APPENDIX D

GEOTECHNICAL INFORMATION

Concept Recommendations (Draft)

Geotechnical Memorandum

Geotechnical Report (Draft)

Material Site – Preliminary Concepts for Development

Concept Recommendations (Draft)

R&M CONSULTANTS, INC.
GEOTECHNICAL MEMORANDUM

TO:	Judy Chapman DOT&PF, Central Region Planning	30 December 2010
FROM:	Bob Scher, P.E. Sr. Geotechnical Engineer	R&M No. 1429.03
RE:	Concept Recommendations - Draft Mertarvik Airport Location Study – Phase III AKSAS No. 51907, AIP No. 3-02-0000-008-2007	

The DOT&PF contracted[1] R&M to perform reconnaissance-level geotechnical explorations at three (Figure 1) of the six previously identified alternate sites for the Mertarvik airport[2]. This memorandum summarizes our geotechnical considerations for selecting the preferred airport site, and preliminary recommendations[3] for conceptual design of the aircraft embankments, based on the test holes (by R&M and others)[4] listed in Table 1.

TABLE 1: SUMMARY OF AIRPORT RECONNAISSANCE TEST HOLES

SITE 1		SITE 3	SITE 4
EAST RIDGE	WEST RIDGE		
TH10-09, 10, 11, 12, 13 & 14[a]; AP-17[c]	TH10-08, 14, 15, 16 & 17[a]; TH08-05[b]; AP-23 & 24[c]	TH08-12, 13, 14, 15 & 16[b]	TH08-17, 18, 19, 20, 21 & 22[b]

a. R&M. 2010. *Geotechnical Report – Draft*, Mertarvik Airport Location Study – Phase III, Additional Reconnaissance Investigation, Nelson Island, Alaska. Prepared for DOT&PF, Central Region Planning.
b. R&M. 2009. *Geotechnical Report*, Mertarvik Airport Location Study – Phase III, Reconnaissance Investigation. Prepared for DOT&PF, Central Region Planning.
c. U.S. Army Corps of Engineers (USACE). 2008. *Geotechnical Report*, Mertarvik Townsite, Newtok, Alaska. Alaska District, Soils and Geology Section.

[1] NTP No. 10, *Foundations & Geotechnical Services Term Agreement* No. P62152.

[2] PDC Inc. Engineers. 2008. Newtok Airport Relocation Reconnaissance Study, Project No. 57405. Prepared for the DOT&PF, Central Region Planning.

[3] A detailed site-specific geotechnical investigation will be required to support the design and construction of the final airport.

[4] Numerous other test holes have been drilled to investigate proposed material sources, airport access roads, and other infrastructure – see the reports referenced in Table 1.

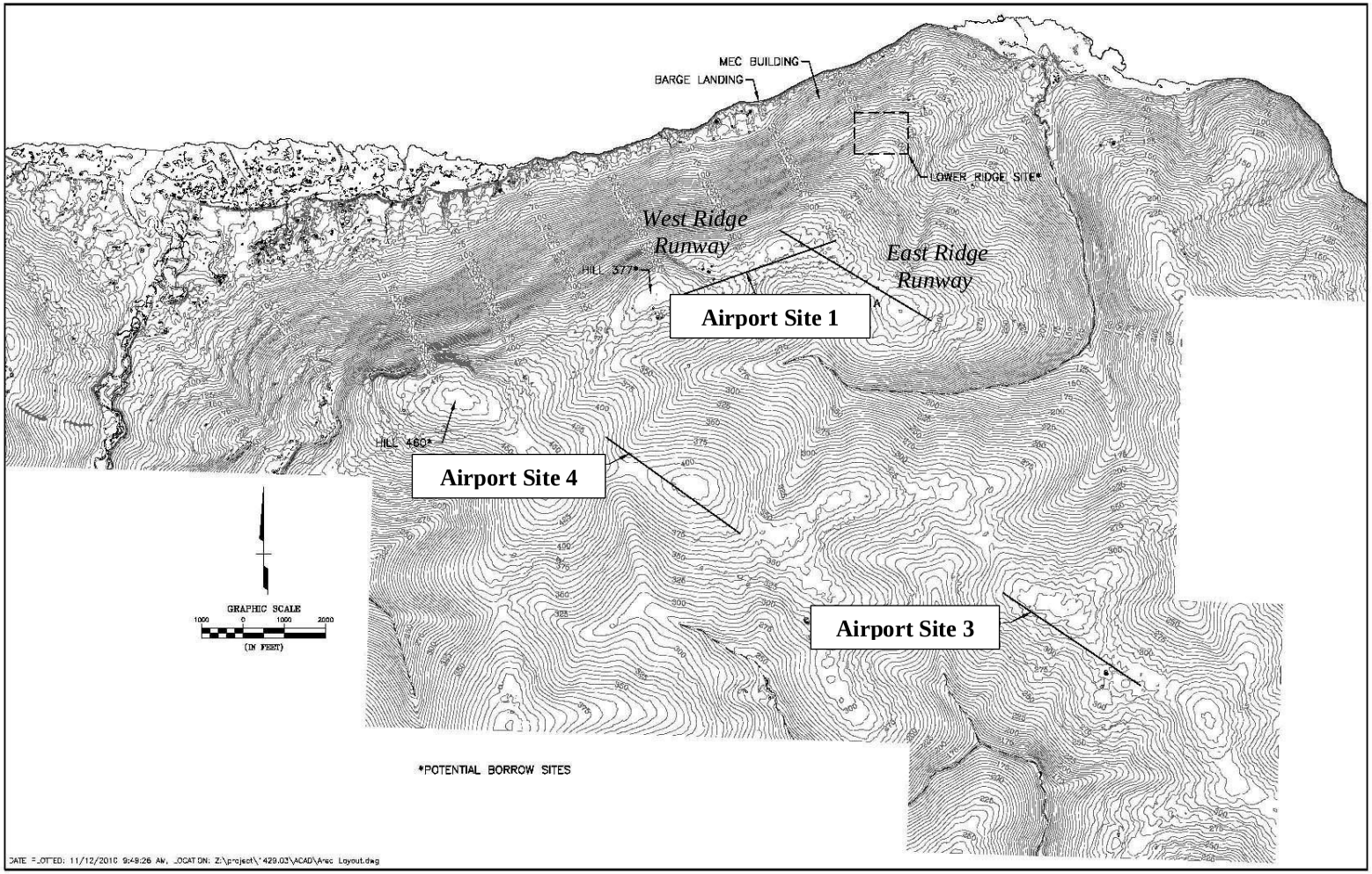


FIGURE 1: MERTARVIK AREA LAYOUT MAP

GEOTECHNICAL CONDITIONS[5]

Based on the reconnaissance borings (Table 1), the surficial geology appears to be relatively consistent at each of the three airport sites. Briefly, the terrain across each site generally appears to be fairly well drained, with a few scattered wet areas (thaw depressions?), and covered with grassy tussock tundra, and scrub willow along drainages and depressions. Underlying the surface vegetative mat (typically less than one foot thick), the soil profile is comprised of loose to medium dense, moist to wet, poorly differentiated units of generally non to slightly plastic fine-grained colluvium, eluvium, and/or residual soil [e.g. *(ML)o, ML, s(ML)*], transitioning with depth to completely weathered bedrock [e.g. *SM, (SM)g, (GM)scb*]; overlying highly to moderately weathered bedrock (basalt). Each airport site is also underlain by variable permafrost. Table 2 summarizes the range of surficial soils with some organic matter, permafrost, and bedrock reported at each of the airport sites.

TABLE 2: SUMMARY OF GEOTECHNICAL CONDITIONS

AIRPORT SITE	TOTAL BORINGS (DEPTHS)	DEPTH OF ORGANICS[a]	NO. OF BORINGS (DEPTH WHERE ENCOUNTERED)	
			PERMAFROST[b]	BEDROCK[c]
Site 1[d] East Ridge West Ridge	 7 (12'-21.5') 7 (9.9'-31.5')	 0.6'-4' 0.5'-4'	 6 (0.5'-7') 5 (2'-12')	 4 (12'-15.5') 3 (10'-15')[e]
Site 3	5 (10.3'-21.5')	4.5'-9.5'	3 (1.5'-2')	2 (9.5'-11.8')
Site 4	6 (13.2'-20.8')	0.5'-9' [f]	1 (5')	4 (13'-20.8')

a. Including vegetative mat, peat, organic soil, and mineral soil with ash contents > 97-98 percent.
b. Where encountered, the permafrost typically extended to the total depth drilled.
c. Top of interpreted highly to moderately weathered bedrock.
d. Including test holes drilled by the USACE in 2007.
e. No bedrock was reported in USACE boring AP-23, drilled to a depth of 31.5 ft.
f. Organic matter was reported to a depth of 19 feet in R&M boring TH08-17.

Permafrost was observed in most of the test holes drilled at the subject airport sites (Table 2), particularly where the ground surface was drained and covered with hummocks; but was absent or very deep where the surface was wet and covered with grass. Recovered samples of frozen soil were generally described as containing about 5-15%, by volume, visible segregated ice; typically in the form of individual ice crystals and random lenses, less than about 1/4 to 1/2-inch thick at Site 1, but up to about two inches at Sites 3 and 4. Permafrost temperatures measured in

[5] See the reports referenced in Table 1 for more thorough discussions of the explorations and geotechnical conditions at Airport Sites 1, 3 and 4.

several test holes at each site were generally > 30ºF at Site 3, and > 31.5ºF at Sites 1 and 4 (i.e. 'very warm').

Groundwater was not observed in any of the test holes drilled at the subject airport sites; however, no monitoring wells were established, and given the fine-grained texture of the soil it is possible that groundwater was missed while drilling. Further, some of the recovered soil samples appeared to be wet, if not saturated; and several small ponds or very wet surfaces were noted in the vicinity of each site. Therefore, it is likely that discontinuous zones of groundwater exist in the areas explored, especially perched seasonally over permafrost or denser soils.

Table 3 summarizes several index properties measured at each site (field and laboratory testing) which generally correlate with, and therefore can be considered indicators of the soil strength and compressibility; as well as the susceptibility of the soil to seasonal frost action (i.e. heave and thaw weakening) and erosion.

TABLE 3: SUMMARY OF SOIL INDEX PROPERTIES

AIRPORT SITE	AVERAGE (MIN-MAX/NO. OF TESTS)			
	MOISTURE CONTENT[a], %		P200, %	SPT N-VALUE[b], bpf
	Frozen	Unfrozen		
Site 1 East Ridge West Ridge Combined	 34 (21-59/14) 37 (21-51/17) 36	 21 (11-38/6) 34 (19-53/8) 29	 69 (27-100/17) 64 (33-99/14) 66	 18 (8-26/3) 19 (6-46/5) 19
Site 3	49 (30-73/10)	33 (19-44/4)	76 (46-98/11)	16 (9-29/6)
Site 4	54 (53-55/2)	33 (21-45/9)	58 (54-99/9)	20 (8-37/9)

a. Excluding samples with organic matter collected above a depth of about 5 feet.
b. Unfrozen soil, excluding samples that encountered large gravel, cobbles or boulders.

In regards to Table 3:

- At Site 1, the differences between the moisture contents in frozen or thawed samples, P200 values, and N-values measured along the east ridge versus the west ridge are not statistically significant ($p > 0.05$). Further, the differences between the moisture contents in unfrozen samples, P200 values, or N-values measured at any of the three sites are not statistically significant.
- The difference between moisture contents measured in frozen samples at Site 1 versus at Site 3 and 4 is statistically significant ($p < 0.05$); although the difference between Site 3 and Site 4 is not significant. Assuming the soils are near or fully saturated, estimated unit

thaw strains may vary from approximately 5-20% at Site 1, up to approximately 15-30% at Sites 3 and 4.

AIRPORT SELECTION CONSIDERATIONS

Based on the reconnaissance explorations discussed above, the subsurface geotechnical conditions which could have the most effect on design and construction of an airport at Mertarvik include the low strength, compressibility, and very high susceptibility to erosion and seasonal frost action (i.e. thaw weakening) in the shallow foundation soils, and variable permafrost. However, it is our interpretation of the reconnaissance explorations completed to-date indicate that these particular geotechnical aspects apply equally to all three sites.

Other important geotechnical considerations when selecting the preferred airport site include embankment stability, surface drainage, and cuts. Briefly, the stability of the embankment side-slopes would be enhanced where formed over ground that is relatively level, versus sloping. Further, the airport embankments should be laid out to avoid, or at least minimize cuts in the existing ground, especially where exposing permafrost.

PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

- There are no climate records from Newtok. Based on historic climate records from Bethel (1949 to 2010), Cape Romanzof (1953-1985), and Mekoryuk (1949-1973), thermal modeling of air temperatures at Mertarvik should consider the following values:

Air Temperature Parameters	Steady State Climate	Continued Climate Warming*
Sinusoidal Model, °F		
Mean, T_m	30.0	*31.4*
Amplitude, A_o	23.0	*22.7*
Mean/Design Indices, °F-Days		
Freeze	3,050/4,225	*2,750/3,910*
Thaw	2,315/2,750	*2,530/2,965*

* Projected values in ±20 years, based on historic trends at Bethel

- Based on these parameters, the maximum depth of seasonal freeze (annual active layer) is estimated to vary from less than approximately 3-5 feet in undisturbed ground not cleared of snow, to greater than approximately 8-10 feet in dry fill embankments cleared of snow. Further, permafrost underlying any disturbed ground or under embankments is expected to degrade (thaw) with time. Note that placing board insulation in the embankments is not expected to preserve or protect permafrost at Mertarvik; although it may reduce the long-

term rate of permafrost degradation and associated thaw settlements

- For conceptual planning, assume that all airport embankments will extend at least 4-5 feet above adjacent ground to minimize accumulation of snow on the surface; and the fill side-slopes should be flatter than 1(v):4(h) to minimize erosion of the fill. Further, final grading and drainage features should be planned to transmit surface water away from versus along or towards the embankment.

- The shallow foundation soils at each airport site, as well as overburden soils recovered from the proposed material source designated Hill 460 used as fill, when unfrozen and wet, are expected to be very weak, and prone to softening and pumping when directly subjected to repeated vehicle/equipment traffic. Therefore, for conceptual planning, assume that a reinforcement geosynthetic product (e.g. woven geotextile of geogrid) will be required (1) under all aircraft embankments; and (2) within the surface section along haul routes during construction.

- We consider that the airport embankments could be successfully formed directly on top of the vegetative mat at each of the subject sites. However, we also believe that the required minimum embankment and aircraft surface sections could be reduced, and the long-term performance of the aircraft surfaces (i.e. reduced settlement) and stability of the embankment side-slopes could be improved, by modifying the shallow foundation soil conditions during construction; such as sub-excavating the organic or ice-rich soils, pre-thawing the permafrost, and/or surcharging the embankment prior to completion.

- Long term settlements in embankments should be expected; associated with thermal degradation (warming and thawing) of the underlying permafrost, and consolidation of the unfrozen foundation soils and fill. The magnitude of settlement will depend on the fill (i.e. classification and relative compaction), embankment thickness, foundation soil conditions, and the extent of foundation soil improvements. For example, long-term (± 20 years after construction) settlements could range from: (1) less than approximately one-half foot under embankments that are less than about 10 feet thick and formed with dry, coarse-grained fill, the foundation soil conditions are improved, and permafrost is absent or thaw-stable; to (2) greater than 2-3 feet under embankments that more than 15-20 feet thick and formed with wet, fine-grained fill, bedrock is more than 20-25 feet deep, the foundation soil conditions are not improved, and the permafrost is ice-rich.

- The overburden soils recovered from the proposed material source designated Hill 460, as well as the foundation soils underlying the vegetative mat at each airport site are considered to be extremely susceptible to erosion. Cuts should be minimized, especially in permafrost soils. Further, appropriate erosion-control measures should be taken to protect these materials, especially where exposed on embankment side-slopes or in cuts

and ditches (e.g. permanent erosion protection matting, rock blanket, etc.)

CLOSURE

The discussions in this memorandum reflect our interpretation of the cited information, the findings from our explorations, and our understanding of the project, as described herein. This memorandum is intended solely for use by the DOT&PF and its consultants that are directly involved with the *Mertarvik Airport Location Study*; under the condition that the reader also possesses a basic understanding of geotechnical terminology and principals.

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.

_____
ROBERT L. SCHER, P.E.
Senior Geotechnical Engineer

Xc: Dave Stanley, DOT&PF Statewide Materials

Geotechnical Memorandum

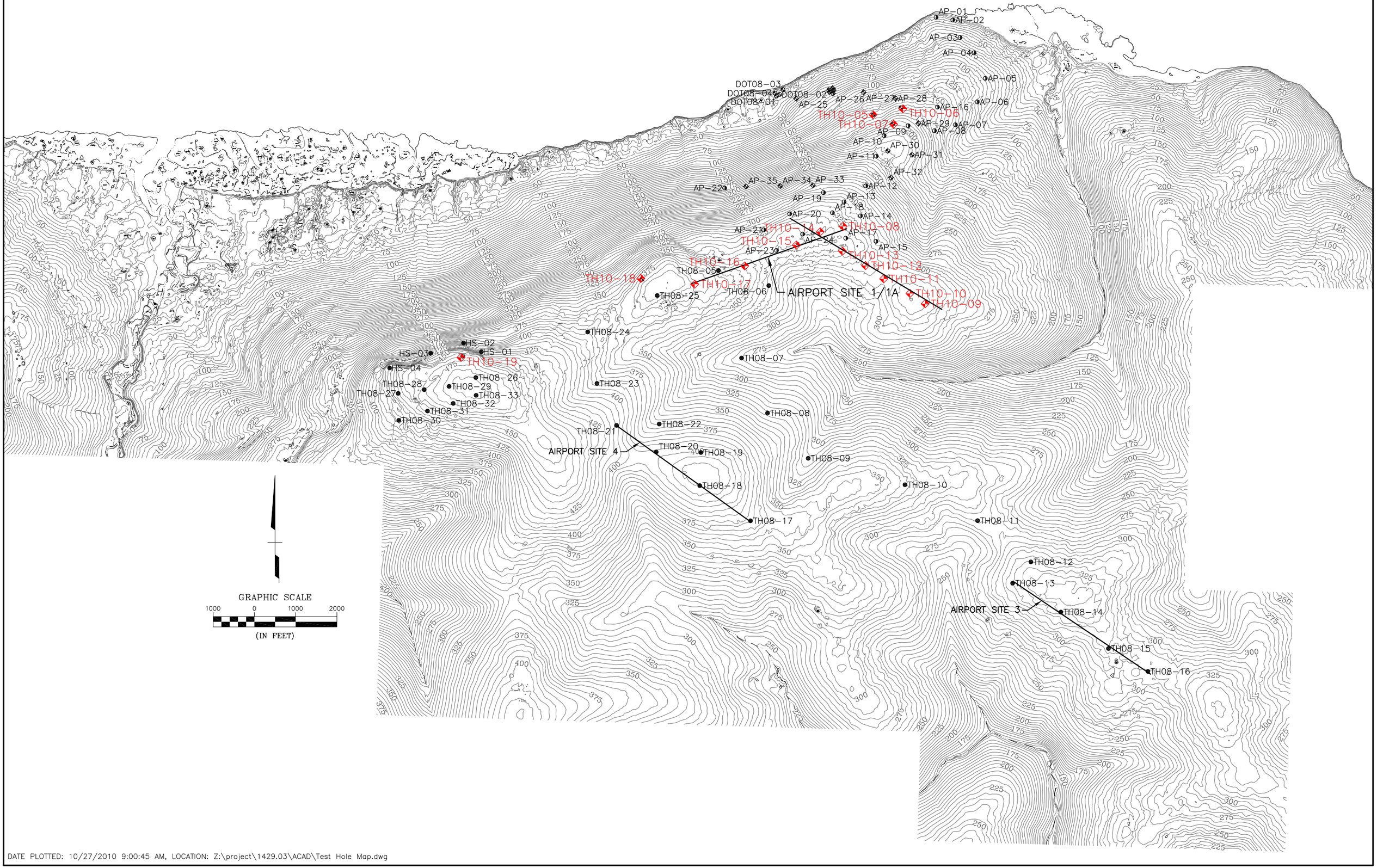
R&M CONSULTANTS, INC.
GEOTECHNICAL MEMORANDUM

TO:	Judy Chapman DOT&PF, Central Region Planning	27 October 2010
FROM:	Bob Scher, P.E. Sr. Geotechnical Engineer	R&M No. 1429.03
RE:	Preliminary Test Hole Information Geotechnical Reconnaissance Investigation – 2010 Explorations Mertarvik Airport Location Study – Phase 3	

Attachments:

- Draft test hole location map (1 page)
- Draft summaries of laboratory soil & rock quality test results (3 pages)
- Draft test hole logs; Lower Ridge Material Site, Hill 377, Hill 460 (3 pages)
- Draft rock core photos (3 pages)

Xc: Dave Stanley, C.P.G.; DOT&PF Statewide Materials
Craig Boeckman, C.P.G.; DOT&PF Central Region Materials



DATE PLOTTED: 10/27/2010 9:00:45 AM, LOCATION: Z:\project\1429.03\ACAD\Test Hole Map.dwg

SUMMARY OF LABORATORY SOIL TEST RESULTS - DRAFT
Geotechnical Reconnaissance Investigation - Lower Ridge Material Site
Mertarvik Airport Location Study - Phase 3

SAMPLE IDENTIFICATION			PARTICLE SIZE ANALYSIS, % Finer (by mass)†					ATTERBERG LIMITS Wet Prep (Dry Prep)			Moisture Content	Organic Content	USC
			Standard Sieve		Hydrometer (mm)								
Test Hole	No.	Depth, ft	#10	#200	0.02	0.005	0.002	LL	PL	PI	%	%	
TH10-05	1	1.5 - 3		76				26	--	NP	27	5.4	
	3	6.5 - 7.5	25	19	13	6.6	5.0				10		*GM**
	4	9 - 10		47							9.3		
TH10-06	1	1.5 - 3		87							41	10.5	
	2	5 - 6.4									8.0		
	3	10 - 11.3		41							19		
	4	15 - 16.5	59	35	23	12	7.6	50	42	8	29		*(GM)s**
TH10-07	1	1.5 - 3		89							30	4.8	
	2	5 - 6.5		89							27		
	3	10 - 11.5	78	34	19	8.8	6.7				11		*(SM)g**
	4	15 - 16.5									9.7		
	6	25 - 25.9		34							50		
	7	30 - 31.5									30		

† Maximum particle size that could be recovered was limited to 1.375-inches, the I.D. of the sampling tool.

* Estimated classification following visual-manual procedures (ASTM D 2488)

SUMMARY OF LABORATORY SOIL TEST RESULTS - DRAFT
Geotechnical Reconnaissance Investigation - Airport Site 1/1A
Mertarvik Airport Location Study - Phase 3

SAMPLE IDENTIFICATION			PARTICLE SIZE ANALYSIS, % Finer (by mass)†					ATTERBERG LIMITS			Moisture Content	Organic Content	USC
			Standard U.S. Sieve		Hydrometer (mm)			Wet Prep (Dry Prep)					
Test Hole	No.	Depth, ft	#10	#200	0.02	0.002	0.005	LL	PL	PI	%	%	
TH10-08	1	1 - 3	51	49	22	7.0	3.5	27	24	3	31	4.2	*GM**
	2	5 - 6.5									21		
	3	10 - 11.5	64	34	24	12	8.6	36	--	NP	23		*(SM)g**
TH10-09	1	1.5 - 3									63	4.2	
	2	5 - 6.5	96	91	43	13	6.9	25	23	2	29		ML
	3	10 - 10.8	82	53	37	19	12				22		*s(ML)**
TH10-10	1	1.5 - 3									34	6.2	
	2	5 - 6.5		100	55	24	17				22		*ML**
	3	10 - 11.5	45	27	14	4.4	0.9				11		*(GM)s**
TH10-11	1	1.5 - 3	49	49	37	16	11	28	25	3	29		GM
	2	5 - 6.5	100	99	70	29	18				44		*ML**
	3	10 - 11.5									39		
	4	15 - 16.5	100	73	40	16	10	32	--	NP	44		(ML)s
	5	20 - 21.5	95	61	35	15	9.9				39		*s(ML)**
TH10-12	1	1.5 - 3	88	86	61	30	21				69	7.8	*ML**
	2	5 - 6.5									59		
	3	10 - 11.5	100	99	55	22	14	26	--	NP	25		ML
	4	15 - 16.5		45							21		
TH10-13	1	2 - 3	91	89	62	30	19				26		*ML**
	2	5 - 6.5									23		
	3	10 - 11.5	76	42	28	13	9.1				21		*(SM)g**
	4	15 - 16.4									12		
	5	20 - 21.5	90	49	34	18	13				38		*SM**
TH10-14	1	1.5 - 2.5	64	63	39	16	8.9				33	6.9	*g(ML)**
	2	5 - 6.5	100	99	73	30	18	32	29	3	49		ML
	3	10 - 11.5									37		
	4	15 - 15.8	94	42	25	13	8.4				21		*SM**
TH10-15	1	1.5 - 3	88	88	57	16	6.5				56		*ML**
	2	5 - 5.9	99	98	22	10	7.0				29		*ML**

SUMMARY OF LABORATORY SOIL TEST RESULTS - DRAFT
Geotechnical Reconnaissance Investigation - Airport Site 1/1A
Mertarvik Airport Location Study - Phase 3

SAMPLE IDENTIFICATION			PARTICLE SIZE ANALYSIS, % Finer (by mass)†					ATTERBERG LIMITS			Moisture Content	Organic Content	USC
			Standard U.S. Sieve		Hydrometer (mm)			Wet Prep (Dry Prep)					
Test Hole	No.	Depth, ft	#10	#200	0.02	0.002	0.005	LL	PL	PI	%	%	
TH10-16	1	5 - 6.5									44	3.8	
	2	10 - 11.4	94	83	46	20	12	26	22	4	27		(ML)s
	3	15 - 16	76	48	33	16	11				39		*(SM)g**
	4	20 - 20.4									27		
TH10-17	1	1.5 - 3	34	33	20	7.6	4.6				29	5.0	*GM**
	2	5 - 6.5									19		
	3	10 - 11.5	74	46	33	19	12				50		*(SM)g**
	4	15 - 16.4									53		
	5	20 - 21.5	97	47	30	12	6.8				38		*SM**

† Maximum particle size that could be recovered was limited to 1.375-inches, the I.D. of the sampling tool.

* Estimated classification following visual-manual procedures (ASTM D 2488)

SUMMARY OF LABORATORY ROCK QUALITY TEST RESULTS - DRAFT
Geotechnical Reconnaissance Investigation
Mertarvik Airport Location Study - Phase 3

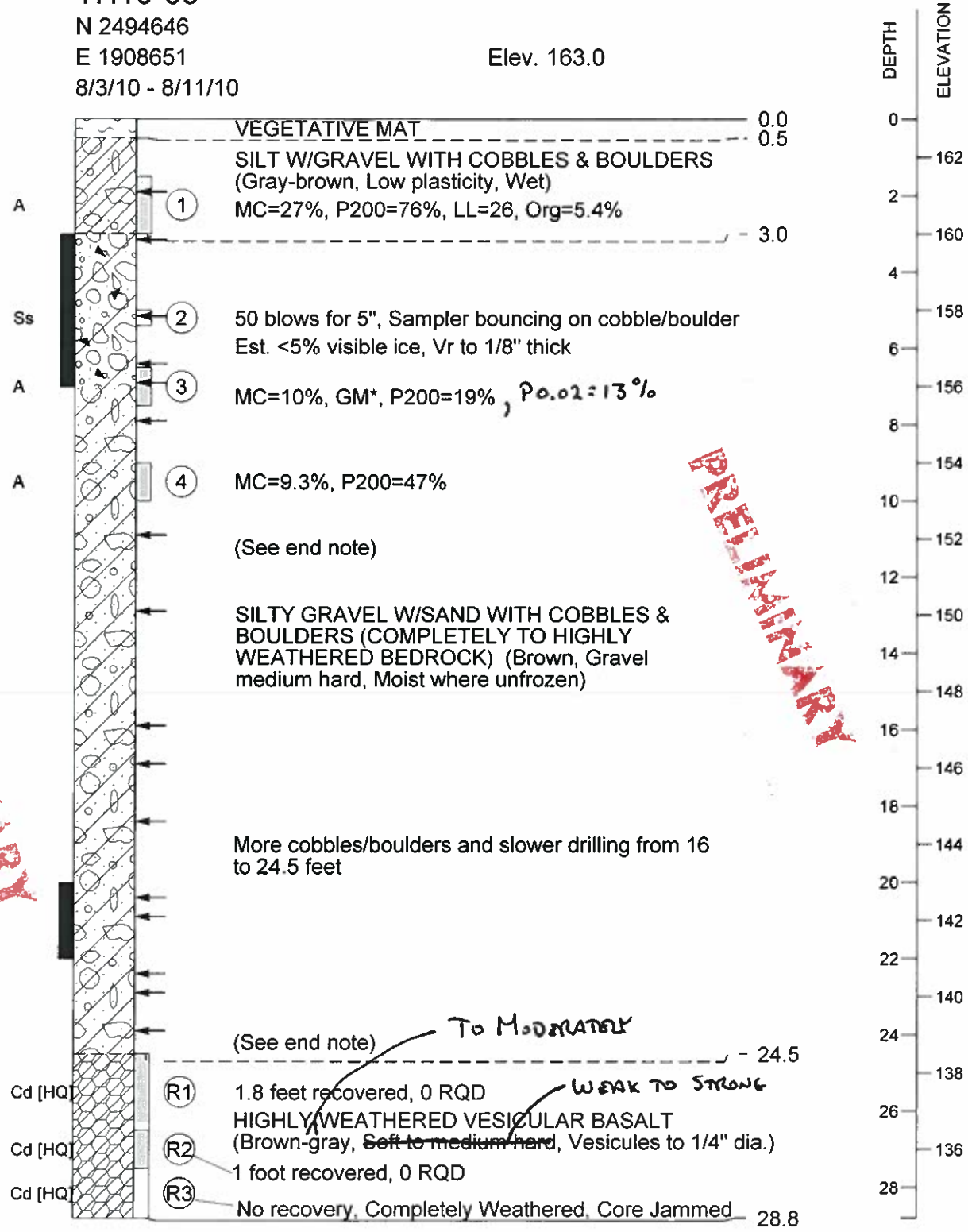
SAMPLE IDENTIFICATION			SPECIFIC GRAVITY Coarse Aggregate (AASHT0 T 85)				Degradation D-Value (ATM T13)	Soundness Sodium Sulfate, Coarse (AASHTO T 104)
Test Hole	Core Run	Depth, ft	Bulk	Bulk SSD	Apparent	Absorption		
Lower Ridge Material Site								
TH10-5A	1 & 2	25 - 28	2.39	2.56	2.88	7.1%	11	(1)
Hill 377								
TH10-18	2, 3 & 4	7.0 - 12.4	2.84	2.89	2.97	1.5%	73	1%
	5, 6, 7 & 8	12.4 - 21.0	2.81	2.86	2.96	1.8%	56	3%
Hill 460								
TH10-19	1 & 2	≈ 4 - 13.0	2.69	2.77	2.92	3.0%	37	6%
	4 & 5	15.2 - 25.2	2.77	2.83	2.94	2.2%	52	6%

(1) Insufficient coarse sample to perform test

TH10-05

N 2494646
E 1908651
8/3/10 - 8/11/10

Elev. 163.0



*Estimated classification following visual-manual procedures (ASTM D 2488).
No groundwater observed while drilling.
Coordinate locations are NAD83, State Plane Zone 8.
Auger boring was terminated at a depth of 10 feet on 8/3/10; returned to location on 8/10/10. Tri-coned with air to 8 feet, cored through a bouler to 10.5 feet and last return. Augered then to 24.5 feet, and tri-coned with air to 28.8 feet and last return.

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	OCT. 10
SCALE:	1"=4'

PREPARED BY: R&M CONSULTANTS, INC.

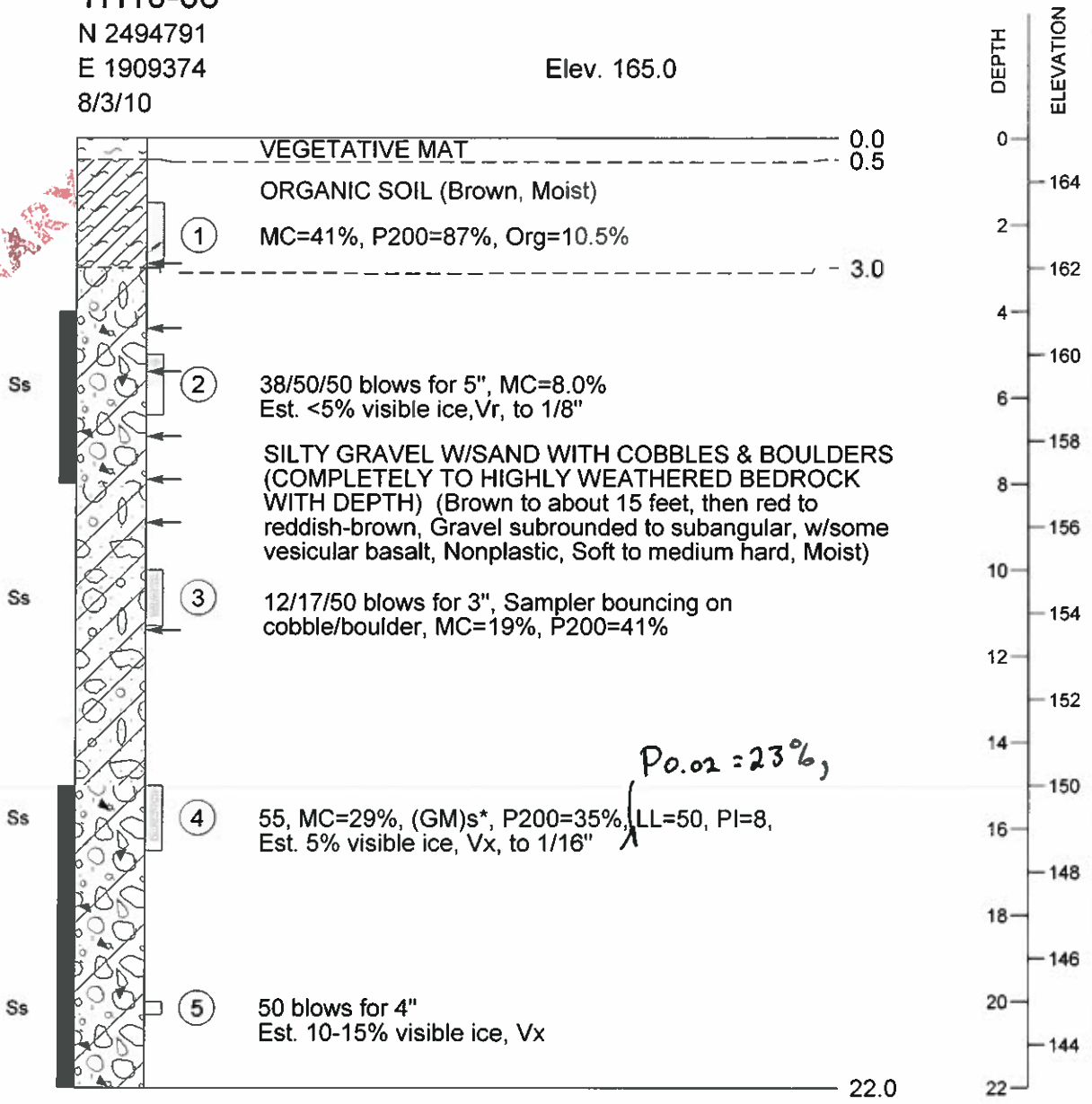
AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
LOWER RIDGE MATERIAL SITE
TH10-05

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	1

TH10-06

N 2494791
E 1909374
8/3/10

Elev. 165.0



Estimated Classification following visual-manual procedures (ASTM D 2488)

Auger Refusal at 22 ft., 20 minutes w/no advance.

No Groundwater Observed While Drilling

Coordinate Locations are NAD 83, State Plane 8

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MASTER ONE COL/PAGE MERTARVIK AIRPORT AND ROADS 2010.GPJ MASTER2.GDT 10/27/10

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	OCT. 10
SCALE:	1"=4'

PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
LOWER RIDGE MATERIAL SITE
TH10-06

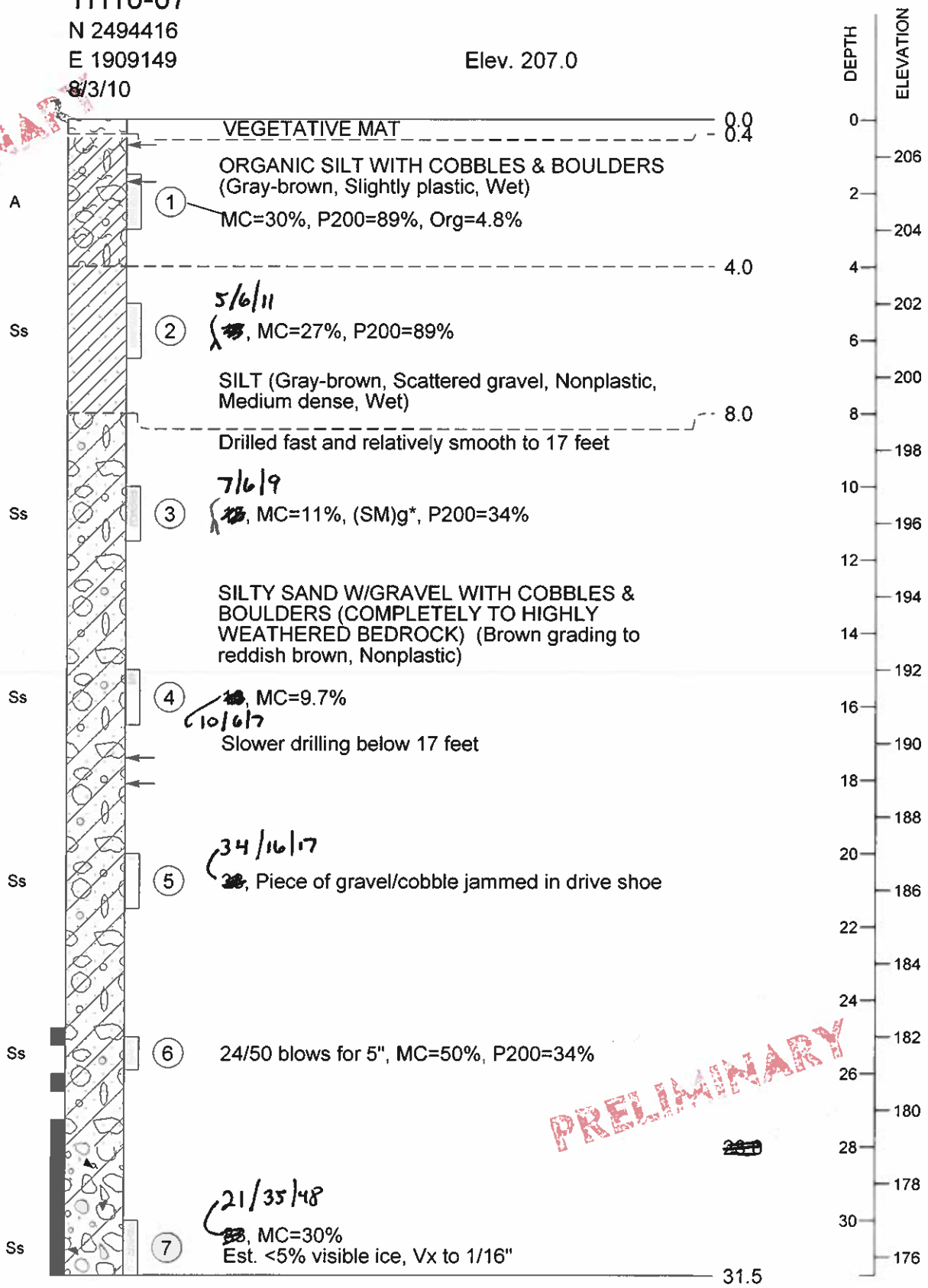
FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	3

TH10-07

N 2494416
E 1909149
8/3/10

Elev. 207.0

PRELIMINARY



*Estimated Classification following visual-manual procedures (ASTM D 2488).
No groundwater observed while drilling.
Coordinate locations are NAD83, State Plane Zone 8.

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MASTER ONE COL/PAGE MERTARVIK AIRPORT AND ROADS 2010.GPJ MASTER2.GDT 10/27/10

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	OCT. 10
SCALE:	1"=4'

PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
LOWER RIDGE MATERIAL SITE
TH10-07

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	4

DRAFT LOG OF TEST HOLE TH10-18

PROJECT: **Mertarvik Airport Reconnaissance Study**

LOCATION:	Hill 377	**DATE:**	8 August 2010
COORDINATES:	N 2490679, E 1903019 (NAD 83, AK 8)	**TOTAL DEPTH:**	24.0 ft
ELEVATION:	374 ft	**GEOLOGIST:**	Aaron Banks
CORE AZIMUTH:	--	**DRILLING FIRM:**	Denali Drilling, Inc.
CORE ANGLE:	90°	**DRILL:**	Mobile B-61
GROUNDWATER:	None observed while drilling	**CORE SIZE:**	NQ3; no casing

INTERVAL, ft	DESCRIPTION	CORE				
		Run	Time, min	Length, ft	Recovery, ft	*RQD*
0 - 0.5	Vegetative Mat (auger drilling)					
0.5 - 3.8	Cobbles & Boulders w/ silt (auger drilling) (highly weathered basalt)					
3.8 - 5.3	Vesicular Basalt: Brown to reddish brown, highly weathered, weak to medium weak	1	10.0	1.5	≈ 0.2	0
5.3 - 7.0	tri-cone drilling (no core)					
7.0 - 8.4	Vesicular Basalt: Grey to light brown, moderately weathered, medium weak to strong	2	6.8	1.4	≈ 1	*≈ 25*
8.4 - 10.7	Vesicular Basalt: Light brown, highly weathered, weak to medium weak	3	12.5	2.3	≈ 0.3	*0*
10.7 - 12.4	Vesicular Basalt: Grey to light brown, moderately weathered, medium weak	4	25.3	1.7	≈ 1.1	*0*
12.4 - 15.7	Vesicular Basalt: Grey, moderately to slightly weathered, strong; top ≈0.3 ft blackish and medium weak	5	22.0	3.3	3.3	*≈ 45*
15.7 - 19.5	Vesicular Basalt: Grey, slightly weathered, strong	6	22.1	3.8	3.8	*60+*
19.5 - 20.6	Vesicular Basalt: Grey, slightly weathered, strong	7	5.5	1.1	1.1	*≈ 50*
20.6 - 21.0	Vesicular Basalt: Grey, slightly weathered, strong; core jammed	8	12.0	0.4	0.4	*0*
21.0 - 24.0	Vesicular Basalt: Highly fractured, highly to slightly weathered, strong to weak; core jammed, lost returns	9	9.6	3.0	0.5	*0*
24	No air returns, terminated boring	10				

See core photos on Page x-y

DRAFT LOG OF TEST HOLE TH10-19

PROJECT: **Mertarvik Airport Reconnaissance Study**

LOCATION:	Hill 460	**DATE:**	10 August 2010
COORDINATES:	N 2488761, E 1898658 (NAD 83, AK 8)	**TOTAL DEPTH:**	25.5 ft
ELEVATION:	481 ft	**GEOLOGIST:**	Aaron Banks
CORE AZIMUTH:	--	**DRILLING FIRM:**	Denali Drilling, Inc.
CORE ANGLE:	90°	**DRILL:**	Mobile B-61
GROUNDWATER:	None observed while drilling	**CORE SIZE:**	NQ3; no casing

INTERVAL, ft	DESCRIPTION	CORE				
		Run	Time, min	Length, ft	Recovery, ft	*RQD*
0 to ≈ 4	Cobbles & Boulders w/ silt (tri-cone drilling) (highly to moderately weathered basalt)					
≈ 4 - 10.0	Vesicular Basalt: Grey, slightly weathered, strong	1	--	≈ 6	4.2	*≈ 35+*
10.0 - 13.0	Vesicular Basalt: Top ≈ 2 ft grey, slightly weathered, strong; bottom ≈ 1 ft reddish-brown, moderately weathered, medium weak to weak	2	9.5	3.0	2.8	*≈ 40*
13.0 - 15.2	Vesicular Basalt: Grey to light brown, moderately weathered, medium weak to strong; numerous fractured zones	3	8.8	2.2	1.4	*0 (15)*
15.2 - 20.2	Vesicular Basalt: Grey to light brown, moderately weathered, medium weak to strong	4	25.8	5.0	5.0	*≈ 40+*
20.2 - 25.2	Vesicular Basalt: Grey, slightly weathered, strong; bottom ≈ 1 ft dark brown, highly weathered, weak	5	20.5	5.0	5.0	*≈ 60 (70+)*
25.2 - 25.5	No air returns (completely to highly weathered?); terminated boring	6	--	0.3	0.0	--

See core photos on Page x-y

ROCK CORE, TH10-18 (HILL 377)

ROCK CORE, TH10-19 (HILL 460)

ROCK CORE, TH10-5A (LOWER RIDGE MATERIAL SITE)

Geotechnical Report (Draft)

GEOTECHNICAL REPORT - *DRAFT*

MERTARVIK AIRPORT LOCATION STUDY- PHASE III RECONNAISSANCE INVESTIGATION

AKSAS No. 57405
AIP No. 3-02-0000-008-2007

PREPARED FOR:

ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES
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PREPARED BY:

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

3 April 2009

GEOTECHNICAL REPORT - *DRAFT*

MERTARVIK AIRPORT LOCATION STUDY – PHASE III RECONNAISSANCE INVESTIGATION

The following reports the results of R&M Consultants' reconnaissance geotechnical investigation for the *Mertarvik Airport Location Study*, on Nelson Island in southwestern Alaska; authorized by DOT&PF NTP No. 8 of *Foundations & Geotechnical Services Term Agreement* No. P62152. This report is intended for use by the project planning staff to support their evaluations and selection of a preferred airport location at Mertarvik. It is understood that additional, site-specific geotechnical investigations will be required to support the design and construction phase, once the actual airport site is determined.

