

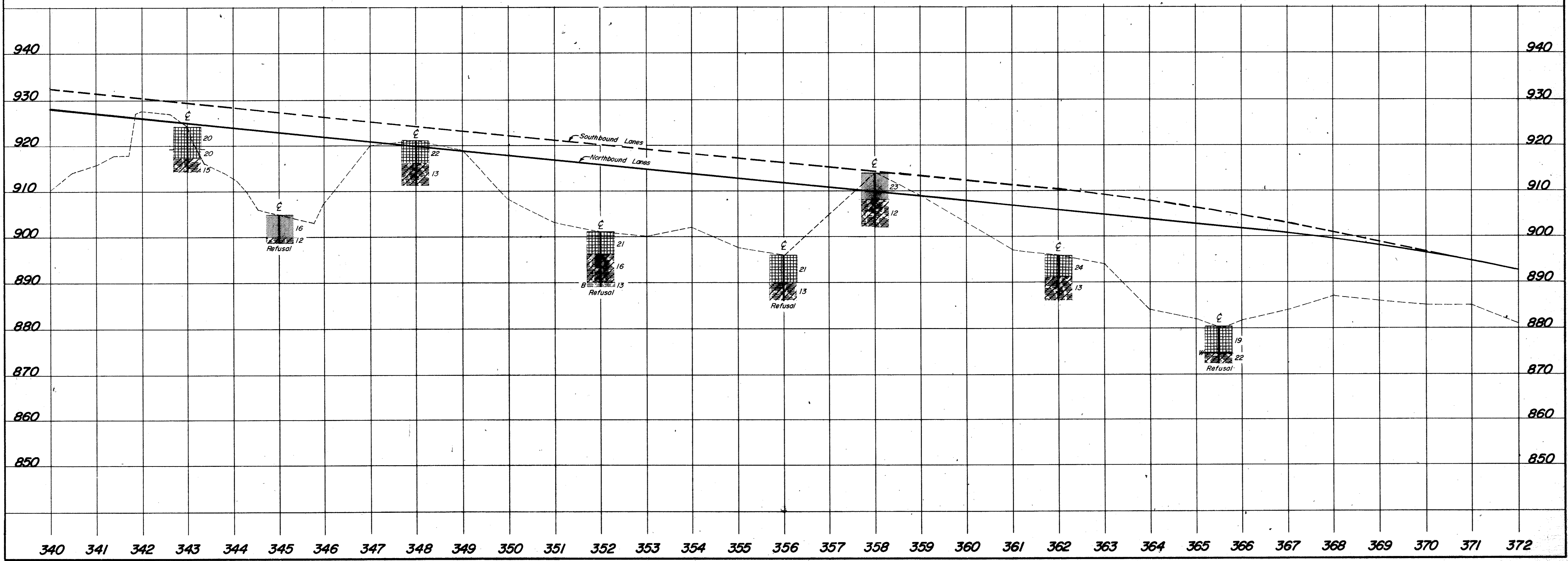
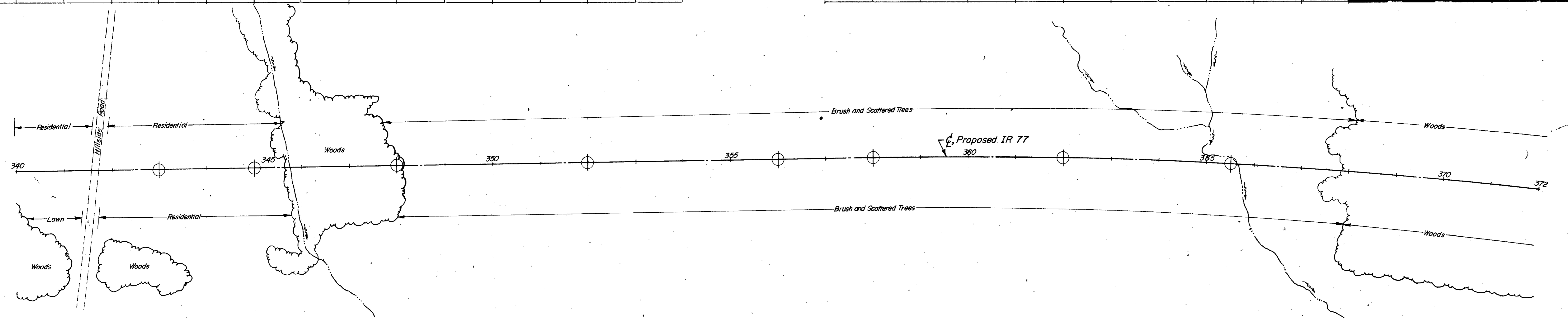
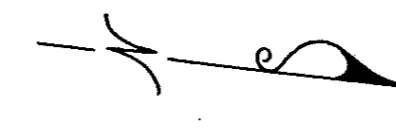
SOIL PROFILE

CUYAHOGA COUNTY
CUY-IR 77-6.45

OHIO STATE HIGHWAY TESTING LABORATORY
1620 W. BROAD ST. COLUMBUS 23, OHIO

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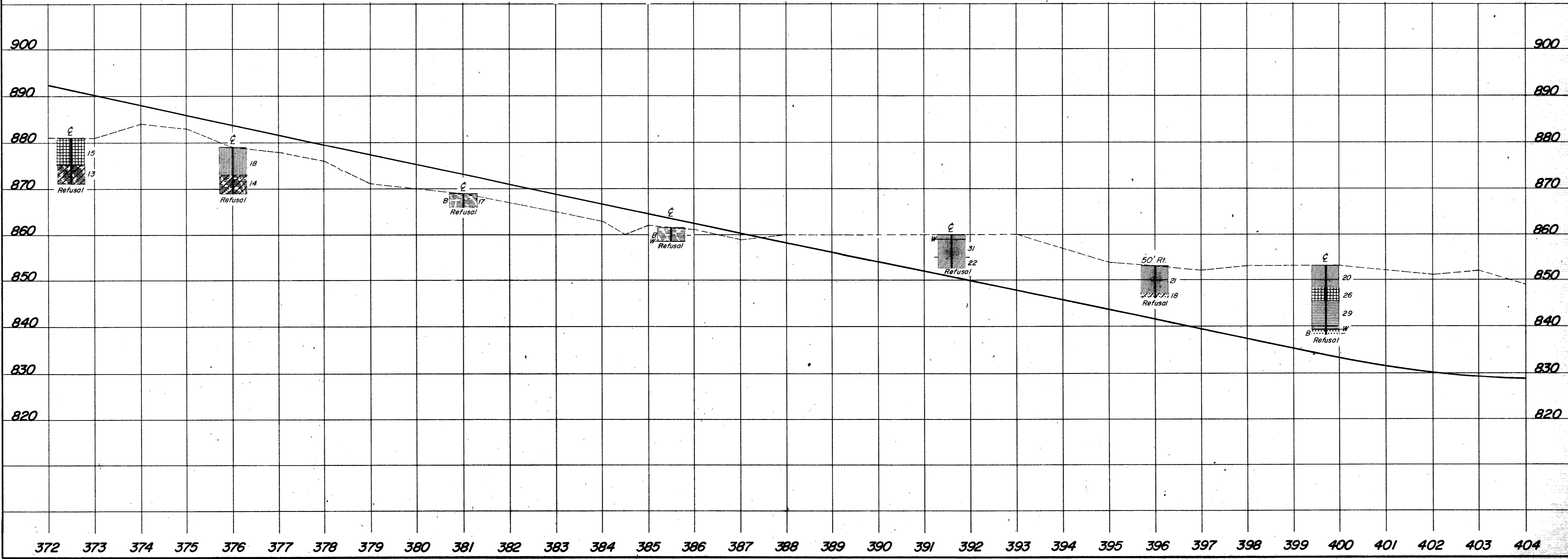
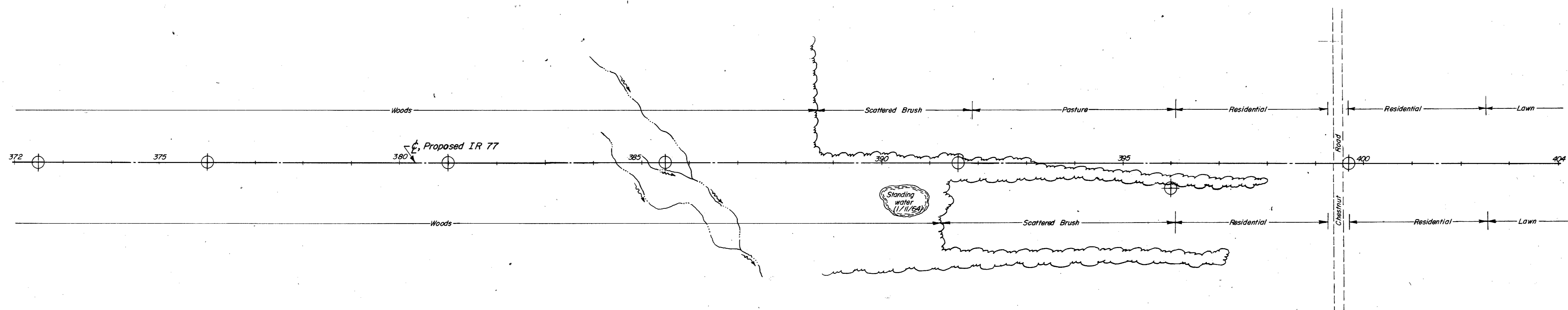
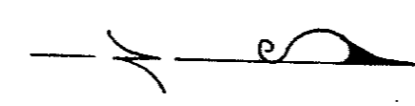
SOIL PROFILE

CUYAHOGA COUNTY
CUY-IR77-6.45

OHIO STATE HIGHWAY TESTING LABORATORY
1620 W. BROAD ST. COLUMBUS 23, OHIO

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GENERAL INFORMATION

INTRODUCTION

The project consists of the construction of 2.5 miles of IR 77, beginning 200 feet south of Hillside Road, 0.7 mile west of USR 21, extending northward, and terminating 0.6 mile north of Rockside Road, 0.5 mile west of USR 21.

Proposed grade indicates maximum 30-foot cuts and 60-foot fill embankments.

GEOLOGY AND OBSERVATIONS OF THE PROJECT

The alignment traverses a portion of an upland terrace to the west of the Cuyahoga River on the glaciated Mississippi Valley Plain, then, near Rockside Road, drops to a dissected lower level terrace, which is part of the Lake Plain region. Shallow to thin drift overlies the Orangeville shale and Berea sandstone on the upper terrace, and thin to moderately deep drift and lacustrine deposits overlie the Bedford shale on the lower terrace. The Berea sandstone is exposed in several places between approximate stations 421+00 and 439+35, as a result of quarrying operations, and a composite section of these exposures was measured.

EXPLORATION

Borings were made by means of truck-mounted mechanical soil auger, hand auger (in areas of difficult access), and rotary type drill rig, between February 8 and 18, and April 5 and 7, 1966.

INVESTIGATIONAL FINDINGS

Materials occurring immediately below proposed grade consist predominantly of sandstone bedrock, and some silts (A-4b), silt clays (A-6a), and clays (A-7-6).

Sandstone bedrock is anticipated at grades and in the ditches and backslopes between stations 389+00 and 439+00.

Frost susceptible silts were encountered within three feet below proposed grade at stations 463+00, 464+50, and 471+50.

Embankment foundation materials on the upper terrace are comprised predominantly of clays (A-7-6); and on the lower terrace of silts (A-4b) and silt clays (A-6a), having generally high moisture contents in the upper portions of, or above the plastic range. The wet materials were encountered between stations 465+50 and 471+50.

LEGEND FOR PROJECT AVERAGE RESULTS OF TESTS— 109 SAMPLES TESTED

DESCRIPTION	H. R. B. CLASS	OHIO CLASS	% AGG.	% C. SAND	% F. SAND	% SILT	% CLAY	LIQUID LIMIT	PLASTICITY INDEX	WATER CONTENT	SAMPLES TESTED		
Gravel with sand	A-1-b(0)	A-1-b	45	9	22	10	14	25	6	18	1		
Coarse or fine sand	-----	A-3a	0	3	75	-	22	NP	NP	13	2		
Gravel or stone fragments with sand and silt	A-2-4(0)	A-2-4	24	16	27	14	19	25	9	19	3		
Stone fragments with sand, silt, and clay	A-2-6(2)	A-2-6	55	1	10	11	23	37	19	14	1		
Sandy silt	A-4(6)	A-4a	5	6	26	38	25	25	4	22	6		
Silt	A-4(8)	A-4b	0	1	5	62	32	26	4	25	30		
Silt and clay	A-6(9)	A-6a	1	4	5	33	57	32	12	24	31		
Silty clay	A-6(11)	A-6b	2	1	5	30	62	39	18	25	5		
Clay	A-7-6(14)	A-7-6	5	5	4	24	62	45	19	22	15		
Weathered shale											VISUAL CLASSIFICATION	11	
Weathered sandstone												VISUAL CLASSIFICATION	1
Shale												VISUAL CLASSIFICATION	3
Sandstone												VISUAL CLASSIFICATION	
Various other materials												VISUAL CLASSIFICATION	
Auger boring-plan view.													● Water content nearly equal to or greater than liquid limit.
Core boring-plan view.													⊖ Indicates a non-plastic material with a high water content.
Auger boring-plotted to vertical scale only.													—W Free water.
Core boring plotted to vertical scale only.													B Indicates broken rock interval.

