



Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

FREEDOM OF INFORMATION ACT/PRIVACY PROGRAM

September 8, 2016

In reply refer to: FOIA #BPA-2016-01355-F

Allan Lemley
Lemley Ranch LLC
9835 SW 25th Avenue
Portland, Oregon 97219
alemley@oneeightyfilms.com

Dear Mr. Lemley:

This communication serves as the Bonneville Power Administration's (BPA) final response to your Freedom of Information Act (FOIA) request BPA-2016-01355-F. Your request was received in this office on August 23, 2016. Your request was acknowledged on August 30, 2016.

Request

"...any and all information, past and present, containing or concerning the Buckley Substation geotechnical report. The Buckley Substation is on our land in Sherman County, Oregon..."

Response

In accord with the FOIA requirements and practices, BPA conducted electronic searches of records associated with the following agency offices:

Civil Design
Transmission Engineering
Real Property Services

Records responsive to your request were located. In accord with the FOIA, BPA is herein releasing 40 pages of responsive agency records to you with no redactions. Your FOIA request BPA-2016-01355-F is closed, with all available agency records provided. Pursuant to 10 C.F.R. § 1004.7(b)(2), I am the individual responsible for the determination of the information described above.

Fee

There are no FOIA fees applicable to the fulfillment of your request for BPA records.

Appeal

This decision, as well as the adequacy of the search, may be appealed within 90 calendar days from your receipt of this letter pursuant to 10 C.F.R. § 1004.8. Appeals should be addressed to:

Director, Office of Hearings and Appeals,
HG-1, L'Enfant Plaza
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585-1615

The written appeal, including the envelope, must clearly indicate that a FOIA appeal is being made. You may also submit your appeal to OHA.filings@hq.doe.gov, including the phrase "Freedom of Information Appeal" in the subject line. The appeal must contain all of the elements required by 10 C.F.R. § 1004.8, including a copy of the determination letter. Thereafter, judicial review will be available to you in the Federal District Court either: 1) in the district where you reside; 2) where you have your principal place of business; 3) where DOE's records are situated; or 4) in the District of Columbia.

You may contact BPA's FOIA Public Liaison, Sarah Westenberg, at the address at the letter header for any further assistance and to discuss any aspect of your request. Additionally, you may contact the Office of Government Information Services (OGIS) at the National Archives and Records Administration to inquire about the FOIA mediation services they offer. The contact information for OGIS is as follows:

Office of Government Information Services
National Archives and Records Administration
8601 Adelphi Road-OGIS
College Park, Maryland 20740-6001
E-mail: ogis@nara.gov
Telephone: 202-741-5770; Toll free: 1-877-684-6448; Facsimile: 202-741-5769

If you have questions about this communication, you may contact James King (CorSource Technology Group, Inc.), assigned to the BPA FOIA office, at 503-230-7621.

Sincerely,



C. M. Frost
Freedom of Information/Privacy Act Officer

Responsive Records Attached

GEOTECHNICAL STAFF REPORT

TITLE: Preliminary Site Evaluation - Buckley Substation	Date:	7/9/79	Report No.:
	Author:	R. A. Vehrs <i>RA Vehrs</i>	
	Assisted By:		
	Approved By:	<i>RAV</i> R. A. Vehrs	
	L. R. No.:		W. O. No.:
	No. of Pages:		840-919
		Head, Geotechnical Staff-ETJ	

SUMMARY:

On June 28, 1979, D. P. McCowan-ENOC and I examined potential sites for the Buckley Substation to be located at or near the intersection of Santiam-McNary 230-kV Slatt-Marion 500-kV and John Day-Grizzly No. 1 and No. 2 500-kV lines. Terrain in the study area is gently rolling wheat land.

Silt soil, ranging from a fraction of a foot to over 5 feet thick, covers an irregular basalt bedrock surface within that area. Isolated cemented zones and inclusions of rock fragments can be expected in soil sections near the bedrock contact. As evident from the recently completed Slatt-Marion footing installations, upper sections of the bedrock are seamy and broken. Rock footings were used for the John Day-Grizzly No. 1 and No. 2 Structures 35/5, indicating firm rock at about 2.5 foot depth. Two rock footings and two plate footings were used in each of the 36/1 structures, indicating firm rock at depths between 2.5 ft. and over 9.5 ft.

The following data are recommended for preliminary estimates:

Grading can be accomplished with usual equipment. Rock, if encountered, is probably ripplable.

Earthwork can utilize the silty soil. Careful moisture control will be essential to obtain suitable compaction.

Water Supply, if required for station service, will have to be from a well. Estimated depth in basalt 300 feet.

DISTRIBUTION:

L. E. Bradshaw - ETJ
N. R. Drulard - ENO
G. L. Bain - ENOC
F. S. Worth - ETJD
Official File - ETJ

Following final site selection, sufficient geologic and subsurface investigation should be done to define engineering characteristics of site soils, bedrock configuration, and potential water supply.

Memo to N. R. Drulard, Subj: Preliminary Site Reconnaissance for Summer Lake and Buckley Substations 7/5/79

I have recommended to Ed Peterson we schedule site development work for summer construction of 1981. The short construction period would not allow ample time for a complete yard contract.

Photographs for this project are available on loan by request.

BUCKLEY SUBSTATION (See Attached Map)

This study area is located at the intersection of a major HPA transmission line crossing. The site is within an existing wheat field. A line access road was open through the field to the intersection for construction of the Slatt-Marion line. We could not walk the area south on the John Day-Grizzly lines because of the wheat crop.

Geology of the area consists of silt deposits approximately seven to nine feet over basalt rock. No particular problems are anticipated when grading these soils. However, a conventional yard layout may encounter some rock excavation. Terracing the yard would be beneficial.

The area around the crossing is essentially flat. However, the topography slopes in all directions from the area. At the intersection using the G.I.S., minimal grading would be required. Transmission Engineering has recommended the area south of the line crossing for a conventional layout. Significant grading would be needed here. Drainage of the area appears good. Soil erosion control for slope protection and disturbed areas will be required.

Telephone service is available on the east side of the county road. Local electric service is north on county road approximately 1.1 miles.

I have informed Ken Shank of the study area for communications.

To reach the site proceed south off of State Highway No. 216 on gravel surfaced county road approximately 2 1/2 miles to our transmission lines. The name of the country road could not be found. The county road should be adequate for our use. A new entrance would be constructed from the county road within our right-of-way to the substation.

Don

Enclosures:
Two maps

DPMcCowan: ddk

cc: (w/encl.)

- M. Klinger - EH
- C. Hart/J. Jones - EN
- B. Middleton - OWD
- J. Frick - OWE
- E. Fischer - EOFB
- V. Williams - EIM
- L. Bradshaw - ETJ
- ✓ R. Vehrs - ETJA
- D. Marihart/K. Shank - ENI

cc: D. Johnson/S. Mirecki - ENT
Circ File - EN
Official File - ENOC

STATE HIGHWAY NO. 216

2223

Quarry
216

TO GRASS VALLEY 8
US 97 11 MILES

5013000 N
T. 4 S.
45° 15'

GRASS VALLEY 12 MI.

5011

570 000
FEET

5010

5009

12' 30"

5008

SCALE: 1" = 2000'

