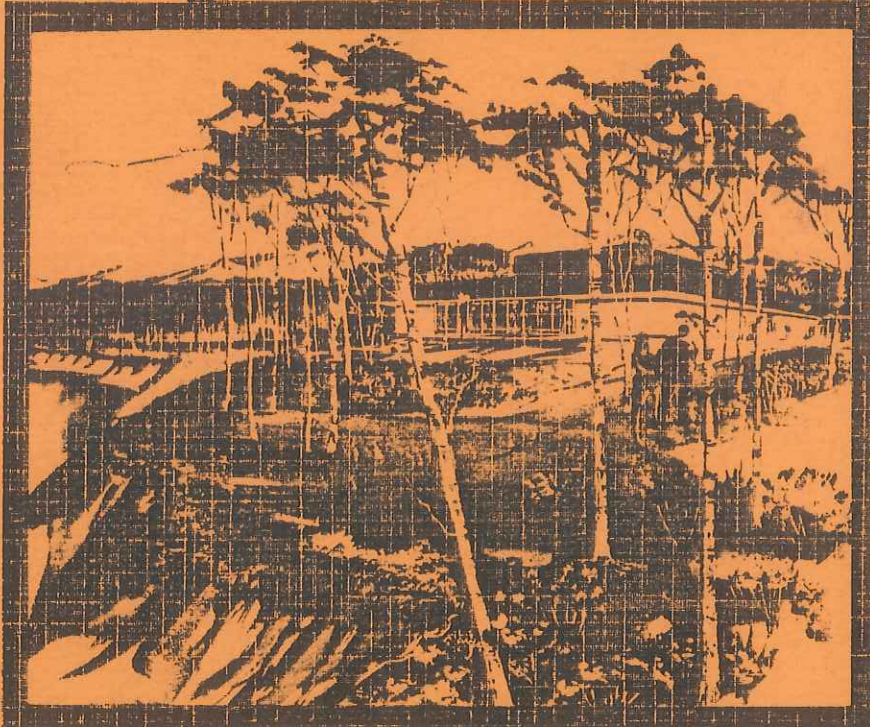


TOTCHAKET
AGRICULTURAL
ROAD

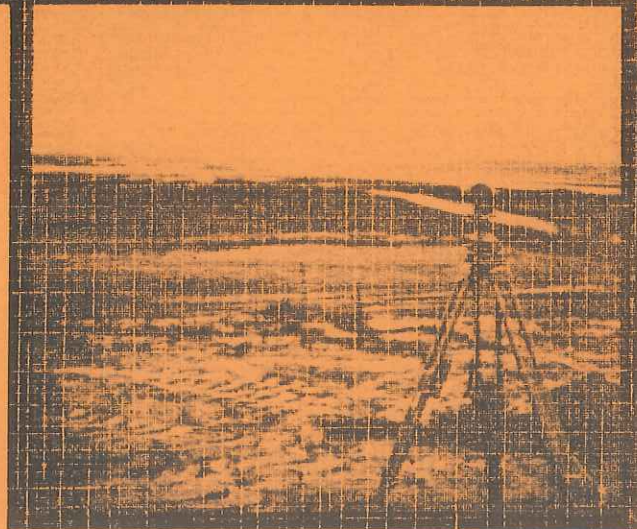


SOILS
INVESTIGATION
FOR THE
CITY OF NENANA

Steve

Bainbridge

~ Office ~
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710 3rd Ave. / P.O. Box 2540 / Fairbanks, Ak 99706 / 452-1267 / 456-5155

**TOTCHAKET AGRICULTURAL ROAD
SUBSURFACE SOILS INVESTIGATION**

Introduction

This report was prepared to evaluate the feasibility of constructing a network of roads and three bridges on the proposed TOTCHAKET AGRICULTURAL DEVELOPMENT SITE. The subsurface soils investigation was conducted by Construction Test Lab for the City of Nenana. Denali Drilling was sub-contracted for performing the actual drilling. This report is not intended to be used for final analysis of design.

Site Description

Geologically, the proposed Totchaket Agricultural Development lies in the Tanana Lowland. The vegetation is the same as that found at the Nenana River Bridge Crossing, consisting of sedges, grasses, willow, aspen, alder, cottonwood, spruce and birch.

The proposed roadway network extends from the Nenana River at the City of Nenana, for 22 miles west. The roadway network consists of about 37-38 miles of primary, secondary and tertiary roads. This report was conducted on 30 miles of primary and secondary roadway only.

The first six miles of roadway west of the Nenana Bridge Crossing traverses an area with swamps, interdispersed permafrost, encroached river beds and alluvium deposits at the crossings for the Little Nenana River and the East & West branches of the Middle River.

At one mile east of the lake, the elevation increases slightly from 350' (average) to 400', as the proposed roadway trends away from the Nenana River Floodplain. Vegetation changes slightly from predominantly cottonwood, spruce, and sedges to spruce and birch. With the exception of four or five small areas of permafrost and swamp, the roadway traverses a series of rolling sand dunes created by glaciation and reworked through aeolian action.

Field Soils Investigation

Drilling sampling, and logging were performed over an 8 day time span. The borings were performed using a B-51 Mobile Drill mounted on a Nodwell tracked vehicle. On the East and West branches of the Middle River, samples were taken driving 8" continuous flight hollow stem augers and utilizing or driving a standard split spoon sampler. The remainder of samples were obtained by driving 8" continuous solid flight auger and either spinning up the samples or taking them directly off the auger. The weather remained moderate (30-40 degrees F.) throughout the project. The only concern was deteriorating ice bridges on the Nenana River and the drilling rig overheating due to a deficient cooling capacity.

Altogether forty six borings were taken; 2 30' split spoon borings on the East & West Middle River, and one 40', three 25', three 20', four 15', and thirty-three 10' borings on the proposed roadway.

The drilling program was modified from the original proposal which entailed two 30' split spoon and fifty 10' holes, because of the lack of information this program would have provided. By drilling the deeper holes, two or three potential borrow sources for gravel were located, the extent of three areas of swamp were made evident, and areas of permafrost and reworked dunes were located and identified.

In areas consisting of a silt loam grading into a fine sand showing evidence of good drainage and potentially good subgrade, 10' holes were drilled.

Lab Soils Testing

Moisture Contents, Mechanical Analysis, and hydrometers were run on selected representative samples in the lab to verify the field logs. The soils found in the East & West Middle River consisted of poorly graded fine and medium sands - SP, grading into well graded sand and gravel - GW or SW. The soils on the roadway were predominantly inorganic silt loam - ML overlaying poorly graded fine and medium sands - SP, with exceptions in the permafrost, swamp, and borrow source areas. The swamp and permafrost areas usually consisted of deeper deposits of peat and organic or inorganic silts - ML. The borrow sources graded from an organic silt or inorganic silt - ML, to a silty sandy gravel - GW or GM.

Moisture contents were predictably high in swamps, permafrost and at the borrow sources, but ran relatively low where fine sands were predominant at 10' on the roadway.

Structural Soils Analysis

East and West Middle Rivers:

Bearing capacities of the sand averaged 8,000 lbs./sq.ft. at depths of 20 feet or greater, and the gravelly sands 10,000 lbs./sq.ft. Both exhibited a compact state of density. Unit weight for the sands are approximately 120 lbs. to 122 lbs./ft.³, and the gravelly sand 132 lbs./ft.³, or 93% of 100% compaction using D-1557. Below 20 feet, the material is structurally similar with the same properties as those found on the Nenana River. Above 20 ft, the major distinction between the sands on the Nenana River and those found on the Middle River is the gradation. On the Nenana River, the sands were classified SW (well graded) and the sands above 20 feet on the Middle are SP (poorly graded) predominantly fine and medium grained.

As in the case of the Nenana River, the material load distribution will exhibit a 30 degree vertical repose if piles are driven. The coefficient of lateral earth pressure for depth of pile will equal 1 whether driven or vibrated, and the coefficient between the sand and pile will equal .45.

The values given are averages of test results and are for preliminary soils analysis. The designer may adjust these results to insure an adequate factor of safety.

The economics of building a roadway dictate many times on how the road will be built. Structurally, the soils of the proposed Totchaket Roadway can be divided into two basic groups. The first has a typical soils profile with an average silt loam layer of 2 to 7 feet, overlying a fine to medium sand with little or no fines. The active frost zone consistently broke off at the end of the silt loam profile. Below the sand had little or no moisture.

The second group of soils are the permafrost soils and those found in the swampy areas. They are characterized by having a higher organic content with an active frost zone of 10 feet to an undetermined depth. These soils have a low permeability and high water retention characteristics.