NOTE: Figures beside borings indicate water content in percent.e.g.15

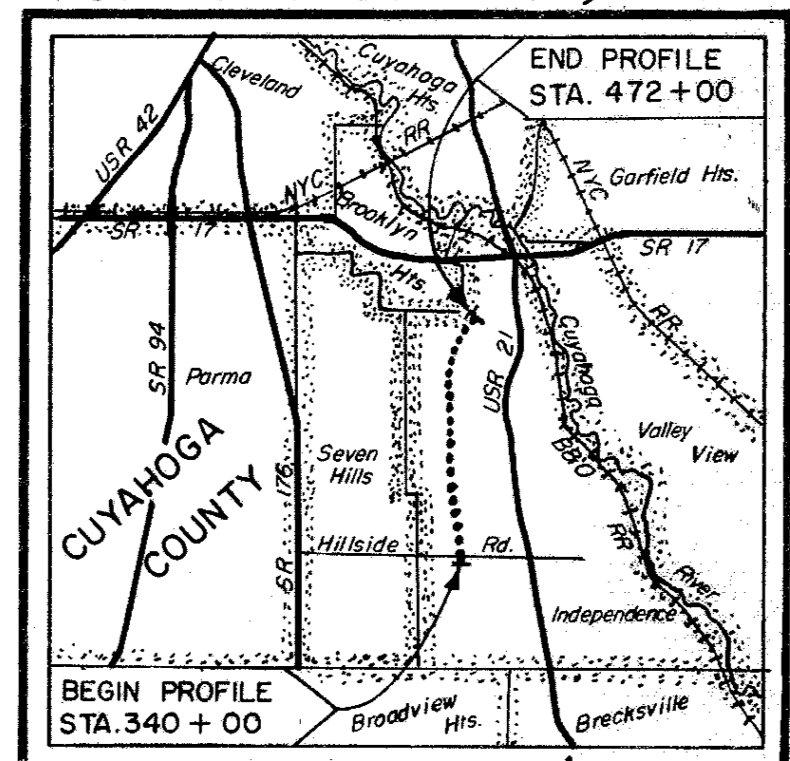
SOIL PROFILE

CUYAHOGA COUNTY
CUY-IR 77-6.45

OHIO STATE HIGHWAY TESTING LABORATORY
1620 W. BROAD ST. COLUMBUS 23, OHIO

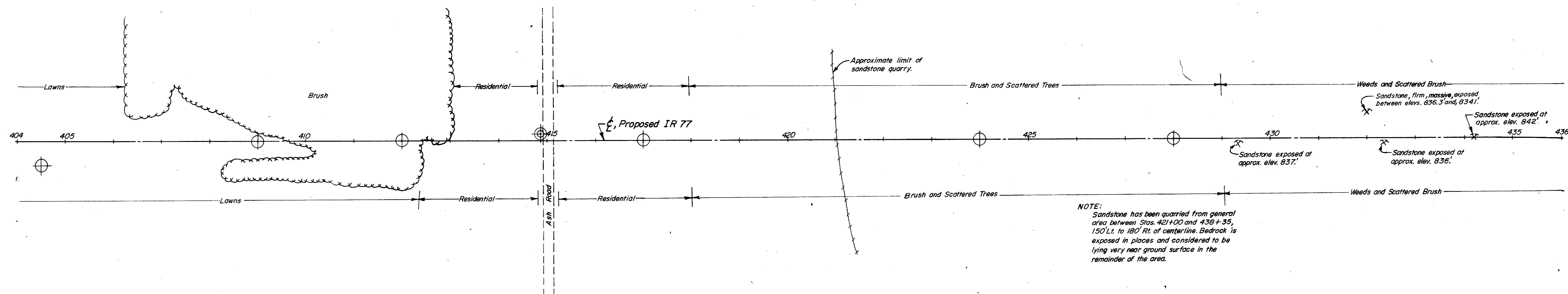
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Fed. No. 1-77-5(9)153

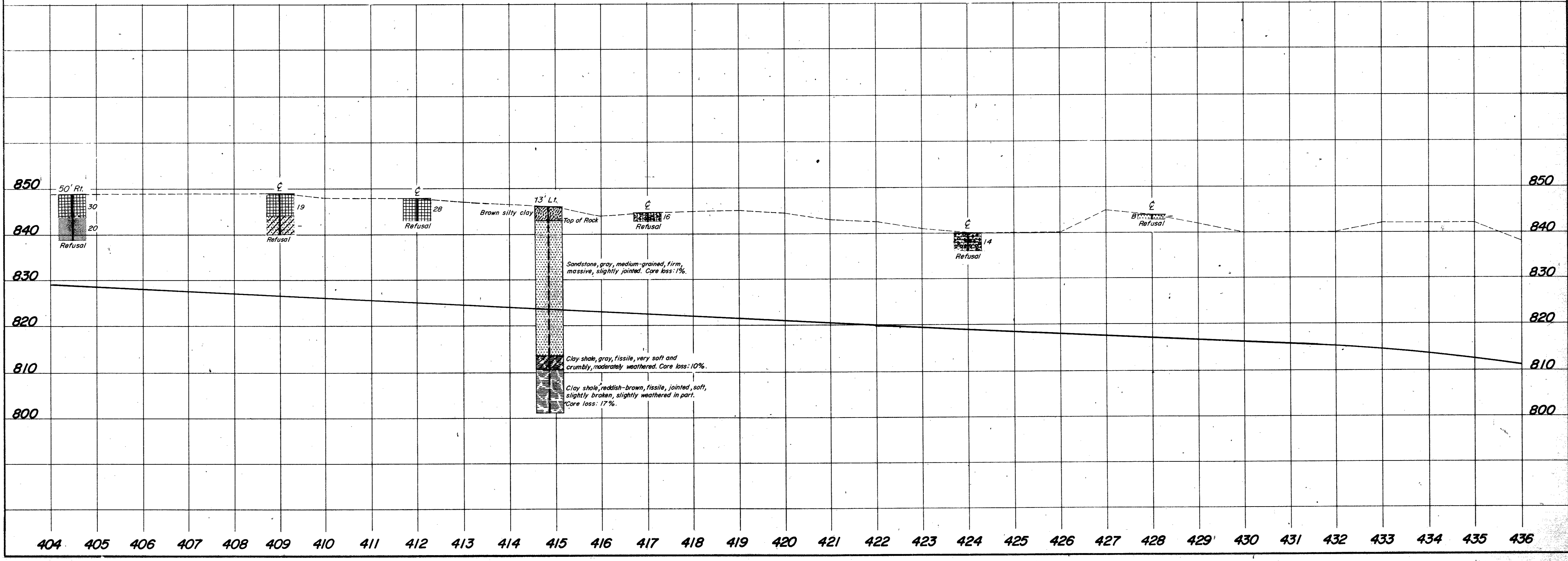


LOCATION MAP

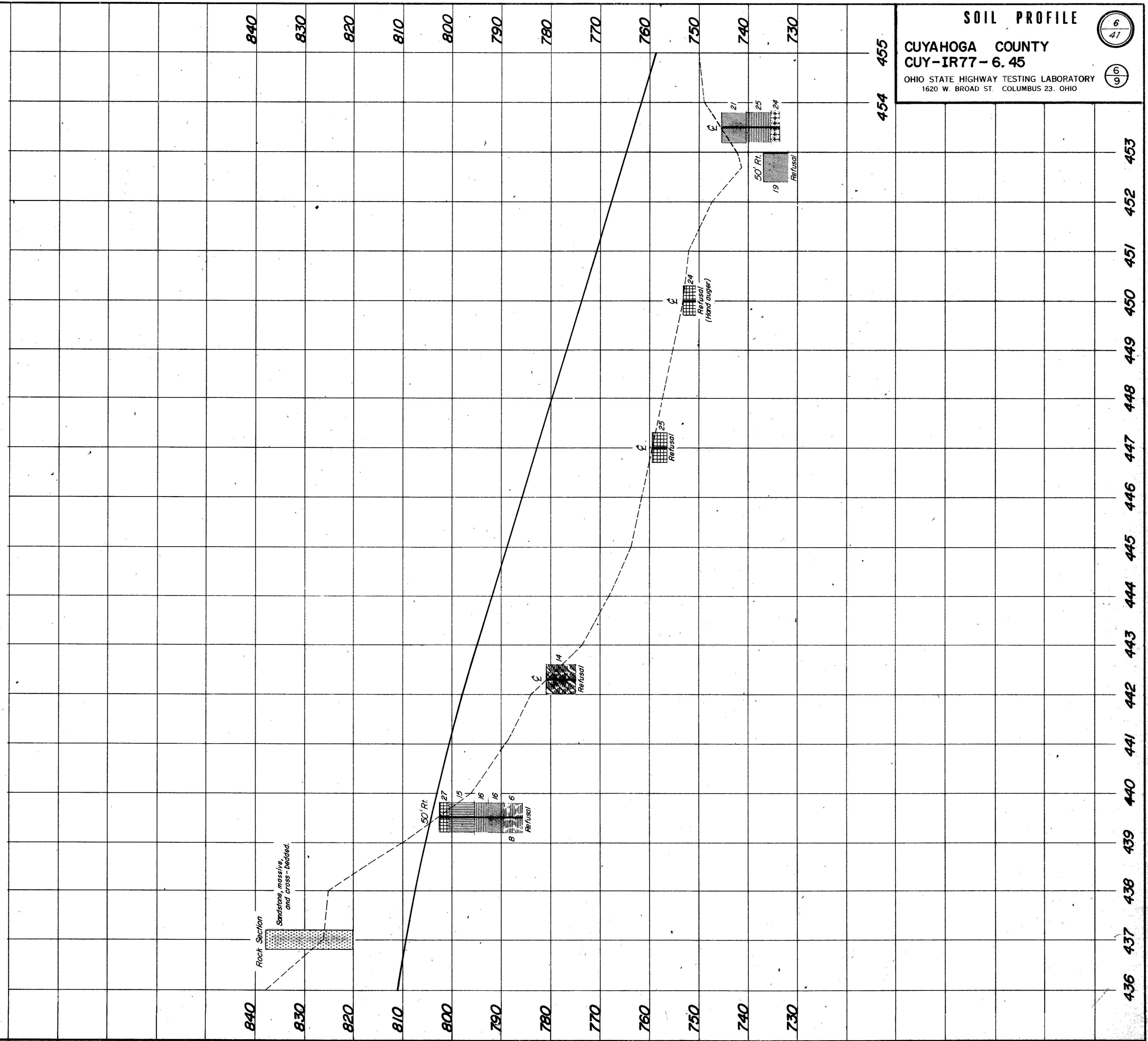
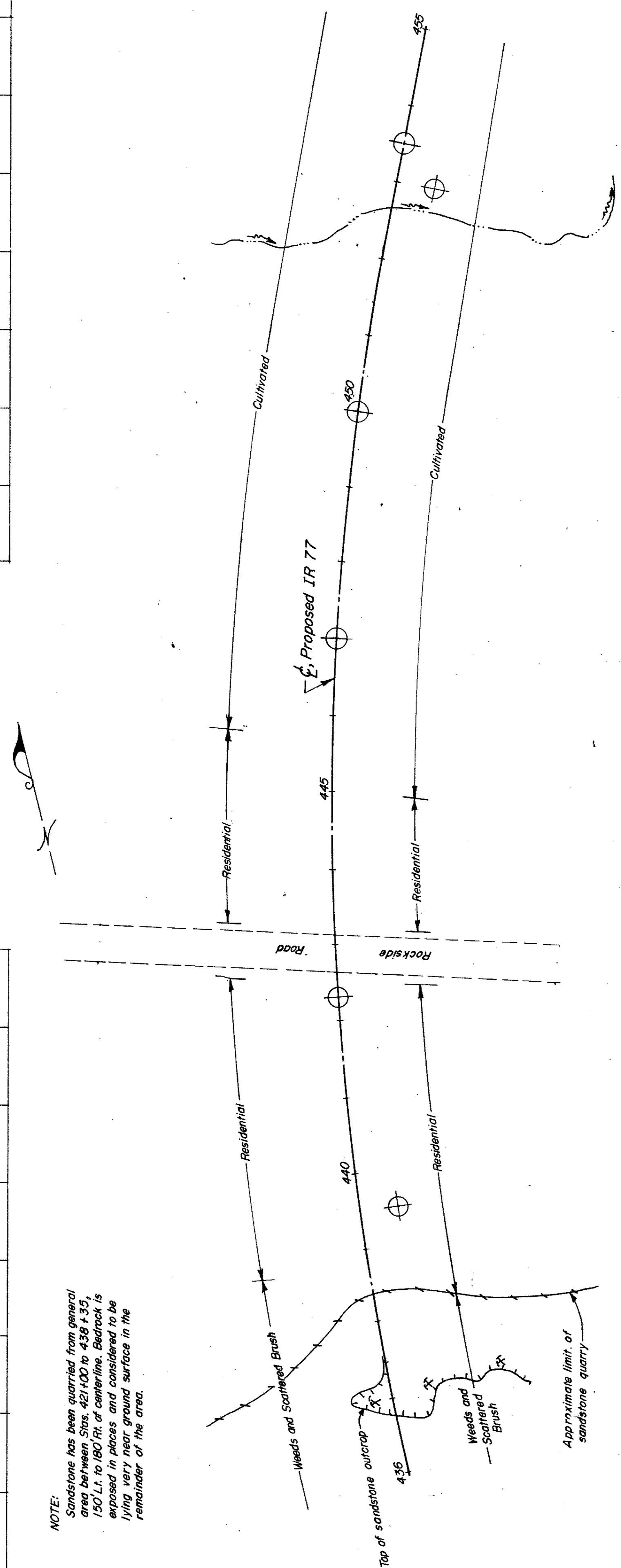
Recon - J.S.M. - 1/14/66.
Drilling - Auger - T.R.S. - 2/8/66, 2/15/66 to 2/18/66.
Core - E.F.L. - 4/5/66 to 4/7/66.
Drafting - C.L.I. - 4/13/66