CANYON

GRAVEL ROAD

PROPOSED ENTRANCE ROAD

G.T.S. LAYOUT

SITE FOR CONVENTIONAL LAYOUT

SANTIAM-MONARY 230 KV
ST. ATT-MARION 500 KV

DIRT ROAD

Storage Bin

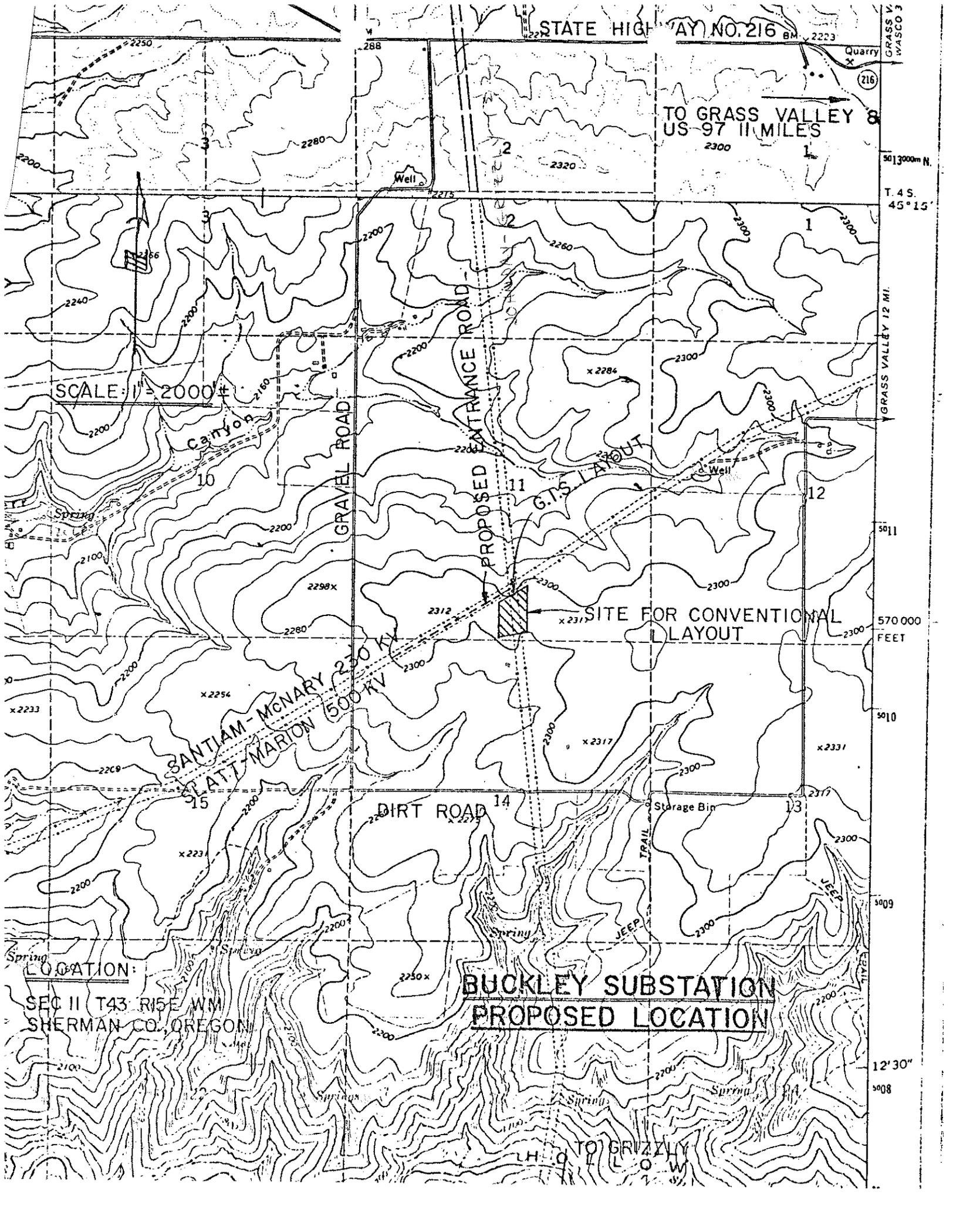
JEEP TRAIL

LOCATION:

SEC II T43 R15E WM
SHERMAN CO., OREGON

BUCKLEY SUBSTATION
PROPOSED LOCATION

TO GRIZZLY
L O W



GEOTECHNICAL STAFF REPORT

TITLE: <u>BUCKLEY SUBSTATION</u> SUBSURFACE INVESTIGATION	Date: 1981	Report No.:
	Author: M.E. ALDER, CIVIL ENGR. GEOTECHNICAL STAFF - ETRA	
	Assisted By:	
	Approved By:	
	L. R. No.:	W. O. No.:
No. of Pages:	Typed By:	

SUMMARY:

FOURTEEN BOREHOLES INDICATE ^{THAT} CLAYEY, FINE SANDY SILT FROM ONE TO FIVE FEET DEEP ~~OVERLIES~~ ^{OVERLIES} BASALT BEDROCK AT THE SITE. EXCAVATION INTO THE BASALT ~~LAYER~~ WILL PROBABLY REQUIRE DRILLING AND BLASTING. COMPACTION OF THE SOIL MAY BE ACHIEVED WITH THE EXISTING MOISTURE CONTENTS, HOWEVER MOISTURE CONTENTS SHOULD BE MONITORED TO ASSURE 95% COMPACTION. FROST HEAVE MAY BE A PROBLEM AND SUITABLE MEASURES SHOULD BE TAKEN TO PREVENT FROST DAMAGE. GROUNDWATER IS NOT EXPECTED TO BE A PROBLEM AND STANDARD DRAINAGE PROVISIONS SHOULD BE ADEQUATE.

DISTRIBUTION:

PRELIMINARY REPORT ON BUCKLEY SUBSTATION

INTRODUCTION

ON SEPTEMBER 24 AND 25, 1981, M. ALDRIDGE AND H. CLARK, ETRA, PERFORMED A SUBSURFACE INVESTIGATION TO OBTAIN SOILS INFORMATION FOR DESIGN AND CONSTRUCTION OF BUCKLEY SUBSTATION. NINE BORE-HOLES WERE HAND AUGERED AT THE ENGINE GENERATOR AND DRAINAGE FIELD SITE LOCATIONS. SOILS WERE FIELD CLASSIFIED NOTING DEPTH TO BEDROCK AND A PERCOLATION TEST WAS PERFORMED. INFORMATION FOR LABORATORY CLASSIFICATIONS, PROCTOR COMPACTIONS, AND R-VALUE DETERMINATION WAS OBTAINED FROM A PREVIOUS SITE INVESTIGATION. A BOREHOLE LOCATION MAP, BORING LOGS, AND TEST SUMMARIES ARE APPENDED AT THE END OF THIS REPORT.

SURFACE AND SUBSURFACE CONDITIONS

BUCKLEY SUBSTATION IS SITUATED ON A HIGH LAVA PLATEAU. THE PLATEAU APPEARS TO BE BASALT AS EVIDENCED BY SURFACE VESICULAR OUTCROPPINGS. THE BASALT APPEARS TO BE VERY COMPETENT WITH LITTLE WEATHERING AND FEW FRACTURES. THE SOIL IS PRIMARILY AEOLIAN DEPOSITS AND IS A DARK GRAY CLAYEY SILT. BEDROCK WAS FOUND TO BE FROM 2'-9" TO 4'-3" BELOW THE SURFACE SOIL. NO FREE WATER WAS ENCOUNTERED DURING THE SUBSURFACE INVESTIGATION. VEGETATION AT THE SITE CONSISTED OF CULTIVATED WHEAT FIELDS WITH SMALL AREAS OF SCATTERED SAGE AND SCRUB.

FIELD AND LABORATORY RESULTS

FIELD TESTING WAS LIMITED TO SOIL CLASSIFICATION AND A PERCOLATION TEST. PREVIOUSLY, IN-SITU MOISTURE CONTENTS AND DENSITIES WERE MEASURED WITH A NUCLEAR DENSOMETER. SOIL SAMPLE CLASSIFICATION, PROCTOR COMPACTION TESTS, AND AN R-VALUE DETERMINATION COMPRISED THE LABORATORY TESTING.

COMPACTION TESTS INDICATE THE SOIL HAS A MAXIMUM DRY DENSITY OF 106.5 lbs/ft^3 . OPTIMUM MOISTURE CONTENT IS 16.5% . THE 95% MAXIMUM DRY DENSITY IS 101.2 lbs/ft^3 WITH THE OPTIMUM ^{MOISTURE} CONTENT RANGING FROM 12% TO 19% . IN-PLACE DENSITY OF THE SOIL VARIED FROM 89.4 lbs/ft^3 TO 99.7 lbs/ft^3 . IN-SITU MOISTURE CONTENTS VARIED FROM 10.6% TO 16.4% . COMPARISON OF THE MOISTURE/DENSITY VALUES WITH THOSE OF THE PROCTOR COMPACTION INDICATE THAT THE SITE SOILS CAN BE COMPACTED TO DENSITIES REQUIRED FOR CONSTRUCTION. A SHRINKAGE FACTOR OF 7% CAN BE EXPECTED BASED ON COMPACTION TO 95% MAXIMUM DRY DENSITY. ALL OF THE SURFACE SOIL IS CLASSIFIED AS A CLAYEY FINE SANDY SILT (ML). THE CLAY FRACTION MAKES UP 22% OF THE GRAIN-SIZE DISTRIBUTION, WHICH IS AN INDICATION THAT THE SOIL MAY BEHAVE MORE LIKE A SLIGHTLY PLASTIC CLAY THAN SILT. RESULTS OF TESTING IN THE DRAINAGE FIELD YIELDED A PERCOLATION RATE OF 7.5 min./inch . DEPTH TO BEDROCK RANGED FROM $3'-7"$ TO $4'-3"$ IN THE DRAINAGE FIELD AND FROM $2'-9"$ TO $3'-6"$ AT THE ENGINE GENERATOR SITE.

TESTS DONE ON BULK SAMPLES OBTAINED FROM THE SITE SHOW AN R-VALUE OF 44 WITH A GRAVEL EQUIVALENT OF 13 INCHES.

CONCLUSIONS

SOILS AT THE BULLLEY SUBSTATION SITE ARE SUITABLE FOR USE AS FILL AND BACKFILL MATERIAL. 95% MAXIMUM DRY DENSITIES REQUIRED FOR CONSTRUCTION MAY BE OBTAINED BY USING STANDARD VIBRATORY COMPACTION TECHNIQUES AND CONTROLLING THE MOISTURE CONTENT OF THE COMPACTED MATERIAL. THE BEARING CAPACITY OF THE SOIL IS ADEQUATE UNDER NORMAL LOADING CONDITIONS AND SETTLEMENT AT THE SITE SHOULD NOT BE A PROBLEM. NO GROUND WATER PROBLEMS ARE ANTICIPATED AT THIS SITE. PERCOLATION TESTS INDICATE A MODERATE DRAINAGE RATE FOR THE SOIL. HOWEVER, THE PRESENCE OF ^{BEDROCK} APPROXIMATELY FOUR FEET BELOW THE SOIL SURFACE MAY HAVE INFLUENCED THE TESTING AND THEREFORE SHOULD BE CONSIDERED WHEN INTERPRETING TEST RESULTS AND DESIGNING FOR DRAINAGE. ANY EXCAVATIONS EXTENDING BELOW THE SOIL INTO THE BEDROCK WILL PROBABLY REQUIRE DRILLING AND BLASTING. THE TYPE OF SOIL IN THIS AREA IS SUSCEPTIBLE TO FROST ACTION AND SUITABLE PRECAUTIONS SHOULD BE TAKEN TO GUARD AGAINST DAMAGE FROM POSSIBLE FROST HEAVE.