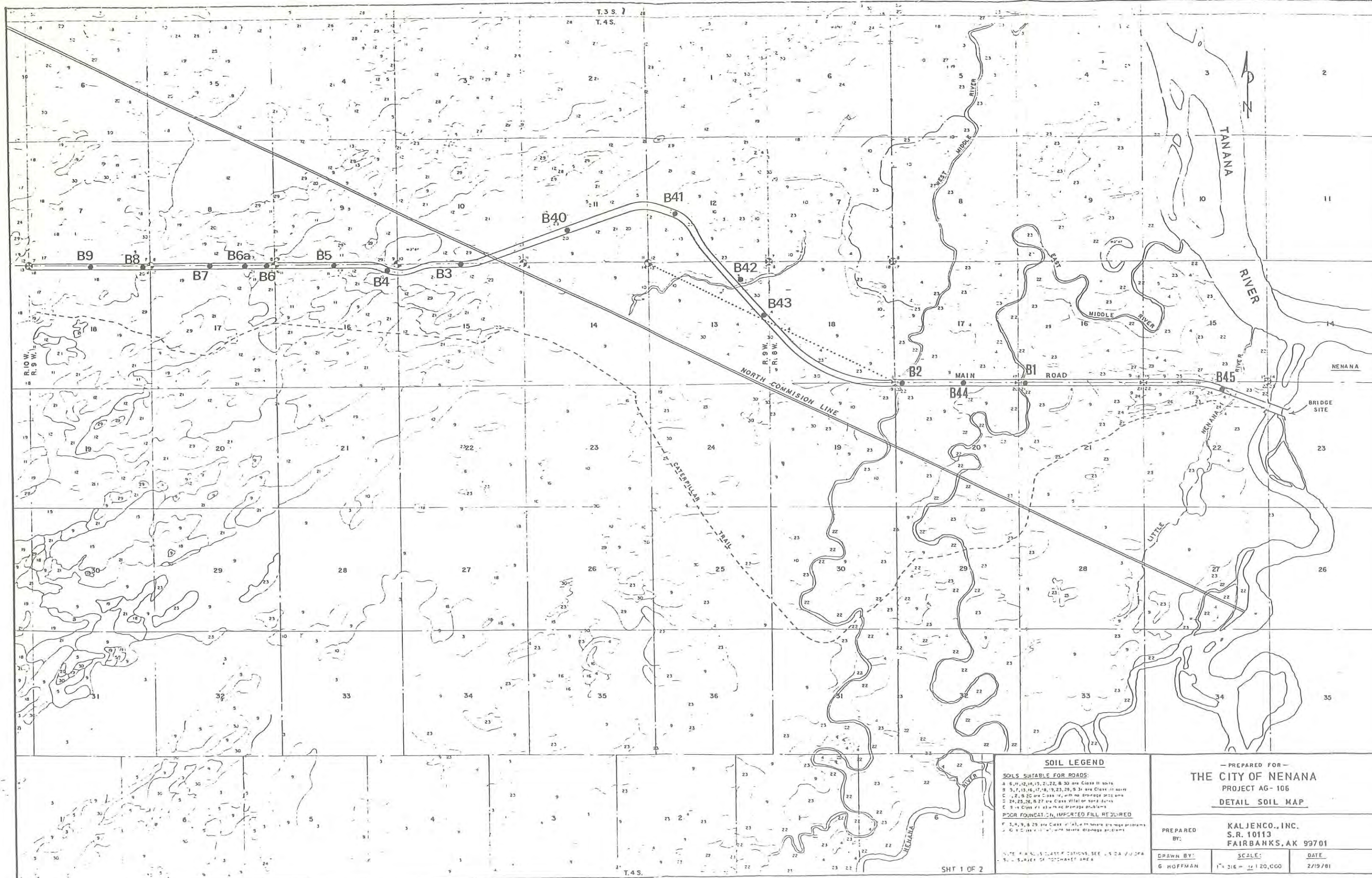
In areas where the silt loam overlies fine sands, drainage below 5 feet on the average does not present any apparent problems. Slope stability on some of the dunes with a slope of greater than 15 degrees could. One alternative in building on the dunes is excavating the silt loam to an average of 5 feet and backfilling with sandy gravel from a borrow source. A potentially less costly alternative is to leave the silt loam in place and utilize a stabilization fabric such as Typar. Less road fill would be necessary with fabric stabilization. Regarding the problem with slope stability, those sand dunes with a slope greater than 15 degrees may be cut down.

The permafrost soils and swamps present different problems in regard to water retention and load bearing. In the case of the silt loam profile, excavating out some of the material presents one alternative. With the permafrost & swamp, the roadway may built up with sandy gravel and compacted to a depth that would both bridge material with a low bearing capacity and insulate the permafrost from thawing out. Again, Typar or another stabilization fabric could be utilized by increasing load bearing and as an insulating barrier underneath any fill to be used. As in any case where roads are built across swamps or permafrost areas, a certain amount of annual maintenance will be required.

Three potential borrow sources were identified through the drilling program, the slough two and one half miles east of the lake, the land mass between the East and West Middle Rivers and the Little Nenana River. How extensive a source of fill is present can only be determined by more drilling. Additionally, these silty sandy gravels may require washing, depending on what percentage of fines are present.

Conclusions

This report was written only to evaluate the feasibility of building a road and bridges for the proposed Totchaket Agricultural Development. It is not intended to establish any specific design parameters and the economics of building the road and bridges will be dependent upon what alternatives are utilized by the design engineer.



SOIL LEGEND

SOILS SUITABLE FOR ROADS:

- A 6, 11, 12, 14, 15, 21, 22, B 30 are Class II soils
- B 5, 7, 13, 16, 17, 18, 19, 23, 29, 31 are Class III soils
- C 1, 2, B 20 are Class IV, with no drainage problems
- D 24, 25, 26, B 27 are Class VIII or worse soils
- E 9 - 4 Class VI, with drainage problems

POOR FOUNDATION, IMPROVED FILL REQUIRED

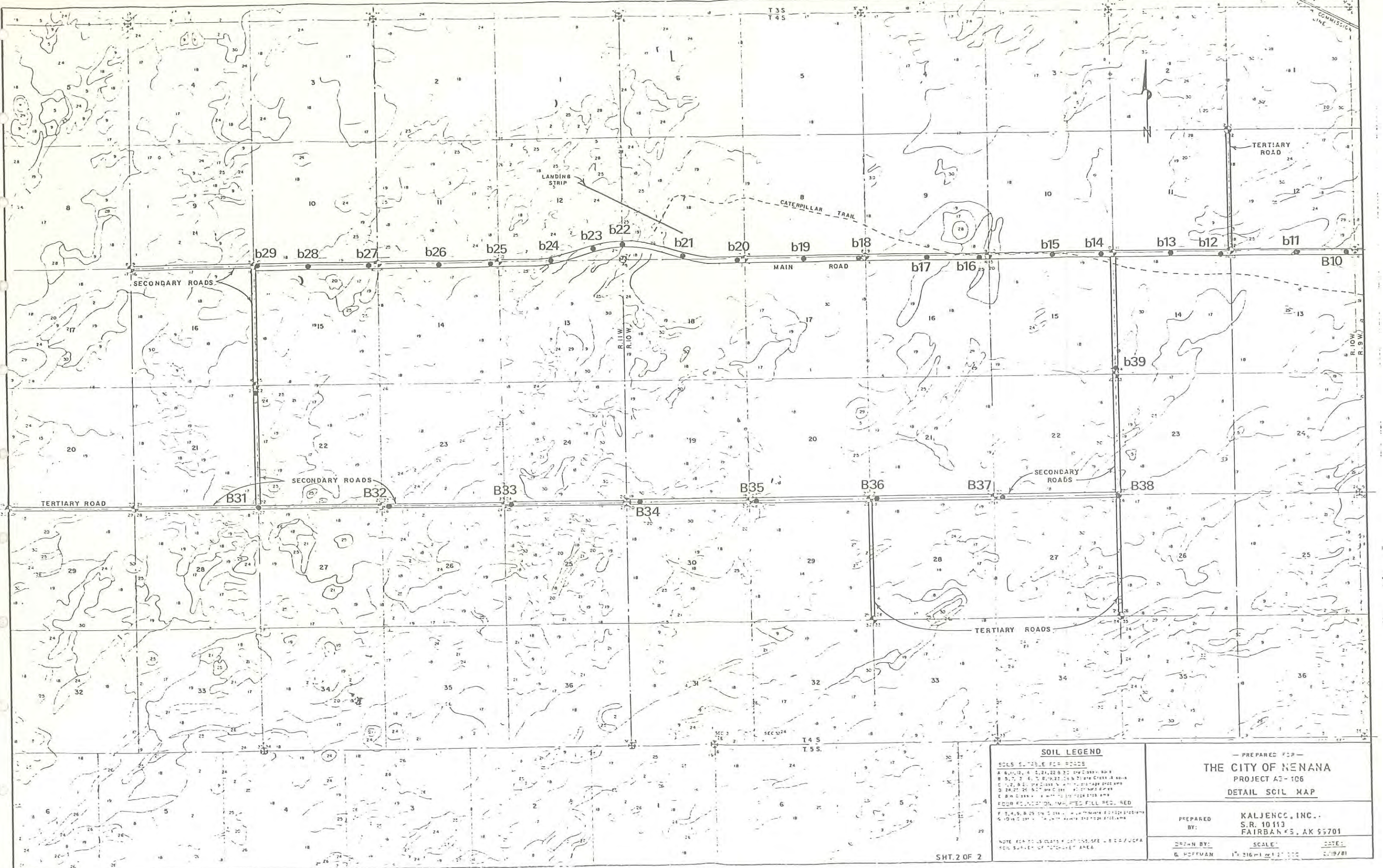
- F 3, 4, 8, 9, 25 are Class VII, with severe drainage problems
- G 10 Class V, with severe drainage problems

NOTE: F AND G CLASSIFICATIONS SEE U.S. DA 100/304
S.U. - SURFACE OF TOPGRAPHIC AREA

— PREPARED FOR —
THE CITY OF NENANA
 PROJECT AG-106
DETAIL SOIL MAP

PREPARED BY: **KALJENCO, INC.**
 S.R. 10113
 FAIRBANKS, AK 99701

DRAWN BY: G. HOFFMAN	SCALE: 1" = 316' = 1/20,000	DATE: 2/19/81
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SOIL LEGEND

SOILS SUITABLE FOR ROADS

A 6, 11, 12, 14, 15, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

POOR FOUNDATION UNIMPROVED FILL REQ. RED

F 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

NOTE: FOR SOIL CLASSIFICATION SEE USDA/USDA FOR SUPPLY OF POTENTIAL AREA.