NOTE:
Sandstone has been quarried from general area between Stas. 421+00 and 438+35, 150' Lt. to 180' Rt. of centerline. Bedrock is exposed in places and considered to be lying very near ground surface in the remainder of the area.



NOTE:
Sandstone has been quarried from general area between Sps. 432/100 to 436/455 (50' Lt. to 180' Rt. of centerline. Bedrock is exposed in places and considered to be lying very near ground surface in the remainder of the area.



SOIL PROFILE
 CUYAHOGA COUNTY
 CUY-IR77-6.45
 OHIO STATE HIGHWAY TESTING LABORATORY
 1620 W. BROAD ST. COLUMBUS 23, OHIO

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 6/9

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436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453

SOIL PROFILE

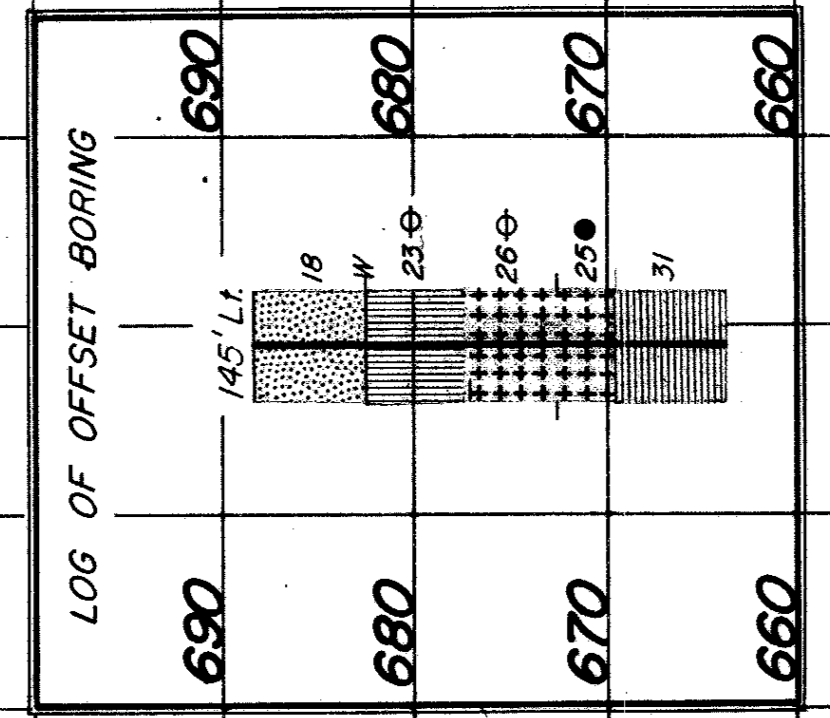
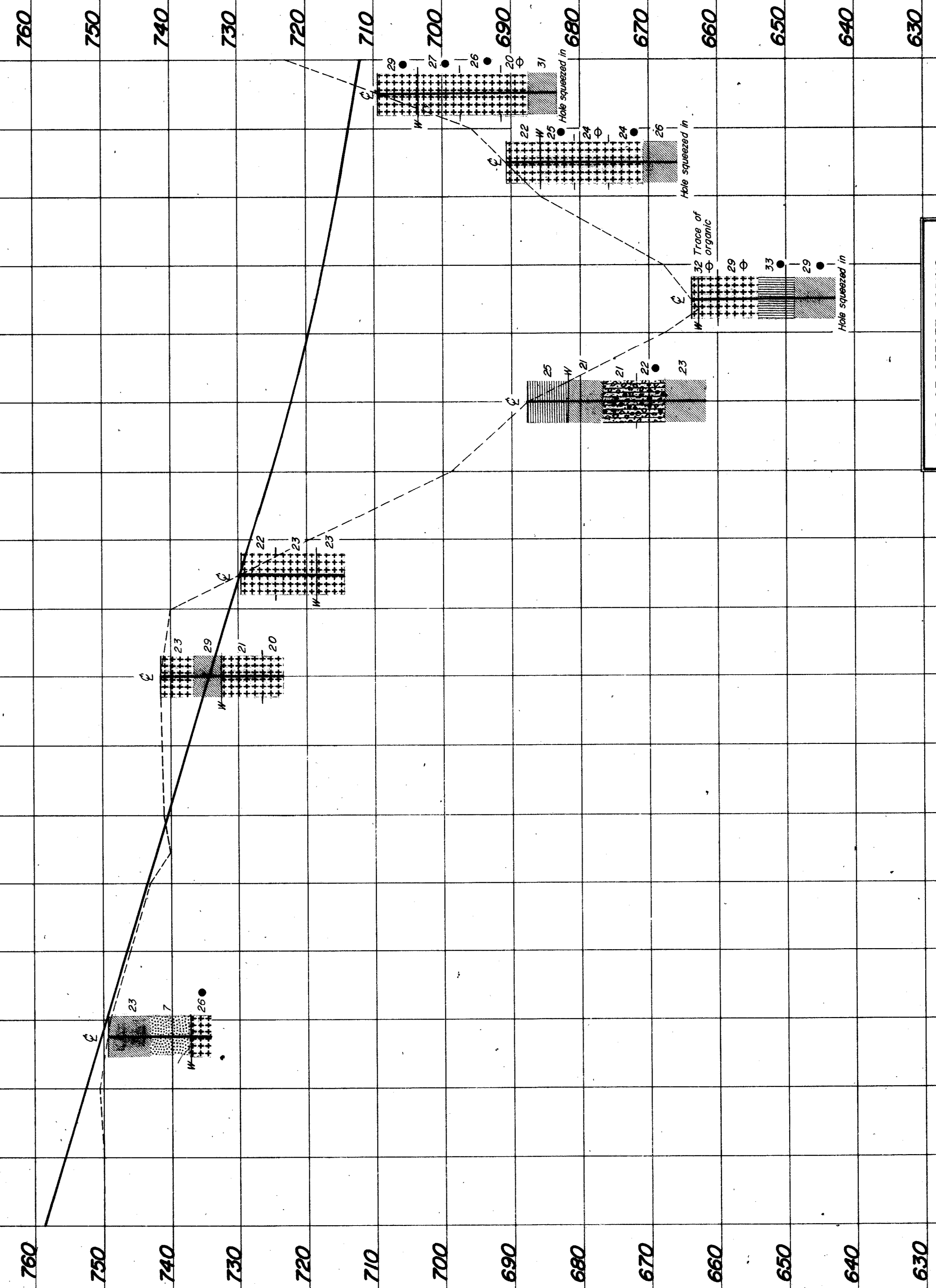
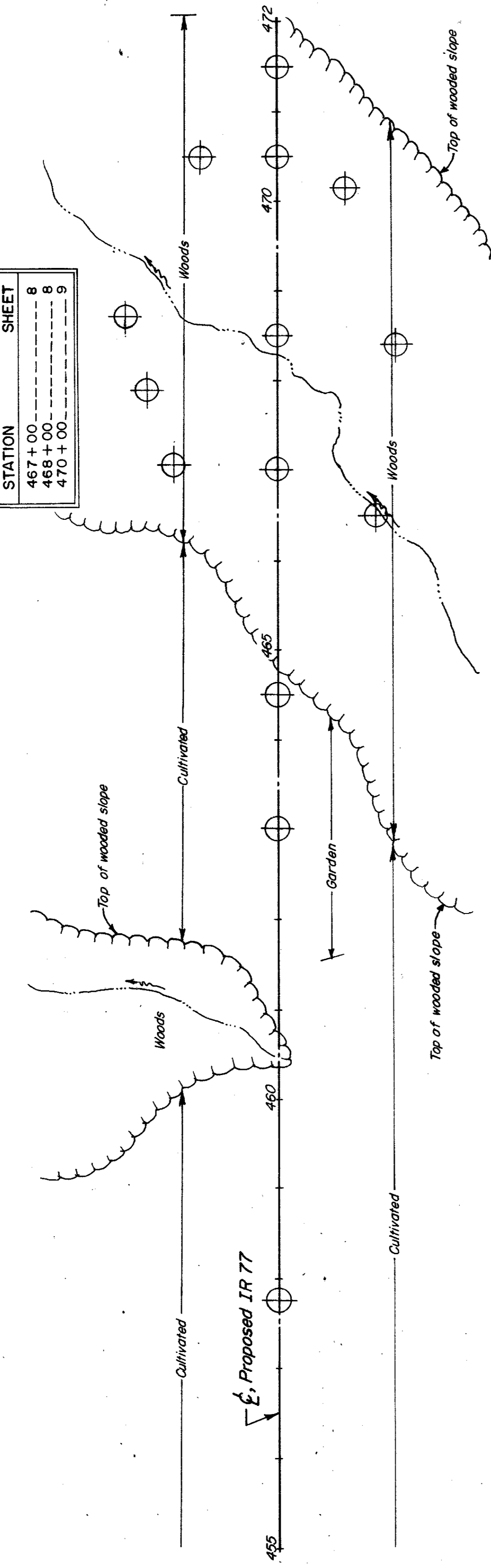
CUYAHOGA COUNTY
CUY-IR 77-6.45