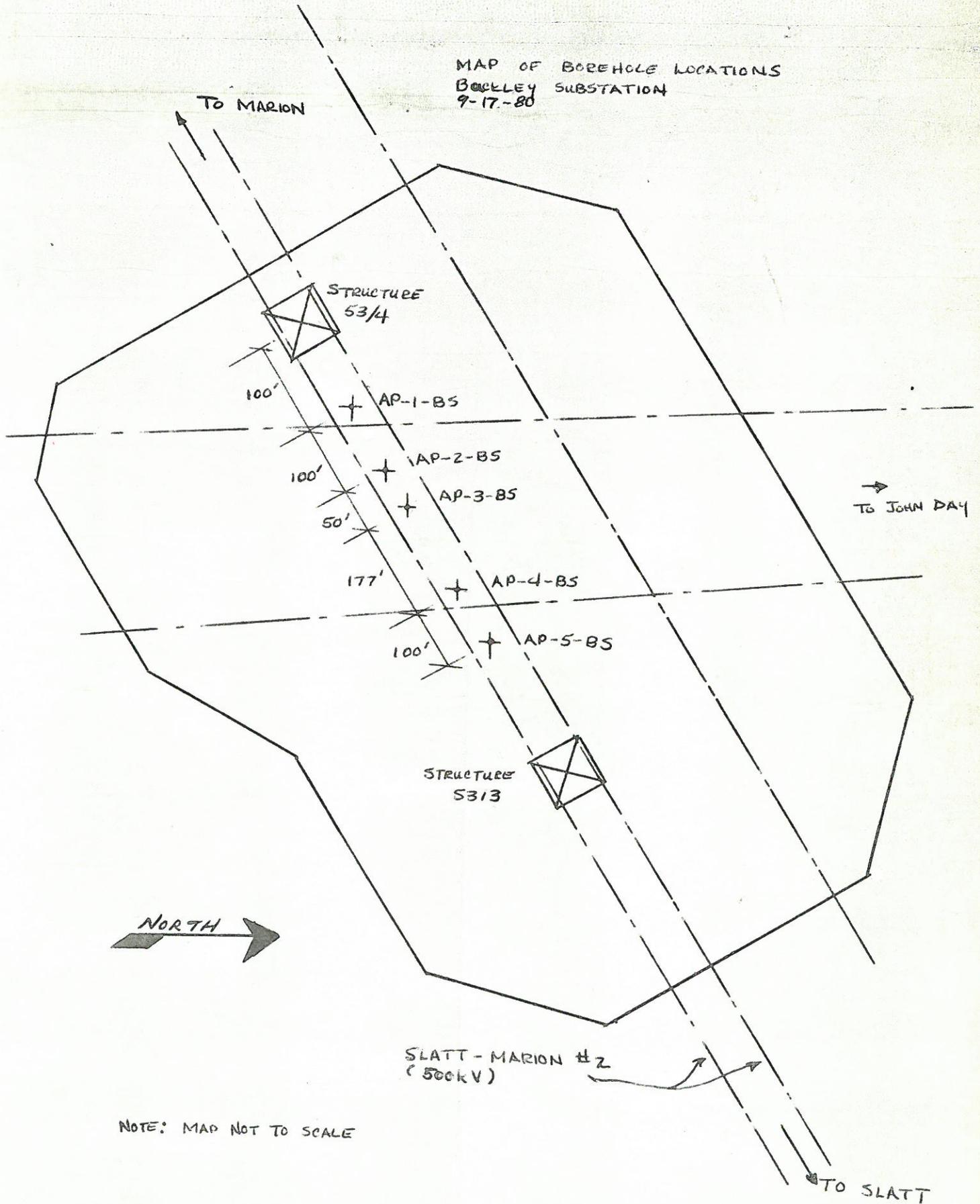
ENGINE
GENERATOR
SITE



DRAINAGE
AREA



MAP OF BOREHOLE LOCATIONS
BOKLEY SUBSTATION
9-17-80



NOTE: MAP NOT TO SCALE

LOG OF XXXXXXXXXX BORING NO. AP-2-BS

Project: BUCKLEY SUBSTATION Feature: New Substation Location: 15 mi. east of Tygh Valley, OR
 Coordinates/Station: 200' Back on Line of 53/4 Slatt-Marion Ground Elevation: 3" x 2 1/2" Approx. Dimensions: 3" x 2 1/2"
 #2 Depth to Water, (Date): Not Encountered Excavation Method: Continuous Flight Power Auger Date: 9/17/80 Logged by: E. Dohleman

FIELD CLASSIFICATION		TEST RESULTS SUMMARY						
Depth	Smpl	SPT N	γ dry pcf (kg/m ³)	w %	LL %	PL %	ϕ °	C Tsf (kN/m ²)
Ft. m.								
0								
2 1/2	0 to 2 1/2': SANDY SILT; gray brown, low plasticity (ML), dry powdery	*						
	Encountered rock fragments, refusal at 2 1/2'							

REMARKS:
 Ground elevation of AP-2-BS is approximately 3 ft. lower than AP-1-BS

*Drill cuttings

NOTES: Sample (Smpl) Type: SK=Sack, ST=Split Tube, TW=Thin Wall, N=Standard Penetration Test Blows/Ft.

LOG OF XXXXXXXXXX BORING NO. AP-5-BS

Project: BUCKLEY SUBSTATION Feature: New Substation Location: 15 mi. East of Tygh Valley, OR
 Coordinates/Station: 527' Back on Line from 53/4 Slatt-Marier On 7/2 Approx. Dimensions: 2" X 1'
 Depth to Water, (Date): Not Encountered Excavation Method: Continuous Flight Power Auger Date: 9/17/80 Logged by: E. Dohleman

FIELD CLASSIFICATION		TEST RESULTS SUMMARY							
Depth Ft.	Depth m.	Smpl	SPT N	γ dry pcf (kg/m ³)	w %	LL %	PL %	ϕ °	C Tsf (kN/m ²)
0	0	0-1': CLAYEY SILT; (ML), gray brown, dry, low plasticity, powdery	*						
		Refusal at 1'							

REMARKS:
 NOTES: Sample (Smpl) Type: SK=Sack, ST=Split Tube, TW=Thin Wall,
 N=Standard Penetration Test Blows/Ft.
 *Drill cuttings

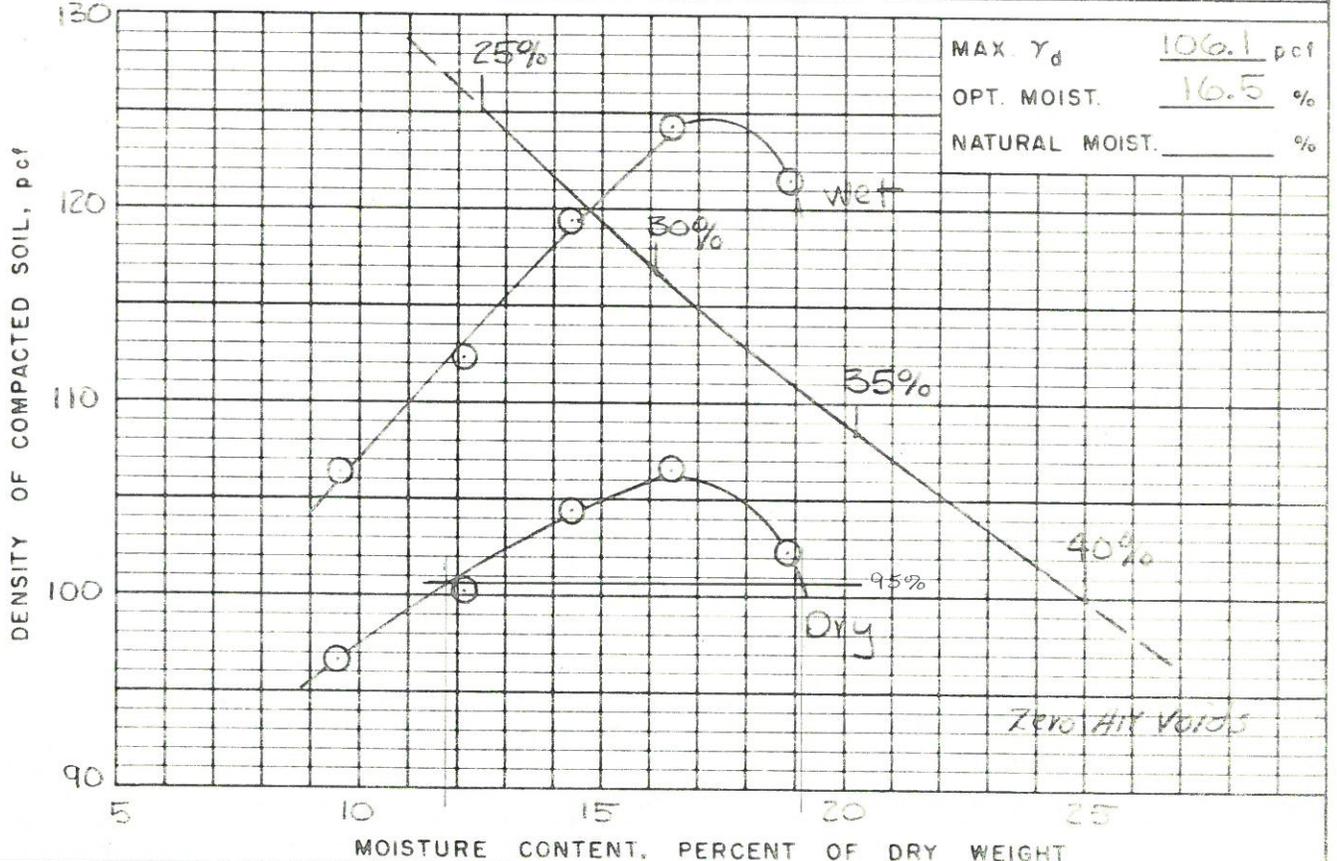
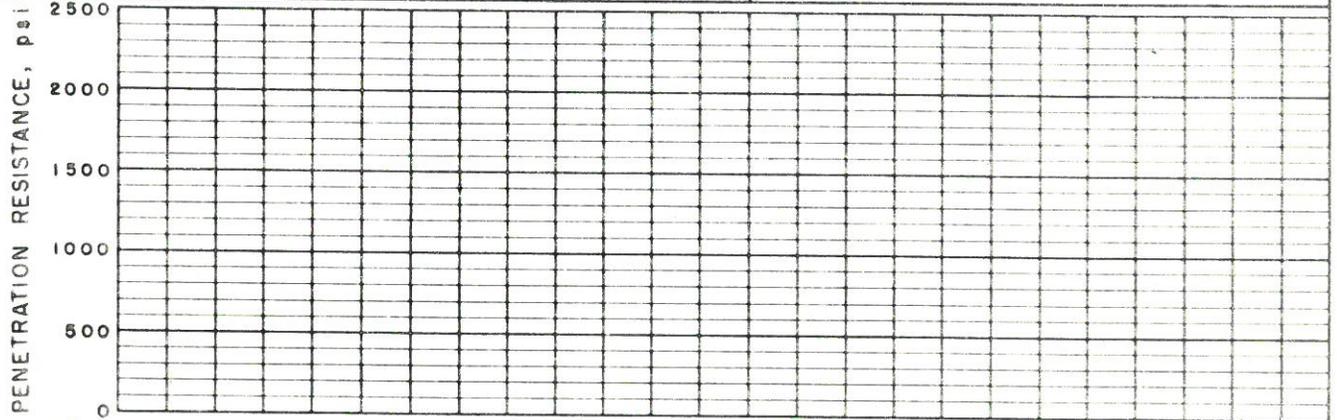
MATERIALS TESTING REPORT U.S. DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION **COMPACTION AND PENETRATION RESISTANCE**