— PREPARED FOR —

THE CITY OF NENANA

PROJECT A2-106

DETAIL SOIL MAP

PREPARED BY: **KALJENCO, INC.**
S.R. 10113
FAIRBANKS, AK 99701

DRAWN BY: **G. HOFFMAN** SCALE: 1" = 316' ± DATE: 11/19/81

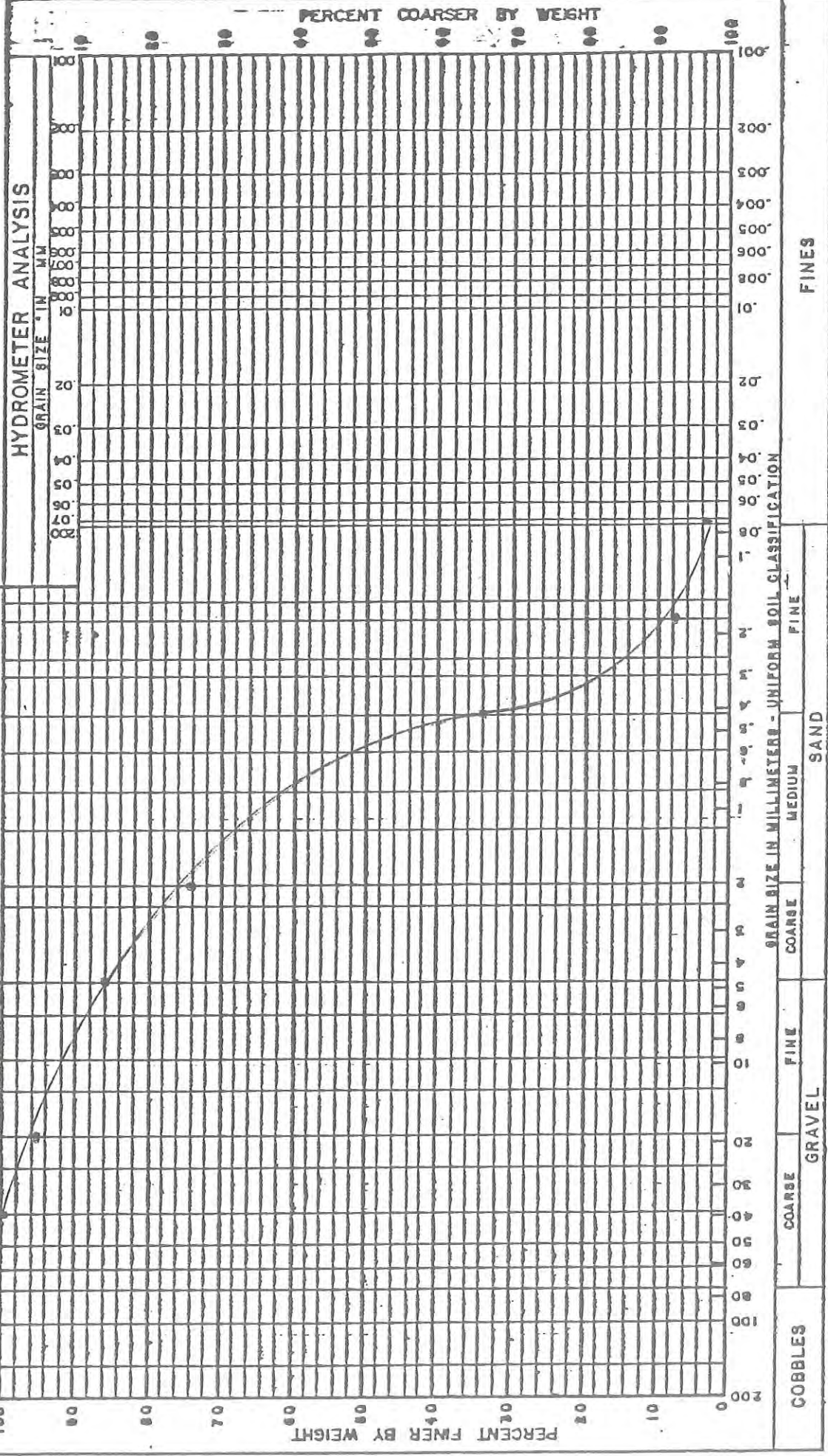
SHT. 2 OF 2

TOTCHAKET AGRICULTURAL SURVEY

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SIEVE ANALYSIS		HYDROMETER ANALYSIS	
SIZE OF OPENING IN INCHES	NUMBER OF MESH PER INCH U.S. STANDARD	GRAIN SIZE IN MILLIMETERS - UNIFORM SOIL CLASSIFICATION	PERCENT COARSER BY WEIGHT
COBBLES		COARSE	
		FINE	
		GRAVEL	
		COARSE	
		MEDIUM	
		FINE	
		SAND	
		LL	
		PI	

SAMPLE NO.	DEPTH - FT.	U.S.C. CLASSIFICATION	NAT. WC	LL	PI
BORING #1	25'	GW Gravelly SAND	12.1		

PROJECT	ACTL-81-1505
SAMPLE DATE	
SUBMITTED BY	
EXPL. OR SP. SAMPLE NO.	
W/O NO.	

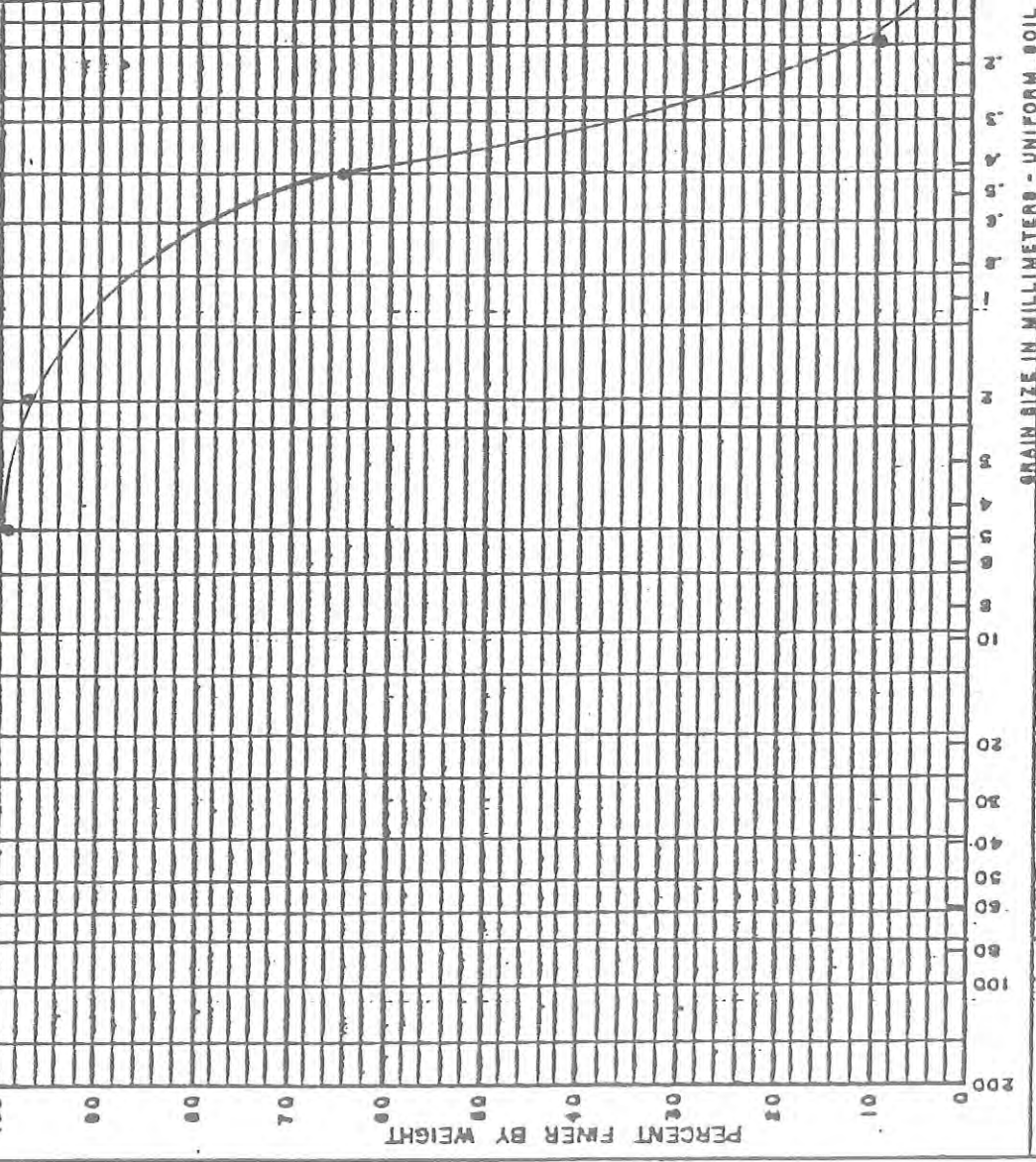
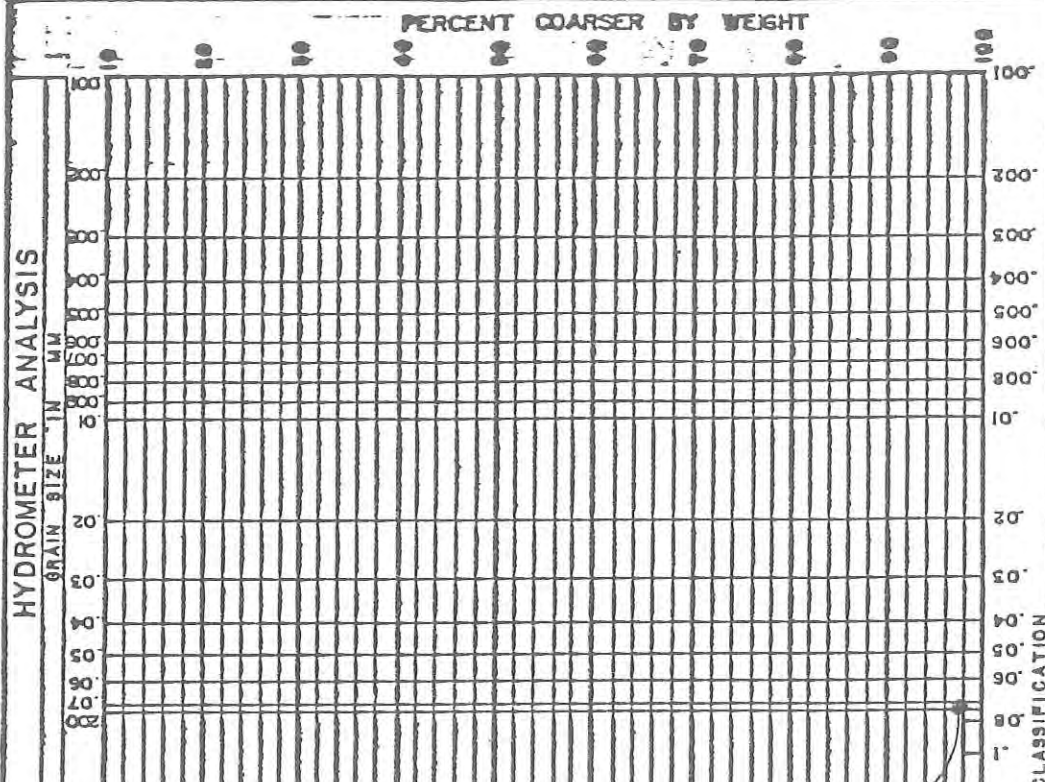
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CHECKED:	

GRADATION CURVES



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PERCENT COARSER BY WEIGHT

GRAIN SIZE IN MILLIMETERS - UNIFORM SOIL CLASSIFICATION

Grain Size (mm)	Percent Coarser (%)
75	100
60	95
40	85
20	75
10	65
5	55
2.5	45
1.2	35
0.6	25
0.3	15
0.15	5
0.075	0

SAMPLE NO.	DEPTH - FT.	U.S.C. CLASSIFICATION	NAT. WC	LL	PI						
						COBBLES	GRAVEL	FINE	COARSE	MEDIUM	SAND
BORING #2	10.01	SP Fine+Med. SAND	20.5								

PROJECT ACTL-81-1505

SAMPLE DATE

SUBMITTED BY KB

EXPL. OR SP. SAMPLE NO.

