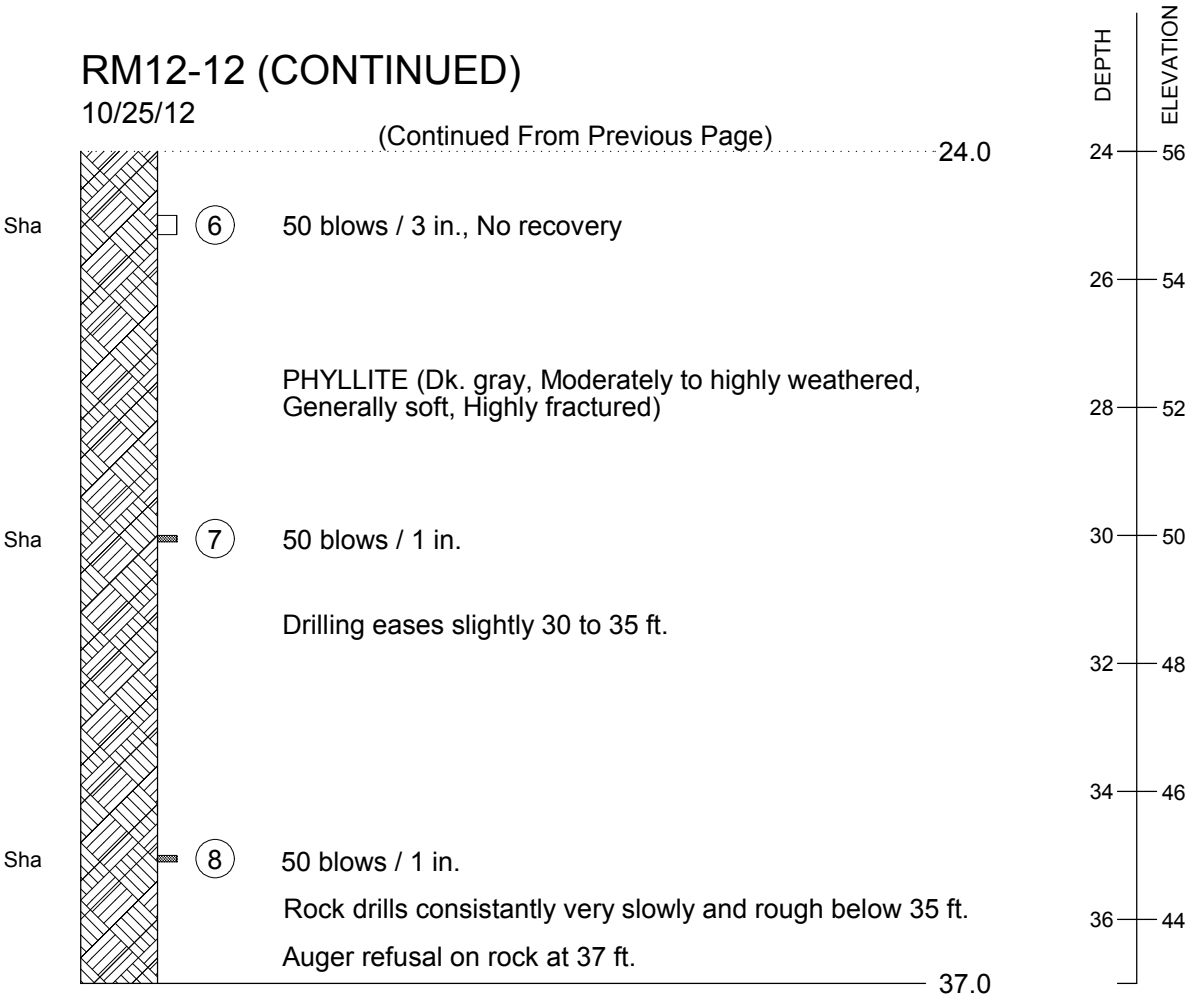
PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-12

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-25

RM12-12 (CONTINUED)

10/25/12



*Coordinates are presented in WGS84 and were obtained with a Garmin 60CSx GPS unit

**Estimated classification based in part on ASTM D 2488

Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

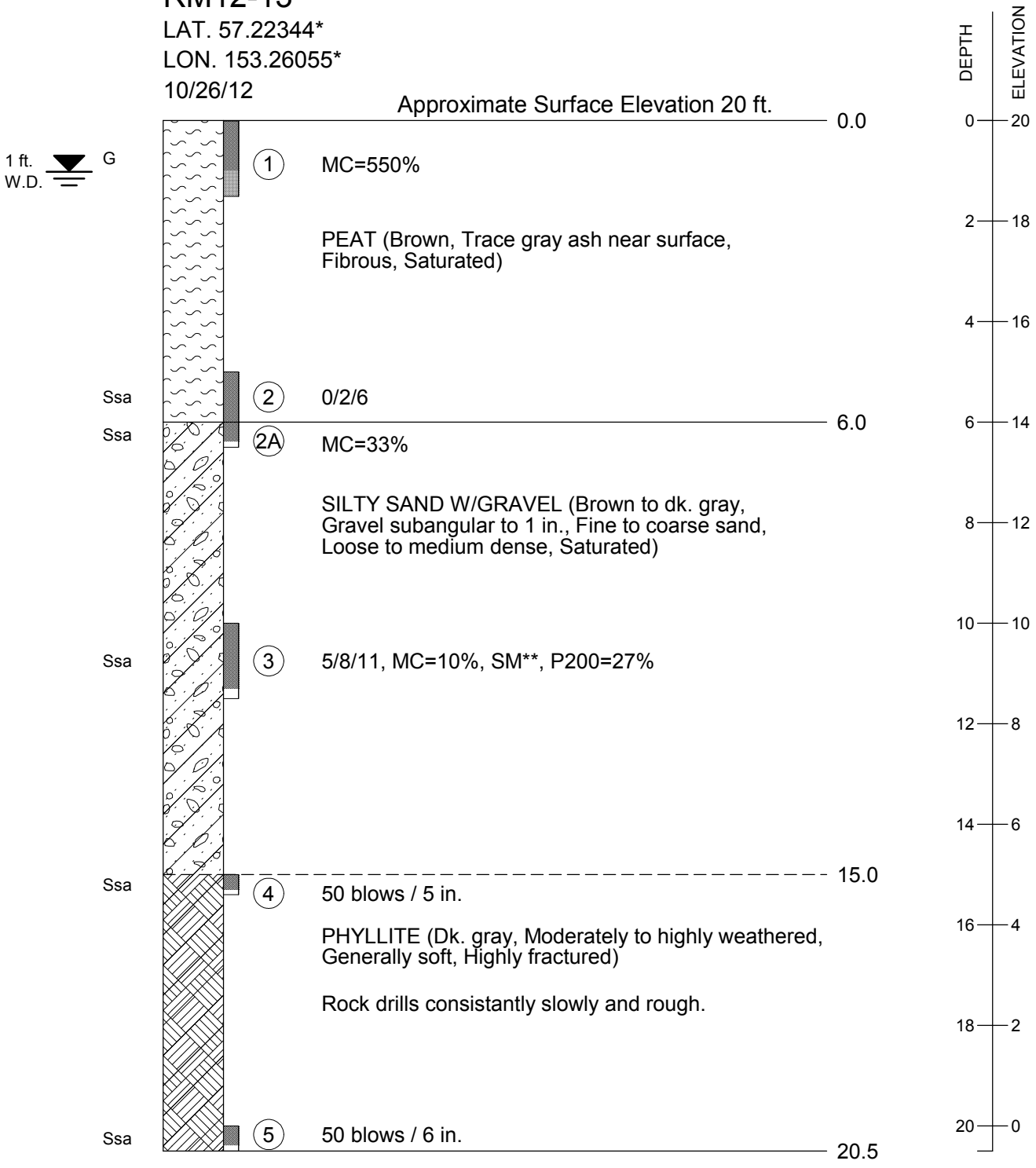
PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-12

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-26

RM12-13

LAT. 57.22344*
LON. 153.26055*
10/26/12



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Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

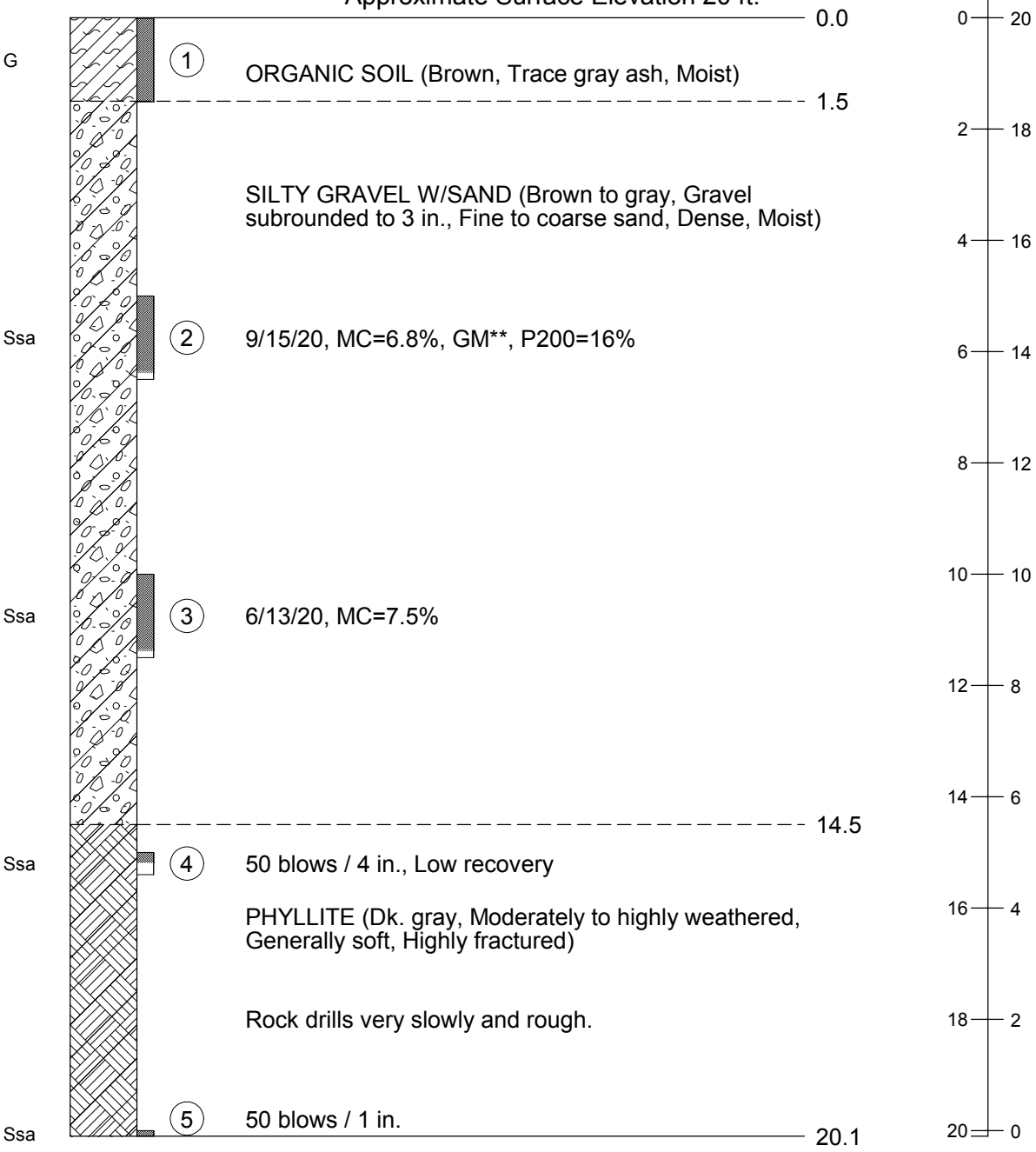
AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-13

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-27

RM12-14

LAT. 57.22284*
LON. 153.26193*
10/26/12

Approximate Surface Elevation 20 ft.



	0.0		Approximate Surface Elevation 20 ft.
G	1		ORGANIC SOIL (Brown, Trace gray ash, Moist)
	1.5		
			SILTY GRAVEL W/SAND (Brown to gray, Gravel subrounded to 3 in., Fine to coarse sand, Dense, Moist)
Ssa	2		9/15/20, MC=6.8%, GM**, P200=16%
Ssa	3		6/13/20, MC=7.5%
	14.5		
Ssa	4		50 blows / 4 in., Low recovery
			PHYLLITE (Dk. gray, Moderately to highly weathered, Generally soft, Highly fractured)
			Rock drills very slowly and rough.
Ssa	5		50 blows / 1 in.
	20.1		

*Coordinates are presented in WGS84 and were obtained with a Garmin 60CSx GPS unit

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Z:\PROJECT\1874.01 SHEARWATER OLD HARBOR AIRPORT GEOTECHNICAL INVESTIGATION\EARTH\GINT\OLD HARBOR AIRPORT GEOTECH LOGS.GPJ

MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

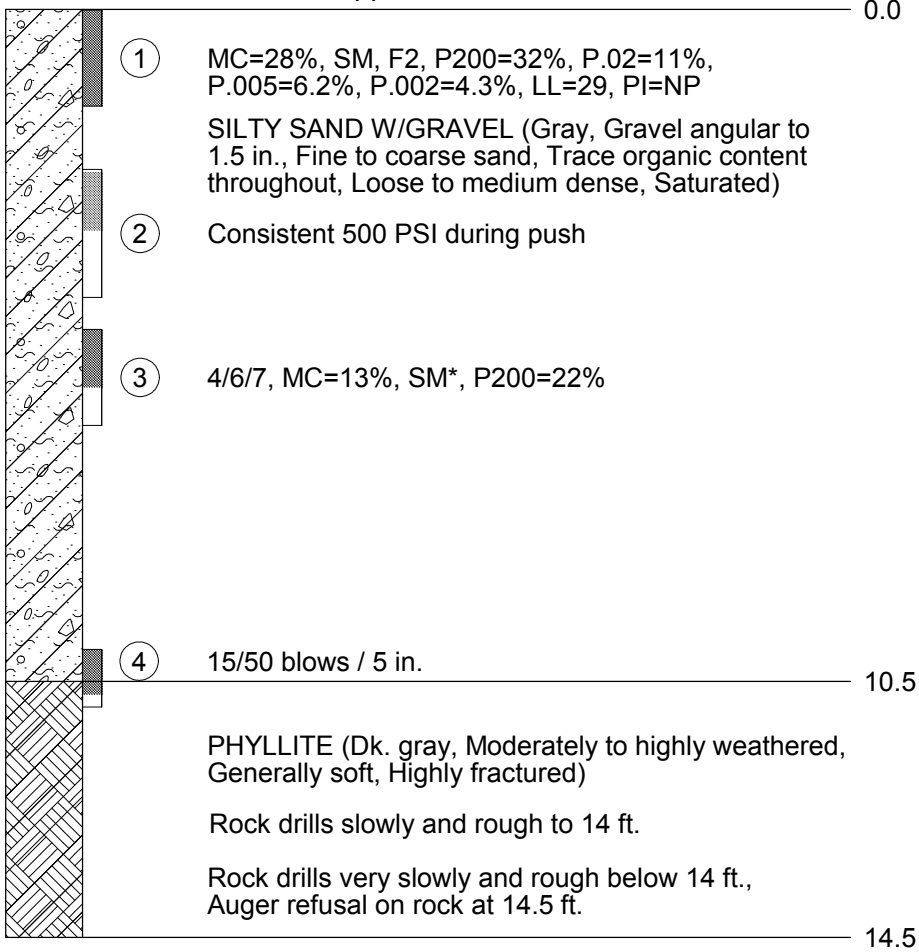
AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-14

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-28

RM12-15

LAT. 57.22195*
LON. 153.26239*
10/26/12

Approximate Surface Elevation -1 ft.



0.0

G ① MC=28%, SM, F2, P200=32%, P.02=11%, P.005=6.2%, P.002=4.3%, LL=29, PI=NP

SILTY SAND W/GRAVEL (Gray, Gravel angular to 1.5 in., Fine to coarse sand, Trace organic content throughout, Loose to medium dense, Saturated)

Ts ② Consistent 500 PSI during push

Ssa ③ 4/6/7, MC=13%, SM*, P200=22%

Ssa ④ 15/50 blows / 5 in.

10.5

PHYLLITE (Dk. gray, Moderately to highly weathered, Generally soft, Highly fractured)

Rock drills slowly and rough to 14 ft.

Rock drills very slowly and rough below 14 ft., Auger refusal on rock at 14.5 ft.

14.5

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MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

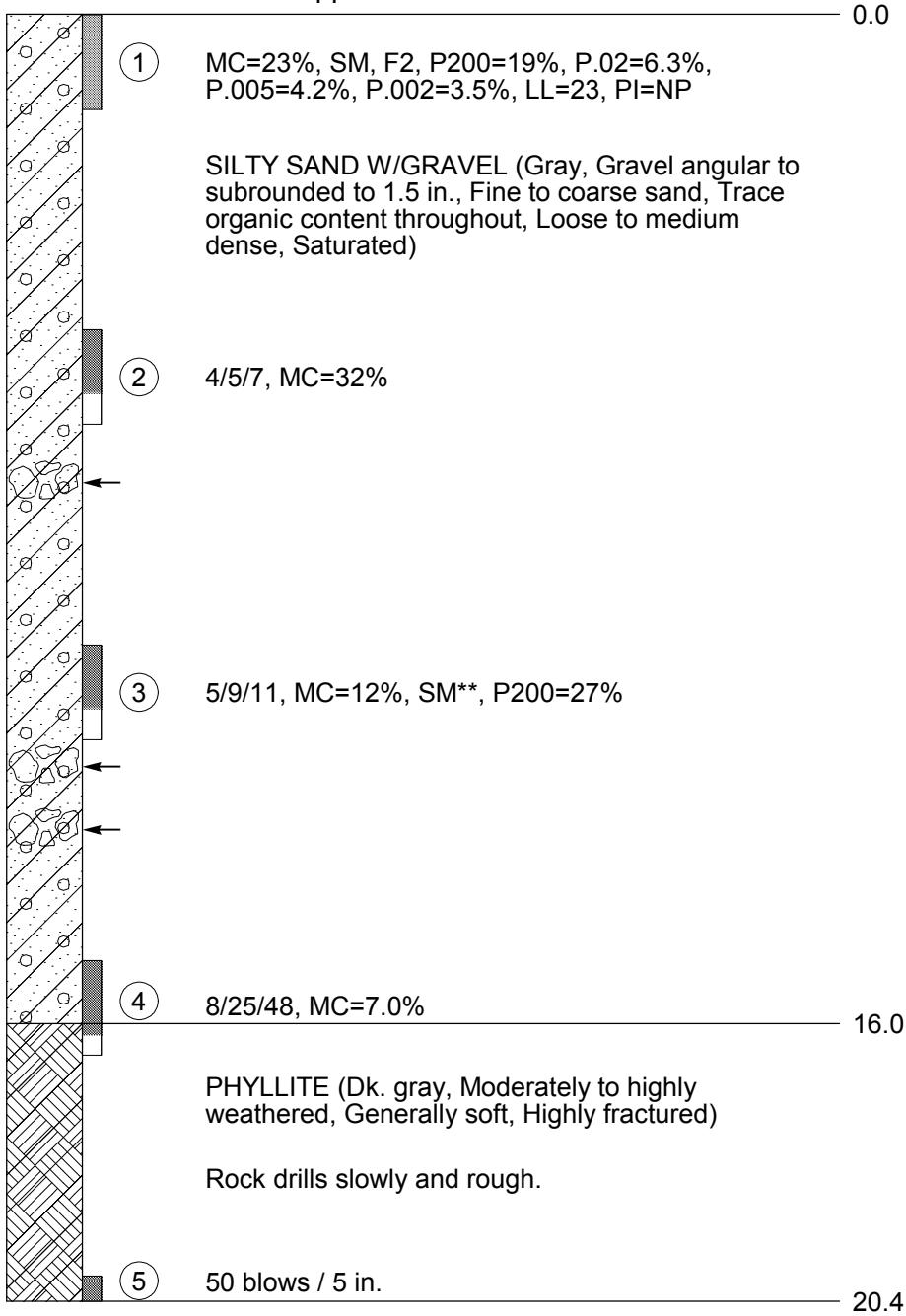
AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-15

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-29

RM12-16

LAT. 57.22368*
LON. 153.26206*
10/26/12

Approximate Surface Elevation 0 ft.