PRINCIPAL INVESTIGATORS:

_____

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_____

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REVIEWED BY:

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

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GEOTECHNICAL REPORT - *DRAFT*

MERTARVIK AIRPORT LOCATION STUDY RECONNAISSANCE INVESTIGATION

1: INTRODUCTION

The village of Newtok is located on the north bank of the Ninglick River, about 12 miles upstream from the Bering Sea in southwest Alaska (Figure 1). In the mid-1990s, the Newtok Traditional Council initiated planning to relocate the village, due to ongoing erosion of the river bank which threatens the present village; ultimately selecting a preferred site, designated Mertarvik, approximately nine miles to the southeast of Newtok, on the north side of Nelson Island (Figure 1).

In association with the efforts to relocate Newtok, the Alaska Department of Transportation and Public Facilities (DOT&PF) sponsored an office study that identified six conceptual sites for an airport at Mertarvik (Figure 2) (PDC, 2007). Subsequently, the DOT&PF selected two of these sites for further study (designated hereafter Airport Sites 3 and 4); and contracted R&M Consultants, Inc. (R&M) to perform reconnaissance-level geotechnical explorations at each site, and at a potential material source (designated hereafter as Hill 460; Figure 2).

For preliminary planning, the new airport would consist of a 4,000-foot runway, 400-foot taxiway and 100,000 square-foot apron; all completed with an aggregate surfacing. Figure 3 illustrates the general location of the subject airport sites, Hill 460, and assumed access routes (corridors), as well as the proposed townsite and new barge landing. This figure was used as the basis for determining the number and location of the reconnaissance test holes.

The general elements of R&M's geotechnical reconnaissance investigation included (i) drilling a small number of test holes to qualify the general subsurface conditions (e.g. soil column, groundwater, and permafrost) at Airport Sites 3 and 4, along assumed access routes between the proposed new townsite and the airport sites, and at Hill 460[1]; and (ii) laboratory testing on some of the recovered samples to measure key soil indexing properties, and rock quality.

The following report describes the findings of R&M's reconnaissance investigation, including background information (i.e. regional geology, climate, and past geotechnical investigations in the area); descriptions of our field exploration and laboratory testing methods and procedures; and summaries of the factual field and laboratory test results, and our interpretations of the site conditions (e.g. surface, soil characteristics, permafrost, groundwater, and bedrock) at the two airport sites, along the assumed access routes, and at Hill 460.

[1] The DOT&PF had intended for R&M to also complete two 30-foot deep cores at Hill 460 to assess the weathering and quality of the rock with depth. However, that task was deleted (deferred to a later date) due to freezing temperatures and absence of a local unfrozen water supply at the time of the field work.

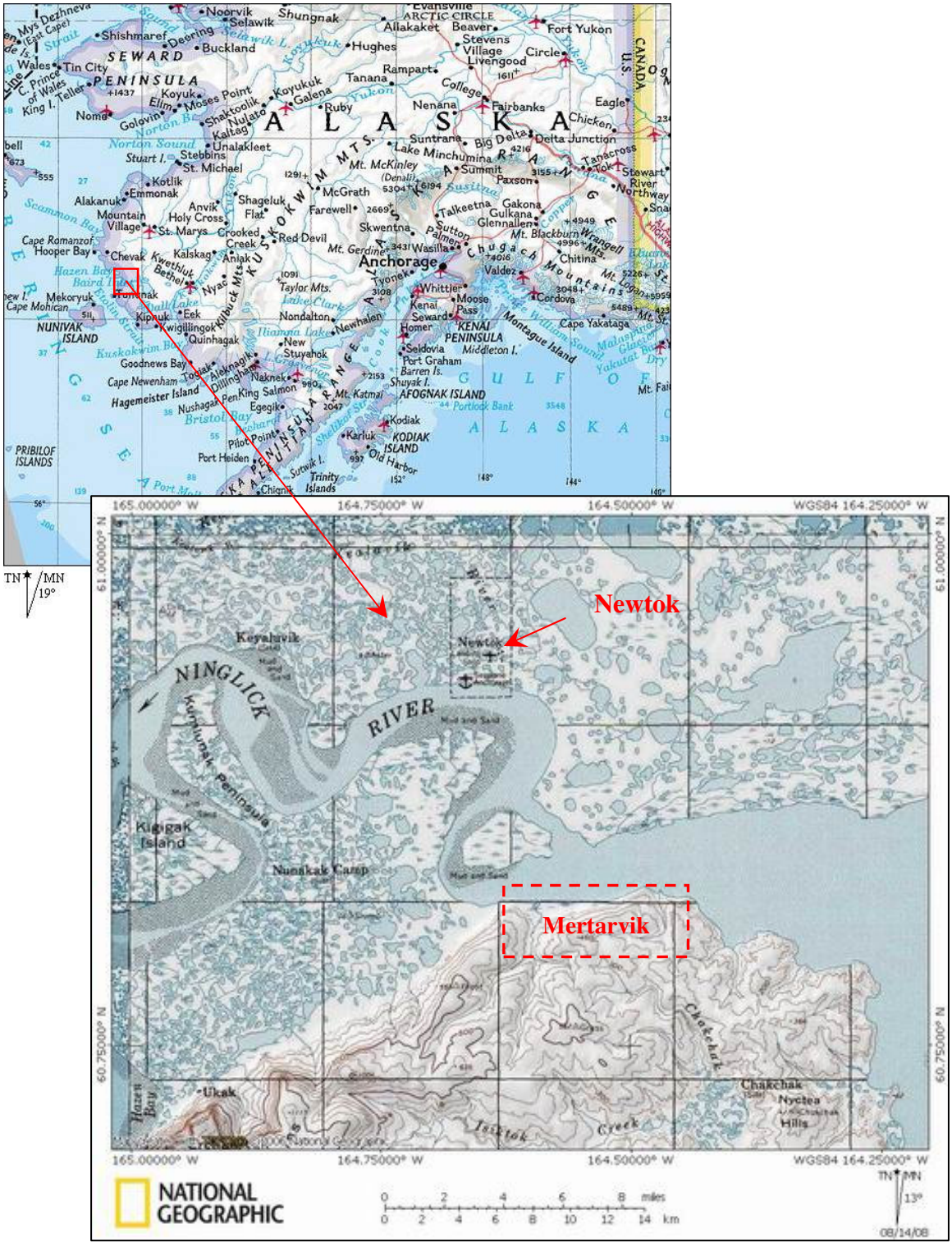

FIGURE 1: LOCATION MAP

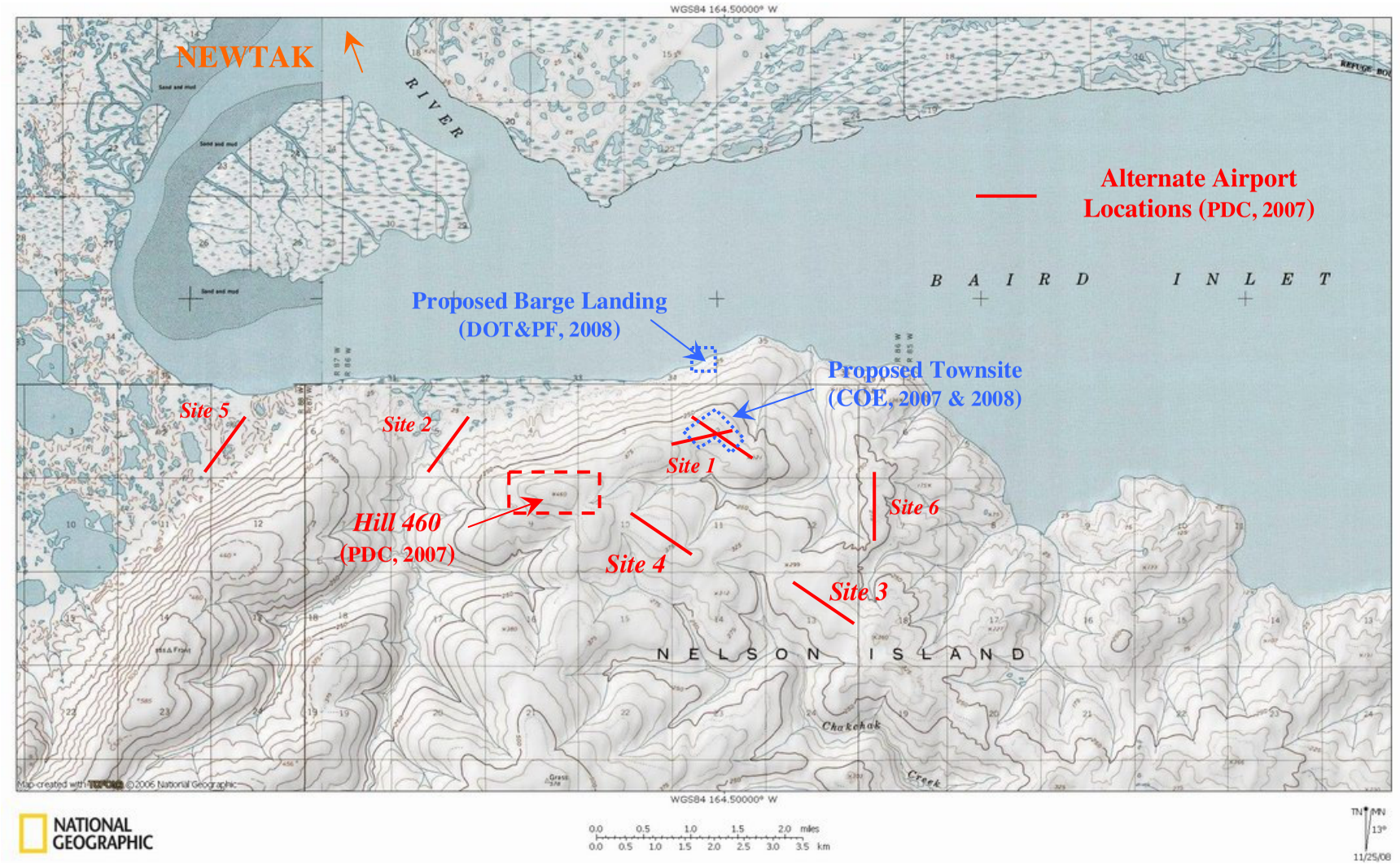

FIGURE 2: NORTH NELSON ISLAND

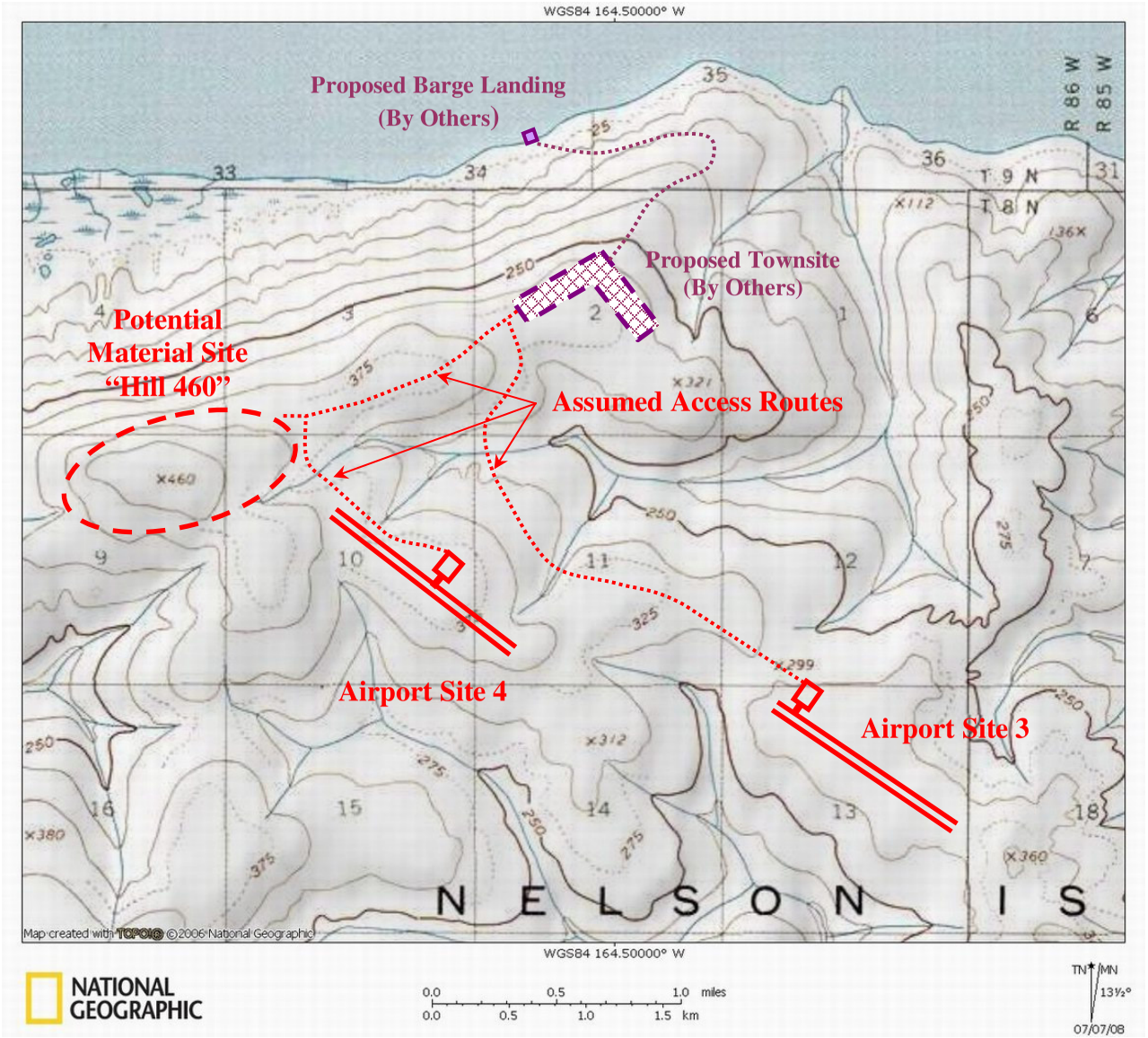

FIGURE 3: PROJECT AREA LAYOUT MAP

2: BACKGROUND

2.1 REGIONAL GEOLOGY

Nelson Island is situated within an unnamed highland subdivision of the *Yukon-Kuskokwim Coastal Lowland* physiographic province (Wahrhaftig, 1965). The terrain on Nelson Island is characterized by rolling, low hills with gentle slopes; generally covered with undifferentiated alluvium and slope deposits comprised mostly of volcanic rock particles, ash and pumice (Karlstrom, et al., 1964). The coastal lowlands surrounding Nelson Island are characterized by relatively flat, poorly draining terrain dotted with numerous lakes, marshes, and meandering streams with extremely low gradients; and covered with generally interstratified, Holocene, Quaternary and Pleistocene age fine-grain eolian, alluvial, estuarine, beach, and re-worked deposits (Biekman, 1974). The region is underlain by continuous permafrost (Brown, et al., 1997).

The bedrock on Nelson Island consists of Quaternary basalt overlying Cretaceous sedimentary rocks of the Kuskokwim Group (Biekman, 1974); although only the basalt has been mapped to outcrop on the north end of Nelson Island. Coonrad (1957) reported there are eight to 20 basalt flows on Nelson Island, each with a columnar structure and dipping gently to the east, and a combined total thickness of more than 200 feet.

Much of Nelson Island is mantled with loess and recent deposits of organic materials. Previous reconnaissance visits to the northern end of Nelson Island (see section 3, below) have also observed beach deposits containing sand and gravel along the coast, and minor coarse-grained soil deposits along established drainages.

Southwestern Alaska is characterized by low seismicity. No faults with interpreted displacements more recent than Pre-Neogene age are known within about 150 to 200 miles of Newtok (Plafker, et al., 1993). The Alaska Earthquake Information Center database[2] lists three seismic events with magnitudes greater than or equal to a local magnitude (M_L) of 5.0 that have occurred within about 200 miles of Newtok between 1898 and 2008; the largest being an earthquake of M_L5.2 (19 August 1971) located roughly 80 to 90 miles to the northeast of Newtok.

2.2 CLIMATE

The Nelson Island-Newtok area experiences a transitional climate (AEIDC, 1975?); characterized in summer by relatively maritime conditions (e.g. moderate annual temperature variations with higher winds and precipitation), and in winter by more continental conditions (e.g. greater annual temperature variations, with more moderate winds and precipitation). We are not aware of any climate records from Newtok. Table 1 summarizes some of the long-term climate data[3] recorded at Bethel, Cape Romanzof, and Mekoryuk, each respectively located about 100 miles east, 80 miles north, and 60 miles southwest of Newtok.

[2] http://www.giseis.alaska.edu/Seis/

[3] http://www.wrcc.dri.edu/summary/climsmak.html

TABLE 1: NELSON ISLAND-NEWTOK AREA CLIMATE DATA

PARAMETER	Bethel (1949–2008)	C. Romanzof (1953-1985)	Mekoryuk (1949-1973)
Air Temperature, °F:			
Mean Annual	29.6	28.9	29.2
Mean Winter (Dec-Feb) / Summer (Jun-Aug)	7.2 / 53.4	12.2 / 47.3	11.8 / 46.8
Historic Extreme Daily Low / High	-48 / 87	-26 / 79	-39 / 76
Precipitation, in:			
Mean Annual	17.2	25.5	15.0
Min / Max Mean Monthly	0.7 / 3.4	1.0 / 5.0	0.6 / 2.2
Max Single Day	2.3 (Aug)	2.8 (Aug)	1.7 (Jul)
Mean Annual Snowfall	54.9	68.2	46.0
Extreme Monthly High Snowfall	47.0 (Dec)	34.1 (Dec)	14.4 (Nov)

2.3 PREVIOUS GEOTECHNICAL INVESTIGATIONS

Between 1977 and 2005, we are aware of at least five site visits by geologists and/or geotechnical engineers to the north end of Nelson Island, for the purpose to visually reconnoiter potential sources of gravel or rock, and/or to inspect surface conditions for a site for relocating Newtok. No subsurface explorations were completed during any of these five site visits; although a few grab samples of soil and rock were collected. A summary of these site visits, including coverage and findings, is included in PDC (2007).

During 2007 and 2008, three geotechnical investigations were completed at Mertarvik (not including the subject airport investigation). Two of these investigations pertained to the new townsite and an access road from the shoreline (COE 2007 and 2009); and the third was for a barge landing facility (DOT&PF, 2008) (Figure 3). None of these past investigations included explorations within the subject two alternate airport sites, or at the proposed Hill 460 material site.

3: METHODS

The following describes the field explorations (drilling and ground temperature measurements), and laboratory testing (soil and rock) completed during the reconnaissance investigation. The results of these elements are discussed in following sections of this report.

3.1 GEOTECHNICAL TEST HOLES

R&M drilled 29 test holes (designated TH08-05[4] through TH08-33) between 10 October and 1 November 2008. The depths of these test holes ranged from about 1.5 to 21.5 feet below existing ground. All of the field work was performed under the direct supervision of R&M engineering geologist Aaron Banks.

Maps illustrating the location of each test hole are provide in Appendices A, B and C. The drilling locations were determined in the field using a recreational Garmin Etrex Vista GPS unit, and are shown on the logs. Note that this unit has a manufacturer's reported accuracy of about 50 feet.

R&M's geologist maintained a field log throughout the drilling of each test hole which documented the drilling method, progress, and samples attempted and recovered; visual-manual descriptions of the recovered soils (following ASTM D 2488 and D 4083); and an interpretation of the geotechnical conditions between the recovered soil samples. Subsequently, the field logs were modified and/or supplemented with additional interpretations of the subsurface conditions based on further visual inspection of the recovered soil samples, and the factual results of our laboratory testing. The final logs for each boring are provided in Appendices A (Airport Site 3), B (Airport Site 4), and C (Hill 460). Keys pertaining to the general format, symbols and terminology contained on the test hole logs are provided in Appendix D.

The test holes were drilled by Denali Drilling, Inc., of Anchorage, using equipment they already had at Mertarvik, including a Mobil B-61 drill mounted on a 240 Nodwell tracked carrier (Figure 4), a hydraulic crane and air compressor mounted on a 160 Nodwell tracked carrier, and continuous-flight hollow-stem auger and air rotary tooling.

While drilling, disturbed soil samples were collected from each test hole, generally at depths of roughly 2.5 and five feet, and then at intervals of about five feet until the boring was terminated. The soil samples collected from all of the assumed access routes and Hill 460 borings were obtained by grabbing cuttings off the auger. The samples from all of the airport site borings were collected following the *Standard Penetration Test* (SPT; ASTM D 1586). The number of hammer blows required to advance the SPT sampler the final 12 inches of each 18-inch interval (*N*-value) can be used to judge the relative density or consistency of unfrozen soils, and are provided on the logs in Appendices A and B.

[4] The test hole designation format (year-test hole number) follows that used by the DOT&PF; we started with TH08-05 to avoid confusion with the four test holes drilled by the DOT&PF earlier in 2008 that were designated TH08-01 through TH08-04 (DOT&PF, 2008).

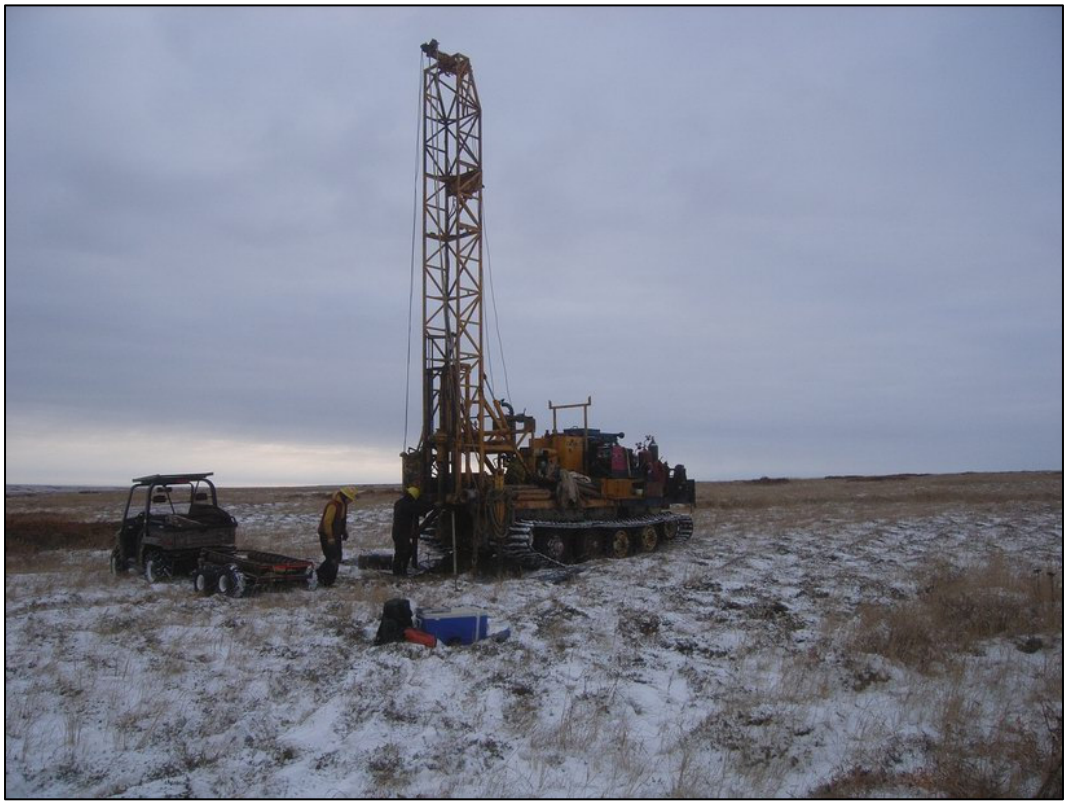

FIGURE 4: MOBIL B-61 DRILL (OCTOBER 2008)

After logging, all of the recovered soil samples were double packaged in sealed plastic bags and shipped to R&M's laboratory in Anchorage. After drilling, each test hole was backfilled with cuttings.

3.2 GROUND TEMPERATURE MEASUREMENTS

Three test holes at each airport site were completed with one inch PVC casing (TH08-13, 14 and 15 at Site 3; TH08-18, 20 and 21 at Site 4). After drilling, a multi-wire cable with *Yellow Springs Instrument Co.* YSI 44007 thermistors spaced at 2.5 to 5-foot intervals (fabricated by Dryden Instrumentation of Anchorage, Alaska), was set in each PVC casing.

On November 2nd, Mr. Banks measured the resistance of each thermistor using a *Fluke Model 87 True RMS* multimeter. The ground temperatures were then determined using an empirical equation as a function of the measured resistance, which is provided in Appendices A and B. These thermistor strings were then left in the PVC casing for future reading, with the top connectors protected with a plastic covering.

3.3 LABORATORY TESTING

All of the soil samples returned to R&M's laboratory in Anchorage were visually inspected. Most of these samples were also tested to measure key index properties for the purpose of classification, and grouping the soils into general units sharing similar physical and mechanical characteristics, following ASTM (2007) procedures:

- D 422 - Particle Size Analysis of Soils;
- D 1140 - Amount of Material in Soils Finer than the No. 200 (75-µm) Sieve;
- D 2216 - Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass;
- D 2974 - Moisture. Ash, and Organic Matter of Peat and Other Organic Soils; and,
- D 4318 - Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

Select samples of the rock collected at Hill 460 were also tested to measure physical and quality (durability) properties, following AASHTO (2007) procedures:

- T85 – Specific Gravity and Absorption of Coarse Aggregate;
- T96 – Resistance to Degradation of Small-Size Aggregate by Abrasion and Impact in the Los Angeles Machine;
- T104 – Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate; and,
- ATM-313 - Degradation Value of Aggregate (DOT&PF, 2005).

The results of the soil tests are shown on the boring logs and tabulated in Appendices A, B and C. A summary of the rock quality test results is provided in Appendix C. When reviewing the test hole logs and laboratory test results note:

(a) The mineral constituents of individual soil samples were assigned *group names* and *symbols* following the *Unified Soil Classification System*, as defined in ASTM D 2487 (see Drawing D-04); although, group symbols annotated with an asterisk (e.g. SM*) indicate that the classification was estimated, in part, based on visual-manual indicators (ASTM D 2488. And,

(b) Soils containing organic matter were assigned group names and symbols following DOT&PF (2007), with two modifications. First, a dual group symbol was used for "coarse or fine-grained soil with organics" where the dry preparation/wet preparation liquid limit ratio was greater than 0.75 (e.g. SM-O or ML-O). Second, the group symbols were annotated with an asterisk (e.g. ML-0* or OL*) where the dry preparation/wet preparation liquid limit ratio was assumed considering the results of plasticity testing on other, but similar samples.

Finally, we have chosen for this project to report the results of ASTM D 2974 in terms of the measured ash content (AC), versus as an apparent organic content (=1-AC). The reason for this is that we believed a portion, if not all of the mass lost during ignition of some samples tested was associated with dehydration and/or decomposition of clay minerals versus loss of organic matter, a known consideration with this test (ASTM, 1983); especially in the deeper samples we interpreted to be residual soil or completely weathered bedrock.

4: AIRPORT SITES – GEOTECHNICAL CONDITIONS

The following summarizes the factual findings from our field explorations and laboratory testing, and our interpretations of the general geotechnical conditions (e.g. surface, soil profile and characteristics, groundwater, permafrost, bedrock, etc) at Airport Sites 3 and 4, and along the assumed access routes. More detailed descriptions of the subsurface conditions are contained on the test hole logs in Appendices A and B.

4.1 GENERAL

In general, the terrain across both airport sites and along assumed access routes appeared to be fairly well drained, and covered with grassy tussock tundra comprised predominantly of grasses and crowberry with patches of short willow along the drainages and in depressions (COE, 2005). No bedrock exposures were observed at either airport site or along the assumed access routes. Permafrost was observed in many of the test holes, although no significant thermokarst features were noted at the surface over those areas.

Based on the reconnaissance borings, the project area is mantled with an organic mat typically six to 10 inches thick. The underlying soil profile was generally comprised of non to moderately plastic silt, with trace amounts of organic matter (roots), and intervals containing variable sand, gravel, and/or scattered cobbles/boulders; over highly to moderately weathered bedrock. Based on color, structure, and texture, we interpreted this general soil profile to represent colluvium and/or eolian deposits overlying residual soil transitioning with depth to completely weathered bedrock; however, visual distinction of and between these designations in any one test hole was very subjective.

Finally, groundwater was observed in only one of the test holes drilled during the entire reconnaissance investigation (TH08-10, along the assumed access route to Airport Site 3). However, no groundwater monitoring wells were established, and given the fine-grained texture it is possible that groundwater was missed while drilling. Therefore, we believe it is likely that discontinuous zones of groundwater may exist in the areas explored, especially seasonally perched over permafrost and more dense soils.

4.2 AIRPORT SITE 3

Airport Site 3 is situated along a northwest-southeast trending ridge, about two miles south-southeast of the proposed new townsite (Figure 3). Based on aerial topographic mapping, ground elevations across the site appear to vary less than about 25 feet, with grades typically less than two to four percent. Table 2 summarizes the general subsurface conditions interpreted in the five reconnaissance test holes drilled at Airport Site 3; a map of the boring locations, the test hole logs, measured ground temperature data, and laboratory test results are provided in Appendix A.

The soils underlying the surface organic mat were generally fine-grained, and described as gray to gray-brown (in some holes grading to red-brown with depth), non to slightly plastic, and medium dense where unfrozen; with intervals containing trace to small amounts of very fine-sized sand, scattered weak gravel, cobbles and/or boulders, and trace amounts of fine organic

matter. Based on visual-manual inspection (ASTM D 2488) and laboratory testing (see Appendix A), most of the soil samples were classified as silt with organics or silt with sand and organics (ML*-O); and silt or silt with sand (ML*). Moisture contents in these soils ranged from 30 to 184% in the frozen samples (number of tests, n=9), and generally decreased with depth; and 19 to 44% in the unfrozen samples (n=6), with no apparent correlation with depth or other index property. The percent of soil particles, by mass, passing the No. 200 sieve (P200) ranged from 46 to 98% (n=8), and marginally decreased with depth. The liquid limits (LL) and plastic indices (PI) were less than 42 and 9, respectively (n=9). Ash contents ranged from 91.1 to 97.7%, by mass (n=9); and dry preparation/wet preparation liquid limit ratios of 0.92 and 1.01 were measured in two of those samples.

TABLE 2: AIRPORT SITE 3 TEST HOLE SUMMARY

TEST HOLE TH08-#	TOTAL DEPTH, ft	DEPTH BELOW EXISTING GROUND, ft		
		Groundwater	Permafrost(1)	Bedrock(2)
12	10.3	n.o.	n.o.	9.5
13	11.8	n.o.	1.5	11.8
14	21.5	n.o.	1.5	n.o.
15	21.5	n.o.	2	n.o.
16	21.5	n.o	n.o.	n.o.

n.o. Not observed
(1) Permafrost extended to the total depth drilled, unless otherwise listed.
(2) Top of interpreted moderately to highly weathered rock.

Some soils exhibiting more plasticity were also recovered from the deeper portions of TH08-14 and TH08-15; classified as elastic silt (MH). Based on limited laboratory testing, moisture contents ranged from 54 to 73% (n=4, all frozen samples); P200 values ranged from 71 to 76% (n=2); and two samples had LL-PI pairings of 60-19 and 66-20. An ash content of 89.6% was also measured in the one sample tested (collected from a depth of about 16 feet in TH08-14); however, we considered that value was more a reflection of the clay content versus organic matter (see 3.3, above).

Permafrost was observed in three of the borings (Table 2). The frozen samples collected from these borings were generally described (see Drawing D-03) as containing about five to 15%, by volume, visible segregated ice in the form of individual ice crystals or inclusions (Vu), or random or irregularly oriented lenses (Vr) up to about one to two inches thick. Ground temperatures measured in these three borings ranged from 31.0 to 31.8 ºF (see data in Appendix A).

4.3 AIRPORT SITE 4

Airport Site 4 is situated along a northwest-southeast trending ridge, about 1.5 miles southwest of the proposed new townsite (Figure 3). Based on aerial topographic mapping, ground elevations across the site appear to vary about 50 to 75 feet, with grades typically less than about four to seven percent. Table 3 summarizes the general subsurface conditions interpreted in the

five reconnaissance test holes drilled at Airport Site 4; a map of the boring locations, the test hole logs, measured ground temperature data, and laboratory test results are provided in Appendix B.

TABLE 3: AIRPORT SITE 4 TEST HOLE SUMMARY

TEST HOLE TH08-#	TOTAL DEPTH, ft	DEPTH BELOW EXISTING GROUND, ft		
		Groundwater	Permafrost(1)	Bedrock(2)
17	19.1	n.o.	n.o.	19
18	15.4	n.o.	5	13
19	13.2	n.o.	n.o.	15
20	20.8	n.o.	n.o.	20.8
21	15.2	n.o	n.o.	15

n.o. Not observed
(1) Permafrost extended to the total depth drilled, unless otherwise noted.
(2) Top of interpreted moderately to highly weathered rock.

The soils underlying the surface organic mat were generally fine-grained, and described as gray to gray-brown (in some holes grading to red-brown with depth), non to slightly plastic, and medium dense to dense; with intervals containing variable amounts of very fine-sized sand, scattered weak gravel, cobbles and/or boulders (i.e. TH08-20 and TH08-21), and trace amounts of fine organic matter. Based on visual-manual inspection (ASTM D 2488) and laboratory testing (see Appendix B), the soil samples were classified as silt with organics or silt with sand and organics (ML*-O); silt, silt with sand, or sandy silt (ML*); silty clay (CL-ML*); elastic silt with sand and gravel (MH*); and silty sand or silty sand with gravel (SM*). Moisture contents in these soils ranged from 16 to 45% in the unfrozen samples (n=14), and 53 to 55% in frozen samples (n=2), with no apparent correlation with depth or other index property. The P200 values ranged from 39 to 99% (n=7), and generally decreased with depth. The LL and PI values were generally less than 50 and 7, respectively (n=6); excluding one sample with a LL-PI pairing of 55-16. Ash contents ranged from 93.4 to 97.0% (n=5); and dry preparation/wet preparation liquid limit ratios of 0.98 and 1.06 were measured in three of those samples.

Permafrost was observed in one boring at the airport site (TH08-18), with the frozen samples generally described as containing about 10% visible segregated ice in the form of random or irregularly oriented lenses (Vr) up to about two inches thick. Ground temperatures measured in TH08-13 ranged from 31.0 to 31.8 ºF; while the temperatures measured in two borings without permafrost, TH08-20 and TH08-21, ranged from about 33.9 to 37.4 ºF (see data in Appendix B).

4.4 ACCESS ROUTES

Figure 3 illustrates the access routes, between the proposed new townsite and the alternate airport sites, we assumed for the purpose of the reconnaissance investigation. Based on aerial topographic mapping, surface grades along these routes are typically less than about four to seven percent. Table 4 summarizes the general characteristics of the reconnaissance test holes

drilled along the assumed access routes; a map of the boring locations, the test hole logs, and the laboratory test results are provided in Appendices A and B.

TABLE 4: ACCESS ROUTE TEST HOLE SUMMARY

PROPOSED TOWNSITETO:	TEST HOLE TH08-#	TOTAL DEPTH, ft	DEPTH BELOW EXISTING GROUND, ft		
			Groundwater	Permafrost(1)	Bedrock(2)
Airport Site 3	6	20	n.o.	7-13	n.o.
	7	20	n.o.	19	n.o.
	8	20	n.o.	n.o.	n.o.
	9	20	n.o.	n.o.	n.o.
	10	10	5	n.o.	10
	11	15	n.o.	6.5-12	n.o.
Airport Site 4	5	20	n.o.	12	n.o.
	22	15	n.o.	n.o.	n.o.
	23	15	n.o.	n.o.	n.o.
	24	15	n.o.	8.5	n.o.
	25	7.5	n.o.	3	7.5 (*cobble?*)

n.o. Not observed
(1) Permafrost extended to the total depth drilled, unless otherwise noted.
(2) Top of interpreted moderately to highly weathered rock.

The descriptions and estimated classifications of the soils underlying the surface organic mat along the assumed access routes were the same as discussed above at the two alternate airport sites. Based on laboratory testing of samples collected at the surface from the auger cutting, moisture contents ranged from 28 to 112% in the unfrozen samples (n=38), and 26 to 60% in frozen samples (n=9), which generally correlated with the ash content; P200 values ranged from 44 to 92% (n=15), with no apparent correlation to depth; and ash contents ranged from 81.1 to 96.7% (n=9).

Permafrost was observed sporadically in six of the borings. Based on the sampling method (i.e. cuttings collected from the auger) it was not possible to describe the concentration or form of the ground ice; however, no massive ice was suspected.

5: HILL 460 - GEOTECHNICAL CONDITIONS

The following summarizes the factual findings from our field explorations and laboratory testing, and our interpretations of the general geotechnical conditions at Hill 460. More detailed descriptions of the subsurface conditions are contained on the test hole logs in Appendix C.

The proposed material site, Hill 460, encompasses an outcrop of massive bedrock exposed (Figure 5) along the northern flank of the east-west trending ridge located about two miles west of the proposed new townsite (Figure 3). The terrain across the top of Hill 460 is well drained; sloping gently to the south and east (<5-10%), but more steeply to the north and west (≈ 15-20%). The ground surface is covered with grassy tussock tundra, comprised predominantly of short grasses, mosses and lichen (COE, 2005).

FIGURE 5: HILL 460 – NORTH BEDROCK EXPOSURE (OCTOBER 2008)

5.1 OVERBURDEN SOILS

R&M completed eight test holes across the top of Hill 460 for the purpose of qualifying the composition and depth of soil overlying the bedrock (overburden). Table 5 summarizes the general subsurface conditions encountered in each of the test holes; a map of the boring locations, the logs, and laboratory test results (soil and rock) are provided in Appendix C.

The area explored was mostly covered with an organic mat typically six to 10 inches thick, but absent along portions of the ridge top. The underlying soils were generally comprised of reddish to dark brown or dark gray, moist to dry, non to slightly plastic silt with variable sand and weak, gravel, and scattered cobbles. Trace amounts of fibrous organic matter (fine roots) were also observed at shallow depths in several of the borings. These soils were interpreted, based on

color, visible structure, and texture, to be a residual soil grading with depth to completely weathered bedrock.

TABLE 5: HILL 460 TEST HOLE SUMMARY

TEST HOLE TH08-#	TOTAL DEPTH, ft	DEPTH BELOW EXISTING GROUND, ft		
		Groundwater	Permafrost(1)	Bedrock(2)
26	15	n.o.	3	10
27	9	n.o.	n.o.	6
28	1.5	n.o.	n.o.	0
29	9.5	n.o.	n.o.	7
30	20	n.o.	6.5-11	n.o.
31	20	n.o.	n.o.	n.o.
32	11.5	n.o.	6.5-12	10.5
33	7	n.o	3(-5.5?)	6

n.o. Not observed
(3) Permafrost extended to the total depth drilled, unless otherwise noted.
(2) Top of interpreted moderately to highly weathered rock.

Moisture contents in these soils ranged from 4.5 to 117% in the unfrozen samples (n=23), and 36 to 64% in frozen samples (n=4), which generally decreased relative to depth and/or fines content. The P200 values ranged from 19 to 88% (n=14), and generally decreased with depth. The LL and PI values were generally less than 34 and 11, respectively (n=6). And ash contents ranged from about 76 to 98% (n=6), and generally decreased with depth.

5.2 BEDROCK

The bedrock exposed along the northern flank of Hill 460 (Figure 5) ranged from approximately 30 to 100 feet high (highest exposure at the western end of the ridge); however, minimal rock was exposure along the top and southern flank of the hill. Based on visual-inspection, the bedrock, as well as the tabular boulders (up to five feet long) and rubble covering the northern slope of the hill, were described as hard, massive, dark gray to black vesicular basalt, with about 10 percent voids (Figure 6).

This exposure was interpreted to be a hard cap rock, more resisted to the geologic processes that have eroded and shaped the surrounding land. It should be noted that basalt is often formed in flows (layers). Each of these flows may have different composition, structure and weathering characteristics. Thus, the rock may transition from hard and unweathered to softer and more highly weathered with depth.

FIGURE 6: VESICULAR BASALT RUBBLE (OCTOBER 2008)

Laboratory tests performed on four samples of rock obtained from the rubble covering the north flank of Hill 460 measured degradation values ranging from 17 to 67, LA abrasion losses of 15 to 33%, sodium sulfate losses of 1 to 4%, and bulk specific gravities of 2.759 to 2.822.

6: CLOSURE

The discussions of regional, local and project site conditions presented in this report have been based on the proposed improvements and development information listed herein. Alteration or deviation from any of these elements could substantially affect the foregoing geologic and geotechnical interpretations.