W/O NO.

DATE OF REPORT

LAB MANAGER

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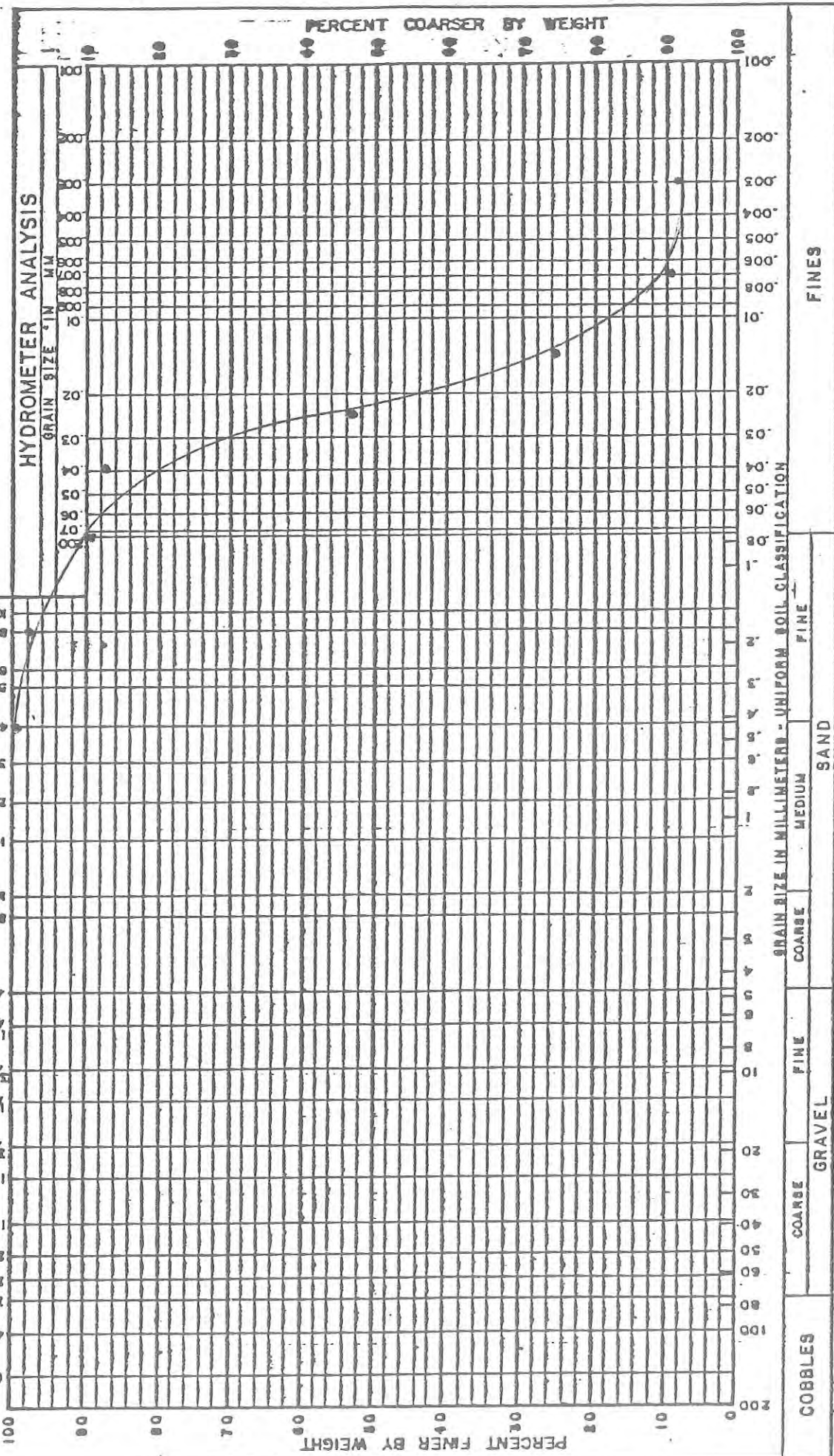
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GRADATION CURVES

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SIEVE ANALYSIS
NUMBER OF MESH PER INCH U.S. STANDARD



SAMPLE NO.	DEPTH - FT.	U.S.C. CLASSIFICATION	NAT. WC	LL	PI	SOIL CLASSIFICATION		
						COARSE	MEDIUM	FINE
BORING# 10	2.5'	ML, Silt TOAM	26.2					

PROJECT: ACTL-81-1505

SAMPLE DATE

SUBMITTED BY: KB

EXPL. OR OP. SAMPLE NO.

W/O NO.

DATE OF REPORT: LAB MANAGER

GRADATION CURVES

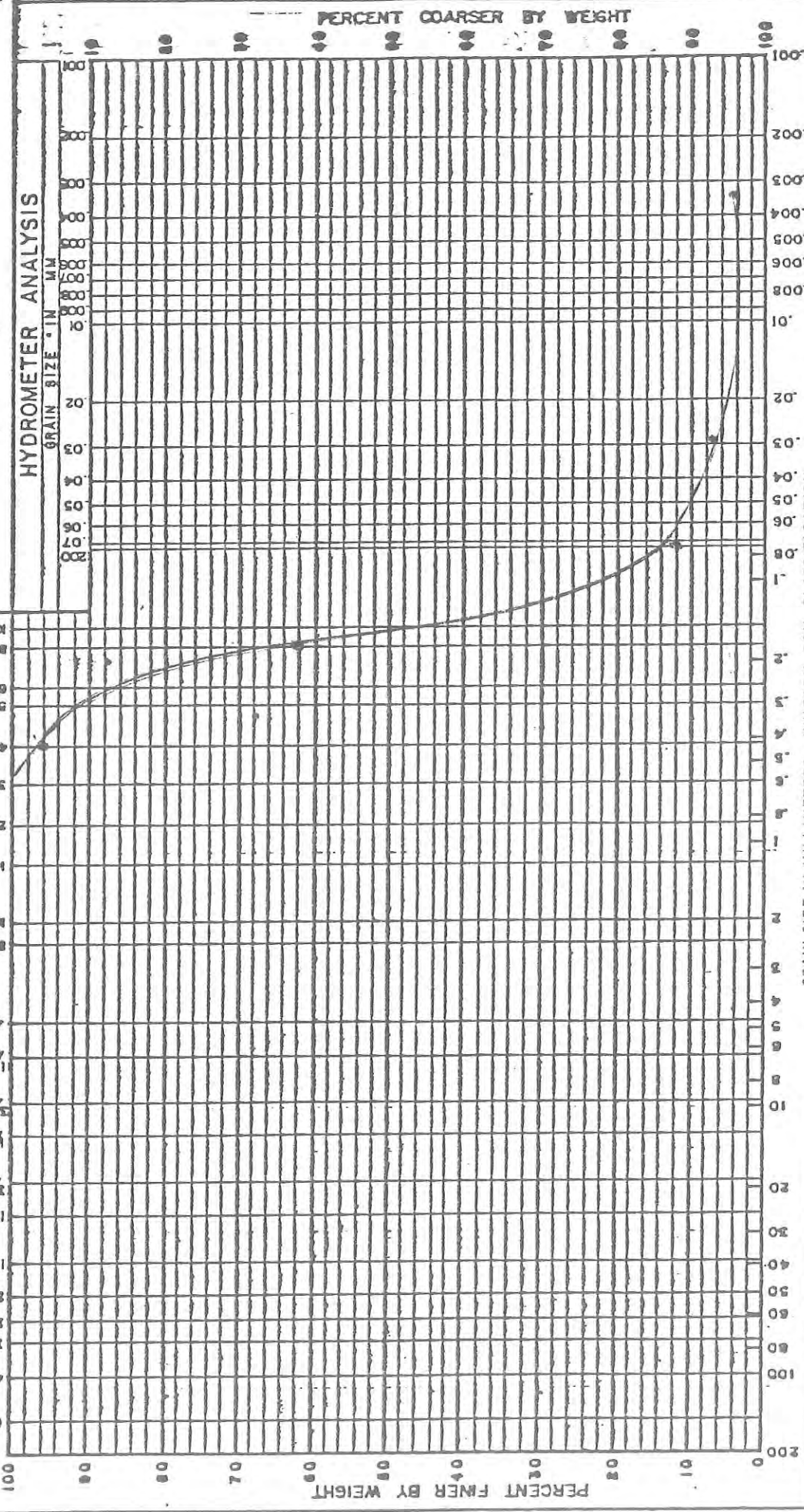
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PERCENT COARSER BY WEIGHT

