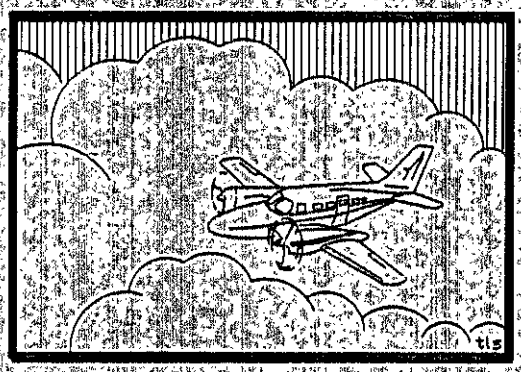
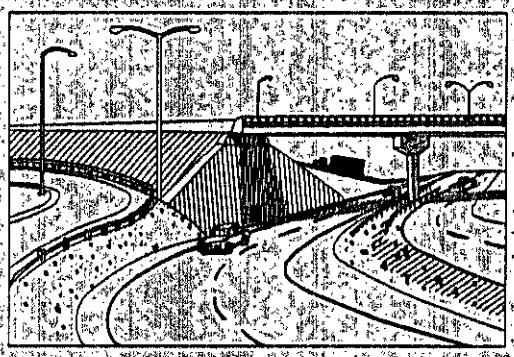
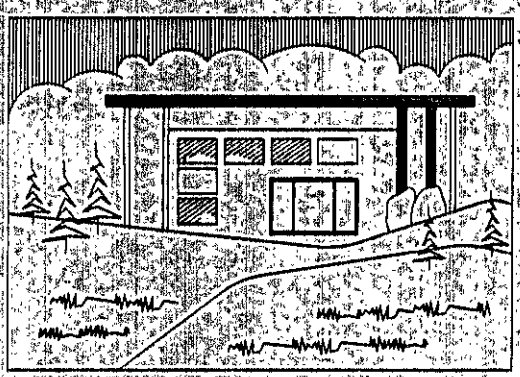
GEOTECHNICAL REPORT

BUCKLAND AIRPORT
MATERIAL SOURCES

FEDERAL PROJECT NO. A.I.P. 3-02-0399-01 / STATE PROJECT NO. 65958







STATE OF ALASKA
Department of Transportation
and Public Facilities

Prepared By

NORTHERN REGION

ENGINEERING SERVICES

GEOLOGY

MAY 1994

GEOTECHNICAL REPORT
BUCKLAND AIRPORT
FEDERAL PROJECT NUMBER AIP 3-02-0399-01
STATE PROJECT NUMBER 65958
NORTHERN REGION
MAY 1994

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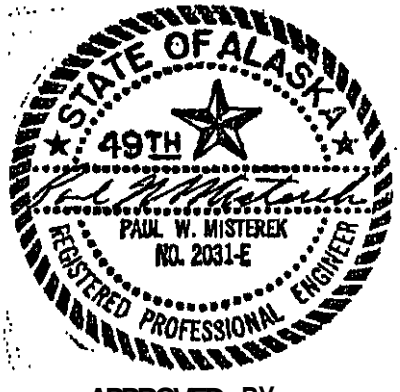