Additionally, because subsurface conditions can change significantly within a given area, and/or with the passing of time, the possibility exists that important subsurface conditions not disclosed by the subject reconnaissance explorations described herein may be discovered during further investigations or construction.

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. This report is intended for use only in accordance with the purposes of study described within.

7: REFERENCES

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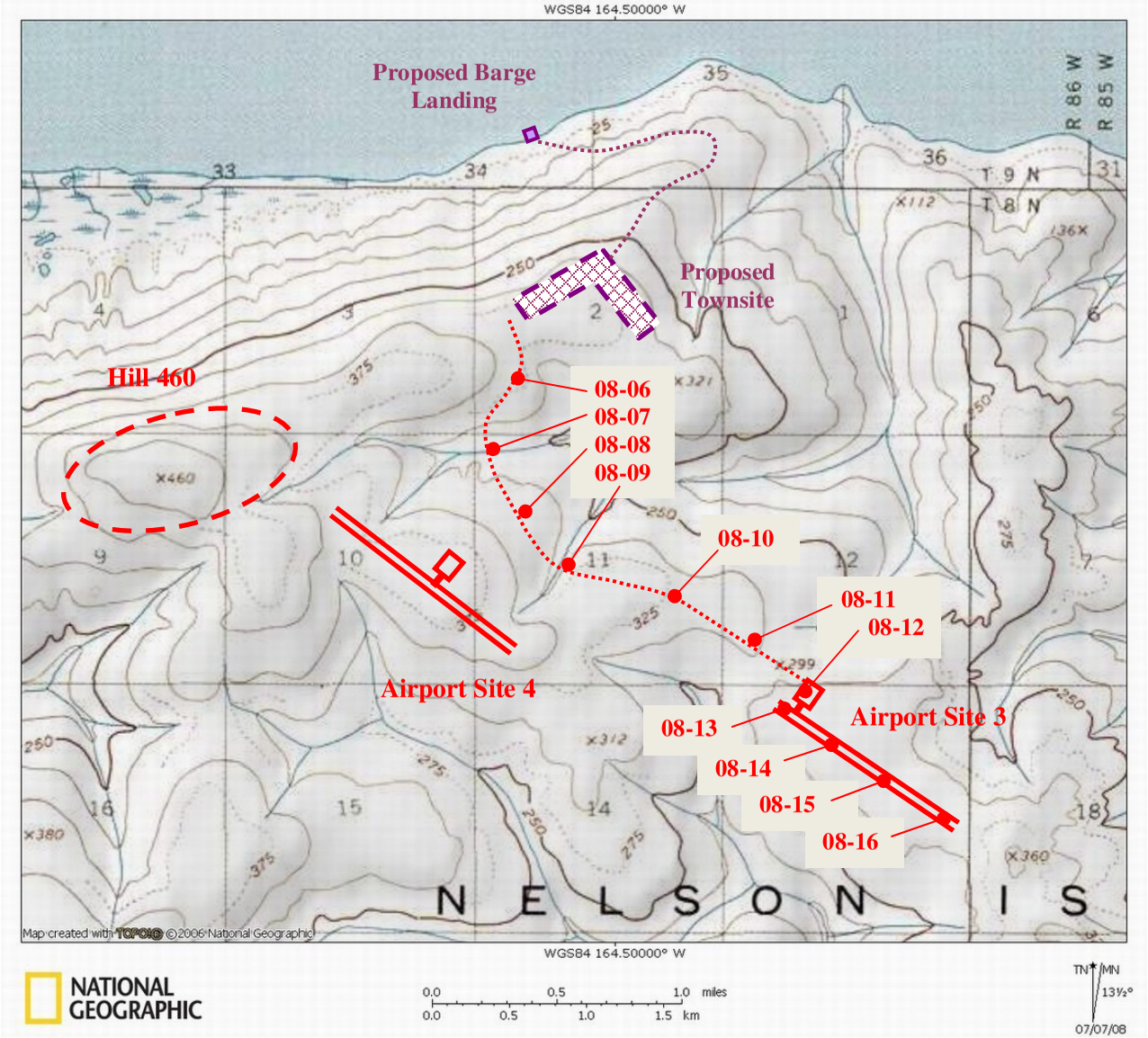
APPENDIX A

AIRPORT SITE 3 EXPLORATIONS

Airport Site 3 Test Hole Location Map A-01
Logs of Test Borings
Airport Site 3 (TH08-12 thru TH08-16) .....A-02 thru A-06
Site 3 Access Route (TH08-06 thru TH08-11) .....A-07 thru A-12
Summary of Laboratory Soil Test Results..... A-13 and A-14
Ground Temperature Measurements..... A-15 and A-16



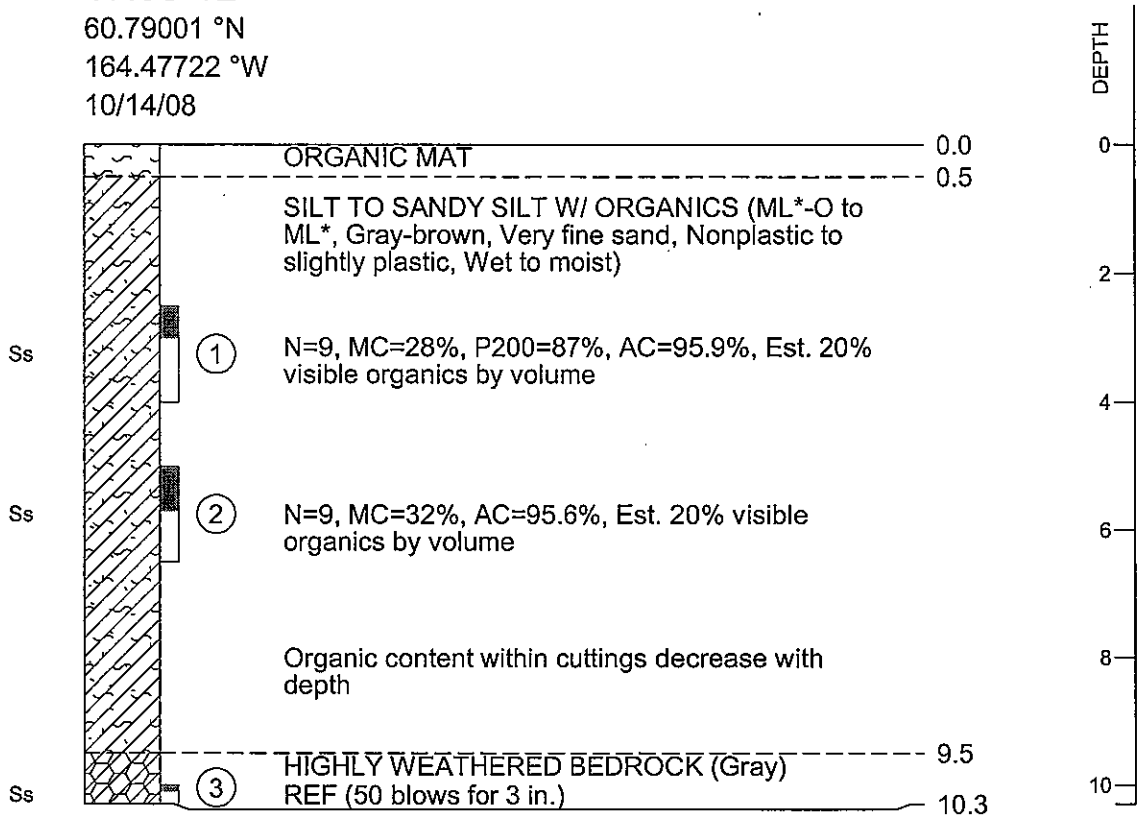
1429.03

MERTARVIK AIRPORT RECONNAISSANCE STUDY
AIRPORT SITE 3 TEST HOLE LOCATION MAP

DRAWING A-01

TH08-12

60.79001 °N
164.47722 °W
10/14/08



* Estimated group symbol (ASTM D 2488)
No groundwater observed

DRAFT

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MASTER ONE COLUMN MERTARVIK AIRPORT AND ROADS.GPJ MASTER2.GDT 3/25/09

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

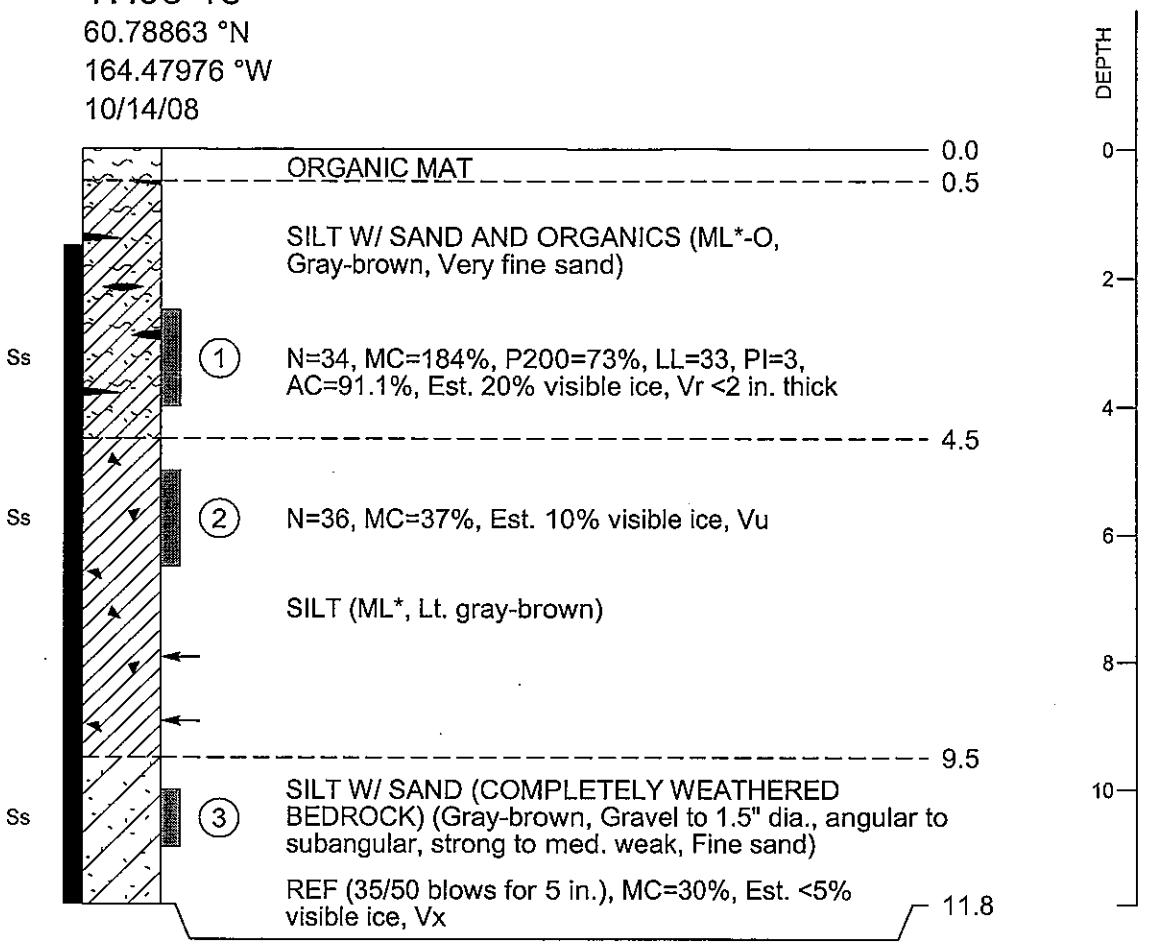
PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
AIRPORT SITE 3
TH08-12

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	A-02

TH08-13

60.78863 °N
164.47976 °W
10/14/08



* Estimated group symbol (ASTM D 2488)
No groundwater observed
Scattered cobbles and boulders interpreted below 7.5 ft.
Auger refusal at 11.8 ft.

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CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

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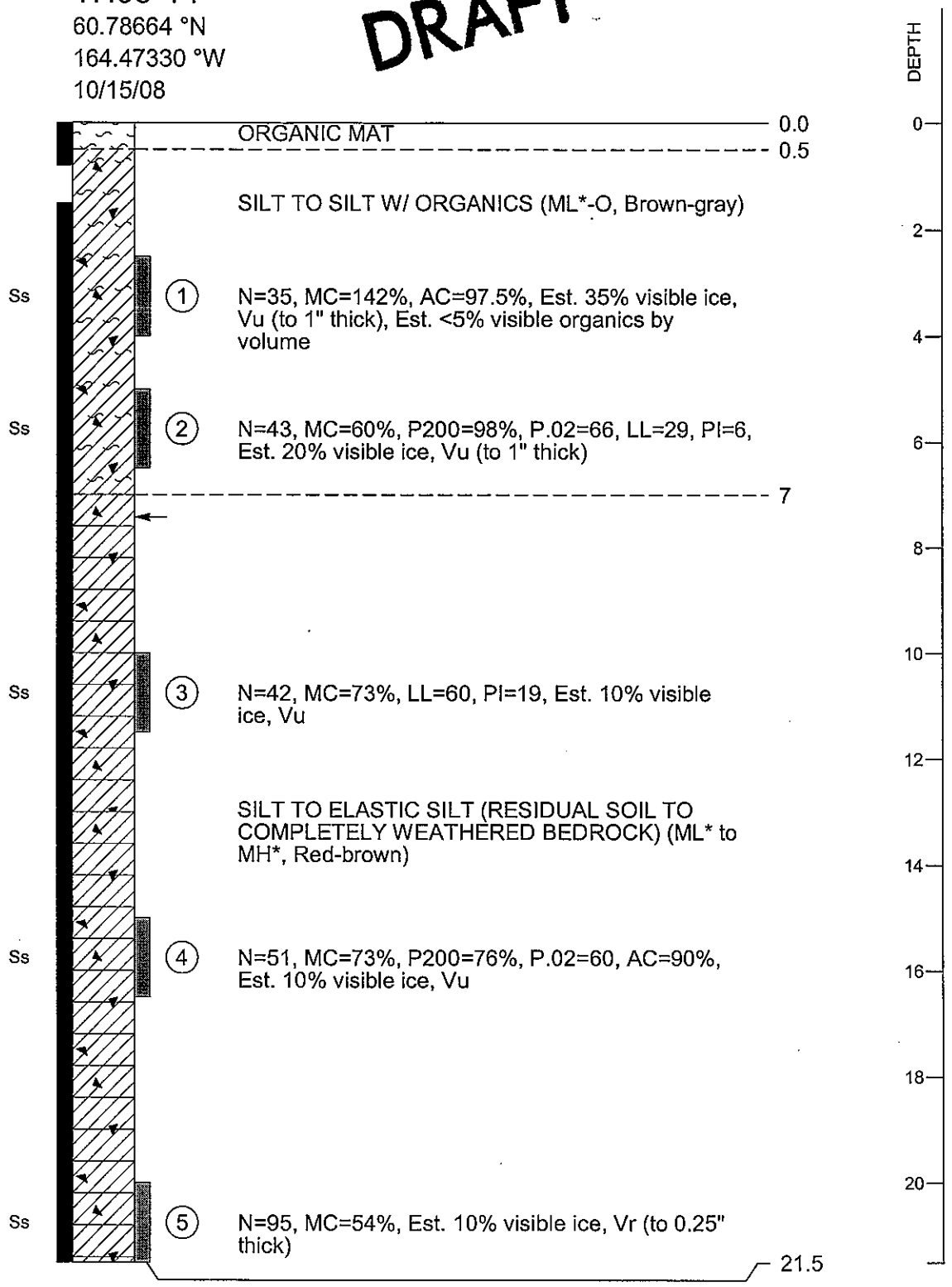
AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
AIRPORT SITE 3
TH08-13

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	A-03

TH08-14

60.78664 °N
164.47330 °W
10/15/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed
Cobble/boulder interpreted at 7.5 ft.

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DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

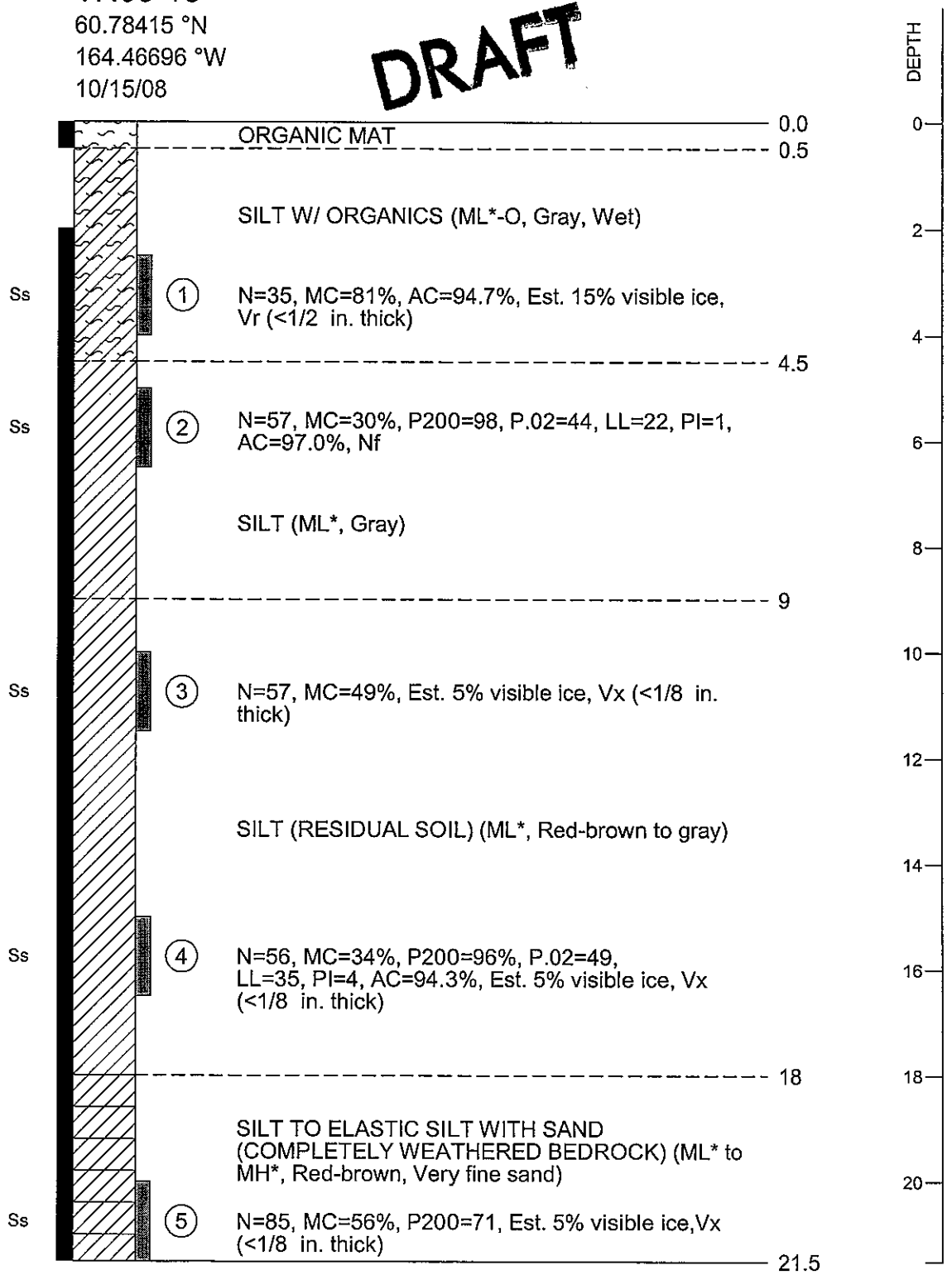
AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
AIRPORT SITE 3
TH08-14

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	A-04

TH08-15

60.78415 °N
164.46696 °W
10/15/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed

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DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

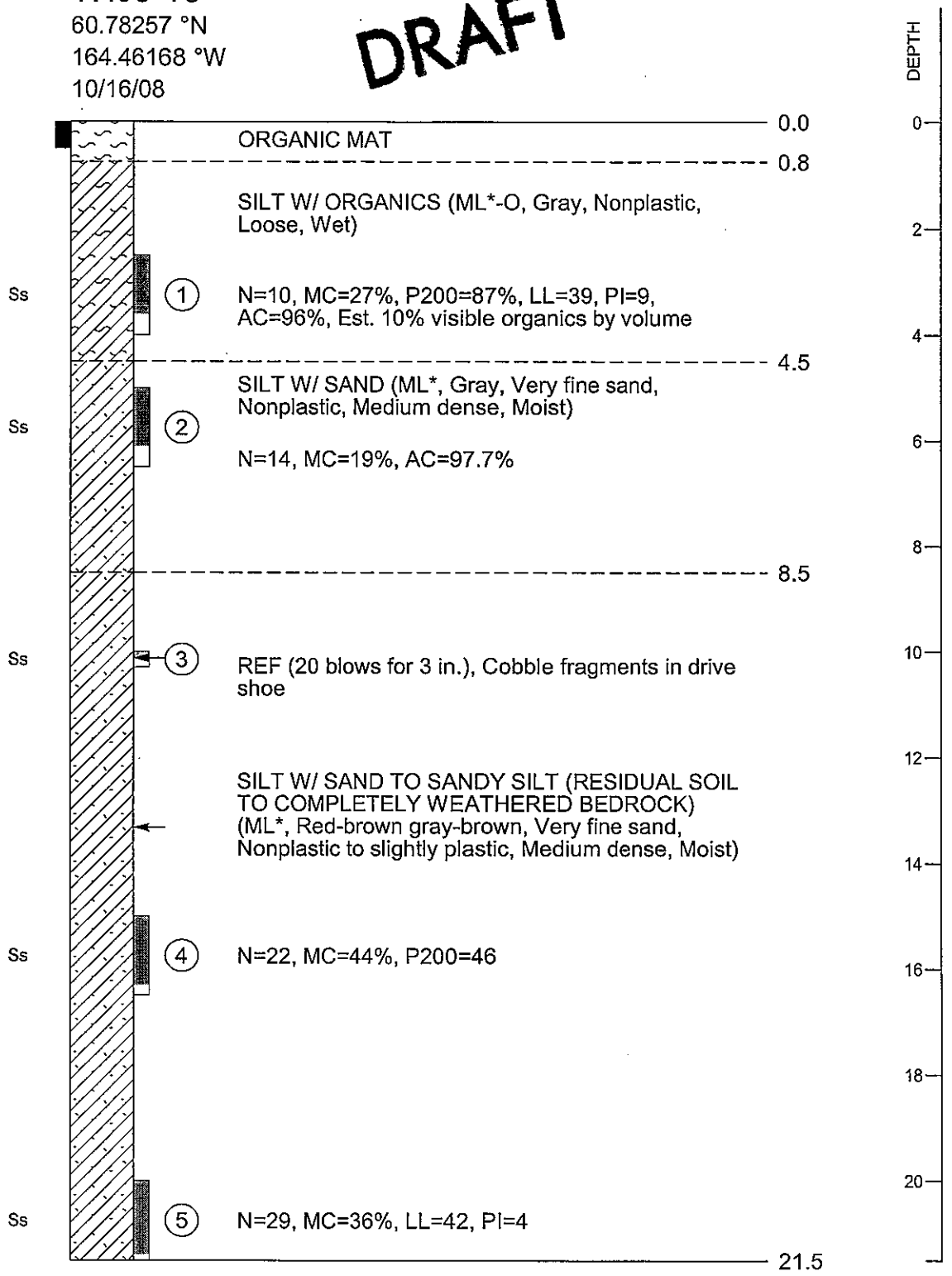
AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
AIRPORT SITE 3
TH08-15

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	A-05

TH08-16

60.78257 °N
164.46168 °W
10/16/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed
Scattered cobbles and boulders interpreted below 8.5 to 14 ft.

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

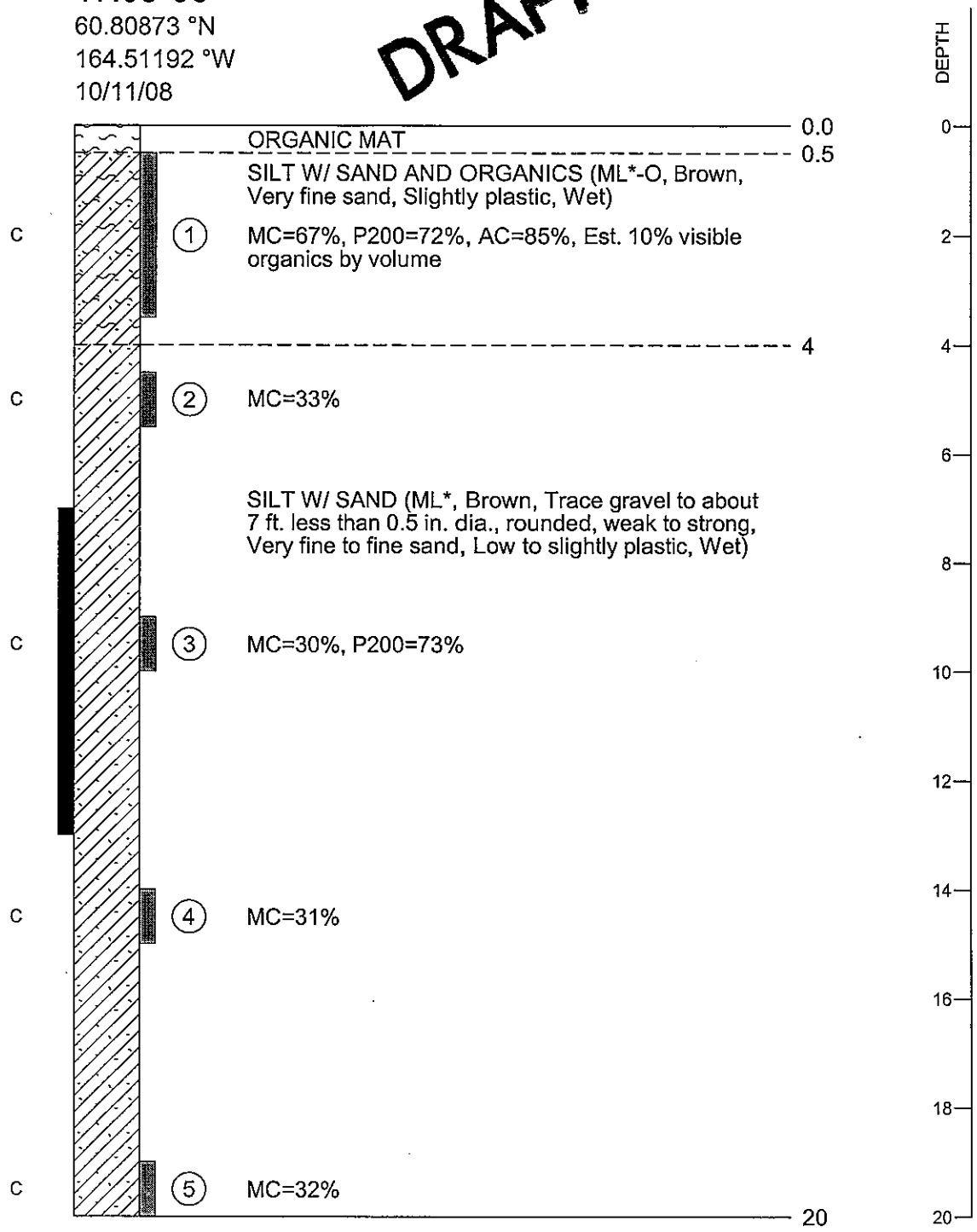
AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
AIRPORT SITE 3
TH08-16

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	A-06

TH08-06

60.80873 °N
164.51192 °W
10/11/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

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AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
SITE 3 ACCESS ROUTE
TH08-06

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	A-07

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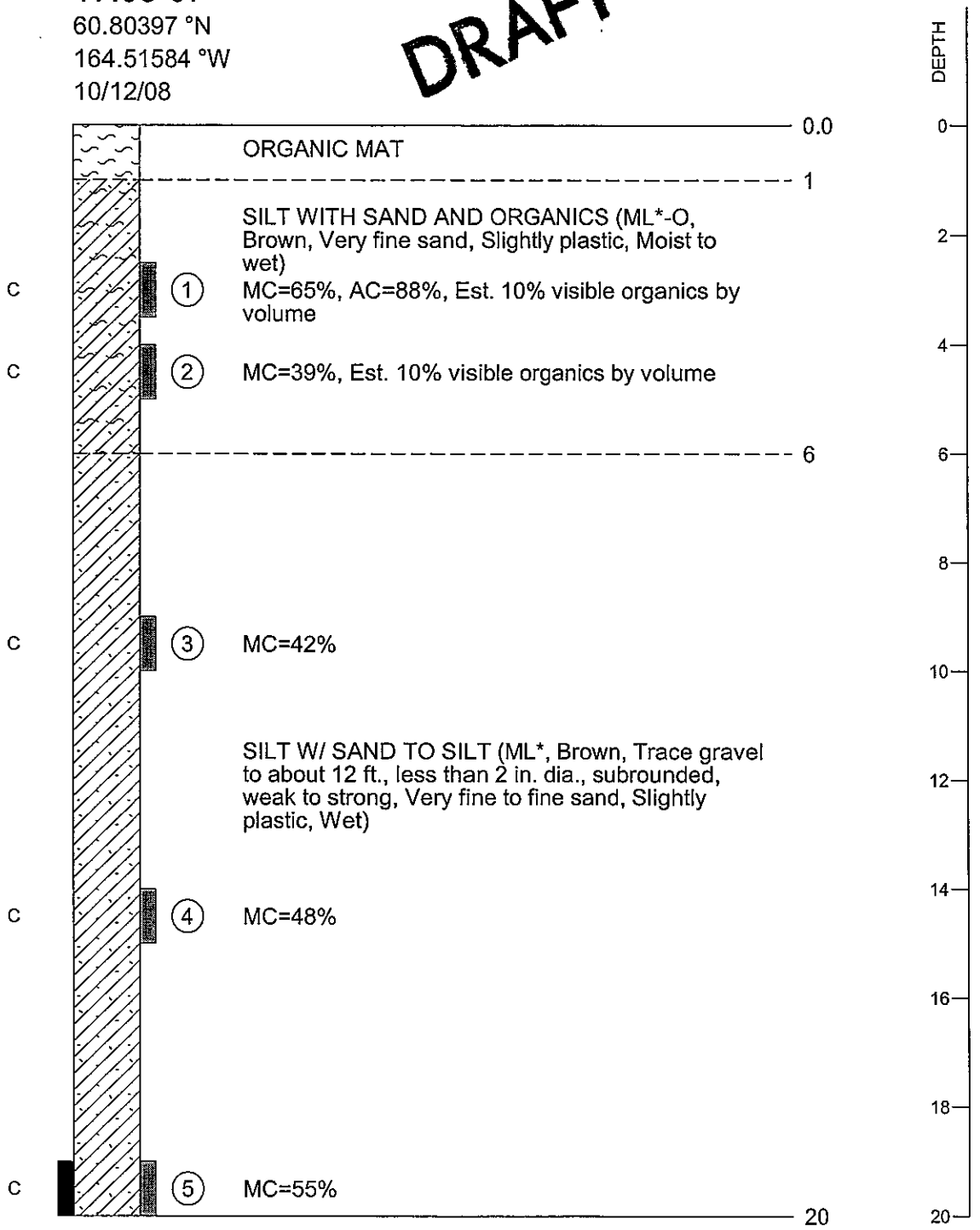
TH08-07

60.80397 °N
164.51584 °W
10/12/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed

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DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

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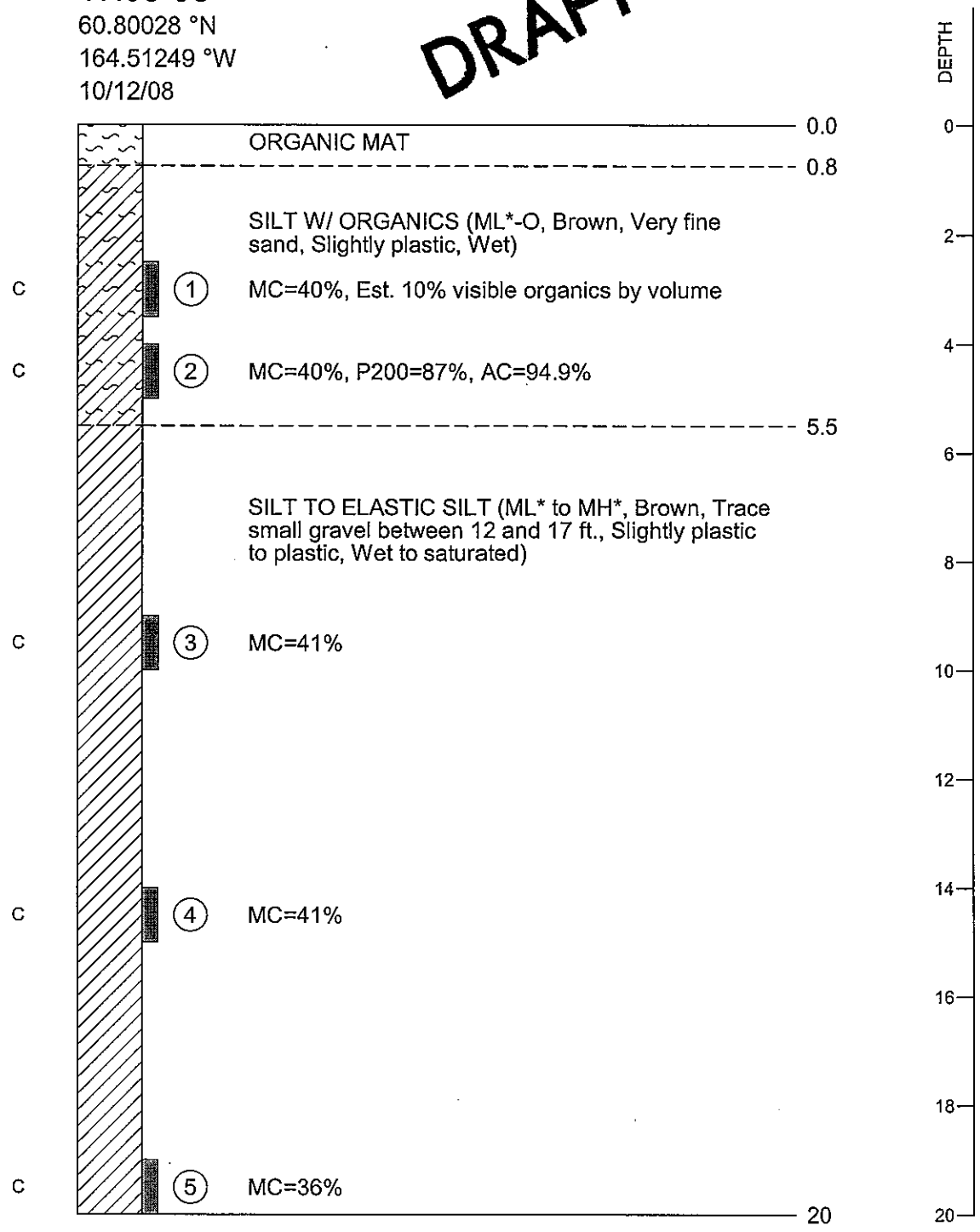
AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
SITE 3 ACCESS ROUTE
TH08-07

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	A-08

TH08-08

60.80028 °N
164.51249 °W
10/12/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed

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DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

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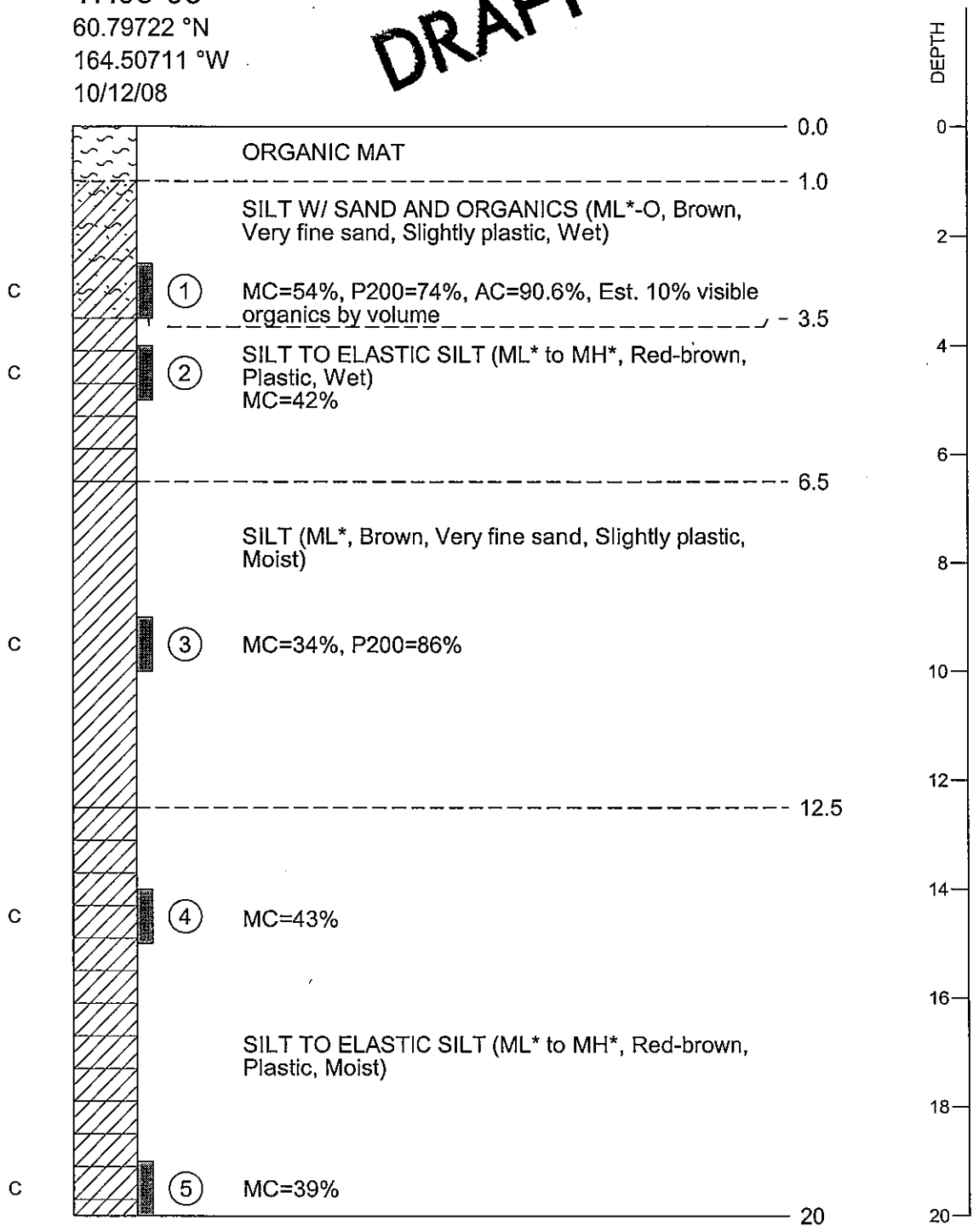
AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
SITE 3 ACCESS ROUTE
TH08-08

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	A-09

TH08-09

60.79722 °N
164.50711 °W
10/12/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed

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MASTER ONE COL/PAGE MERTARVIK AIRPORT AND ROADS.GPJ MASTER2.GDT 3/25/09

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

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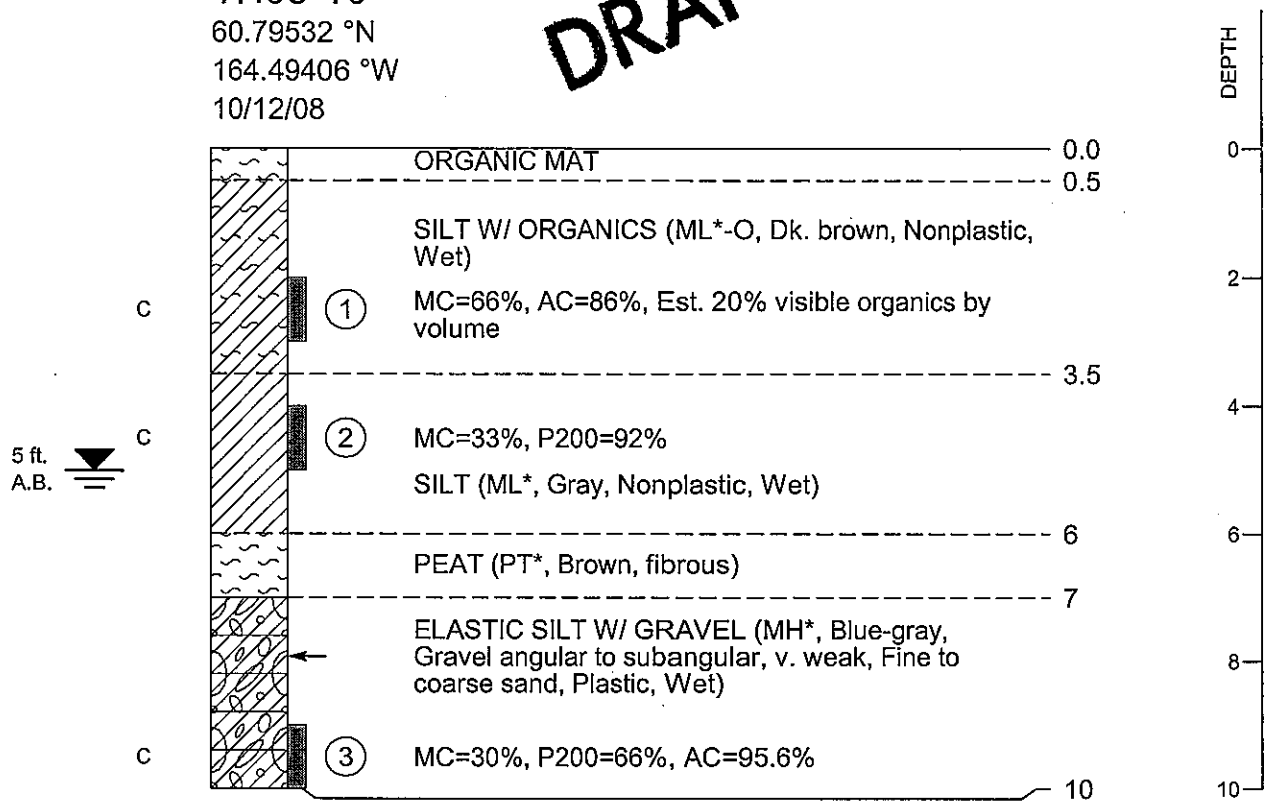
AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
SITE 3 ACCESS ROUTE
TH08-09

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	A-10

TH08-10

60.79532 °N
164.49406 °W
10/12/08

DRAFT



* Estimated group symbol (ASTM D 2488)
Cobble/boulder interpreted at 8 ft.
Auger refusal at 10 ft. Bedrock fragments taken from bit

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MASTER ONE COL/PAGE MERTARVIK AIRPORT AND ROADS.GPJ MASTER2.GDT 3/25/09

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

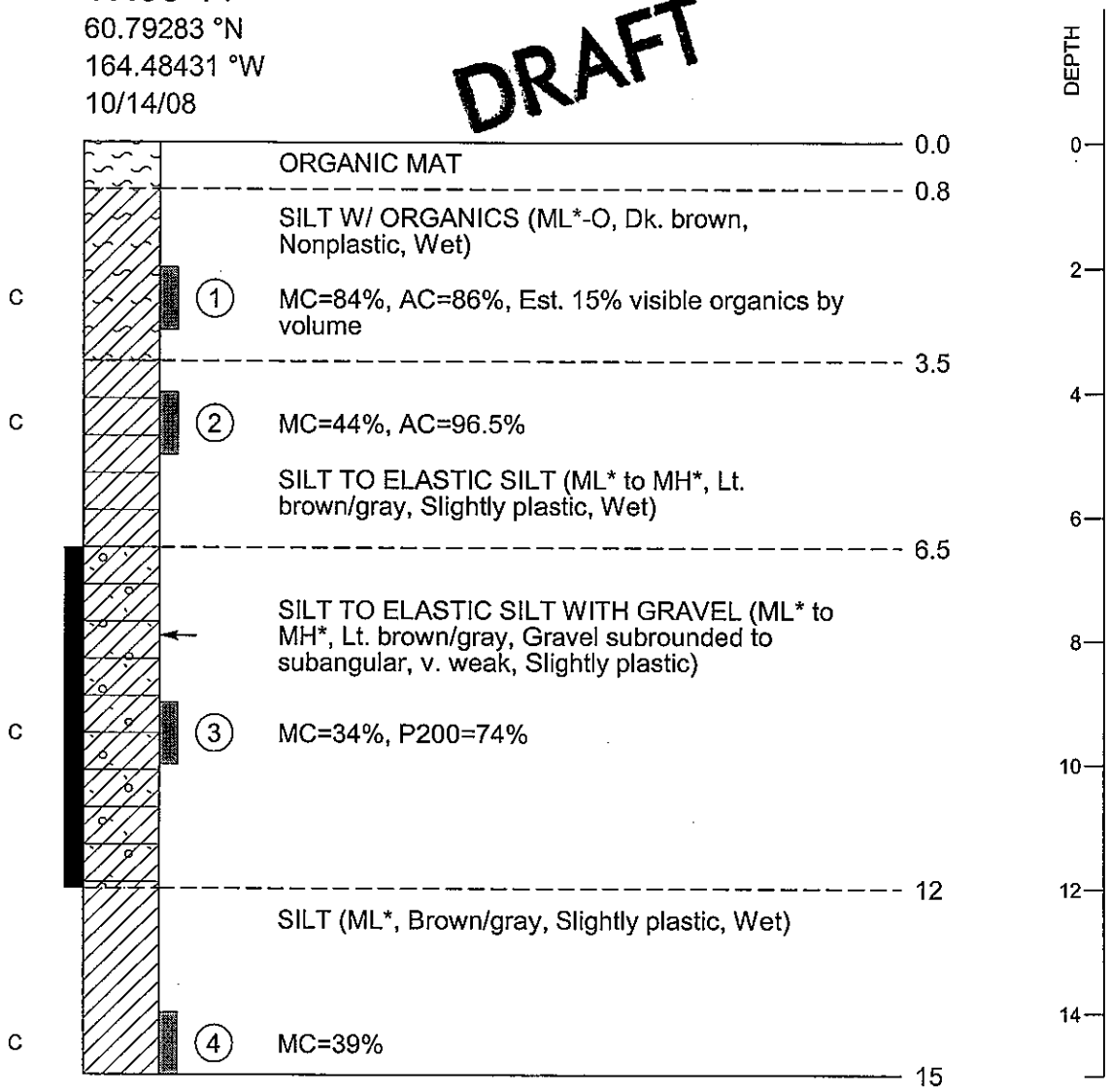
AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
SITE 3 ACCESS ROUTE
TH08-10

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	A-11

TH08-11

60.79283 °N
164.48431 °W
10/14/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed
Cobble/boulder interpreted at 8 ft.

