

**INDOOR RECREATION CENTER
GEOTECHNICAL INVESTIGATION REPORT**

Prepared For:

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Project No. 942717.2

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INTRODUCTION

The field investigation for the Valley Park Recreation site has been completed. Field studies were concluded on 4/1/94 with a total of 11 locations tested.

It is the purpose of this report to describe the methods and findings of the field investigation, analyze the information for general site evaluation for the proposed structure and appurtenant parking areas, and recommend foundation design alternatives.

FIELD INVESTIGATION

The field investigation was performed during the week of March 28 to April 1, 1994. The method utilized is termed the "penetrometer method" and involves the use of a portable tripod/capstan hoist and 140 lb drop hammer to advance a 2" O.D. split-barrel drive sampler to "refusal" on bedrock or very dense soil. The N value or blows per foot are the principal indicator of the bearing capacity of the soil. This method was chosen by contract officials over more invasive methods for purposes of minimizing site disturbance. The other method considered was excavating test pits utilizing a track mounted excavator which would result in significant destruction of vegetation. The test pit method yields a good soil sample and view of the subsurface strata distribution but no soil strength data. The penetrometer method yields a poor soil sample but does provide good soil strength data.

A total of 11 locations were tested by penetrometer. Locations were chosen to provide coverage of all the observed elevation/terrain/vegetation combinations on the property.

The results of the penetrometer tests are summarized on the "Penetrometer Test Record", Appendix II of this report.

SOIL CONDITIONS

Site soil conditions are presented on the "Soil Summary Table" in Appendix I of this report. Soil descriptions were derived by observing soil exposures in stream banks, the sides of the excavation at the adjacent maintenance storage facility, the Valley Park Elementary School and the street-side excavation nearest the school.

These observations were correlated to the observed probe blow count profiles by an experienced engineering geologist in charge of the penetrometer testing. Results indicate the following soil profiles are present at this site.

FORESTED DEEP MUSKEG PROFILE: This typical profile is exemplified by test boring No. 3 and 5. The vegetation consists of cedar and scrub hemlock with thick blueberry and skunk cabbage understory and has developed over a pre-existing muskeg area. The surficial soil is peat with included trunks, limbs and roots. The surficial soil extends to a depth of 8' to 9'.

The peat is underlain by 1' to 2' of loose wet sand of raised, recessional beach origin which is underlain in turn by glacial marine sedimentary soil consisting of a mixture of gravel-to-boulder size rock in a matrix of silty sand with a trace of clay. The upper 1' to 3' of this soil unit is loose or soft in consistency due to saturation. Below the saturated zone the consistency grades from "dense" to "very

dense" in a matter of 3' to 6'. the penetrometer test results in the "very dense" zone are similar to bedrock. Maximum depth of penetration was 17' in No. 3.

OPEN MUSKEG PROFILE: This soil profile is exemplified by probes 1 and 11. The vegetation consists of cedar and "bog pine" with an understory of blueberry with various mosses and sedges.

The surficial soil is peat which extends to a depth of 2' to 3' where it is underlain by loose, wet sand approximately 1' in thickness. The sand is underlain in turn by 2' to 4' of glacial-marine sediment overlying bedrock at a depth of 5' to 7'.

CREEK SIDE PROFILE: This soil is typically found within 25' of the creek which traverses the property. The vegetation consists of Sitka spruce, hemlock and alder.

The surficial soil extends to a depth of 2' and consists of organic-rich silt and peat. The surficial soil is underlain by glacial-marine sediment which increases in density to the water level, then it decreases until contact with the bedrock at a depth of 10' (in Probe No. 10).

"ELEVATION 120" PROFILE: This profile typically exists within 35' of the toe of the steep slope near the south property boundary. The vegetation consists of hemlock and cedar which form a moderately dense canopy over blueberry and alder with some scattered Sitka spruce.

The surficial soil is peat and organics which extend to a depth of 2' to 3' where it is underlain by wet gravelly sand, underlain in turn by bedrock. Probe No. 10 is typical for this soil profile in which bedrock is found within 5' to 7' of the surface.

WATER LEVEL CONDITIONS

The entire site was "wet" at the time of the field activities. The standing water is sheet flow perched on organic soils of low permeability. Several shallow streams traverse the site flowing in the northerly direction to the main stream that flows from west to east and is incised in a narrow channel 3' to 5' in depth. The depth of the hydrostatic water table is unknown.

GEOLOGIC CONDITIONS

All soils at the site are very young in geologic sense, having been deposited following the retreat of the continental ice sheet from the area approximately 10,000 years past. The soil directly overlying bedrock was probably deposited in a marine meltwater environment with rock dropping from the melting ice mass to a sea bottom covered by fine grained sediments from the glacial meltwater. After retreat of the ice, the depressed land surface "rebounded" to its pre-glacial elevation. During this period, recessional beach deposits formed on the glacial marine sediment for a time prior to complete emergence. Surficial organic soils accumulated as plant life was reestablished and growth exceeded the rate of decay and continues to do so.