			DEPTH	ELEVATION
		0.0	0	0
G	1	MC=23%, SM, F2, P200=19%, P.02=6.3%, P.005=4.2%, P.002=3.5%, LL=23, PI=NP		
		SILTY SAND W/GRAVEL (Gray, Gravel angular to subrounded to 1.5 in., Fine to coarse sand, Trace organic content throughout, Loose to medium dense, Saturated)	2	-2
			4	-4
Ssa	2	4/5/7, MC=32%	6	-6
			8	-8
			10	-10
Ssa	3	5/9/11, MC=12%, SM**, P200=27%	12	-12
			14	-14
Ssa	4	8/25/48, MC=7.0%		
		16.0	16	-16
		PHYLLITE (Dk. gray, Moderately to highly weathered, Generally soft, Highly fractured)	18	-18
		Rock drills slowly and rough.		
Ssa	5	50 blows / 5 in.	20	-20
		20.4		

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MASTER ONE COL/PAGE OLD HARBOR AIRPORT GEOTECH LOGS.GPJ MASTER2.GDT 12/14/12

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	JAN. 13
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT GEOTECHNICAL INVESTIGATION
OLD HARBOR, ALASKA
LOG OF TEST BORING
RM12-16

FB:	NA
GRID:	KODIAK
PROJ.NO:	1874.01
DWG.NO:	B-30

SUMMARY OF LABORATORY SOILS DATA
OLD HARBOR AIRPORT EXTENSION

SAMPLE IDENTIFICATION			PARTICLE SIZE ANALYSIS (% FINER) **																MOIST. CONT.	ATTERBERG LIMITS		ASTM CLASS.	FROST CLASS.
			STANDARD SIEVE SIZE													(mm)							
BOREHOLE	NO.	DEPTH (FT.)	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#140	#200	.02	.005	.002	%	LL	PI		
RM12-01	1	0.0 - 1.0		100	88	76	68	52	44	30	20	14	11	9	6	5.5				2.3			GP-GM*	
RM12-01	2	5.0 - 6.5		100	87	83	78	62	53	37	24	16	12	10	7	6.2				3.6			GP-GM*	
RM12-01	3	10.0 - 11.5			100	92	84	71	64	45	28	17	11	9	6	5.4				1.1			GW-GM*	
RM12-01	4	15.0 - 16.5			100	95	92	75	67	48	31	19	13	10	7.0	6.5				0.9			GW-GM*	
RM12-02	1	0.0 - 2.0				100	98	93	89	70	44	29	22	18	14	13				1.6			SM*	
RM12-03	1	0.0 - 2.0			100	86	83	75	69	51	30	19	15	12	9	8.3				2.0			GP-GM*	
RM12-03	2	5.0 - 6.5		100	95	95	89	78	70	51	33	21	15	12	8	7.6				2.2			GW-GM*	
RM12-04	1	0.0 - 2.0				100	99	96	93	76	54	38	30	25	19	17				3.0			SM*	
RM12-05	1	0.0 - 2.0				100	96	84	76	55	38	26	21	17	14	12				3.3			GP-GM*	
RM12-05	2	5.0 - 6.5		100	91	88	86	80	73	56	38	24	17	13	9	8.4				3.7			SW-SM*	
RM12-06	1	0.0 - 2.0					100	98	95	81	63	48	39	33	26	23				6.8			SM*	
RM12-07	2	5.0 - 6.5		100	90	73	67	57	53	42	31	25	20	17	14	13	8.4	4.5	2.3	4.3			GM*	F1*
RM12-07	3	10.0 - 11.5			100	85	74	61	54	40	27	20	16	14	10	9				4.4			GP-GM*	
RM12-08	1	0.0 - 2.0																		140				
RM12-08	2	5.0 - 6.5			100	98	90	78	70	56	42	32	26	22	17	15				8.1			GM*	
RM12-09	1	0.0 - 2.0																		110				
RM12-09	2	5.0 - 6.5		100	88	88	83	77	73	63	46	28	16	11	7	5.7				9.2			GP-GM*	
RM12-09	3	10.0 - 11.5														30				11			GM*	
RM12-09	4	15.0 - 16.5																		7.5				
RM12-10	1	0.0 - 2.0																		100				
RM12-10	2	5.0 - 6.5		100	94	92	87	81	74	61	47	37	30	31	18	15				9.2			GM*	
RM12-10	3	10.0 - 11.5														13				5			GM*	
RM12-10	4	15.0 - 16.5																		7.5				
RM12-11	2	5.0 - 6.5		100	97	93	88	81	77	63	48	39	33	29	24	22	16	8.9	5.7	7.9			GM*	F2*
RM12-12	2	5.0 - 6.5	100	71	71	70	70	66	61	44	29	25	22	20	17	16	12	8.0	5.9	7.3			GM*	F2*
RM12-12	3	10.0 - 10.7																		11				
RM12-13	1	0.0 - 1.5																		550				
RM12-13	2A	6.0 - 6.5																		33				
RM12-13	3	10.0 - 10.5				100	98	93	87	74	63	53	45	40	31	27				10			SM*	
RM12-14	2	5.0 - 6.5			100	94	88	77	71	58	46	35	28	24	18	16				6.8			GM*	
RM12-14	3	10.0 - 11.5																		7.5				
RM12-15	1	0.0 - 1.5				100	96	83	79	68	56	49	44	40	30	23	11	6.2	4.3	28	29	NP	SM	F2
RM12-15	3	5.0 - 6.5				100	96	88	83	73	56	42	35	31	25	22				13			SM*	
RM12-16	1	0.0 - 1.5			100	99	97	92	87	76	62	53	46	40	26	19	6.3	4.2	3.5	23	23	NP	SM	F2
RM12-16	2	5.0 - 6.5																		32				
RM12-16	3	10.0 - 11.5				100	98	88	87	76	64	53	44	38	30	27				12			SM*	
RM12-16	4	15.0 - 16.5																		7.0				

* Soil Plasticity was estimated following ASTM D 2488 when the Atterberg limits were not tested.
** The maximum particle size of samples is limited by the I.D. of the sampler opening or the width of the auger flights.

Drilling Report (Discontinuities)

R&M CONSULTANTS, INC.

Borehole RM12-01
Project #1874.01

Client Shearwater Systems, LLC
Project Old Harbor Airport Geotechnical Investigation
Site Southwest Portion of North Cutslope

Depth (ft)		zone		# of discontinuities	Description	Discontinuity surface and shape												
from	to	broken	fragmented			Angle from perp core axis	slickensided	slick	smooth	rough	planar	curved	irregular	staining	filling	weathering	alteration	open (in)
24.1	25.6	X	X		Highly Fractured											S		
24.6					Joint					X			X			S		
26.3	26.4				Joint	60			X		X					S		
26.5	26.6				Joint	5									S	H	Y	3/4
26.6	26.8	X	X		Highly Fractured											S		
27.2	28				Joint	85			X		X					S		
27.3	28.1	X	X		Highly Fractured											S		
28.2	28.7	X			Joint	75			X		X					S		
28.7	29.4				Joint	70				X	X					S		
29.2	31.6	X	X		Highly Fractured											M		
31.6	33	X	X		Highly Fractured											M		
32	33.9		X	3	Joint Set	70			X		X					S		
33.4	34.9	X	X		Highly Fractured											S		
34	38.3				Joint	90			X				X			S		
34.9	36.6		X		Highly Fractured											M		
36.6	38	X	X		Highly Fractured											M		
38	39.9	X	X		Highly Fractured											H		
38.5	39				Joint					X			X		S	H	Y	1/8
39.7	40				Joint	65			X		X					S		
40.1	40.2				Joint	40				X	X					S		
41.1	41.6	X	X	2	Joint Set	25			X		X					S		
41.6	45.5	X			Joint	80			X							M		
43	46.3	X	X	4	Joint Set	70			X		X					S		
45.3	46.1	X	X		Highly Fractured											M		
46.1	47.8				Joint	90			X		X					M	Y	1/16
47					Joint	15				X	X					S		
47.2	51.1	X	X		Highly Fractured											M		
51.1	52.1		X		Highly Fractured											S		
51.6	52.6				Joint				X				X			S		
52.2	54				Joint	90			X				X			M	Y	1/16
52.5	55.1	X	X		Highly Fractured											M	Y	1/8
55.1	55.5		X		Highly Fractured											S		
55.1	56.6				Joint	90			X				X			S		
55.7					Joint					X			X			S		
56.6	57.4		X	2	Joint Set	80			X		X					M		
57.4					Joint	10			X		X					S		

Filling:
C- carbonate
CL- clay
K - chlorite
O - organics
Q - Quartz
S - silt

Staining:
B- brown
BL - black
G - green
H- hematite
L - limonite
R - oxidation

Weathering:
S- slightly
M - moderately
H - highly

Drilling Report (Discontinuities)

R&M CONSULTANTS, INC.

Borehole RM12-01
Project #1874.01

Client Shearwater Systems, LLC
Project Old Harbor Airport Geotechnical Investigation
Site Southwest Portion of North Cutslope

Depth (ft)		zone		# of discontinuities	Description	Discontinuity surface and shape												
from	to	broken	fragmented			Angle from perp core axis	slickensided	slick	smooth	rough	planar	curved	irregular	staining	filling	weathering	alteration	open (in)
57.4	59.4	X	X		Highly Fractured											M		
58.7	59.6				Joint	75			X		X					M	Y	1/16
59.9	60.4				Joint	75										M	Y	1/16
59.9	60.4	X	X		Highly Fractured											M		
60.4	61.6	X	X		Highly Fractured											M		
60.6	60.9				Joint								X			H		
61.1	61.5				Joint	60			X		X					S		
61.2	61.6				Joint	65			X		X					S		
61.6	63		X	4	Joint Set	75			X		X					M	Y	1/8
63					Joint	25			X		X					M		
63.4	64.6	X	X		Highly Fractured											M		
64	64.6	X			Highly Fractured											M		

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G - green
H- hematite
L - limonite
R - oxidation

Weathering:
S- slightly
M - moderately
H - highly

Drilling Report (Discontinuities)

R&M CONSULTANTS, INC.

Borehole RM12-02
Project #1874.01

Client Shearwater Systems, LLC
Project Old Harbor Airport Geotechnical Investigation
Site Central Portion of North Cutslope

Depth (ft)		zone		# of discontinuities	Description	Discontinuity surface and shape												
from	to	broken	fragmented			Angle from perp core axis	slickensided	slick	smooth	rough	planar	curved	irregular	staining	filling	weathering	alteration	open (in)
9.4	9.6	X	X		Highly Fractured									R		M		
9.4	10.1				Joint	75			X		X			R		M		
9.9	10.1				Joint	50			X		X			R		M		
10.3	10.4				Joint	40			X		X			R		M		
10.4	11	X	X		Highly Fractured									R		M		
11.5	12		X		Highly Fractured				X				X	R		M		
12.4	12.9				Joint	90				X			X			S		
12.7	12.9				Joint	30				X	X			R		M		
13.2	13.3				Joint	35				X	X					S		
13.6	13.8				Joint	55			X		X					S		
14	14.2				Joint	60			X		X					S		
14.8	15.1				Joint	60			X		X					S		
15.2	15.5		X		Highly Fractured									R		S		
15.8	16				Joint	40			X		X			R		S		
16.1	16.6				Joint					X		X		R		M		
17.6	17.7				Joint	35			X		X			R		M		
18.5	18.6				Joint	35			X		X			R		M		
18.9	19		X		Joint Set	45				X	X					M		
19.3	19.8	X			Joint					X			X	R		S		
20.1	20.3				Joint	60			X		X			R		S		
20.5	20.7				Joint	60			X		X					S		
21.1	21.3				Joint	55			X		X					M		1/8
21.5	21.8				Joint	60			X		X					S		
21.9	22.1				Joint	60			X		X					S		
22	22.5	X	X		Highly Fractured									R		S		
22	22.8				Joint					X			X			S		
23.2		X			Joint					X			X			M		
23.3	23.6				Joint	60			X		X					S		
24.1	24.3				Joint	60			X		X					S		
24.7	25.1				Joint	65			X		X					S		
25.5	25.8				Joint	70			X		X					S		
25.8	26				Joint					X			X	R		S		
26.7					Joint	10			X		X					S		
26.7	27				Joint	70			X		X					S		
27.6					Joint	5				X	X					S		
27.9	28.2				Joint					X			X	R		S		

Filling:
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Staining:
B- brown
BL - black
G - green
H- hematite
L - limonite
R - oxidation

Weathering:
S- slightly
M - moderately
H - highly

Drilling Report (Discontinuities)

R&M CONSULTANTS, INC.

Borehole RM12-02
Project #1874.01

Client Shearwater Systems, LLC
Project Old Harbor Airport Geotechnical Investigation
Site Central Portion of North Cutslope

Depth (ft)		zone		# of discontinuities	Description	Discontinuity surface and shape												
from	to	broken	fragmented			Angle from perp core axis	slickensided	slick	smooth	rough	planar	curved	irregular	staining	filling	weathering	alteration	open (in)
28.6	29.5	X	X	4	Joint Set	74										M		
29.7	29.9				Joint	60			X		X					M		
30.8	32	X	X	4	Joint Set								X			M	Y	1/4
32	33	X	X		Highly Fractured										S	H	Y	
33.6	34	X	X		Highly Fractured											M		
34.8	35				Joint	50			X		X					M	Y	1/4
35.3	35.5				Joint	50			X		X					M		
35.8	36.5	X	X		Joint											M		
36.5	36.7				Joint	50			X		X					M		
36.8	38.9				Joint	30			X		X					M		
37.3	38	X	X		Highly Fractured											M		
37.9	38.6				Joint	70				X	X					M		
38.6	40.2	X	X		Highly Fractured											M		
40.2	40.4	X	X		Highly Fractured											S		
41					Joint					X			X			S		
41.2	41.5				Joint	65			X		X					S		
41.9	42.2				Joint	65			X		X					S		
43.5					Joint					X			X			S		
44.6	44.7				Joint	50			X		X					M		
45.4	45.5				Joint	35				X			X			M		
45.7	46	X	X		Joint	70				X			X			M		
46.3	46.6	X	X		Joint	40				X			X			M		
46.6	47.5	X	X		Joint				X				X			M		
47.4	48				Joint				X			X				M		
48.1	48.2				Joint	25				X	X					M		
49.1	49.2				Joint	25			X		X					M		
49.2	49.5				Joint	55				X	X					M		
49.8	50.5				Joint	80				X			X			M		
50.9	51				Joint	70			X		X					M		
51.3	51.5	X	X		Highly Fractured											M		

Filling:
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Staining:
B- brown
BL - black
G - green
H- hematite
L - limonite
R - oxidation

Weathering:
S- slightly
M - moderately
H - highly

Drawing B-35

Drilling Report (Discontinuities)

R&M CONSULTANTS, INC.

Borehole RM12-03
Project #1874.01

Client Shearwater Systems, LLC
Project Old Harbor Airport Geotechnical Investigation
Site Eastern Portion of North Cutslope

Depth (ft)		zone				Discontinuity surface and shape												
from	to	broken	fragmented	# of discontinuities	Description	Angle from perp core axis	slickensided	slick	smooth	rough	planar	curved	irregular	staining	filling	weathering	alteration	open (in)
15	20.6	X	X		Highly Fractured											M		
21					Joint	30			X		X			R		M		
21	21.8	X	X		Highly Fractured											M		
21.8	22.4	X	X		Highly Fractured											M		
22.4					Joint					X			X			M		
22.8	23	X	X		Highly Fractured											M		
23	23.5				Joint				X			X				S		
23.4	24.9	X	X		Joint	80			X		X					M		
24.9	25				Joint	80			X		X					S		
24.9	25.1				Joint	35			X		X					S		
25.5					Joint					X			X			M		
25.6	26.1				Joint	70			X		X					S		
25.8	26.9		X		Joint	75			X		X					M		
26.5	28	X	X		Joint				X				X	R		M	Y	1/8
28	29.2	X	X		Highly Fractured											M		
29	30.8	X	X	3	Joint Set				X		X					M		
31.1		X			Joint					X			X			M		
31.5	32.5	X	X		Highly Fractured											M		
32.5	33.1		X	3	Joint Set											M		
33.1	34.8	X	X		Highly Fractured											M		
34.8	35.4	X			Joint	75			X		X					S		
35.3	36.5	X	X	2	Joint Set				X				X			S		
36.5	38.2	X	X		Highly Fractured											S		
37.2	38.4	X	X	2	Joint Set				X				X			S		
38.4	39				Joint				X			X				S		
39.2	40.4		X		Joint				X			X				M		
40.6	41.6	X	X		Joint				X				X			M		
41.9	42.2				Joint	65			X		X					M		
42.2	43.6	X	X		Joint				X				X			M		
43.6					Joint	15				X			X			S		
44.1	44.7				Joint				X			X				S		
44.2					Joint	10			X		X					S		
45.3	45.9	X	X		Joint	60			X		X					S		

Filling:
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Staining:
B- brown
BL - black
G - green
H- hematite
L - limonite
R - oxidation

Weathering:
S- slightly
M - moderately
H - highly

Drilling Report (Discontinuities)

R&M CONSULTANTS, INC.