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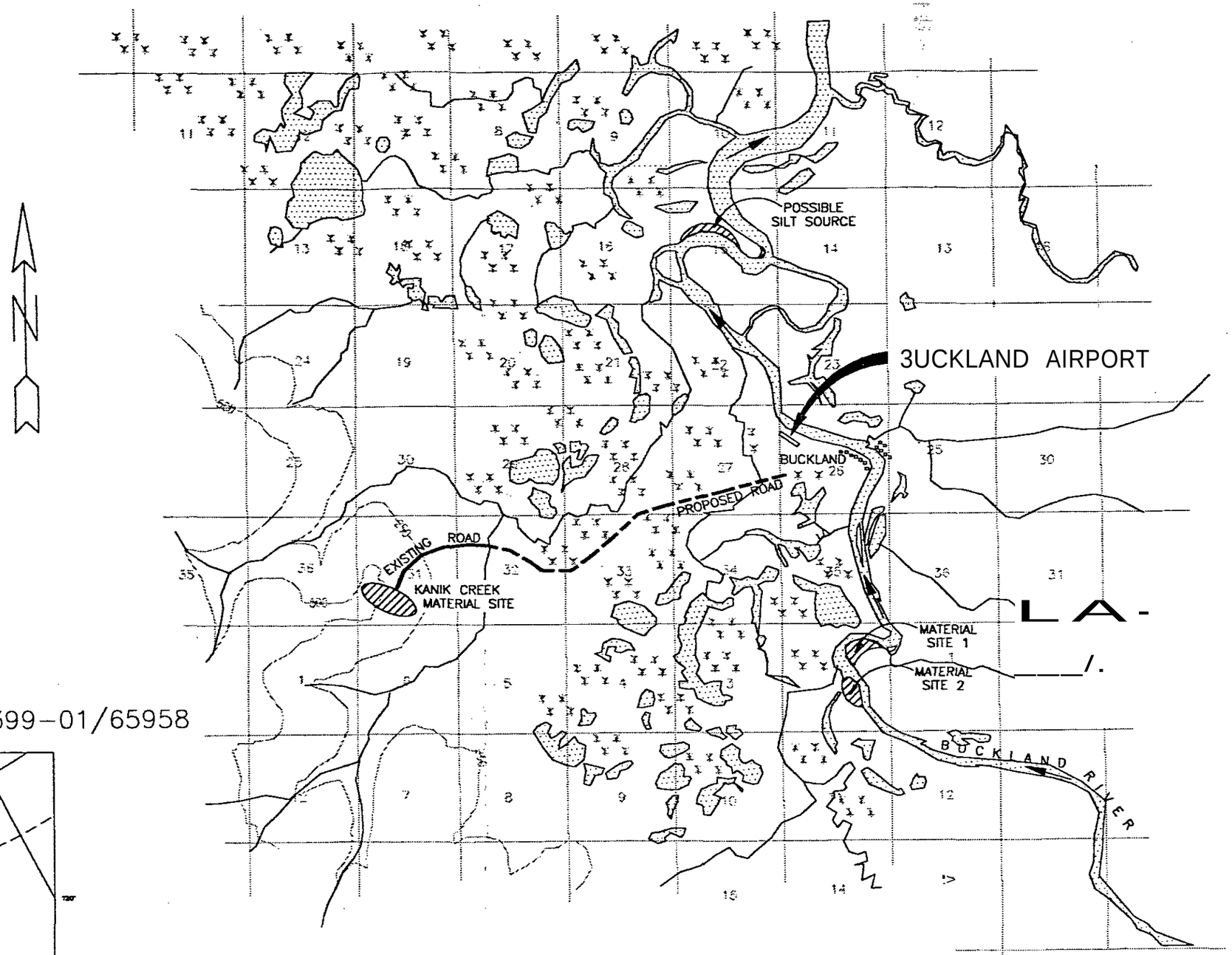
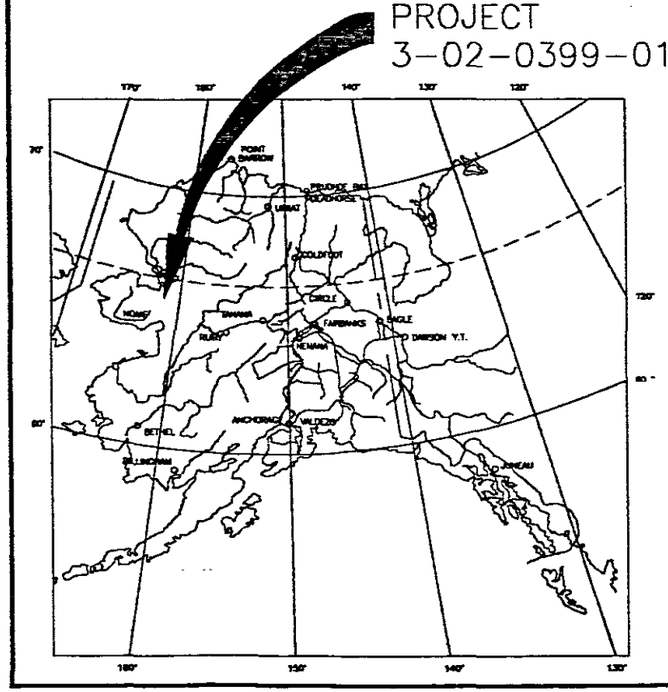
ILLUSTRATIONS





SCALE
0 1
mile

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

DATA: JDB	BUCKLAND **AJRPORT** VICINITY SKETCH
DRAWN: RA	
APPROVED:	PROJECT NO.: 3-02-0399-01/65958
DATE: APR 94	PUFF\TH\65958\65958LOC

GEOTECHNICAL REPORT
BUCKLANO AIRPORT
FEDERAL PROJECT NUMBER AIP 3-02-0399-01
STATE PROJECT NUMBER 65958
NORTHERN REGION

INTRODUCTION

The proposed improvements to the Buckland Airport include:

1. Extending the existing 100 X 3,000 foot runway safety area to 150 X 4,600 feet. This extension would add embankment to the northwest end of the runway and widen the runway by 25 feet on each side.
2. Widening and lengthening the existing 100 x 200 foot apron to 200 x 300 feet.
3. Rerouting the access road around the existing beacon pad to access the apron near the northernmost (corner.
4. The existing beacon pad may be moved north-northeast of the new access road.
5. Resurfacing the runway, taxiway, and apron.
6. Installing a new Airport Lighting System.
7. Construct a heated snow removal equipment storage building on a 100' x 100' pad on the northeast side of the apron expansion.