CONCLUSIONS AND RECOMMENDATIONS

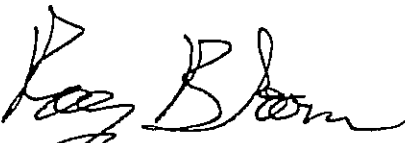
The soil conditions vary considerably over the site. None of the site is underlain by natural soil conditions favorable for shallow spread and strip footing foundations. Building construction will require overexcavation to remove the very loose, soft or compressible soil prior to the placement of an engineered rock building pad. As a general rule we recommend removing all organic soils and all mineral soils having an N value of 5 or less from under foundation elements and floor slabs.

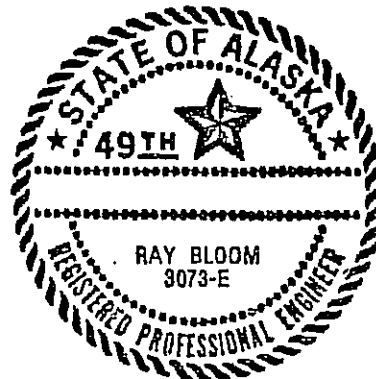
Development of roads and parking area can be constructed utilizing less stringent foundation preparation. Limited overexcavation, geotextile fabric placement and engineered shot rock embankment construction is recommended for access and parking areas where a limited amount of differential settlement can be tolerated.

CLOSURE

The conclusions and recommendations of this report are necessarily general and preliminary in nature. However the information reported herein should enable selection of the location for the planned structure which balances aesthetics, project construction and design costs and the necessity to minimize site disturbance.

R&M ENGINEERING-KETCHIKAN, INC.


Ray Bloom, P.E.



Appendix I

SOIL SUMMARY TABLE

INDOOR RECREATION CENTER SITE

R&M PROJECT NO. 942717.2

PROBE	PEAT AND ORGANIC SOIL	BROWN GRAVELLY SAND	GRAY GLACIAL MARINE SEDIMENT, LOOSE TO MEDIUM DENSE	GRAY GLACIAL MARINE SEDIMENT DENSE TO VERY DENSE	BEDROCK
1	0 TO 2	2 TO 3	3 TO 7	-	7
2	0 TO 2	2 TO 4	4 TO 5	5 TO 8	87
3	0 TO 9	9 TO 10	-	10 TO 17	177
4	0 TO 9	9 TO 10	10 TO 12	12 TO 13.5	13.57
5	0 TO 9	9 TO 11	11 TO 12	12 TO 16	16
6	0 TO 7	7 TO 9	-	8 TO 13.3	13.37
7	0 TO 5	5 TO 7	7 TO 9	9 TO 10.5	10.5
8	0 TO 2.5	-	2.5 TO 10	-	10
9	0 TO 8	8 TO 9	9 TO 11	11 TO 14.5	14.5
10	0 TO 3	3 TO 4	-	-	4
11	0 TO 3	3 TO 4	4 TO 6.5	-	6.5

PLEASE REFER TO REPORT TEXT FOR COMPLETE SOIL DESCRIPTIONS.