GRAIN SIZE IN MILLIMETERS - UNIFORM SOIL CLASSIFICATION

COARSE GRAVEL FINE SAND

COARSE FINE MEDIUM SAND

COBBLES

PROJECT	ACTL -81-1505
SAMPLE DATE	
SUBMITTED BY	KB
EXPL. OR SP. SAMPLE NO.	
W/O NO.	
DATE OF REPORT	LAB MANAGER

SAMPLE NO.	DEPTH - FT.	U.S.C.	CLASSIFICATION	NAT. WC	LL	PI
BORING# 20	5'	SP-SM	Fine SAND	3.9		

GRADATION CURVES

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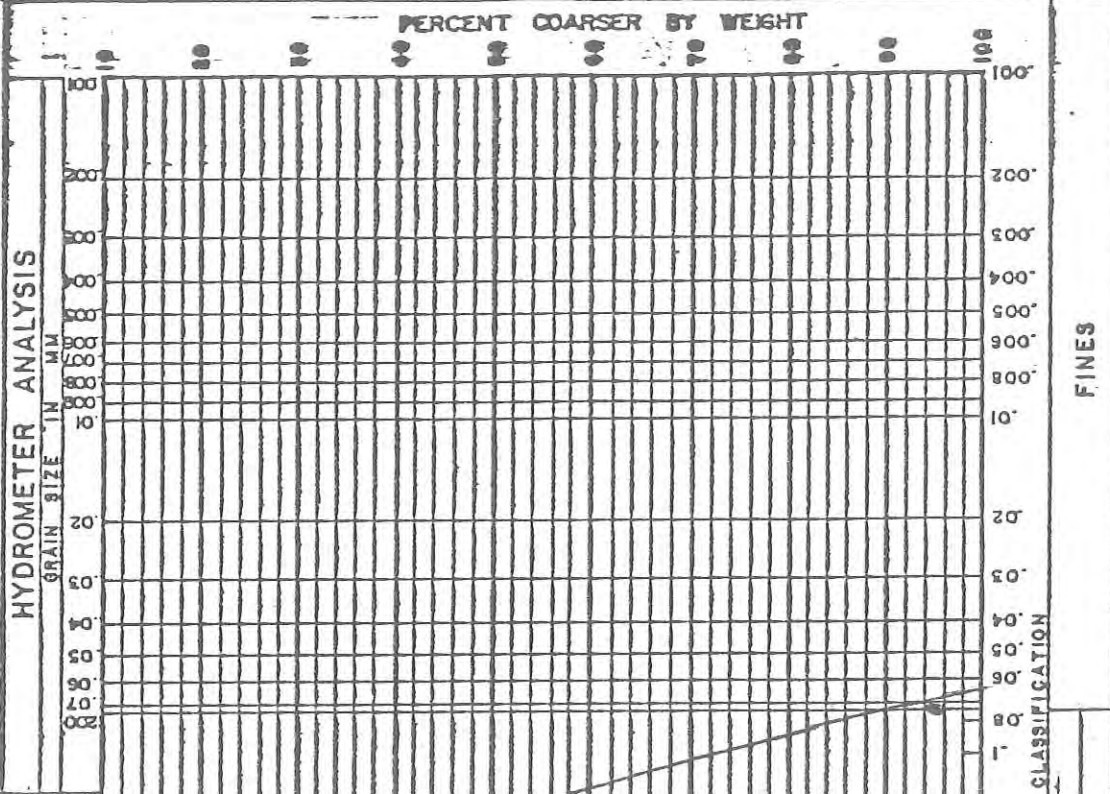
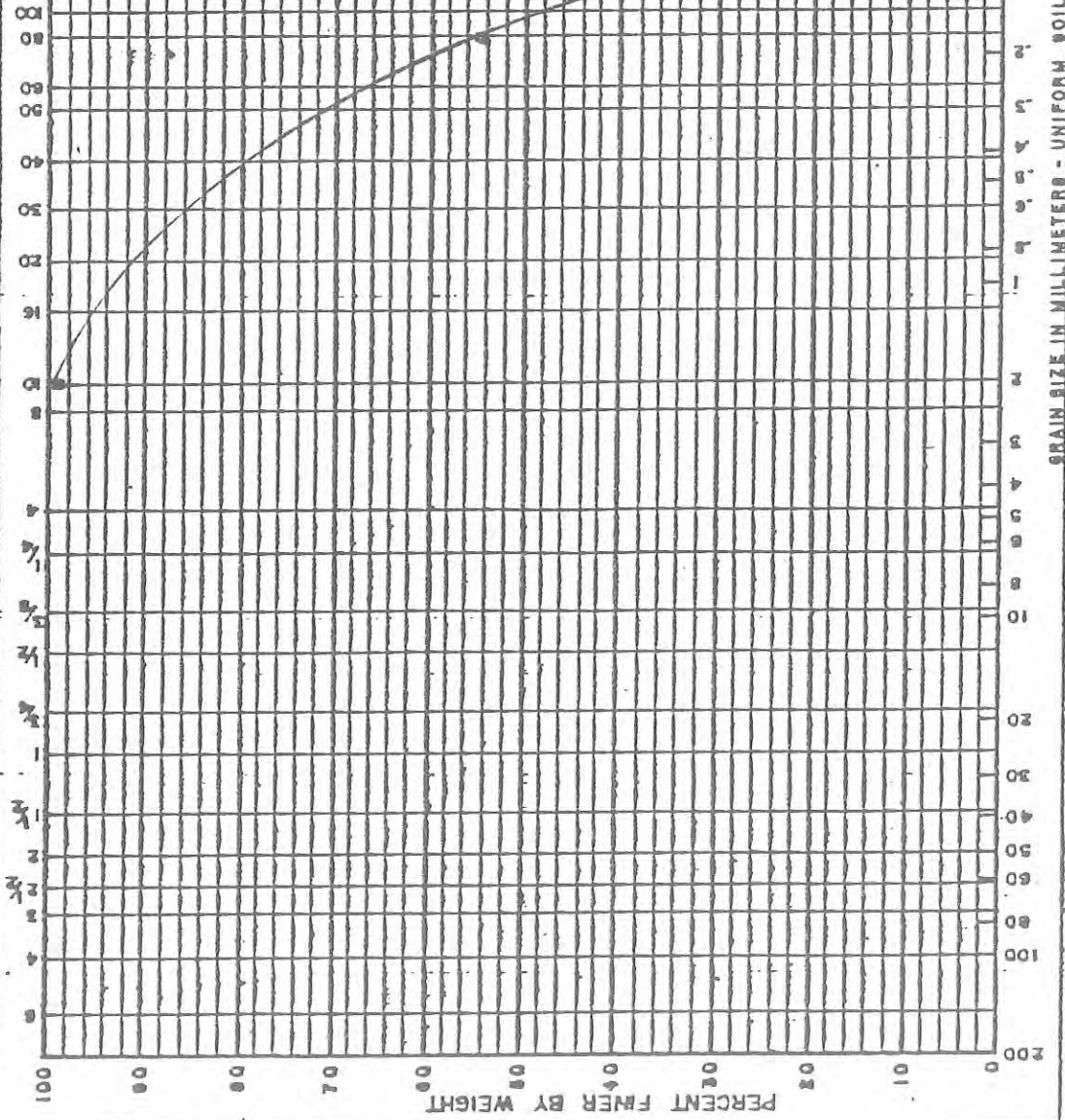
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SIEVE ANALYSIS
 NUMBER OF MESH PER INCH U.S. STANDARD



COBBLES	GRAVEL		SAND	
	COARSE	FINE	COARSE	FINE

SAMPLE NO.	DEPTH - FT.	U.S.C.	CLASSIFICATION	NAT. WC	LL	PI
BORING # 33	10.0'	SP	Fine+Med. SAND	3.2		

PROJECT ACTL-81-1505
 SAMPLE DATE
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 EXPL. OR SP. SAMPLE NO.
 W/O NO.

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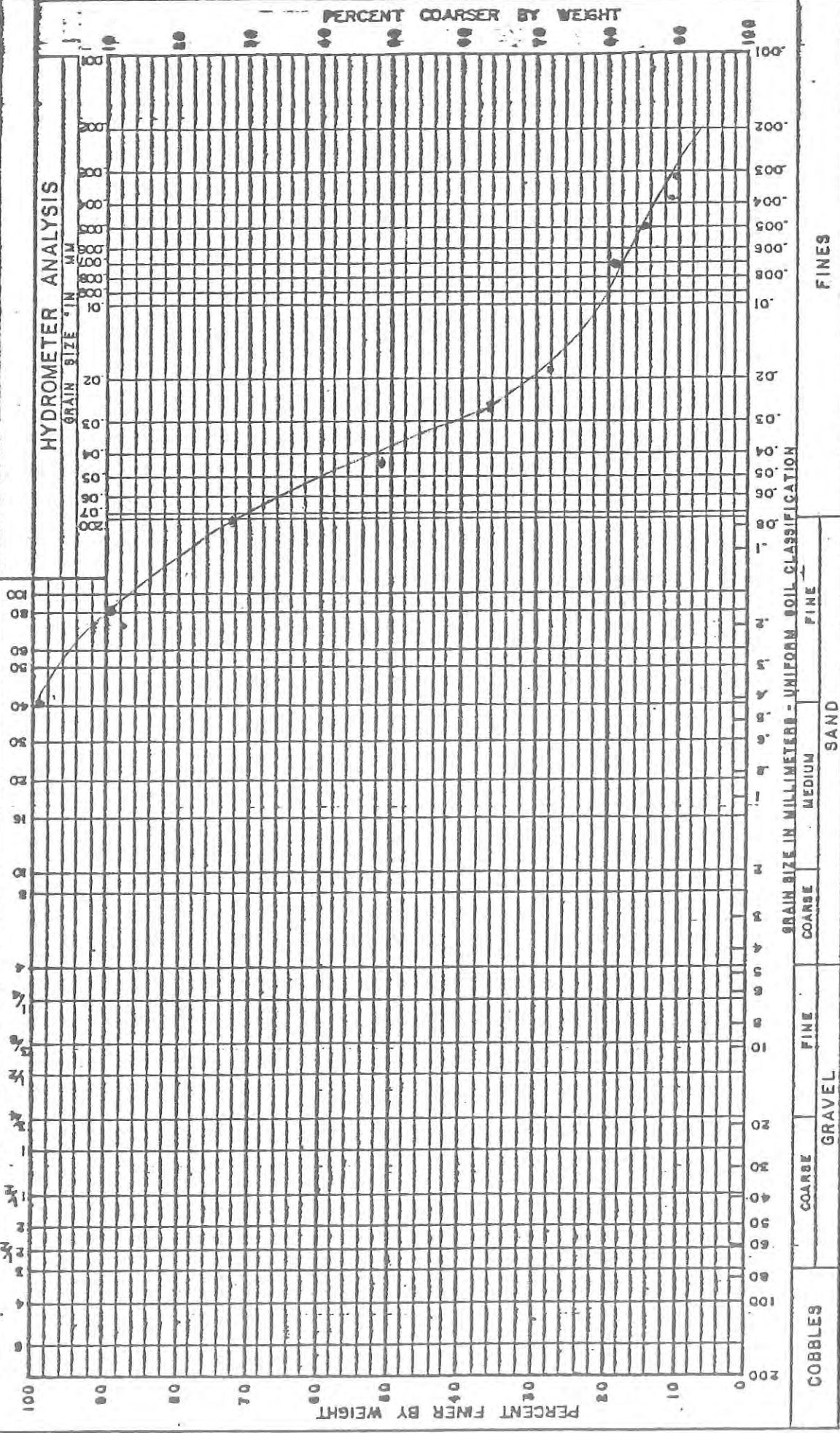
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COBBLES		GRAVEL		SAND		FINE	
DEPTH - FT.	U.S.C. CLASSIFICATION	NAT. WC	LL	PI			
BORING 44	5' ML Sandy SILT						