At the request of Earl Wellen, Project Manager, DOT&PF engineering geology and design personnel performed a brief geotechnical examination of the proposed borrow areas. This investigation gathered samples from two locations on the Buckland River and one location southwest of Kanik Creek.

The examination was completed between June 23 and 24, 1993 by H.R. Livingston, M.J. Morrow, and J.D. Bennett.

Two grab samples were gathered from gravel bars on the Buckland River approximately 2 and 2½ miles upstream from the village of Buckland. One sample was also obtained at the Kanik Creek inaterial site approximately 4.5 miles west of the village of Buckland. The test results of a sample gathered by M.J. Morrow in 1992, from the Kanik Creek Material Site, are also included.

A total of 4 samples were visually identified in the field using DOT&PF textural descriptions and transported to the Northern Region Materials Laboratory for testing.

This report describes the information obtained in the field examination and the laboratory testing and makes geotechnical recommendations concerning the availability and quality of borrow material as tested. Also, reconmendations are made concerning proposed airport improvements based on information collected during previous explorations and construction. The laboratory results are shown on the Soils Testing Reports on pages 12 and 15.

LOCATION

Buckland is located approximately 179 miles northeast of Nome, 108 miles southeast of Kotzebue and about 360 miles northwest of Fairbanks on the south bank of the Buckland River, approximately 14 air miles from its mouth at Eschscholtz Bay, in Kotzebue Sound. See Vicinity Sketch, Figure 1.

GEOLOGY AND TOPOGRAPHY

The project area lies along the western edge of the Buckland River Lowland Section of the Western Alaska Province. The region is generally characterized as a rolling lowland with the relief determined by flat-lying lava flows of Quaternary age. These lavas are commonly cut by granitic intrusions and mantled by a thick layer of aeolian (wind-blown) silt. The Buckland Airport is located on the floodplain of the Buckland River, which contains several tens of feet of alluvial material (sand, gravel, and rocks) covered by 2 to 5 feet of peat and 3 to 10 feet of sandy silt. These materials are perennially frozen except near larger rivers and lakes.

The upland material source, located west of Kanik Creek, is composed of granitic rock that is part of the Hunter Creek pluton. The rock is of Cretaceous age and consists chiefly of hornblende and pyroxene monzonite and syenite with some biotite quartz monzonite.

The Buckland River bars are generally composed of alluvial sandy gravel and gravel that consists of well-rounded particles of dark brown vesicular basalt. Occasional large angular blocks of vesicular basalt, to approximately 8 feet in diameter, were noted in the vicinity and especially in front of town.

Test holes drilled during the investigation performed by Shannon and Wilson, in 1980, generally showed 1.0 foot of surface organic mat over 4 to 8 feet of ice-rich organic silt, organics, and/or massive ice. The natural moisture content of the foundation soils ranged from 160.1% to 590.5% while the organic content ranged from 7.7% to 69.3%.

VEGETATION

The vegetation near the runway is typical of a sedge meadow complex consisting of sedge grasses and tussocks. Near the Kanik Creek material site the vegetation is more typical of heath tundra with tall alder shrubs.

CLIMATE

The project lies within the subarctic region and in the transitional climatic zone of Alaska. The weather generally fluctuates between maritime and continental conditions. The moderating influence of Kotzebue Sound is only felt during the summer and fall (May to October). Storms moving through the area in July and August provide almost continuous cloud cover and raln. During the summer the daily temperature range is small. Once Norton Sound freezes, generally in November, the climate changes from maritime to continental.

The climatological data presgnted below was taken ,from the "Environmental Atlas of Alaska" and is considered representative for the project area:

Mean Annual Precipitation, inches.	10
Mean Annual Snow, inches..	40
Mean Annual Temperature, F	22
Thawing Index, degree days	1400
Design Thawing Index (1 year in 10)	2600
Freezing Index, degree days..	4900
Design Freezing Index (1 year in 10)	6400

GENERAL MATERIAL SITE INFORMATION

Sand and gravel from the alluvial sand and gravel bar sites along the Buckland River were used for the initial relocation and construction of the existing runway and apron. For further information on previous work in the area see the 1981 Geotechnical report compiled by Shannon and Wilson.

Results from laboratory tests indicate that. the gravel and sandy gravel from the river bar sources and the bedrock from the Kanik Creek quarry source generally meet the requirements for Embankment. The alluvial material is extremely clean however (<1%-200), and may require the addition of finer material to achieve the desired compaction. The river gravel is generally too small to crush though results from a quality test submitted in 1980 indicate that it meets the L.A. and sulphate soundness requirements for Aggregate Surface Course. The test results of quality samples submitted in 1992 and 1993 indicate that the sampled material from the Kanik Creek Material Source was of variable quality and generally does not meet the quality requirements for Aggregate Surface Course. (See test results).