Borehole RM12-04
Project #1874.01

Client Shearwater Systems, LLC
Project Old Harbor Airport Geotechnical Investigation
Site Southwestern Portion of South Cutslope

Depth (ft)		zone		# of discontinuities	Description	Discontinuity surface and shape												
from	to	broken	fragmented			Angle from perp core axis	slickensided	slick	smooth	rough	planar	curved	irregular	staining	filling	weathering	alteration	open (in)
15,5		X			Drill Break													
16.2					Joint	20			X		X					M		
16.2	17.3	X	X		Highly Fractured											M		
17.3	17.7		X	3	Joint Set	40			X		X					M		
18.3	18.4				Joint	25			X		X					S		
18.3	20.6	X	X		Highly Fractured										S	H	Y	
21.1					Joint	50			X		X					M		
21.1		X	X		Hammer Breaks													
21.5	21.9		X	3	Joint Set	60			X		X					M		
22.2	22.3				Joint	40			X		X					M		
22.3	22.4		X		Highly Fractured											M		
22.6					Joint	20				X	X					M		
22.6	23.3				Joint	70			X		X					M		
23					Joint	10			X		X					M		
23.6					Joint	15				X	X					S		
24.5	24.7				Joint	60			X		X					S		
25.1	25.4				Joint	60			X		X					S		
25.5	25.7				Joint	45			X		X					S		
26.7	27				Joint	50			X		X					S		
27.2	27.4				Joint	50			X		X					S		
28.7	28.9				Joint	60			X		X					S		
30.2	30.3				Joint	20				X	X					M		
30.3	30.4	X	X		Joint	65			X		X					M		
32.3	32.5	X	X		Joint	55			X		X					S		
33.7					Joint	20				X	X					S		
35.4	35.5				Joint	45				X	X					S		
35.6	35.7				Joint	40				X	X					S		
36.8	36.9				Joint	20			X		X					S		
37.3		X			Drill Break													
37.9	38.4				Joint	65				X	X					S		
39					Joint					X			X			S		
39.4					Joint					X			X			S		
40.5		X			Hammer Break													
41		X			Hammer Break													
42.2	42.5	X			Joint	50			X							S		
43.5	43.6	X			Joint	35				X	X					S		

Filling:
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Staining:
B- brown
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G - green
H- hematite
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R - oxidation

Weathering:
S- slightly
M - moderately
H - highly

Drilling Report (Discontinuities)

R&M CONSULTANTS, INC.

Borehole RM12-04
Project #1874.01

Client Shearwater Systems, LLC
Project Old Harbor Airport Geotechnical Investigation
Site Southwestern Portion of South Cutslope

Depth (ft)		zone			Description	Discontinuity surface and shape												
from	to	broken	fragmented	# of discontinuities		Angle from perp core axis	slickensided	slick	smooth	rough	planar	curved	irregular	staining	filling	weathering	alteration	open (in)
45	45.3				Joint	45				X	X					M		
45.6	46.3				Joint	70			X		X					S		
47.5	47.6				Joint					X			X			S		
47.5	48.1				Joint					X			X			M		
48.1					Joint					X			X			M		
48.9	49		X	2	Joint Set	40			X		X					M		
49.1	49.4				Joint	60			X		X					M		
49.7	49.9				Joint	10				X	X					M		
50	50.4				Joint	70				X	X					M		
50.3		X			Joint					X			X			M		
51.2	51.3	X	X	2	Joint Set	35			X		X					M		
51.5	51.8				Joint	65			X		X					M		
52.3		X			Drill Break													

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Drilling Report (Discontinuities)

R&M CONSULTANTS, INC.

Borehole RM12-05
Project #1874.01

Client Shearwater Systems, LLC
Project Old Harbor Airport Geotechnical Investigation
Site Central Portion of South Cutslope

Depth (ft)		zone				Discontinuity surface and shape												
from	to	broken	fragmented	# of discontinuities	Description	Angle from perp core axis	slickensided	slick	smooth	rough	planar	curved	irregular	staining	filling	weathering	alteration	open (in)
20.2	21.4				Joint				X			X				M		
20.8	21.2				Joint	70			X		X					M		
21.4					Joint	30				X			X			M		
21.4	23.6				Joint				X				X			M		
22.4	22.7	X	X		Highly Fractured											M		
23.1	23.7				Joint	70				X	X					M		
23.1	24.1	X	X		Highly Fractured											M		
23.8	24.2				Joint	60				X	X					M		
24.8	25.8	X	X		Highly Fractured											M		
24.8	26.2				Joint				X				X			M		
25.5	25.7				Joint	60				X	X					M		
26.4					Drill Break													
26.4	27.8				Highly Fractured					X			X			M		
27.6	28.1				Joint				X			X				M		
28.3	29.2				Joint				X			X				M		
29	30.1				Joint					X		X				H		
29.3	30.1	X	X		Highly Fractured											M		
30.3	31		X	3	Joint Set				X		X					S		
31	31.3	X	X		Joint	65			X		X					M		
31.5	31.7				Joint	55			X		X					M		
31.8	32.5				Joint				X			X				M		
31.5	31.8				Joint	65			X		X					M		
32.8	33.3				Joint	75			X		X					M		
33.3	33.7				Joint				X				X			M		
33.9	34.8				Joint				X				X			M		
34.5	35.4	X	X		Highly Fractured											M		
35.8	36.6				Joint	80			X		X					M		
37.7	38.2		X	2	Joint Set	60			X		X					S		
38.2	38.6	X	X		Highly Fractured											M		
38.4	39.8				Joint				X			X				M		
39.5	40.2				Highly Fractured											H		
40	40.4				Joint					X			X			M		
40.4	45.4	X	X		Highly Fractured											M		
45.4	48	X	X		Highly Fractured											M		
48					Joint	60					X	X				S		
49.8	50.5		X	2	Joint Set	70			X		X					S		

Filling:
C- carbonate
CL- clay
K - chlorite
O - organics
Q - Quartz
S - silt

Staining:
B- brown
BL - black
G - green
H- hematite
L - limonite
R - oxidation

Weathering:
S- slightly
M - moderately
H - highly

Drawing B-39

Drilling Report (Discontinuities)

R&M CONSULTANTS, INC.

Borehole RM12-05
Project #1874.01

Client Shearwater Systems, LLC
Project Old Harbor Airport Geotechnical Investigation
Site Central Portion of South Cutslope

Depth (ft)		zone		# of discontinuities	Description	Discontinuity surface and shape												
from	to	broken	fragmented			Angle from perp core axis	slickensided	slick	smooth	rough	planar	curved	irregular	staining	filling	weathering	alteration	open (in)
51.2	51.5				Joint	60			X		X					S		
51.6		X			Drill Break													

Filling:
C- carbonate
CL- clay
K - chlorite
O - organics
Q - Quartz
S - silt

Staining:
B- brown
BL - black
G - green
H- hematite
L - limonite
R - oxidation

Weathering:
S- slightly
M - moderately
H - highly

Drilling Report (Discontinuities)

R&M CONSULTANTS, INC.

Borehole RM12-06
Project #1874.01

Client Shearwater Systems, LLC
Project Old Harbor Airport Geotechnical Investigation
Site Northeastern Portion of South Cutslope

Depth (ft)		zone		# of discontinuities	Description	Discontinuity surface and shape												
from	to	broken	fragmented			Angle from perp core axis	slickensided	slick	smooth	rough	planar	curved	irregular	staining	filling	weathering	alteration	open (in)
15.2					Joint	25			X		X					S		
15.6	15.9				Joint	65			X		X					S		
16.5	16.6				Joint	20				X	X					S		
17.2	17.3				Joint	15				X	X					M		
17.7	18	X			Joint	60			X		X					M		
18.2	18.5	X	X		Highly Fractured											M		
18.9	19				Joint	25				X	X					S		
19.9	20				Joint	30			X		X					S		
20.9	21.2				Joint	60			X		X					S		
21.6					Joint					X		X				M		
22					Joint	15			X		X					M		
22.1	22.7				Joint	70			X		X					M		
22.4					Joint	15			X		X					M		
22.6	23.3	X	X		Joint	75			X		X					M		
23.4					Joint	10				X	X					M		
23.7	24.4		X	2	Joint Set				X			X				M		
24.6	24.7				Joint	25			X		X					M		
24.8	25.4				Joint	70			X		X					M		
25.8	26.3	X	X		Highly Fractured											M		
26.5	26.6				Joint	40			X		X					M		

Filling:
C- carbonate
CL- clay
K - chlorite
O - organics
Q - Quartz
S - silt

Staining:
B- brown
BL - black
G - green
H- hematite
L - limonite
R - oxidation

Weathering:
S- slightly
M - moderately
H - highly

APPENDIX C

GENERAL INFORMATION

SOILS
CONSISTENCY AND SYMBOLS

CLASSIFICATION: Identification and classification of the soil is accomplished in accordance with the ASTM version of the Unified Soil Classification System. When laboratory testing data on material passing the 75-mm sieve is available Standard D 2487 (Classification of Soils for Engineering Purposes) is used and when laboratory data is not available D 2488 Visual-Manual Procedure) is used. This classification system identifies three major soil divisions: coarse-grained soils, fine-grained soils, and highly organic soils. These three divisions are further subdivided into a total of 15 basic soils groups. Based on the results of visual observations and prescribed laboratory tests, a soil is catalogued according to the basic soil groups, assigned a group symbol(s) and name, and thereby classified. Flow charts contained in the two standards can be used to assign the appropriate group symbol(s) and name.

SOIL DENSITY/CONSISTENCY - CRITERIA: Soil density/consistency as defined below and determined by normal field and laboratory methods applies only to non-frozen material. For these materials, the influence of such factors as soil structure, i.e. fissure systems shrinkage cracks, slickensides, etc., must be taken into consideration in making any correlation with the consistency values listed below. In permafrost zones, the consistency and strength of frozen soil may vary significantly and inexplicably with ice content, thermal regime and soil type.

COHESIONLESS

Description	N * (blows/FT.)	Relative Density
Loose	0 - 10	0 to 40%
Medium Dense	10 - 30	40 to 70%
Dense	30 - 60	70 to 90%
Very Dense	>60	90 to 100%

* Standard Penetration "N": Blows per 12 inches of a 140-pound manual hammer (lifted with rope & cathead) falling 30 inches on a 2-inch O.D. split-spoon sampler except where noted.

COHESIVE

Consistency	Shear Strength (TSF)	Unconfined Compressive Strength (TSF)
Very Soft	0.0 - 0.25	0.0 - 0.5
Soft	0.25 - 0.5	0.5 - 1.0
Firm	0.5 - 1.0	1.0 - 2.0
Stiff	1.0 - 2.0	2.0 - 4.0
Very Stiff	2.0 - 4.0	4.0 - 8.0
Hard	OVER 4.0	OVER 8.0

KEY TO TEST RESULTS

DD - Dry Density
LL - Liquid Limit
MC - Moisture Content
Org - Organic Content
PI - Plastic Index
PL - Plastic Limit
PP - Pocket Penetrometer
P200 - % Passing No. 200 Screen
P.02 - % Passing 0.02 mm
SG - Specific Gravity
TV - Torvane

DWN:	B.M.M.
CKD:	R.M.P.
DATE:	GENERAL
SCALE:	NONE

PREPARED BY: R&M CONSULTANTS, INC.

GENERAL NOTES

FB:	N/A
GRID:	N/A
PROJ.NO:	GENERAL
DWG.NO:	C-01

STANDARD SYMBOLS

SYMBOL	NAME	PARTICLE SIZE	SYMBOL	NAME
	CLAY	< 0.002mm, Plastic		ORGANICS
	SILT	0.002mm, - #200		ICE
	SAND	#200, - #4		ICE W/SOIL INCLUSIONS
	GRAVEL	#4, - 3"		ICE LENSE IN SILT
	COBBLES & BOULDERS	3" - 12" & > 12"		ICE CRYSTALS IN CLAY

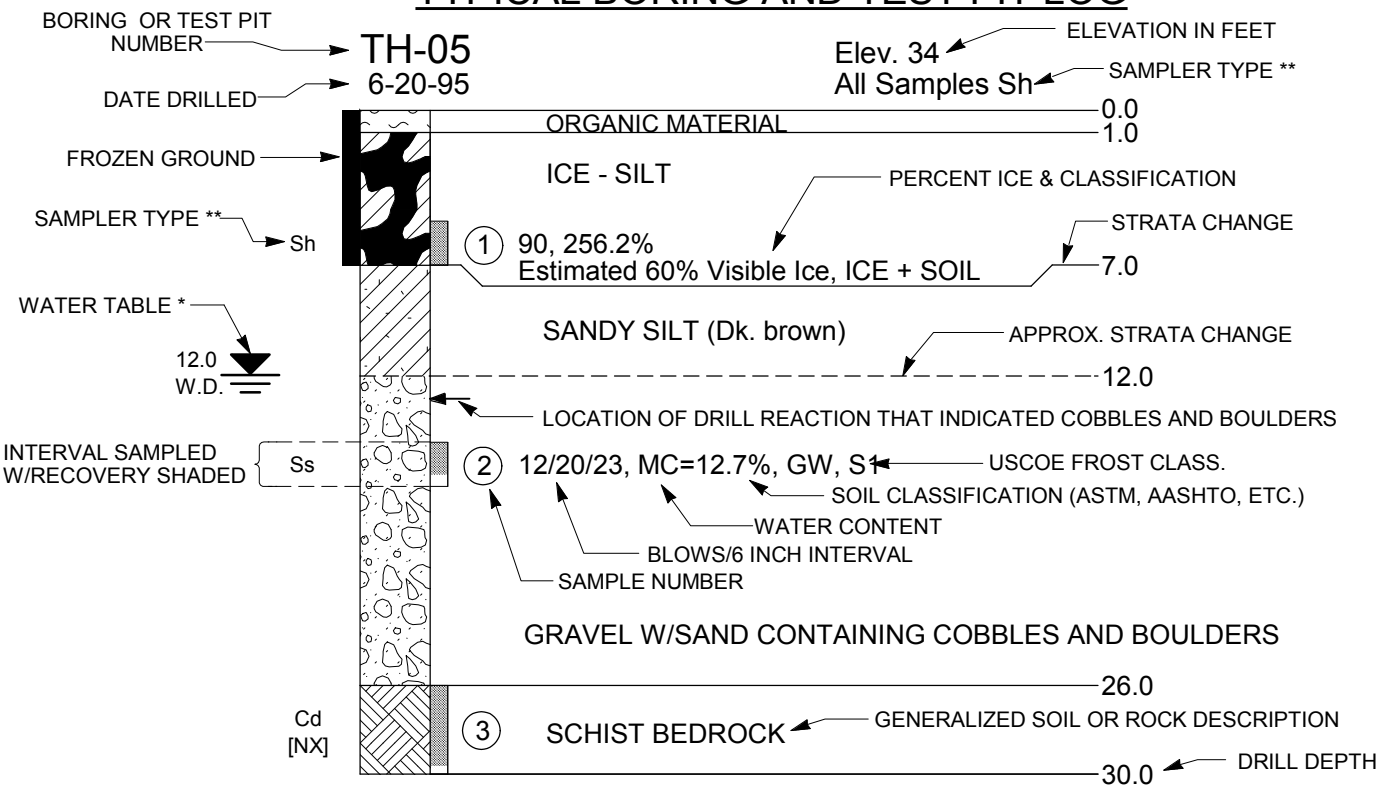
(The symbols shown above are frequently used in combinations, e. g. GRAVEL W/SILT AND SAND)

SAMPLER TYPE SYMBOLS

A	Auger Sample	Sh	2.5 In. Split Spoon w/340 lb. Manual Hammer	Sp	2.5 In. Split Spoon Pushed
C	Cuttings Sample	Sha	2.5 In. Split Spoon w/340 lb. Auto Hammer	Sz	1.4 In. Split Spoon w/340 lb. Hammer
Cd	Double Tube Core Barrel	Sl	2.5 In. Split Spoon w/140 lb. Hammer	Ts	Shelby Tube
Ct	Triple Tube Core Barrel	Ss	1.4 In. Split Spoon w/140 lb. Manual Hammer	Tm	Modified Shelby Tube
Cs	Single Tube Core Barrel	Ssa	1.4 In. Split Spoon w/140 lb. Auto Hammer	[x]	Sampler I. D. (Added to Symbol)
G	Grab Sample				

NOTE: Sampler types are either noted above the boring log or adjacent to it at the respective depth. An individual log may not utilize all of the items listed.

TYPICAL BORING AND TEST PIT LOG



* W.D. - WHILE DRILLING, A.B. - AFTER BORING, Ref. - SAMPLER REFUSAL
** - REFER TO SAMPLER SYMBOL (Ss, Sh, ETC.) FOR SAMPLER I.D. & HAMMER WEIGHT/TYPE
NOTE: Water levels shown on the boring logs are the levels measured in the boring at the times indicated.

DWN:	B.M.M.
CKD:	R.M.P.
DATE:	GENERAL
SCALE:	NONE

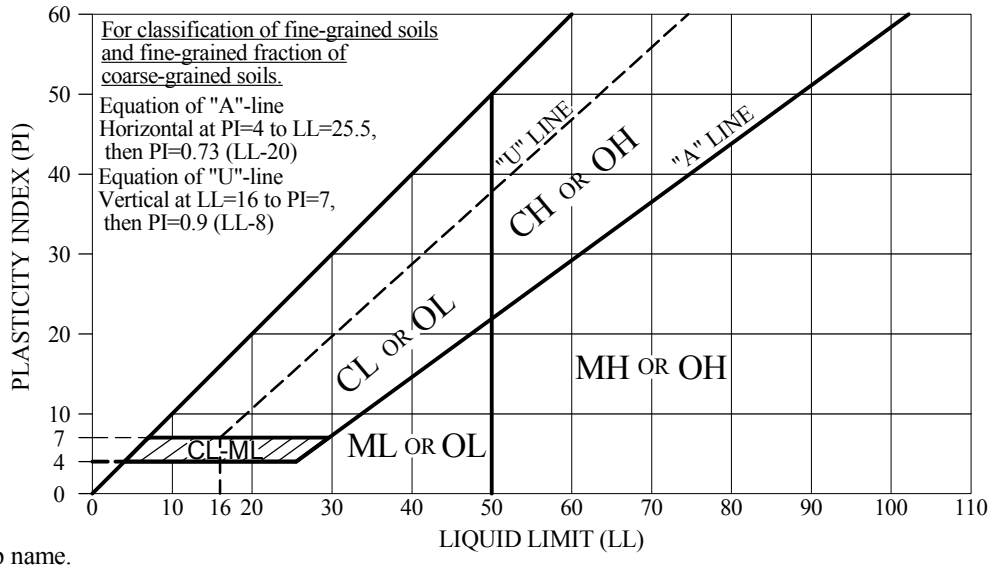
PREPARED BY: R&M CONSULTANTS, INC.