PROJECT ACTL 81-1505
SAMPLE DATE
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EXPL. OR SP. SAMPLE NO.
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GRADATION CURVES

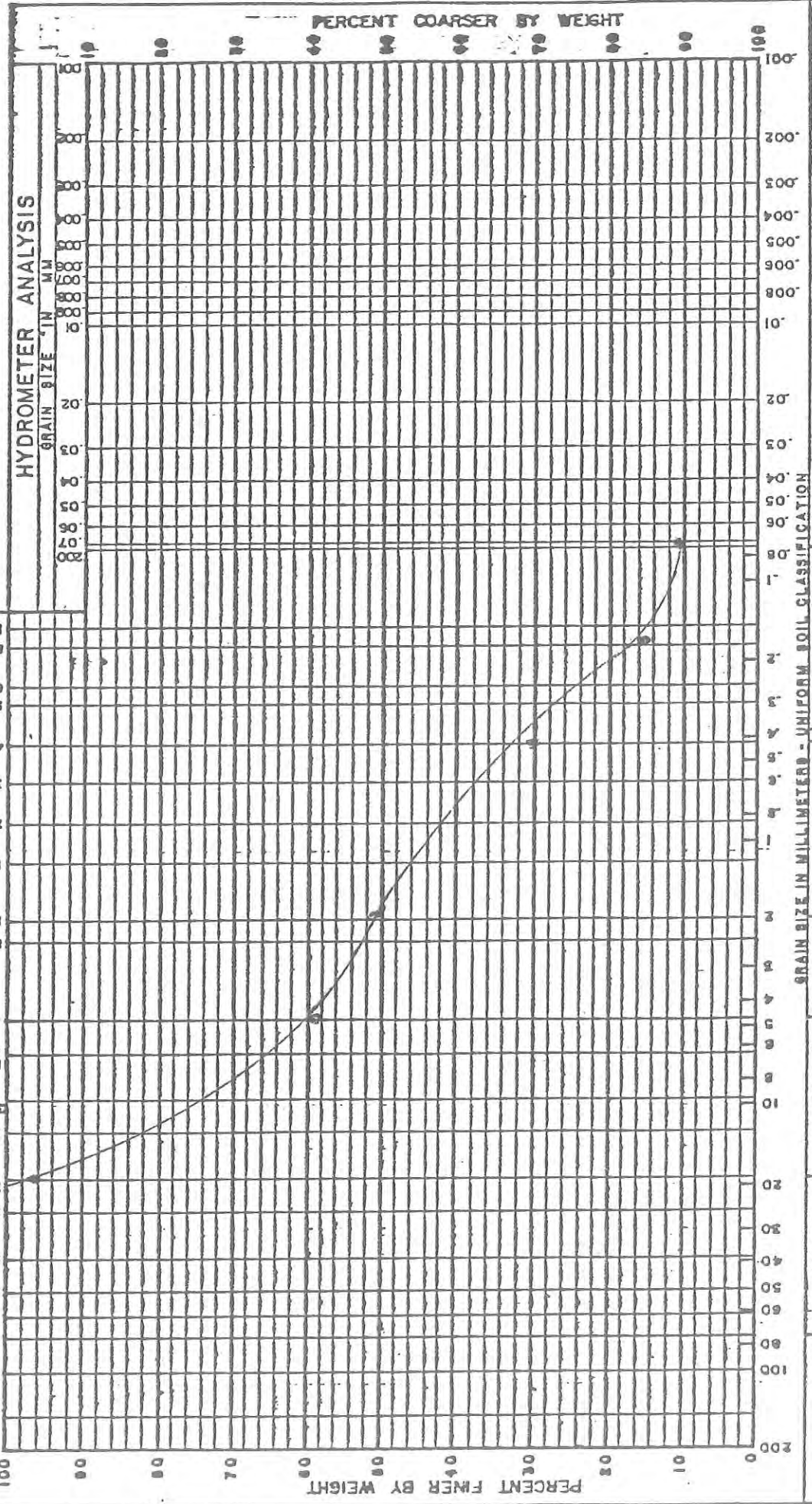
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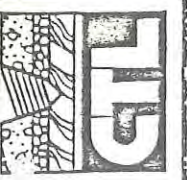
SAMPLE NO.	DEPTH - FT.	U.S.C. CLASSIFICATION	NAT. WC	LL	PI	GRAVEL			SAND			FINES							
						COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE					
BORING# 42	25'	CW Gravelly SAND	11.1																

GRADATION CURVES

PROJECT ACTI.-81-1505
 SAMPLE DATE
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 W/O NO.

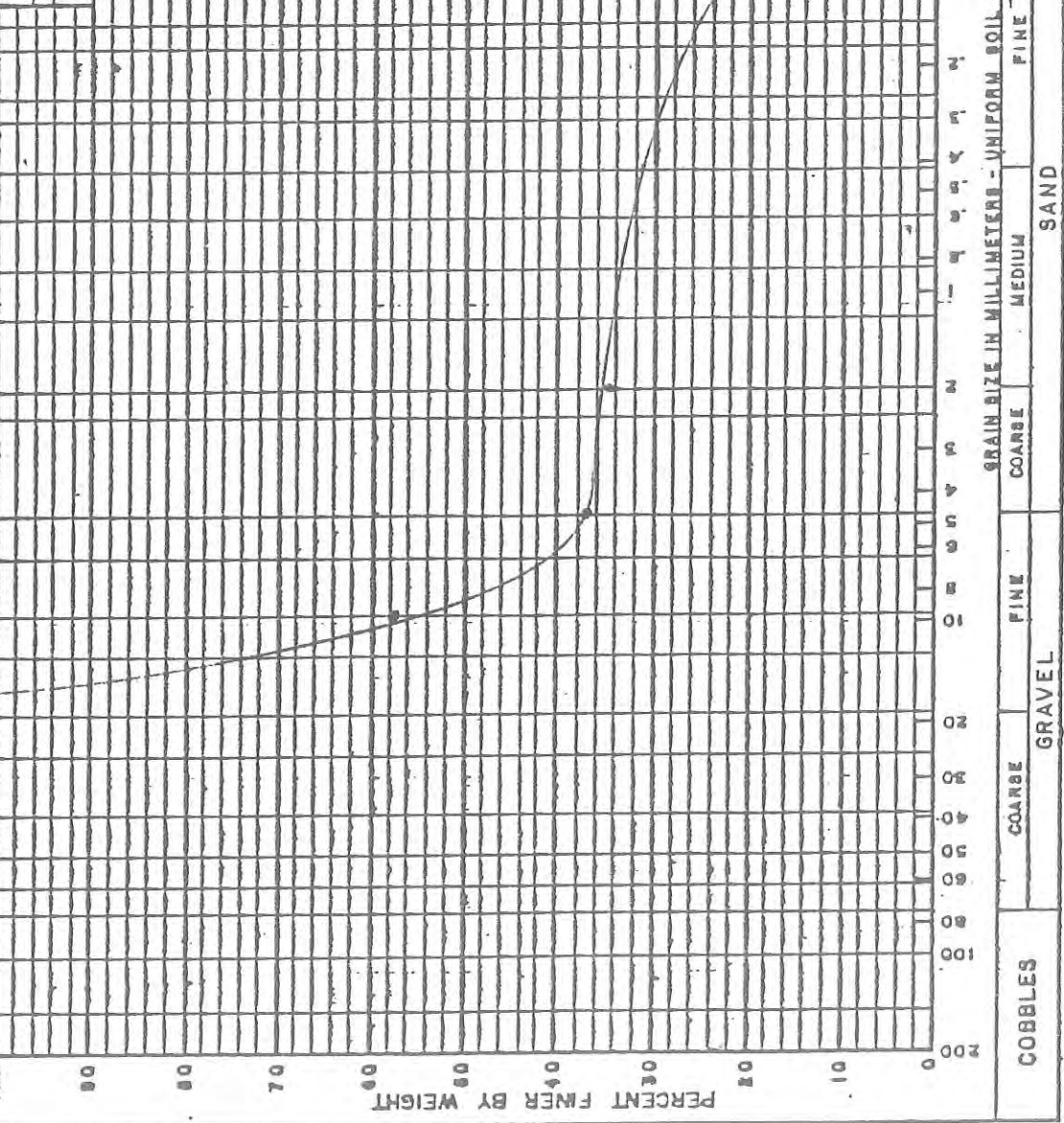
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 248-1333



SAMPLE NO.	DEPTH - FT.	U.S.C. CLASSIFICATION	NAT. WC	LL	PI	GRAVEL			SAND		
						COARSE	FINE	COARSE	MEDIUM	FINE	
BORING #44	20'	GM Silty Sandy GRAVEL	13.1								

PROJECT ACTI-81-1505
 SAMPLE DATE
 SUBMITTED BY
 EXPL. OR OP. SAMPLE NO.
 W/O NO.
 DATE OF REPORT
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GRADATION CURVES