GENERAL DESIGN COMMENTS AND RECOMMENDATIONS

1. Do not disturb the organic mat in the area of any proposed improvements. The natural ground organic mat will serve soil separation purposes and provide some support for construction equipment. Care will need to be exercised in order to place the first fill layer thick enough to protect the surface organic layer from being damaged by construction equipment. The initial layer of fill should be at least 3 feet thick and placed by end dumping and then spreading with a bulldozer.

2. Separation type geotextile fabric is recommended between Embankment Material and wet, fine-grained foundation soils to eliminate pumping of silt into the cleaner fill material and to better facilitate the use of truck equipment in the area of the improvements. Areas with an unbroken organic layer may not require separation fabric.

3. To insure adequate compaction, bench the foreslope of the existing embankment on the sides and the end to be extended.

4. It is anticipated that widening the embankment will result in differential thaw settlement during and after the completion of construction. To compensate for settlement, do not slope or minimize the slope on the shoulder of the widened and lengthened sections. After two years it is anticipated that all practical thaw settlement will have occurred and maintenance effort to keep a level surface should decrease.

5. For quantity calculations:
   a. Use a 10 percent shrink factor for all excavated gravels.
   b. Use a 15 percent shrink factor for excavated silt.
   c. Assume 1 foot of settlement during construction.
   d. Use a 10 percent shrink factor for surficial Kanik Creek material. If material has to be blasted from deeper in the site, use a 5% swell factor.

6. Use a minimum of 6 inches of aggregate surface course over a minimum of 30 inches of Borrow Embankment on the runway and apron expansion. Use of 8 inches of aggregate surface course is suggested to provide additional material for blading, thus retaining the finer surface course material over a longer period.

7. To slow thawing of permafrost and to match existing construction use 6 inches of polystyrene insulation board placed 34 inches below the final grade. The joints between the boards must remain tight to attain maximum performance. Use of 2 or more layers of insulation board with staggered joints is recommended. An 8 inch thick cushioning layer composed of minus 3-inch diameter materials should be placed below and above the insulation.

8. The top 6 inches of Borrow Embankment and material in contact with the insulation should contain 100 percent passing the 3-inch screen and a maximum of 15 percent passing the 200 mesh screen. For the remainder of the Borrow Embankment, use 100 percent passing the 10-inch screen and a maximum of 25 percent passing the 200 mesh screen.

9. Silt may be used for fill material, beneath the Borrow Embankment layer, if it is thawed, drained and dried before placement. However, this may take considerable time (all summer) and may be impossible in a relatively wet year. Silt that has a natural moisture content of more than 5 percent above optimum moisture should not be used in the structural portion of the embankment. Water present at the toe of the embankment should be removed prior to fill placement or oversaturation of the silty fill will occur.

10. Fill thaw pits in the existing terrain and at the edges of the runway with material composed of at least 60 percent silt (P200). Waste material, including organic silt, peat, silt with rock fragments and material with a natural moisture content over up to 90 percent is acceptable for use as thaw-pit fill. Ideally, fill material should be unfrozen to allow some compaction. If use of frozen material cannot be avoided use "sheeps-foot" rollers to reduce voids. Separation geotextile should be placed over this material where the runway embankment will be extended onto these filled areas.

11. Sideslopes should be no steeper than 2:1 for all improvements. The recommended sideslopes should be a minimum of 4:1 to provide lateral support for the embankment and as flat as 6:1 to reduce snow accumulation.

12. If winter construction is required, frozen material may be placed in the embankment if heavy vibratory compactors and "sheeps-foot" rollers are used to ensure partial compaction. Additional compaction will be necessary after the following spring or summer thaw depth has progressed at least 36 inches. Surface ice present must be removed before fill placement.

13. The shop building foundation should contain a minimum of 8 inches of insulation. Placement of the building should consider wind direction to avoid show drifts.

14. Seed all slopes and ditches with a clover-containing seed mix of annual and perennial grasses.

Because of the relatively uniform foundation conditions anticipated in the area, these recommendations apply to all of the planned improvements.