Z:\PROJECT\1429.03\LOGS\MERTARVIK AIRPORT AND ROADS.GPJ

MASTER ONE COLPAGE MERTARVIK AIRPORT AND ROADS.GPJ MASTER2.GDT 3/25/09

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
SITE 3 ACCESS ROUTE
TH08-11

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	A-12

SUMMARY OF LABORATORY SOIL TEST RESULTS
Geotechnical Reconnaissance Investigation
Mertarvik Airport Location Study - Phase 3

Airport Site 3

SAMPLE IDENTIFICATION			PARTICLE SIZE ANALYSIS, % Finer (by mass)						ATTERBERG LIMITS			Moisture Content	Ash Content	USC
			Standard U.S. Sieve			Hydrometer (mm)			Wet Prep (Dry Prep)					
Test Hole	No.	Depth, ft	#10	#40	#200	0.02	0.005	0.002	LL	PL	PI	%	%	
TH08-12	1	2.5 - 4			87							28	95.9	ML*-O
	2	5 - 6.5										32	95.6	ML*-O
TH08-13	1	2.5 - 4	100	87	73				33 (33)	(30)	(3)	184	91.1	ML
	2	5 - 6.5										37		
	3	10 - 10.9										30		
TH08-14	1	2.5 - 4										142	97.5	ML*
	2	5 - 6.5		100	98	66	27	16	29	23	6	60		ML
	3	10 - 11.5							60	41	19	73		MH*
	4	15 - 16.5	100	95	76	60	31	22	66	46	20	73	89.6	MH
	5	20 - 21.5										54		
TH08-15	1	2.5 - 4										81	94.7	ML*-O
	2	5 - 6.5	100		98	44	14	7.7	22	21	1	30	97.0	ML
	3	10 - 11.5										49		
	4	15 - 16.5	100		96	49	21	15	35	31	4	34	94.3	ML
	5	20 - 21.5			71							56		ML*/MH*
TH08-16	1	2.5 - 4	100	96	87				35 (39)	(30)	(9)	27	96.0	ML
	2	5 - 6.5										19	97.7	ML*
	4	15 - 16.5			46							44		
	5	20 - 21.5							42	38	4	36		ML*

* Estimated soil group following ASTM D 2488

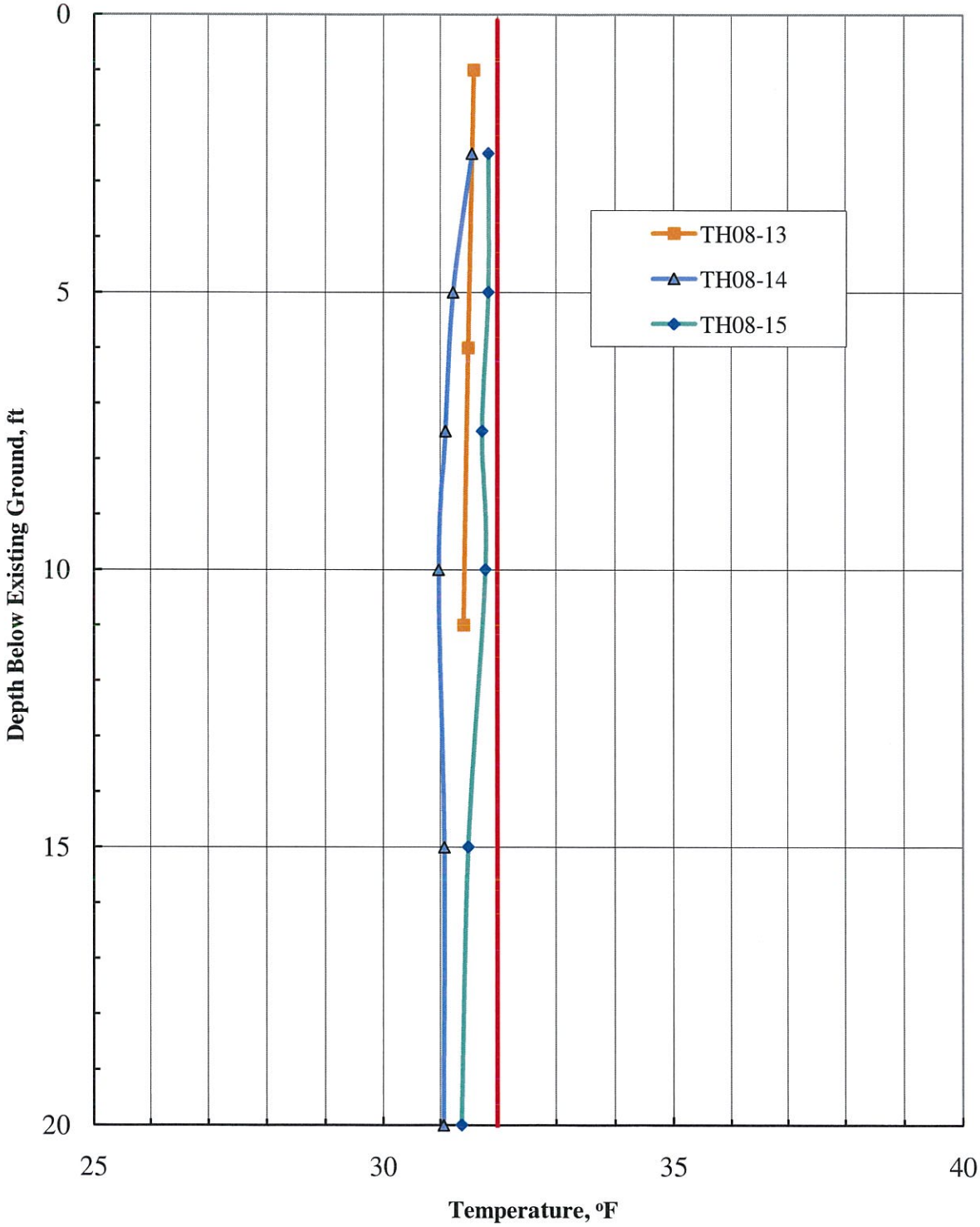
SUMMARY OF LABORATORY SOIL TEST RESULTS
Geotechnical Reconnaissance Investigation
Mertarvik Airport Location Study - Phase 3

Access Route to Site 3

SAMPLE IDENTIFICATION			PARTICLE SIZE ANALYSIS, % Finer (by mass)						ATTERBERG LIMITS Wet Prep (Dry Prep)			Moisture Content	Ash Content	USC
			Standard U.S. Sieve			Hydrometer (mm)								
Test Hole	No.	Depth, ft	#10	#40	#200	0.02	0.005	0.002	LL	PL	PI	%	%	
TH08-06	1	0.5 - 3.5			72							67	85.1	ML*-O
	2	4.5 - 5.5										33		
	3	9 - 10			73							30		ML*
	4	14 - 15										31		
	5	19 - 20										32		
TH08-07	1	2.5 - 3.5										65	88.3	ML*-O
	2	4 - 5										39		
	3	9 - 10										42		
	4	14 - 15										48		
	5	19 - 20										55		
TH08-08	1	2.5 - 3.5										40		
	2	4 - 5			87							40	94.9	ML*-O
	3	9 - 10										41		
	4	14 - 15										41		
	5	19 - 20										36		
TH08-09	1	2.5 - 3.5			74							54	90.6	ML*-O
	2	4 - 5										42		
	3	9 - 10			86							34		ML*
	4	14 - 15										43		
	5	19 - 20										39		
TH08-10	1	2 - 3										66	86.1	ML*-O
	2	4 - 5			92							33		ML*
	3	9 - 10			66							30	95.6	MH*
TH08-11	1	2 - 3										84	85.7	ML*-O
	2	4 - 5										44	96.5	ML*
	3	9 - 10			74							34		ML*
	4	14 - 15										39		

* Estimated soil group following ASTM D 2488

Mertarvik Airport Location Study, Phase 3
Geotechnical Reconnaissance Investigation
Ground Temperature Plots - Airport Site 3



Mertarvik Airport Location Study, Phase 3

Geotechnical Reconnaissance Investigation

Ground Temperature Measurements - Airport Site 3

TH08-13

String Installed

Date	Thermistor			R	Temperature	
(String)	No.	BS1, ft	CF, °C	Ohms	°C	°F
2 Nov '08	1		0.02			
(RM8-1)	2		0.1			
	3		0.07			
	4	1.0	0.1	16,440	-0.2	31.6
	5	6.0	0.07	16,510	-0.3	31.5
	6	11.0	0.09	16,530	-0.3	31.4

TH08-14

String Installed

Date	Thermistor			R	Temperature	
(String)	No.	BS1, ft	CF, °C	Ohms	°C	°F
2 Nov '08	1	2.5	0.06	16,490	-0.3	31.5
(RM8-2)	2	5.0	0.04	16,660	-0.4	31.2
	3	7.5	0.09	16,680	-0.5	31.1
	4	10.0	0.05	16,770	-0.6	31.0
	5	15.0	0.02	16,750	-0.5	31.1
	6	20.0	0.05	16,730	-0.5	31.1

TH08-15

String Installed

Date	Thermistor			R	Temperature	
(String)	No.	BG, ft	CF, °C	Ohms	°C	°F
2 Nov '08	1	2.5	0.09	16,330	-0.1	31.8
(RM8-3)	2	5.0	0.09	16,330	-0.1	31.8
	3	7.5	0.02	16,440	-0.2	31.7
	4	10.0	0.01	16,420	-0.1	31.8
	5	15.0	0.06	16,520	-0.3	31.5
	6	20.0	0.04	16,590	-0.3	31.4

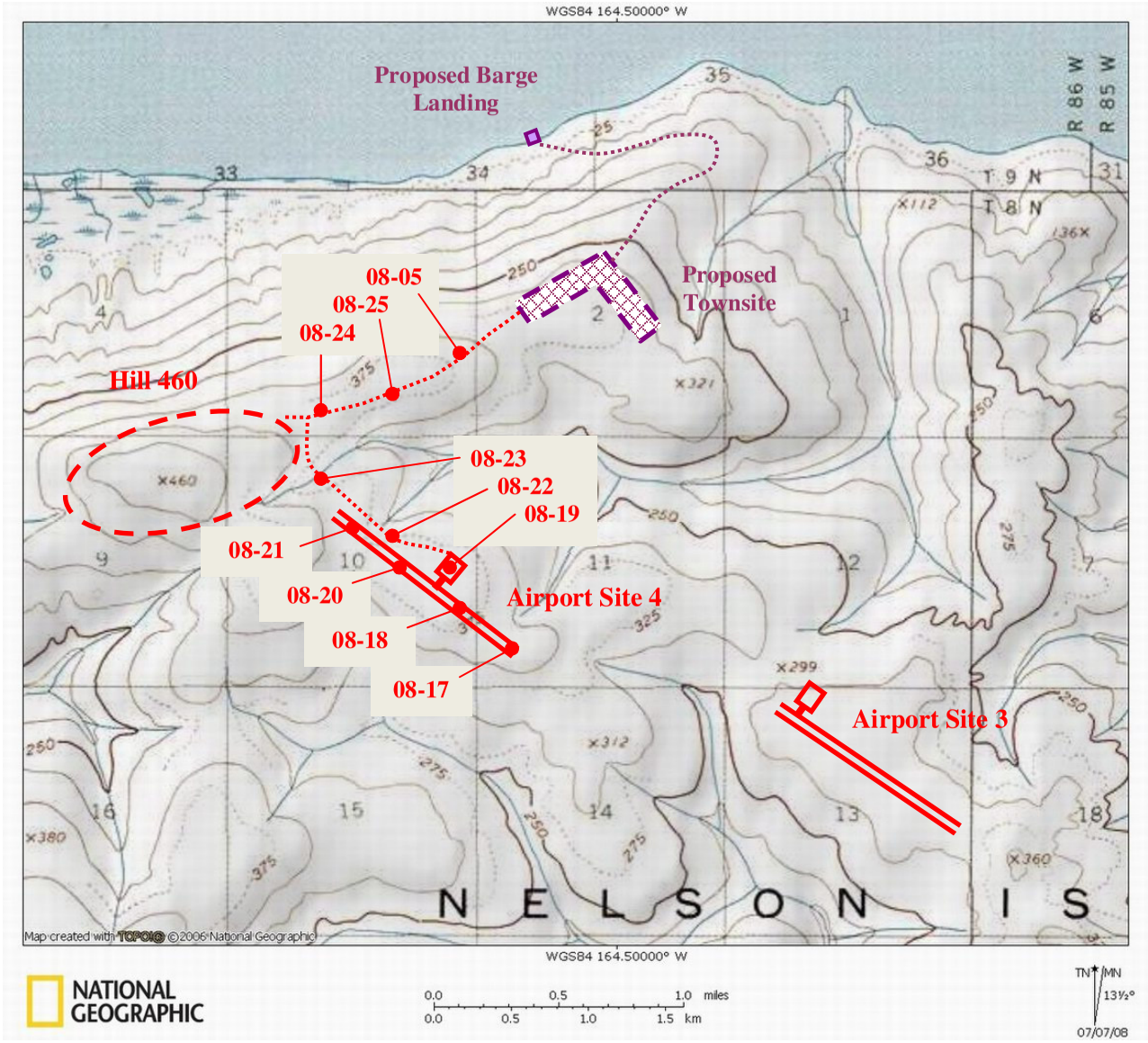
$$\text{Temp, °C} = [a+b*\ln R+c*(\ln R)^3]^{-1}-273.15-CF$$

	YSI 44034
a =	0.0012818350
b =	0.0002366900
c =	0.0000000910

APPENDIX B

AIRPORT SITE 4 EXPLORATIONS

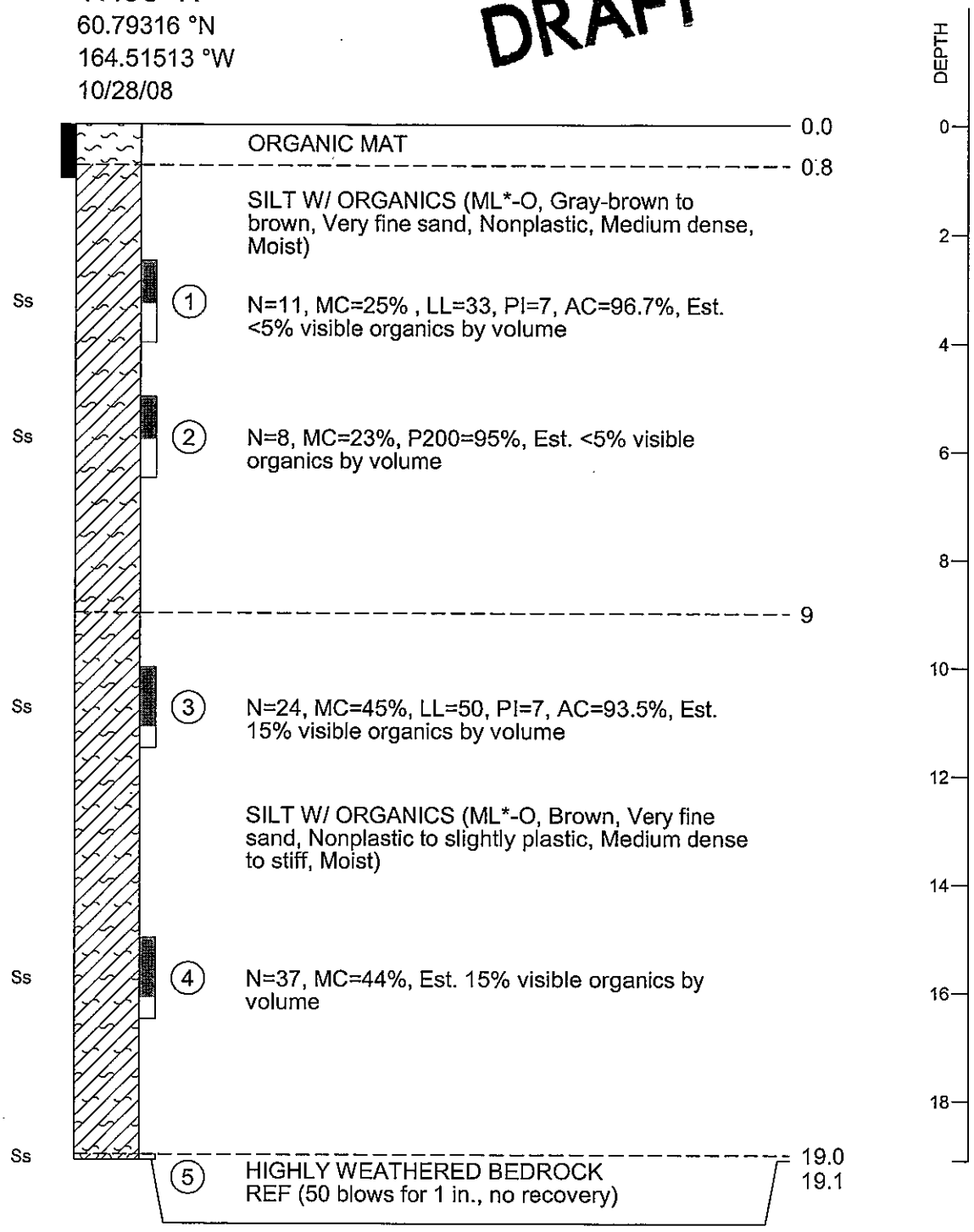
Airport Site 4 Test Hole Location Map B-01
Logs of Test Borings
Airport Site 4 (TH08-17 thru TH08-21) ..... B-02 thru B-06
Site 4 Access Route (TH08-05, and TH08-22 thru TH08-25)..... B-07 thru B-11
Summary of Laboratory Soil Test Results.....B-12 and B-13
Ground Temperature Measurements.....B-14 and B-15


WGS84 164.50000° W
Proposed Barge Landing
Proposed Townsite
08-05
08-25
08-24
Hill 460
08-23
08-22
08-19
08-21
08-20
08-18
08-17
Airport Site 4
Airport Site 3
R 86 W
R 85 W
T 9 N
T 8 N
N E L S O N I S
Map created with TOPO! ©2006 National Geographic
WGS84 164.50000° W
NATIONAL GEOGRAPHIC
0.0 0.5 1.0 miles
0.0 0.5 1.0 1.5 km
TN MN
13½°
07/07/08

TH08-17

60.79316 °N
164.51513 °W
10/28/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed
Auger refusal at 19 ft.

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
AIRPORT SITE 4
TH08-17

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	B-02

MASTER ONE COLPAGE MERTARVIK AIRPORT AND ROADS.GPJ MASTER2.GDT 3/25/09

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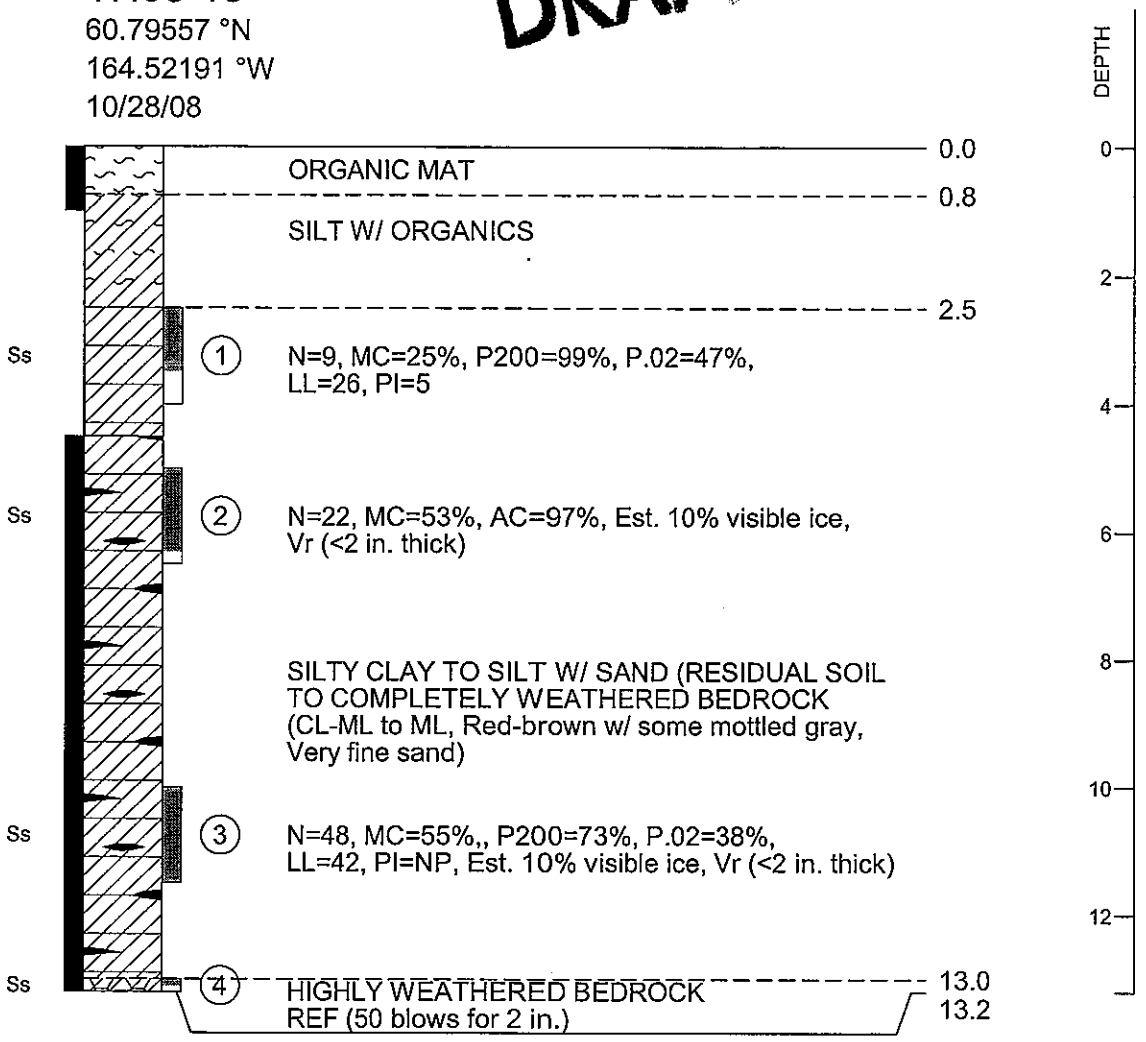
TH08-18

DRAFT

60.79557 °N
164.52191 °W
10/28/08



No groundwater observed
Auger refusal at 13 ft.

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

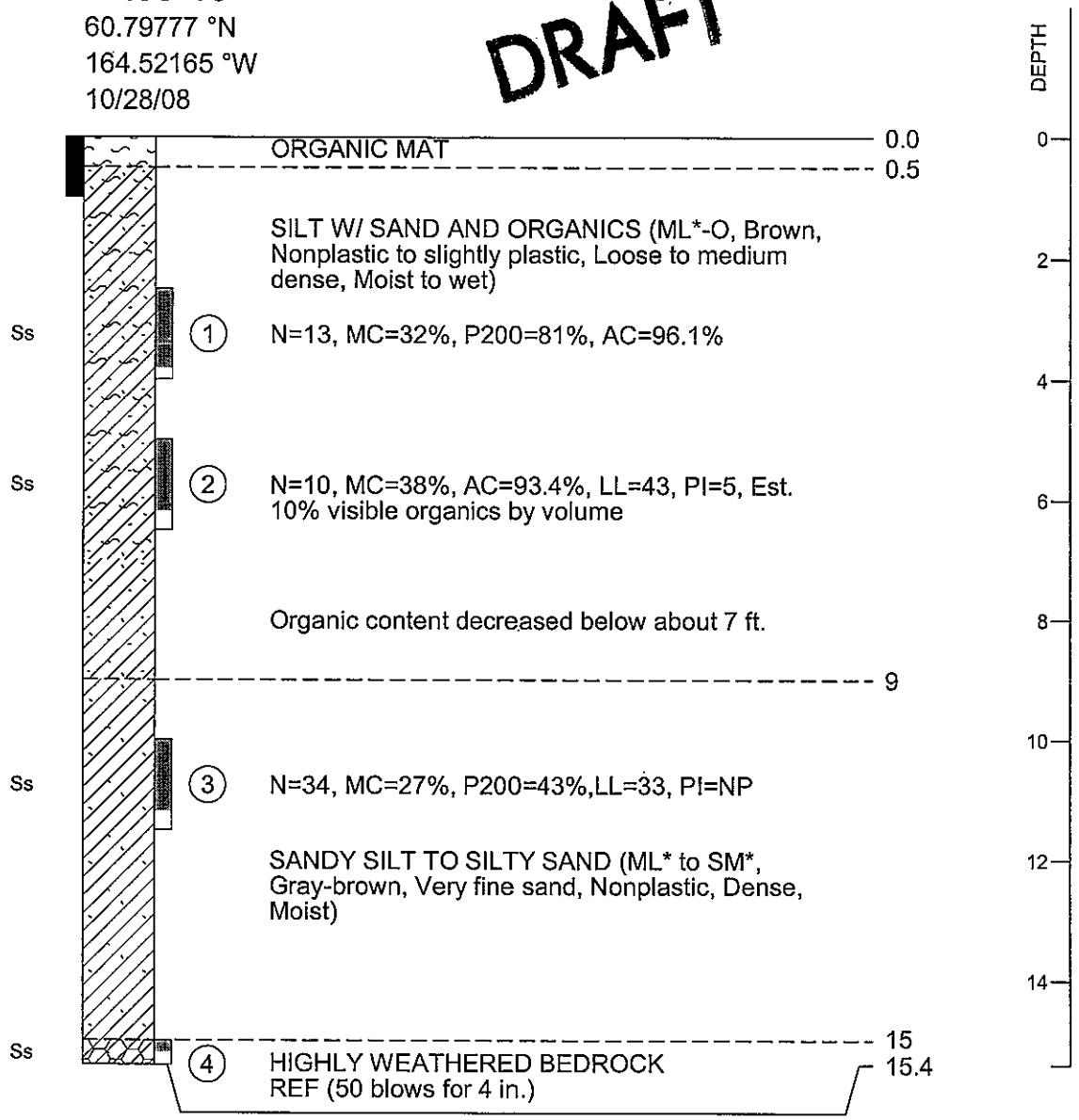
AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
AIRPORT SITE 4
TH08-18

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	B-03

TH08-19

60.79777 °N
164.52165 °W
10/28/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed
Auger refusal at 15.4 ft.

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

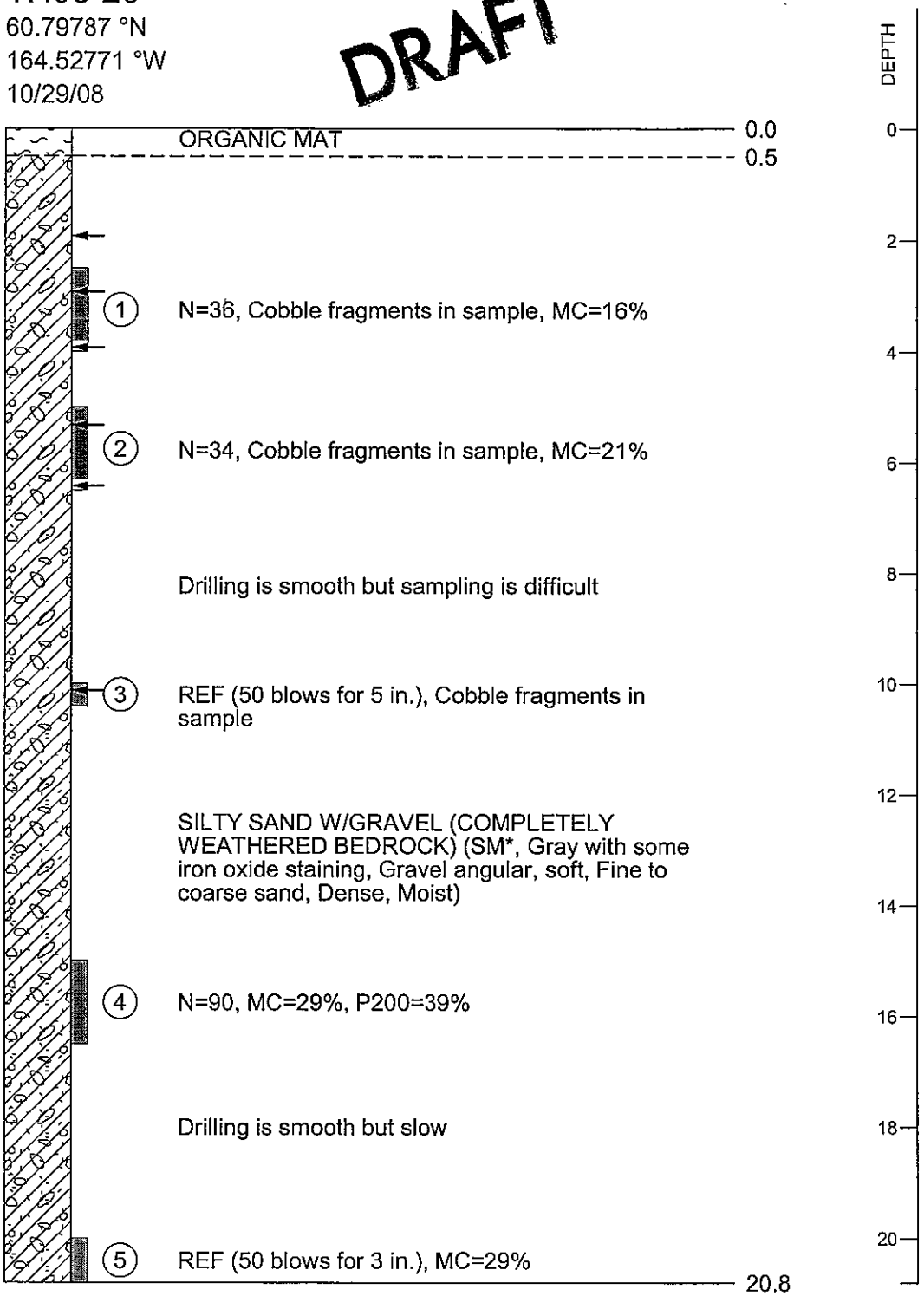
AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
AIRPORT SITE 4
TH08-19

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	B-04

TH08-20

60.79787 °N
164.52771 °W
10/29/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed
Scattered cobbles and boulders interpreted below 2 ft.

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MASTER ONE COL/PAGE MERTARVIK AIRPORT AND ROADS.GPJ MASTER2.GDT 3/26/09

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

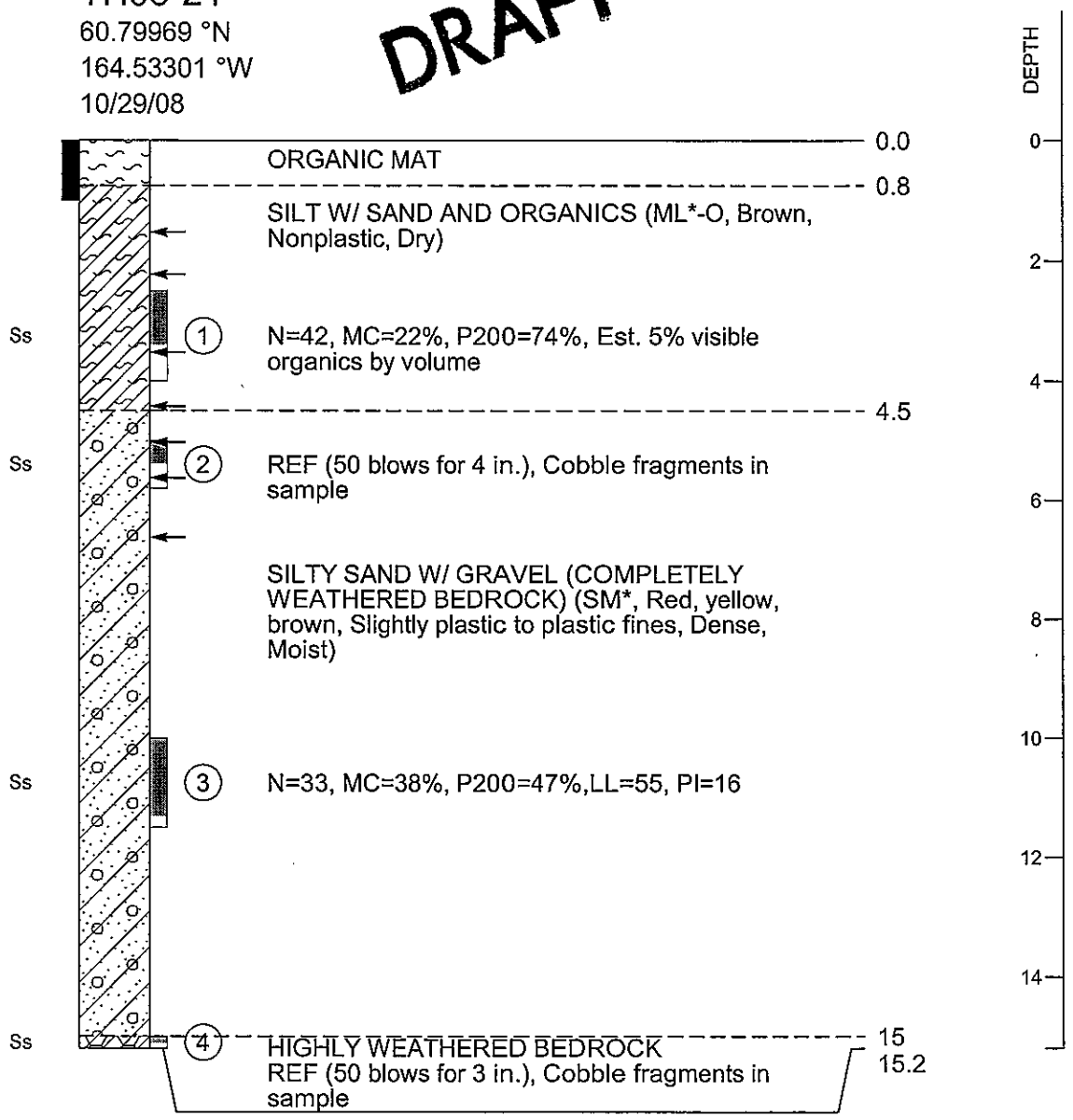
AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
AIRPORT SITE 4
TH08-20

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	B-05

TH08-21

60.79969 °N
164.53301 °W
10/29/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed
Cobbles and boulders interpreted from surface to about 7 ft.
Auger refusal at 15.2 ft.

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

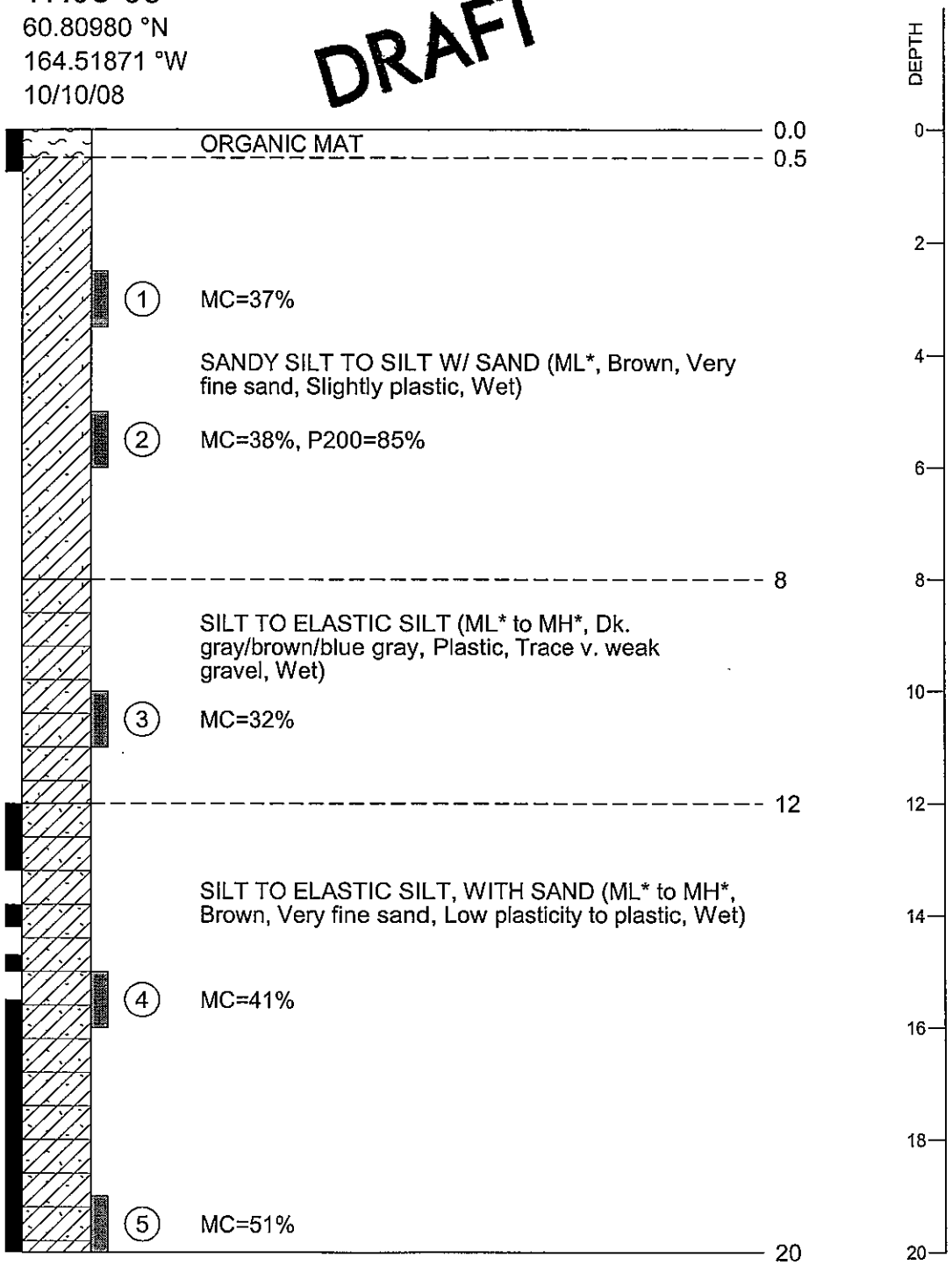
AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
AIRPORT SITE 4
TH08-21

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	B-06

TH08-05

60.80980 °N
164.51871 °W
10/10/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed
Drilling action indicated discontinuous permafrost from 12 ft. to approx. 15.5 ft.