EXPLANATION OF SELECTED SYMBOLS

FB:	N/A
GRID:	N/A
PROJ.NO:	GENERAL
DWG.NO:	C-02

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification	
				Group Symbol	Group Name [B]
Coarse-grained Soils More than 50% retained on the No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]	GW	Well-graded gravel [F]
			$Cu < 4$ and/or $1 > Cc > 3$ [E]	GP	Poorly-graded gravel [F]
		Gravels with Fines More than 12% fines [C]	Fines classify as ML or MH	GM	Silty gravel [F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel [F,G,H]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5 % fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]	SW	Well-graded sand [I]
			$Cu < 6$ and/or $1 > Cc > 3$ [E]	SP	Poorly-graded sand [I]
		Sands with Fines More than 12 % fines [D]	Fines classify as ML or MH	SM	Silty sand [G,H,I]
			Fines classify as CL or CH	SC	Clayey sand [G,H,I]
Fine-grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid Limit less than 50	inorganic	PI > 7 and plots on or above "A" line [J]	CL	Lean clay [K, L, M]
			PI < 4 and plots below "A" line [J]	ML	Silt [K, L, M]
		organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OL	Organic Clay [K, L, M,N] / Organic Silt [K, L, M,O]
	Silts and Clays Liquid Limit 50 or more	inorganic	PI plots on or above "A" line	CH	Fat clay [K, L, M]
			PI plots below "A" line	MH	Elastic silt [K, L, M]
		organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OH	Organic Clay [K, L, M,P] / Organic Silt [K, L, M,Q]
Highly organic soils	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravel with 5 to 12 % fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly-graded gravel with silt
GP-GC poorly-graded gravel with clay
[D] Sands with 5 to 12 % fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly-graded sand with silt
SP-SC poorly-graded sand with clay
[E] $Cu = D_{60} / D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$
[F] If soil contains ≥ 15% sand, add "with sand " to group name.
[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H] If fines are organic, add "with organic fines" to group name.
[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.
[J] If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.
[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L] If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥ 4 and plots on or above "A" line.
[O] PI < 4 and plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.



DWN:	B.M.M.
CKD:	R.M.P.
DATE:	GENERAL
SCALE:	NONE

PREPARED BY: R&M CONSULTANTS, INC.

CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES ASTM D 2487

FB:	N/A
GRID:	N/A
PROJ.NO:	GENERAL
DWG.NO:	C-03

CLASSIFICATION[1] OF SOILS WITH ORGANIC MATTER

PEAT (Pt): Soil comprised of predominantly organic carbon fibers (macroscopic) and/or decayed (microscopic) vegetal matter. Peat is generally dark brown to black, with a very spongy feel and strong organic odor; typically, the ash content (ASTM D 2974) is <20%, the moisture content is >500%, the fiber content is >50% (by volume), the specific gravity is <1.7, and the dry unit weight is <17 pounds per cubic-foot (pcf).

PEATY-ORGANIC SOIL (PtO): Transitional soil group comprised of significant proportions, by mass, of both mineral particles and organic carbon fibers and/or decayed vegetal matter. Peaty-Organic Soil is generally light brown to black, with a spongy feel and organic odor; typically, the ash content ranges from 20 to 40%, the moisture content is between 150 and 800%, the fiber content is <50%, the specific gravity ranges from 1.6 to 1.9, and the dry unit weight is between 11 and 19 pcf.

ORGANIC SOIL (O): Soil comprised predominately of mineral particles, with a fraction of organic matter sufficient to notably effect the geotechnical properties (i.e. plasticity, dry strength and compactability). Most of the organic matter formed in-place (sedentary deposit), and is typically comprised of microscopic particles (the fiber content is often insignificant). Organic Soil is generally brown to blackish-brown, and soft to loose; typically, the ash content ranges from 40 to 95%, the moisture content is between 100 and 500%, the specific gravity is >1.7, the liquid limit is >50% and/or the liquid limit measured on an oven-dried sample ("Dry Preparation") is <70% of the liquid limit measured on a fresh sample ("Wet Preparation"), and the dry unit weight is >13 to 15 pcf.

MINERAL SOIL WITH ORGANIC CONTENT (oUSC)[2]: Transitional soil group consisting predominately of mineral constituents with a small fraction of organic matter which may, under certain conditions, effect the geotechnical properties. Most of the organic matter is macroscopic and likely formed in-place; but may also include roots, or fibrous particles that likely originated elsewhere and were transported to the site by wind or very low energy lacustrine-environment (sedimentary deposit). The soil color and odor is often not effected by the organic matter; typically, the ash content ranges from 90 to 99%, the moisture content is <100%, the specific gravity is >2.4, and the liquid limit is <50%.

MINERAL SOIL (USC): Soil is comprised predominately of mineral particles, but may contain a trace of organic (or apparent organic) matter that has no significant effect on the geotechnical properties. Ash contents are typically >97 to 99%, and the loss of mass may be more from ignition of interstitial water or non-vegetal, carbon-based matter. Most of the organic matter likely originated elsewhere and was transported to the site by wind or very low energy lacustrine-environment, and is typically comprised of fine-woody particles or roots.

[1] Callout (Group Symbol) for a general stratigraphic unit consisting predominately of this type soil.

[2] Use an annotated group symbol; a small caps "o", proceeded by the mineral constituents based on the Unified Soil Classification (USC) System (following ASTM D 2487, Classification of Soil for Engineering Purposes).

DWN:	B.M.M.
CKD:	R.M.P.
DATE:	GENERAL
SCALE:	NTS

PREPARED BY: R&M CONSULTANTS, INC.

CLASSIFICATION OF SOILS WITH ORGANIC MATTER

FB:	NA
GRID:	NA
PROJ.NO:	GENERAL
DWG.NO:	C-04

U.S. ARMY CORPS OF ENGINEERS
FROST DESIGN SOIL CLASSIFICATION

FROST GROUP	KIND OF SOIL	PERCENTAGE FINER THAN 0.02 mm BY WEIGHT	TYPICAL SOIL TYPES UNDER UNIFIED SOIL CLASSIFICATION SYSTEM
NFS*	(a) Gravels Crushed Stone Crushed Rock	0 - 1.5	GW, GP
	(b) Sands	0 - 3	SW, SP
PFS+	(a) Gravels Crushed Stone Crushed Rock	1.5 - 3	GW, GP
	(b) Sands	3 - 10	SW, SP
S1	Gravelly Soils	3 - 6	GW, GP, GW-GM, GP-GM
S2	Sandy Soils	3 - 6	SW, SP, SW-SM, SP-SM
F1	Gravelly Soils	6 - 10	GM, GW-GM, GP-GM
F2	(a) Gravelly Soils	10 - 20	GM, GW-GM, GP-GM
	(b) Sands	6 - 15	SM, SW-SM, SP-SM
F3	(a) Gravelly Soils	Over 20	GM, GC
	(b) Sands, Except Very Fine Silty Sands	Over 15	SM, SC
	(c) Clays, PI>12	--------	CL, CH
F4	(a) All Silts	--------	ML, MH
	(b) Very Fine Silty Sand	Over 15	SM
	(c) Clays PI<12	--------	CL, CL-ML
	(d) Varved Clays and Other Fine-grained Banded Sediments	--------	CL, CL-ML CL and ML CL, ML, and SM; CL, CH and ML; CL, CH, ML and SM

* Non-frost-susceptible

\+ Possibly frost-susceptible, but requires laboratory test to determine frost design soils classification.

From: "Seasonal Frost Conditions", June, 1992, U.S. Army Corps of Engineers TM-5-822-5.

DWN:	B.M.M.
CKD:	R.M.P.
DATE:	GENERAL
SCALE:	NONE

PREPARED BY: R&M CONSULTANTS

FROST DESIGN SOIL CLASSIFICATION

FB:	N/A
GRID:	N/A
PROJ.NO:	GENERAL
DWG.NO:	C-05

ROCK CORE DESCRIPTORS

WEATHERING

F- Fresh: No visible sign of weathering.

FW- Faintly weathered: weathering limited to the surface of major discontinuities.

SW- Slightly weathered: penetrative weathering developed on open discontinuity surfaces but only slight weathering of rock material.

MW- Moderately weathered: weathering extends throughout the rock mass but the rock material is not friable.

HS- Highly weathered: rock is wholly decomposed and in a friable condition but the rock texture and structure are preserved.

RS- Residual soil: a soil material with the original texture, structure and mineralogy of the rock completely destroyed (includes fault gouge).

HARDNESS

Very Hard (VH) - Cannot be scratched with knife or sharp pick. Breaking of hand specimens requires several hard blows of geologist's pick.

Hard (H) - Can be scratched with knife or pick only with difficulty. Hard blow of hammer required to detach hand specimen.

Moderately Hard (MH) - Can be scratched with knife or pick. Gouges or grooves to ¼-inch deep can be excavated by hard blow of point of a geologist's pick. Hand specimens can be detached by moderate blow.

Medium (M) - Can be grooved or gouged to 1/16-inch deep by firm pressure on knife or pick point. Can be excavated in small chips to pieces about one inch maximum size by hard blows of the point of a geologist's pick.

Soft (S) - Can be gouged or grooved readily with knife or pick point. Can be excavated in chips to pieces several inches in size by moderate blows of a pick point. Small thin pieces can be broken with finger pressure.

Very Soft (VS) - Can be carved with knife. Can be excavated readily with point of pick. Pieces one inch or more in thickness can be broken with finger pressure. Can be scratched readily by fingernail.

FRACTURE SPACING

F1- Wide; fracture spacing greater than three feet.

F2- Moderately close: fracture spacing eight inches to three feet.

F3- Close: fracture spacing four inches to eight inches.

F4- Very Close: fracture spacing two inches to four inches.

F5- Extremely Close: fracture spacing less than two inches.

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	GENERAL
SCALE:	NA

PREPARED BY: R&M CONSULTANTS, INC.

ROCK CORE DESCRIPTORS

FB:	NA
GRID:	NA
PROJ.NO:	GENERAL
DWG.NO:	C-06

Rock Quality Designation (RQD) method of determining rock quality generally applies to core of approximately NX size and is as follows: Count only those pieces of core which are four inches (10 cm) in length or longer and which are hard and sound. Sum up the total length of core recovered in each run. The sum is then represented as a percentage over the entire length of the run. If the core is broken by handling or by the drilling process, the fresh broken pieces are fitted together and counted as one piece provided that they form the requisite length of four inches (10 cm).

RELATION OF RQD AND ROCK QUALITY

RQD (%)	DESCRIPTION OF ROCK QUALITY
0-25	Very Poor
25-50	Poor
50-75	Fair
75-90	Good
90-100	Excellent

CORE RECOVERY CRITERIA

During the diamond core drilling process, the bit cuttings are removed by fluid circulation. The sample which passes up into the core barrel may be classified into three categories:

(a) Solid core;

(b) Fragmental material;

(c) Additional material which may have been lost from the previous core run. This may be the core stump left when the barrel was pulled or material dropped from the core barrel during its withdrawal from the hole or cuttings which have settled when circulation of drilling fluid was stopped.

Core may have been lost by erosion of the soft or friable material resulting in a reduction in the diameter or length of core or both. This eroded material may be entirely removed by the drilling fluid.

The material which is placed in the core box consists of items (a), (b), and (c), above and is strictly defined as the total core recovery. Core recovery is expressed as a percentage of the total run length. If no material is lost then the total core recovery is 100 percent.

Core recovery may be correlated with rock soundness, but other possible influences must be considered, i.e. circulation loss, rock fractures, core barrel blockages, bit condition and type, down pressure, and operator experience.

DWN:	B.M.M.
CKD:	R.M.P.
DATE:	GENERAL
SCALE:	NA

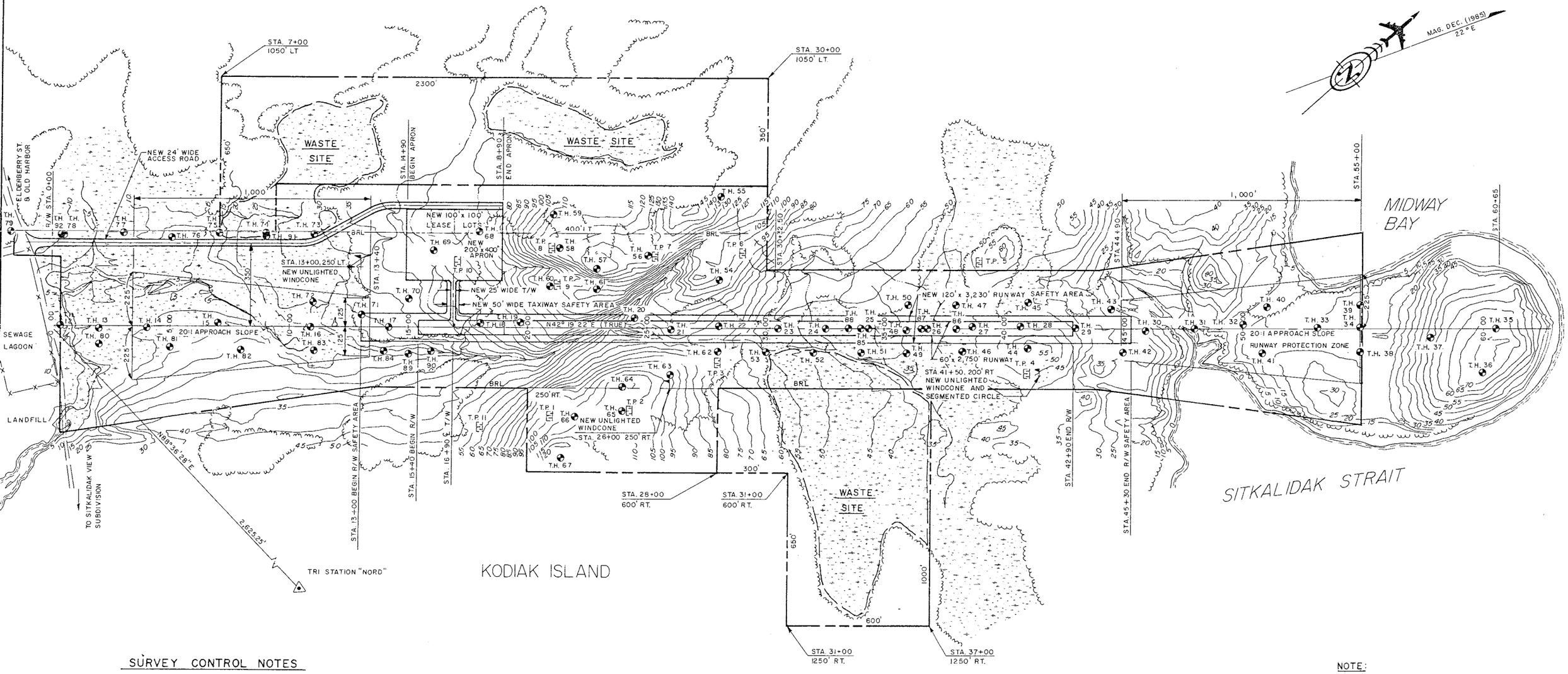
PREPARED BY: R&M CONSULTANTS, INC.

ROCK CORE DESCRIPTORS

FB:	NA
GRID:	NA
PROJ.NO:	GENERAL
DWG.NO:	C-07

APPENDIX D

PREVIOUS GEOTECHNICAL INVESTIGATION



SURVEY CONTROL NOTES

1. BEARINGS AND STATIONS ARE TRUE.
2. COORDINATES ARE SHOWN IN ALASKA STATE PLANE COORDINATES (Y, X) FOR ALASKA ZONE 5.
3. ALASKA STATE PLANE DATA IS TAKEN FROM THE NATIONAL GEODETIC SURVEY DATA SHEET DATED JAN., 1977 FOR TRIANGULATION STATION "NORD" (Y= 1,174,412.57 X= 645,862.74).
4. TO CONVERT FROM ALASKA STATE PLANE COORDINATES TO TRUE BEARINGS AND DISTANCES:
   a) ADD 0°37'07" CONVERGENCY TO AZIMUTH
   b) MULTIPLY THE DISTANCE BY 1.000075266.
5. VERTICAL DATUM IS BASED ON MEAN SEA LEVEL.
6. MLLW IS 4.40' BELOW MSL – NOS NOAA PUBLISHED DATUM FOR PORT HOBRON, SITKALIDAK ISLAND, AK.

LEGEND

- LOWLANDS
- PROPERTY BOUNDARY
- EASEMENT BOUNDARY
- WASTE LIMITS
- APPROXIMATE TREE & BRUSH LIMIT
- STREAM
- EXISTING FENCE
- (T.H.) TEST HOLE LOCATION
- (T.P.) TEST PIT LOCATION

SURVEY MONUMENTATION

STATION	OFFSET	ELEV	COMMENT
0+00	℄	7.75	ALUMINUM CAP
0+00	100' LT.	7.71	ALUMINUM CAP
0+00	200' LT.	4.74	ALUMINUM CAP
30+32.50	℄	52.34	ALUMINUM CAP
30+32.50	100' LT.	54.53	ALUMINUM CAP
30+32.50	200' LT.	59.80	ALUMINUM CAP
60+65	℄	76.50	ALUMINUM CAP
60+65	100' LT.	63.13	ALUMINUM CAP
60+65	200' LT.	50.08	ALUMINUM CAP

NOTE:
ALL TEST HOLE/PIT LOCATIONS ARE APPROXIMATE.