SYMBOLS AND DEFINITIONS

BASIC MATERIAL SYMBOLS

ORGANICS (Org)

CLAY (Cl)

ICE

SILT (Si)

SAND (Sa)

GRAVEL (Gr)

ANGULAR FRAGMENTS (Ang Frogs)

COLLUVIUM (Coll) ***

BEDROCK (Bx), soft (Type)

BEDROCK (Bx), hard (Type)

NOTE

MAIN COMPONENT (UPPER CASE..SOLID LINES)
MINOR COMPONENT (lower case..DASHED LINES)
*** MIXTURE OF ROCK FRAGMENTS IN SILT AND SAND MATRIX

SIZE DEFINITIONS

BOULDERS	12" +
COBBLES	5" TO 12"
GRAVEL	.10 TO 3"
ANGULAR FRAGMENTS	10 TO 12" +
SAND	200 TO #10
SILT	MINUS #200 (P.I. 10 OR LESS)
CLAY	MINUS #200 (PI>10)

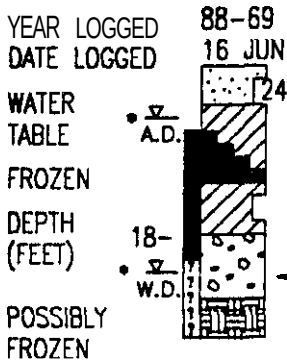
TEST .RESULTS

-2-200	= 2 PASSING
N.M. _%	= NATURAL MOISTURE
ORG. _%	= ORGANIC CONTENT
L.A.:_	= LOS ANGELES ABRASION
DEG.:_	= DEGRADATION
P.I._	= PLASTIC INDEX

MISC.

Tr.	= TRACE (0-6%)
w/_	= WITH UNSPECIFIED AMOUNT
X'tls	= CRYSTALS

TYPICAL LOG



* W.D.= WHILE DRILLING, A.D.= AFTER DRILLING

** BLOW COUNT INDICATES SAMPLE TAKEN WITH STANDARD PENETRATION TEST (1.4"I.D.., 2.0" O.D. SAMPLER DRIVEN WITH 140 LB. HAMMER, 30" FREE FALL)

PLAN VIEW SYMBOLS

POWER AUGER TEST HOLE (T.H.)

HAND AUGER TEST HOLE (T.H.)

EXPOSED MATERIAL

PROBE

HAND DUG TEST PIT (T.P.)

DOZER/BACKHOE TEST TRENCH (T.T.)

BODY OF WATER

FLOW DIRECTION

XXXXX WASTE BERM

BANK

SWAMP

TREELINE

COLOR

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

MOISTURE

dry	= < OPTIMUM*
moist	~ OPTIMUM*
wet	= > OPTIMUM*

* OPTIMUM MOISTURE FOR MAXIMUM DENSITY

FIGURE 2

ALASKA DEPARTMENT OF TRANSPORTATION TEXTURAL SOIL DESCRIPTIONS

Rev. May 11, 1993

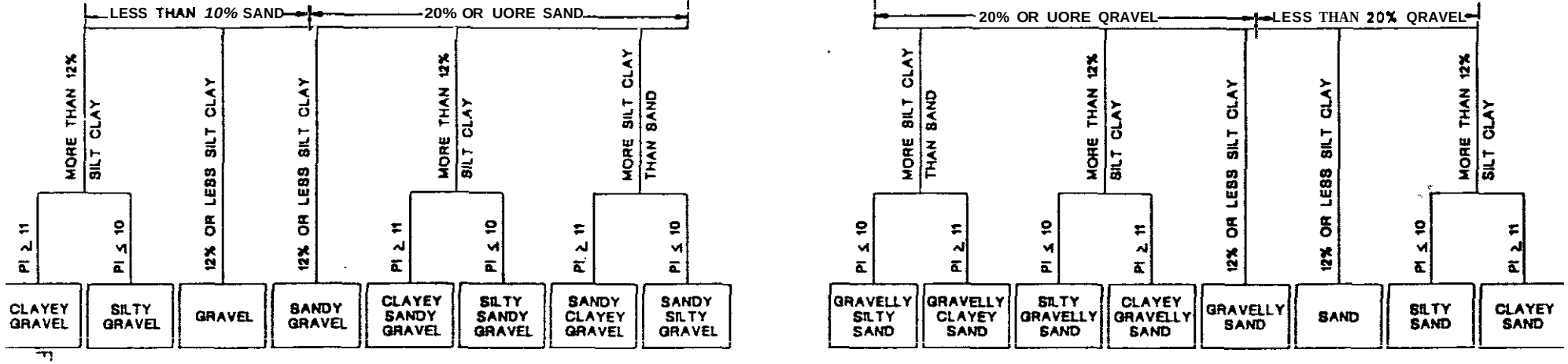
NOTES: 1) All silts with a plastic index > 4 shall be termed "slightly clayey".

2) Sands and gravels with 7% thru 12% silt and/or clay (#200) shall be termed slightly silty or if plastic, (PI > 4), slightly clayey sand or gravel.