OHIO STATE HIGHWAY TESTING LABORATORY
1620 W. BROAD ST. COLUMBUS 23, OHIO

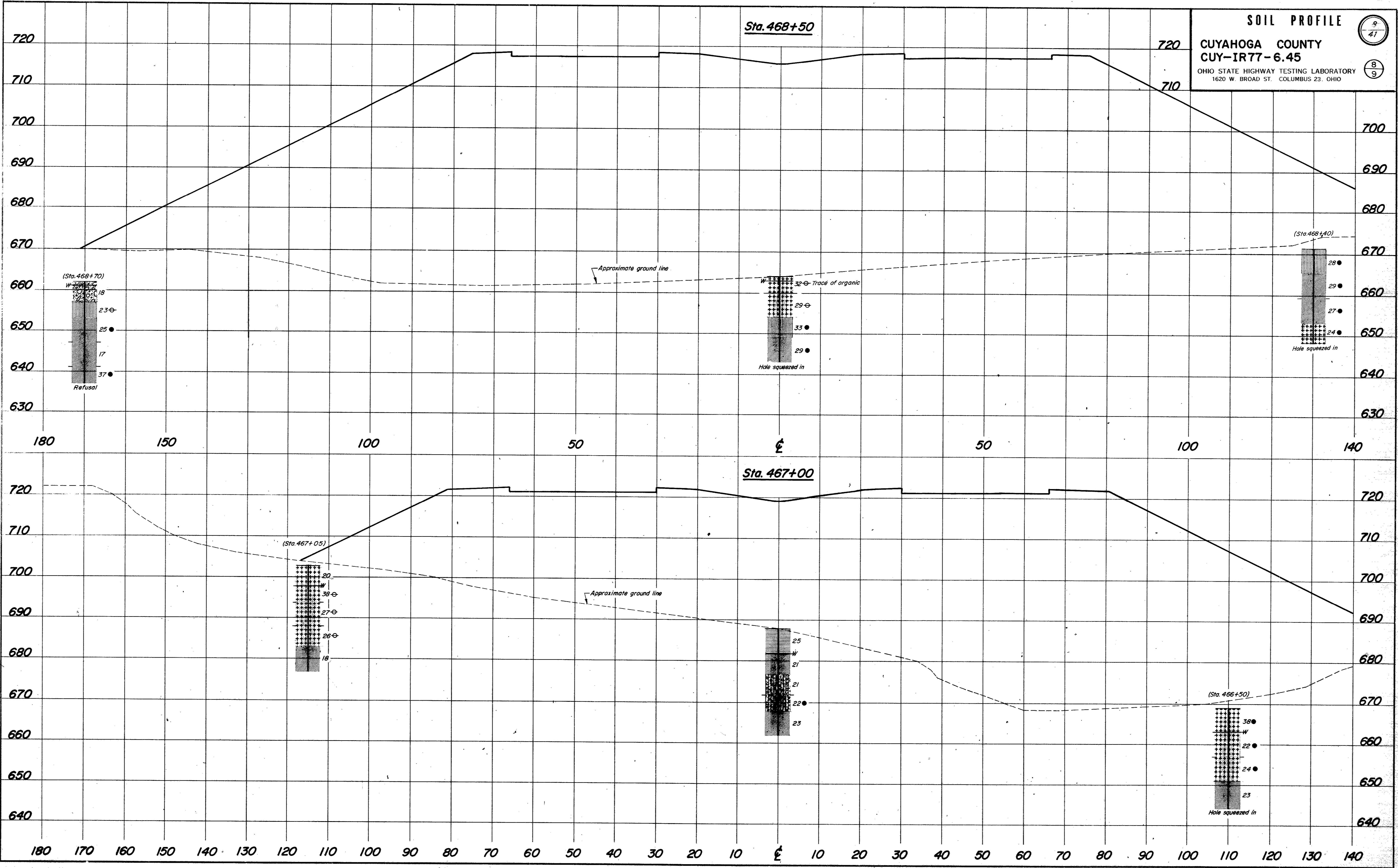
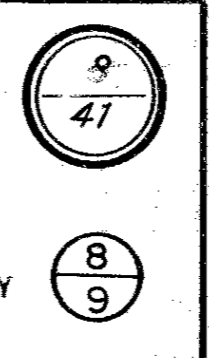
7
41

7
9

CROSS SECTION INDEX	SHEET
STATION	
467+00	8
468+00	8
470+00	9
470+00	9



SOIL PROFILE
 CUYAHOGA COUNTY
 CUY-IR77-6.45
 OHIO STATE HIGHWAY TESTING LABORATORY
 1620 W. BROAD ST. COLUMBUS 23, OHIO



Sta. 468+50

Sta. 467+00

(Sta. 468+70)

(Sta. 468+40)

(Sta. 467+05)

(Sta. 466+50)

Approximate ground line

Approximate ground line

Refusal

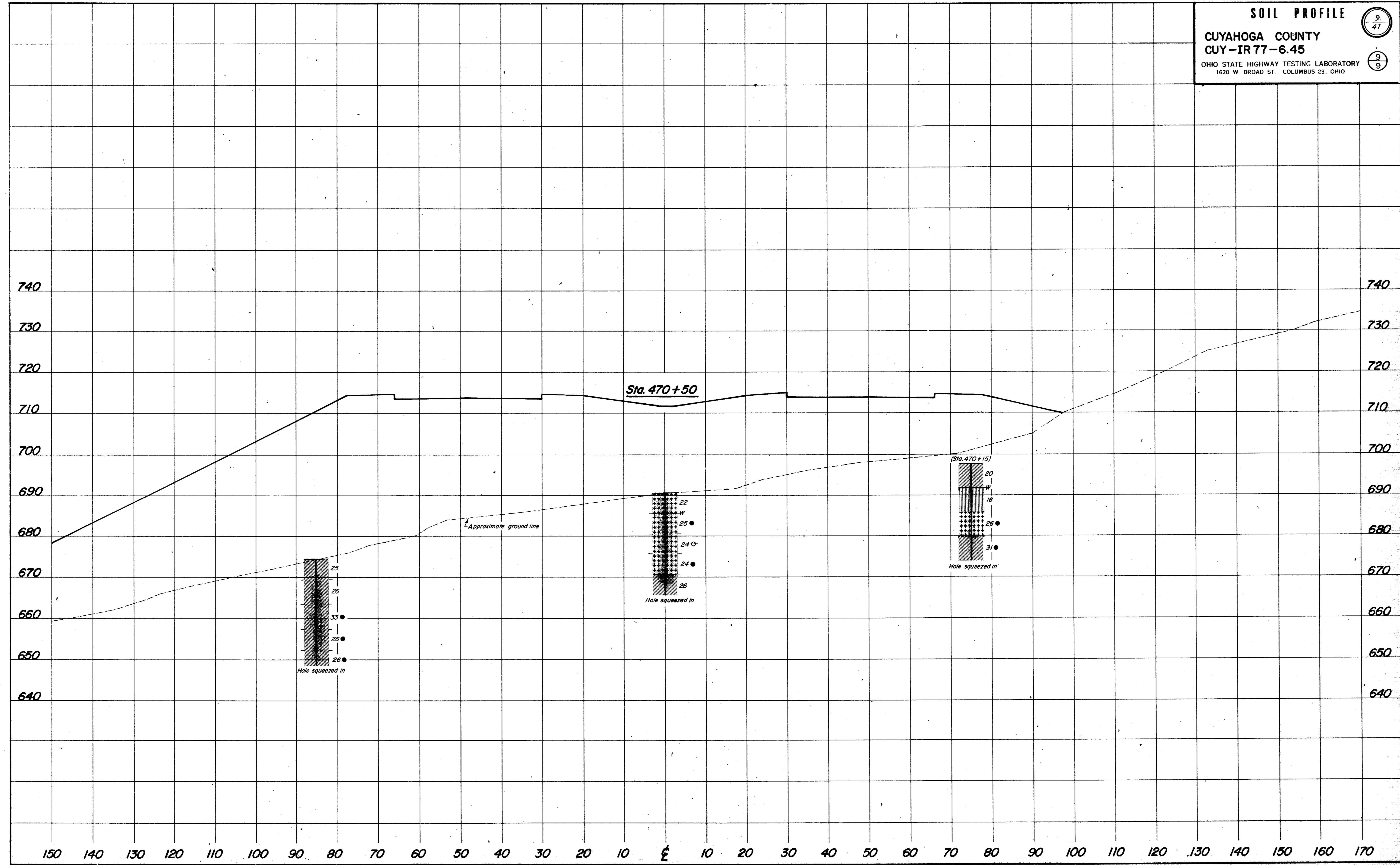
Hole squeezed in

Hole squeezed in

Hole squeezed in

Hole squeezed in

Trace of organic



GENERAL INFORMATION

INTRODUCTION

The project consists of the construction of the Rockside Road Interchange and the southern portion of the IR 30-IR 77 Interchange, in Independence.

Maximum proposed cuts and fills are shown in the Project Index, on this sheet.

GEOLOGY AND OBSERVATIONS OF THE PROJECT

The project is located on a portion of an upland terrace to the west of the Cuyahoga River, on the glaciated Mississippi Valley Plain, and to the north of Rockside Road, on a dissected lower level terrace, which is part of the Lake Plain region. Shallow to thin drift overlies the Orangeville shale and Berea sandstone on the upper terrace, and thin to moderately deep drift and lacustrine deposits overlie the Bedford shale on the lower terrace. The Berea sandstone is exposed in several places between approximate IR 77 stations 427+00 and 438+35, as a result of quarrying operations.

EXPLORATION

Borings were made by means of truck-mounted mechanical soil auger and rotary-type drill rig, between May 24 and July 1, 1966. Included in this report are logs of borings made in the vicinity for the mainline investigation, and structure foundation investigations.

INVESTIGATIONAL FINDINGS

Materials occurring immediately below proposed grade consist predominantly of silts (A-4a), silt clays (A-6a), and shale and sandstone bedrock.

Bedrock is anticipated in the excavations at the following locations:

Ramp F-1 stations 30+00 to 44+50 - shale at grade and in the ditches and backslopes; sandstone in the upper portions of the backslopes above approximate elevation 820 feet.

Ramp F-2 stations 30+00 to 42+50 - shale at grade and in the ditches and backslopes; sandstone in the backslopes above approximate elevation 815 feet.

Ramp F-3 stations 31+00 to 33+00 - shale at grade and in the ditches and backslopes; sandstone in the upper portions of the backslopes above approximate elevation 815 feet.

Occasionally wet silts (A-4b) were encountered within three feet below proposed grades at Ramp F-4 station 73+00, Ramp F-7 station 62+00, and Lane E-S stations 44+50 to 43+50.

Embankment foundation materials are predominantly comprised of silts (A-4a and A-4b) and silt clays (A-6a) having a wide range of moisture contents.

Wet materials were encountered predominantly in the area north of IR 77 station 460+00. Elastic clay (A-7-5) was encountered at Ramp F-4 station 70+00, and Lane E-S station 32+00. Peaty materials were encountered at Ramp F-4 station 70+00.

LEGEND FOR PROJECT AVERAGE RESULTS OF TESTS - 132 SAMPLES TESTED

DESCRIPTION	H.R.B. CLASS	OHIO CLASS	% AGG.	% C. SAND	% F. SAND	% SILT	% CLAY	LIQUID LIMIT	PLASTICITY INDEX	WATER CONTENT	SAMPLES TESTED
Gravel and/or stone fragments with sand	A-1-b(0)	A-1-b	32	33	21	-	8	NP	NP	8	9
Fine sand	A-3(0)	A-3	15	22	57	-	6	NP	NP	4	1
Coarse and fine sand	-----	A-3a	9	24	51	7	9	NP	NP	20	1
Gravel with sand and silt	A-2-4(0)	A-2-4	43	7	15	15	17	21	4	12	1
Sandy silt	A-4(E)	A-4a	12	6	21	33	28	33	6	19	13
Silt	A-4(B)	A-4b	0	1	4	64	31	28	3	23	40
Silt and clay	A-6(9)	A-6a	3	2	6	36	53	32	12	23	38
Silty clay	A-6(11)	A-6b	0	1	5	33	61	39	17	21	4
Elastic clay	A-7-5(14)	A-7-5	0	2	4	39	55	52	20	31	2
Clay	A-7-6(12)	A-7-6	11	4	6	23	51	44	19	27	10
Weathered shale											6
Weathered sandstone											-
Shale											7
Sandstone											-
Various other materials											-

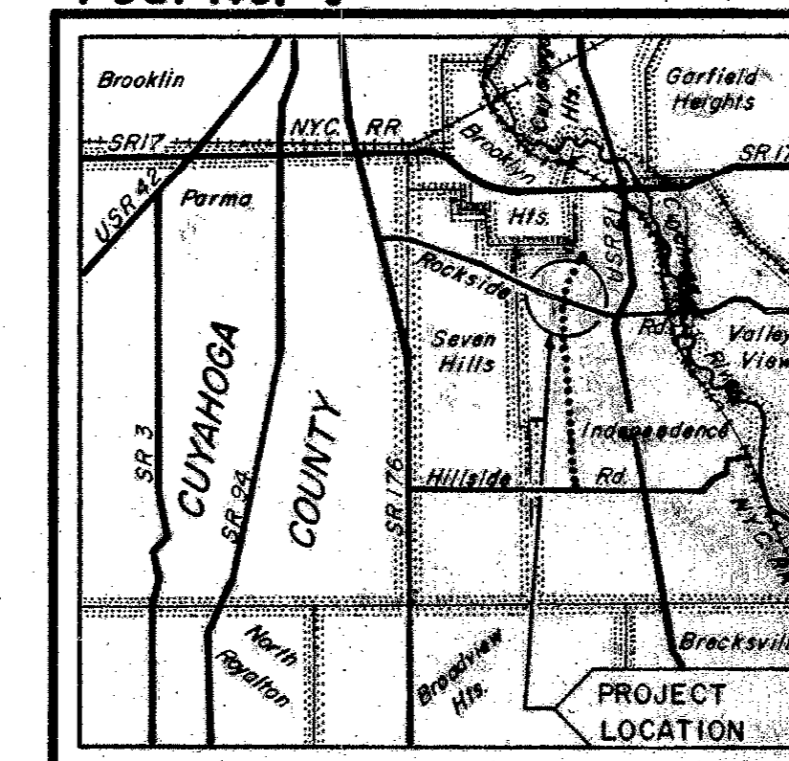
	Soils or Topsoil = X' = Approximate depth.		Water content nearly equal to or greater than liquid limit.
	Auger boring-plan view.		Indicates a non-plastic material with a high water content.
	Drive sample and/or core boring-plan view.		Free water.
	Auger boring plotted to vertical scale only.		Static water level.
	Drive sample and/or core boring plotted to vertical scale only.		Number of blows for "Standard Penetration" test. X=number of blows for first 6 inches. Y=number of blows for second 6 inches.
	NOTE: Figures beside borings indicate water content in percent, e.g. 15		Indicates broken rock interval.