0' 100' 200' 400'
SCALE IN FEET

Project Map - Drawing D-01

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

OLD HARBOR AIRPORT
TEST HOLE/TEST PIT LOCATIONS

BY	DATE	CHANGE

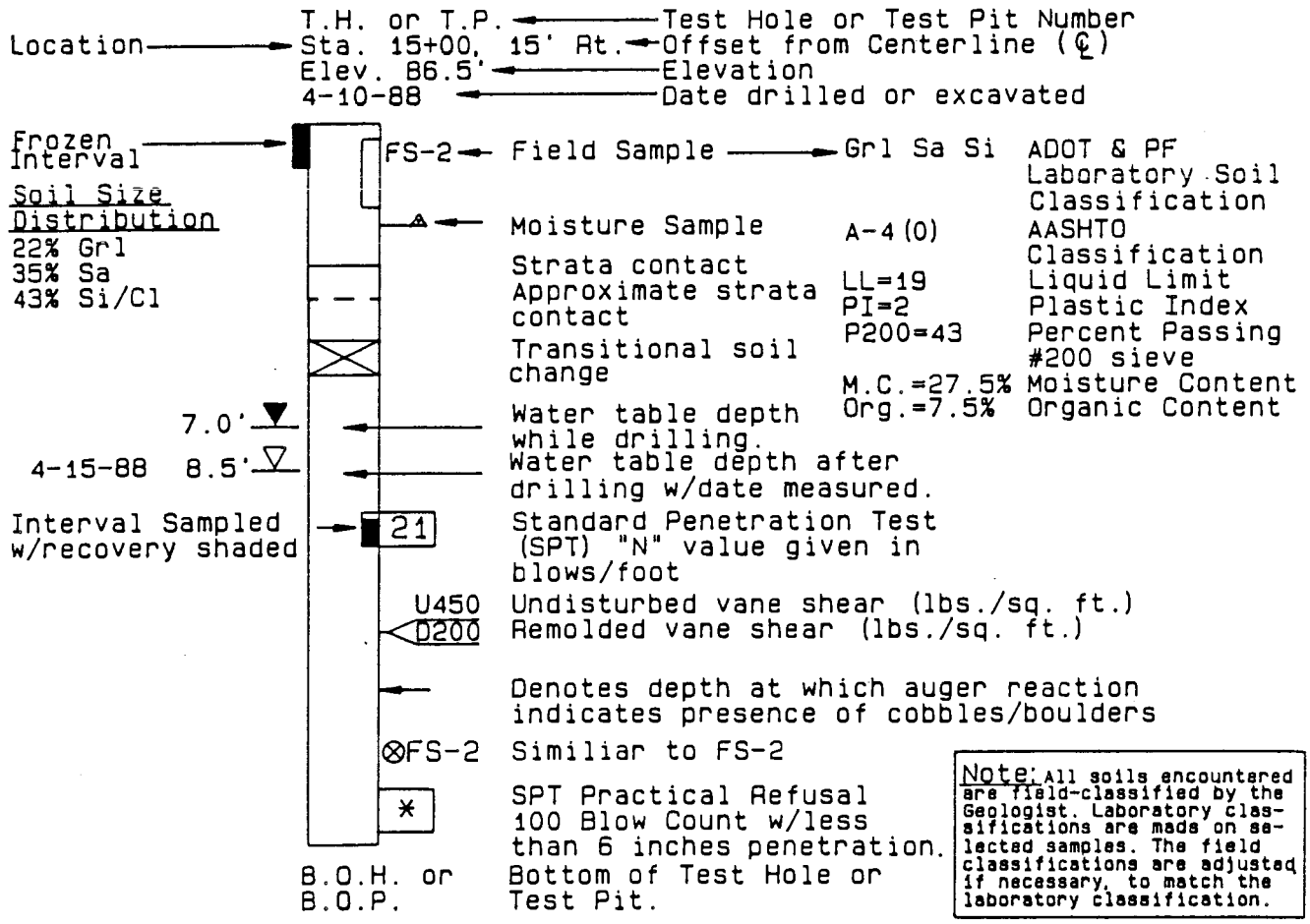
REVISIONS

APPROVED: DONALD W. HOLLAND — REGIONAL GEOLOGIST
APPROVED: THOMAS L. MOSES, P.E. — CENTRAL REGION MATERIALS ENGINEER

SCALE	DESIGNED	DRAWN	SHEET
1" = 200'	CHECKED T.O.	DATE 7-25-90	1 OF 1

TEST PIT AND TEST HOLE LOG EXPLANATION
STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES
MATERIALS SECTION

6-2-88



Note: All soils encountered are field-classified by the Geologist. Laboratory classifications are made on selected samples. The field classifications are adjusted if necessary, to match the laboratory classification.

Abbreviations

Blk	=Black	Org	=Organic(s)
Bn	=Brown	Grl	=Gravel
Bl	=Blue	w/	=with
Gn	=Green	tr.	=trace
Gr	=Gray	sl.	=slightly
Or	=Orange	G.S.	=Grab Sample
Rd	=Red	S.S.	=Split spoon
Tn	=Tan	S.T.	=Shelby Tube
Sa	=Sand	M.S.	=Modified Shelby Tube
Si	=Silt		
Cl	=Clay		

Soil Size Distribution

Based on U.S. Standard Sieve Sizes:

Boulders	=>10"
Cobbles	=3"-10"
Gravel	=#10-3"
Sand	=#200-#10
Silt/Clay	=<#200

Plan View Symbols

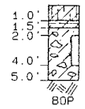
- Power Auger Test Hole
- Hand Auger Test Hole
- Surface Sample
- 4.5' Hand Probe Depth & Location
- Hand Dug Test Pit
- Dozer/Backhoe Pit
- ×××× Berm
- Terrace or Bank
- Swamp

Graphic Symbols (Two or more soil symbols may be used together to indicate a combination of soil types.)

Organics	(Org)
Gravel	(Grl)
Sand	(Sa)
Silt	(Si)
Clay	(Cl)
Ice	(Ice)
Bedrock	(Bx)
Cobbles and/or Boulders	

Test Hole Explanation - Drawing D-02

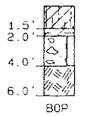
T.P. 1
Sta. 21+00, 371' Rt.
Elev. 101'
10-4-84



0.0'-1.0' Dark Brown Organic Silt. Wet.
1.0'-1.5' Rust Brown Silty Clay (Ash). Damp.
1.5'-5.0' Gray Silty Sandy Gravel. Saturated.
A-1-b (0). LL=22. PI=NP. P200=22%.
M.C.=134.6%.

Rock
Refusal

T.P. 2
Sta. 24+00, 350' Rt.
Elev.=112'
10-4-84

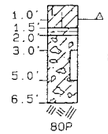


0.0'-1.5' Dark Brown Organic Silt. Wet.

1.5'-2.0' Rust Brown Silty Clay (Ash). Wet.
2.0'-4.0' Gray Silty Sandy Gravel. Saturated.
A-1-b (0). LL=32. PI=NP. P200=19%.
M.C.=14.4%.

Rock
Refusal

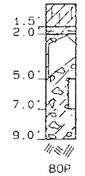
T.P. 3
Sta. 28+00, 148' Rt.
Elev.=73'
10-4-84



0.0'-1.5' Dark Brown Organic Sandy Silt. Wet.
A-4 (0). LL=NV. PI=NP. P200=75%.
M.C.=138.4%. Org.=7.6%.
1.5'-2.0' Rust Brown Silty Clay (Ash). Wet.
2.0'-6.5' Gray Silty Sandy Gravel. Saturated.
A-1-b (0). LL=22. PI=NP. P200=20%.
M.C.=11.2%.

Rock
Refusal

T.P. 4
Sta. 41+00, 186' Rt.
Elev.=47'
10-4-84



0.0'-1.5' Dark Brown Organic Silt. Wet.

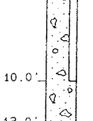
1.5'-2.0' Rust Brown Silty Clay (Ash). Damp.
2.0'-9.0' Gray Silty Sandy Gravel. Saturated.

Boulder from 2-5'.

A-1-a (0). LL=20. PI=NP. P200=13%. M.C.=7.2%.

Rock
Refusal

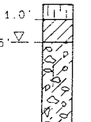
T.P. 5
Sta. 39+00, 275' Lt.
Elev.=53'
10-5-8



0.0'-1.0' Dark Brown Organic Silt. Wet.
1.0'-1.5' Rust Brown Silty Clay (Ash). Wet.
1.5'-4.5' Gray Silty Sandy Gravel. Saturated.
A-1-b (0) LL=NV. PI=NP. P200=15%.
M.C.=10.4%.

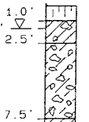
Rock
Refusal

T.P. 6
Sta. 29+00, 315' Lt.
Elev.=98'
10-5-84



0.0'-1.0' Dark Brown Organic Silt. Wet.
1.0'-1.5' Rust Brown Silt (Ash). Wet. A-4 (0).
LL=NV. PI=NP. P200=70%. M.C.=194.7%.
1.5'-3.5' Gray Silty Sandy Gravel. Saturated.
A-1-a (0). LL=28. PI=NP. P200=14%.
M.C.=6.4%.
3.5'-5.5' Weathered Rock. (Dark Gray-Black Slate).

T.P. 7
Sta. 25+00, 300' Lt.
Elev.=131'
10-5-84



0.0'-1.0' Dark Brown Organic Silt. Wet.
1.0'-2.5' Rust Brown Silty Clay (Ash). Wet.

2.5'-4.0' Brown-Gray Sandy Silty Gravel.
Wet.
Rock
Refusal

T.P. 8
Sta. 21+00, 341' Lt.
Elev.=124'
10-5-84

0.0'-0.5' Dark Brown Organic Silt. Wet.
0.5'-2.0' Rust Brown Silty Clay (Ash). Wet.
2.0'-2.5' Brown-Gray Sandy Silty Gravel.
Saturated.
Rock
Refusal

T.P. 9
Sta. 21+00, 180' Lt.
Elev.=93'
10-5-84

0.0'-1.0' Dark Brown Organic Silt. Wet.
1.0'-2.0' Rust Brown Silty Clay (Ash). wet.
2.0'-3.0' Brown-Gray Sandy Silty Gravel.
Saturated.
Rock
Refusal

T.P. 10
Sta. 17+00, 378' Lt.
Elev.=57'
10-5-84

0.0'-0.5' Dark Brown Organic Silt. Wet.
0.5'-1.0' Rust Brown Silty Clay (Ash). Wet.
1.0'-4.0' Gray Silty Sandy Gravel.
Saturated. A-1-b (0). LL=27. PI=NP.
P200=20%. M.C.=14.1%.

Rock
Refusal

T.P. 11
Sta. 18+00, 415' Rt.
Elev.=48'
10-5-84

0.0'-0.5' Dark Brown Organic Silt. Wet.
0.5'-1.5' Rust Brown Silty Clay (Ash). Wet.
1.5'-7.0' Gray Silty Sandy Gravel. Saturated.
A-1-b (0). LL=26. PI=NP. P200=20%.
M.C.=12.1%.

Rock
Refusaal

T.H. 12
Sta. 0+40, Proposed ℄
11-17-84

0.0'-1.5' Dark Brown Organic Silt.
Saturated.
1.5'-2.0' Dark Brown Organic Silty Gravel Wet.

2.0'-4.0' Dark Brown Silty Gravel.
Gravel is shale rock.

4.0'-20.0' Black Gravel w/Sand & Silt.
Saturated. A-1-a (0). LL=30. PI=NP.
Gravel=90%. Sand=8%. Silt=2%.
Gravel is shale rock.

T.H. 13
Sta. 2+00, 10' Rt. ℄
11-17-84

0.0'-1.5' Dark Brown Silty Organic.
Saturated.

1.5'-13.0' Dark Brown Gravelly Sand or Sandy
Gravel. Saturated. Loose Shale.
A-1-a (0). LL=30. PI=NP. Gravel=90%.
Sand=8%. Silt=2%.

13.0'-20.0' Gray Silty Gravel to Gravelly
Silt. Very tight. slow drilling. Shale
flakes.

T.H. 14
Sta. 4+00, 6' Rt. ℄
11-17-84

0.0'-1.0' Dark Brown Organic. Saturated.
1.0'-2.5' Brown Silt w/Organic.
2.5'-11.0' Brown Silty Gravel. Saturated.
Tight. Estimate 50-70% cobbles & boulders.
Slow drilling. Little to no retrieval.

11.0'-13.0' Gray Gravelly Silt. Shale
flakes. very tight.

13.0'-15.0' Boulders or broken rock.

Rock
Refusal

T.H. 15
Sta. 7+00, 10' Lt. ℄
11-17-84

0.0'-1.0' Dark Brown Organic w/roots. Saturated.
1.0'-2.5' Gray-Brown Gravelly Silt. Saturated.

2.5'-7.5' Brown Silty Gravel w/cobbles &
boulders. Tight. Saturated. Augers up
as a slurry.

7.5'-15.0' Gravelly Silt w/cobbles & boulders
Very tight. Augers up as a slurry.

15.0'-17.0' Boulders or bedrock. Slow drilling.

Refusal

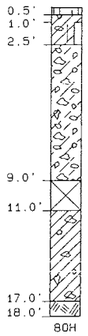
Test Hole Logs - Drawing D-03

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND
PUBLIC FACILITIES

OLD HARBOR
TEST PIT & TEST HOLE LOGS
PROJECT NO. 53263

Scale:	Designed: T.B.	Drawn: N.B.	SHEET 1 OF 8
1"=5'	Checked: M.D.	Date: 8-5-92	

T.H. 16
Sta. 10+90, Prooosed R/W ℄
11-19-04



0.0'-0.5' Brown Moss. Saturated.
0.5'-2.5' Brown Silt w/Organic & Gravel. Saturated, soft. M.C.=83%.
2.5'-9.0' Brown Silty Gravel w/cobbles & boulders. Saturated. Tight. Augers up as a slurry.

11.0'-17.0' Gray Gravelly Silt. Very tight. Augers up as a Slurry.

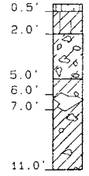
17.0'-18.0' Boulders of Bedrock. Hard drilling. Refusal

T.H. 17
Sta. 14+15, R/W ℄
11-19-84

0.0'-1.5' Dark Brown Organic w/roots. Saturated.
1.5'-3.0' Brown Silt w/Volcanic Ash. Saturated.
3.0'-15.0' Brown Silty Gravel w/cobbles & boulders. Tight. Augers up as a slurry. Slow drilling. Very slow drilling on boulders.

15.0'-16.0' Gray Gravelly Silt to Silty Gravel. Very tight. Refusal due to tight soil.

T.H. 18
Sta. 18+00, 15' Lt. R/W ℄
11-19-84

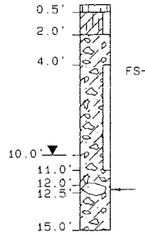


0.0'-0.5' Dark Brown Organic w/roots. Saturated.
0.5'-2.0' Brown Silt w/Organic. Saturated.
2.0'-5.0' Brown Silty Gravel w/cobbles & boulders. Saturated.

5.0'-11.0' Gray-Brown Gravelly Silt. Very tight, very slow drilling. Augers up as a slurry.

Refusal

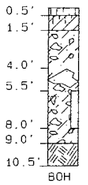
T.H. 19
Sta. 19+70, 20' Lt. ℄
11-19-84



0.0'-0.5' Dark Brown Organic. Saturated. Soft.
0.5'-2.0' Dark Brown Organic Silt. Saturated. Soft. Thrusts to 2'. M.C.=95%, Org.=16%.

2.0'-15.0' Gray-Brown Silty Sandy Gravel w/cobbles & boulders. Saturated. Tight. A-2-4(0), LL=25, PI=NP, Gravel=42%, Sand=31%, Silt=27%.

T.H. 20
Sta. 24+50, 40' Lt. ℄
11-29-84



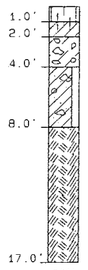
0.0'-0.5' Dark Brown Organic
0.5'-1.5' Brown Organic Silt. Wet to Saturated.

1.5'-9.0' Gray-Brown Silty Sandy Gravel w/cobbles & boulders. Wet to saturated. A-1-b(0), SM, LL=31, PI=NP, Gravel=47%, Sand=32%, Silt=21%.

9.0'-10.5' Boulder or Bedrock. Slow drilling.

Refusal

T.H. 21
Sta. 26+00, 3' Rt. ℄
11-29-84

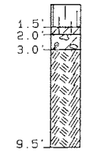


0.0'-1.0' Dark Brown Organic w/roots.
1.0'-2.0' Brown Organic Silt. Saturated.
2.0'-4.0' Gray-Brown Silty Gravel.

4.0'-8.0' Gray-Brown Gravelly Sandy Silt. A pebble gravel, tight, wet. A-4(0) LL=24, PI=2, Gravel=27%, Sand=37%, Silt=36%.

8.0'-17.0' Bedrock. Probably a Shale. Fairly easy drilling to 13'. Harder 13-17'.

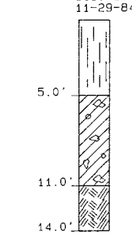
T.H. 22
Sta. 28+00, 5' Lt. ℄
11-29-84



0.0'-1.5' Dark Brown Organic w/roots. Saturated.
1.5'-2.0' Brown Organic Silt. Saturated, soft.
2.0'-3.0' Gray-Brown Silty Gravel w/cobbles.
3.0'-9.5' Bedrock. Probably a Shale. Harder drilling w/depth.

Refusal

T.H. 23
Sta. 30+50, R/W ℄
11-29-84



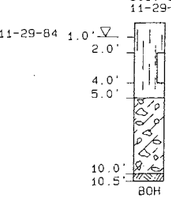
0.0'-5.0' Dark Brown Organic w/roots. Coarse, fibrous. Thrusts to 5'.

5.0'-11.0' Gray-Brown Gravelly Silt. Saturated. When spun to surface. Gravel is pebble size. Easy drilling.

11.0'-14.0' Possible Bedrock. No return. Slow drilling.

Refusal

T.H. 24
Sta. 32+50, R/W ℄
11-29-84



0.0'-5.0' Organic, (Peat) w/small roots. Coarse, fibrous. M.C.=396%.

5.0'-10.0' Gray-Brown Silty Gravel w/cobbles & boulders. Fairly easy drilling.

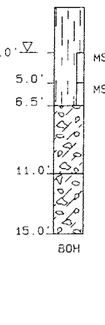
10.0'-10.5' Boulders or Bedrock. Hard drilling. Refusal

T.H. 25
Sta. 34+35, R/W ℄
12-1-84

0.0'-10.0' Dark Brown Organic, (Peat), w/roots. Coarse fibrous. Saturated. Thrusts to 10'. M.C.=600%.

10.0'-25.0' Gray-Brown Silty Gravel w/cobbles. Moderately easy drilling. Augers up as a slurry.

T.H. 26
Sta. 36+80, R/W ℄
12-1-84



0.0'-6.5' Dark Brown Organic (Peat), w/roots. Coarse fibrous. Saturated.