Appendix II

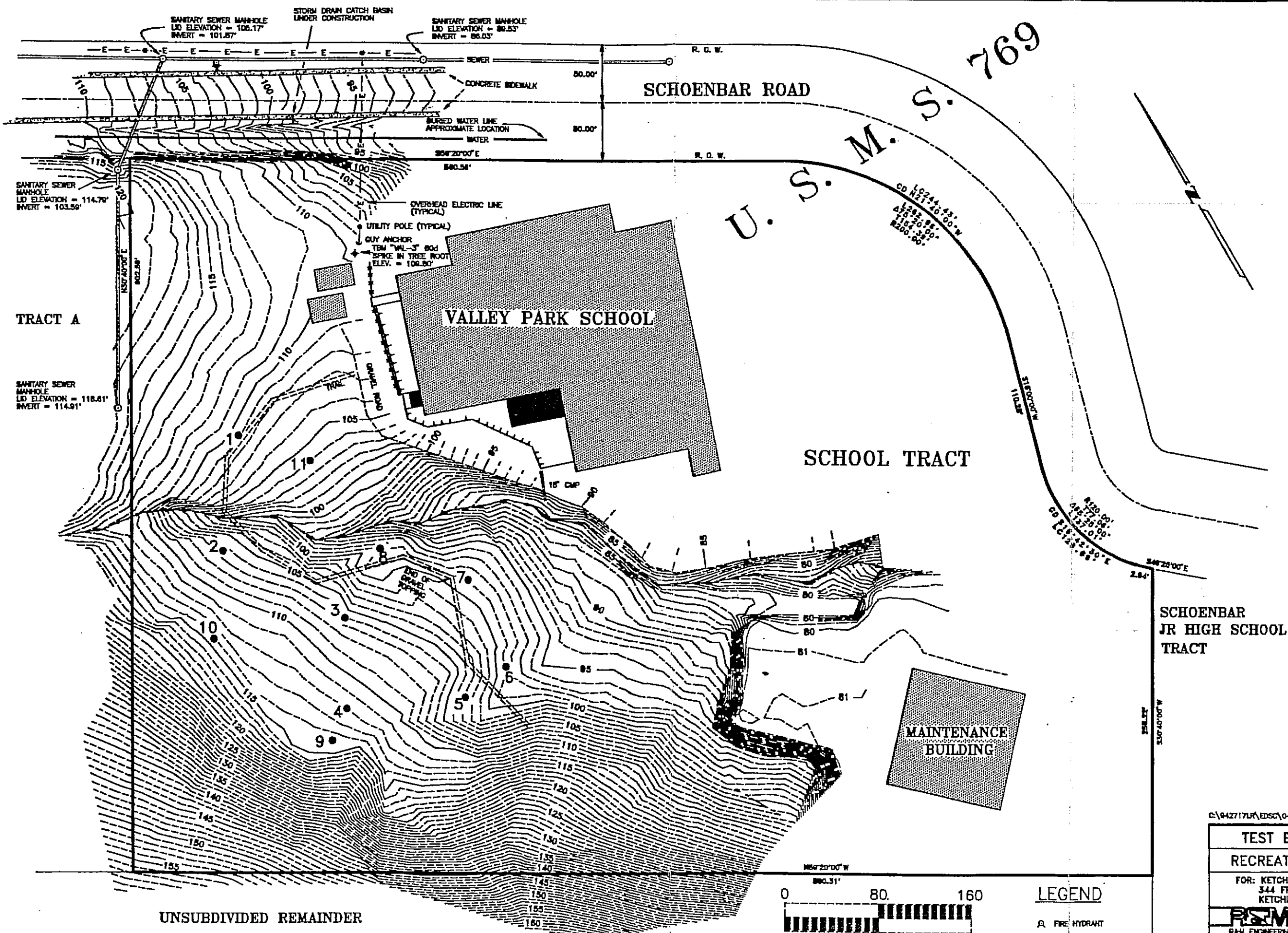
PENETROMETER TEST RECORD
INDOOR RECREATION CENTER SITE

STANDARD BLOWS PER FOOT (SEE NOTE 1)
R&M PROJECT NO. 942717.2

PROBE NO. DEPTH INTER- VAL	1	2	3	4	5	6	7	8	9	10	11
0 TO 1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	2	1	1	1
3	6	2	1	1	1	1	1	5	1	1	1
4	3	17	1	1	1	1	1	4	1	3	5
5	6	21	1	1	1	1	1	7	1	R	4
6	8	77	1	1	1	1	3	24	1		12
7	50	125	1	1	1	1	3	21	1		R
8	R	65	1	TREE TRUNK	1	3	12	12	1		
9			1	1	1	3	24	8	5		
10			1	6	5	7	28	4	20		
11			28	6	5	18	<u>65</u> R	R	12		
12											
13			26	22	19	22			24		
14			26	60	25	R			36		
15			33		27				<u>36</u> R		
16			65		48						
17			130								

NOTE 1 - STANDARD BLOWS BY A 140# DROP HAMMER FREE FALLING A STANDARD 30".

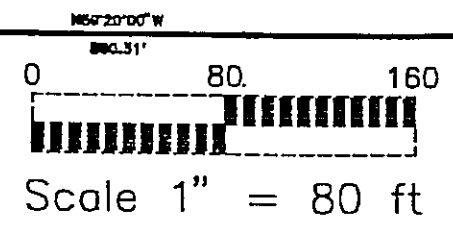
NOTE 2 - "R" INDICATES PROBABLE BEDROCK CONTACT AT THIS DEPTH.



TRACT A

SANITARY SEWER
MANHOLE
LID ELEVATION = 118.61'
INVERT = 114.91'

UNSUBDIVIDED REMAINDER
TREETOPS ADDITION TO HIGHLANDS SUBDIVISION



LEGEND

- ⊙ FIRE HYDRANT
- ⊗ WATER VALVE
- ① TEST BORING

C:\942717\EDSC\041804

TEST BORING LOCATIONS
RECREATION CENTER SITE
FOR: KETCHIKAN GATEWAY BOROUGH
344 FRONT STREET
KETCHIKAN AK 99901

R&M
R&M ENGINEERING-KETCHIKAN, INC.
P.O. BOX 8502
KETCHIKAN, ALASKA 99901

DATE: 4/19/04	DRAWN BY: LR	PROJECT NO.: 942717
SCALE: 1" = 80'	APPROVED BY:	SHEET 1 of 1