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

COARSE-GRAINED SOILS
35% OR LESS SILT/CLAY

GRAVEL > SAND | SAND ≥ GRAVEL



FINE-GRAINED SOILS
36% OR MORE SILT/CLAY

PI ≤ 10 | PI > 10

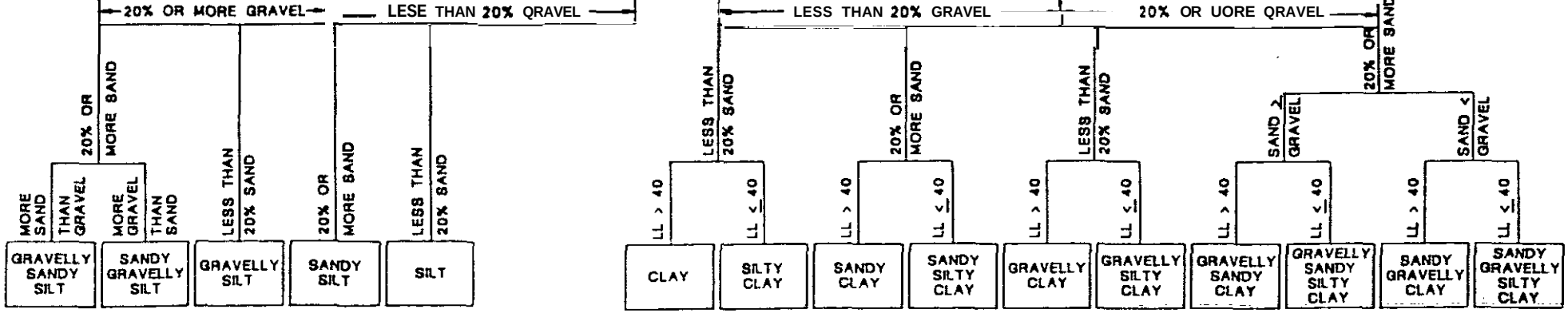


FIGURE 3

				Soil Classification	
				Group Symbol	Group Name[a]
Coarse-Grained Soils More than 50 % retained on No. 200 sieve	Gravels More than 50 % of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5 % fines[c]	Cu ≥ 4 and 1 ≤ Cc ≤ 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 ≥ 6 and 1 ≤ Cc ≤ 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 or 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 < 0.15	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.

Gravels 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

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

[c] Gravels 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] $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[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 or plots below "A" line.

[p] PI plots on or above "A" line.

[q] PI plots below "A" line.

FIGURE 4-1

UNIFIED SOIL CLASSIFICATION SYSTEM
(BASED ON ASTM D-2487)

BUCKLAND RIVER BARS
LOCATION AND ACCESS

The sampled sand and gravel bars in the Buckland River are located about two miles upstream from the village. One sand and gravel bar is on the opposite (east) bank of the river while the other is on the west side of the river. No haul road exists to either of these sources and a winter haul road would have to be constructed to obtain material. Material was removed from them to construct the present airport and to provide small quantities of material for village 4-wheeler trails. A winter haul road was used to reach the site in the spring after ice on the river had thickened. Use of these pits will be weather dependent and quantities available will vary seasonally.

DESCRIPTION

The sandy gravel and gravel in these sites are alluvial in origin, recently deposited by flows in the Buckland River, and consist of well-rounded particles of dark brown vesicular basalt. The gravel is generally less than 3 inches in diameter with less than 1 percent cobbles by visual estimate. Occasional large angular blocks of vesicular basalt, up to a diameter of approximately 8 feet, were noted in the vicinity and especially in front of town. These large blocks have apparently been ice-rafted to their present location from farther upstream, where bedrock lava flows outcrop on the stream bank.

CLEARING AND STRIPPING

No clearing or stripping S necessary as the sand and gravel bars are bare at low water.

WATER TABLE

Sand and gravel were obse ved to be present 5 to 7 feet above the water level in the river durins June. 1993. Winter water levels may be lower. While travelling to the site via boat, the outboard motor prop struck the gravel bottom of the river on numerous occasions, especially in the vicinity of the gravel bars. High water flows during spring breakup are 6 to 8 feet higher and cover the gravel bars.

FROZEN GROUND

Investigation using a steel probe during June did stop on seasonally frozen material at a depth of 4 feet in several probe locations. Ripping frozen sandy gravel during the spring will be difficult.

LAND STATUS

The Buckland River is a navigable stream arid all gravel bars are owned by the State up to the ordinary high water level.

QUALITY OF MATERIALS

The sand and gravel in this source contain few particles smaller than fine sand. The gravel bar materials are suitable for embankment and possibly for asphalt aggregate and aggregate surface course. The abundance of sand and lack of fines will result in a very soft, cohesionless surface if this material is used without adding either fines or asphalt to stabilize it. Fines consisting of crushed rock fragments from the Kanik Creek bedrock source combined with the sand or by themselves will provide a dense, compact surface if they are available.

MINING PLAN

A winter haul road (probably March or April) will be needed to transport material from these sand and gravel bars to the airport. The material must be stockpiled and allowed to thaw before use in the airport improvements.