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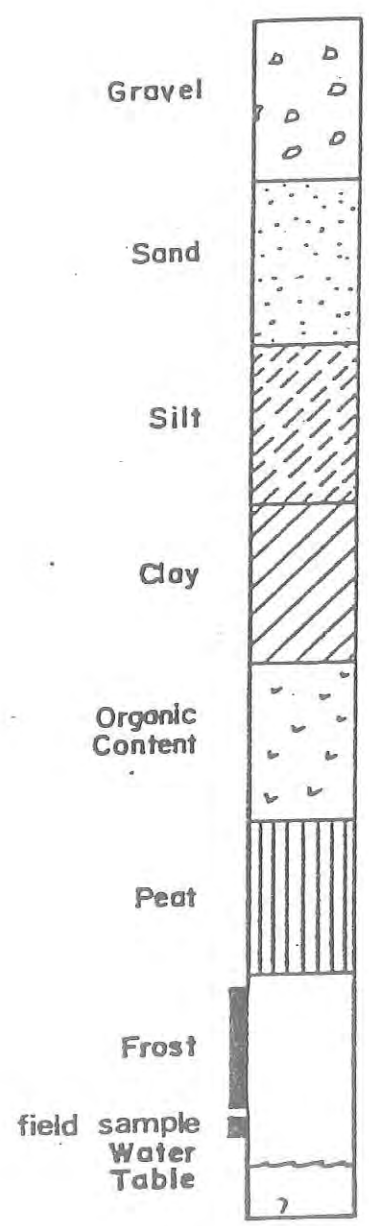
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PROJECT NAME TOTCHAKET AGRICULTURAL ROAD
PROJECT NO. ACTL- 81-1505
CLIENT CITY OF NENANA

Legend





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Hole No. 1

Sheet _____ of _____

Location East Middle River

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2 ft.	-		ICE & WATER	-
5 ft.	#1		Fine to Medium SAND - SP	5ft. N=36 Bearing 6,000-7,200 lbs/ft. ²
10 ft.	#2		Fine to Medium SAND - SP	10 ft. N=17 Bearing 4,000-5,000 lbs/ft. ²
15 ft.	#3		Fine to Coarse SAND - SW	15 ft. N=43 Bearing 8,000-9,000 lbs/ft. ²
20 ft.	-		No Sample	



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Hole No. 1

Sheet _____ of _____

Location East Middle River

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
25 ft.	#4		Gravelly SAND - GW	25 ft. N=69 Bearing 11,000-13,000 lbs/ft. ²
30 ft.	#5		Fine to Coarse SAND - SW E.O.B.	30 ft. N=70+ Bearing 10,000-12,000 lbs/ft. ²



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Hole No. 2

Sheet _____ of _____

Location West Middle River

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2ft.	-		ICE & WATER	
5ft.	-		No Sample	
10ft.	#1		Fine & Medium SAND -SP	10 ft. N=42 Bearing 6,000-8,000 lbs/ft. ² W.C. = 20.5%
15ft.	#2		Fine & Medium SAND -SP	15 ft. N=41 Bearing 6,000-8,000 lbs/ft. ²
20ft.	#3		Fine to Coarse SAND w/trace of Fine GRAVEL -SW	20 ft. N=54 Bearing 9,000-10,000 lbs/ft. ²



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Hole No. 2

Sheet _____ of _____

Location West Middle River

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
25ft.	#4		Fine to Coarse SAND -SW	25 ft. N=65 Bearing 10,000-11,000 lbs/ft. ²
30ft.	#5		Fine to Coarse SAND -SW E.O.B.	30 ft. No Split Spoon



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Hole No. 3

Sheet _____ of _____

Location .6 Miles East of B-4

W. O. No. _____



Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
5 ft.	#1		SILT with trace of SAND	Frozen
10 ft.			Silty SAND E.O.B.	Damp



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Hole No. 4

Sheet _____ of _____

Location 400' west of 9, 10, 15, 16
In swamp along lake

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
1 ft.	-		PEAT	
5ft.	#1		Organic SILT	Frozen
10ft.	#2		SILT with trace of Fine SAND	Moist
15ft.	#3		SILT with trace of SAND	Saturated
20ft.	#4		Silty SAND F O B	Saturated



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Hole No. 5

Sheet _____ of _____

Location .5 Miles West of B-4

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2ft.	-		SILT with trace of Fine SAND	Frozen
5ft.	#1		Fine SAND with trace of SILT	Damp
10ft.	#2		Fine SAND with trace of SILT	Damp



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Hole No. 6

Location 100' west 1f 8, 9, 16, 17

Top Elevation _____

Sheet _____ of _____

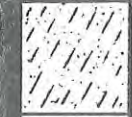

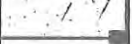
W. O. No. _____

Operator _____

Date _____

Client _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2 ft.	-		Sandy SILT	Frozen
5 ft.	#1		Fine SAND with trace of SILT	Damp
10ft.	#2		Fine SAND with trace of SILT	Damp



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Hole No. 6 A

Sheet _____ of _____

Location In swampy area .25 Miles west
of B-6 Swamp approximately 500-800'
in length

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
1 ft.			Peat & Muck	
5 ft.	#1		Organic SILT	Frozen
10 ft.	-		No Sample	
15 ft.	#2		Sandy SILT	Saturated
16 ft.			E.O.B.	



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Hole No. 7

Sheet _____ of _____

Location .5 Miles west of B-6

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
3 ft.	-		Organic SILT	Frozen
5 ft.	#1		Sandy SILT	Frozen
8 ft.	-			
10 ft.	#2		Fine SAND with trace of SILT	Damp



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Hole No. 8

Sheet _____ of _____

Location 300' west of 7, 8, 17, 18

W. O. No. _____




Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
3 ft.	-		SILT with trace of SAND	Frozen
5 ft.	#1		Fine SAND with trace of SILT	Damp
10 ft.	#2		Fine SAND	Damp
			E.O.B.	



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Hole No. 9

Location .5 miles west of B-8

Top Elevation _____

Sheet _____ of _____




W. O. No. _____

Operator _____

Date _____

Client _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
4 ft.	-		SILT with trace of SAND	Frozen
5 ft.	#1		Fine SAND with trace of SILT	Damp
10 ft.	#2		Fine SAND	Damp



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Hole No. 10
Location 100' west of 12,7,18,13

Top Elevation _____

Sheet _____ of _____
W. O. No. _____
Operator _____
Date _____
Client _____
Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
3 ft.	-		SILT with trace of SAND-ML	Frozen W.C. = 16.2
5 ft.	#1		Fine SAND with trace of SILT	Damp
10 ft.	#2		Fine & Medium SAND E.O.B.	



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Core No. 11

Sheet _____ of _____

Location .5 miles west of B-10

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
3ft.	-		SILT with trace of SAND	Frozen
5 ft.	#1		Fine tan SAND w/ trace of SILT	Damp
10 ft.	#2		Fine SAND	Damp



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Hole No. 12

Sheet _____ of _____

Location 100' west of 11, 12, 13, 14

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
3 ft.	-		Sandy SILT	Frozen
5 ft.	#1		Silty SAND	Dry
10 ft.	#2		Fine SAND w/trace of SILT	Damp



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Hole No. 12

Sheet _____ of _____

Location 100' west of 11, 12, 13, 14

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
40 ft.			E.O.B.	



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Hole No. 13

Sheet _____ of _____

Location .5 Miles west of B-12

W. O. No. _____




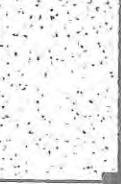
Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
4 ft.	-		SILT with trace of SAND	Frozen
5 ft.	#1		Fine SAND with trace of SILT	Dry
10 ft.	#2		SILT with trace of SAND	Damp
15 ft.	#3		Fine SAND E.O.B.	Damp



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Hole No. 14

Location 100' west of 10, 11, 14, 15

Top Elevation _____

Sheet _____ of _____




W. O. No. _____

Operator _____

Date _____

Client _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
4 ft.	-		SILT with trace of SAND	FROZEN
5 ft.	#1		Fine SAND with trace of SILT	Damp
10 ft.	#3		Fine SAND with trace of SILT	Damp



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Hole No. 15

Sheet _____ of _____

Location .5 Miles west of B-14

W. O. No. _____




Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2 ft.	-		SILT with trace of SAND	Frozen
5 ft.	#1		Fine SAND with trace of SILT	Dry
10 ft.	#2		Fine SAND with trace of SILT E.O.B.	Damp



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Hole No. 16

Sheet _____ of _____

Location 100' west of 9, 10, 15, 16

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2 ft.	-		SILT & SAND	Frozen
5 ft.	#1		Fine SAND with trace of SILT	Dry
10 ft.	#2		Fine SAND with trace of SILT E.O.B.	Damp



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Hole No. 17

Sheet _____ of _____

Location .5 Miles west of B-16

W. O. No. _____




Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
3 ft.	#		SILT with a trace of SAND	Frozen
5 ft	#2		Tan Fine SAND w/trace of SILT	Damp
10 ft.			Tan Fine SAND w/trace of SILT E.O.B.	Damp



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Hole No. 18

Sheet _____ of _____

Location 100' west of 8, 9, 16, 17

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
5 ft.	#1		SILT with trace of SAND	Frozen
10 ft.	#2		SILT & SAND E.O.B.	Damp



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Hole No. 19

Sheet _____ of _____

Location .5 Miles west of B-18

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
5 ft.	#1		Fine SAND with trace of SILT	DRY
10 ft.	#2		Fine SAND with trace of SILT E.O.B.	Damp



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Hole No. 20

Sheet _____ of _____

Location 100' west of 7, 8, 17, 18

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
3 ft.	-		SILT with trace of SAND	Frozen
5 ft.	#1		Fine SAND with trace of SILT	Damp W.C. = 3.9%
10 ft.	#2		Fine SAND with trace of SILT E.O.B.	Damp



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Hole No. 21

Sheet _____ of _____

Location .5 Miles west lf B-20

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2 ft.	-		SILT & SAND	Frozen
5 ft.	#1		Fine SAND with trace of SILT	Dry
10 ft.	#2		Fine SAND E.O.B.	Damp



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Hole No. 22

Sheet _____ of _____

Location Top of reworked sand dune
75' west of 12, 7, 18, 13

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
5 ft.	#1		SAND with some SILT	Frozen
7 ft.			Silt with trace of Fine SAND	Damp
10 ft.	#2			
15 ft.	#3		Fine SAND w/ some SILT E.O.B.	Damp