SOIL PROFILE
CUYAHOGA COUNTY
CUY-77-6.45
SUPPLEMENT

OHIO STATE HIGHWAY TESTING LABORATORY
1620 W. BROAD ST. COLUMBUS 23, OHIO

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Fed. No. 1-



LOCATION MAP

Recon - W.C.J. 5/13/66
Drilling - Auger, T.R.S. 6/9/66 to 7/1/66
Core, J.H.S. 5/24/66 to 6/1/66
Drafting - A.F., R.K., A.D.B., R.L.D. 7/29/66

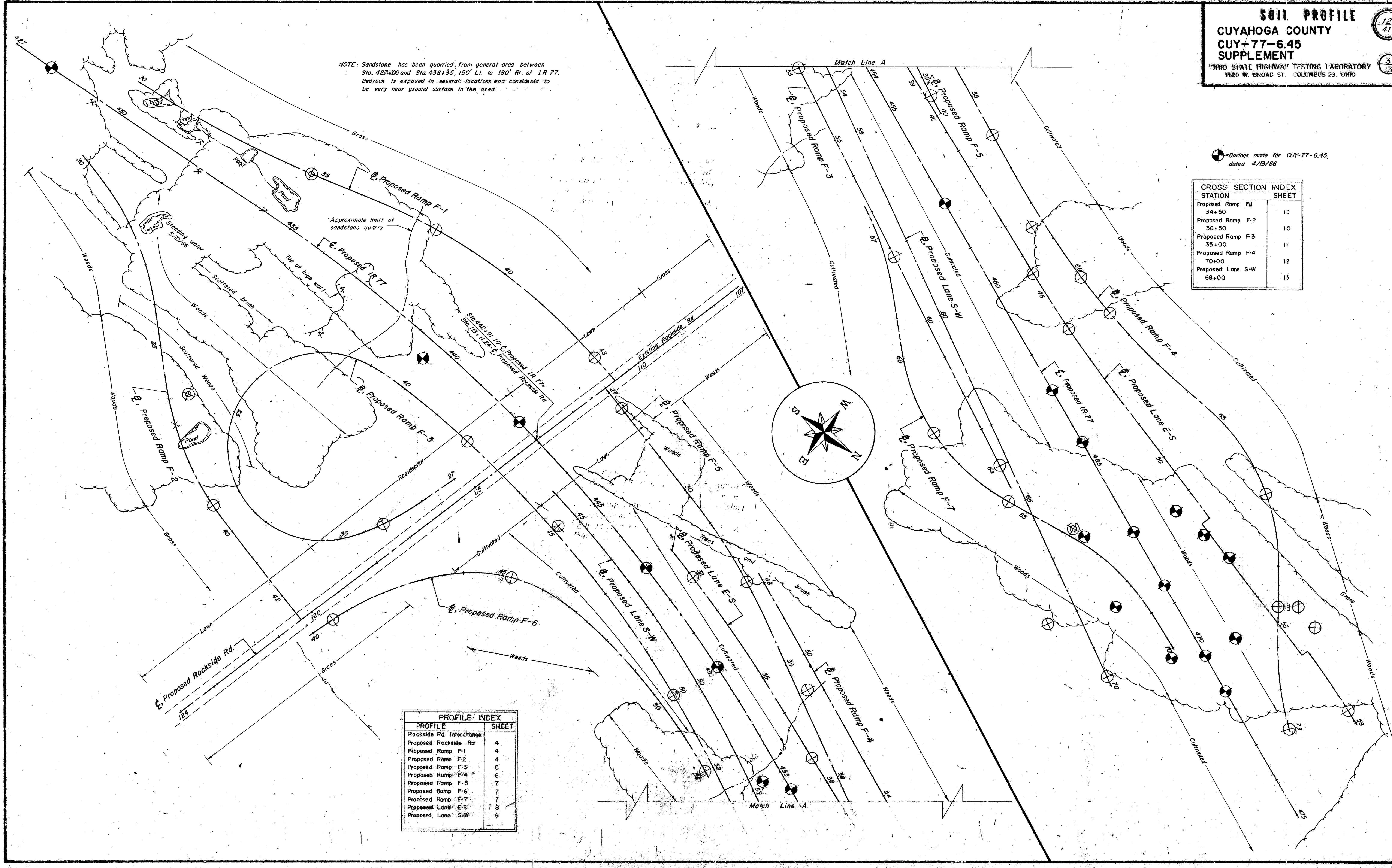
PROJECT INDEX		PLAN VIEW SHEET	PROFILE SHEET	CUT MAX.	FILL MAX.	EMB. MAX.
ROCKSIDE ROAD INTERCHANGE						
Rockside Road 107+00	124+00	3	4			
Ramp F-1 30+00	43+72	3	4		40'	
Ramp F-2 30+00	42+73	3	4		50'	
Ramp F-3 27+00	64+60	3	5		50'	35'
Ramp F-4 47+72	73+00	3	6		19'	78'
Ramp F-5 26+34	40+00	3	7			18'
Ramp F-6 40+00	52+00	3	7			26'
Ramp F-7 56+13	70+00	3	7		10'	57'
Ramp E-S 51+11	58+00	3	8		34'	52'
Ramp S-W 44+10	70+00	3	9		46'	34'

NOTE: Sandstone has been quarried from general area between Sta. 42+00 and Sta. 43+35, 150' Lt. to 180' Rt. of IR 77. Bedrock is exposed in several locations and considered to be very near ground surface in the area.

⊗ Borings made for CUY-77-6.45, dated 4/13/66

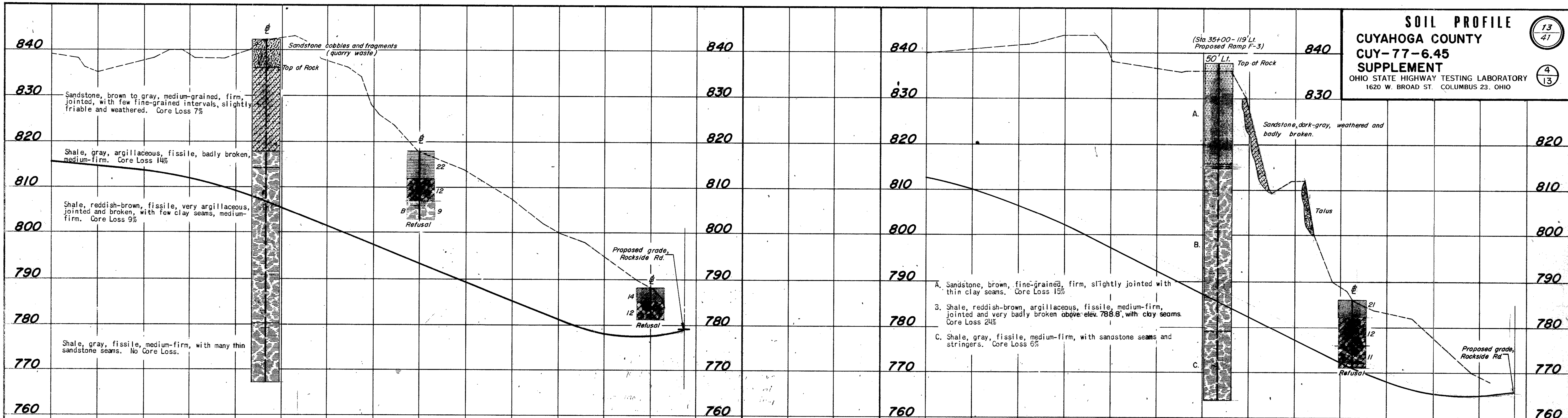
CROSS SECTION INDEX	
STATION	SHEET
Proposed Ramp F-1	10
34+50	10
Proposed Ramp F-2	10
36+50	10
Proposed Ramp F-3	11
35+00	11
Proposed Ramp F-4	12
70+00	12
Proposed Lane S-W	13
68+00	13

PROFILE INDEX	
PROFILE	SHEET
Rockside Rd. Interchange	4
Proposed Rockside Rd	4
Proposed Ramp F-1	4
Proposed Ramp F-2	4
Proposed Ramp F-3	5
Proposed Ramp F-4	6
Proposed Ramp F-5	7
Proposed Ramp F-6	7
Proposed Ramp F-7	7
Proposed Lane E-S	8
Proposed Lane S-W	9



SOIL PROFILE
CUYAHOGA COUNTY
CUY-77-6.45
SUPPLEMENT
 OHIO STATE HIGHWAY TESTING LABORATORY
 1620 W. BROAD ST. COLUMBUS 23, OHIO

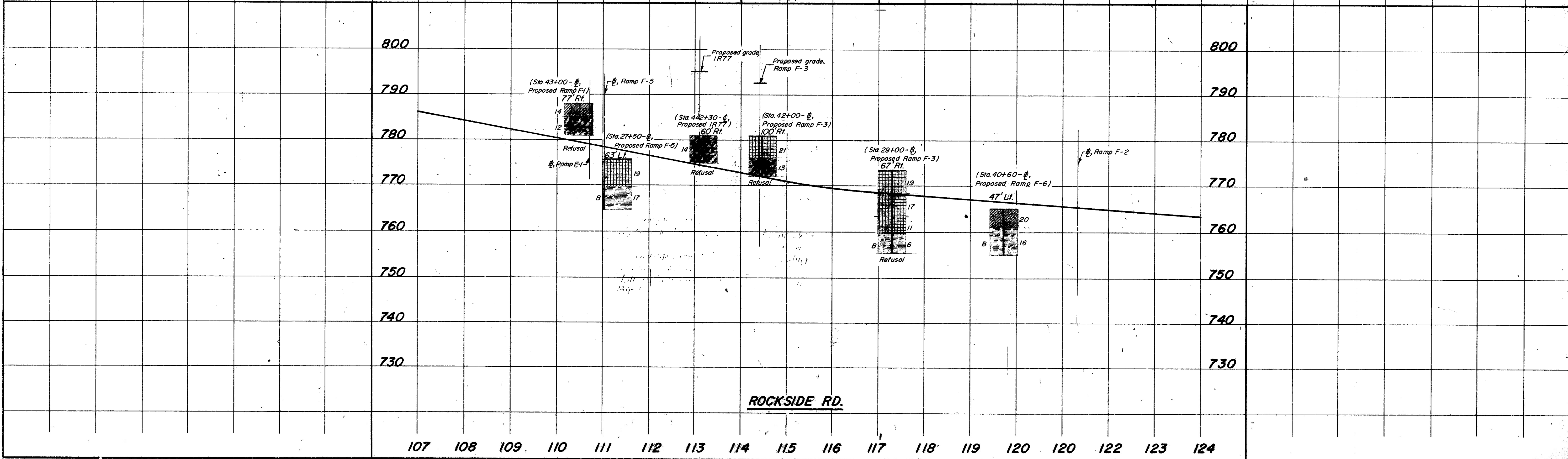
13
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4
13