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

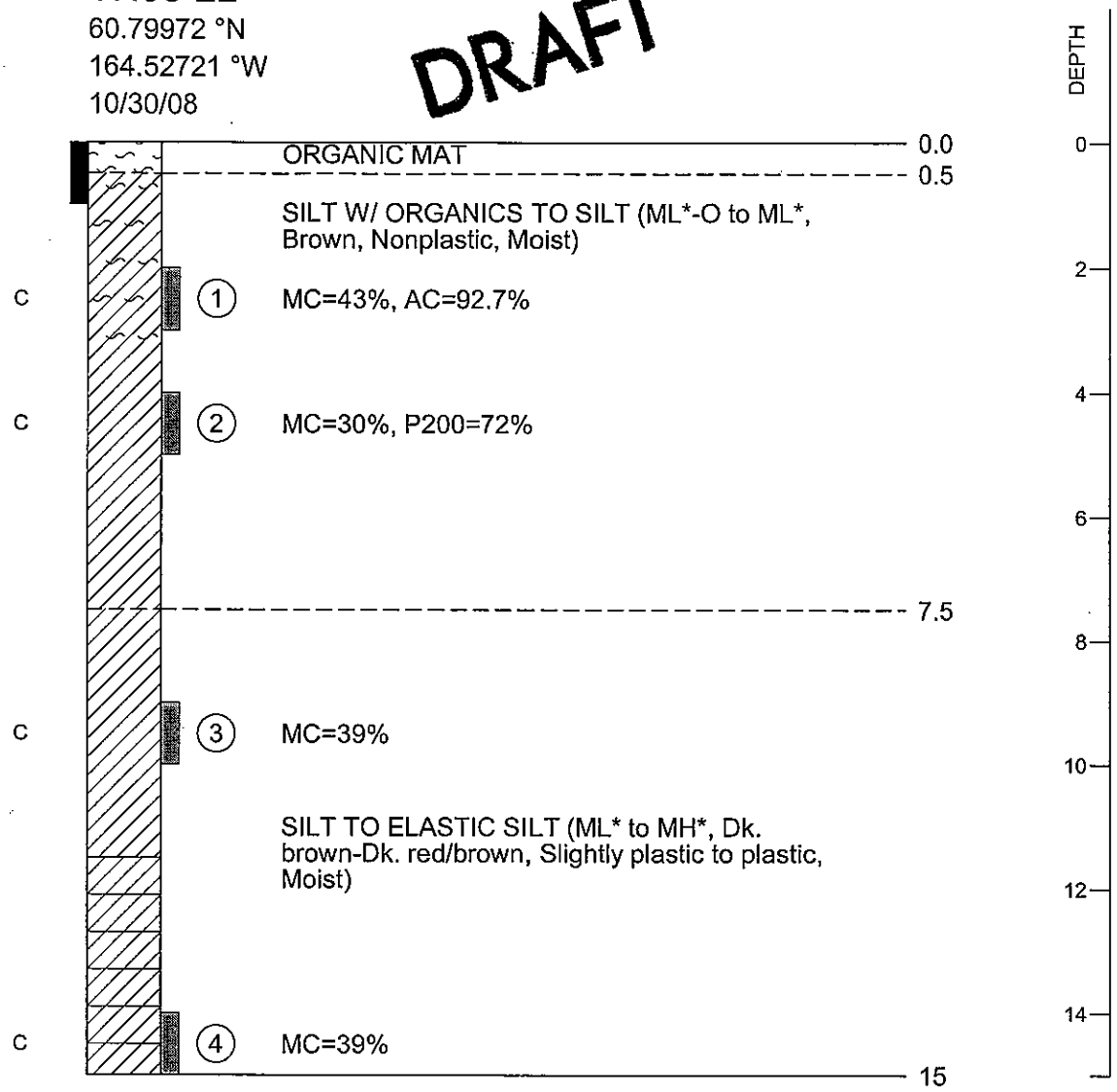
AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
SITE 4 ACCESS ROUTE
TH08-05

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	B-07

TH08-22

60.79972 °N
164.52721 °W
10/30/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed

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MASTER ONE COL/PAGE MERTARVIK AIRPORT AND ROADS.GPJ MASTER2.GDT 3/26/09

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

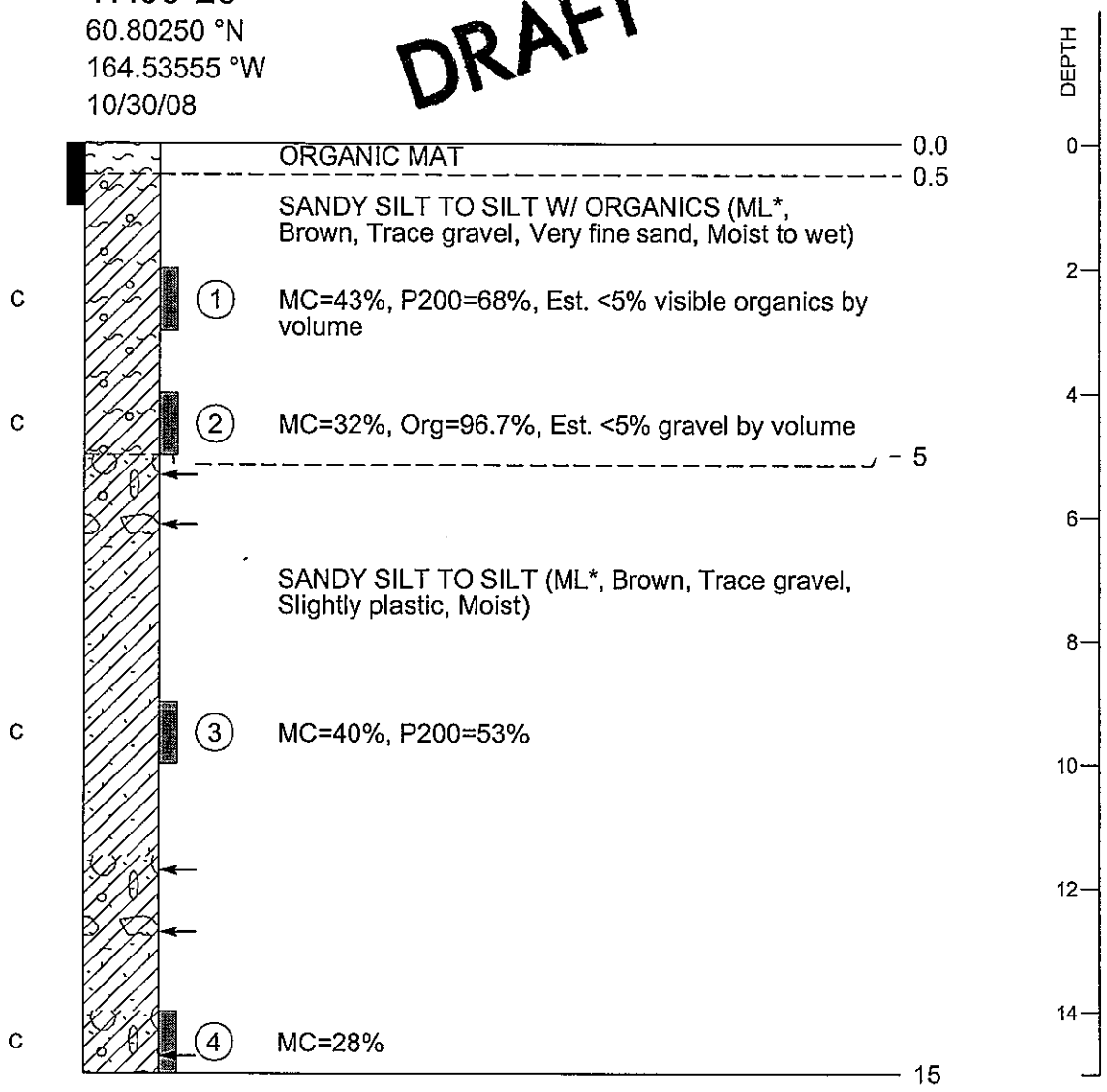
AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
SITE 4 ACCESS ROUTE
TH08-22

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	B-08

TH08-23

60.80250 °N
164.53555 °W
10/30/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed
Scattered cobbles and boulders interpreted below about 5 ft.

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MASTER ONE COLPAGE MERTARVIK AIRPORT AND ROADS.GPJ MASTER2.GDT 3/26/09

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

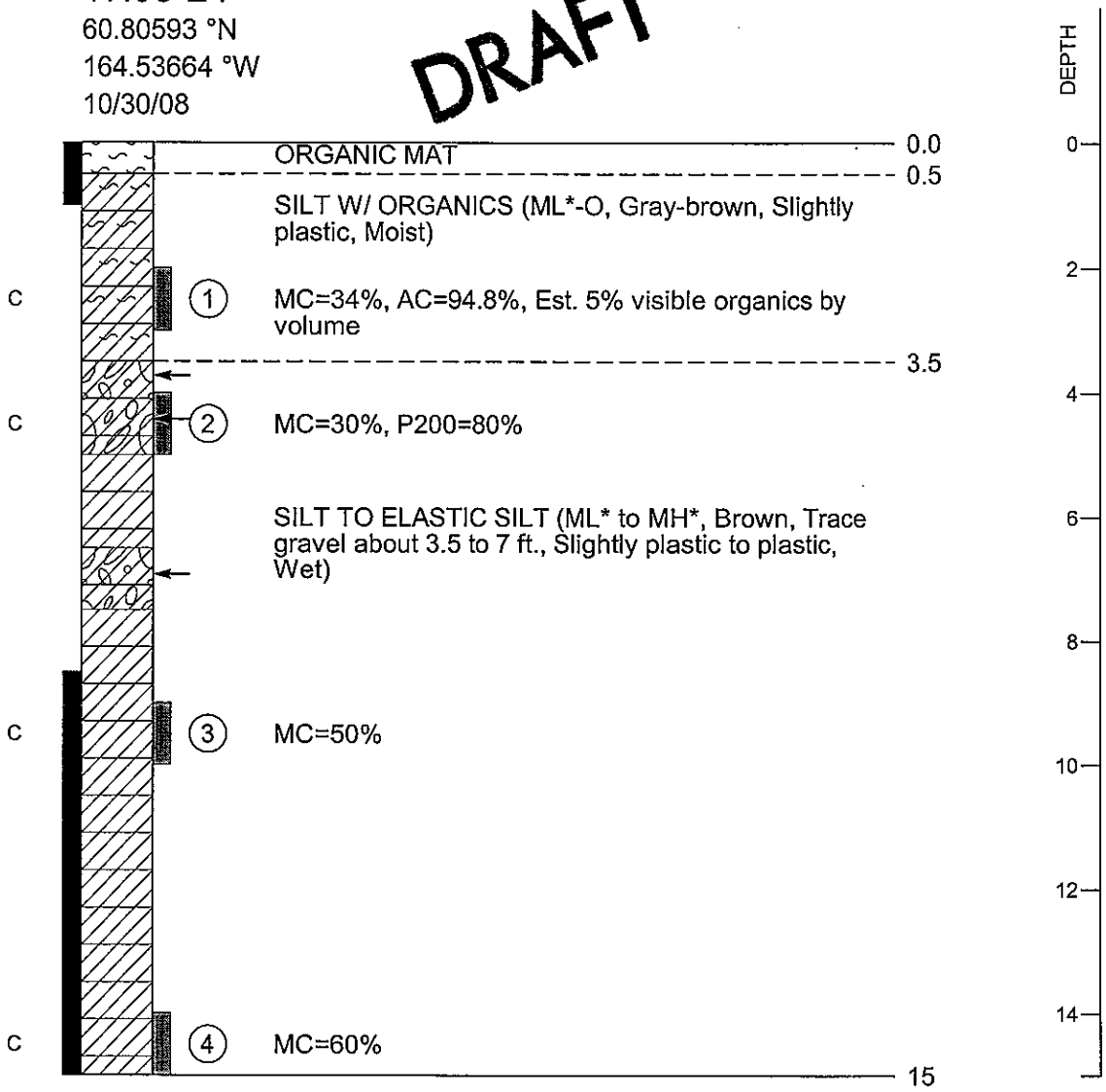
AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
SITE 4 ACCESS ROUTE
TH08-23

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	B-09

TH08-24

60.80593 °N
164.53664 °W
10/30/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed
Scattered cobbles and boulders interpreted below about 5 ft.

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

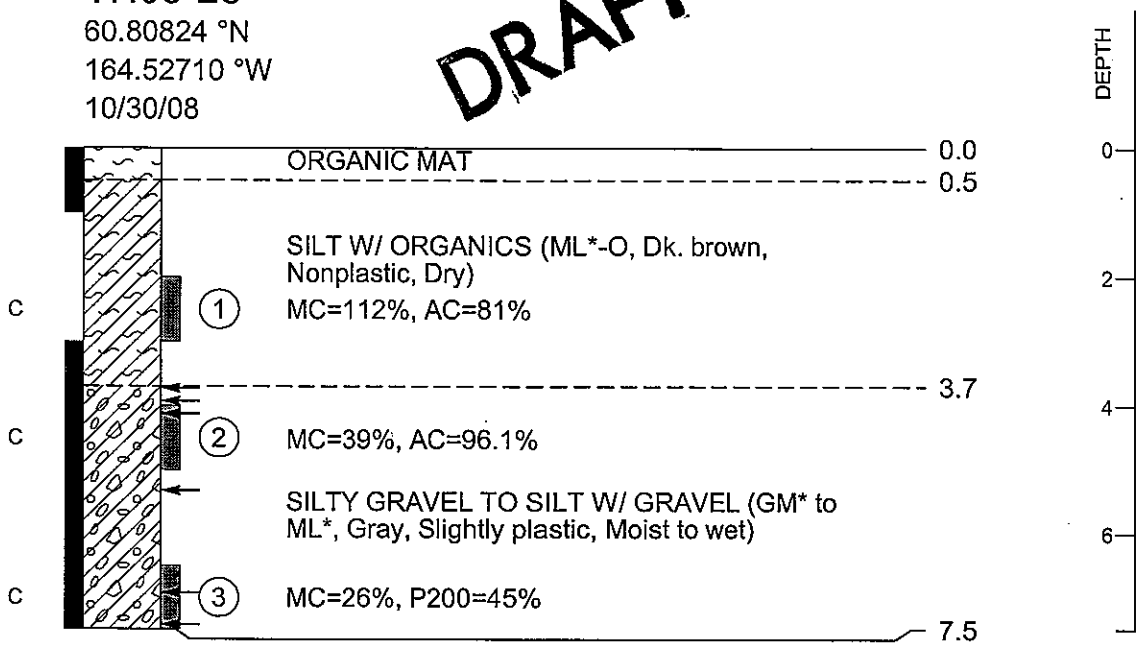
AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
SITE 4 ACCESS ROUTE
TH08-24

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	B-10

TH08-25

60.80824 °N
164.52710 °W
10/30/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed
Scattered cobbles and boulders interpreted below about 4 ft.

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MASTER ONE COL/PAGE MERTARVIK AIRPORT AND ROADS.GPJ MASTER2.GDT 3/26/09

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

AIRPORT RECONNAISSANCE STUDY
MERTARVIK, ALASKA
SITE 4 ACCESS ROUTE
TH08-25

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	B-11

SUMMARY OF LABORATORY SOIL TEST RESULTS
Geotechnical Reconnaissance Investigation
Mertarvik Airport Location Study - Phase 3

Airport Site 4

SAMPLE IDENTIFICATION			PARTICLE SIZE ANALYSIS, % Finer (by mass)						ATTERBERG LIMITS			Moisture Content	Ash Content	USC
			Standard U.S. Sieve			Hydrometer (mm)			Wet Prep (Dry Prep)					
Test Hole	No.	Depth, ft	#10	#40	#200	0.02	0.005	0.002	LL	PL	PI	%	%	
TH08-17	1	2.5 - 4							32 (33)	(26)	(7)	25	96.7	ML*-O
	2	5 - 6.5			95							23		
	3	10 - 11.5							49 (50)	(43)	(7)	45	93.5	ML*-O
	4	15 - 16.5										44		
TH08-18	1	2.5 - 4	100		99	47	16	9.8	26	21	5	25		CL-ML
	2	5 - 6.5										53	97.0	
	3	10 - 11.5	100		73	38	15	4.2	42	nv	np	55		ML
TH08-19	1	2.5 - 4			81							32	96.1	ML*-O
	2	5 - 6.5							46 (43)	(38)	(5)	38	93.4	ML*-O
	3	10 - 11.5			43				33	nv	np	27		SM*
TH08-20	1	2.5 - 4										16		
	2	5 - 6.5										21		
	4	15 - 16.5			39							29		SM*
	5	20 - 20.8										29		
TH08-21	1	2.5 - 4			74							22		
	3	10 - 11.5			47				55	39	16	38		MH*

* Estimated soil group following ASTM D 2488

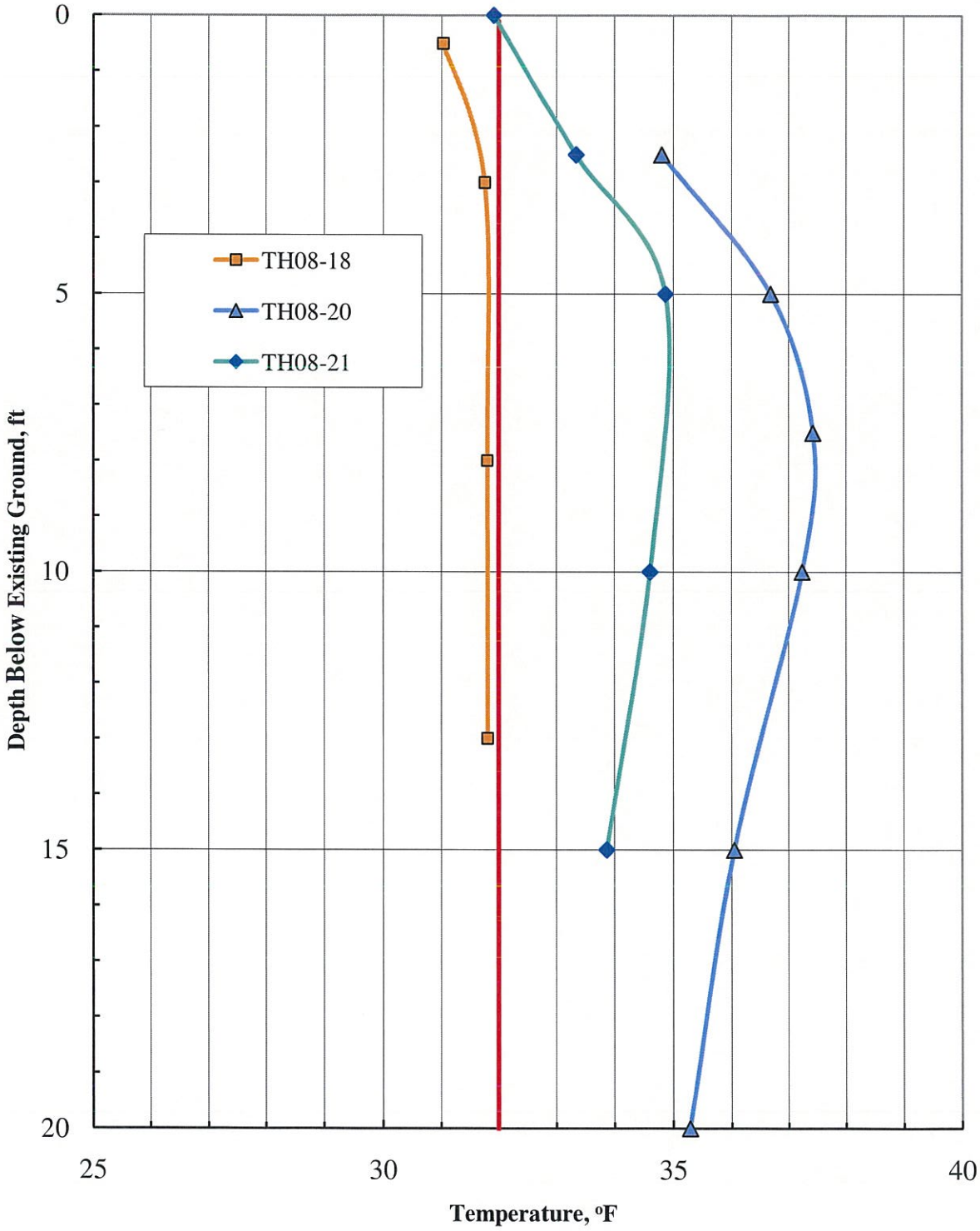
SUMMARY OF LABORATORY SOIL TEST RESULTS
Geotechnical Reconnaissance Investigation
Mertarvik Airport Location Study - Phase 3

Access Route to Airport Site 4

SAMPLE IDENTIFICATION			PARTICLE SIZE ANALYSIS, % Finer (by mass)						ATTERBERG LIMITS			Moisture Content	Organic Content	USC
			Standard U.S. Sieve			Hydrometer (mm)			Wet Prep (Dry Prep)					
Test Hole	No.	Depth, ft	#10	#40	#200	0.02	0.005	0.002	LL	PL	PI	%	%	
TH08-05	1	2.5 - 3.5										37		
	2	5 - 6			85							38		ML*
	3	10 - 11										32		
	4	15 - 16										41		
	5	19 - 20										51		
TH08-22	1	2 - 3										43	92.7	ML*-O
	2	4 - 5			72							30		ML*
	3	9 - 10										39		
	4	14 - 15										39		
TH08-23	1	2 - 3			68							43		
	2	4 - 5										32	96.7	ML*-O
	3	9 - 10			53							40		ML*
	4	14 - 15										28		
TH08-24	1	2 - 3										34	94.8	ML*-O
	2	4 - 5			80							30		ML*
	3	9 - 10										50		
	4	14 - 15										60		
TH08-25	1	2 - 3										112	81.1	ML*-O
	2	4 - 5										39	96.1	
	3	6.5 - 7.5			45							26		

* Estimated soil group following ASTM D 2488

Mertarvik Airport Location Study, Phase 3
Geotechnical Reconnaissance Investigation
Ground Temperature Plots - Airport Site 4



Mertarvik Airport Location Study, Phase 3

Geotechnical Reconnaissance Investigation

Ground Temperature Measurements - Airport Site 4

RM 08-18

String Installed

Date (String)	Thermistor No.	BG, ft	CF, °C	R Ohms	Temperature °C	°F
2 Nov '08 (RM8-6)	1					
	2					
	3	0.5	0.08	16,720	-0.5	31.0
	4	3.0	0.1	16,360	-0.1	31.8
	5	8.0	0.05	16,380	-0.1	31.8
	6	13.0	0.07	16,360	-0.1	31.8

RM 08-20

String Installed

Date (String)	Thermistor No.	BS1, ft	CF, °C	R Ohms	Temperature °C	°F
2 Nov '08 (RM8-5)	1	2.5	0.05	15,050	1.6	34.8
	2	5.0	0.09	14,250	2.6	36.7
	3	7.5	0.1	13,950	3.0	37.4
	4	10.0	0.09	14,030	2.9	37.2
	5	15.0	0.07	14,520	2.2	36.0
	6	20.0	0.02	14,870	1.8	35.3

RM 08-21

String Installed

Date (String)	Thermistor No.	BS1, ft	CF, °C	R Ohms	Temperature °C	°F
2 Nov '08 (RM8-4)	1					
	2	0.0		16,370	0.0	31.9
	3	2.5		15,720	0.7	33.3
	4	5.0		15,060	1.6	34.9
	5	10.0		15,170	1.4	34.6
	6	15.0		15,490	1.0	33.9

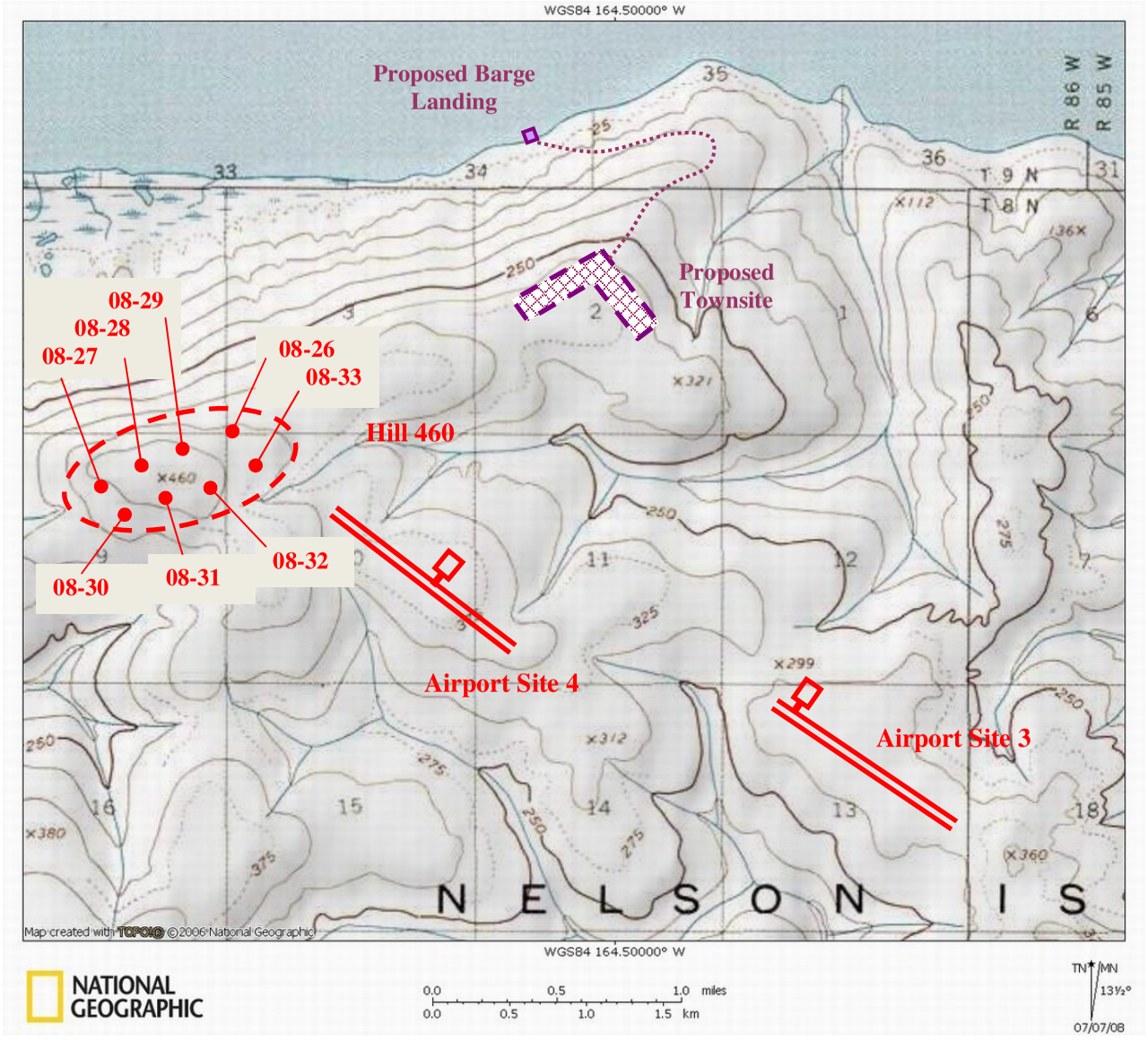
$$\text{Temp, } ^\circ C = [a+b*\ln R+c*(\ln R)^3]^{-1}-273.15-CF$$

	YSI 44034
a =	0.0012818350
b =	0.0002366900
c =	0.0000000910

APPENDIX C

HILL 460 EXPLORATIONS

Hill 460 Test Hole Location Map C-01
Logs of Test Borings (TH08-26 thru TH08-33) ..... C-02 thru C-09
Summary of Laboratory Soil Test Results C-10
Summary of Laboratory Rock Quality Test Results C-11



1429.03

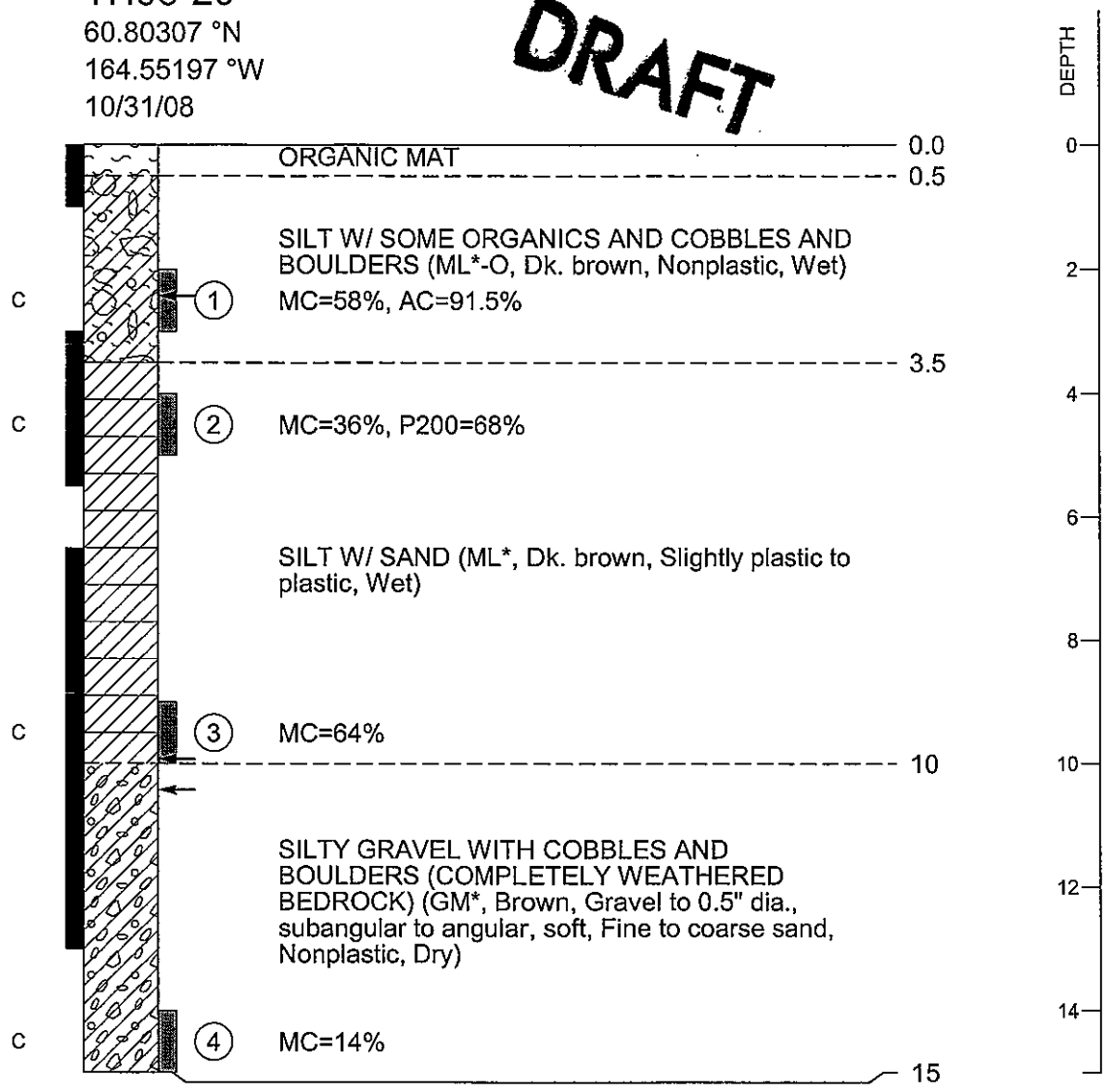
MERTARVIK AIRPORT RECONNAISSANCE STUDY
HILL 460 TEST HOLE LOCATION MAP

DRAWING C-01

TH08-26

60.80307 °N
164.55197 °W
10/31/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed
Auger refusal at 15 ft.

Z:\PROJECT\1429.03\LOGS\MERTARVIK QUARRY.GPJ

MASTER.ONE COL/PAGE MERTARVIK QUARRY.GPJ MASTER2.GDT 4/1/09

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

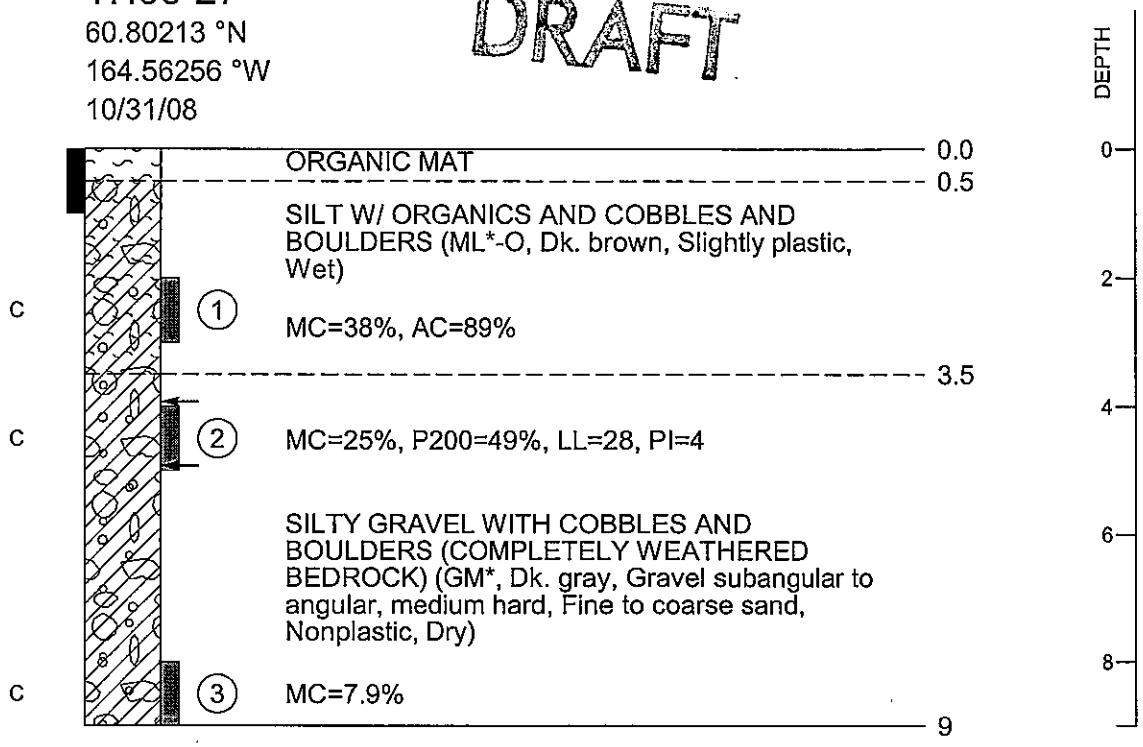
NEWTOK AIRPORT RELOCATION
MERTARVIK, ALASKA
HILL 460
TH08-26

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	C-02

TH08-27

60.80213 °N
164.56256 °W
10/31/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed
Auger refusal at 9 ft.

Z:\PROJECT\1429.03\LOGS\MERTARVIK QUARRY.GPJ

MASTER ONE COL/PAGE MERTARVIK QUARRY.GPJ MASTER2.GDT 4/1/09

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

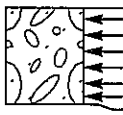
NEWTOK AIRPORT RELOCATION
MERTARVIK, ALASKA
HILL 460
TH08-27

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	C-03

TH08-28

60.80234 °N
164.55901 °W
10/31/08

DRAFT



0.0 — COBBLES AND BOULDERS, Sparse oganic overburden and numerous cobbles and boulders on the surface. — 1.5

DEPTH
0

No groundwater observed
Auger refusal at 1.5 ft.

Z:\PROJECT\1429.03\LOGS\MERTARVIK QUARRY.GPJ

MASTER ONE COL/PAGE MERTARVIK QUARRY.GPJ MASTER2.GDT 4/1/09

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

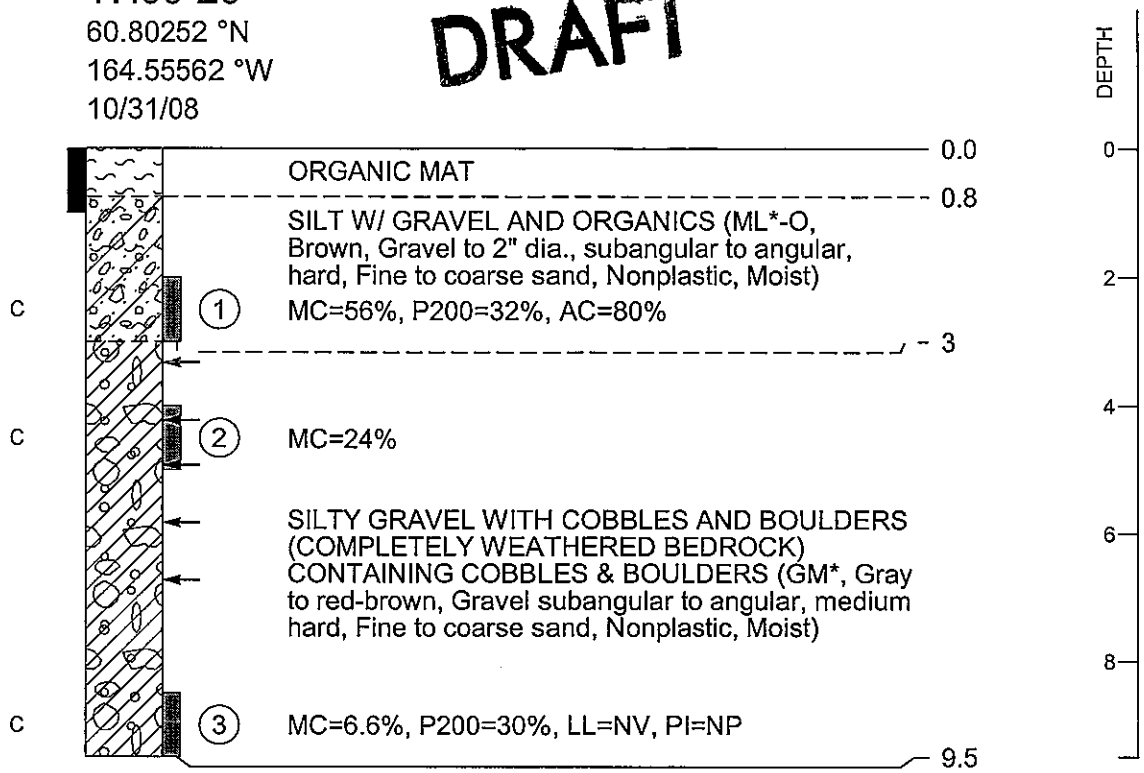
NEWTOK AIRPORT RELOCATION
MERTARVIK, ALASKA
HILL 460
TH08-28

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	C-04

TH08-29

60.80252 °N
164.55562 °W
10/31/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed
Auger refusal at 9.5 ft.

Z:\PROJECT\1429.03\LOGS\MERTARVIK QUARRY.GPJ

MASTER ONE COL/PAGE MERTARVIK QUARRY.GPJ MASTER2.GDT 4/1/09

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

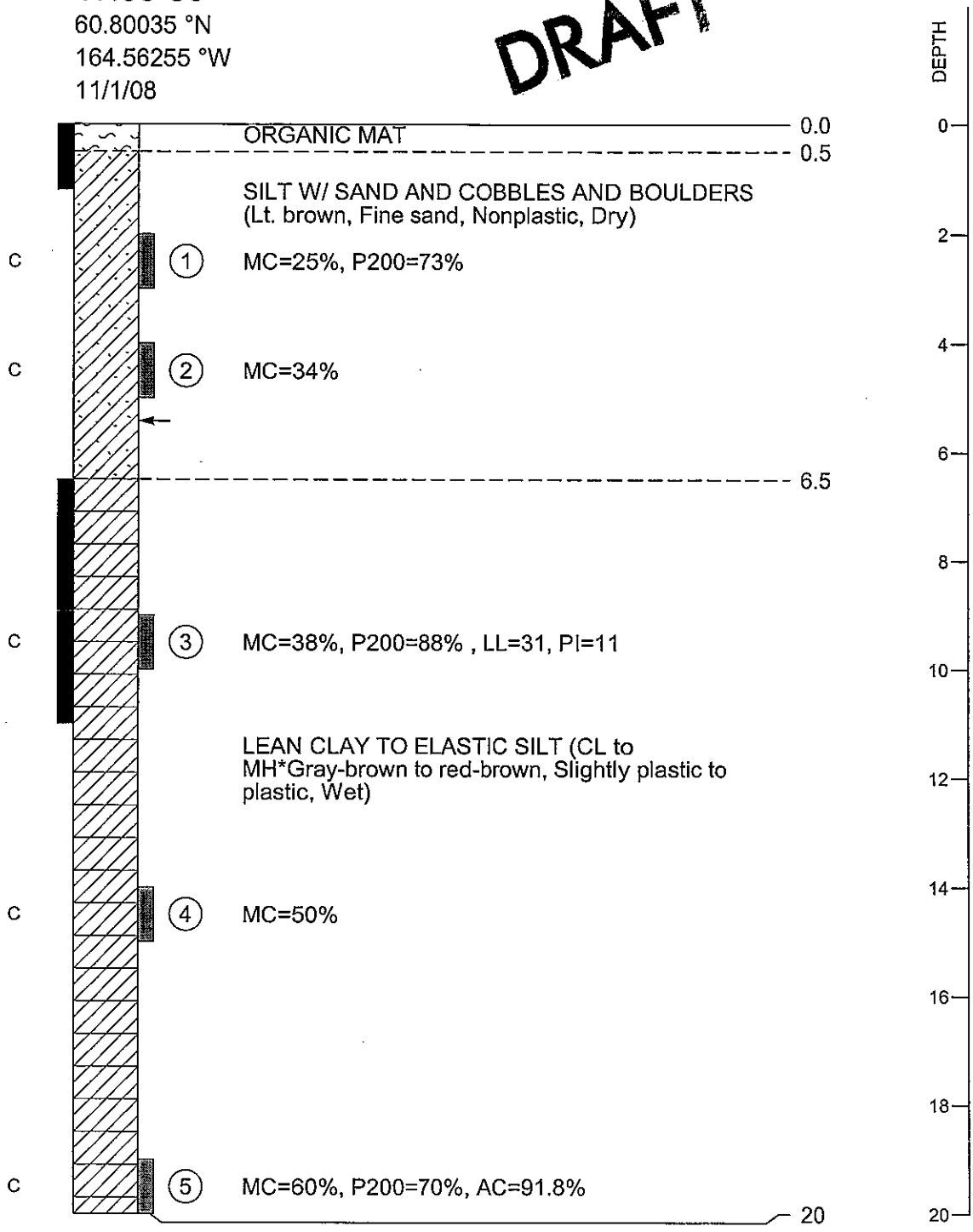
NEWTOK AIRPORT RELOCATION
MERTARVIK, ALASKA
HILL 460
TH08-29

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	C-05

TH08-30

60.80035 °N
164.56255 °W
11/1/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed

Z:\PROJECT\1429.03\LOGS\MERTARVIK QUARRY.GPJ

MASTER ONE COLPAGE MERTARVIK QUARRY.GPJ MASTER2.GDT 4/1/09

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

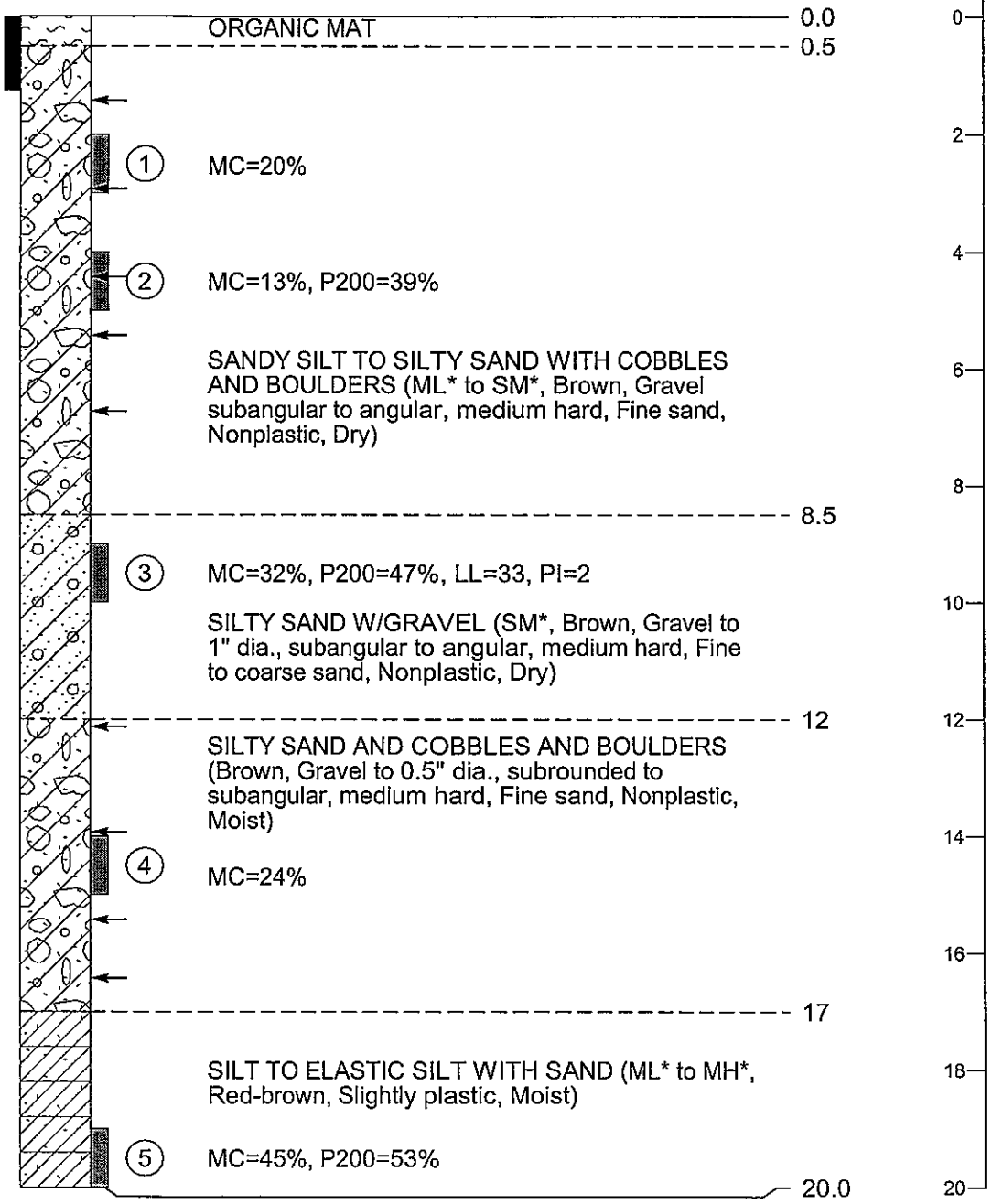
NEWTOK AIRPORT RELOCATION
MERTARVIK, ALASKA
HILL 460
TH08-30

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	C-06

TH08-31

60.80092 °N
164.55863 °W
11/1/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed

Z:\PROJECT\1429.03\LOGS\MERTARVIK QUARRY.GPJ

MASTER.ONE COL/PAGE MERTARVIK QUARRY.GPJ MASTER2.GDT 4/1/09

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

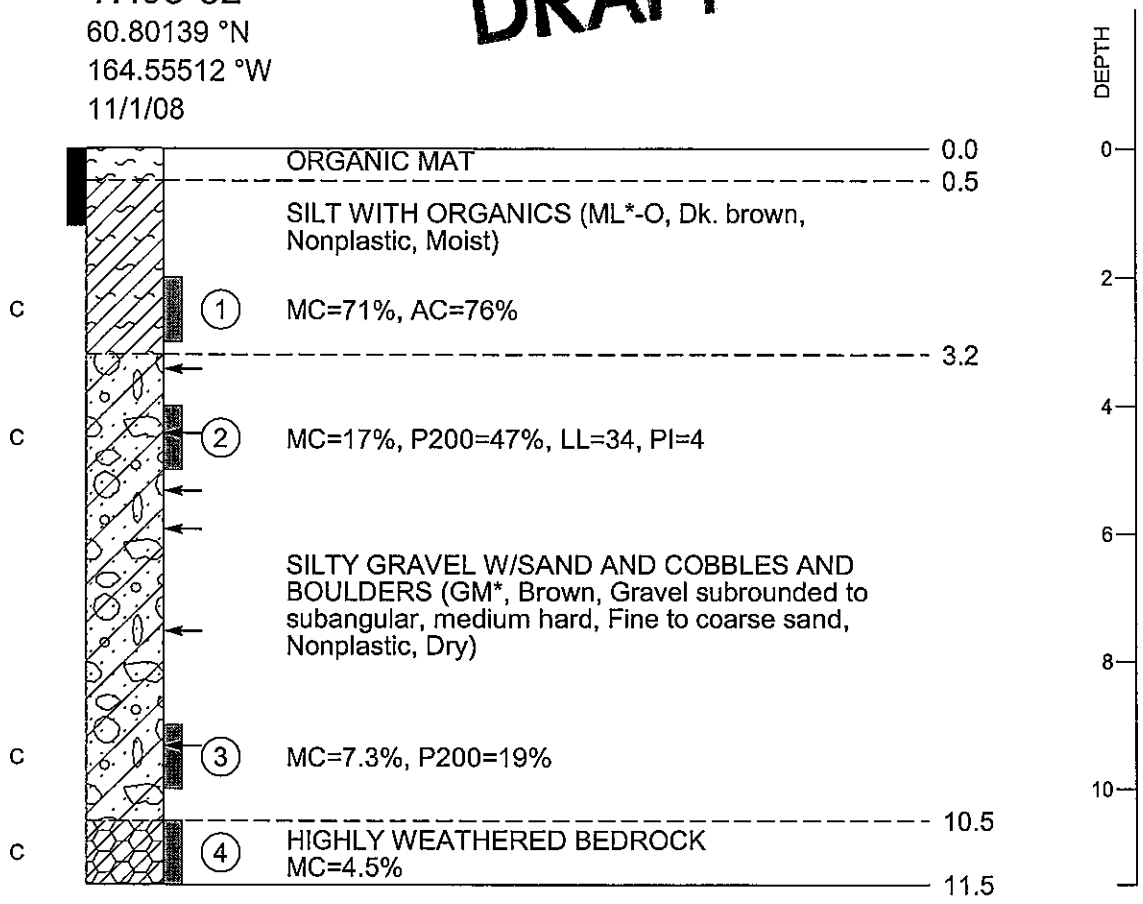
NEWTOK AIRPORT RELOCATION
MERTARVIK, ALASKA
HILL 460
TH08-31

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	C-07

TH08-32

60.80139 °N
164.55512 °W
11/1/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed
Auger refusal at 11.5 ft.