PROJECT and STATE: Buckley Substation

FIELD SAMPLE NO: AP-1-BS LOCATION: _____ DEPTH: 0.0 to 1.0 ft.

GEOLOGIC ORIGIN: _____ TESTED AT: B. FA E. R.W. M. APPROVED BY: [Signature] DATE: 9/26/80

CLASSIFICATION: ML LL N.P. PI N.P. CURVE NO. _____ OF _____
 MAX. PARTICLE SIZE INCLUDED IN TEST: 0.107 " STD. (ASTM D-698) ; METHOD A
 SPECIFIC GRAVITY (G_s) { MINUS NO. 4: 2.67 MOD. (ASTM D-1557) ; METHOD _____
 PLUS NO. 4: _____ OTHER TEST (SEE REMARKS)



REMARKS: _____

MATERIALS TESTING REPORT U.S. DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION **COMPACTION AND PENETRATION RESISTANCE**

PROJECT and STATE Buckley Substation

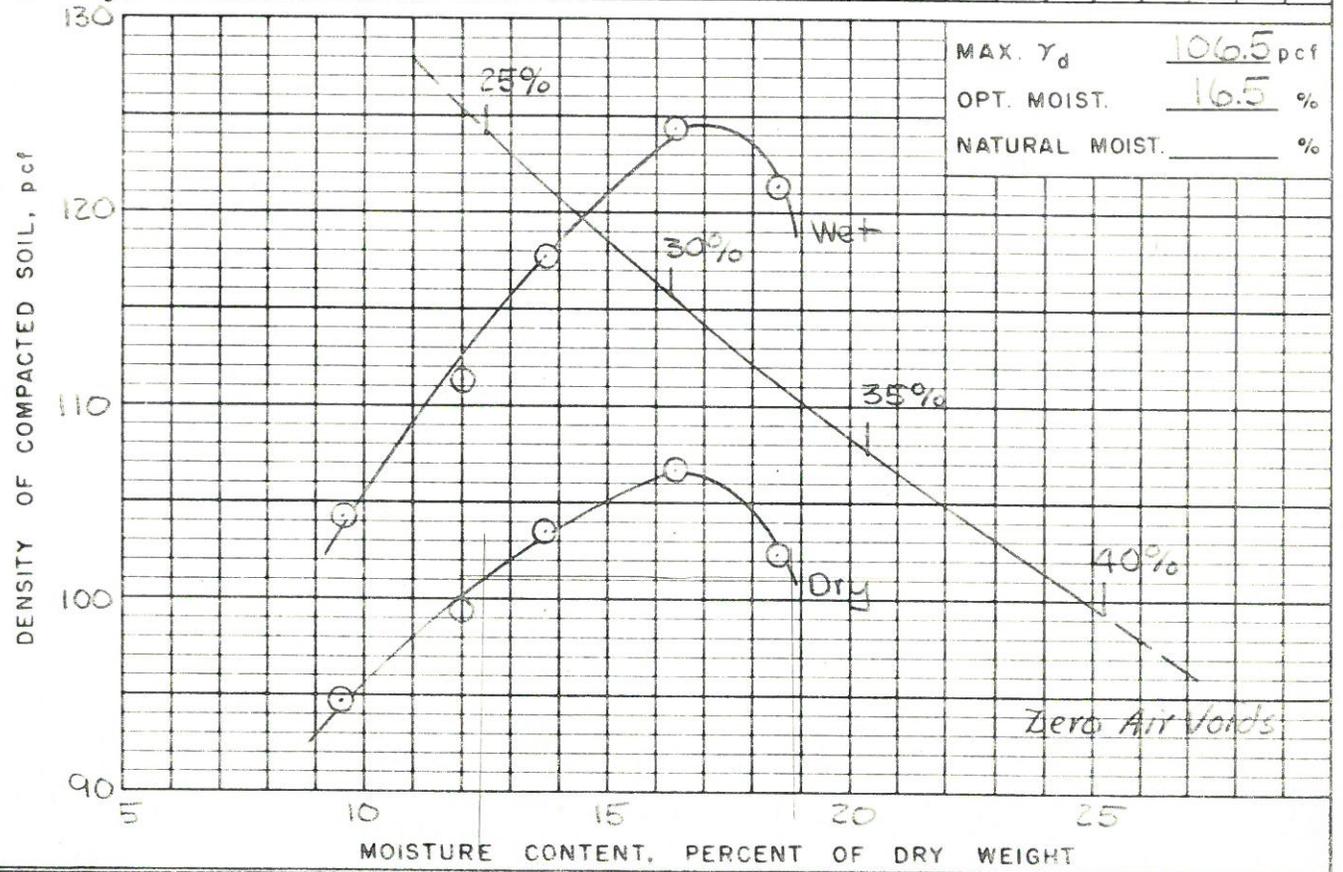
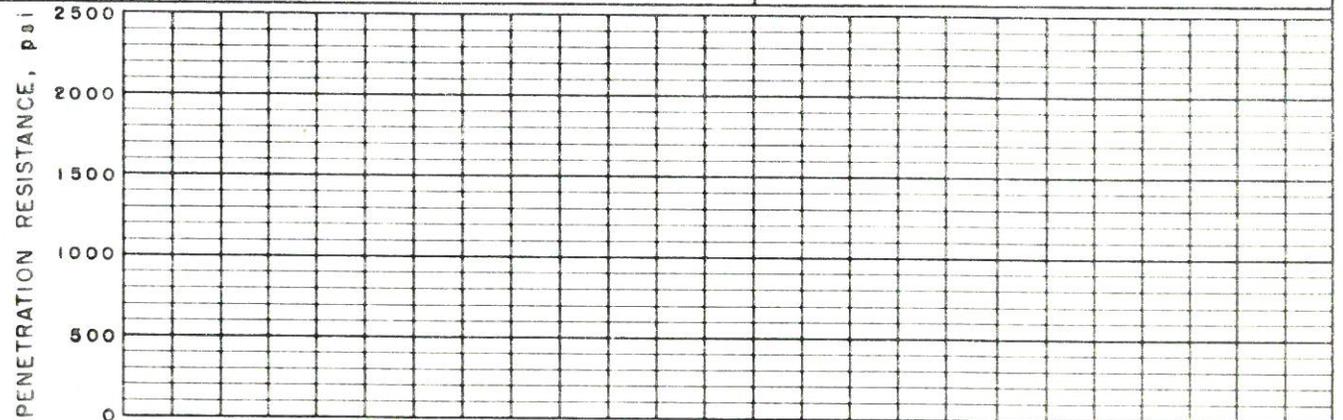
FIELD SAMPLE NO AP-4-B5 LOCATION _____ DEPTH 0.0 to 1.0 ft

GEOLOGIC ORIGIN _____ TESTED AT B.P.A. By R.W.M. APPROVED BY T. J. M. [Signature] DATE 9/26/80

CLASSIFICATION ML LL N.P. PI N.P. CURVE NO. _____ OF _____

MAX. PARTICLE SIZE INCLUDED IN TEST 0.187 " STD. (ASTM D-698) ; METHOD A

SPECIFIC GRAVITY (G_s) { MINUS NO. 4 2.65 MOD. (ASTM D-1557) ; METHOD _____ PLUS NO. 4 _____ OTHER TEST (SEE REMARKS)