M.C.=280%

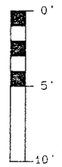
M.C.=267%

6.5'-11.0' Gray-Brown Silty Gravel to Gravelly Silt w/cobbles.

11.0'-15.0' Gray-Brown Silty Gravel w/cobbles & boulders. Hard/slow drilling. Tight.

Refusal

Test Hole Logs - Drawing D-04



STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND
PUBLIC FACILITIES

OLD HARBOR AIRPORT
TEST HOLE LOGS
PROJECT NO. 53263

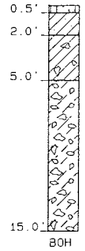
Scale: 1"=5'	Designed: T.O.	Drawn: N.B.	SHEET 2 OF 8
	Checked: T.O.	Date: 8-6-92	

T.H. 27
Sta. 38+65, 8' Lt. ℄
12-1-84

0.0'-5.0' Dark Brown Organic. Coarse fibrous. Saturated.

5.0'-20.0' Gray-Brown Silty Gravel w/cobbles & boulders. Moderately tight to 20'. Saturated when spun to surface.

T.H. 28
Sta. 40+65, 5' Lt. ℄
12-1-84



0.0'-0.5' Dark Brown Organic w/roots. Wet to Saturated.

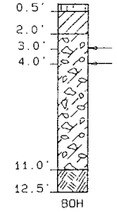
0.5'-2.0' Brown Sandy Silt. Saturated.

2.0'-5.0' Gray-Brown Gravelly Silt or Silty Gravel. Gravel is pebble size.

5.0'-15.0' Gray Silty Gravel w/cobbles. Wet to saturated when spun to surface.

Tight, w/boulders 10-15'.

T.H. 29
Sta. 43+00, R/W ℄
12-1-84



0.0'-0.5' Dark Brown Organic w/roots.

0.5'-2.0' Brown Silt. Saturated.

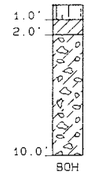
2.0'-11.0' Gray-Brown Silty Gravel w/cobbles & boulders. Augers up wet to saturated.

Tight after 10'

11.0'-12.5' Boulder or Bedrock. Hard/slow drilling.

Refusal

T.H. 30
Sta. 46+00, 5' Rt. ℄
12-1-84



0.0'-1.0' Dark Brown Organic w/roots.

1.0'-2.0' Brown Silt. Saturated.

2.0'-1.0' Gray-Brown Silty Gravel w/cobbles & boulders.

Tight to 7'. Very tight 7-10'.

Refusal

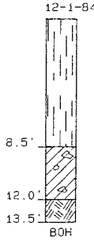
T.H. 31
Sta. 48+00, R/W ℄
12-1-84

0.0'-2.5' Dark Brown Silty Sandy Gravel w/cobbles & boulders.

2.5'-4.0' Shale rock.

Refusal

T.H. 32
Sta. 50+00, 15' Lt. ℄
12-1-84



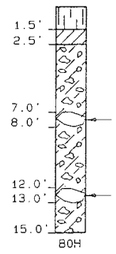
0.0'-8.5' Brown Organic w/roots. Fibrous. Saturated.

8.5'-12.0' Gray-Brown Gravelly Silt. Easy drilling.

12.0'-13.5' Boulder or Bedrock. Slow Drilling.

Refusal

T.H. 33
Sta. 53+10 4' Lt. ℄
12-1-84

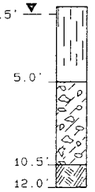


0.0'-1.5' Dark Brown Organic w/roots.

1.5'-2.5' Dark Brown Silt. Saturated.

2.5'-15.0' Gray-Brown Silty Gravel w/cobbles & boulders. Augers to surface as a slurry.

T.H. 34
Sta. 55+00, 5' Lt R/W ℄
12-1-84



0.0'-5.0' Brown Organic, Fibrous, Saturated. Water flowing into hole at 0.5'.

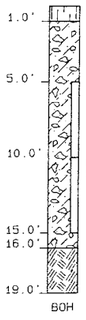
5.0'-10.5' Gray-Brown Silty Gravel w/cobbles & boulders.

Tight after 9'.

10.5'-12.0' Boulder or Bedrock. Hard drilling.

Refusal

T.H. 35
Sta. 60+55, R/W ℄
12-3-84



0.0'-1.0' Dark Brown Organic w/grass roots. Saturated.

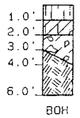
1.0'-16.0' Gray-Brown Silty Sandy Gravel w/cobbles. Wet to Saturated. A-1-b (0), LL=21, PI=NP, Gravel=57%, Sand=23%, Silt=20%.

M.C.=7.6%.

16.0'-19.0' Bedrock. A soft rock. Fairly easy drilling.

Refusal

T.H. 36
Sta. 60+00, 180' Rt. ℄
12-3-84



0.0'-1.0' Dark Brown Organic w/grass roots.

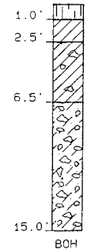
1.0'-2.0' Brown Organic Silt. Saturated.

2.0'-3.0'/4.0' Gray-Brown Silty Gravel w/cobbles & boulders.

3.0'/4.0'-6.0' Probable Bedrock.

Refusal

T.H. 37
Sta. 57+80, 33' Rt. ℄
12-3-84



0.0'-1.0' Dark Brown Organic w/grass roots. Saturated.

1.0'-2.5' Dark Brown Silt w/volcanic Ash. Saturated.

2.5'-6.5' Brown Gravelly Silt w/cobbles. Saturated. Highly dilatant

6.5'-15.0' Gray-Brown Sandy Silty Gravel w/cobbles. Tight. Very tight 11-15'.

Boulders after 10'.

Refusal

Test Hole Logs - Drawing D-05

STATE OF ALASKA
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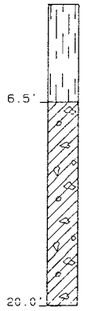
OLD HARBOR AIRPORT
TEST HOLE LOGS
PROJECT NO. 53263

Scale:	Designed:	Drawn:	
1"=5'	Checked:	Date: 8-5-92	SHEET 3 OF 8

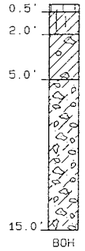
T.H. 38
Sta. 55+00, 100' Rt. ℄
12-3-84



0.0'-6.5' Dark Brown Organic, (Peat). Fine fibrous to fibrous. Saturated. Thrusts to 6.5'.

6.5'-20.0' Gray-Brown Gravelly Silt w/cobbles. Saturated. Easy drilling to 14'. Moderately tight 14-20'.

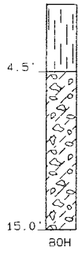
T.H. 39
Sta. 55+00, 100' Lt. ℄
12-3-84



0.0'-0.5' Dark Brown Organic w/roots. Saturated.
0.5'-2.0' Brown Organic Silt. Saturated.
2.0'-5.0' Brown Gravelly Silt. Soft. Saturated.

5.0'-15.0' Gray-Brown Sandy Silty Gravel w/cobbles. Wet to saturated. Moderately tight 5-12'. Tight 12-15'.

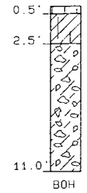
T.H. 40
Sta. 51+00, 90' Lt. ℄
12-3-84



0.0'-4.5' Dark Brown Organic. Fibrous. Saturated.

4.5'-15.0' Gray-Brown Silty Gravel w/cobbles & boulders. Tight after 6'. Augers up as a slurry.

T.H. 41
Sta. 50+80, 100' Rt. ℄
12-3-84

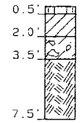


0.0'-0.5' Dark Brown Organic w/roots. Saturated.
0.5'-2.5' Brown Silt w/Organic. Soft. Saturated.

2.5'-11.0' Gray-Brown Sandy Silty Gravel w/cobbles. Augers up wet. Very tight after 10'.

Refusal

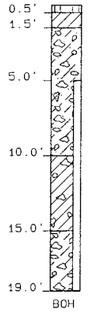
T.H. 42
Sta. 45+00, 80' Rt. ℄
12-4-84



0.0'-0.5' Dark Brown Organic w/roots. Saturated.
0.5'-2.0' Brown Silt w/volcanic ash. Saturated.
2.0'-3.5' Gray-Brown Sandy Silty Gravel w/cobbles & boulders. Tight. Wet to saturated.
3.5'-7.5' Probable Bedrock. Hard/slow drilling.

Refusal

T.H. 43
Sta. 44+50, 80' Lt. ℄
12-4-84



0.0'-0.5' Dark Brown Organic w/roots. Saturated.
0.5'-1.5' Brown Silt w/volcanic Ash. Saturated.
1.5'-10.0' Gray-Brown Silty Sandy Gravel w/cobbles & boulders, wet to saturated. A-1-a(0), LL=25, PI=NP, Gravel=63%, Sand=24%, Silt=13%.

10.0'-15.0' Gray-Brown Gravelly Silt. Saturated.

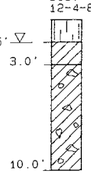
15.0'-19.0' Gray-Brown Silty Gravel w/cobbles & boulders. Moderately tight.

T.H. 44
Sta. 41+00, Approx. 85' Rt. ℄
12-4-84

0.0'-0.8' Dark Brown Organic w/roots.
0.8'-1.5' Dark Brown Broken Rock w/Silt.
1.5'-6.0' Probable Bedrock. Hard/slow drilling.

Refusal

T.H. 45
Sta. 41+00, Approx. 110' Lt. ℄
12-4-84

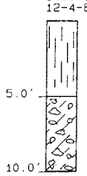


0.0'-1.5' Dark Brown Organic. Saturated.

1.5'-3.0' Dark Brown Silt w/volcanic Ash. Soft. Saturated. Thrusts to 3'.
3.0'-10.0' Gray-Brown Gravelly Silt w/cobbles. Very tight/Very slow drilling. Plastic.

Refusal

T.H. 46
Sta. 38+30, 100' Rt ℄
12-4-84



0.0'-5.0' Dark Brown Organic. Coarse, fibrous. Saturated.

5.0'-10.0' Gray-Brown Silty Gravel w/cobbles & boulders. Augers up as a Slurry. Tight to very tight. Slow drilling.

Refusal

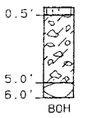
T.H. 47
Sta. 38+00, 100' Lt. ℄
12-4-84

0.0'-5.0' Dark Brown Organic w/roots. Coarse fibrous. Saturated.

5.0'-10.0' Gray-Brown Gravelly Silt. Augers up as a Slurry.

10.0'-15.0' Gray-Brown Silty Gravel w/cobbles & boulders. Tight.

T.H. 48
Sta. 35+94, 10' Rt. ℄
12-5-84

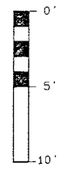


0.0'-0.5' Dark Brown Organic.
0.5'-5.0' Gray-Brown Silty Gravel w/cobbles & boulders.

5.0'-6.0' possible Boulder.

Refusal

Test Hole Logs - Drawing D-06



STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
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TEST HOLE LOGS
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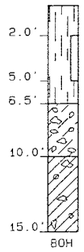
Scale:	Designed: T.O.	Drawn: N.B.	SHEET 4 OF 8
1"=5'	Checked: T.O.	Date: 8-5-92	

T.H. 49
Sta. 36+00, 100' Rt. ℄
12-5-84

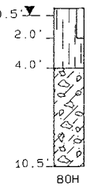


0.0'-6.5' Dark Brown Peat, Coarse, fibrous.
M.C.=210%

6.5'-10.0' Gray-Brown Silty Gravel w/cobbles. Tight.

10.0'-15.0' Gray-Brown Gravelly Silt w/cobbles. Easy drilling.

T.H. 50
Sta. 36+00, 100' Lt. ℄
12-5-84

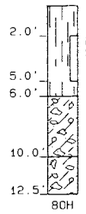


0.0'-4.0' Dark Brown Peat w/roots & volcanic Ash. Saturated. M.C.=136%.

4.0'-10.5' Gray-Brown Sandy Silty Gravel. Augers up as a Slurry. Easy drilling to 9'. Very tight 9-10.5'.

Refusal

T.H. 51
Sta. 34+00, 100' Rt. ℄
12-5-84



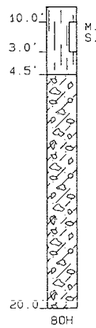
0.0'-6.0' Dark Brown Organic w/roots. Coarse fibrous. Saturated. Thrusts to 6'. M.C.=434%.

6.0'-10.0' Gray-Brown Sandy Silty Gravel. Gravel is pebble size. Augers up as a Slurry.

10.0'-12.5' Gray-Brown Silty Gravel w/cobbes & boulders. Tight.

Refusal

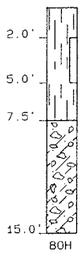
T.H. 52
Sta. 32+00, 100' Rt. ℄
12-5-84



0.0'-4.5' Dark Brown Organic w/roots. Coarse fibrous. Saturated. M.C.=331%.

4.5'-20.0' Gray-Brown Sandy Silty Gravel. Gravel is pebble size. Moderately easy drilling. Augers up a slurry.

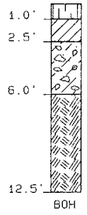
T.H. 53
Sta. 30+00, 100' Rt. ℄
12-5-84



0.0'-7.5' Dark Brown Organic, (Peat). Fibrous. Saturated. M.C.=251%.

7.5'-15.0' Gray-Brown Sandy Silty Gravel w/cobbles & boulders. Moderately tight.

T.H. 54
Sta. 28+00, 200' Lt ℄
12-5-84

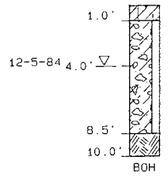


0.0'-1.0' Dark Brown Organic w/grass roots.
1.0'-2.5' Dark Brown Silt w/volcanic Ash. Saturated.
2.5'-6.0' Gray-Brown Sandy Silty Gravel w/cobbles. Wet to saturated.

6.0'-12.5' Probable Bedrock. Easy drilling to 10'. Then hard/slow drilling.

Refusal

T.H. 55
Sta. 28+00, Approx. 550' Lt.℄
12-5-84



0.0'-1.0' Brown Organic Silt w/grass roots. Saturated.
1.0'-8.5' Gray Silty Sandy Gravel. Saturated. A-2-4(0), LL=21, PI=NP, Gravel=39%, Sand=32%, Silt=29%.

8.5'-1.0' Boulder or Bedrock. Hard/slow Drilling.
Refusal

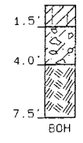
T.H. 56
Sta. 25+00, 300' Lt. ℄
12-6-84

0.0'-1.5' Dark Brown Organic Silt. Saturated.

1.5'-3.5' Gray-Brown Sandy Silty Gravel w/cobbles. Wet to saturated.

3.5'-20.0' Bedrock. Easy drilling to 8'. Hit water at 10'. Augers up as a slurry after 10'. Hard drilling 8-15'. Very hard drilling 15-20'.

T.H. 57
Sta. 22+90, Approx. 250' Lt. ℄
12-6-84



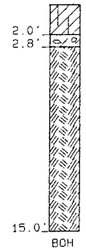
0.0'-1.5' Dark Brown Orgnic Silt. Saturated.

1.5'-4.0' Gray-Brown Sandy Silty Gravel w/cobbles. Wet to saturated.

4.0'-6.0' Bedrock, Broken/weathered to 7'. Very hard rock 7-7.5', would not drill beyond 7.5' in 1/2 hours time.

Refusal

T.H. 58
Sta. 21+30, 330' Lt. ℄
12-6-84



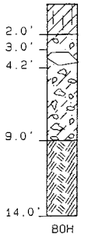
0.0-2.0' Dark Brown Organic Silt. Saturated.

2.0'-2.8' Gray Sandy Silty Gravel w/cobbles. Wet to saturated.

2.8'-15.0' Bedrock. Broken/weathered to 6'. Easy drilling to 6'. Moderately easy drilling to 13', w/some fractured zones. Hit water at 6'. Augers up as a Slurry after 6'. Hard drilling 13'+.

Refusal

T.H. 59
Sta. 21+00, 475' Lt.℄
12-6-84



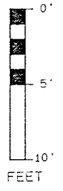
0.0'-2.0' Brown Organic Silt. Saturated.

2.0'-9.0' Gray-Brown Sandy Silty Gravel w/cobbles & boulders. Wet to saturated.

8.0'-14.0' Bedrock. Medium hard to hard drill.

Refusal

Test Hole Logs - Drawing D-07



STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND
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OLD HARBOR AIRPORT
TEST HOLE LOGS
PROJECT NO. 53263

Scale: 1"=5'	Designed: T.O.	Drawn: N.B.	SHEET 5 OF 8
	Checked: T.O.	Date: 8-5-92	

T.H. 60
Sta. 21+00, 170' Lt. ℄
12-6-84

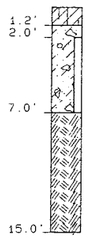
MS-31 0.0'-2.0' Brown Organic Silt. Saturated. M.C.=81%.

2.0'-4.0' Gray-Brown Sandy Silty Gravel w/cobbles. Wet to saturated.

4.0'-20.0' Bedrock. Easy drilling to 14'. Hard drilling 14-16'. Appears to have fractured zones full of Silt & water.

Easy drilling 16-17'. Then harder to 20'.

T.H. 61
Sta. 23+00, 160' Lt. ℄
12-6-84



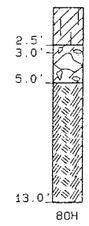
0.0'-1.2' Brown Organic Silt. Saturated.

FS-32 1.2'-7.0' Gray-Brown Silty Gravelly Sand. Wet to saturated. A-2-4(0), LL=21, PI=NP, Gravel=35%, Sand=36%, Silt=29%.

7.0'-15.0' Bedrock. Easy drilling to 10', w/fractured zones.

Hard drilling 10-15'.

T.H. 62
Sta. 28+00, 100' Rt. ℄
12-7-84



0.0'-2.5' Dark Brown Organic Silt. Saturated.

2.5'-5.0' Gray-Brown Sandy Silty Gravel w/cobbles & boulders. Tight. Hit boulder, very hard drilling. Moved Nodwell.

5.0'-13.0' Bedrock. Hard drilling to 11'. Easy drilling 11-12.5', hard drilling 12.5-13.0'.

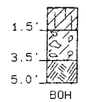
T.H. 63
Sta. 26+00, 200' Rt. ℄
12-7-84

0.0'-1.0' Brown Organic Silt. Saturated.

1.0'-3.0' Gray-Brown Sandy Silty Gravel w/cobbles & boulders. Wet to saturated.