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

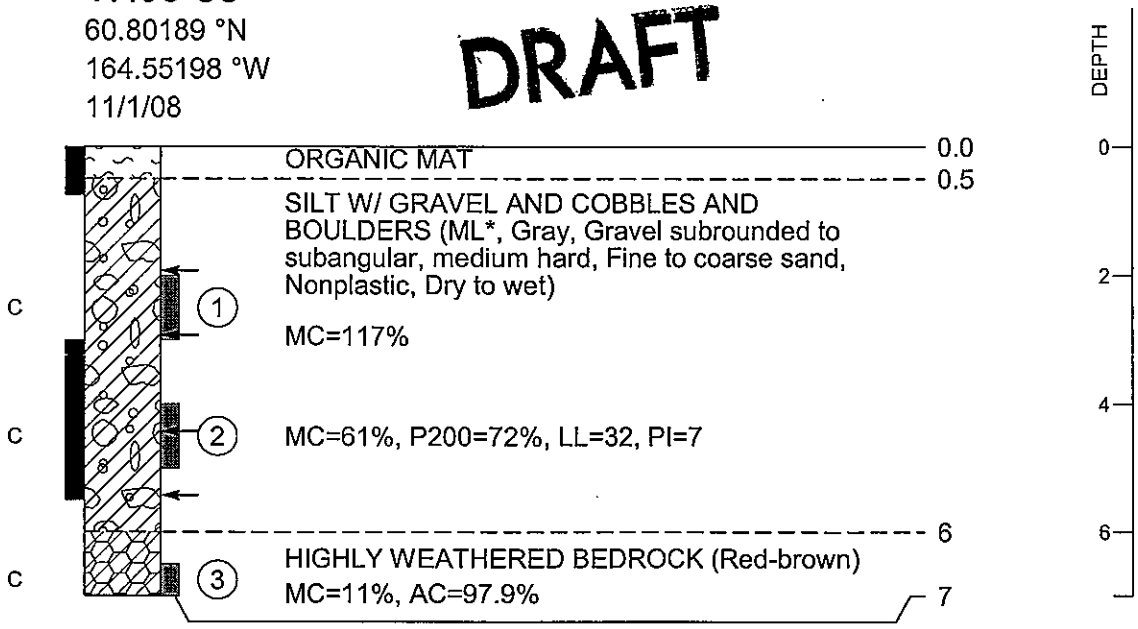
NEWTOK AIRPORT RELOCATION
MERTARVIK, ALASKA
HILL 460
TH08-32

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	C-08

TH08-33

60.80189 °N
164.55198 °W
11/1/08

DRAFT



* Estimated group symbol (ASTM D 2488)
No groundwater observed
Auger refusal at 7 ft.

Z:\PROJECT\1429.03\LOGS\MERTARVIK QUARRY.GPJ

MASTER ONE COL/PAGE MERTARVIK QUARRY.GPJ MASTER2.GDT 4/1/09

DWN:	A.T.B.
CKD:	R.L.S.
DATE:	NOV. 08
SCALE:	1"=3'

PREPARED BY: R&M CONSULTANTS, INC.

NEWTOK AIRPORT RELOCATION
MERTARVIK, ALASKA
HILL 460
TH08-33

FB:	NA
GRID:	BAIRD INL.
PROJ.NO:	1429.03
DWG.NO:	C-09

SUMMARY OF LABORATORY SOIL TEST RESULTS
Geotechnical Reconnaissance Investigation
Mertarvik Airport Location Study - Phase 3

Hill 460

SAMPLE IDENTIFICATION			PARTICLE SIZE ANALYSIS, % Finer (by mass)					ATTERBERG LIMITS			Moisture Content	Ash Content	USC
			Standard U.S. Sieve			Hydrometer (mm)		Wet Prep (Dry Prep)					
Test Hole	No.	Depth, ft	#10	#40	#200	0.02	0.005	LL	PL	PI	%	%	
TH08-26	1	2 - 3								✓	58	91.5	ML*-O
	2	4 - 5			68						36		
	3	9 - 10									64		
	4	14 - 15									14		
TH08-27	1	2 - 3									38	88.9	ML*-O
	2	4 - 5			49			28	24	4	25		GM*
	3	9 - 10									7.9		
TH08-29	1	2 - 3			32						56	79.7	ML*-O
	2	4 - 5									24		
	3	8.5 - 9.5			30			nv	nv	np	6.6		SM*
TH08-30	1	2 - 3			73						25		
	2	4 - 5									34		
	3	9 - 10			88			31	20	11	38		CL*
	4	14 - 15									50		
	5	19 - 20			70						60	91.8	
TH08-31	1	2 - 3									20		
	2	4 - 5			39						13		
	3	9 - 10			47			33	31	2	32		SM*/ML*
	4	14 - 15									24		
	5	19 - 20			53						45		
TH08-32	1	2 - 3									71	75.8	
	2	4 - 5			47			34	30	4	17		
	3	9 - 10			19						7.3		
	4	10.5 - 11.5									4.5		
TH08-33	1	2 - 3									117		
	2	4 - 5			72			32	25	7	61		
	3	6.5 - 7									11	97.9	

* Estimated soil group following ASTM D 2487, ASTM D 2488, and Drawing A-29 (for soil with organic matter)

SUMMARY OF LABORATORY ROCK QUALITY TEST RESULTS

TEST	ROCK HAND SAMPLE (HS)			
	HS-1	HS-2	HS-3	HS-4
Degradation Value (*Reading*)	54 (*3.6*)	67 (*2.3*)	38 (*5.6*)	17 (*9.7*)
LA Abrasion, % Loss (*Grading*)	33 (*B*)	29 (*B*)	26 (*B*)	15 (*B*)
Sodium Sulfate, % Loss - Coarse Particles	1	1	1	4
Specific Gravity Bulk Apparent (*Absorption, %*)	 2.766 2.935 (*2.084*)	 2.786 2.924 (*1.696*)	 2.822 2.997 (*2.058*)	 2.759 2.938 (*2.208*)

APPENDIX D

GENERAL DRAWINGS

General Notes D-01
Explanation of Selected Symbols D-02
Explanation of Ice Symbols D-03
ASTM D 2487 - Classification of Soils for Engineering Purposes D-04

SOILS
CONSISTENCY AND SYMBOLS

SOIL DENSITY/CONSISTENCY - CRITERIA: Soil density/consistency as defined below and determined by normal field 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.

GRANULAR/NON-COHESIVE

Consistency	N * (blows/ft.) Manual 140 lb. hammer	N** (blows/ft.) Automatic 340 lb. hammer
Very Loose	0 - 4	0 - 2
Loose	5 - 10	3 - 4
Medium Dense	11 - 30	5 - 14
Dense	31 - 50	14 - 23
Very Dense	>50	>23

CLAYEY/COHESIVE

Consistency	N * (blows/ft.) Manual 140 lb. hammer	N ** (blows/ft.) Automatic 340 lb. hammer
Very Soft	<2	0
Soft	2 - 4	1 - 2
Medium	5 - 8	3 - 4
Stiff	9 - 15	5 - 6
Very Stiff	16 - 30	7 - 13
Hard	>30	>13

* Standard Penetration "N": Blows per 6 inches of a 140-pound manual hammer (lifted with rope & cathead) falling 30 inches on a 2 in O.D. split-spoon sampler except where noted.

From State of Alaska Department of Transportation and Public Facilities "Alaska Geotechnical Exploration Procedures Manual" dated October 1, 2003.

** Equivalent "N": Blows per 6 inches of a 340 lb automatic hammer (CME) falling 30 inches on a 3 in O.D. split-spoon sampler.

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 #200 Screen
P.02 - % Passing 0.02 mm
SG - Specific Gravity
TV - Torvane

DWN:	P.K.H.
CKD:	C.H.R.
DATE:	GENERAL
SCALE:	NONE

PREPARED BY: R&M CONSULTANTS, INC.

GENERAL NOTES

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

Z:\EARTHSCI\GINT FORMS\B01&B02.GDW (DRAWING I - 8-01 ENGLISH 2-HAMMER (DOT&PF-AIA)) 4/3/09 11:04 AM

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

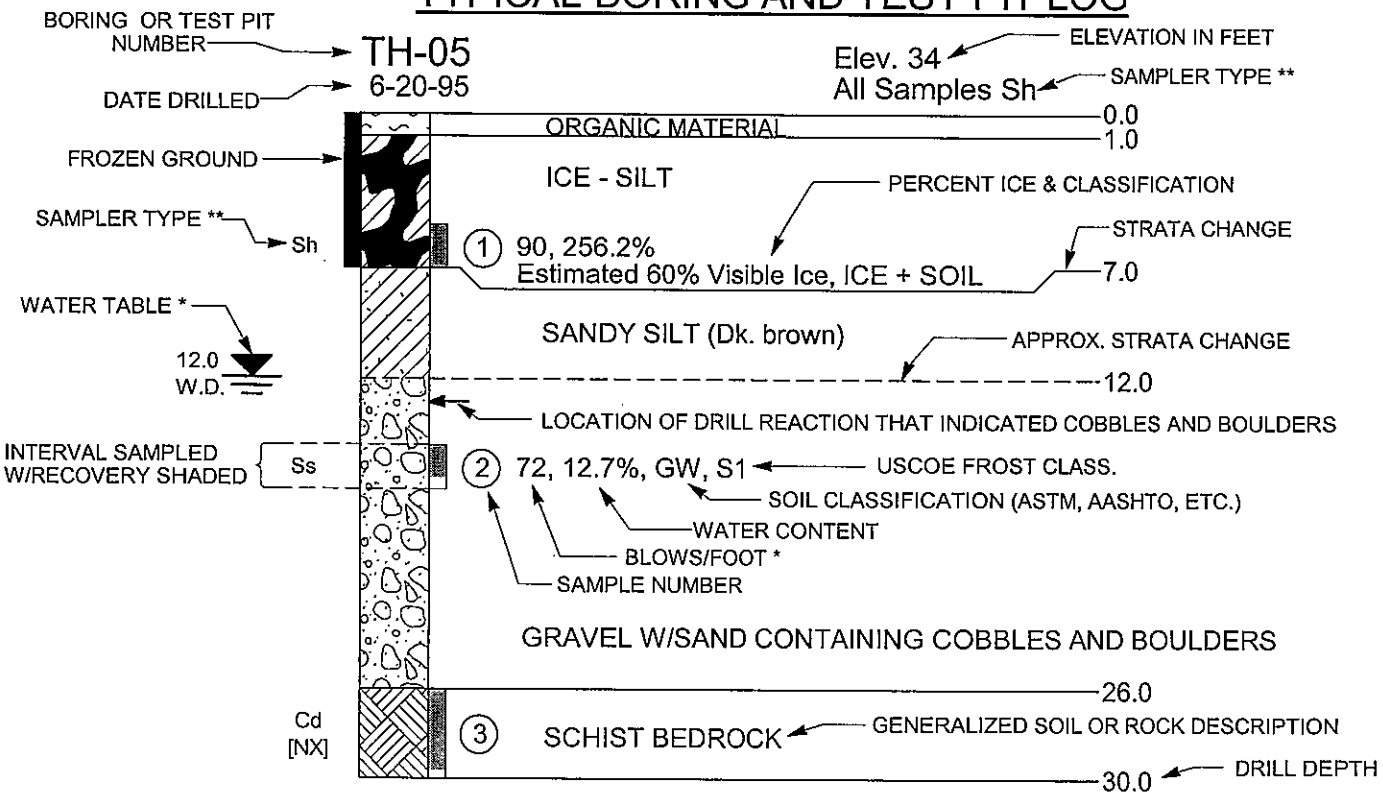
(The symbols shown above are frequently used in combinations, e. g. GRAVEL W/SILT AND SAND)

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	Auger 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.

Z:\EARTHSCI\GINT FORMS\B01&B02.GDW (DRAWING W - B-02 DOT ASTM (ENG)) 4/3/09 11:05 AM

DWN:	P.K.H.
CKD:	C.H.R.
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:	D-02

EXPLANATION OF ICE SYMBOLS

The ice description system follows the Standard Practice for Description of Frozen Soils (Visual-Manual Procedure), ASTM D 4083. In this system, which is an extension of the Unified Soil Classification System, the amount and physical characteristics of the soil ice are accounted for. The following table is a summary of the salient points of the classification system:

ICE DESCRIPTIONS

GROUP SYMBOL	ICE VISIBILITY & CONTENT	SUBGROUP	
		DESCRIPTION	SYMBOL
N	Ice not visible to the unaided eye	Poorly Bonded or Friable	Nf
		Well bonded — No excess ice	Nb — Nbn
		Well bonded — Excess Ice	Nb — Nbe
V	Significant segregated ice is visible to the unaided eye, but individual ice masses or layers are less than 1 inch thick	Individual ice crystals or inclusions	V x
		Ice coatings on particles	V c
		Random or irregularly oriented ice formations	V r
		Stratified or distinctly oriented ice formations	V s
		Uniformly distributed ice	V u
ICE	Strata are greater than 1 inch thick *	Ice with soil inclusions	ICE + SOIL TYPE
		Ice without soil inclusions	ICE

* In some special cases where the soil is ice poor a thin layer may be called out by special notation on the log, i.e. 2 inch ice lense at 6 feet.

Z:\EARTHSCI\GINT FORMS\ICE.GDW (DRAWING ICE SYMBOLS DOT) 4/3/09 11:05 AM

DWN:	P.K.H.
CKD:	C.H.R.
DATE:	GENERAL
SCALE:	NONE

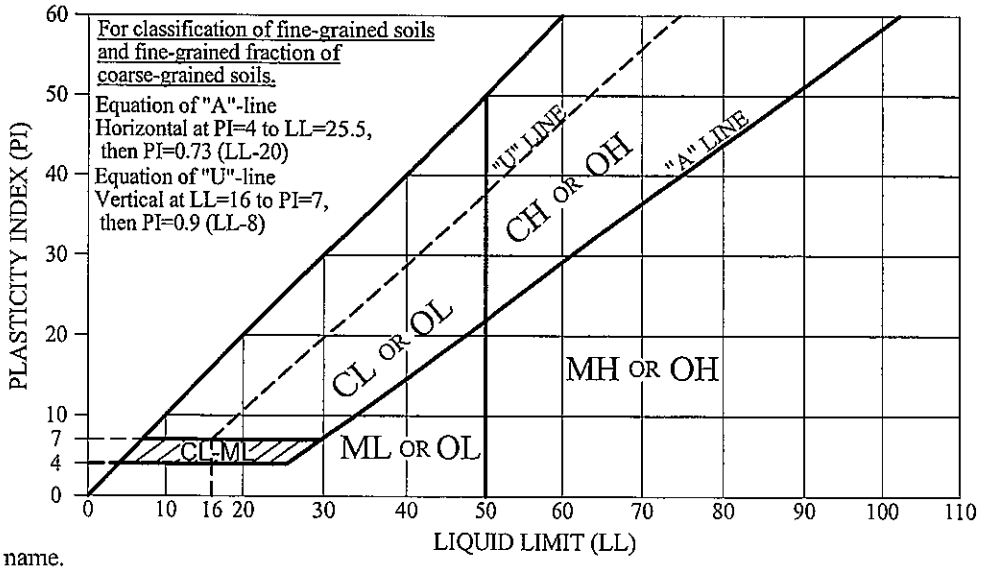
PREPARED BY: R&M CONSULTANTS, INC.

EXPLANATION OF ICE SYMBOLS

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

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.



Z:\EARTHSCI\GINT FORMS\ASTM.GDW (DRAWING ASTM CLASS DOT BORDER) 4/3/09 11:06 AM

DWN:	P.K.H.
CKD:	C.H.R.
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:	D-04

Material Site –
Preliminary Concepts for Development

Proposed Approach:

Walk equipment up the hill using geo panels or geomats to get past wet/soft areas or tundra covered boulders to prevent breaking through.
Use geomats and other plastic geogrid trail materials for ATV access to the site for fuel and equipment supply.
Develop the rock quarry and build the road back down to the camp area (road will be built in phases between 2011 to 2013)
The time to build the access road depends on equipment access, fuel supply logistics, and other logistics.
Protect areas of damaged tundra and excavated surfaces from erosion per the SWPP Plan.
Devlop the rock quarry in such a way to provide a 30-40 ft rock face for excavation (1/2:1 back slopes). Determine the use of the rock quarry based on performance from shots. Observe the size of materials manufactured from "suitable" shots and fracture spacing in quarry.

Estimate of Material Quantities at "Bedrock Extraction Area" and "Overburden Soil Storage Area"

Bedrock Extraction Area

About 15.2 Acres or about 662,112 ft^2

735,680 Cubic yards of material possible (banked yards) (using a 30 ft excavation depth)

This is the maximum possible quantity, the entire area will not need to be excavated for the access road fill.

Area for Excavated Stockpile Storage

About 22.2 Acres

Will be filled as needed to operate the quarry site. Fill will consist of overburden and shot rock.

Entire area may or may not be used/filled in the initial quarry development by the US Air Guard.

Lower US Air Guard Access Road:

About 12.4 acres

Equals about 1.5 miles or 7,920 feet.

If 20 ft wide at top shoulder and 4:1 slopes it will be 68 ft wide at base. This will total an area of about 538,560 ft^2 of road.

If 20 ft wide at top shoulder and 2:1 slopes it will be 44 ft wide at base.

An estimated 70,000 cubic yards of material is required to build the road to a 6 ft high embankment.

Much less fill may be used if the US Air Guard only builds a 20 ft road with only 2-3 ft of fill. The above estimated fill amount is if the development of the quarry goes well and there is sufficient amount of material available and time to place it.

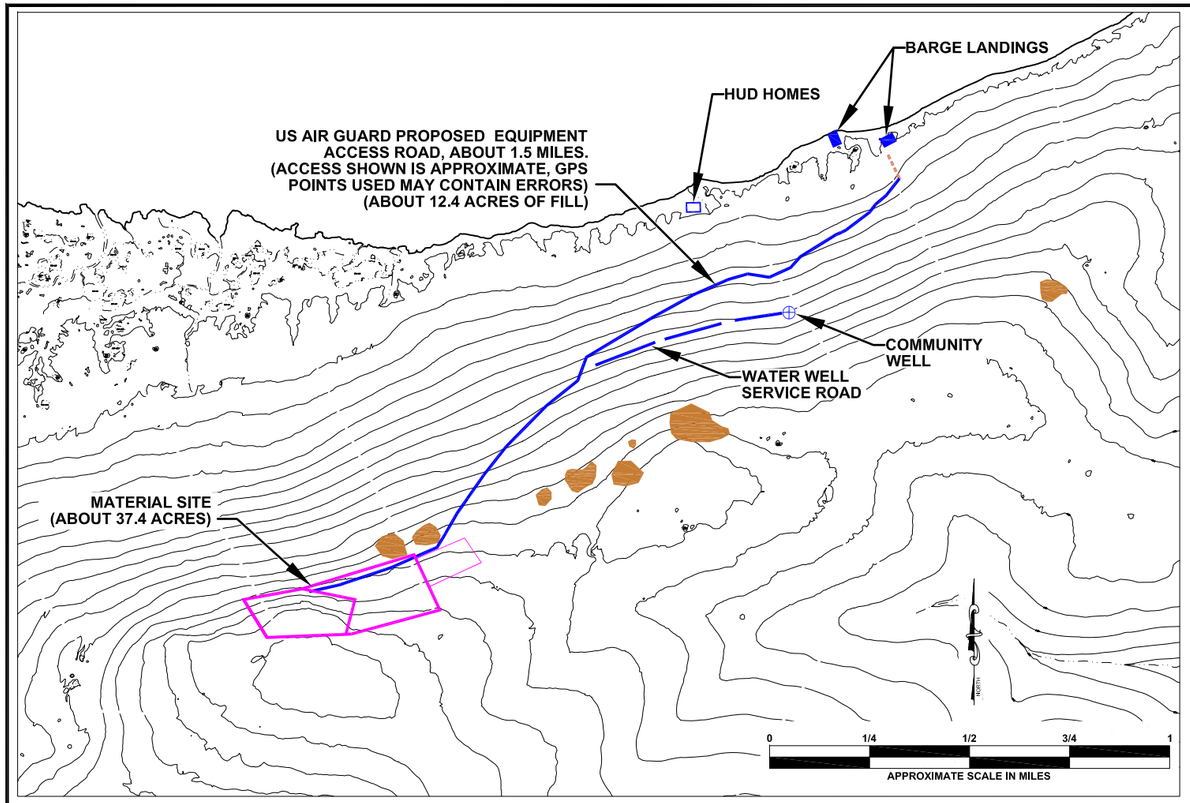
Material Site Staging Area:

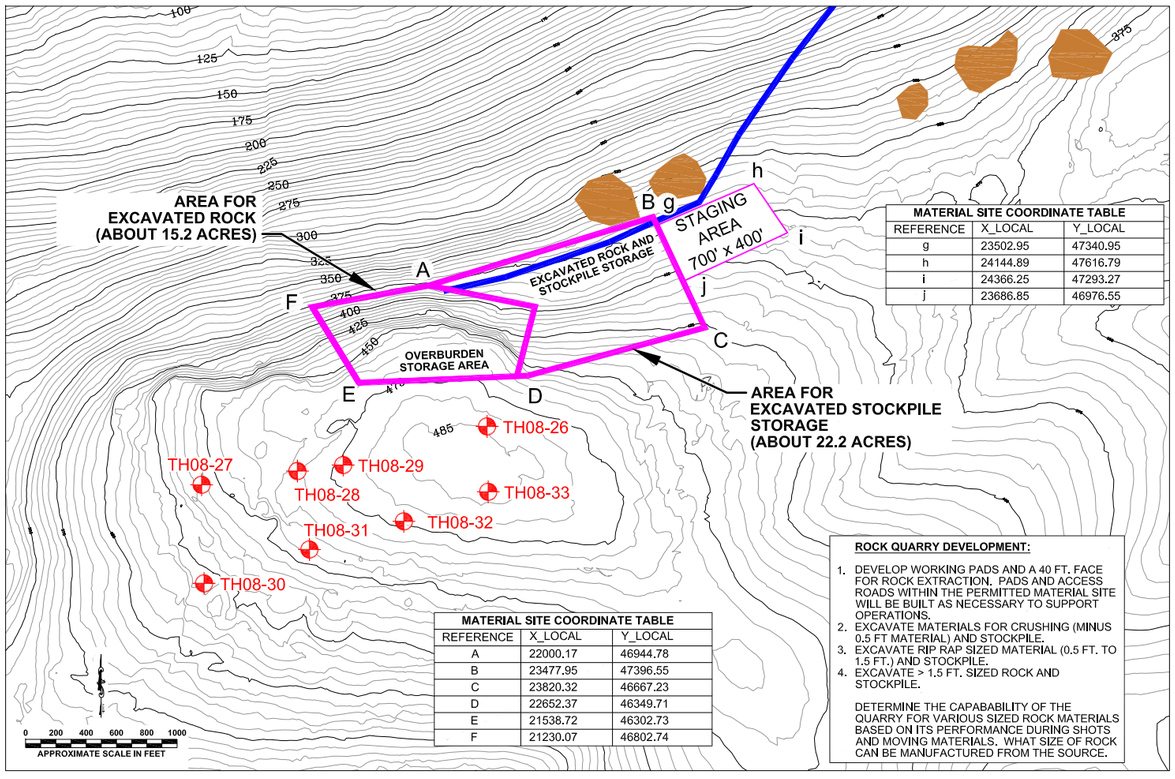
About 6.4 acres

A 400 x 700 ft pad that is 4 ft thick (about 280,000 ft2)

Constructed as needed.

It will take an estimated 42,000 cubic yards of material to build the pad.





MATERIAL SITE COORDINATE TABLE		
REFERENCE	X_LOCAL	Y_LOCAL
g	23502.95	47340.95
h	24144.89	47616.79
i	24366.25	47293.27
j	23686.85	46976.55

MATERIAL SITE COORDINATE TABLE		
REFERENCE	X_LOCAL	Y_LOCAL
A	22000.17	46944.78
B	23477.95	47396.55
C	23820.32	46667.23
D	22652.37	46349.71
E	21538.72	46302.73
F	21230.07	46802.74

ROCK QUARRY DEVELOPMENT:

1. DEVELOP WORKING PADS AND A 40 FT. FACE FOR ROCK EXTRACTION. PADS AND ACCESS ROADS WITHIN THE PERMITTED MATERIAL SITE WILL BE BUILT AS NECESSARY TO SUPPORT OPERATIONS.
2. EXCAVATE MATERIALS FOR CRUSHING (MINUS 0.5 FT MATERIAL) AND STOCKPILE.
3. EXCAVATE RIP RAP SIZED MATERIAL (0.5 FT. TO 1.5 FT.) AND STOCKPILE.
4. EXCAVATE > 1.5 FT. SIZED ROCK AND STOCKPILE.

DETERMINE THE CAPABABILITY OF THE QUARRY FOR VARIOUS SIZED ROCK MATERIALS BASED ON ITS PERFORMANCE DURING SHOTS AND MOVING MATERIALS. WHAT SIZE OF ROCK CAN BE MANUFACTURED FROM THE SOURCE.

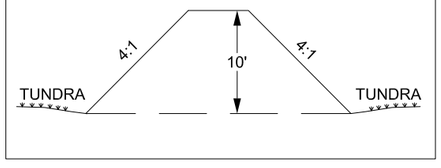
NOTE:

1. STAKE ROAD ALIGNMENT AND MATERIAL SITE BOUNDARIES PRIOR TO MOVING EQUIPMENT UP THE HILL OR PERFORMING STRIPPING OF OVERBURDEN AT THE MATERIAL SITE.
2. NO EXCAVATED MATERIALS SHALL BE PLACED OUTSIDE THE MATERIAL SITE BOUNDARIES.
3. EXCAVATED SLOPES IN ROCK SHALL BE 0.5 FT. (HORZ.), 1 FT. (VERT.).
4. OVERBURDEN SOILS SHALL BE PLACED INTO STOCKPILES NO MORE THAN 10 FT. IN HEIGHT. SLOPES SHALL BE 4 FT. (HORZ.), 1 FT. (VERT.). DURING INITIAL QUARRY DEVELOPMENT THE OVERBURDEN SOILS MAY ALSO BE USED TO BUILD WORKING PADS WITHIN THE MATERIAL SITE.
5. REFER TO TEST HOLE LOGS FOR SOIL TYPES AND ANALYTICAL RESULTS.
6. STAGING PAD SHALL BE MINIMUM 4 FT. IN HEIGHT WITH 4:1 SIDE SLOPES.
7. CONTROL SURFACE WATER RUN-OFF AND/OR RESEED AS INDICATED IN THE SWPP PLAN.
8. ACCESS ROAD SHALL BE 6 FT. OF FILL. USE STABILIZATION FABRIC PRIOR TO PLACING FILL. THE ROAD WILL BE CONSTRUCTED IN STAGES (BUILT UP TO 6 FT. OF FILL)

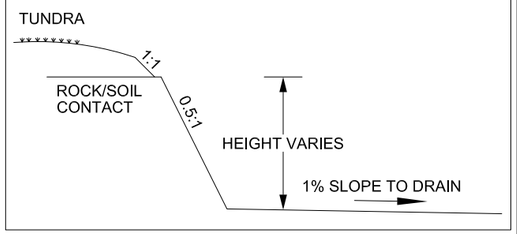
   A. INSTALL 24 INCH CULVERTS WHERE NECESSARY.
9. USE 2:1 SLOPES FOR THE EXCAVATED ROCK (SHOT ROCK) EMBANKMENT.
10. IF RE-SEEDING IS NECESSARY FOR THE SHOT ROCK EMBANKMENT USE 4:1 SLOPES IF OVERBURDEN SOILS ARE USED PRIOR TO SEEDING.

    A. FABRIC UNDER THIS AREA IS NOT NECESSARY.

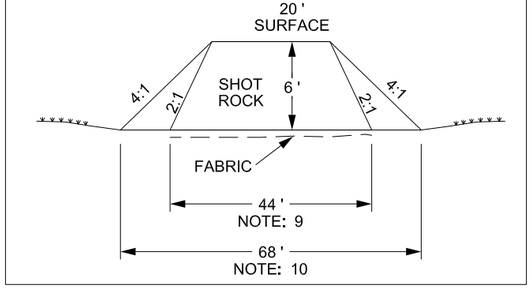
TYPICAL SECTION FOR OVERBURDEN STORAGE



TYPICAL SECTION FOR ROCK EXCAVATION



TYPICAL CROSS SECTION OF ACCESS ROAD



N:\Central\ARPT\Mertarvik Barge Facility, 50850\Data\ACAD\DRD_80573\80573_Mertarvik Mining Plan 12-28-10.dwg

PLOT STYLE: half-english.ctb

ADDENDUM NUMBER

ATTACHMENT NUMBER

RECORD OF REVISIONS

No.	DATE	DESCRIPTION

LEGEND

TEST HOLE

BOULDER FIELDS

WORK TO BE PERFORMED BY: USAF ANG 201 & 202 RHS

TIME PERIOD: SUMMER 2011 TO 2013

DESIGNED BY: CRAIG BOECKMAN, AKDOT&PF CENTRAL REGION MATERIALS craig.boeckman@alaska.gov

DRAWN BY: D.R. DODGE david.dodge@alaska.gov

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
CENTRAL REGION MATERIALS

MERTARVIK RELOCATION PROJECT

MERTARVIK MINING PLAN DEC. 28, 2010

PROJECT DESIGNATION
XXXXX

STATE	YEAR
ALASKA	2010
SHEET NUMBER	TOTAL SHEETS
1	1

APPENDIX E

ENVIRONMENTAL ANALYSIS

Scoping Letter

Agency Responses

Scoping Letter

STATE OF ALASKA

DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

CENTRAL REGION DESIGN AND CONSTRUCTION
PRELIMINARY DESIGN AND ENVIRONMENTAL SECTION

SEAN PARNELL, GOVERNOR

4111 AVIATION AVENUE
P.O. BOX 196900
ANCHORAGE, ALASKA 99519-6900

PHONE: (907) 269-0542
FAX: (907) 243-6927

Date: April 22, 2011
Project: Newtok Airport Relocation
Project No.:52240

Dear Agency Staff Member:

The Alaska Department of Transportation and Public Facilities (DOT&PF), in cooperation with the lead federal agency, the Federal Aviation Administration (FAA), is soliciting comments and information on a proposed project that would relocate the Newtok Airport to a new location on Nelson Island called Mertarvik.

The relocation area is on the north end of Nelson Island, approximately nine miles southeast of the current Newtok community site. The airport site alternatives are located within the U.S. Geological Survey (USGS) Baird Inlet (D-7) quadrangle, Seward Meridian, in Sections 2, 3, 10, 11, 12, 13 T8N, R87W (Figures 1 & 2).

Purpose and Need

The community of Newtok is on the west coast of Alaska in the broad, low-lying delta between the Yukon and Kuskokwim Rivers (Figure 1). The meandering rivers of the region have eroded their banks, cut new channels, and abandoned old channels since their origin. The Ninglick River is eroding toward Newtok at an average rate of 72 feet per year. By 2005, the barge and landfill areas had eroded away. Erosion is projected to impact the village structures by 2015 and the airport by 2022. Severe erosion and continuous seasonal sea surges threaten the health and welfare of the community. Years of erosion studies have concluded that Newtok must relocate, as there is no permanent and cost effective alternative for remaining at the current village site[1]. The community has selected a site called Mertarvik, nine miles southeast, on the north end of Nelson Island. Multiple state and federal agencies have been participating for many years in efforts to relocate the community. Early relocation planning includes the following:

- 1994, Newtok Traditional Council (NTC) initiated the relocation planning process
- 1996, The Newtok Native Corporation (NNC) passed a resolution authorizing the negotiation of land exchange within the Yukon Delta National Wildlife Refuge with the U.S. Fish and Wildlife Service
- 2000, NTC hired Arctic Slope Consulting Group to assist in development plans through funding by the Bureau of Indian Affairs (BIA) and the United States Army Corp of Engineers (USACE)
- 2003, Land exchange between the NNC and the USFWS for 10,943 acres for the relocation site on Nelson Island was complete (Public Law 108-129)

[1] http://www.commerce.state.ak.us/dca/planning/npg/Newtok_Planning_Group.htm, accessed 1/9/11

Since these early efforts, construction has been initiated with the help of the United States Army Innovative Readiness Training (USA IRT). Existing infrastructure in Mertarvik now consists of the following:

- Barge landing completed in 2009
- Staging area near the barge landing
- Beginning of an access road to the new village location
- Three houses provided by the Bureau of Indian Affairs (BIA) Housing Improvement Program (HIP) were delivered in 2006 and built in 2009

Additional development planned for construction in 2011 includes:

- From one to three new homes depending on funding
- Initial groundwork on the Mertarvik Evacuation Center

The purpose of the proposed project is to provide airport facilities for the new village of Mertarvik, on Nelson Island. An airport facility is essential transportation infrastructure for the residents of Mertarvik, because the village will not have a road system connecting to other communities. Residents will therefore rely heavily upon air transportation for travel, medevac services, and cargo transport, as air travel is the only year-round means of transportation.

Proposed Action

At this time DOT&PF is conducting planning level engineering and environmental work to support site selection and to prepare planning documents that may eventually be used to initiate the NEPA process, and to maintain discussions for additional funding.

Depending on which airport site is selected, estimated ground disturbance would be approximately 80 to 90 acres. The areas around the proposed airport sites are currently undeveloped, and the only development activity has been site surveys and testing for water and other resources.

Two runways (main and crosswind) would be needed at any of the airport site alternatives under consideration. The crosswind runway is necessary to obtain required wind coverage. The ultimate dimensions of the runways are planned to be 75' x 4,000', with runway safety areas of 150' x 4,600'. The taxiway width would be 50 feet with a taxiway safety area width of 118 feet. The apron, including the aviation support area, would be 350' x 400'. The facility would also include equipment storage buildings, airport lighting, and navigational aids. An access road from the proposed community to the airport facilities would also be constructed. As the project develops, a single runway with a wider operational area will be considered to address the crosswind requirements.

A material site would be required to construct the airports. The proposed material site is located approximately 1.5 miles southwest of Mertarvik. The overall material site area has been identified to be approximately 245 acres. Usable material required ranges from 400,000 to 1.1 million cubic yards. A 10-foot-thick layer of overburden soil will need to be extracted to reach the usable bedrock. A portion of this overburden soil is anticipated to be used in the lower layers of the airport embankments. The material site will be broken down as follows (Figure 2):

- Area for bedrock excavation and overburden soil storage (approximately 15 acres)
    - Overburden storage area (approximately 5 acres within the 15 acre storage area)
- Excavated rock and stockpile storage (approximately 22 acres)
- Staging area (approximately 6 acres)

Additional background information regarding the community and overall relocation efforts can be found on the Newtok Planning Group website:

http://www.commerce.state.ak.us/dcra/planning/npg/Newtok_Planning_Group.htm

Preliminary Environmental Research

This is an introductory letter that will be used to complete a preliminary environmental analysis to support site selection. We have conducted preliminary research using the most current available data to identify environmental resources within the proposed project vicinity. This information is contained in Appendix A. Additional project information can be found on our project website: http://pdcprojects.info/newtok/index.html . Also below are links to agency-specific questions for each federal, state, and local agency from which DOT&PF is requesting comments and information. To ensure that all factors are considered in the airport site selection process, please provide your written comments, recommendations, and any additional requested information to our office no later than **May 22, 2011**.