REMARKS _____

PROJECT BUCKLEY SUBSTA
ACCT. NO. 165-68- 0- 0- 0- 0
SAMPLED BY SEEMAN DATE SAMPLED / /
SAMPLE NO. MTS#800322 NO. SACKS 1
DEPTH 0-1' TYPE OF DEPOSIT
LOCATION
OWNER OR MFR
AGENCY BPA
REMARKS

SUBMITTED BY
ADDRESS VANCOUVER WA
DATE SHIPPED / /
SAMPLE OF SOIL
COUNTY STATE OR
QUANTITY REPRESENTED
INTENDED USE

SIEVE ANALYSIS

SIEVE SIZE	PERCENT PASSING
3 IN.	
2-1/2 IN.	
2 IN.	
1-1/2 IN.	
1 IN.	100.0
3/4 IN.	99.8
1/2 IN.	99.7
3/8 IN.	99.6
NO. 4	99.3
NO. 10	
NO. 40	
NO. 200	
0.02 MM	
0.005 MM	

SOIL CLASSIFICATION
DESCRIPTION
AASHTO

SOIL ANALYSIS

COMPACTION AASHTO T-99

AASHTO FLEXIBLE PAVEMENT DESIGN
R VALUE
R VALUE BY EXUDATION 300 PSI 44
R VALUE BY EQUILIBRIUM----- 44
DENSITY AT R VALUE PCF----- 104.0
PCT MOISTURE AT R VALUE----- 18

AASHTO-DESIGN
SERVICEABILITY INDEX (PT)---- 2.0
REGIONAL FACTOR (R)----- 2.0
18 KIP EQUIVALENT----- 15
TRAFFIC ANALYSIS PERIOD----- 20

STRENGTH COEF BASE-----A2--- 0.14

DESIGN R VALUE----- 44
SUPPORT VALUE----- 6.5
STRUCTURAL NUMBER--- 1.83

GRAVEL EQUIVALENT--- 13 INCHES

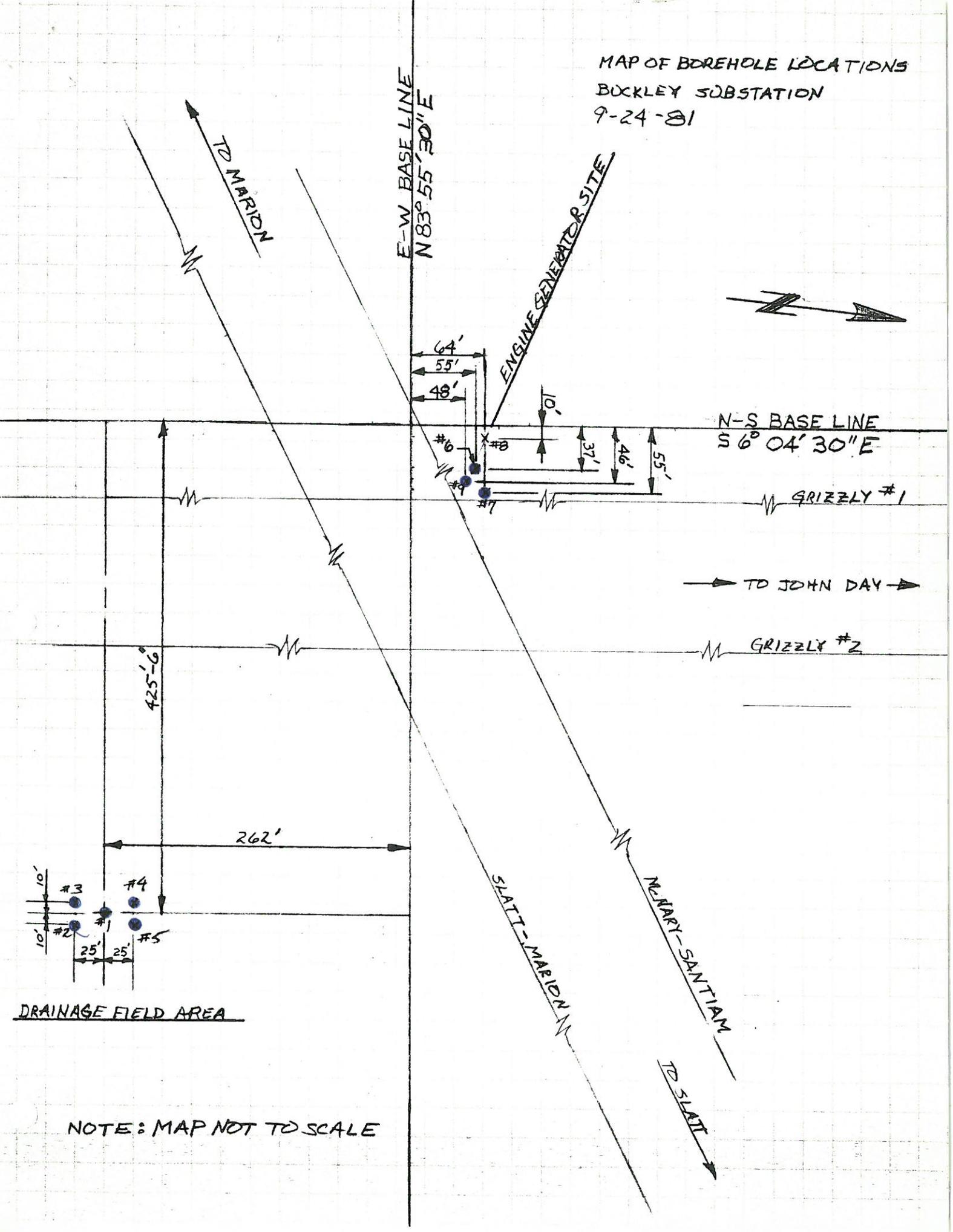
DISTRIBUTION

MATERIALS SECTION
DIVISION ENGR.
RESIDENT ENGR.
LAB FILES
ACCOUNTING
OTHER

TOTAL TEST CHARGES \$ 105.00

GUY E. MATTHEWS
CHIEF MATERIALS LABORATORY

MAP OF BOREHOLE LOCATIONS
 BUCKLEY SUBSTATION
 9-24-81



NOTE: MAP NOT TO SCALE

LOG OF [REDACTED] PIT OR BORING NO. AH-1-B5

Project: BUCKLEY SUBSTATION Feature: DRAIN FIELD Location: East of Tygh Valley, OR
 Coordinates/Station: E425-6" S262' (Construction Base Line) Ground Elevation: Appx. 2305' Approx. Dimensions: 3" X 4'
 Depth to Water, (Date): Not Encountered Excavation Method: Hand Auger Date: 9/24/81 Logged by: M. Alder

FIELD CLASSIFICATION		TEST RESULTS SUMMARY						
Depth	Smp'l	SPT	γ_{dry}	w	LL	PL	ϕ	C
Ft. m.	N	pcf (kg/m ³)	%	%	%	%	°	Tsf (kN/m ²)
0-0								
0-4'								
4'								

Surface - Wheat field
 0-4': CLAYEY SILT (ML), dry, dark gray, low plasticity, soil is damp after 6', Rock fragment encountered at 3'-6", light orange brown in color
 Auger Refusal at 4'

Percolation Test Results (2nd Day)
 0-30 min. ... 9"
 30-45 min. ... 7" *
 45-60 min. ... 7"
 * Water had drained completely out during this time period

REMARKS: NOTES: Sample (Smp'l) Type: SK=Sack, ST=Split Tube, TW=Thin Wall, N=Standard Penetration Test Blows/Ft.

LOG OF [REDACTED] OR BORING NO. AH-3-B5

Project: BUCKLEY SUBSTATION Feature: DRAIN FIELD Location: 1.5 mi. East of Toh Valley, OR
 Coordinates/Station: E415-6, S287 Ground Elevation: App. 2305 Approx. Dimensions: 3" X 3' - 9"
 Depth to Water, (Date): Not Encountered Excavation Method: HAND AUGER Date: 9/24/81 Logged by: M. Alder

FIELD CLASSIFICATION		TEST RESULTS SUMMARY						
Depth Ft. m.	Smp'l	SPT N	γ dry pcf (kg/m ³)	w %	LL %	PL %	ϕ °	C Tsf (kN/m ²)
0-0	Surface ~ Wheat Field 0-3 3/4' ; CLAYEY SILT; (M); dry, dark grey low plasticity, soil is damp after 1.5 Agger refusal at 3'-9"							
	Percolation Test Results (2nd day) 0-30 min. - 1.11" 30-60 min 1.16"							

REMARKS: NOTES: Sample (Smp'l) Type: SK=Sack, ST=Split Tube, TW=Thin Wall, N=Standard Penetration Test Blows/Ft.

LOG OF PIT OR BORING NO. AH-4-B5

Project: BUCKLEY SUBSTATION Feature: DRAIN FIELD Location: 5 mi. East of Tigh Valley, DR.
 Coordinates/Station: E415'-6", S237' (Construction Per Line) Ground Elevation: App. 2325 Approx. Dimensions: 3" X 3' 9"
 Depth to Water, (Date): Not Encountered Excavation Method: Hand Auger Date: 9/24/81 Logged by: M. Alden

FIELD CLASSIFICATION		TEST RESULTS SUMMARY						
Depth Ft. m.	Smpl	SPT N	γ dry pcf (kg/m ³)	w %	LL %	PL %	ϕ °	C Tsf (kN/m ²)
0-0	Surface - Wheat Field. 0-3'-7" : Clayey Silt (ML), material rolls into 1/8" threads, walls of pit hold well vertically Auger refusal at 3'-7"							
	Percolation Test Results (2 nd Day) 0-30 min 1.19" 30-60 min 1.17"							

REMARKS: NOTES: Sample (Smpl) Type: SK=Sack, ST=Split Tube, TW=Thin Wall, N=Standard Penetration Test Blows/Ft.