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Hole No. 23

Sheet _____ of _____

Location Along swamp which extends
between B-22 and B-24

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
3 ft.	-		Organic SILT & PEAT	Frozen
5 ft.	#1		SILT with some SAND	Damp
10 Ft.	#2		Fine Sand w/ some SILT E.O.B.	Damp



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Hole No. 24

Sheet _____ of _____

Location .5 Miles east of B-25

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2 ft.	-		SILT with trace of Fine SAND	Frozen
5 ft.	#1		SILT with trace of Fine SAND	Damp
10 ft.	#2		SILT with trace of Fine SAND	Damp
15 ft.	#3		Fine SAND w/trace of SILT	Damp



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Hole No. 25

Sheet _____ of _____

Location 100' west of 11, 12, 13, 14

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2 ft.	-		SILT with trace of SAND	Frozen
5 ft.	#1		Fine SAND with trace of SILT	Damp
10 ft.	#2		Fine SAND with trace of SILT E.O.B.	Damp



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Hole No. 26

Sheet _____ of _____

Location .5 Miles west of B-25

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2 ft.	-		Fine SAND with trace of SILT	Frozen
5 ft.	#1		Fine SAND	Dry
10 ft.	#2		Fine SAND E.O.B.	Damp



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Hole No. 27

Location 100' west of 10, 11, 14, 15

Top Elevation _____

Sheet _____ of _____




W. O. No. _____

Operator _____

Date _____

Client _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2 ft.	-		SILT with trace of SAND	Frozen
5 ft.	#1		Fine SAND with trace of SILT	Dry
10 ft.	#2		Fine SAND	Damp
			E.O.B.	



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Hole No. 28

Sheet _____ of _____

Location .5 Miles west of B-27

W. O. No. _____




Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2 ft.	-		SILT with trace of SAND	Frozen
5 ft.	#1		Fine SAND with trace of SILT	Damp
10 ft.	#2		Fine SAND	Damp
			E.O.B.	



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Hole No. 29

Sheet _____ of _____

Location .45 Miles west of B-28

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2 ft.	-		SILT with trace of SAND	Frozen
5 ft.	#1		Fine SAND with trace of SILT	Damp
10 ft.	#2		Fine SAND E.O.B.	Damp



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Hole No. 30

Location 300' north of 16, 15, 21, 22

Top Elevation _____

Sheet _____ of _____



W. O. No. _____

Operator _____

Date _____

Client _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2 ft.	-		SILT with trace of SAND	Frozen
5 ft.	#1		Fine SAND	Dry
10 ft.	#2		Fine SAND E.O.B.	Damp



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Hole No. 31

Sheet _____ of _____

Location Intersect of Secondary Road
at 21, 22, 27, 28

W. O. No. _____




Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
1 ft.	-		SILT with trace of SAND	FROZEN
5 ft.	#1		Fine SAND	Dry
10 ft.	#2		Fine SAND E.O.B.	Damp



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Hole No. 32

Sheet _____ of _____

Location 100' east of 22, 23, 27, 26

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
3 ft.	-		SILT with trace of SAND	Frozen
5 ft.	#1		Fine SAND with trace of SILT	Damp
10 ft.	#2		Tan Fine SAND E.O.B.	Damp



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Hole No. 33

Sheet _____ of _____

Location 200' east of 23,24,25,26

W. O. No. _____




Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
3 ft.	-		SILT with trace of SAND	Frozen
5 ft.	#1		Fine SAND with trace of SILT	Damp
10 ft.	#2		Fine SAND with trace of SILT-SP E.O.B.	Damp W.C. =3.2%



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Hole No. 34

Sheet _____ of _____

Location .1 Mile east of 24, 19, 30, 25

W. O. No. _____




Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
3 ft.	-		SILT with trace of SAND	Frozen
5 ft.	#1		Fine SAND with trace of SILT	Damp
10 ft.	#2		Fine SAND E.O.B.	Damp



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248-1333

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Hole No. 35

Location 50' east of 19, 20, 29, 30

Top Elevation _____

Sheet _____ of _____




W. O. No. _____

Operator _____

Date _____

Client _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2 ft.	-		Fine SAND & SILT	Dry
5 ft.	#1		Fine SAND with trace of SILT	Damp
10 ft.	#2		Fine SAND with trace of SILT	Damp



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Hole No. 36

Sheet _____ of _____

Location 100' east of 20, 21, 28, 29

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2 ft.	-		SILT with trace of SAND	Frozen
5 ft.	#1		Fine SAND with trace of SILT	Dry
10 ft.	#2		Fine SAND	Damp



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Hole No. 37

Sheet _____ of _____

Location 100' E of 21, 22, 27, 28

W. O. No. _____




Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2 ft.	-		SILT with trace of SAND	Frozen
5 ft.	#1		Fine SAND with trace of SILT	Dry
10 ft.	#2		Fine SAND	Damp
			E.O.B.	



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Hole No. 38

Sheet _____ of _____

Location Intersect of Secondary

W. O. No. _____

Road North 22, 23, 26, 27

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2 ft.	-		Sandy SILT	Frozen
5 ft.	#1		Fine SAND with trace of SILT	Dry
10 ft	#2		Fine SAND with trace of SILT E.O.B.	Dry



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Hole No. 39

Sheet _____ of _____

Location 15, 14, 23, 22

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2 ft.	-		Sandy SILT	Frozen
5 ft.	#1		Fine SAND with trace of SILT	Dry
10 ft.	#2		Fine SAND with trace of SILT	Damp
			E.O.B.	



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Hole No. 40

Sheet _____ of _____

Location .7 Miles N.E. of 10, 11, 14, 15

W. O. No. _____



Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
5 ft.	#1		SILT with trace of SAND	Frozen
7 ft.			Fine SAND some SILT	Damp
10 ft.	#2		E.O.B.	



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Hole No. 41

Sheet _____ of _____

Location .8 Miles NE of 11, 12, 13, 14

W. O. No. _____

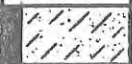

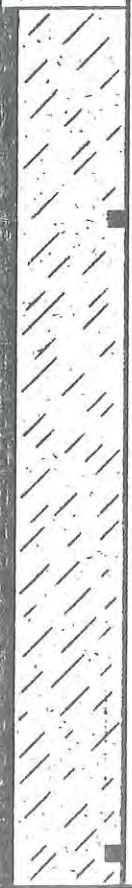
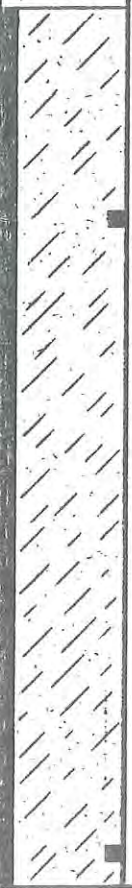
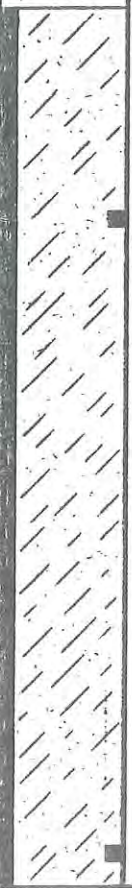
Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
1 ft.	-		SILT with trace of SAND	Frozen
5 ft.	#1		Fine SAND with trace of SILT	Damp
7 ft.				
10 ft.	#2		SILT with trace of SAND	Frozen Permafrost
20ft.	#3		SILT with trace of SAND	Frozen Permafrost



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Hole No. 42

Sheet _____ of _____

Location .25 Miles SW of 12, 7, 18, 13
edge of slough

W. O. No. _____


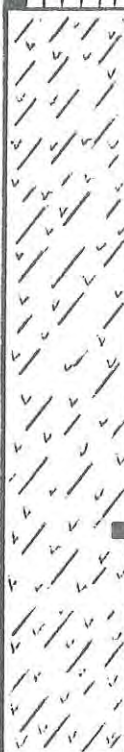


Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2 ft.	-		PEAT	Frozen Water Table
10 ft.	#1		Organic SILT	Saturated
15 ft.	#2		Inorganic SILT w/trace of SAND	Saturated
20 ft.			Silty Sandy GRAVEL-GW	Saturated

W.C.=11.1%



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Hole No. 42

Sheet _____ of _____

Location .25 Miles SW of 12, 7, 18, 13
edge of slough

W. O. No. _____


Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
25 ft.			<p>Silty Sandy GRAVEL -GW</p> <p>E.O.B.</p>	<p>Saturated W.C. = 11.1%</p>



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Hole No. 43

Sheet _____ of _____

Location .4 Miles south of 12,7,18,13
old river bed channel

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
4 ft.	-		PEAT & Organic SILT	Frozen Water Table
5 ft.	#1		PEAT & Organic SILT	Frozen
10 ft.	#2		SILT with trace of SAND	Saturated
15 ft.	#3		Silty Sandy GRAVEL	Saturated
20 ft.				



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Hole No. 43

Sheet _____ of _____

Location .4 Miles south of 12,7, 18, 13
old river bed channel

W. O. No. _____


Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
25 ft.	#4		Silty Sandy GRAVEL E.O.B.	Saturated



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Hole No. 44

Sheet _____ of _____

Location Between E & W Middle River

W. O. No. _____

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
2 ft.	-		SILT	Frozen
5 ft.	#1		SILT with trace of SAND -ML	Damp W.C.= 9.6%
10 ft.	#2		SILT with SAND	Damp
15 ft.	#3		SILT with SAND	Damp
20 ft.	#4		Gravelly Sandy SILT	Saturated



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Hole No. 44

Sheet _____ of _____

Location Between E & W Middle Rivers

W. O. No. _____


Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
25 ft.	#5		Silty Sandy GRAVEL E.O.B.	Saturated



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Hole No. 45

Sheet _____ of _____

Location .2 Miles west of

W. O. No. _____

Little Nenana

Operator _____

Date _____

Client _____

Top Elevation _____

Project _____

DEPTH FEET	SAMPLES	LOG	CLASSIFICATION SYSTEM	SAMPLE DATA
8 ft.	-		Frozen SILT	Frozen
10 ft.	#1		SILT with trace of SAND	Damp
15 ft.	#2		SAND and SILT	Moist
20 ft.	#3		Silty Sandy GRAVEL E.O.B.	Saturated