ADEC ADF&G ADNR-DCOM ADNR-DPOR

ADNR-RAD ADNR-SHPO ADNR-SRO FAA Air Carriers

BLM City-Village-Borough Native Entities USACE

USCG EPA USFWS NMFS NPS

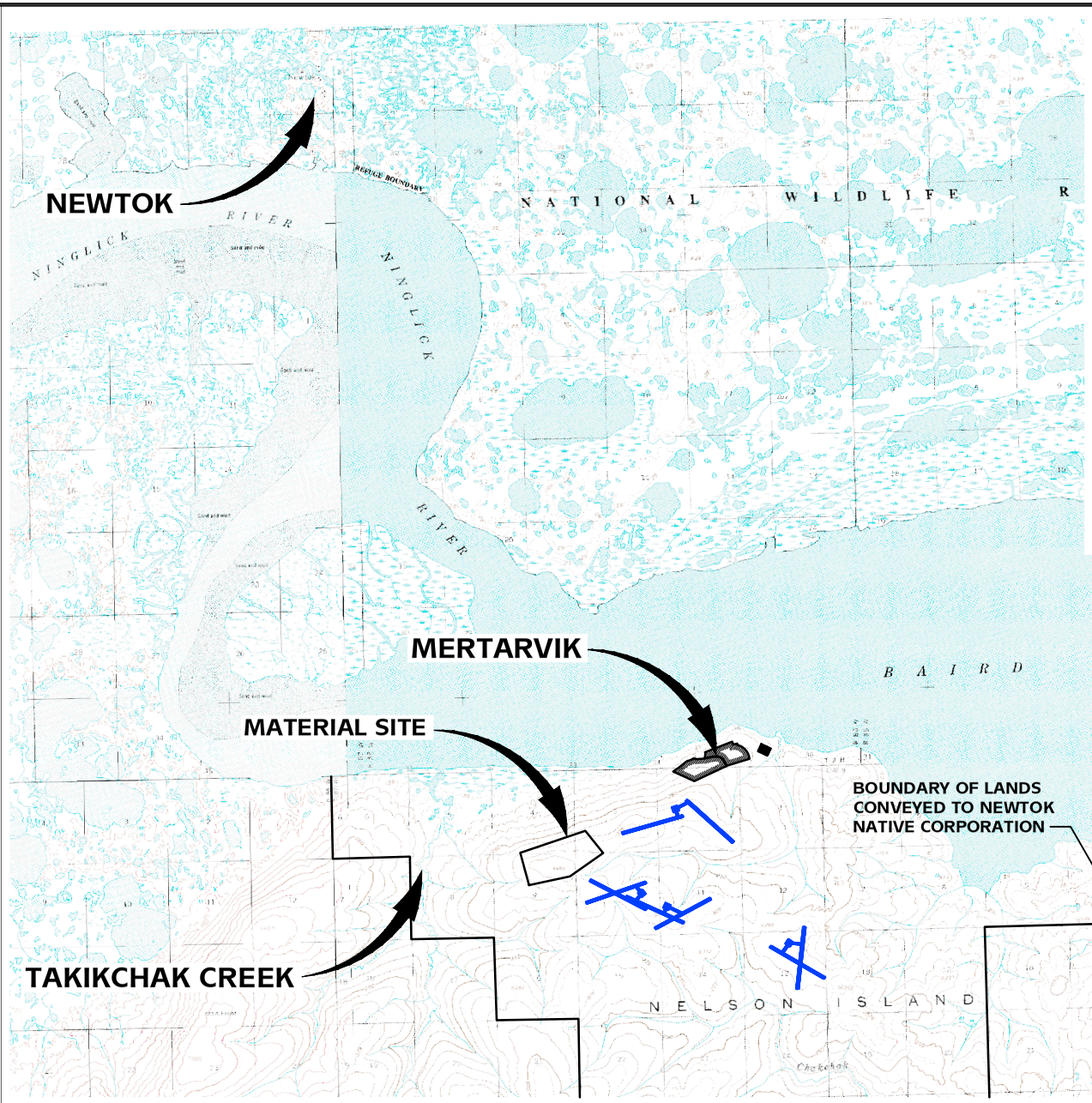
If you have any questions on the environmental effects, please contact Teresa Zimmerman, Environmental Impact Analyst, DOT&PF, at (907) 269-0551 or by email at teresa.zimmerman@alaska.gov. Questions concerning the planning aspects of the proposed project can be directed to Donald Fancher, Project Manager, DOT&PF, at (907) 269-0516 or by email at donald.fancher@alaska.gov. An alternative contact for planning/engineering questions is Royce Conlon, P.E., Principal, PDC Inc. Engineers, at (907) 452-1414 or by email at royceconlon@pdceng.us.

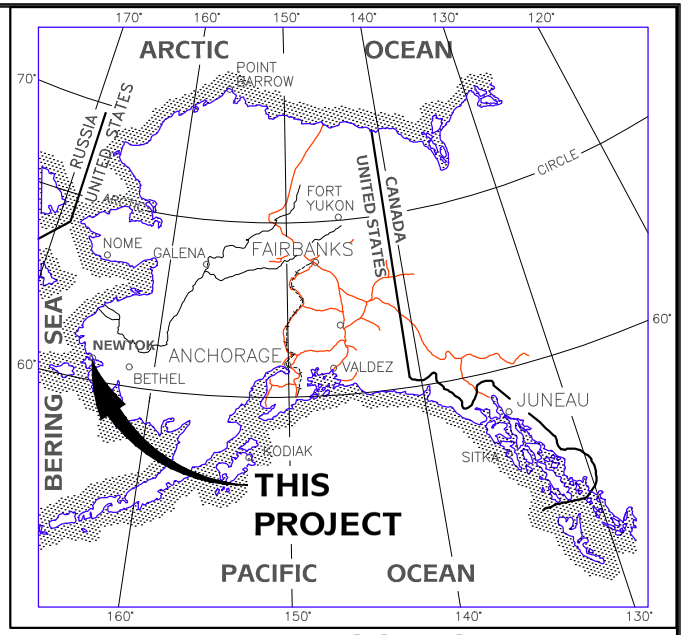
Sincerely,

Jennifer Witt, AICP
Central Region Planning Chief

Enclosures: Appendix A
Figure 1 Vicinity Map
Figure 2 Plan View Map

P:\2005\F05024\C\C1001ALTSF05024O2: LOCATION & VICINITY MAP 2/25/2011 10:54 AM





LOCATION MAP

POTENTIAL MAIN AND CROSSWIND RUNWAY LOCATIONS

SEC 32,33,34,35,36, T9N, R86W;
SEC 31, T9N, R85W;
SEC 4, 3, 2, 1, T8N, R87W;
SEC 10, 11, 12, T8N, R87W;
SEC 5, 6, 7, 8, 9, 10, 17, 18
T8N, R86W,
SEWARD MERIDIAN

5280 2640 0 5280 10560 13200
SCALE IN FEET

1

PROJ. No. F05024.02
JAN. 2011

DESIGN: TDM
DRAWN: TDM, RJP
CHECK: RLC

LOCATION AND VICINITY MAP
NEWTOK AIRPORT SITE RECONNAISSANCE STUDY

MERTARVIK, ALASKA

PLANS DEVELOPED BY:
PDC, INC.

NOTES:

1. THESE ALTERNATIVES ARE PRELIMINARY IN TERMS OF FACILITY LAYOUT & EXACT LOCATION. BASED ON TOPOGRAPHY, GEOTECHNICAL, WIND AND ENVIRONMENTAL CONSIDERATIONS, THE LOCATION OF THE VARIOUS FACILITIES (RUNWAY, APRON, ACCESS ROAD, ETC.) WILL BE REFINED.

2. MERTARVIK COMMUNITY FACILITIES, PLANNED ROAD, AND MATERIAL SITE BOUNDARIES BASED ON 12/2010 PLANNING DOCUMENTS.

N

1000 500 0 1000 2000 3000
SCALE IN FEET

INCINERATOR
RECYCLING CENTER
LANDFILL
SEWAGE LAGOON
EXISTING ROAD (2010 CONSTRUCTION)
SCHOOL
EVAC CENTER
PP & TANK FARM
COMMUNITY PLANNED ROAD
MERTARVIK
5423' (REF)
STAGING AREA (700' x 400') (ABOUT 6 ACRES)
MERTARVIK SPRING
MATERIAL SITE (ABOUT 245 ACRES)
5000' SETBACK (TYP)
AREA FOR EXCAVATED ROCK (ABOUT 15 ACRES)
1
1A
AIRPORT ACCESS ROAD
AIRPORT ACCESS ROAD
TAKIKCHAK CREEK
OVERBURDEN STORAGE AREA
4
4A
4C
4B
AREA FOR EXCAVATED STOCKPILE STORAGE (ABOUT 22 ACRES)
3A
3

POTENTIAL MAIN AND CROSSWIND RUNWAY LOCATIONS

P:\2009\F05024\C\C1001ALTSF05024O2; PRELIM ALTS 4/22/2011 9:09 AM

CONSULTANT :

PLANS DEVELOPED BY:
PDC, INC.
1028 Aurora Drive, Fairbanks, Alaska 99709-5529

PROJECT :
NEWTOK, AIRPORT
MERTARVIK, ALASKA

SHEET TITLE :
PRELIMINARY ALTERNATIVES

DESIGN	TDM
DRAWN	TDM, RJF
CHECKED	RLC
DATE	JAN 2011
PROJECT No.	F05024.02
SHEET NUMBER	2
OF	2 SHEETS

APPENDIX A
Preliminary Environmental Research

Historic Properties and Archaeological and Cultural Resources: The U.S. Army Corps of Engineers (USACE) Alaska District and U.S. Fish and Wildlife Service (USFWS) archaeologists surveyed the Mertarvik area in 2002. During this survey several archaeological sites were identified, none of which are expected to be affected by the project. Newtok residents identified several shallow pits located about one mile northeast of the barge landing to be pits where clay was excavated for making pottery (USACE, Environmental Assessment, July 2008).

Wetlands and Other Waters of the U.S.: The USFWS wetlands mapper, reviewed on December 6, 2010, indicated there are wetlands present in the proposed project area. In 2005 the USACE delineated the wetland types around the proposed airport locations, with the exception of location 3. The delineation indicated that wetlands dominate the region, and the proposed airport locations. The wetland types are typical and widespread throughout the higher ground on Nelson Island (USACE Environmental Assessment, July 2008). The wetland types consist of palustrine emergent persistent/scrub-shrub evergreen/moss and palustrine emergent persistent/scrub-shrub broad leaved deciduous wetland. PDC Inc. Engineers also performed a preliminary wetland delineation. Recent site work has found that palustrine emergent wetlands, palustrine scrub-shrub wetlands, and fresh water ponds are located in the areas of the proposed airport locations. The USACE identified one area of high value wetlands located within the Takikchak Creek watershed, approximately 1.5 miles northwest of the possible airport locations (Figure 2).

Anadromous Fish Streams and Essential Fish Habitat: A search of the Alaska Department of Fish and Game (ADF&G) *Atlas to the Catalog of Waters Important to the Spawning, Rearing or Migration of Anadromous Fish* on December 6, 2010, indicated Coho Salmon as the only salmon species in Takikchak Creek, which is approximately 1 mile west of the proposed material site. However, in 2005 USACE biologists found five species of Pacific salmon in Takikchak Creek. Dolly Varden char and stickleback have also been found in Takikchak Creek (USACE Environmental Assessment, July 2008). The Ninglick River and the Baird Inlet, which are located approximately 1.5 miles north of the proposed airport locations, are both listed as anadromous fish streams. An existing barge landing is available on the Ninglick River, and no additional work in the river is anticipated.

Migratory Birds and Eagle Nests: According to the USFWS website, along the Yukon-Kuskokwim Delta the recommended time period for avoiding vegetation clearing on shrub or open (i.e., shrub cover or marsh, pond, tundra, gravel, or other treeless/shrubless ground) habitat is May 5 through July 25. A search of the USFWS bald eagle Nest GIS Mapper on December 13, 2010, indicated there are no bald eagle nests within the proposed project area. Email consultation with the USFWS from the Yukon Delta National Wildlife Refuge was conducted on March 8, 2011 to determine the presence of golden eagles and raptors in the vicinity of the proposed airport locations. The USFWS has not conducted a raptor survey on Nelson Island. They determined that the nearest potential habitat for golden eagles is about 7-8 miles southwest of the project area. If golden eagles are nesting there, it is unlikely that they would be disturbed by the construction of the airport facilities. An Environmental Assessment (EA) provided by the USACE in July 2008 describes the different bird species that can be found throughout the Yukon Delta National Wildlife Refuge, within which Mertarvik is located. The areas surrounding the

potential airport locations are the summer home to geese and also the summer home of freshwater ducks, loons, shorebirds, raptors, passerine birds, and ptarmigan. Wetlands within the vicinity of the proposed airport locations are not particularly suitable for nesting waterfowl and shorebirds (USACE, Environmental Assessment, 2008).

Threatened and Endangered Species: The USFWS and ADF&G websites were both reviewed on December 13, 2010, to determine if any threatened or endangered species or its habitat is located within the vicinity of the proposed airport locations. The species that are listed include Eskimo Curlew (presumed extinct), Spectacled Eider, Steller's Eider, Steller Sea Lion, and several species of whale. According to the USFWS website (March 16, 2011), the project is located in a region that contains critical habitat for Spectacled and Steller's Eiders, however the USACE July 2008 EA stated that neither of these species of eider nested at or near the area. This EA also states that informal consultation with the USFWS and the National Marine Fisheries Service (NMFS) determined that none of the listed species were present at the Mertarvik site at that time.

State Refuges, National Wildlife Refuges, Critical Habitat Areas, and Sanctuaries: A review of the ADF&G listing of State of Alaska Refuges, Critical Habitat Areas, and Sanctuaries on January 12, 2011, indicated the possible Mertarvik airport locations do not contain any State-designated special use areas. The Yukon Delta National Wildlife Refuge encompasses most of Nelson Island with the exception of small private village inholdings. Mertarvik is within one of these village inholdings and is located approximately 1.5 miles from the refuge boundaries.

A review of the Bureau of Land Management (BLM) and the National Park Service (NPS) websites on December 13, 2010, found that no Federal Recreational Areas exist in the proposed project area.

Navigable Waters: A review of the USACE Alaska District's List of Navigable Waters website on December 13, 2010, indicated that there are no navigable waters at the proposed airport locations. There are several small drainages and streams that may be affected by the airport development, but none of them is listed as navigable.

Receiving Waters and Impaired Water Bodies: Takikchak Creek, located approximately 1.5 miles west of the material site, flows into the Ninglick River. Chakchak Creek, located approximately 8 miles south of the airport locations, flows east to the Kolavinarak River. Mertarvik Spring flows near the planned community and barge landing and empties into the Ninglick River. Baird Inlet and the Ninglick River border the proposed project area to the north.

According to the Alaska Department of Environmental Conservation (ADEC) Impaired Water Bodies List (2010), there are no impaired water bodies in the vicinity of the proposed airport locations.

Coastal Zone Management: A review of the Coastal Zone Boundaries atlas on December 13, 2010, found that the project area is within the coastal zone of Alaska and is located within the Cenaliulriit Coastal Resources Service Area.

Contaminated Sites, Spills, and Underground Storage Tanks: The proposed airport location is undeveloped. A search of the (ADEC) contaminated sites and LUST databases on

December 13, 2010, indicated no contaminated releases, spills, or leaking underground storage tanks exist in the vicinity of the proposed airport locations.

Flood Plain and Regulatory Floodway: A review of the Federal Emergency Management Agency (FEMA) online Flood Insurance Rate Maps (FIRM) on December 13, 2010, indicated that the proposed project area is unmapped (UNMAPPED_025064). The proposed airport locations are all well above the flood level and not expected to experience flooding.

State Parks, National Parks, National Forests, and Wild and Scenic Rivers: The NPS website, reviewed on December 13, 2010, indicated there are no National Parks, Preserves, Monuments, or Wild and Scenic Rivers in the proposed project area.

A search of the Alaska Department of Natural Resources (ADNR) Division of Parks and Outdoor Recreation (DPOR) on December 13, 2010, indicated that there are no state parks in the proposed project area.

Air Quality: According to the ADEC website, there are no air quality advisories in effect for the proposed project area. Mertarvik is not located in a non-attainment or maintenance area.

Anticipated Permits and Authorizations:

- APDES Construction General Permit
- USACE 404/10 Permit
- ADEC 401 Permit
- Coastal Project Questionnaire and Local Consistency Review

Newtok Airport Relocation

The Alaska Department of Transportation and Public Facilities (DOT&PF), in cooperation with the lead federal agency, the Federal Aviation Administration (FAA), is soliciting comments and information on a proposed project that would relocate the Newtok Airport to a new location on Nelson Island called Mertarvik.

The purpose of the proposed project is to provide airport facilities for the new village of Mertarvik, on Nelson Island. An airport facility is essential transportation infrastructure for the residents of Mertarvik, because the village will not have a road system connecting to other communities. Residents will therefore rely heavily upon air transportation for travel, medevac services, and cargo transport, as air travel is the only year-round means of transportation.

At this time DOT&PF is conducting planning level engineering and environmental work to support site selection and to prepare planning documents that may eventually be used to initiate the NEPA process, and to maintain discussions for additional funding. ,

Project Information

- Project Homepage
- Agency Scoping Letter
- Agency Scoping Questions
- Submit Comments

Further Information

- Appendix A - Preliminary Environmental Research
- Newtok Planning Group

Jeff Shannon

From: Jeff Shannon
Sent: Thursday, April 28, 2011 2:38 PM
To: 'charter@flyera.com'; 'patrick.thurston@hageland.com'; 'res@flygrant.com'; 'info@aceaircargo.com'; 'yuteair@gci.com'; 'renfrosalaskanadventures@gmail.com'; 'info@pbadventures.com'; 'fred.broerman@alaska.gov'; 'sally.cox@alaska.gov'; 'elizabeth.manfred@alaska.gov'; 'taunnie.boothby@alaska.gov'; 'david.longtin@alaska.gov'; 'greg.magee@alaska.gov'; 'gary.mendivil@alaska.gov'; 'william.ashton@alaska.gov'; 'michael.daigneault@alaska.gov'; 'phillip.perry@alaska.gov'; 'roger.seavoy@alaska.gov'; 'dean.brown@alaska.gov'; 'tom.atkinson@alaska.gov'; 'oha@alaska.net'; 'sylvia.kreel@alaska.gov'; 'wyn.menefee@alaska.gov'; 'dnr.dcompraanc@alaska.gov'; 'oha.revcomp@alaska.gov'; 'craig.boeckman@alaska.gov'; 'rutha.carter@alaska.gov'; 'harvey.douthit@alaska.gov'; 'mike.coffey@alaska.gov'; 'Wolfgang.junge@alaska.gov'; 'robert.lundell@alaska.gov'; 'kim.mahoney@alaska.gov'; 'rich.sewell@alaska.gov'; 'harvey.smith@alaska.gov'; 'joel.staubin@alaska.gov'; 'edie.zukauskas@alaska.gov'; 'dlockard@aidea.org'; 'cmello@aidea.org'; 'senator_lyman_hoffman@legis.state.ak.us'; 'senator_donny_olson@legis.state.ak.us'; 'patricia_walker@legis.state.ak.us'; 'mblack@anthc.org'; 'mbrubaker@anthc.org'; 'nrcharles@gci.net'; 'mhoffman@avcp.org'; 'mark@accphousing.org'; 'myron_naneng@avcp.org'; 'psamson@avcp.org'; 'sstreet@avcp.org'; 'jmcatee@calistacorp.com'; 'calista@calistacorp.com'; 'lisa_c@coastalvillages.org'; 'neil_r@coastalvillages.org'; 'michael_b@coastalvillages.org'; 'cjandrew2003@yahoo.com'; 'stephen_fusilier@blm.gov'; 'sam.kito@alaska.gov'; 'carl_berger@ddc-alaska.org'; 'gary_baldwin@lksd.org'; 'Gary_Hanson@lksd.org'; 'andy.jones@alaska.gov'; 'mark.roberts@alaska.gov'; 'panai_nevak@yahoo.com'; 'ntcamii@yahoo.com'; 'stanley_tom2003@yahoo.com'; 'ilandxc@yahoo.com'; 'lawrence.davis@alaska.gov'; 'mbarker@ruralcap.com'; 'jhall@denali.gov'; 'cstern@ruralcap.com'; 'jgeorge@denali.gov'; 'realnews@deltadiscovery.com'; 'alex@alaskanewspapers.com'; 'chad.hailey@usmc.mil'; 'cathe.a.grosshandler@usps.gov'; 'charles.stoyer@ang.af.mil'; 'andrea.b.elconin@usace.army.mil'; 'Guy.R.McConnell@usace.army.mil'; 'regpagemaster@poa02.usace.army.mil'; 'eugene.virden@bia.gov'; 'mark.kahklen@bia.gov'; 'arthur.high@bia.gov'; 'bcribley@blm.gov'; 'james.n.helfinstine@uscg.mil'; 'gene.kane@ak.usda.gov'; 'amy.holman@noaa.gov'; 'matthew.forney@noaa.gov'; 'greg.stuckey@hud.gov'; 'david_vought@hud.gov'; 'gabriel.mahns@faa.gov'; 'pat.oien@faa.gov'; 'patricia.sullivan@faa.gov'; 'skelly@eda.doc.gov'; 'combes.marcia@epamail.epa.gov'; 'kramer.jackie@epa.gov'; 'fleek.adrienne@epamail.epa.gov'; 'curtis.jennifer@epamail.epa.gov'; 'gene_peltola@fws.gov'; 'patrick_snow@fws.gov'; 'brian_mccaffery@fws.gov'; 'michael_buntjer@fws.gov'; 'ellen_lance@fws.gov'; 'ann_rappoport@fws.gov'; 'jeanne.hanson@noaa.gov'; 'hcd.anchorage@noaa.gov'; 'sue_masica@nps.gov'; 'bob_walsh@murkowski.senate.gov'; 'tiffany_zulkosky@begich.senate.gov'; 'rbronen@yahoo.com'
Cc: 'donald.fancher@alaska.gov'; 'judy.chapman@alaska.gov'; 'teresa.zimmerman@alaska.gov'; Royce Conlon; Patrick Cotter; Mike Storey
Subject: Newtok Airport Relocation
Attachments: Newtok Planning Scoping Letter.pdf; Figure 1 - Location & Vicinity Map.pdf; Figure 2 - Preliminary Alternatives.pdf; Appendix A.pdf

On behalf of the Alaska Department of Transportation and Public Facilities (DOT&PF) - Central Region, PDC Engineers is transmitting the attached electronic Planning/Scoping letter for the proposed Newtok Airport Relocation.

This letter and its attachments can be viewed at http://pdcprojects.info/newtok/index.html where you will also find a link to submit comments electronically.

Please note that all comments are requested by **May 22, 2011**.

If you would prefer to mail in your comments, please address them to:

Donald Fancher
Project Manager
State of Alaska, Department of Transportation and Public Facilities
PO Box 196900
MS-2525
Anchorage, AK 99519-6900

Additional questions or comments can be directed to Mr. Fancher at (907) 269-0516 or by email to donald.fancher@alaska.gov .

Thank you

Jeff Shannon
Environmental Coordinator

PDC Inc. Engineers
Planning Design Construction

1028 Aurora Drive | Fairbanks, Alaska 99709
v 907.452.1414 | f 907.456.2707 | www.pdceng.com

"Transforming Challenges into Solutions"

Jeff Shannon

From: Jeff Shannon
Sent: Friday, April 29, 2011 2:38 PM
To: 'rdudley@fltalaska.net'; 'mark@avcphousing.org'; 'carl_berger@hotmail.com'
Subject: Newtok Airport Relocation
Attachments: Newtok Planning Scoping Letter.pdf; Figure 1 - Location & Vicinity Map.pdf; Figure 2 - Preliminary Alternatives.pdf; Appendix A.pdf

On behalf of the Alaska Department of Transportation and Public Facilities (DOT&PF) - Central Region, PDC Engineers is transmitting the attached electronic Planning/Scoping letter for the proposed Newtok Airport Relocation.

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"Transforming Challenges into Solutions"

Agency Responses

Jeff Shannon

From: stanley tom [stanley_tom2003@yahoo.com]
Sent: Thursday, April 28, 2011 3:35 PM
To: Jeff Shannon
Cc: donald.fancher@alaska.gov; judy.chapman@alaska.gov; teresa.zimmerman@alaska.gov; Royce Conlon; Patrick Cotter; Mike Storey
Subject: Re: Newtok Airport Relocation

Follow Up Flag: Follow up
Flag Status: Flagged

Jeff,
The 3 houses are funded and we'll build them this summer.
Stanley Tom,Tribal administrator

--- On **Thu, 4/28/11, Jeff Shannon <*JeffShannon@PDCENG.US*>** wrote:

From: Jeff Shannon <JeffShannon@PDCENG.US>
Subject: Newtok Airport Relocation
To: "charter@flyera.com" <charter@flyera.com>, "patrick.thurston@hageland.com" <patrick.thurston@hageland.com>, "res@flygrant.com" <res@flygrant.com>, "info@aceaircargo.com" <info@aceaircargo.com>, "yuteair@gci.com" <yuteair@gci.com>, "renfrosalaskanadventures@gmail.com" <renfrosalaskanadventures@gmail.com>, "info@pbadventures.com" <info@pbadventures.com>, "fred.broerman@alaska.gov" <fred.broerman@alaska.gov>, "sally.cox@alaska.gov" <sally.cox@alaska.gov>, "elizabeth.manfred@alaska.gov" <elizabeth.manfred@alaska.gov>, "taunnie.boothby@alaska.gov" <taunnie.boothby@alaska.gov>, "david.longtin@alaska.gov" <david.longtin@alaska.gov>, "greg.magee@alaska.gov" <greg.magee@alaska.gov>, "gary.mendivil@alaska.gov" <gary.mendivil@alaska.gov>, "william.ashton@alaska.gov" <william.ashton@alaska.gov>, "michael.daigneault@alaska.gov" <michael.daigneault@alaska.gov>, "phillip.perry@alaska.gov" <phillip.perry@alaska.gov>, "roger.seavoy@alaska.gov" <roger.seavoy@alaska.gov>, "dean.brown@alaska.gov" <dean.brown@alaska.gov>, "tom.atkinson@alaska.gov" <tom.atkinson@alaska.gov>, "oha@alaska.net" <oha@alaska.net>, "sylvia.kreel@alaska.gov" <sylvia.kreel@alaska.gov>, "wyn.menefee@alaska.gov" <wyn.menefee@alaska.gov>, "dnr.dcompraanc@alaska.gov" <dnr.dcompraanc@alaska.gov>, "oha.revcomp@alaska.gov" <oha.revcomp@alaska.gov>, "craig.boeckman@alaska.gov" <craig.boeckman@alaska.gov>, "rutha.carter@alaska.gov" <rutha.carter@alaska.gov>, "harvey.douthit@alaska.gov" <harvey.douthit@alaska.gov>, "mike.coffey@alaska.gov" <mike.coffey@alaska.gov>, "Wolfgang.junge@alaska.gov" <Wolfgang.junge@alaska.gov>, "robert.lundell@alaska.gov" <robert.lundell@alaska.gov>, "kim.mahoney@alaska.gov" <kim.mahoney@alaska.gov>, "rich.sewell@alaska.gov" <rich.sewell@alaska.gov>, "harvey.smith@alaska.gov" <harvey.smith@alaska.gov>, "joel.staubin@alaska.gov" <joel.staubin@alaska.gov>, "edie.zukauskas@alaska.gov" <edie.zukauskas@alaska.gov>, "dlockard@aidea.org" <dlockard@aidea.org>, "cmello@aidea.org" <cmello@aidea.org>, "senator_lyman_hoffman@legis.state.ak.us" <senator_lyman_hoffman@legis.state.ak.us>, "senator_donny_olson@legis.state.ak.us" <senator_donny_olson@legis.state.ak.us>, "patricia_walker@legis.state.ak.us" <patricia_walker@legis.state.ak.us>, "mblack@anthc.org" <mblack@anthc.org>, "mbrubaker@anthc.org" <mbrubaker@anthc.org>, "nrcharles@gci.net" <nrcharles@gci.net>, "mhoffman@avcp.org" <mhoffman@avcp.org>, "mark@accphousing.org" <mark@accphousing.org>, "myron_naneng@avcp.org" <myron_naneng@avcp.org>,

"psamson@avcp.org" <psamson@avcp.org>, "sstreet@avcp.org" <sstreet@avcp.org>, "jmcatee@calistacorp.com" <jmcatee@calistacorp.com>, "calista@calistacorp.com" <calista@calistacorp.com>, "lisa_c@coastalvillages.org" <lisa_c@coastalvillages.org>, "neil_r@coastalvillages.org" <neil_r@coastalvillages.org>, "michael_b@coastalvillages.org" <michael_b@coastalvillages.org>, "cjandrew2003@yahoo.com" <cjandrew2003@yahoo.com>, "stephen_fusilier@blm.gov" <stephen_fusilier@blm.gov>, "sam.kito@alaska.gov" <sam.kito@alaska.gov>, "carl_berger@ddc-alaska.org" <carl_berger@ddc-alaska.org>, "gary_baldwin@lksd.org" <gary_baldwin@lksd.org>, "Gary_Hanson@lksd.org" <Gary_Hanson@lksd.org>, "andy.jones@alaska.gov" <andy.jones@alaska.gov>, "mark.roberts@alaska.gov" <mark.roberts@alaska.gov>, "panai_nevak@yahoo.com" <panai_nevak@yahoo.com>, "ntcamii@yahoo.com" <ntcamii@yahoo.com>, "stanley_tom2003@yahoo.com" <stanley_tom2003@yahoo.com>, "ilandxc@yahoo.com" <ilandxc@yahoo.com>, "lawrence.davis@alaska.gov" <lawrence.davis@alaska.gov>, "mbarker@ruralcap.com" <mbarker@ruralcap.com>, "jhall@denali.gov" <jhall@denali.gov>, "cstern@ruralcap.com" <cstern@ruralcap.com>, "jgeorge@denali.gov" <jgeorge@denali.gov>, "realnews@deltadiscovery.com" <realnews@deltadiscovery.com>, "alex@alaskanewspapers.com" <alex@alaskanewspapers.com>, "chad.hailey@usmc.mil" <chad.hailey@usmc.mil>, "cathe.a.grosshandler@usps.gov" <cathe.a.grosshandler@usps.gov>, "charles.stoyer@ang.af.mil" <charles.stoyer@ang.af.mil>, "andrea.b.elconin@usace.army.mil" <andrea.b.elconin@usace.army.mil>, "Guy.R.McConnell@usace.army.mil" <Guy.R.McConnell@usace.army.mil>, "regpagemaster@poa02.usace.army.mil" <regpagemaster@poa02.usace.army.mil>, "eugene.virden@bia.gov" <eugene.virden@bia.gov>, "mark.kahklen@bia.gov" <mark.kahklen@bia.gov>, "arthur.high@bia.gov" <arthur.high@bia.gov>, "bcribley@blm.gov" <bcribley@blm.gov>, "james.n.helfinstine@uscg.mil" <james.n.helfinstine@uscg.mil>, "gene.kane@ak.usda.gov" <gene.kane@ak.usda.gov>, "amy.holman@noaa.gov" <amy.holman@noaa.gov>, "matthew.forney@noaa.gov" <matthew.forney@noaa.gov>, "greg.stuckey@hud.gov" <greg.stuckey@hud.gov>, "david_vought@hud.gov" <david_vought@hud.gov>, "gabriel.mahns@faa.gov" <gabriel.mahns@faa.gov>, "pat.oien@faa.gov" <pat.oien@faa.gov>, "patricia.sullivan@faa.gov" <patricia.sullivan@faa.gov>, "skelly@eda.doc.gov" <skelly@eda.doc.gov>, "combes.marcia@epamail.epa.gov" <combes.marcia@epamail.epa.gov>, "kramer.jackie@epa.gov" <kramer.jackie@epa.gov>, "fleek.adrienne@epamail.epa.gov" <fleek.adrienne@epamail.epa.gov>, "curtis.jennifer@epamail.epa.gov" <curtis.jennifer@epamail.epa.gov>, "gene_peltola@fws.gov" <gene_peltola@fws.gov>, "patrick_snow@fws.gov" <patrick_snow@fws.gov>, "brian_mccaffery@fws.gov" <brian_mccaffery@fws.gov>, "michael_buntjer@fws.gov" <michael_buntjer@fws.gov>, "ellen_lance@fws.gov" <ellen_lance@fws.gov>, "ann_rappoport@fws.gov" <ann_rappoport@fws.gov>, "jeanne.hanson@noaa.gov" <jeanne.hanson@noaa.gov>, "hcd.anchorage@noaa.gov" <hcd.anchorage@noaa.gov>, "sue_masica@nps.gov" <sue_masica@nps.gov>, "bob_walsh@murkowski.senate.gov" <bob_walsh@murkowski.senate.gov>, "tiffany_zulkosky@begich.senate.gov" <tiffany_zulkosky@begich.senate.gov>, "rbronen@yahoo.com" <rbronen@yahoo.com>
Cc: "donald.fancher@alaska.gov" <donald.fancher@alaska.gov>, "judy.chapman@alaska.gov" <judy.chapman@alaska.gov>, "teresa.zimmerman@alaska.gov" <teresa.zimmerman@alaska.gov>, "Royce Conlon" <RoyceConlon@PDCENG.US>, "Patrick Cotter" <PatrickCotter@PDCENG.US>, "Mike Storey" <MikeStorey@PDCENG.US>
Date: Thursday, April 28, 2011, 2:38 PM

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MS-2525
Anchorage, AK 99519-6900

Additional questions or comments can be directed to Mr. Fancher at (907) 269-0516 or by email to donald.fancher@alaska.gov .

Thank you

Jeff Shannon
Environmental Coordinator

PDC Inc. Engineers
Planning Design Construction

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v 907.452.1414 | f 907.456.2707 | www.pdceng.com

"Transforming Challenges into Solutions"

Jeff Shannon

From: Longtin, David L (DEC) [david.longtin@alaska.gov]
Sent: Monday, May 02, 2011 8:14 AM
To: Fancher, Donald L (DOT)
Cc: Jeff Shannon; Magee, Gregory L (DEC); Kloc, Emily C (DEC)
Subject: RE: Newtok Airport Relocation

Thank you for the opportunity to comment. I have two comments:

1. I am pleased that the proposed location of the sewage lagoon and landfill are outside the 5,000-foot protective radius for Alternatives 1 and 1A required by the FAA. I participated in the process of placing these elements on the map, and I want to emphasize that the locations are approximate. Mertarvik is blessed with sufficient gradients to make a gravity-only sewer system a strong possibility. The community would benefit greatly from not having to operate and maintain any pumping infrastructure to deliver wastewater to the lagoon, if that is the sanitation alternative chosen by them. It is possible that site conditions will not allow the lagoon to be constructed in the location shown on your Figure 2. It is also possible that the actual location may have to impinge on the 5,000-foot radius to allow for gravity-only flow. Please consider either moving the airport to the west-southwest to allow more room for the proposed lagoon, or provide some assurance that FAA would grant a waiver of the 5,000-foot radius to accommodate a gravity-only sewer system if it is needed.
2. The Newtok Traditional Council and Village Safe Water have teamed up to drill a well approximately 1,200 feet upgradient from the spring at Mertarvik, at 60d48m57s N and 164d31m10s W. The well produces high-quality water in quantities sufficient to meet the needs of the community. It does not appear that the proposed material site is directly upgradient from the spring (see Figure 2), but I would like some assurance that the excavation will not intercept the subsurface water flow and prevent it from reaching the well. Also, I'd like care to be taken in the operation of the material source to prevent the contamination of the groundwater.

Thank you, Dave

David Longtin, PE
Village Safe Water Engineer
DEC - Village Safe Water
555 Cordova Street
Anchorage, AK 99501-2617
phone: (907) 269-7606
fax: (907) 269-7509
david.longtin@alaska.gov

From: Jeff Shannon [mailto:JeffShannon@PDCENG.US]
Sent: Thursday, April 28, 2011 2:38 PM
To: charter@flyera.com; patrick.thurston@hageland.com; res@flygrant.com; info@aceaircargo.com; yuteair@gci.com; renfrosalaskanadventures@gmail.com; info@pbadventures.com; Broerman, Fred J (CED); Cox, Sally A (CED); Manfred, Elizabeth K (CED); Boothby, Taunnie L (CED); Longtin, David L (DEC); Magee, Gregory L (DEC); Mendivil, Gary A (DEC); Ashton, William S (DEC); Daigneault, Michael J (DFG); Perry, Phillip L (DFG); Seavoy, Roger J (DFG); Brown, Dean N (DNR); Atkinson, Tom A (DNR); oha@alaska.net; Kreel, Sylvia A (DNR); Menefee, Wyn (DNR); DNR, DCOM Anchorage PRA (DNR sponsored); DNR, Parks OHA Review Compliance (DNR sponsored); Boeckman, Craig T (DOT); Carter, Ruth A (DOT); Douthit, Harvey M (DOT); Coffey, Michael J (DOT); Junge, Wolfgang E (DOT); Lundell, Robert H (DOT); Mahoney, Kimberly I (DOT); Sewell, Richard E (DOT); Smith, Harvey N (DOT); St Aubin, Joel G (DOT); Zukauskas, Edie A (DOT); Lockard, David A (AIDEA); Mello, Christopher P (AIDEA); Hoffman, Lyman F (LAA); Olson, Donny (LAA); Walker, Pat (LAA); mblack@anthc.org; mbrubaker@anthc.org; nrcharles@gci.net; mhoffman@avcp.org; mark@accphousing.org; myron_naneng@avcp.org; psamson@avcp.org; sstreet@avcp.org; jmcatee@calistacorp.com; calista@calistacorp.com;

lisa_c@coastalvillages.org; neil_r@coastalvillages.org; michael_b@coastalvillages.org; Carl Andrew; stephen_fusilier@blm.gov; Kito, Sam (EED); carl_berger@ddc-alaska.org; gary_baldwin@lksd.org; Gary_Hanson@lksd.org; Jones, Andy M (MVA); Roberts, Mark W (MVA); panai_nevak@yahoo.com; ntcamii@yahoo.com; stanley_tom2003@yahoo.com; ilandxc@yahoo.com; Davis, Lawrence J (DPS); mbarker@ruralcap.com; jhall@denali.gov; cstern@ruralcap.com; jageorge1 iphone; realnews@deltadiscovery.com; alex@alaskanewspapers.com; chad.hailey@usmc.mil; cathe.a.grosshandler@usps.gov; charles.stoyer@ang.af.mil; andrea.b.elconin@usace.army.mil; Guy.R.McConnell@usace.army.mil; regpagemaster@poa02.usace.army.mil; eugene.virden@bia.gov; mark.kahklen@bia.gov; arthur.high@bia.gov; bcribley@blm.gov; james.n.helfinstine@uscg.mil; gene.kane@ak.usda.gov; amy.holman@noaa.gov; matthew.forney@noaa.gov; greg.stuckey@hud.gov; david_vought@hud.gov; gabriel.mahns@faa.gov; pat.oien@faa.gov; patricia.sullivan@faa.gov; skelly@eda.doc.gov; combes.marcia@epamail.epa.gov; kramer.jackie@epa.gov; fleek.adrienne@epamail.epa.gov; curtis.jennifer@epamail.epa.gov; gene_peltola@fws.gov; patrick_snow@fws.gov; brian_mccaffery@fws.gov; michael_buntjer@fws.gov; ellen_lance@fws.gov; ann_rappoport@fws.gov; jeanne.hanson@noaa.gov; hcd.anchorage@noaa.gov; sue_masica@nps.gov; bob_walsh@murkowski.senate.gov; tiffany_zulkosky@begich.senate.gov; rbronen@yahoo.com
Cc: Fancher, Donald L (DOT); Chapman, Judy (DOT); Zimmerman, Teresa J (DOT); Royce Conlon; Patrick Cotter; Mike Storey
Subject: Newtok Airport Relocation

On behalf of the Alaska Department of Transportation and Public Facilities (DOT&PF) - Central Region, PDC Engineers is transmitting the attached electronic Planning/Scoping letter for the proposed Newtok Airport Relocation.

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Thank you

Jeff Shannon
Environmental Coordinator

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"Transforming Challenges into Solutions"

Jeff Shannon

From: Ballard, Christine A (DNR) [christine.ballard@alaska.gov]
Sent: Tuesday, May 03, 2011 3:43 PM
To: Jeff Shannon; Fancher, Donald L (DOT)
Subject: FW: Newtok Airport Relocation
Attachments: Newtok Planning Scoping Letter.pdf; Figure 1 - Location & Vicinity Map.pdf; Figure 2 - Preliminary Alternatives.pdf; Appendix A.pdf

Good Afternoon Mr. Fancher,

Thank you for the opportunity to comment on the above referenced project. The location of the proposed [PROJECT/ACTION] lies within the coastal zone boundaries of the State of Alaska and the Cenaliulriit CRSA. The Department of Natural Resources, Division of Coastal & Ocean Management requests the submission of a completed Coastal Project Questionnaire/Certification Statement and Project Evaluation when project design work has progressed to the point where ADOT&PF is ready to submit applications for appropriate state and/or federal permits. A determination as to the status of the project with regard to potential requirements for a coordinated ACMP review through this office will be made at that time. The Questionnaire can be found on our web site at www.alaskacoast.state.ak.us . Once ready for the permitting process, you may email it to dnr.dcompraanc@alaska.gov .

Thank you and please feel free to contact me at (907) 269-7478 with any questions.
--
Christine Ballard, Project Review Assistant
DNR, Division of Coastal & Ocean Management
phone: (907) 269-7478, fax: (907) 269-3981
christine.ballard@alaska.gov

From: Jeff Shannon [mailto:JeffShannon@PDCENG.US]
Sent: Thursday, April 28, 2011 2:38 PM
To: charter@flyera.com; patrick.thurston@hageland.com; res@flygrant.com; info@aceaircargo.com; yuteair@gci.com; renfrosalaskanadventures@gmail.com; info@pbadventures.com; Broerman, Fred J (CED); Cox, Sally A (CED); Manfred, Elizabeth K (CED); Boothby, Taunnie L (CED); Longtin, David L (DEC); Magee, Gregory L (DEC); Mendivil, Gary A (DEC); Ashton, William S (DEC); Daigneault, Michael J (DFG); Perry, Phillip L (DFG); Seavoy, Roger J (DFG); Brown, Dean N (DNR); Atkinson, Tom A (DNR); oha@alaska.net; Kreel, Sylvia A (DNR); Menefee, Wyn (DNR); DNR, DCOM Anchorage PRA (DNR sponsored); DNR, Parks OHA Review Compliance (DNR sponsored); Boeckman, Craig T (DOT); Carter, Ruth A (DOT); Douthit, Harvey M (DOT); Coffey, Michael J (DOT); Junge, Wolfgang E (DOT); Lundell, Robert H (DOT); Mahoney, Kimberly I (DOT); Sewell, Richard E (DOT); Smith, Harvey N (DOT); St Aubin, Joel G (DOT); Zukauskas, Edie A (DOT); Lockard, David A (AIDEA); Mello, Christopher P (AIDEA); Hoffman, Lyman F (LAA); Olson, Donny (LAA); Walker, Pat (LAA); mblack@anthc.org; mbrubaker@anthc.org; nrcharles@gci.net; mhoffman@avcp.org; mark@accphousing.org; myron_naneng@avcp.org; psamson@avcp.org; sstreet@avcp.org; jmcatee@calistacorp.com; calista@calistacorp.com; lisa_c@coastalvillages.org; neil_r@coastalvillages.org; michael_b@coastalvillages.org; Carl Andrew; stephen_fusilier@blm.gov; Kito, Sam (EED); carl_berger@ddc-alaska.org; gary_baldwin@lksd.org; Gary_Hanson@lksd.org; Jones, Andy M (MVA); Roberts, Mark W (MVA); panai_nevak@yahoo.com; ntcamii@yahoo.com; stanley_tom2003@yahoo.com; ilandxc@yahoo.com; Davis, Lawrence J (DPS); mbarker@ruralcap.com; jhall@denali.gov; cstern@ruralcap.com; jageorge1 iphone; realnews@deltadiscovery.com; alex@alaskanewspapers.com; chad.hailey@usmc.mil; cathe.a.grosshandler@usps.gov; charles.stoyer@ang.af.mil; andrea.b.elconin@usace.army.mil; Guy.R.McConnell@usace.army.mil; regpagemaster@poa02.usace.army.mil; eugene.virden@bia.gov; mark.kahklen@bia.gov; arthur.high@bia.gov; bcribley@blm.gov; james.n.helfinstine@uscg.mil; gene.kane@ak.usda.gov; amy.holman@noaa.gov; matthew.forney@noaa.gov; greg.stuckey@hud.gov; david_vought@hud.gov; gabriel.mahns@faa.gov; pat.oien@faa.gov; patricia.sullivan@faa.gov; skelly@eda.doc.gov; combes.marcia@epamail.epa.gov; kramer.jackie@epa.gov; fleek.adrienne@epamail.epa.gov; curtis.jennifer@epamail.epa.gov; gene_peltola@fws.gov; patrick_snow@fws.gov; brian_mccaffery@fws.gov; michael_buntjer@fws.gov; ellen_lance@fws.gov; ann_rappoport@fws.gov; jeanne.hanson@noaa.gov;

hcd.anchorage@noaa.gov; sue_masica@nps.gov; bob_walsh@murkowski.senate.gov; tiffany_zulkosky@begich.senate.gov; rbronen@yahoo.com
Cc: Fancher, Donald L (DOT); Chapman, Judy (DOT); Zimmerman, Teresa J (DOT); Royce Conlon; Patrick Cotter; Mike Storey
Subject: Newtok Airport Relocation

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Jeff Shannon
Environmental Coordinator

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"Transforming Challenges into Solutions"

Jeff Shannon

From: Gould, Thomas - Aniak, AK [thomas.gould@ak.usda.gov]
Sent: Tuesday, May 03, 2011 1:54 PM
To: Zimmerman, Teresa J (DOT); Fancher, Donald L (DOT)
Cc: Jones, Robert - Palmer, AK; Naegele, Phil - Palmer, AK; Maroney, Ryan - Fairbanks, AK
Subject: Newtok airport relocation

Hello Teresa and Don.