3.0'-13.5' Bedrock. Very hard drilling 3-7'. Moderately hard drilling 7-8.5'. Very hard drilling 8.5-13.5'.

T.H. 64
Sta. 24+00, Approx. 250' Rt. ℄
12-7-84

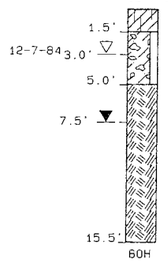


0.0'-1.5' Brown Organic Silt. Saturated.

1.5'-3.5' Gray-Brown Sandy Silty Gravel w/cobbles & boulders.

3.5'-5.0' Bedrock. Very hard drilling, moved ahead 5', same results. Refusal

T.H. 65
Sta. 24+00, 350' Rt. ℄
12-7-84



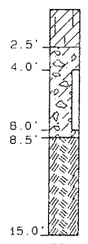
0.0'-1.5' Brown Organic Silt. Saturated.

FS-33 1.5'-5.0' Gray-Brown Silty Sandy Gravel w/cobbles. Wet to saturated. A-1-b(0), LL=26, PI=NP, Gravel=50%, Sand=29%, Silt=21%.

5.0'-15.5' Bedrock. Augers up as a slurry after 7.5'. Weathered/fractured & easy drilling to 7.5'. Moderately hard drilling 7.5-9'. Easy drilling, fractured (?) 9-15'. Very hard drilling 15-15.5'.

Refusal

T.H. 66
Sta. 22+00, Approx. 375' Rt. ℄
12-8-84



0.0'-2.5' Dark Brown Organic Silt. Saturated.

FS-33 2.5'-8.5' Gray-Brown Silty Sandy Gravel w/cobbles. Saturated. A-1-b(0), LL=26, PI=NP, Gravel=50%, Sand=29%, Silt=21%.

8.5'-15.0' Bedrock. Hit water at 10.5'. Hard drilling 8.5-10.5', easy drilling 10.5-12'. Hard drilling 12-14', easy drilling 14-15'.

T.H. 67
Sta. 21+50, Approx. 550' Rt. ℄
12-8-84

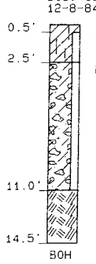
0.0'-1.5' Dark Brown Organic Silt. Saturated.

1.5'-3.0' Gray-Brown Sandy Silty Gravel w/cobbles. Wet to saturated.

3.0'-7.0' Bedrock. Very hard/slow drilling 5-7'.

Refusal

T.H. 68
Sta. 18+00, 400' Lt. ℄
12-8-84

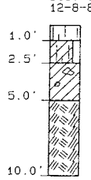


MS-34 0.0'-2.5' Dark Brown Organic Silt. Saturated. M.C.=186%.

FS-35 2.5'-11.0' Gray-Brown Silty Sandy Gravel w/cobbles. Moderately tight. Wet to saturated. A-1-b(0), LL=20, PI=3, Gravel=49%, Sand=31%, Silt=20%.

11.0'-14.5' Bedrock. Easy drilling.

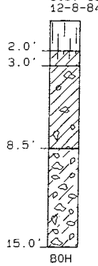
T.H. 69
Sta. 16+00, Approx. 315' Lt.℄
12-8-84



MS-36 0.0'-1.0' Dark Brown Organic w/roots.
1.0'-2.5' Brown Organic Silt. Saturated. M.C.=160%.
2.5'-5.0' Gray-Brown Gravelly Silt w/cobbles & boulders. Saturated.

5.0'-10.0' Bedrock. Easy drilling to 8', hard drilling 8-10'.

T.H. 70
Sta. 15+00, Approx. 120' Lt. ℄
12-8-84



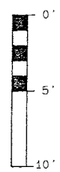
0.0'-2.0' Organic w/roots. Saturated.

2.0'-3.0' Brown Organic Silt. Saturated.

3.0'-8.5' Gray-Brown Gravelly Silt w/cobbles. Saturated. Soft to 8.5'.

8.5'-15.0' Gray-Brown Silty Gravel w/cobbles & boulders. Easy drilling.

Test Hole Logs - Drawing D-08

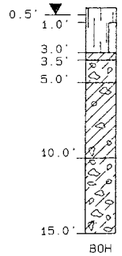


STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND
PUBLIC FACILITIES

OLD HARBOR AIRPORT
TEST HOLE LOGS
PROJECT NO. 53263

Scale: 1"=5'	Designed: T.O.	Drawn: N.B.	SHEET 6 OF 8
	Checked: T.O.	Date: 8-5-92	

T.H. 71
Sta. 13+00, Approx. 50' Lt. ℄
12-8-84



0.0'-3.0' Dark Brown Organic. Coarse, fibrous. Saturated. M.C.=193%..

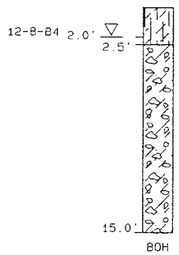
3.0'-3.5' Brown Sandy Silt. Volcanic Ash. Saturated.

3.5'-5.0' Gray-Brown Silty Gravel w/cobbles & Boulders.

5.0'-10.0' Gray-Brown Gravelly Silt. Soft. Augers up as a slurry.

10.0'-15.0' Gray-Brown Silty Gravel w/cobbles & boulders. Tight.

T.H. 72
Sta. 11+00, 100' Lt. ℄
12-8-84

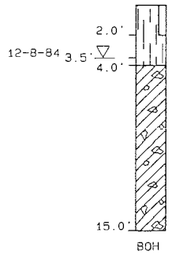


0.0'- 2.5' Dark Brown Silty Organic w/roots. Coarse, fibrous. Saturated.

2.5'-15.0' Gray-Brown Silty Gravel to Gravelly Silt, w/cobbles & boulders. Augers up as a slurry.

Tight after 10'.

T.H. 73
Sta. 11+00, Approx. 390' Lt. ℄
12-8-84

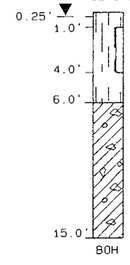


0.0'-4.0' Dark Brown Organic, (Peat). Coarse fibrous. Saturated. M.C.=209%.

4.0'-15.0' Gray-Brown Gravelly Silt. Easy drilling to 10'. Augers up as a slurry.

Tight 10-15'.

T.H. 74
Sta. 9+00, Approx. 390' Lt. ℄
12-8-84

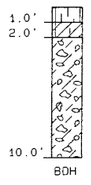


0.0'-6.0' Dark Brown Organic. Fibrous. Saturated. M.C.=385%.

6.0'-15.0' Gray-Brown Gravelly Silt to Silty Gravel, w/cobbles. Augers up as a slurry.

Tight agter 10'.

T.H. 75
Sta. 7+00, Approx. 390' Lt. ℄
12-4-84

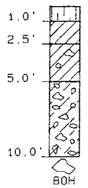


0.0'-1.0' Dark Brown Organic w/roots. Saturated.

1.0'-2.0' Brown Organic Silt. Saturated.

2.0'-10.0' Gray-Brown Silty Gravel w/cobbles & boulders.

T.H. 76
Sta. 5+00, Approx. 370' Lt. ℄
12-10-84



0.0'-1.0' Dark Brown Organic w/roots. Saturated.

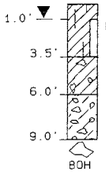
1.0'-2.5' Brown Silt w/Volcanic Ash. Soft. Saturated.

2.5'-5.0' Gray-Brown Gravelly Silt w/cobbles.

5.0'-10.0' Gray-Brown Silty Gravel w/cobbles & boulders. Augers up as a slurry.

Refusal

T.H. 77
Sta. 3+00, Approx. 390' Lt. ℄
12-10-84



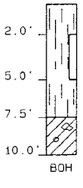
0.0'-3.5' Dark Brown Organic Silt. Saturated. Thrusts to 3.5'. M.C.=118%.

3.5'-6.0' Gray-Brown Gravelly Silt. Augers up as a slurry.

6.0'-9.0' Gray-Brown Silty Gravel w/cobbles & boulders.

Refusal

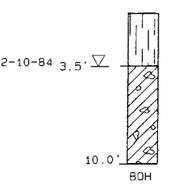
T.H. 78
Sta. 0+50, Approx. 390' Lt. ℄
12-10-84



.0'-7.5' Dark Brown Peat. Fibrous. Saturated. Thrusts to 7.5'. M.C.=210%.

7.5'-10.0' Gray-Brown Gravelly Silt w/cobbles. Augers up as a slurry.

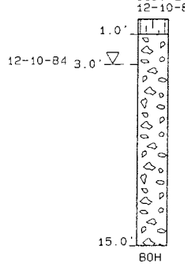
T.H. 79
Sta. -1+75, Approx. 390' Lt. ℄
12-10-84



0.0'-3.5' Dark Brown Organic w/roots. Saturated.

3.5'-10.0' Gray-Brown Gravelly Silt w/cobbles. Tight.

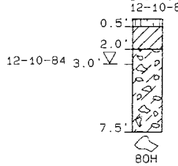
T.H. 80
Sta. 2+00, 80' Rt. ℄
12-10-84



0.0'-1.0' Dark Brown Organic w/grass roots. Saturated.

1.0'-15.0' Black Gravel, a beach Gravel. Loose. Saturated. Gravel is mostly shale flakes.

T.H. 81
Sta. 5+00, 90' Rt. ℄
12-10-84

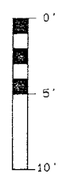


0.0'-0.5' Dark Brown Organic w/roots. Saturated.
0.5'-2.0' Brown Silt. Soft. Saturated. Thrusts to 2'.

2.0'-7.5' Gray-Brown Silty Gravel w/cobbles & boulders. Tight. Augers up as a slurry.

Refusal

Test Hole Logs - Drawing D-09



STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
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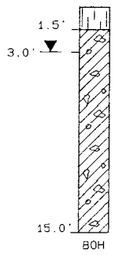
Scale:	Designed: T.O.	Drawn: N.B.	SHEET 7 OF 8
1"=5'	Checked: T.O.	Date: 8-5-92	

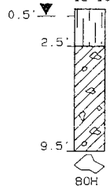
T.H. 82
Sta. 8+00, 100' Rt.℄
12-10-84



0.0'-1.5' Dark Brown Organic w/roots. Saturated.

1.5'-15.0' Brown Gravelly Silt. Soft. Saturated. Thrusts to 5'. Augers up as a slurry.

T.H. 83
Sta. 11+00, 100' Rt. ℄
12-10-84

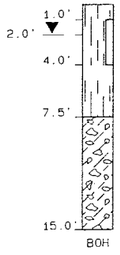


0.0'-2.5' Dark Brown Organic. Saturated.

2.5'-9.5' Gray-Brown Gravelly Silt w/cobbles & boulders. Tight after 6'. Augers up as a slurry.

Refusal

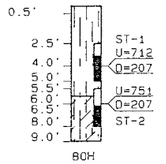
T.H. 84
Sta. 14+00, 100' Rt. ℄
12-10-84



0.0'-7.5' Dark Brown Organic. Fibrous. Saturated. M.C.=138%.

7.5'-15.0' Gray-Brown Silty Gravel w/cobbles & boulders. Tight after 10'.

T.H. 85
Sta. 34+30, R/W ℄
12-11-84

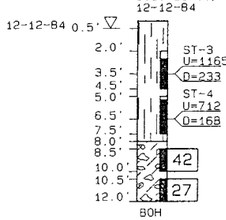


0.0'-6.0' Dark Brown Organic (Peat). Coarse fibrous. Saturated.
M.C.=288%, Org.=35%.

6.0'-9.0' Brown Silty Organic. Thrusts to 9'.
M.C.=629%, Org.=86%.

Bottomed on a Till.

T.H. 86
Sta. 38+00, R/W ℄
12-12-84

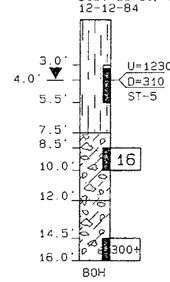


0.0'-8.0' Dark Brown Organic, (Peat). Coarse fibrous. Saturated.
M.C.=235%, Org.=34%.

Some Sand & Silt in St-4. Thrusts to 8'.
M.C.=663%, Org.=87%.

8.0'-12.0' Gray-Brown Silty Gravel to Gravelly Silt.

T.H. 87
Sta. 36+60, R/W ℄
12-12-84

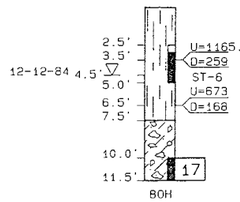


0.0'-7.5' Dark Brown Organic, (Peat), w/roots. Saturated, Fibrous.
M.C.=345%, Org.=59%.

7.5'-12.0' Gray-Brown Sandy Silty Gravel. Saturated.

12.0'-16.0' Gray-Brown Silty Gravel w/cobbles & boulders. Tight after 12'. Very tight after 14'.

T.H. 88
Sta. 33+50, R/W ℄
12-12-84

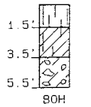


0.0'-7.5' Dark Brown Organic, (Peat). Coarse fibrous. Saturated.

M.C.=210%, Org.=25%.

7.5'-11.5' Gray Sandy Silty Gravel. Saturated.

T.H. 89
Sta. 14+95, 110' Rt. ℄
12-13-84

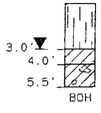


0.0'-1.5' Dark Brown Organic. Saturated.

1.5'-3.5' Brown Organic Silt. Soft. Saturated. Thrusts to 3.5'.

3.5'-5.5' Gray-Brown Silty Gravel to Gravelly Silt. Soft. Saturated.

T.H. 90
Sta. 15+95, 100' Rt.℄
12-13-84

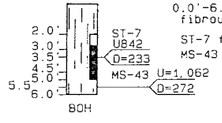


0.0'-3.0' Dark Brown Organic. Fibrous. Saturated.

3.0'-4.0' Brown Silt w/Volcanic Ash. Soft. Saturated. Thrusts to 4'.

4.0'-5.5' Brown Gravelly Silt. Saturated.

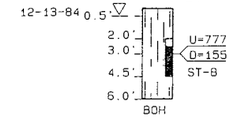
T.H. 91
Sta. 9+00, Approx. 380' Lt. ℄
12-13-84



0.0'-6.0' Dark Brown Organic, (Peat). Coarse fibrous. Saturated.

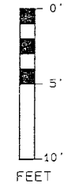
ST-7 from 2-4.5' w/90% recovery.
MS-43 3-5' M.C.=446%, Org.=89%.

T.H 92
Sta.0+35, 390' Lt. ℄
12-13-84



0.0'-6.0' Dark Brown Organic, (Peat). Coarse, fibrous. Saturated. M.C.=184%, Org.=24%.

Test Hole Logs - Drawing D-10



STATE OF ALASKA
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OLD HARBOR AIRPORT
TEST HOLE LOGS
PROJECT NO. 53263

Scale: 1"=5'	Designed: T.S.	Drawn: N.B.	SHEET 8 OF 8
	Checked: T.E.	Date: 8-5-92	

ALASKA DEPARTMENT OF TRANSPORTATION TEXTURAL SOIL DESCRIPTIONS

Rev. Dec. 8, 1989

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.

(CLAYS < .002 mm)
(SILTS < #200)
(SAND #200 TO #10)
(GRAVEL #10 TO 3" DIAMETER)
(COBBLES 3" TO 10" DIAMETER)
(BOULDERS +10" DIAMETER)

COARSE-GRAINED SOILS
35% OR LESS SILT/CLAY

GRAVEL > SAND | SAND ≥ GRAVEL

GRAVEL > SAND

LESS THAN 20% SAND | 20% OR MORE SAND

- LESS THAN 20% SAND
  - MORE THAN 12% SILT CLAY
    - PI ≥ 11 → CLAYEY GRAVEL
    - PI ≤ 10 → SILTY GravEL
  - 12% OR LESS SILT CLAY → GRAVEL
- 20% OR MORE SAND
  - 12% OR LESS SILT CLAY → SANDY GRAVEL
  - MORE THAN 12% SILT CLAY
    - PI ≥ 11 → CLAYEY SANDY GRAVEL
    - PI ≤ 10 → SILTY SANDY GRAVEL
  - MORE SILT CLAY THAN SAND
    - PI ≥ 11 → SANDY CLAYEY GRAVEL
    - PI ≤ 10 → SANDY SILTY GRAVEL

SAND ≥ GRAVEL

20% OR MORE GRAVEL | LESS THAN 20% GRAVEL

- 20% OR MORE GRAVEL
  - MORE SILT CLAY THAN SAND
    - PI ≤ 10 → GRAVELLY SILTY SAND
    - PI ≥ 11 → GRAVELLY CLAYEY SAND
  - MORE THAN 12% SILT CLAY
    - PI ≤ 10 → SILTY GRAVELLY SAND
    - PI ≥ 11 → CLAYEY GRAVELLY SAND
  - 12% OR LESS SILT CLAY → GRAVELLY SAND
- LESS THAN 20% GRAVEL
  - 12% OR LESS SILT CLAY → SAND
  - MORE THAN 12% SILT CLAY
    - PI ≤ 10 → SILTY SAND
    - PI ≥ 11 → CLAYEY SAND

FINE-GRAINED SOILS
36% OR MORE SILT/CLAY

PI ≤ 10 | PI > 10

PI ≤ 10

20% OR MORE GRAVEL | LESS THAN 20% GRAVEL

- 20% OR MORE GRAVEL
  - 20% OR MORE SAND
    - MORE SAND THAN GRAVEL → GRAVELLY SANDY SILT
    - MORE GRAVEL THAN SAND → SANDY GRAVELLY SILT
  - LESS THAN 20% SAND → GRAVELLY SILT
- LESS THAN 20% GRAVEL
  - 20% OR MORE SAND → SANDY SILT
  - LESS THAN 20% SAND → SILT

PI > 10

LESS THAN 20% GRAVEL | 20% OR MORE GRAVEL

- LESS THAN 20% GRAVEL
  - LESS THAN 20% SAND
    - LL > 40 → CLAY
    - LL ≤ 40 → SILTY CLAY
  - 20% OR MORE SAND
    - LL > 40 → SANDY CLAY
    - LL ≤ 40 → SANDY SILTY CLAY
- 20% OR MORE GRAVEL
  - LESS THAN 20% SAND
    - LL > 40 → GRAVELLY CLAY
    - LL ≤ 40 → GRAVELLY SILTY CLAY
  - 20% OR MORE SAND
    - SAND ≥ GRAVEL
      - LL > 40 → GRAVELLY SANDY CLAY
      - LL ≤ 40 → GRAVELLY SANDY SILTY CLAY
    - SAND < GRAVEL
      - LL > 40 → SANDY GRAVELLY CLAY
      - LL ≤ 40 → SANDY GRAVELLY SILTY CLAY