LOG OF [REDACTED] OR BORING NO. AH-5-65

Project: BUCKLEY SUBSTATION Feature: DRAIN FIELD Location: 5 mi. East of Tygh Valley, OR.
 Coordinates/Station: E435-6, 5237' (Construction Base Line) Ground Elevation: app. 230.5 Approx. Dimensions: 3' x 3' x 8"
 Depth to Water, (Date): Not Encountered Excavation Method: Hand Auger Date: 9/24/81 Logged by: M. Alden

TEST RESULTS SUMMARY

FIELD CLASSIFICATION		Smp'l	SPT N	γ dry pcf (kg/m ³)	w %	LL %	PL %	ϕ °	C Tsf (kN/m ²)
Depth Ft. m.									
0-0	Surface — wheat field 0-3'-8": Clayey silt; (ML), dry, dark gray low plasticity, soil is damp after 1 1/2" 1 1/2"								
	Auger Refusal at 3'-8"								
	Penetration Test Results (2nd day)								
	0-30 7"								
	30-60 4"								

NOTES: Sample (Smp'l) Type: SK=Sack, ST=Split Tube, TW=Thin Wall,
N=Standard Penetration Test Blows/Ft.

REMARKS:

LOG OF [REDACTED] OR BORING NO. AH-6-RS

Project: BUCKLEY SUBSTATION Feature: ENGINE GENERATOR SITE Location: 15 mi. EAST of Tygh Valley, OR
 Coordinates/Station: E37, N55, (Construction Base Line) Ground Elevation: 299.2 Approx. Dimensions: 3" X 3' 1 1/2"
 Depth to Water, (Date): Not Encountered Excavation Method: Hand Auger Date: 9/25/81 Logged by: M. Alder

FIELD CLASSIFICATION		TEST RESULTS SUMMARY						
Depth Ft. m.	Smpl	SPT N	γ dry pcf (kg/m ³)	w %	LL %	PL %	ϕ °	C Tsf (kN/m ²)
0-3'	Surface - Wheat Field 0-3 1/2': Clayey, fine sandy silt, (ML), dry, low plasticity, dark gray soil is damp after 1' medium plasticity, rock fragments encountered at 3' Auger refusal at 3'-6"							

REMARKS: NOTES: Sample (Smpl) Type: SK=Sack, ST=Split Tube, TW=Thin Wall,
N=Standard Penetration Test Blows/Ft.

Log No. BONNEVILLE POWER ADMINISTRATION

LOG OF [REDACTED] OR BORING NO. AH-7-B5

Project: BUCKLEY SUBSTATION Feature: ENGINE GENERATOR SITE Location: 1.5 mi. East of Tugh Valley, OR
 Coordinates/Station: E55, N63-6" (Construction Base line) Ground Elevation: 2792 Approx. Dimensions: 3" x 3' 10"
 Depth to Water, (Date): Not encountered Excavation Method: Hand Auger Date: 9/25/81 Logged by: M. Alder

FIELD CLASSIFICATION		TEST RESULTS SUMMARY							
Depth Ft.	Depth m.	Smpl	SPT N	γ_{dry} pcf (kg/m ³)	w %	LL %	PL %	ϕ °	C Tsf (kN/m ²)
0	0								
3	3								

Surface ~ small brush & sage
 0-3' Clayey silt (ML) dark gray, dry soil
 is damp after 0, light brown, medium plasticity.
 Auger Refusal at 3'-0"

REMARKS:

NOTES: Sample (Smpl) Type: SK=Sack, ST=Split Tube, TW=Thin Wall,
 N=Standard Penetration Test Blows/Ft.

LOG OF [REDACTED] BORING NO. AH-B-BS

Project: BUCKLEY SUBSTATION Feature: ENGINE GENERATOR SITE Location: 1/2 mi. East of Tygh Valley, OR
 Coordinates/Station: EPD, NGA (Construction Base Line) Ground Elevation: 229.2 Approx. Dimensions: 3" X 2'-9"
 Depth to Water, (Date): Not Encountered Excavation Method: HAND AUGER Date: 9/25/81 Logged by: M. Alder

FIELD CLASSIFICATION		TEST RESULTS SUMMARY							
Depth Ft. m.		Smp	SPT N	γ dry pcf (kg/m ³)	w %	LL %	PL %	ϕ °	C Tsf (kN/m ²)
0-0	Surface ~ Wheat Field 0-2'-9": Clayey silt, (mu), dry dark gray low plasticity, soil is damp after 1" rock fragments encountered at 2"-6" Auger refusal at 2'-9" * This boring was enlarged with a shovel to bedrock. Unable to break a piece from the bedrock layer, appears to be Basalt.								

REMARKS:

NOTES: Sample (Smp) Type: SK=Sack, ST=Split Tube, TW=Thin Wall,
N=Standard Penetration Test Blows/Ft.

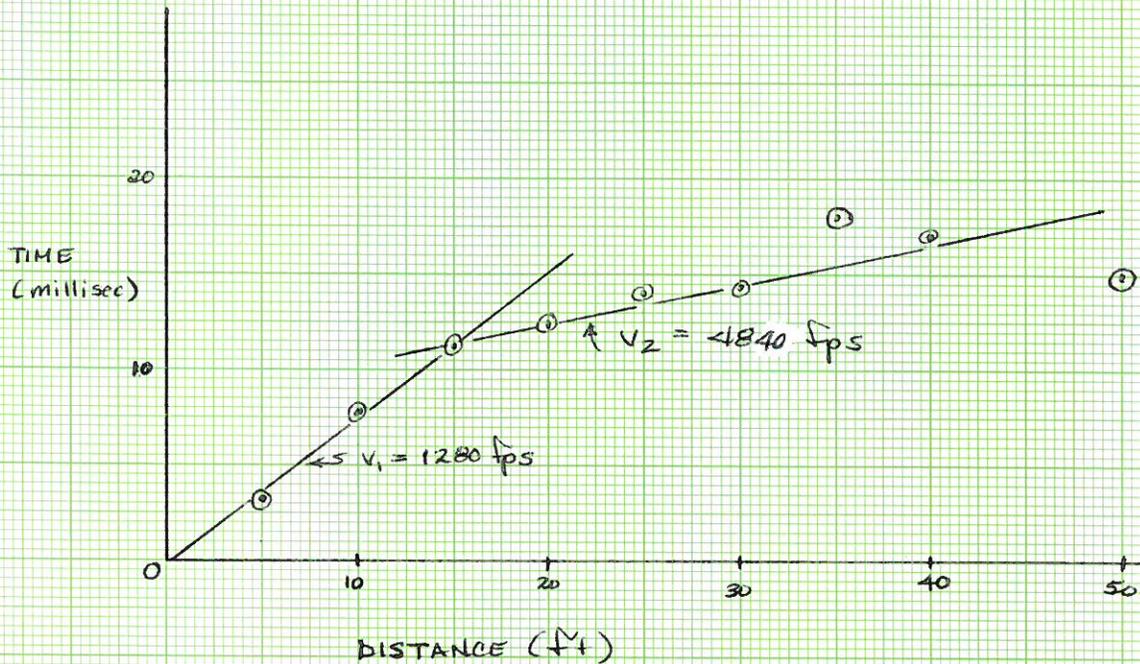
SEISMOGRAPH LINE

BUCKLEY SUBSTATION

AD-1-B5

100' BACK ON LINE AND 15' TO THE RIGHT OF
STRUCTURE 53/4 SLATT-MARION #2

9-17-80



INTERPRETATION

$$\text{DEPTH} = \frac{15}{2} \sqrt{\frac{4840 - 1280}{4840 + 1280}} = 5.7 \text{ ft (say } 5\frac{1}{2}\text{)}$$

SOIL TO A DEPTH OF $5\frac{1}{2}$ FT UNDERLAIN BY FRACTURED ROCK
(PROBABLY BASALT) TO AN UNKNOWN DEPTH.

NOTE: DATA POINTS @ 35' AND 50' WERE ASSUMED TO BE IN
ERROR. THIS INTERPRETATION MAY HOWEVER BE IN
QUESTION AND CAUTION SHOULD BE USED IN ESTIMATING
COMPETENCY OF THE ROCK AT DEPTHS BELOW 10 FT WITH
THIS SEISMIC GRAPH.

E. DEHLEMAN

DEPTH TO FRACTURED ROCK CORRESPONDS QUITE WELL
TO THE BORING MADE AT THIS LOCATION. (REFUSAL @ $5\frac{1}{2}$ ')





memorandum

DATE: 7/8/09

REPLY TO
ATTN OF: Jessica Hamilton, Civil Engineering Student (SCEP)

SUBJECT: Buckley Substation Microwave Tower Investigation

TO: Amy Freel, Project Manager

This memorandum provides the results of a foundation investigation for a proposed microwave tower at the Buckley Substation. Two alternative locations were explored, one site at the storage yard and one site east of the existing parking lot. The purpose of this memorandum is to present the results of the explorations and provide recommendations for tower foundation design.

Buckley Substation is located in central Oregon on a basalt terrace covered with a layer of fine sandy silt soil. The area around the Substation is essentially flat, though the surrounding topography is gently sloped.