Material should be mined from the sand and gravel bars by removing a thin (3 to 5 foot) layer over a large area. Digging deep holes in the bar will not be permitted. Such deep holes will trap fish. Mining will require a Corps of Engineers permit and concurrence from the Alaska Department of Fish and Game.

REHABILITATION

Smooth the area mined to allow non-turbulent flow over the bar as water levels rise and fall. Rehabilitate in accordance with an approved reclamation plan.

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

PROJECT NAME: **Bucklend Airport improvements**
PROJECT NUMBER: 30798422
SOURCE: **Bucklend River M.S.**
SAMPLED BY: J.D. Bennett

TEST HOLE NO.		GRAB	GRAB					
DEPTH (FEET)		0-1	0-1					
STATION (LOCATION)		**Site** No.2	**Site** No.1					
OFFSET (FEEJ)								
LAB NO.		93-2671	93-2672					
DATE SAMPLED		6-23-93	6-23-93					
PERCENT PASSING-								
	3"							
	2"	100	100					
	1"	95	96					
Gravel	**3/4"**	89	89					
	1/2"	75	77					
	3/8"	65	67					
	#4	37	48					
	#10	18	33					
Sand	**#30**	9	13					
	#60	2	1					
	#100	1						
Silt\Clay	**#200**	0.5	0.1					
	.02mm							
	.005mm							
Clay	**.002mm**							
LIQUID LIMIT		NV	NV					
PLASTIC INDEX		NP	NP					
CLASSIFICATION		GW	GW					
SOIL DESCRIPTION		Gr	SaGr					
NATURAL MOISTURE								
SP.GR. (FINE)								
SP.GR. (COARSE)								
***MAX** DRY DENSIN*								
OPTIMUM MOISTURE								
L.A ABRASION								
DEGRADATION FACTOR								
SODIUM SULF. (CRSE)								
SODIUM SULF. (FINE)								
ORGANICS								

REMARKS

buck01

- Gradation is based on material passing the 3 inch sieve, according to Alaska Test Method T-7.
  See graphic logs for amount of +3 inch material, if any.

KANIK CREEK MATERIAL SOURCE
LOCATION AND ACCESS

This developed source is an upland site about 4.5 miles west of the Buckland Airport. Work to provide access has been started and about one-half mile of roadway has been built from the site. The terrain that must be crossed is swampy, flat, and contains at least two creeks that must be crossed - Kanik Creek and Keeyuk Creek. An undersized culvert is in place at the Kanik Creek Crossing. Both will require substantial pipes or small bridges. Additional work on extending this haul road to the village is scheduled for the summer of 1994.

DESCRIPTION

The material in this site consists of granitic bedrock that is covered with a 2 to 5 foot thick layer of colluvium consisting of silt and angular rock fragments. The site is developed on the lower slopes of a series of rounded hills that rise gradually to heights of over 1100 feet. Buckland airport is at an elevation of 30 feet. The quarry is on a hill about 400 feet higher than Buckland. The coarsely crystalline granitic material appears to be a quartz-monzonite porphyry. Joints exposed in the worked area are 2 to 5 feet apart and have rather random orientations. Three to four feet of the bedrock surface is weathered and some of the material is sand-like. Additional outcrops of similar granite were seen farther up the slope at a distance of approximately one quarter mile. Much of this surface layer has been removed from the developed area to construct the beginnings of an access road. The short segment built is in relatively good condition and is 20 to 25 feet wide. Where the existing access road crosses low lying areas the embankment is in poor condition.

Harder material of a less weathered, more massive nature is present in the floor of the worked area. Blasting will be necessary to obtain deeper material. Crushing will be necessary to produce desired gradations.

CLEARING AND STRIPPING

Alder brush clumps 50 to 200 feet apart grow on the slopes. Individual clumps are 8 to 10 feet tall. Low moss and lichens cover the rocky surface between alder clumps. Overburden consisting of mixed silt and rock fragments covers the bedrock. This colluvial layer ranged from 2 to 8 feet thick in the developed area.

WATER TABLE

No water table was observed, however, seepage from the surface of the surrounding permafrost may enter the site from higher slopes.

FROZEN GROUND

At this latitude and elevation perennially frozen ground should be expected within 1 or 2 feet of the surface.

LAND STATUS

The local native village corporation or the regional corporation own the land and the contractor will need to coordinate use of the site with the corporations. Village leaders have indicated the corporation desires to develop this site.

QUALITY OF MATERIALS

Laboratory tests are attached. Results from a sample collected in 1992 indicated an Los Angeles Abrasion percentage loss of 54 and a degradation test value of 21. The specific gravity of the coarse and fine material is 2.61 and 2.59, respectively.