My name is Tom Gould, the district conservationist for the Natural Resources Conservation Service (NRCS) for SW AK located in Aniak. Perhaps my questions/concerns have already been addressed in an engineering plan but I had a concern regarding the spoil pile created from excavating 10 feet of overburden to get at the bedrock. Is the overburden going to be used, entirely, in the construction of the airport or perhaps used, in part, elsewhere? If so, is there a seeding or reseeding involved? Will it be done with clean, local ecotype seeds? If mulch is to be used, will it be from a weed free source so as to avoid bringing in "invasive" species? Is it feasible/desirable to incorporate other landscape or wildlife plantings with the activity?

Secondly, I have some questions regarding the road used to transport the stone/gravel from its source.

1) Will it be established on a grade and if so, what variety of grades and lengths of those grades?

2) What mitigating practices are scheduled to address any soil loss from the road construction and the road itself once it is established, assuming erosion is a concern?

3) Does the road lead to or run through a subsistence area? The thought is that since folks use ATV's (to excess at times) in accessing the tundra's subsistence resources, perhaps the road could be constructed with the long term view of ATV use and access to the tundra in mind.

If the road does, indeed, access a nice subsistence area, it would be nice to involve the village in developing a resource plan re: the use of the road and intensity of subsistence activities. We, as the NRCS, would be more than happy to meet with them to begin planning right now for future eventualities.

Sincerely,

Tom Gould
District Conservationist
Natural Resources Conservation Service
PO Box 214
Aniak, AK 99557
(907) 675-4578
Fax: 675-4579

Jeff Shannon

From: McConnell, Guy R POA [Guy.R.McConnell@usace.army.mil]
Sent: Wednesday, May 04, 2011 10:30 AM
To: donald.fancher@alaska.gov; teresa.zimmerman@alaska.gov; Royce Conlon; Jeff Shannon
Cc: Elconin, Andrea B POA; Kuhle, Don P POA
Subject: Newtok Airport Relocation (UNCLASSIFIED)
Attachments: Wetlands.shx; Wetlands.prj; Wetlands.sbn; Wetlands.sbx; Wetlands.shp; Wetlands.shp.xml

Classification: UNCLASSIFIED
Caveats: NONE

This responds to your request for scoping comments for an air field at Mertarvik:

1. We do not have any additional information about floodplains or related hazards.

2. You should contact our Regulatory Division for review of activities when your project is better defined. You can expect to find that Baird Inlet and Ninglick River are navigable waters subject to Section 10.

3. You can expect to fill jurisdictional wetlands for project construction and to apply for a Section 404 permit.

4. Wetlands data in Shapefile format are attached.

Please let me know if you have any further questions or need any assistance in preparing environmental documents for this important action.

Guy R. McConnell
Biologist

Classification: UNCLASSIFIED
Caveats: NONE

Jeff Shannon

From: Fancher, Donald L (DOT) [donald.fancher@alaska.gov]
Sent: Friday, May 06, 2011 3:28 PM
To: Longtin, David L (DEC)
Cc: Jeff Shannon; Magee, Gregory L (DEC); Kloc, Emily C (DEC); Chapman, Judy (DOT); Douthit, Harvey M (DOT); Cox, Sally A (CED); gabriel.mahns@faa.gov; Witt, Jennifer W (DOT); Royce Conlon; Jeff Shannon; stanley_tom@yahoo.com
Subject: RE: Newtok Airport Relocation

Mr. Longtin,

Thank you for your comments regarding the April 22, 2011 DOT & PF preliminary scoping letter for various agencies to review and comment on to better help us develop the basis for our preferred alternative(s) for an eventual airport construction at Mertavrik. The various infrastructure development involved in the unprecedented attempt to move an entire community of 350+ residents and related infrastructure has far reaching implications. Not the least of which is trying to coordinate all of the necessary related activities, which has further reaching implications such as the cause and effect between them that is unavoidable.

While it is very early still and DOT & PF has not yet completed its engineering studies, the options for a preferred alternative are actually quite limited and DOT & PF is being careful not to preclude any of its options until the right time is upon us. We're expecting to have our Preferred Alternative, with other contingent options, before the end of this year (2011), along with an Airport Layout Plan and associated estimates involving quantities, costs, etc...

In that light, to preliminarily exclude an alternate option based on a possibility of encroachment in airspace protection without knowing for sure is or isn't an option yet would not be prudent. Nonetheless, to leave as many options available to the community for the best possible location for its vital air transportation needs, the DOT & PF cannot support the possibility of creating any avigation hazards (sewage lagoons and sanitary land-fill) within that safety zone created specifically for that purpose. Additionally, the DOT & PF cannot provide you with assurance that the FAA would grant a waiver either. Such a proposal would have to be made to the FAA, which we would not support based on what we currently know.

Based on the engineering studies to date (approximately ½ million dollars spent), the 1/1A Alternative, compared to the other locations, is the easiest to access and the most cost efficient approach for construction, operations and maintenance so far.

Again, thanks for your input and we look forward to working with DEC/VSW and all the other state and federal agencies in this unprecedented "village move".

Don Fancher

From: Longtin, David L (DEC)
Sent: Monday, May 02, 2011 8:14 AM
To: Fancher, Donald L (DOT)
Cc: Jeff Shannon; Magee, Gregory L (DEC); Kloc, Emily C (DEC)
Subject: RE: Newtok Airport Relocation

Thank you for the opportunity to comment. I have two comments:

1. I am pleased that the proposed location of the sewage lagoon and landfill are outside the 5,000-foot protective radius for Alternatives 1 and 1A required by the FAA. I participated in the process of placing these elements on the map, and I want to emphasize that the locations are approximate. Mertarvik is blessed with sufficient

gradients to make a gravity-only sewer system a strong possibility. The community would benefit greatly from not having to operate and maintain any pumping infrastructure to deliver wastewater to the lagoon, if that is the sanitation alternative chosen by them. It is possible that site conditions will not allow the lagoon to be constructed in the location shown on your Figure 2. It is also possible that the actual location may have to impinge on the 5,000-foot radius to allow for gravity-only flow. Please consider either moving the airport to the west-southwest to allow more room for the proposed lagoon, or provide some assurance that FAA would grant a waiver of the 5,000-foot radius to accommodate a gravity-only sewer system if it is needed.

2. The Newtok Traditional Council and Village Safe Water have teamed up to drill a well approximately 1,200 feet upgradient from the spring at Mertarvik, at 60d48m57s N and 164d31m10s W. The well produces high-quality water in quantities sufficient to meet the needs of the community. It does not appear that the proposed material site is directly upgradient from the spring (see Figure 2), but I would like some assurance that the excavation will not intercept the subsurface water flow and prevent it from reaching the well. Also, I'd like care to be taken in the operation of the material source to prevent the contamination of the groundwater.

Thank you, Dave

David Longtin, PE
Village Safe Water Engineer
DEC - Village Safe Water
555 Cordova Street
Anchorage, AK 99501-2617
phone: (907) 269-7606
fax: (907) 269-7509
david.longtin@alaska.gov

From: Jeff Shannon [mailto:JeffShannon@PDCENG.US]
Sent: Thursday, April 28, 2011 2:38 PM
To: charter@flyera.com; patrick.thurston@hageland.com; res@flygrant.com; info@aceaircargo.com; yuteair@gci.com; renfrosalaskanadventures@gmail.com; info@pbadventures.com; Broerman, Fred J (CED); Cox, Sally A (CED); Manfred, Elizabeth K (CED); Boothby, Taunnie L (CED); Longtin, David L (DEC); Magee, Gregory L (DEC); Mendivil, Gary A (DEC); Ashton, William S (DEC); Daigneault, Michael J (DFG); Perry, Phillip L (DFG); Seavoy, Roger J (DFG); Brown, Dean N (DNR); Atkinson, Tom A (DNR); oha@alaska.net; Kreel, Sylvia A (DNR); Menefee, Wyn (DNR); DNR, DCOM Anchorage PRA (DNR sponsored); DNR, Parks OHA Review Compliance (DNR sponsored); Boeckman, Craig T (DOT); Carter, Ruth A (DOT); Douthit, Harvey M (DOT); Coffey, Michael J (DOT); Junge, Wolfgang E (DOT); Lundell, Robert H (DOT); Mahoney, Kimberly I (DOT); Sewell, Richard E (DOT); Smith, Harvey N (DOT); St Aubin, Joel G (DOT); Zukauskas, Edie A (DOT); Lockard, David A (AIDEA); Mello, Christopher P (AIDEA); Hoffman, Lyman F (LAA); Olson, Donny (LAA); Walker, Pat (LAA); mblack@anthc.org; mbrubaker@anthc.org; nrcharles@gci.net; mhoffman@avcp.org; mark@accphousing.org; myron_naneng@avcp.org; psamson@avcp.org; sstreet@avcp.org; jmcatee@calistacorp.com; calista@calistacorp.com; lisa_c@coastalvillages.org; neil_r@coastalvillages.org; michael_b@coastalvillages.org; Carl Andrew; stephen_fusilier@blm.gov; Kito, Sam (EED); carl_berger@ddc-alaska.org; gary_baldwin@lksd.org; Gary_Hanson@lksd.org; Jones, Andy M (MVA); Roberts, Mark W (MVA); panai_nevak@yahoo.com; ntcamii@yahoo.com; stanley_tom2003@yahoo.com; ilandxc@yahoo.com; Davis, Lawrence J (DPS); mbarker@ruralcap.com; jhall@denali.gov; cstern@ruralcap.com; jageorge1 iphone; realnews@deltadiscovery.com; alex@alaskanewspapers.com; chad.hailey@usmc.mil; cathe.a.grosshandler@usps.gov; charles.stoyer@ang.af.mil; andrea.b.elconin@usace.army.mil; Guy.R.McConnell@usace.army.mil; regpagemaster@poa02.usace.army.mil; eugene.virden@bia.gov; mark.kahklen@bia.gov; arthur.high@bia.gov; bcribley@blm.gov; james.n.helfinstine@uscg.mil; gene.kane@ak.usda.gov; amy.holman@noaa.gov; matthew.forney@noaa.gov; greg.stuckey@hud.gov; david_vought@hud.gov; gabriel.mahns@faa.gov; pat.oien@faa.gov; patricia.sullivan@faa.gov; skelly@eda.doc.gov; combes.marcia@epamail.epa.gov; kramer.jackie@epa.gov; fleek.adrienne@epamail.epa.gov; curtis.jennifer@epamail.epa.gov; gene_peltola@fws.gov; patrick_snow@fws.gov; brian_mccaffery@fws.gov; michael_buntjer@fws.gov; ellen_lance@fws.gov; ann_rappoport@fws.gov; jeanne.hanson@noaa.gov; hcd.anchorage@noaa.gov; sue_masica@nps.gov; bob_walsh@murkowski.senate.gov; tiffany_zulkosky@begich.senate.gov; rbronen@yahoo.com

Cc: Fancher, Donald L (DOT); Chapman, Judy (DOT); Zimmerman, Teresa J (DOT); Royce Conlon; Patrick Cotter; Mike Storey
Subject: Newtok Airport Relocation

On behalf of the Alaska Department of Transportation and Public Facilities (DOT&PF) - Central Region, PDC Engineers is transmitting the attached electronic Planning/Scoping letter for the proposed Newtok Airport Relocation.

This letter and its attachments can be viewed at http://pdcprojects.info/newtok/index.html where you will also find a link to submit comments electronically.

Please note that all comments are requested by **May 22, 2011**.

If you would prefer to mail in your comments, please address them to:

Donald Fancher
Project Manager
State of Alaska, Department of Transportation and Public Facilities
PO Box 196900
MS-2525
Anchorage, AK 99519-6900

Additional questions or comments can be directed to Mr. Fancher at (907) 269-0516 or by email to donald.fancher@alaska.gov .

Thank you

Jeff Shannon
Environmental Coordinator

PDC Inc. Engineers
Planning Design Construction

1028 Aurora Drive | Fairbanks, Alaska 99709
v 907.452.1414 | f 907.456.2707 | www.pdceng.com

"Transforming Challenges into Solutions"

Jeff Shannon

From: Judy_Jacobs@fws.gov
Sent: Friday, May 06, 2011 4:00 PM
To: donald.fancher@alaska.gov; Jeff Shannon
Subject: Endangered Species act comments on Newtok Airport relocation
Attachments: Nelson Island Report 2005.pdf; 2011-0112 Newtok airport relocation response.pdf

Please see the attached documents and contact me if you have any questions on our comments.

Thanks,
Judy

(See attached file: Nelson Island Report 2005.pdf)(See attached file: 2011-0112 Newtok airport relocation response.pdf)

****

Judy Jacobs
US Fish and Wildlife Service
AFWFO Endangered Species Program
605 W. 4th Avenue, Rm G-61
Anchorage, Alaska 99501
Phone: (907) 271-2768
FAX: (907) 271-2786

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Anchorage Fish and Wildlife Field Office
605 West 4th Avenue, Room G-61
Anchorage, Alaska 99501-2249

in reply refer to:
AFWFO

May 5, 2011

Donald Fancher
Project Manager
State of Alaska, Department of Transportation and Public Facilities
PO Box 196900
MS-2525
Anchorage, AK 99519-6900

Re: Newtok Airport Relocation

Dear Mr. Fancher:

This responds to a letter from Jennifer Witt dated April 22, 2011, emailed from Jeff Shannon to Ellen Lance on April 28, 2011, requesting scoping comments on the project referenced above. We are providing the following comments pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq*. as amended; ESA).

Two threatened species, the spectacled eider (*Somateria fischeri*) and Steller's eider (*Polysticta stelleri*) nest or have historically nested within the wetlands of the Yukon-Kuskokwim Delta. Kigigak Island, located four linear miles from Mertarvik, hosts a spectacled eider nesting concentration and is within designated Critical Habitat for those species. These sea ducks generally nest near pond edges, or on small hummocks within ponds, in sedge meadow-wetland complexes.

In June, 2005, two U.S. Fish and Wildlife Service biologists surveyed wetlands in the Mertarvik area, to determine their value as nesting habitat for these threatened eiders. Although they observed substantial numbers of waterfowl and shorebirds feeding and loafing in the wetland habitat, they saw very few nests. They observed no threatened eiders, but concluded that the wetlands within the project area have value to a variety of other birds and mammals as a feeding and resting area (see attached report).

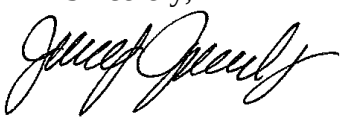
According to the maps you included, all potential sites for the airport are located farther inland than the wetland complexes surveyed by these biologists, and none appear to be located in the preferred nesting habitat for Steller's or spectacled eiders. In view of the above information, it appears these listed species are not likely to nest in the project area. However, if project plans change such that any extensive coastal wetland areas will be impacted, you should contact our office to verify whether these species could be affected.

This letter relates only to federally listed or proposed species, and designated or proposed critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service; it does not address species under the jurisdiction of the National Marine Fisheries Service, or other responsibilities under the Fish and Wildlife Coordination Act, Clean Water Act, National Environmental Policy Act, migratory Bird Treaty Act, Marine Mammal Protection Act, Bald and Golden Eagle Protection Act, or other legislation.

Donald Fancher

Thank you for your cooperation in protecting and enhancing endangered, threatened, and other rare species in Alaska. If you have any questions, please contact me at (907) 271-2768 and refer to consultation number 2011-0112.

Sincerely,



Judy Jacobs
Endangered Species Biologist

Attachment

Field Reconnaissance of Takikchak, Preferred Town Site for the Relocation of Newtok Village - Report to the Army Corps of Engineers

Introduction

Newtok is near sea level and situated on a layer of peat underlain with frozen silt that is highly susceptible to erosion when thawed (Figure 1). Melting permafrost and decreased extent and duration of sea ice, consequences of global warming (Hassol 2004), are causing increasing rates of shoreline sloughing along the banks of the Ninglick River. Since the 1970s, the village of Newtok has continuously monitored the rapid advance of the Ninglick River (averaging 19.5 meters per year) as homes and facilities are threatened by encroaching waters (ASCG Inc. 2004). The village dumpsite and boardwalk leading to it, the barge landing, the container storage area and several containers have already been lost to the advancing river.

In recent years, spring ice jams on the Ninglick River and westerly windstorms from the Bering Sea have increased the vulnerability of Newtok to flooding and erosion. During the fall of 2004, heavy rains associated with unusually severe storms caused flooding in Newtok, damaged buildings and other infrastructure, and threatened to contaminate the community water supply.

Taking a proactive approach to this serious and imminent erosion and flooding threat, the village of Newtok proposed to relocate to the northeast coast of Nelson Island, approximately 14 km (9 mi) south, to a new site called Takikchak. In November 2003, Congress approved a land exchange between the Newtok Village Corporation and the U.S. Fish and Wildlife Service (Service). In April 2004, 4,428 ha (10, 943 ac) at Takikchak were conveyed to Newtok. The proposed village location is situated on solid mineral soil on gently sloping hillsides at elevations ranging from sea level to approximately 90 meters (Figure 1).

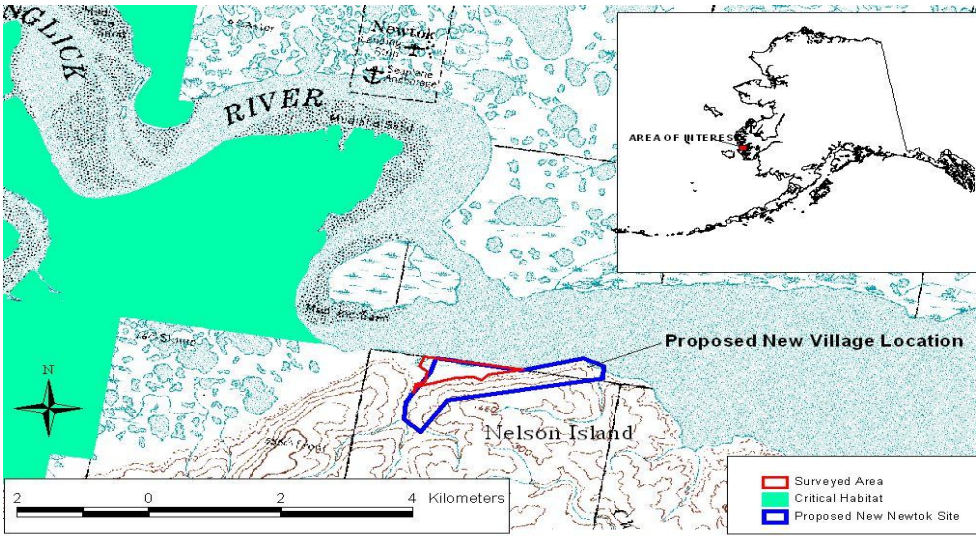


Figure 1. Newtok Village and proposed location of Takikchak Village on Nelson Island.

During the spring of 2005, the U.S. Army Corps of Engineers requested that the Service provide expertise in assessing impacts to threatened and endangered species at the relocation site on Nelson Island. Service fish and wildlife biologists initiated intensive ground surveys of Takikchak and nearby wetlands in June 2005.

Spectacled (*Somateria fischeri*) and Steller's (*Polysticta stelleri*) eiders were listed as threatened under the Endangered Species Act of 1973 in 1993 and 1997, respectively. Both species nest or have historically nested within the wetlands of the Yukon-Kuskowim Delta. Kigigak Island, located four linear miles from Takikchak, hosts a spectacled eider nesting concentration and is within designated Critical Habitat for those species.

Ideal nesting habitat for spectacled and Steller's eiders is a complex of sedge-grass meadows, pond shorelines, peninsulas and islands (Dau 1974). On nesting grounds, they feed by dabbling in shallow freshwater or brackish ponds, or on flooded tundra (Dau 1974, Kistchinski and Flint 1974). Aerial photos at Takikchak indicate approximately 175 ha of potential nesting habitat within the footprint of the proposed new village site (Figure 2).

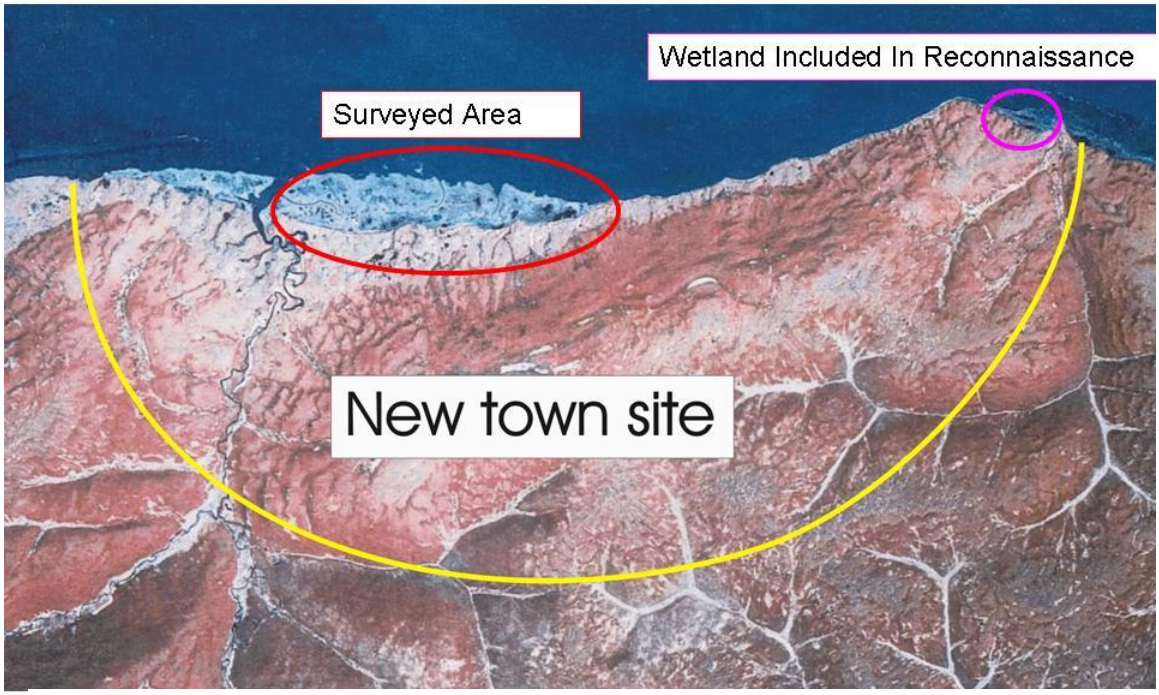


Figure 2. Aerial view of the proposed new town site and habitat surveyed for potential eider breeding on Nelson Island, Alaska.

Methods

Service waterfowl experts Ellen Lance and Tim Bowman conducted a waterfowl nest survey of a 175 ha wetland complex adjacent to the proposed village site of Takikchak on June 5, 2005. An initial reconnaissance of the area entailed walking the length of the wetland next to the uplands, followed by an intensive ground search through the marshy wetlands. Nearly all suitable nesting habitat within the proposed relocation site at Takikchak was searched (Figure 3).

Figure 3. Wetland habitat surveyed by Service biologists near the proposed village relocation site.

Results

The wetland site surveyed consisted of a seawater-saturated brackish sedge meadow interspersed with tidal ponds. Lance and Bowman observed substantial numbers of waterfowl and shorebirds feeding and loafing in the wetland habitat (Table 1), but very few nests. Only two emperor goose (*Chen canagica*), two black turnstone (*Arenaria melanocephala*), and one mew gull (*Larus canus*) nest was found in the wetlands complex adjacent to Takikchak. Nesting densities appeared far lower than what is typically encountered in other coastal areas of the Yukon-Kuskokwim Delta (Fischer et al. 2005). Service biologists considered the wetland habitat complex largely unsuitable for nesting waterfowl or shorebirds.

Lance and Bowman watched large congregations of mew gulls diving and feeding on smelt (*Osmerus eperlanus*), apparently migrating up the unnamed river west of the proposed town site. They also observed four female and one male red-breasted merganser (*Mergus serrator*) engaged in ritual courtship behavior on a pond near the mouth of the river. A northern pintail (*Anas acuta*) nest was discovered along the banks of the river, as well. Songbirds identified included yellow warblers (*Dendroica petechia*) and yellow wagtails (*Motacilla flava).*

Service biologists encountered abundant evidence of microtine rodents (e.g. runways) within and along the edge of the wetland, as well as in adjacent grassy riparian areas. They frequently scared voles out from underfoot or them saw scurrying in the grass, suggesting a relatively dense population. They did not attempt to classify the specific species of small mammals. They observed one river otter (*Lutra canadensis*) running across the wetlands.

Table 1. Birds observed at the Takikchak Village re-location site.

SPECIES	COMMENTS
Loon (unidentified) *Gavia* spp.	On pond in wetland
Sandhill crane (*Grus canadensis*)	Flying over wetland
Tundra swan (*Cygnus columbianus*)	Pairs and singles
Greater white-fronted goose (*Anser albifrons*)	Many; loafing in wetland
Emperor goose (*Chen canagica*)	Many; two nests found
Cackling Canada goose (*Branta canadensis*)	Many; loafing in wetland
Green-winged teal (*Anas crecca*)	Many
American wigeon (*Anas americana*)	Few
Northern pintail (*Anas acuta*)	Many
Northern shoveler (*Anas clypeata*)	Many
Greater scaup (*Aythya marila*)	One pair
Red-breasted merganser (*Mergus serrator*)	4 females, 1 male
Bar-tailed godwit (*Limosa lapponica*)	Few
Red-necked phalarope (*Phalaropus lobatus*)	Many
Common snipe (*Gallinago gallinago*)	Heard 1
Black turnstone (*Arenaria melanocephala*)	Many; two nests found
Dunlin (*Calidris alpine*)	Few
Western sandpiper (*Calidris mauri*)	Many; nesting in uplands, feeding in wetlands
Parasitic jaeger (*Stercorarius parasiticus*)	Few, flying
Long-tailed jaeger (*Stercorarius longicaudus*)	Few, flying
Mew gull (*Larus canus*)	Many; one nest found
Glaucous gull (*Larus hyperboreus*)	Few, flying
Arctic tern (*Sterna paradisaea*)	Few, flying
Willow ptarmigan (*Lagopus lagopus*)	Many; pairs, in uplands
Common raven (*Corvus corax*)	1 flying
Yellow wagtail (*Motacilla flava*)	Many; pairs, in uplands
Yellow warbler (*Dendroica petechia*)	Uplands
Grey-cheeked thrush (*Catharus minimus*)	2 singles
Savanna sparrow (*Passerculus sandwichensis*)	Many
Golden-crowned sparrow (*Zonotrichia atricapilla*)	Few, singing
American tree sparrow (*Spizella arborea*)	Many
Common redpoll (*Cardeulis flammea*)	Few; feeding on surface of snow
Lapland longspur (*Calcarius lapponicus*)	Many

Service biologists Lance and Bowman found abundant beaver (*Castor canadensis*) activity throughout the wetland and riparian areas (Figure 3). They saw them walking through the riparian areas and noted that the resident mammal occupied the stream central to the new town site (Figure 4). Nearly every drainage had evidence of beaver activity (e.g., fresh cuttings, dams, lodges), indicating this species is important to shaping the landscape of this area.

Figure 4. Beaver dam on unnamed river west of the proposed town site of Takikchak.

Figure 5. Beaver are important in shaping the landscape of Takikchak.

Conclusions

Service biologists did not observe any spectacled or Steller's eiders at the proposed Newtok relocation site at Takikchak. They are confident that these two threatened species were not nesting in the relocation site at the time of the survey. Survey information suggests that the wetland complex associated with the Takikchak site has value to a variety of other birds and mammals as a feeding and resting area.

Literature Cited

ASCG Inc. 2004. Newtok background for relocation report. Unpubl. rep. ASCG Inc., Anchorage, Alaska. 63pp.

Dau, C.P. 1974. Nesting biology of the spectacled eider, *Somateria fischeri* (Brandt), on the Yukon-Kuskokwim Delta. Alaska. M.S. thesis, Univ. Alaska, Fairbanks, Alaska. 72pp.

Fischer, J. B., R. A. Stehn, T. D. Bowman, and G. Walters. 2005. Nest population size and potential production of geese and spectacled eiders on the Yukon-Kuskokwim Delta, Alaska, 2005. Unpubl. Rep. U.S. Fish and Wildlife Service, Anchorage, Alaska. 28pp.

Hassol, S. J. 2004. Impacts of a warming climate – Arctic Climate Assessment. Cambridge University Press. Cambridge, UK. 139 pp.

Kistchinski, A.A., and V.E. Flint. 1974. On the biology of the spectacled eider. Wildfowl 25:5-15.

Jeff Shannon

From: Weise, James R (DEC) [james.weise@alaska.gov]
Sent: Wednesday, May 11, 2011 1:37 AM
To: Fancher, Donald L (DOT); Zimmerman, Teresa J (DOT); Royce Conlon; Jeff Shannon
Subject: Newtok Airport Relocation

Hello

Based upon a review of project documents forwarded to the DEC Drinking Water Program and the well log and well location provided by Village Safe Water Program staff (Dave Longtin), here are the DEC Drinking Water Program comments regarding the proposed airport relocation from Newtok to Mertarvik:

1. The currently used community well will be classified as a Class C well this summer, and in the future will become a Community Water System source. It appears that the projected material site to be constructed is down gradient from the site of the recently drilled Mertarvik well (drilled October 10, 2007). As a precautionary measure, it would be necessary to ensure that the bedrock excavation and overall construction of the material site does not cause biological contamination of the groundwater source, either through the construction activity and any associated pollutant runoff to the spring water or through percolation following ground disturbance. It is located just a couple hundred feet upgradient of the "Metarvik Spring" shown in the map. Overall, the aquifer in the area is interpreted to be poorly confined with fractured basalt and other loose materials, so care should be taken to divert stormwater and runoff away from that gradient.

2. It would be important to note that although it appears there is more than enough distance between the materials storage site from the spring water and the ground water well source, construction activity and use of the storage site may cause potential chemical contamination, such as spent oil and spilled fuels, and this should be considered during transport and use of materials to/from the airport construction sites.

3. Protection from potential sanitary concerns are assured with the lagoon and landfill being outside of the 5000-foot setback parameter for the proposed airport sites (1 and 1A; figure 2).

4. DEC Drinking Water Program staff, Leah Guzman and Dan Reichardt, who reviewed the proposed project are not aware of any other potential drinking water well contaminant sources other than the concerns expressed above. The current compliance monitoring lab results data received and migrated in the DEC Drinking Water Programs' SDWIS database are only for the existing Newtok water system, PWSID #271431. To date, no water quality data identified from the project site has been received or reviewed by the DEC Drinking Water Program. As the project is currently proposed, no permits or engineered plan reviews are required from the DEC Drinking Water Program. Other DEC programs may have water quality monitoring and permit requirements.

Thank you for this opportunity to provide comments on the proposed Newtok airport relocation project. If you have questions about these comments, please contact me, or Leah Guzman at 269-7518 or Dan Reichardt at 269- 7631.

James Weise
Manager
Alaska Drinking Water Program
(907) 269 - 7647
E-mail: James.Weise@alaska.gov

The Alaska Drinking Water Program - "High Standards, High Performance, and No Excuses"

Jeff Shannon

From: Bales, James E (DFG) [james.bales@alaska.gov]
Sent: Friday, May 20, 2011 3:42 PM
To: Jeff Shannon
Subject: RE: Newtok Airport Relocation

Good afternoon Mr. Shannon,

Below we have answered the scoping questions that ADOT put together specifically for ADF&G regarding the proposed Newtok Airport Relocation Project. The bolded items are from ADOT and have been reproduced here for clarity.

In addition to identifying any concerns and/or issues your agency might have with the proposed project, the following information is requested:

1. We have researched the ADF&G's *An Atlas to the Catalog of Waters Important to the Spawning, Rearing or Migration of Anadromous Fishes* and any findings are identified in the scoping letter and/or Appendix A. If you have any other information and/or data on anadromous or resident fish streams in the vicinity of the proposed project, including spawning/rearing habitat and migration corridors please provide us that information.

As noted in Appendix A, the Ninglick River (Stream No. 335-40-14800), Baird Inlet (Stream No. 335-40-14800-0020), and Takikchak Creek (Stream Nos. 335-40-14800-2300 and 335-40-14800-2300-3015) have been specified as being important for the spawning, rearing, or migration of anadromous fishes pursuant to AS 16.05.871(a).

2. Identify any fish species within the project boundaries that may be used for subsistence.

Pink and coho salmon and whitefish may be used for subsistence.

3. We have researched the ADF&G *State of Alaska Refuges, Critical Habitat Areas and Sanctuaries* and any findings are identified in the scoping letter and/or Appendix A. If these special areas exist in the project vicinity, would the normal activities of these areas be affected by the proposed project?

There are no state-designated special areas in the vicinity of the proposed project.

4. Provide information on wildlife other than fish in the vicinity of the proposed project.

There does not appear to be any wildlife conflicts with the proposed project.

5. Would the project affect wildlife migration corridors or bisect/segment wildlife habitat?

There does not appear to be any conflicts regarding wildlife migration corridors and habitat in the proposed project area.

6. Identify any permits and/or clearances to be obtained from your agency for the proposed project.

An ADF&G Fish Habitat Permit would be needed if water to be used for the project is withdrawn from a fish bearing stream or lake. A permit would also be needed if a culvert or bridge is installed on the airport access road to cross a fish stream. Any other activity that could impact a fish bearing stream or lake may also require a permit.

Thank you for the opportunity to review the proposed project and comment. Please let me know if you have any questions.

Jim Bales, Habitat Biologist
Alaska Department of Fish and Game
Division of Habitat
333 Raspberry Road
Anchorage, AK 99518
(907) 267-2143

From: Jeff Shannon [mailto:JeffShannon@PDCENG.US]
Sent: Thursday, April 28, 2011 2:38 PM
To: charter@flyera.com; patrick.thurston@hageland.com; res@flygrant.com; info@aceaircargo.com; yuteair@gci.com; renfrosalaskanadventures@gmail.com; info@pbadventures.com; Broerman, Fred J (CED); Cox, Sally A (CED); Manfred, Elizabeth K (CED); Boothby, Taunnie L (CED); Longtin, David L (DEC); Magee, Gregory L (DEC); Mendivil, Gary A (DEC); Ashton, William S (DEC); Daigneault, Michael J (DFG); Perry, Phillip L (DFG); Seavoy, Roger J (DFG); Brown, Dean N (DNR); Atkinson, Tom A (DNR); oha@alaska.net; Kreel, Sylvia A (DNR); Menefee, Wyn (DNR); DNR, DCOM Anchorage PRA (DNR sponsored); DNR, Parks OHA Review Compliance (DNR sponsored); Boeckman, Craig T (DOT); Carter, Ruth A (DOT); Douthit, Harvey M (DOT); Coffey, Michael J (DOT); Junge, Wolfgang E (DOT); Lundell, Robert H (DOT); Mahoney, Kimberly I (DOT); Sewell, Richard E (DOT); Smith, Harvey N (DOT); St Aubin, Joel G (DOT); Zukauskas, Edie A (DOT); Lockard, David A (AIDEA); Mello, Christopher P (AIDEA); Hoffman, Lyman F (LAA); Olson, Donny (LAA); Walker, Pat (LAA); mblack@anthc.org; mbrubaker@anthc.org; nrcharles@gci.net; mhoffman@avcp.org; mark@accphousing.org; myron_naneng@avcp.org; psamson@avcp.org; sstreet@avcp.org; jmcatee@calistacorp.com; calista@calistacorp.com; lisa_c@coastalvillages.org; neil_r@coastalvillages.org; michael_b@coastalvillages.org; Carl Andrew; stephen_fusilier@blm.gov; Kito, Sam (EED); carl_berger@ddc-alaska.org; gary_baldwin@lksd.org; Gary_Hanson@lksd.org; Jones, Andy M (MVA); Roberts, Mark W (MVA); panai_nevak@yahoo.com; ntcamii@yahoo.com; stanley_tom2003@yahoo.com; ilandxc@yahoo.com; Davis, Lawrence J (DPS); mbarker@ruralcap.com; jhall@denali.gov; cstern@ruralcap.com; jageorge1 iphone; realnews@deltadiscovery.com; alex@alaskanewspapers.com; chad.hailey@usmc.mil; cathe.a.grosshandler@usps.gov; charles.stoyer@ang.af.mil; andrea.b.elconin@usace.army.mil; Guy.R.McConnell@usace.army.mil; regpagemaster@poa02.usace.army.mil; eugene.virden@bia.gov; mark.kahklen@bia.gov; arthur.high@bia.gov; bcribley@blm.gov; james.n.helfinstine@uscg.mil; gene.kane@ak.usda.gov; amy.holman@noaa.gov; matthew.forney@noaa.gov; greg.stuckey@hud.gov; david_vought@hud.gov; gabriel.mahns@faa.gov; pat.oien@faa.gov; patricia.sullivan@faa.gov; skelly@eda.doc.gov; combes.marcia@epamail.epa.gov; kramer.jackie@epa.gov; fleek.adrienne@epamail.epa.gov; curtis.jennifer@epamail.epa.gov; gene_peltola@fws.gov; patrick_snow@fws.gov; brian_mccaffery@fws.gov; michael_buntjer@fws.gov; ellen_lance@fws.gov; ann_rappoport@fws.gov; jeanne.hanson@noaa.gov; hcd.anchorage@noaa.gov; sue_masica@nps.gov; bob_walsh@murkowski.senate.gov; tiffany_zulkosky@begich.senate.gov; rbronen@yahoo.com
Cc: Fancher, Donald L (DOT); Chapman, Judy (DOT); Zimmerman, Teresa J (DOT); Royce Conlon; Patrick Cotter; Mike Storey
Subject: Newtok Airport Relocation

On behalf of the Alaska Department of Transportation and Public Facilities (DOT&PF) - Central Region, PDC Engineers is transmitting the attached electronic Planning/Scoping letter for the proposed Newtok Airport Relocation.

This letter and its attachments can be viewed at http://pdcprojects.info/newtok/index.html where you will also find a link to submit comments electronically.

Please note that all comments are requested by **May 22, 2011**.

If you would prefer to mail in your comments, please address them to:

Donald Fancher
Project Manager
State of Alaska, Department of Transportation and Public Facilities
PO Box 196900
MS-2525
Anchorage, AK 99519-6900

Additional questions or comments can be directed to Mr. Fancher at (907) 269-0516 or by email to donald.fancher@alaska.gov .

Thank you

Jeff Shannon
Environmental Coordinator

PDC Inc. Engineers
Planning Design Construction

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"Transforming Challenges into Solutions"

From: Betsy_McCracken@fws.gov [mailto:Betsy_McCracken@fws.gov]
Sent: Tuesday, May 24, 2011 8:52 AM
To: Zimmerman, Teresa J (DOT)
Subject: Mertavarvik/Newtok Airport Relocation

Hi Teresa,

The United States Fish and Wildlife Service (Service) would like to be involved in early planning and scoping for the proposed Newtok Airport relocation project. Due due to the existing Mertarvik airport's location within an inholding of the boundaries of the Yukon Delta National Wildlife Refuge (Refuge), and the proximity to the Refuge for the proposed relocation of the Newtok Airport, the Service is concerned with potential impacts to fish and wildlife resources. The Service would like provide technical assistance and recommendations to avoid, minimize and mitigation for project impacts.

Thank you,

Betsy W. McCracken

Fishery Biologist
Conservation Planning Assistance
Ecological Services
US Fish and Wildlife Service/Region 7/Anchorage Field Office
Betsy_McCracken@fws.gov
(907) 271 - 2783

Jeff Shannon

From: Judy_Jacobs@fws.gov
Sent: Wednesday, July 06, 2011 1:26 PM
To: Jeff Shannon
Cc: Royce Conlon
Subject: RE: Endangered Species act comments on Newtok Airport relocation
Attachments: YK_delta.jpg; Nelson Island Report 2005.pdf; 2011-0112 Newtok airport relocation response.pdf; Kigigak Island.JPG

Jeff, you are right, our wording was unclear. Kigigak is the island we were referring to (to alleviate your confusion there); however, designated critical habitat for Steller's eider (which includes Kigigak) extends to within 4 miles of Mertarvik -- see attached map.

(See attached file: YK_delta.jpg)

Hope this clears things up a bit, and --you're right again-- this correction doesn't make a difference in terms of your project impacts or our response.

Please let me know if you have any further questions about this, and sorry for the confusion.

Judy
****

Judy Jacobs
US Fish and Wildlife Service
AFWFO Endangered Species Program
605 W. 4th Avenue, Rm G-61
Anchorage, Alaska 99501
Phone: (907) 271-2768
FAX: (907) 271-2786

Jeff Shannon <JeffShannon@PDCENG.US>

Jeff Shannon
<**JeffShannon@PDCENG.US**>

07/06/2011 12:14 PM

To"Judy_Jacobs@fws.gov" <Judy_Jacobs@fws.gov>

ccRoyce Conlon <RoyceConlon@PDCENG.US>

SubjectRE: Endangered Species act comments on Newtok Airport relocation

Judy,

I'm working on the environmental analysis for the proposed Newtok Airport Relocation, and there's a discrepancy I'm hoping you can help me clear up. Both the letter and report you had sent us earlier (attached) refer to Kigigak Island as an area with a concentration of Spectacled Eider nesting, approximately four linear miles from the project area. The discrepancy I noted was that according to the USGS maps and Google Earth

(attached screen shot), Kigigak Island appears to be much further to the west; approximately 12 miles. There is a small island in the Ninglick River, approximately 4 miles northwest of the proposed relocation area, so I just want to clarify that that isn't actually the island in question with the Spectacled Eider concentration. Neither island would be directly impacted by construction activities, but we would like to address their location in regard to potential approach routes.

Any clarification you can provide is greatly appreciated.

Thank you,

Jeff Shannon
Environmental Coordinator

PDC Inc. Engineers
Planning Design Construction

1028 Aurora Drive | Fairbanks, Alaska 99709
v 907.452.1414 | f 907.456.2707 | www.pdceng.com
"Transforming Challenges into Solutions"

From: Judy_Jacobs@fws.gov [mailto:Judy_Jacobs@fws.gov]
Sent: Friday, May 06, 2011 4:00 PM
To: donald.fancher@alaska.gov; Jeff Shannon
Subject: Endangered Species act comments on Newtok Airport relocation

Please see the attached documents and contact me if you have any questions on our comments.

Thanks,
Judy

(See attached file: Nelson Island Report 2005.pdf)(See attached file: 2011-0112 Newtok airport relocation response.pdf)

****

Judy Jacobs
US Fish and Wildlife Service
AFWFO Endangered Species Program
605 W. 4th Avenue, Rm G-61
Anchorage, Alaska 99501
Phone: (907) 271-2768
FAX: (907) 271-2786*(See attached file: Nelson Island Report 2005.pdf)(See attached file: 2011-0112 Newtok airport relocation response.pdf)(See attached file: Kigigak Island.JPG)*