The investigation consisted of excavating two test pits at locations shown on the attached site plan. Test pits were excavated with a rubber tire, 580 Super L backhoe. Test pits extended to refusal on hard basalt rock which was encountered at depths ranging from 4 to 4.5 feet below existing grade, as shown on the attached Site Plan. Material overlying rock generally consists of loose to medium dense brown sandy silt. The site in the existing storage yard also contained some gravel to cobble-sized angular basalt fragments within the silty soils, likely a result of the substation grading. Representative photos of test pits are attached.

Foundation support for the proposed tower can be provided by slab or spread footings bearing on the underlying rock encountered at depths of 4 to 4.5 feet. Foundations constructed on the basalt bedrock may be designed to impose bearing pressures up to a recommended maximum value of 8,000 pounds per square foot. This value applies to the total of dead plus permanently and/or frequently applied live loads and may be increased by 1/3 to include seismic and/or edge pressures due to overturning moments.

Attachments: Site Plan showing test pit locations, depth to rock, and photo locations
Test Pit Photos (1 page)

CC:

Nancy Jacobsen: TFDB- THE DALLES

Amanda Williams: TELD-TPP-3

Kerry Cook: TELF-TPP-3

Eric Matteld: TECT-CSB-1

Mason Tabata: TECT-CSB-1



Test Pit 2, Loose to medium dense sandy silt; Approx. 4.5 ft. to bedrock



Test Pit 1, Loose sandy silt
Approx. 4 ft to bedrock



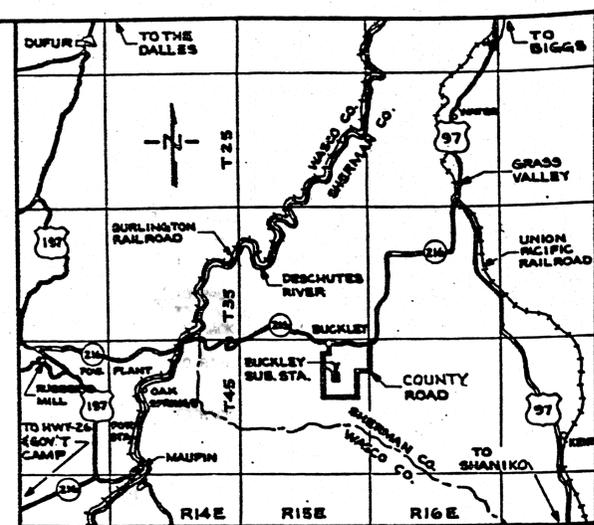
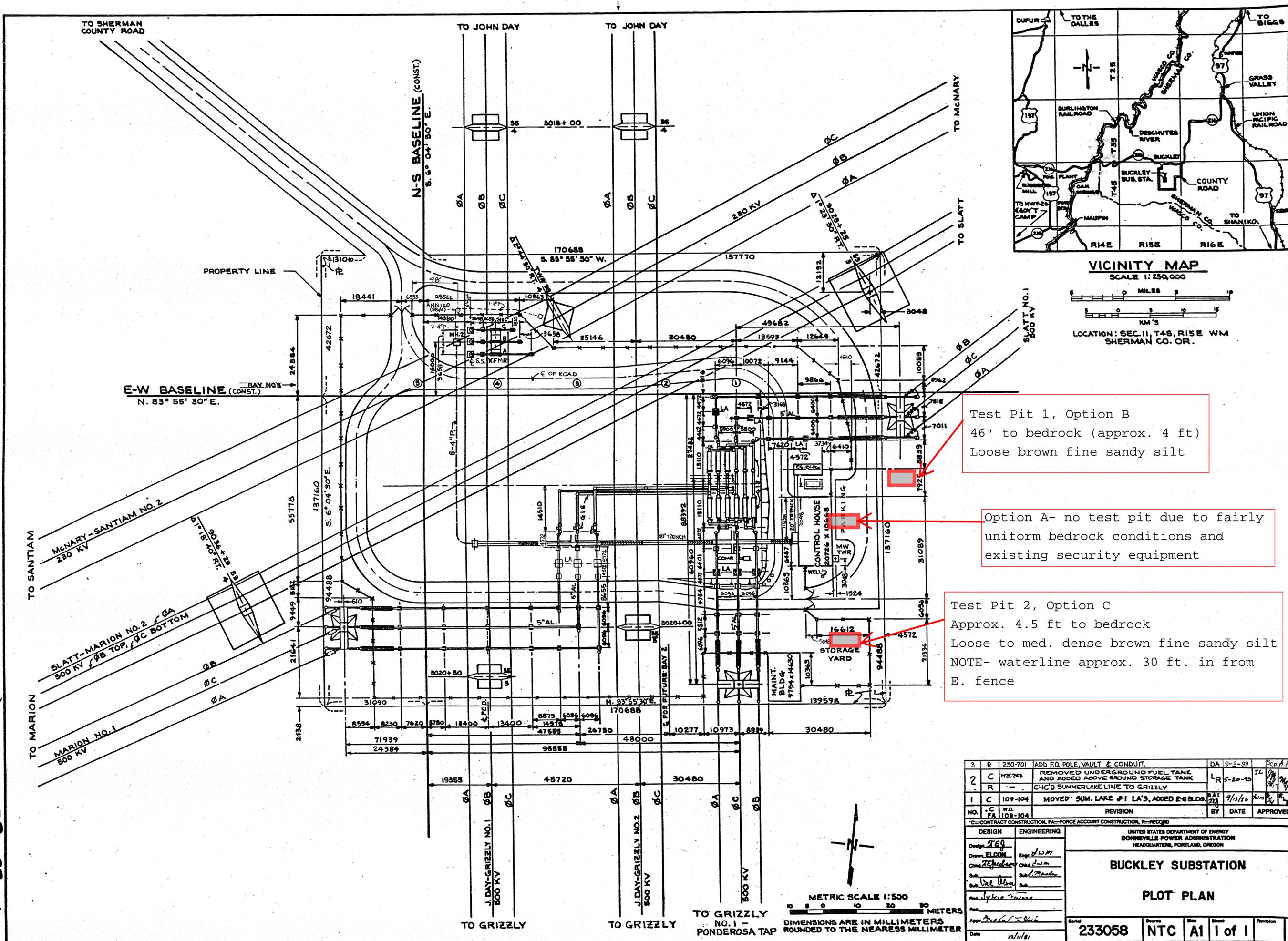
Test Pit 2,
Spoils



Test Pit 1 with spoils

Buckley Substation; Test Pits performed 6/29/09

12-30-83



Test Pit 1, Option B
46" to bedrock (approx. 4 ft)
Loose brown fine sandy silt

Option A- no test pit due to fairly uniform bedrock conditions and existing security equipment

Test Pit 2, Option C
Approx. 4.5 ft to bedrock
Loose to med. dense brown fine sandy silt
NOTE- waterline approx. 30 ft. in from E. fence

3	R	250-701	ADD F.O. POLE, VAULT & CONDUIT.	DA	9-3-99	SEP/11
2	C	H2C243	REMOVED UNDERGROUND FUEL TANK AND ADDED ABOVE GROUND STORAGE TANK	LR	5-20-75	JL
	R		C-40'D SUMMERLAKE LINE TO GRIZZLY			
1	C	109-104	MOVED SUM. LAKE #1 LA'S, ADDED E-BLDGS.	BAI	9/15/72	WMP
NO.	C	FA 109-104	REVISION	BY	DATE	APPROVED

DESIGN	ENGINEERING	UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON			
Design: TEG	Eng: J.W.M.	BUCKLEY SUBSTATION			
Drawn: ELCO	Eng: J.W.M.				
Checked: TEG	Checked: J.W.M.	PLOT PLAN			
Sub: Val Ulan	Sub: J. Ulan				
App: Metal	App: J. Ulan	Sheet: 233058	Source: NTC	Size: A1	Sheet: 1 of 1

METRIC SCALE 1:500
DIMENSIONS ARE IN MILLIMETERS
ROUNDED TO THE NEAREST MILLIMETER

LABORATORY REPORT

BRANCH OF LABORATORIES

TITLE: Soil Resistivity Analysis at Buckley Substation Site	Date:	5-11-81	Report No.:	ERGJ-81-12
	Author:	R. H. Hall <i>R. H. Hall</i>		
	Assisted By:	R. W. Mitchell, K. J. Ross		
	Approved By:	ERGJ	<i>R. R. Nilson</i> R. R. Nilson	
	L. R. No.:	92067-EN	W. O. No.:	840-919
	No. of Pages:	4	Typed By:	Brenda Vinson

SUMMARY:

Soil resistivity measurements were completed on the Buckley Substation Site on April 17, 1981, and the test results, based on equal probe spacing data, indicate that the deep resistivity value is 160 ohm-meters.

If it is desirable to lower the grid resistance, the most economical method would be to expand the area enclosed by the perimeter conductor of the grounding grid.

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Discussion

Soil resistivity measurements were completed on the Buckley Substation Site on April 17, 1981, and the test results, based on equal probe spacing data, indicate that the deep resistivity value is 160 ohm-meters.

Data obtained is shown in Table I. The test locations are shown in Figure 1. The equal probe spacing data is plotted on Figure 2 and indicates that the deep resistivity value is 160 ohm-meters.

The excessive voltage pickup on the instrument test leads laying under and parallel to the transmission lines allowed only tests of 30 meters and less in spacing to be conducted on the substation grid site area. These are tests 4, 5, 7, 8, 9, and 10.