Results from a 1993 Los Angeles Abrasion test gave a loss of 49 percent. The degradation test gave a result of 55. The specific gravity of the coarse and fine material is 2.64. The sodium sulfate loss on the coarse material was 10.6.

MINING PLAN

A winter haul road (probably March or April) would be needed to transport material from this site unless the haul road construction has been completed.

The site was opened while the ground was frozen. Equipment was moved to the site over a frozen winter trail. Summer work later permitted placement and compaction of the roadway by hauling equipment. There is no summer access unless the haul road is completed before the airport contract is awarded.

Ripping the overburden and 2 to 5 feet of the weathered rock may be possible but drilling and blasting to remove deeper unweathered material will be necessary.

The owners must be contacted to determine how they desire to develop the site. Additional area will need to be stripped of overburden to provide adequate area for site development. The floor should be sloped to allow drainage and keep the work area dry.

REHABILITATION

Rehabilitate in accordance with a reclamation plan approved by the property owners. Smoothing the work area and sloping backslopes to 1½:1 may be all that will be required.

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

PROJECT NAME: **Buckland** *Airport* **Improvements**
PROJECT NUMBER: 30798422
SOURCE: *Kanik* **Creek M.S.**
SAMPLED BY: I.D. **Benne** A. **Morrow**

TEST HOLE NO.		92-1	Grab	Grab				
DEPTH (FEET)		2-4	0-1	0-1				
STATION (LOCATION)		Kanik Cr.	Kanik Cr.	Kanik Cr.				
OFFSET (FEET)								
LAB NO.		93-3102	93-2673	93-2674				
DATE SAMPLED		10-19-92	6-24-93	6-24-93				
PERCENT PASSING-	+3"	10.5	71.4					
	3"	100						
	2"	97	11					
	1"	91	4					
Gravel	3/4"	87	4					
	1/2"	80	4					
	3/8"	76	3					
	#4	58	3					
	#10	39	2					
Sand	#30	22	1					
	#60	16	1					
	#100	14	1					
Silt\Clay	#200	12	0.5					
	.02mm	6						
	.005mm	4						
Clay	.002mm							
LIQUID LIMIT		NV	NP					
PLASTIC INDEX		NP						
CLASSIFICATION		SW-SM						
SOIL DESCRIPTION		BEDROCK	BEDROCK	BEDROCK				
NATURAL MOISTURE		6.4		2.4				
SP.GR. (FINE)		2.59	2.64					
SP.GR. (COARSE)		2.61	2.64					
MAX DRY DENSIN		133.3						
OPTIMUM MOISTURE		6.4						
L.A. ABRASION		54	49					
DEGRADATION FACTOR		21	55					
SODIUM SULF. (CRSE)			10.6					
SODIUM SULF. (FINE)								
ORGANICS								

REMARKS

buck02

- Gradation is based on material passing the 3 inch sieve, according to Alaska Test Method T-7.
  See graphic logs for amount of t 3 inch material, if any.

REFERENCES

Abbott, Rohn D., 1981, Geotechnical Recommendations for Proposed Runway, Buckland Alaska, Shannon & Wilson, Fairbanks 28p.

Bates, Robert L, and Jackson, Julia A., 1980, Glossary of Geology, Amer. Geol. Inst., Falls Church, Virgiinia, 751p.

Candle, 1951, (D-5), Alaska. Quadrangle, USGS Printing Office, 1:63,000 Map.

Cass, J.T., 1959, Reconnaissance Geoloyic Map of the Candle Quadrangle, Alaska, United States Geological Survey, Map I-287.

Hunt, R.E., 1984, Geotechnical Engineering Investigation Manual, McGraw-Hill Book Company, 983p.

Johnson & Hartman, 1984, Environmental Atlas of Alaska, 2nd Ed. Revised: Inst. of Water Resources, Univ. of AK, Fairbanks, 95p.

Patton, Jr., W.W., 1967, Regional Geologic Map the Candle Quadrangle, Alaska, United States Geologicail Survey, Map 1-492.

Pewe, T.L., 1975, Quaternary Geology of Alaska, U.S. Geol. Sur. Prof. Paper 835, U.S. Gov't. Printing Office, Wash., 145p., 1 map, 2 tables in pocket.

Rosadiuk, T., 1977, Village Site Investigations, Buckland, Alaska, RoEn Design Associates, Fairbanks, 70p.

Staff, 1983, Geotechnical Proced. Manual, Alaska Dept. of Transportation and Public Facilities, Division of Stds & Tech. Ser., Materials Section, Anchorage, 58p.

_____, 1983 General Contract Provisions and Construction Spec. for Airports, AK. DOT&PF.

Wahrhaftig, Clyde, 1965. Physiographic Div. of Alaska, US Geol. Survey Prof. Paper 482, US Government Printing Office, Wash. D.C., 52p., 6 plates.