RAMP F-1

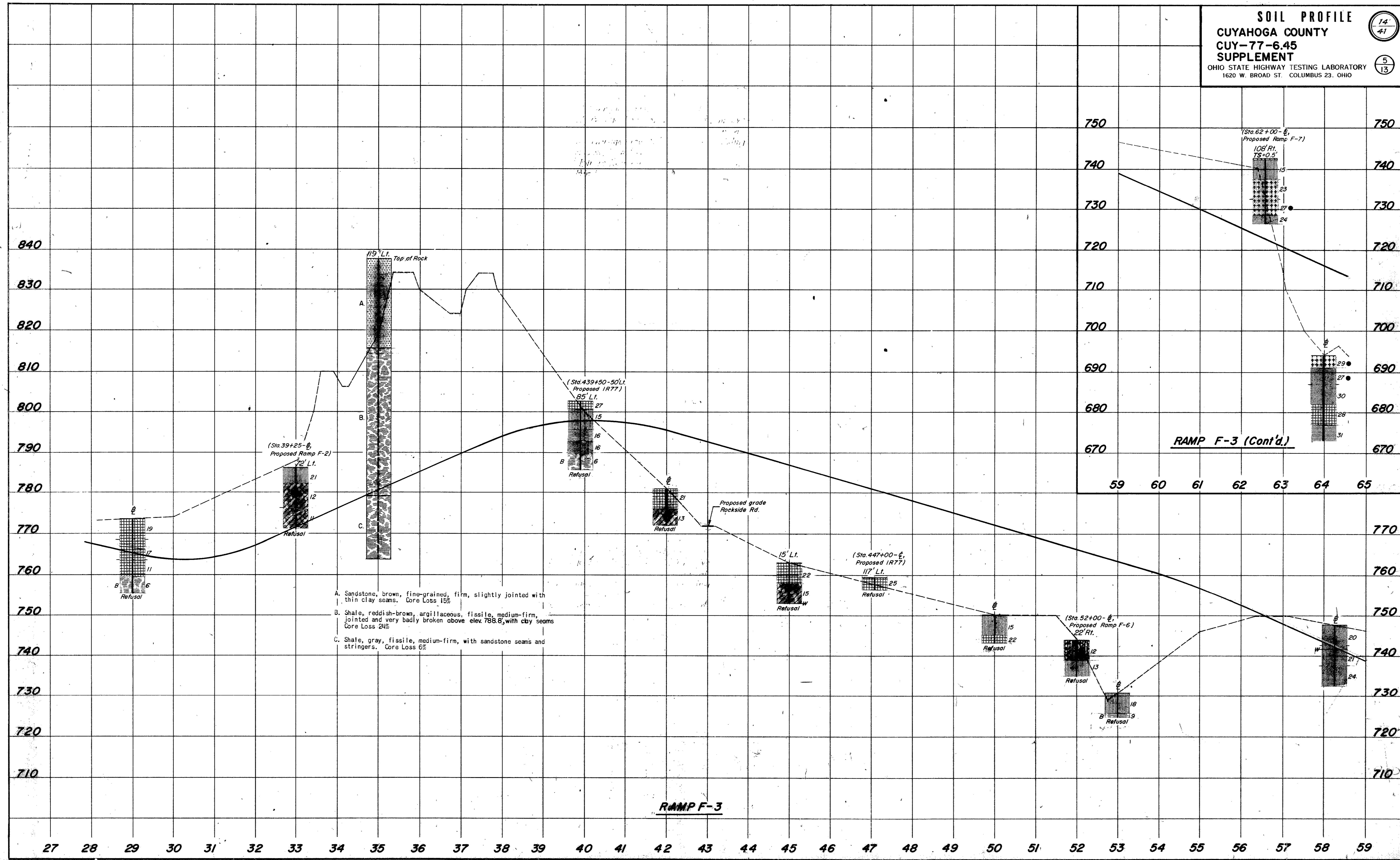
RAMP F-2

30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 30 31 32 33 34 35 36 37 38 39 40 41 42 43



ROCKSIDE RD.

107 108 109 110 111 112 113 114 115 116 117 118 119 120 120 122 123 124



- A. Sandstone, brown, fine-grained, firm, slightly jointed with thin clay seams. Core Loss 15%
- B. Shale, reddish-brown, argillaceous, fissile, medium-firm, jointed and very badly broken above elev. 788.8, with clay seams. Core Loss 24%
- C. Shale, gray, fissile, medium-firm, with sandstone seams and stringers. Core Loss 6%

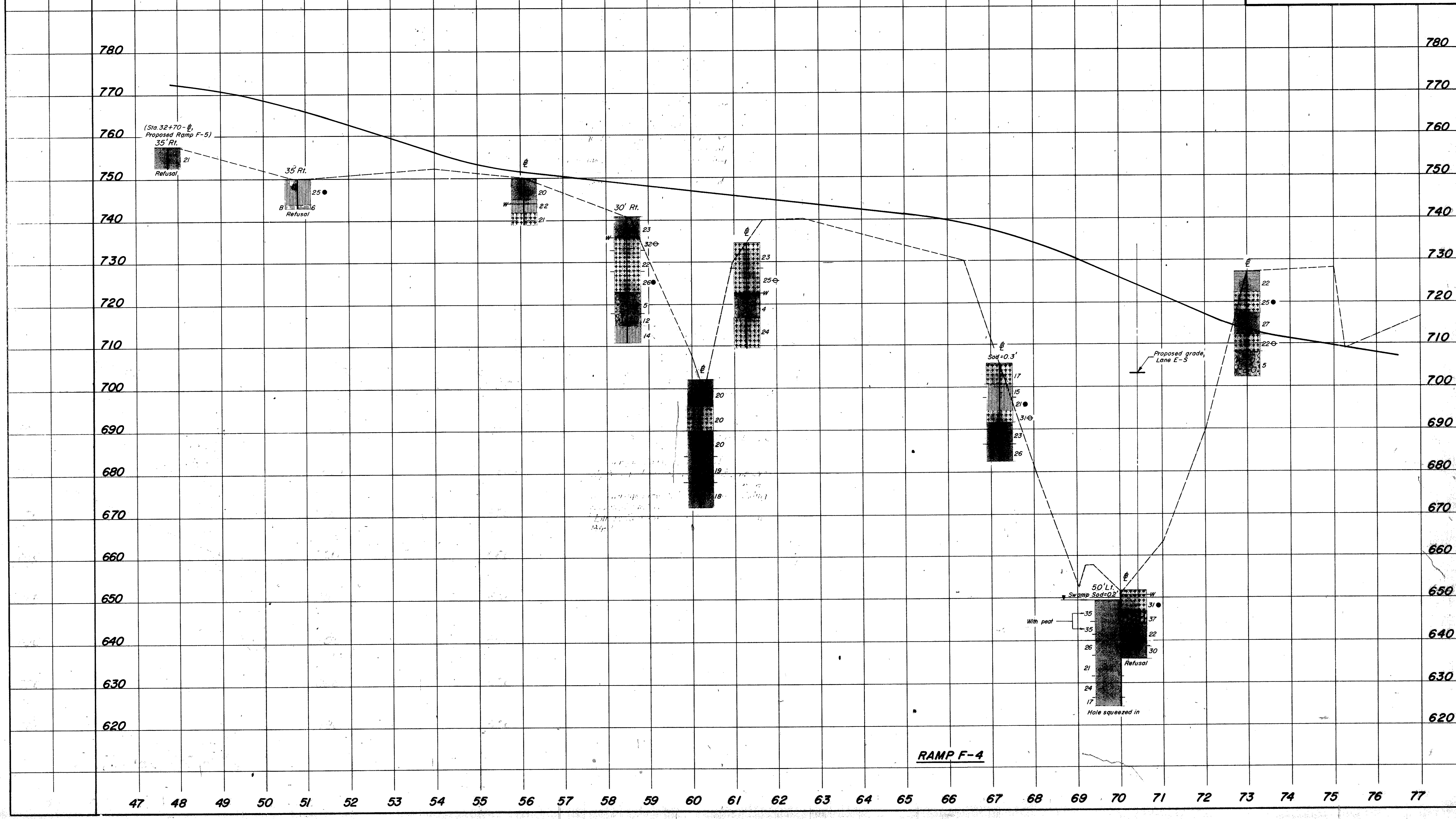
RAMP F-3

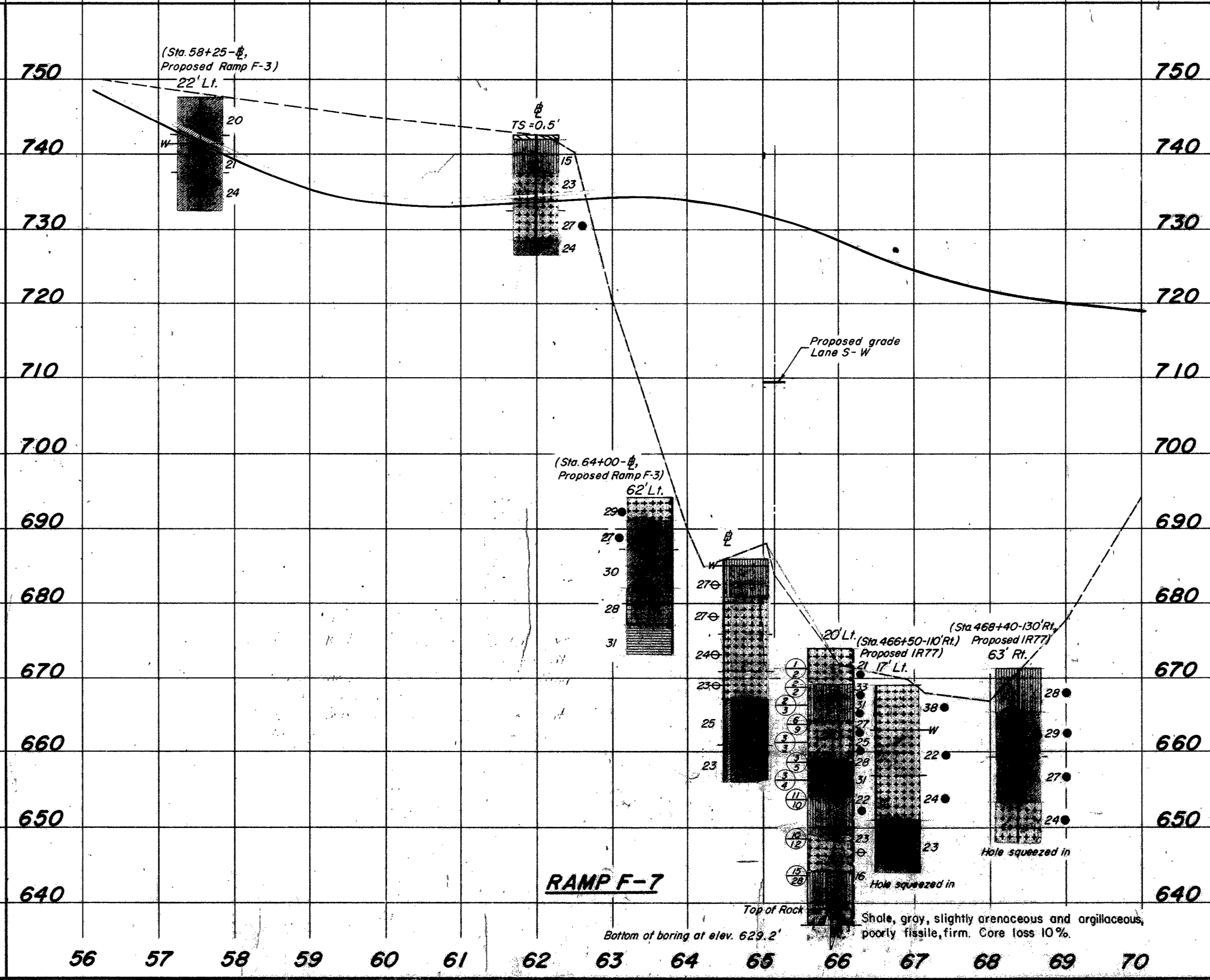
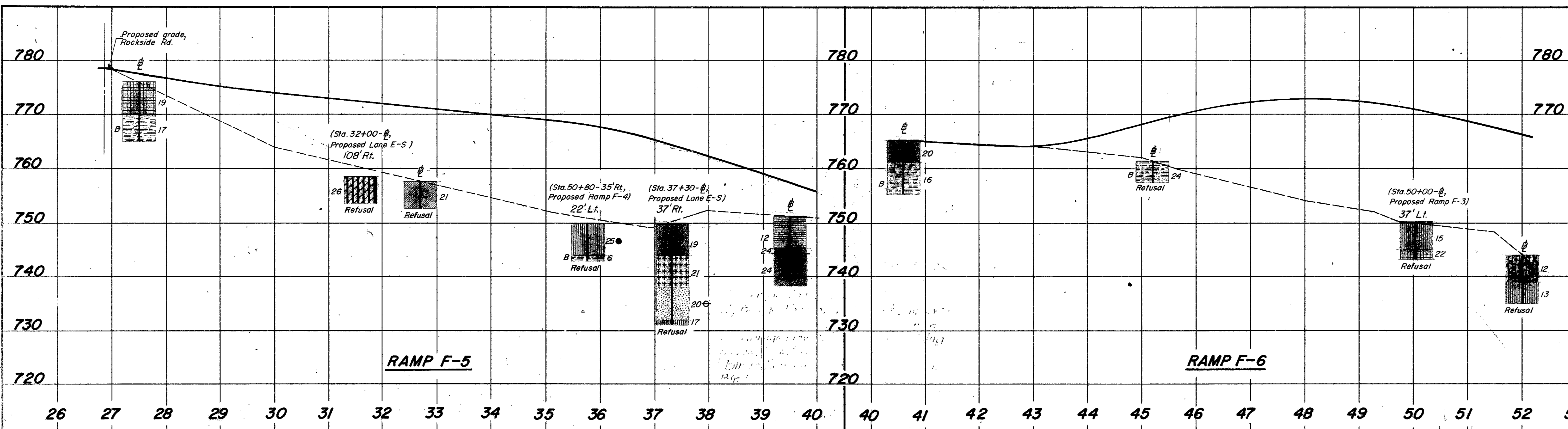
RAMP F-3 (Cont'd)