Tests 1, 2, 3, and 6 were conducted completely outside the proposed grid area, but did cover areas adjacent to three of the four sides to the substation site.

From 30 meter to 90 meter equal test spacings, there was no indication that the resistivity would either increase or decrease in value.

If it is desirable to lower the grid resistance, the most economical method would be to expand the area enclosed by the perimeter conductor of the grounding grid.

No unusual conditions were noted on the site which might affect either the data or the conclusion drawn.

TABLE I

Buckley Substation Site Resistivity Survey Data

Date: April 17, 1981

LR-92067

Test By: R. W. Mitchell
K. J. Ross
R. H. Hall

Equal Probe
Spacing

Resistivity
OHM - Meters

Meters	Test	Average									
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	of Tests
2	78	72	78	78	64	78	116	109	160	157	104
3	86	83	106	106	87	106	130	124	186	184	123
6	111	105	168	168	131	168	152	166	211	210	157
9	133	123	179	179	167	179	164	180	220	213	172
12	143	142	187	187	174	187	166	191	206	216	178
15	157	154	197	197	169	197	177	180	196	194	178
18	169	162	186	186	166	186	177	180	196	194	171
21			180	180	164	180					172
24	190	168	177	177	161	177					174
27			165	165	160	165					163
30	192	175	155	155	160	155					171
36	190	192									191
42	185	198									192
48	184	208									196
54	180	207									194
60	192	196									194
90			192								192

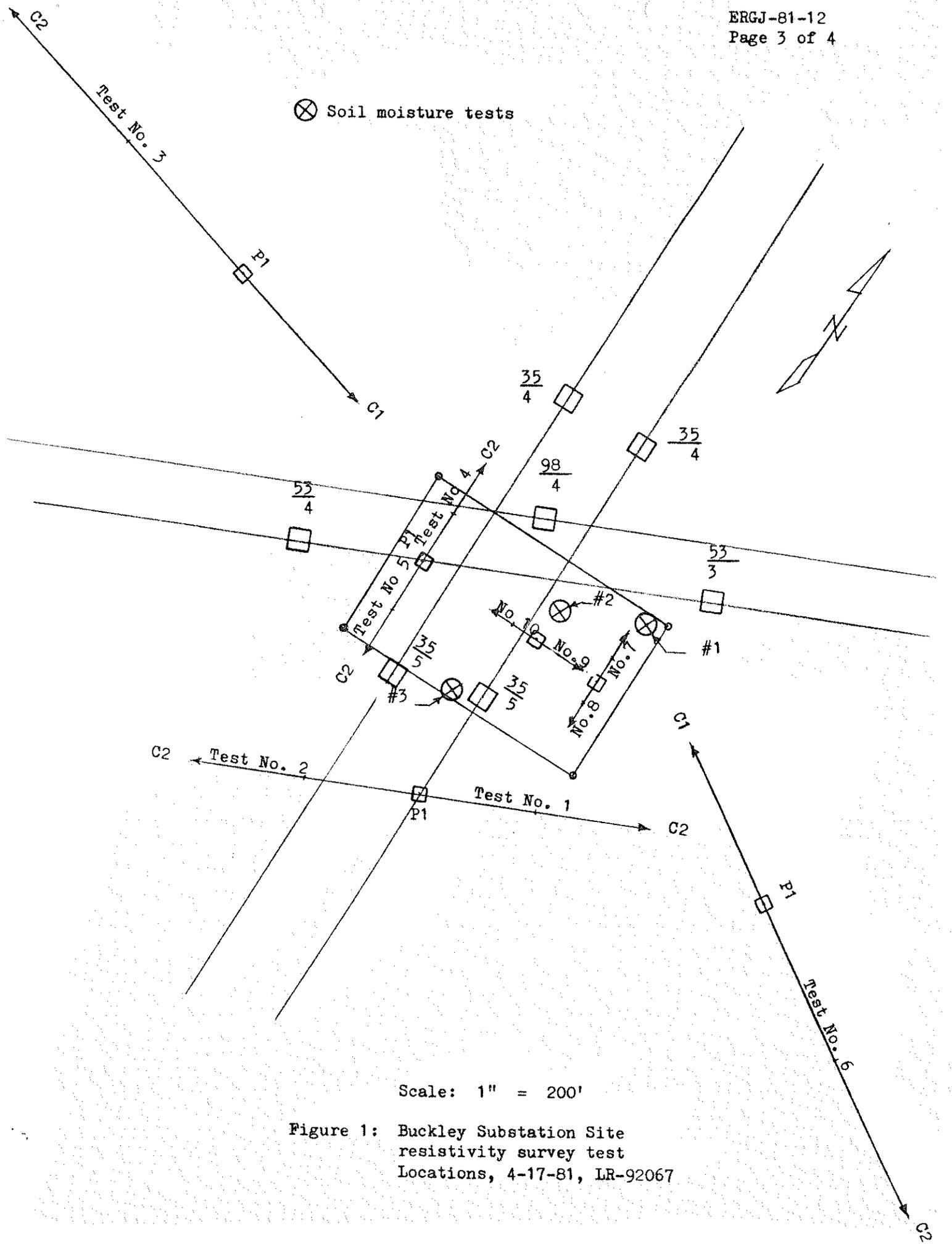
Soil Moisture Tests
% Moisture 0.3 m Depth

Tests No. 1 Test No. 2 Test No. 3

22.9%

20.2%

24.2%



⊗ Soil moisture tests

Scale: 1" = 200'

Figure 1: Buckley Substation Site resistivity survey test Locations, 4-17-81, LR-92067

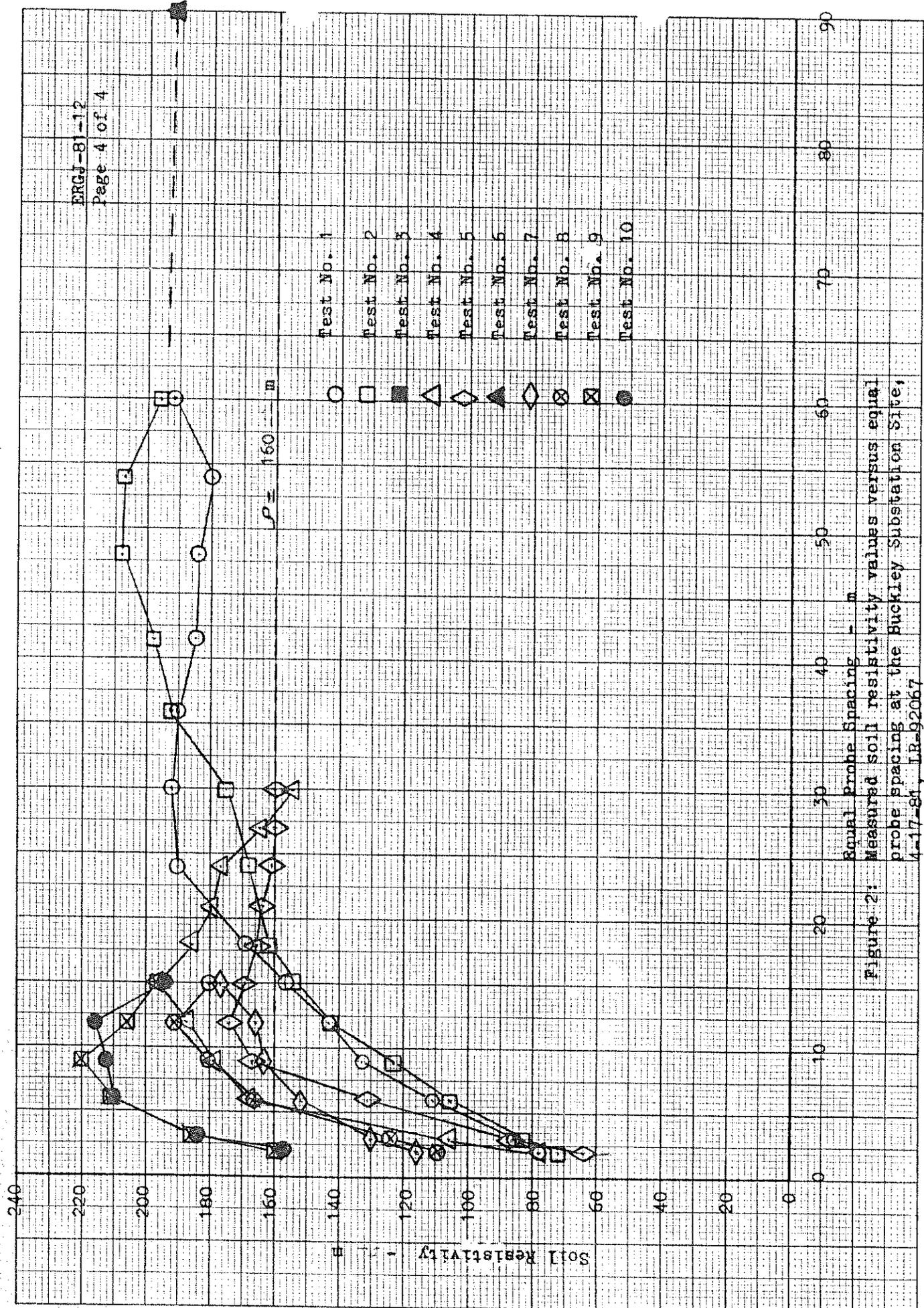


Figure 2: Measured soil resistivity values versus equal probe spacing at the Buckley Substation Site, 4-17-81, IR-92067