Drawing D-11

SOILS TESTING REPORT

Project Name Old Harbor Airport Project # D53263 Code #

Centerline Material Site Sampled by Lewis

Station		21+00	24+00	28+00	28+00	41+00	39+00	29+00	29+00
Offset (feet)		371.5 Rt.	350 Rt.	148.4 Rt.	148.4 Rt.	186.3 Rt.	275 Lt.	315 Lt.	315 Lt.
Depth (feet)		2-4	2-4	1	3-5	5-7	2-4	1.5	1.5-3.5
Test Hole No.		T.P. 1	T.P. 2	T.P. 3	T.P. 3	T.P. 4	T.P. 5	T.P. 6	T.P. 6
Field No.		FS-1	FS-2	FS-3	FS-4	FS-5	FS-6	FS-7	FS-8
Date Sampled		10-4-84	10-4-84	10-4-84	10-4-84	10-4-84	10-4-84	10-4-84	10-4-84
Lab No.		84A-1480	84A-1481	84A-1482	84A-1483	84A-1484	84A-1485	84A-1486	84A-1487
Estimated %+10									
Estimated %+3									
Percent Passing Sieve Size	3	100				100	100		100
	2	97	100		100	98	92	100	95
	1	90	82		91	84	82	94	81
	3/4	85	78		87	80	76		75
	1/2	80	72		81	73	70		68
	3/8	75	67		76	68	66	93	62
	#4	65	57		64	55	57	91	52
	#10	55	48		54	41	48	89	42
	#40	38	33		34	24	30	86	27
	#50	34	30		31	21	26		24
	#100	29	25		25	17	20		19
	#200	22	19		20	13	15	70	14
	.02mm								
	.002mm								
Liquid Limit		22	32		22	20	NV	NV	28
Plastic Index		NP	NP		NP	NP	NP	NP	NP
AASHTO Class		A-1-b(0)	A-1-b(0)		A-1-b(0)	A-1-a(0)	A-1-b(0)	A-4(0)	A-1-a(0)
FSV									
Soils Description		Si Sa Grl	Si Sa Grl	Org Sa Si	Si Sa Grl	Si Sa Grl	Si Sa Grl	Si	Si Sa Grl
Organic Content %									
Sulfate Soundness									
L.A.Abrasion Loss									
Degradation Value									
Natural Moisture %		134.6	14.4	138.4	11.2	7.2	10.4	194.7	6.4
Sp.G. Fine									

SOILS TESTING REPORT

Project Name Old Harbor Airport Project # D53263 Code #

Centerline Material Site Sampled by Lewis & Tom Ottley

Station	17+00	18+00	Unknown	0+40/2+00	10+90	19+70	19+70	24+50	
Offset (feet)	378 Lt.	415 Rt.	Unknown	℄ /10 Rt	℄	20 Lt.	20 Lt.	40 Lt.	
Depth (feet)	1-3	3-5	Unknown	3-17	1-2.5	0.5-2	4-11	5.5-8	
Test Hole No.	T.P. 10	T.P. 11	Unknown	T.H. 12/13	T.H. 16	T.H. 19	T.H. 19	T.H. 20	
Field No.	FS-9	FS-10	FS-11	FS-12	MS-13	MS-14	FS-15	FS-16	
Date Sampled	10-5-84	10-5-84	10-5-84	11-17-84	11-19-84	11-19-84	11-19-84	11-19-84	
Lab No.	84A-1488	84A-1489	84A-1490	84A-2037	84A-2038	84A-2039	84A-2040	84A-2041	
Estimated %+10									
Estimated %+3									
Percent Passing Sieve Size 3	100	92							3
2	93	86	100	100					2
1	89	80	96	97				100	1
3/4	86	75	90	90			100	99	3/4
1/2	81	68	82	64			95	96	1/2
3/8	77	63	75	44			90	91	3/8
#4	68	53	63	19			72	73	#4
#10	56	45	51	10			58	53	#10
#40	35	31	33	5			41	34	#40
#50	31	28							#50
#100	25	24		3			34		#100
#200	20	19	20	2			27	21	#200
.02mm									.02mm
.002mm									.002mm
Liquid Limit	27	26	31	30			25	31	
Plastic Index	NP	NP	NP	NP			NP	NP	
AASHTO Class	A-1-b(0)	A-1-b(0)	A-1-b(0)	A-1-a(0)			A-2-4(0)	A-1-b(0)	
FSV									
Soils Description	Si Sa Grl	Si Sa Grl	Si Sa Grl	Grl	Org Grl Si	Org Si	Si Sa Grl	Si Sa Grl	
Organic Content %									
Sulfate Soundness									
L.A.Abrasion Loss									
Degradation Value									
Natural Moisture %	15.4	12.1	15.2		83.0	96.0			
Sp.G. Fine									
Unified Class				GW			SM	SM	

SOILS TESTING REPORT

Project Name Old Harbor Airport Project # D53263 Code #

Centerline Material Site Sampled by Ottley

Station	26+00	32+50	34+35	36+80	36+80	60+55	60+55	44+55	
Offset (feet)	3 Rt.	℄	℄	℄	℄	℄	℄	80 Lt.	
Depth (feet)	4-8	2-4	2-4	3-5	5-6.5	5-15	10-14	5-19	
Test Hole No.	T.H. 21	T.H. 24	T.H. 25	T.H. 26	T.H. 26	T.H. 35	T.H. 35	T.H. 43	
Field No.	FS-17	MS-18	MS-19	MS-20	MS-21	FS-22	MS-23	FS-24	
Date Sampled	11-29-84	11-29-84	12-1-84	12-1-84	12-1-84	12-3-84	12-3-84	12-4-84	
Lab No.	84A-2042	84A-2043	84A-2044	84A-2045	84A-2046	84A-2047	84A-2048	84A-2049	
Estimated %+10									
Estimated %+3									
Percent Passing Sieve Size 3									3
2						100		100	2
1						99		96	1
3/4	100					96		86	3/4
1/2	99					89		75	1/2
3/8	98					83		65	3/8
#4	89					60		49	#4
#10	73					43		37	#10
#40	53					30		22	#40
#50									#50
#100								17	#100
#200	36					20		13	#200
.02mm									.02mm
.002mm									.002mm
Liquid Limit	24					21		25	
Plastic Index	2					NP		NP	
AASHTO Class	A-4(0)					A-1-b(0)		A-1-a(0)	
FSV									
Soils Description	Grl Sa Si	Peat	Peat	Peat	Peat	Si Sa Grl	Si Sa Grl	Si Sa Grl	
Organic Content %									
Sulfate Soundness									
L.A.Abrasion Loss									
Degradation Value									
Natural Moisture %		396	600	280	267		7.6		
Sp.G. Fine						2.73			
Unified Class						SM			
Optimum Moist.						5.8			
Max. Dry Density						141.4 pcf			

SOILS TESTING REPORT

Sheet 4 of 7

Project Name Old Harbor Airport Project # D53263 Code #

Centerline Material Site Sampled by Ottley

Station	36+00	36+00	34+00	32+00	30+00	28+00	21+00	23+00	
Offset (feet)	100 Rt.	100 Lt.	100 Rt.	100 Rt.	100 Rt.	550 Lt.	170 Lt.	160 Lt.	
Depth (feet)	2-5	0-2	2-5	1-3	2-5	1-8.5	0-2	2-7	
Test Hole No.	T.H. 49	T.H. 50	T.H. 51	T.H. 52	T.H. 53	T.H. 55	T.H. 60	T.H. 61	
Field No.	MS-25	MS-26	MS-27	MS-28	MS-29	FS-30	MS-31	FS-32	
Date Sampled	12-5-84	12-5-84	12-5-84	12-5-84	12-5-84	12-5-84	12-6-84	12-6-84	
Lab No.	84A-2050	84A-2051	84A-2052	84A-2053	84A-2054	84A-2055	84A-2056	84A-2057	
Estimated %+10									
Estimated %+3									
Percent Passing Sieve Size 3									3
2									2
1						100			1
3/4						96		100	3/4
1/2						91		98	1/2
3/8						84		96	3/8
#4						71		82	#4
#10						61		65	#10
#40						45		43	#40
#50									#50
#100						37			#100
#200						29		29	#200
.02mm									.02mm
.002mm									.002mm
Liquid Limit						21		21	
Plastic Index						NP		NP	
AASHTO Class						A-2-4(0)		A-2-4(0)	
FSV									
Soils Description	Peat	Peat	Peat	Peat	Peat	Si Sa Grl	Org Si	Si Grl Sa	
Organic Content %									
Sulfate Soundness									
L.A.Abrasion Loss									
Degradation Value									
Natural Moisture %	210	136	434	331	251		81		
Sp.G. Fine									
Unified Class						GM			

Soils Testing Reports - Drawing D-15

SOILS TESTING REPORT

Sheet 5 of 7

Project Name Old Harbor Airport Project # D53263 Code #

Centerline Material Site Sampled by Ottley

Station	22+00/24+00	18+00	18+00	16+00	13+00	11+00	9+00	3+00
Offset (feet)	350/375 Rt	400 Lt.	400 Lt.	315 Lt.	50 Lt.	380 Lt.	390 Lt.	390 Lt.
Depth (feet)	1.5-8	0.5-2.5	2.5-11	1-2.5	2-3	0-2	1-4	1-3.5
Test Hole No.	T.H. 65/66	T.H. 68	T.H. 68	T.H. 69	T.H. 71	T.H. 73	T.H. 74	T.H. 77
Field No.	FS-33	MS-34	FS-35	MS-36	MS-37	MS-38	MS-39	MS-40
Date Sampled	12-7-84	12-8-84	12-8-84	12-8-84	12-8-84	12-8-84	12-8-84	12-10-84
Lab No.	84A-2058	84A-2059	84A-2060	84A-2061	84A-2062	84A-2063	84A-2064	84A-2065
Estimated %+10								
Estimated %+3								
Percent Passing Sieve Size 3								
2								
1	100							
3/4	98		100					
1/2	91		97					
3/8	85		92					
#4	65		71					
#10	50		51					
#40	34		30					
#50								
#100	28							
#200	21		20					
.02mm								
.002mm								
Liquid Limit	26		20					
Plastic Index	NP		3					
AASHTO Class	A-1-b(0)		A-1-b(0)					
FSV								
Soils Description	Si Sa Grl	Org Si	Si Sa Grl	Org Si	Peat	Peat	Peat	Org Si
Organic Content %								
Sulfate Soundness								
L.A.Abrasion Loss								
Degradation Value								
Natural Moisture %		186		160	193	209	385	118
Sp.G. Fine								

SOILS TESTING REPORT

Sheet 6 of 7

Project Name Old Harbor Airport Project # D53263 Code #

Centerline Material Site Sampled by Ottley

Station	0+50	14+00	9+00	34+30	34+30	38+00	38+00	36+60	
Offset (feet)	390 Lt.	100 Rt.	380 Lt.	℄	℄	℄	℄	℄	
Depth (feet)	2-5	1-4	3-5	2.5-5	5.5-8	2-4.5	5-7.5	3-5.5	
Test Hole No.	T.H. 78	T.H. 84	T.H. 91	T.H. 85	T.H. 85	T.H. 86	T.H. 86	T.H. 87	
Field No.	MS-41	MS-42	MS-43	S-1	S-2	S-3	S-4	S-5	
Date Sampled	12-10-84	12-10-84	12-13-84	12-11-84	12-11-84	12-11-84	12-12-84	12-12-84	
Lab No.	84A-2066	84A-2067	84A-2068	85A-25	85A-26	85A-27	85A-28	85A-29	
Estimated %+10									
Estimated %+3									
Percent Passing Sieve Size 3									3
2									2
1									1
3/4									3/4
1/2									1/2
3/8									3/8
#4									#4
#10									#10
#40									#40
#50									#50
#100									#100
#200									#200
.02mm									.02mm
.002mm									.002mm
Liquid Limit				NV	NV	NV	NV	NV	
Plastic Index				NP	NP	NP	NP	NP	
AASHTO Class				A-8	A-8	A-8	A-8	A-8	
FSV									
Soils Description	Peat	Peat	Peat	Peat	Peat	Peat	Peat	Peat	
Organic Content %				35	86	34	87	59	
Sulfate Soundness									
L.A.Abrasion Loss									
Degradation Value									
Natural Moisture %	210	138	446	288	629	235	663	345	
Sp.G. Fine				2.11	1.54	2.05	1.51	1.69	

SOILS TESTING REPORT

Project Name Old Harbor Airport Project # D53263 Code #

Centerline Material Site Sampled by Ottley

Station	33+50	9+00	0+35						
Offset (feet)	℄	380 Lt.	390 Lt.						
Depth (feet)	2.5-5	2-4.5	2-4.5						
Test Hole No.	T.H. 88	T.H. 91	T.H. 92						
Field No.	S-6	S-7	S-8						
Date Sampled	12-12-84	12-13-84	12-13-84						
Lab No.	85A-30	85A-31	85A-32						
Estimated %+10									
Estimated %+3									
Percent Passing Sieve Size 3									3
2									2
1									1
3/4									3/4
1/2									1/2
3/8									3/8
#4									#4
#10									#10
#40									#40
#50									#50
#100									#100
#200									#200
.02mm									.02mm
.002mm									.002mm
Liquid Limit	NV	NV	NV						
Plastic Index	NP	NP	NP						
AASHTO Class	A-8	A-8	A-8						
FSV									
Soils Description	Peat	Peat	Peat						
Organic Content %	25	89	24						
Sulfate Soundness									
L.A.Abrasion Loss									
Degradation Value									
Natural Moisture %	210	446	184						
Sp.G. Fine	2.29	1.41	2.20						

APPENDIX E

ROCK CORE PHOTOGRAPHS

ROCK CORE PHOTOGRAPHS

RM12-01, Box 1, 25.5 to 35.8 feet, Dry.

RM12-01, Box 2, 35.8 to 46.1 feet, Dry.

Figure E-01

ROCK CORE PHOTOGRAPHS

RM12-01, Box 3, 46.1 to 57.4 feet, Dry.

RM12-01, Box 4, 57.4 to 64.6 feet, Dry.

Figure E-02

ROCK CORE PHOTOGRAPHS

RM12-02, Box 1, 9.6 to 18.7 feet, Dry.

RM12-02, Box 2, 18.7 to 27.7 feet, Dry.

Figure E-03

ROCK CORE PHOTOGRAPHS

RM12-02, Box 3, 27.7 to 36.5 feet, Dry.

RM12-02, Box 4, 36.5 to 45.5 feet, Dry.

Figure E-04

ROCK CORE PHOTOGRAPHS

RM12-02, Box 5, 45.5 to 51.5 feet, Dry.

RM12-03, Box 1, 15.0 to 26.1 feet, Dry.

Figure E-05

ROCK CORE PHOTOGRAPHS

RM12-03, Box 2, 26.1 to 37.2 feet, Dry.

RM12-03, Box 3, 37.2 to 45.9 feet, Dry.

Figure E-06

ROCK CORE PHOTOGRAPHS

RM12-04, Box 1, 15.5 to 25.1 feet, Dry.

RM12-04, Box 2, 25.1 to 32.3 feet, Dry.

Figure E-07

ROCK CORE PHOTOGRAPHS

RM12-04, Box 3, 32.3 to 40.4 feet, Dry.

RM12-04, Box 4, 40.4 to 48.9 feet, Dry.

Figure E-08

ROCK CORE PHOTOGRAPHS

RM12-04, Box 5, 48.9 to 52.3 feet, Dry.

RM12-05, Box 1, 20.0 to 30.1 feet, Dry.

Figure E-09

RM12-05, Box 2, 30.1 to 38.6 feet, Dry.

RM12-05, Box 3, 38.6 to 48.0 feet, Dry.

ROCK CORE PHOTOGRAPHS

RM12-05, Box 4, 48.0 to 51.6 feet, Dry.

RM12-06, Box 1, 15.0 to 23.4 feet, Dry.

Figure E-11

ROCK CORE PHOTOGRAPHS

RM12-06, Box 2, 23.4 to 26.6 feet, Dry.

Figure E-12

Summary of work at Old Harbor Airport

- Barge arrived with 400 tons of supplies and equipment in Mid-May 2012
- Project Construction started up on June 4, 2012
- Full complement of operators and laborers Mid-June 2012
- Purpose of the project in 2012 was to remove overburden in preparation for rock removal next year. The hills on both sides of the runway will be cut back to a slope of seven horizontal feet per foot of vertical height
- Project has employed 14 full and part-time Old Harbor residents
- We have been operating four 20 cubic yard (540 cubic feet) trucks
- Production (depending on location and weather) has ranged from 500 to over 1000 loads per week, with an average of 800 loads per week. This is equal to approximately 16,000 cubic yards per week.
- We have purchase diesel fuel from the City of Old Harbor and gasoline from Larionoff's the local fuel supplier. We have used over 20,000 gallons of fuel for the project.
- The project has been challenging from several perspectives, the steep terrain, wet weather and wet soil conditions, and of course the remote aspect for supplies and parts.
- The crew has worked very well together putting in six 12 hours days per week.
- Non-locals were hired for training purposes and for certain skill sets not readily available within Old Harbor.
- With increased rain the second half of September 2012, we began shutting down for the winter. Moved remaining loose overburden, preparing SWPPP actions for winter, and preparing equipment for winter storage in Old Harbor. We structured our equipment lease to allow for equipment to remain in Old Harbor to avoid barging costs (demobilizing and mobilizing again in 2013)
- To date we have hauled 11,000 loads of material with an approximate volume of 200,000 cubic yards which met our goal for 2012. The goal was established for a 20 week season, the project was only at full operations for approximately 13 weeks.
- The west side construction area (area where IRT will be working) has been adequately prepared for them to begin operations in 2013. The Shearwater crew will extend the northern haul road and the west pad area next spring prior to IRT arrival.
- A geotechnical study (including additional borings) was conducted in October of 2012 and a draft report received in early January 2013.
- A draft Environmental Assessment has been completed by the USACE and submitted to the IRT for review and comment
- POA-1986-95 was issued October 30, 2013
- Permit Modification of POA-1986-95 will go out for public notice February 2013
- IRT conducted a planning meeting on the project and site visit to Old Harbor in January 2013 to continue their logistics planning efforts.
- Overall the project has been successful having moved the projected amount of material in approximately 70% of the anticipated time.
- We will continue efforts on the design documents for phase II and perform procurement activities for additional equipment and supply needs for 2013 and work with IRT on logistics planning.