SOIL PROFILE
CUYAHOGA COUNTY
CUY-77-6.45
SUPPLEMENT
 OHIO STATE HIGHWAY TESTING LABORATORY
 1620 W. BROAD ST. COLUMBUS 23, OHIO

15
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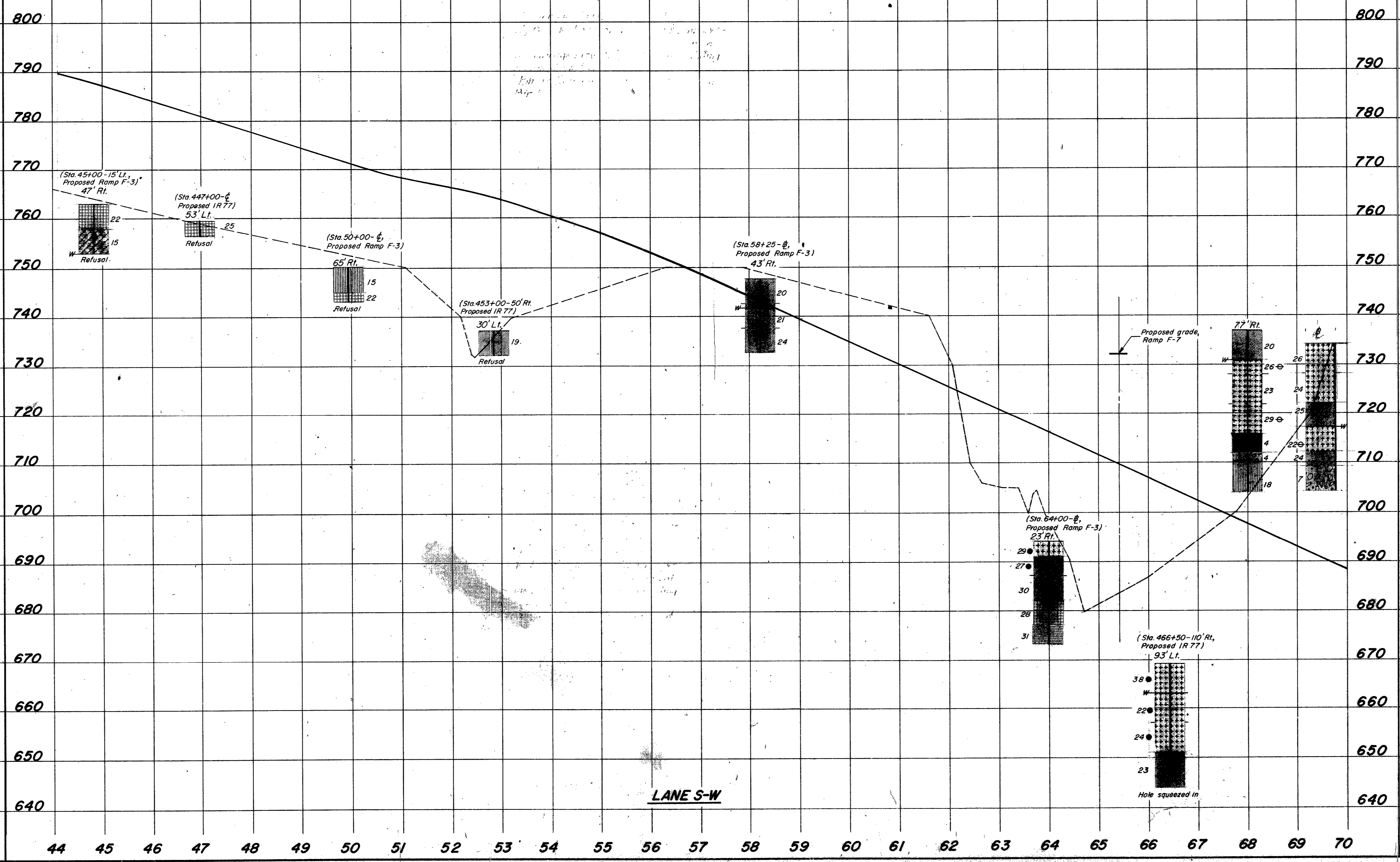
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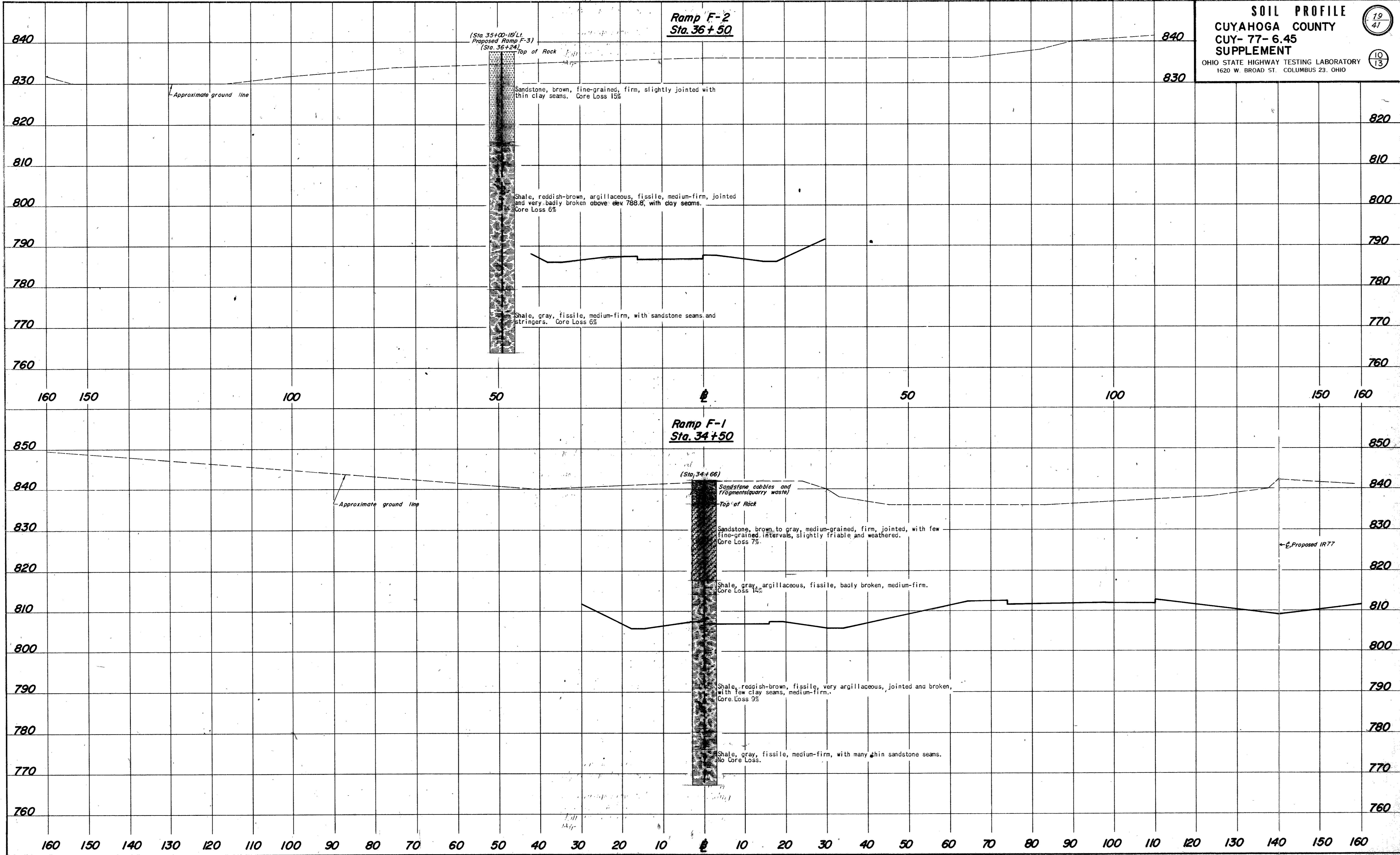


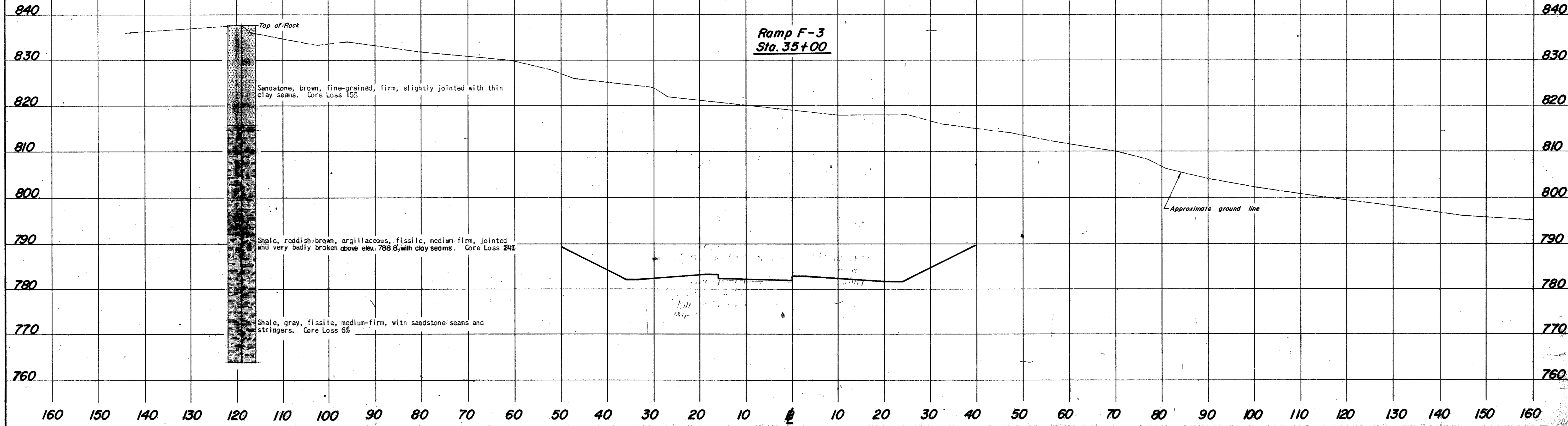


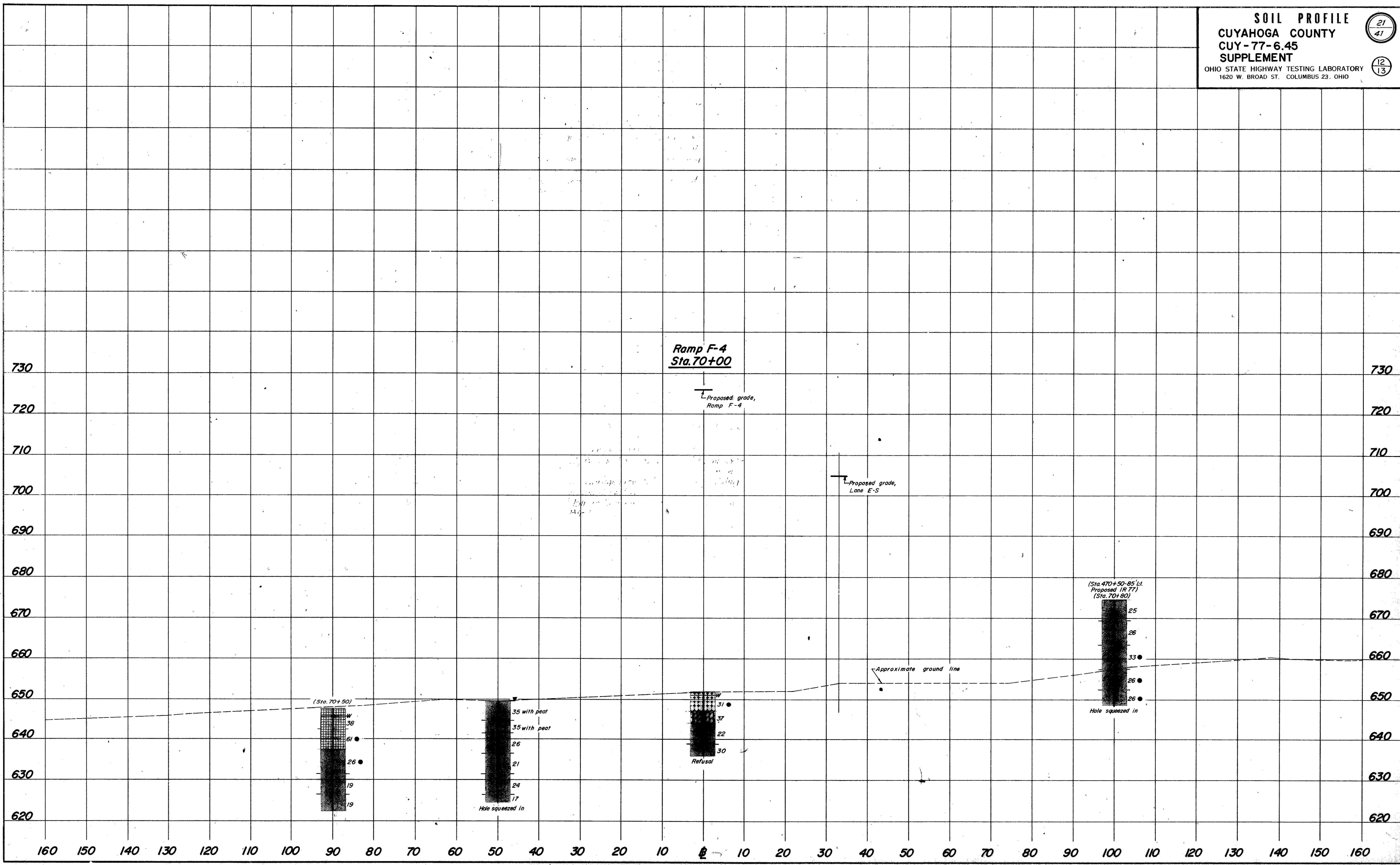
LANE E-S

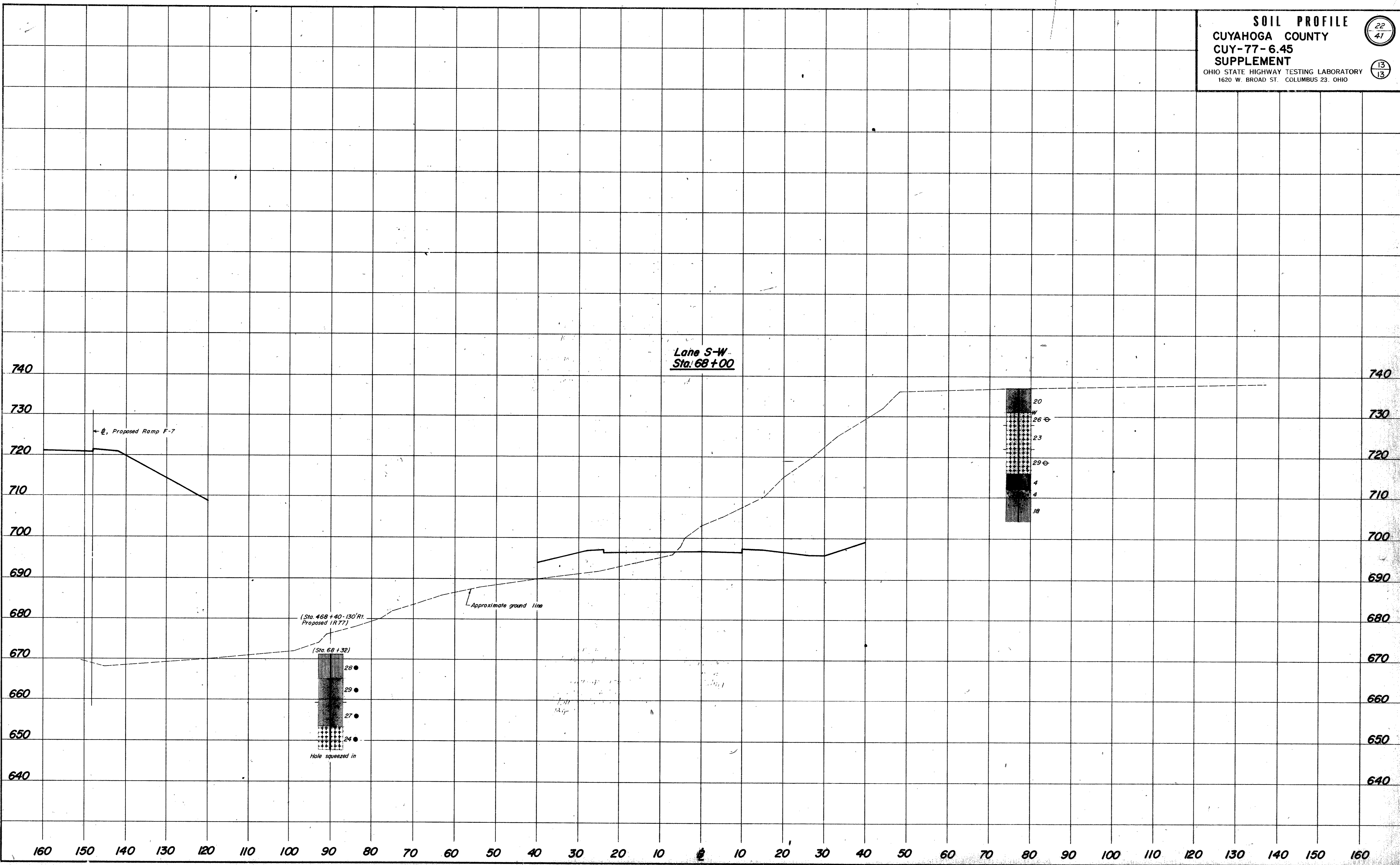


LANE S-W









GEOLOGY OF THE SITE

The structure site is located on a flat portion of the dissected glaciated Mississippi Valley Plain, in an area where shallow glacial drift overlies shale bedrock, of Mississippian age.

EXPLORATION

The exploration consisted of two drive sample-core borings, made between June 30 and July 6, 1966, and eight drive rod penetration tests, made on June 14 and 15, 1966. Also included in this report is the log of a boring made by means of mechanical earth auger in conjunction with the roadway foundation investigation.

INVESTIGATIONAL FINDINGS

The borings disclosed that very stiff clays overlie gently sloping bedrock surface, encountered at 4 and 10-foot depths, elevations 917 and 915 feet. The borings were terminated 30 and 31 feet below bedrock surface, elevation 885 feet. The mechanical earth auger boring was terminated after penetrating 3 feet below bedrock surface, upon encounter with refusal to penetrate, considered to be on firm bedrock surface.

Rod soundings met rapid increase in penetration resistance with increase in depth, and were terminated upon encounter with rather abrupt refusal to penetration at 6 and 10-foot depths, elevations 918 to 903 feet, considered to be on bedrock surface, as revealed by the borings.

No free water was observed in any of the rod sounding holes.

On the basis of the tests, bedrock surface generally is considered to gently slope downward from forward to rear and left to right.

If it is the intention to found substructure units on bedrock, it is considered advisable that the open excavations be inspected in the field, in order to insure that the excavations have been extended to rock throughout the entire founding area. It is further suggested that the area of the footing contact not be subjected to prolonged atmospheric exposure, and that the excavations be well drained at all times.

Unconfined compression tests on similar shale bedrock indicates a crushing strength on the order of 100 tons per square foot.

- Auger Boring Location - Plan View.
- Press and / or Drive Sample and / or Core Boring Location - Plan View.
- Drive Rod Penetration Resistance Sounding Location - Plan View.
- Capped Pile
- Footing
- Footing on Pile
- Top of Rock

- Coal
- Weathered Indurated Clay
- Indurated Clay
- Weathered Shale
- Shale

LEGEND

- Horizontal Bar on Boring Log Indicates the Depth the Sample Was Taken.
- Figures Beside the Boring Log in Profile Indicate the Number of Blows for Standard Penetration Test.
X = Number of Blows for First 6 inches.
Y = Number of Blows for Second 6 inches.
- Drive Rod Penetration Resistance Sounding Log - Profile
- Casing
- Resistance "R" < 10,000 lbs.
- Resistance "R" > 10,000 lbs.
- Indicates Final Measurement of Penetration, in Inches.
- Indicates Free Water Elevation.
- Indicates Static Water Elevation.

SYMBOLS OF ROCK TYPES

- Weathered Sandstone
- Sandstone
- Leached Dolomite
- Dolomite
- Leached Limestone
- Limestone

GENERAL INFORMATION

Drive Rod Penetration Sounding Tests

Drive rod penetration resistance tests constitute driving a 1.315-inch diameter steel rod, with a 45° cone point, into the ground, using a 122-pound drop-hammer with a free fall of five feet. At one or two-foot depth intervals, a measurement is taken to determine the amount of penetration achieved in three hammer drops. This reading is converted to an empirical value for capacity "R", in thousands of pounds (which is a measure of both the point resistance and frictional resistance on the rod), by using charts prepared by the Ohio Department of Highways, Bureau of Bridges, on the basis of correlation study of rod penetration with past performance of pile driving. For interpretation, a graph is prepared by plotting the value "R" against the depth at which the reading was taken, and connecting the plotted points. The curve so obtained reflects the density of subsurface materials in a manner that can be readily compared with data from similar tests at other locations on the structure site. From this comparison, the overall uniformity of subsurface condition may be evaluated.

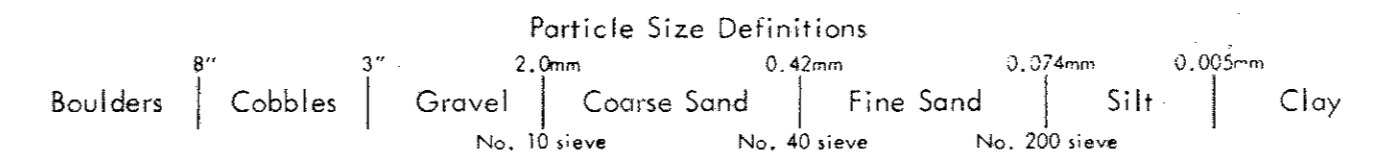
Drive Sample Borings - Drive-Press Sample Borings

Drive sample borings are made by means of a rotary-type drill rig, employing a 2" O.D., 1-3/8" I.D. sampler, at 2-1/2 and 5-foot depth intervals, driven by means of a 140-pound drop-hammer with a free fall of 30 inches. The number of blows required to drive the sampler 12 inches is considered the standard penetration test.

Drive-press sample borings are made by means of a rotary-type drill rig, employing a 2" O.D., 1-3/8" I.D. drive sampler, and 3" O.D. thin-wall press sampler. The press sampler is advanced by continuous uniform pressure, applied by the drill rig.

The boring log sheets show a graphic plot of the information obtained, including depth and elevation of the sample, number of blows for the standard penetration tests in two 6-inch increments, depth of press samples, field sample number, sample description - based on laboratory tests and the Casagrande AC classification system - and gradation, plasticity, and moisture content determinations. Results of strength and consolidation testing, if performed, appear on separate enclosures.

At depths where materials are bouldery or gravelly to the extent that the sampler can not be driven, a wash sample is procured for visual classification, in order to determine the general character of the material. These samples are not considered sufficiently representative to warrant laboratory testing.



LOG OF BORING
Date Started 7-5-66, Date Completed 7-6-66, Boring No. B-4, Station & Offset 340+55, 78' Lt. (Rear Abutment), Surface Elev. 919.7', Water Elev. _____, Sampler Type SS Dia. 1 3/8", Casing Length 101, Dia. 1 1/2"

Elev.	Depth	Std. Pen (N)	Rec. ft.	Loss ft.	Description	Physical Characteristics											SHTL Class.				
						Sample No.	% Agg.	% C.S.	% F.S.	% Silt	% Clay	LL	PI	W.C.	Class.						
919.7	0				Brown Clay (Driller's Description)																
915.7	4				TOP OF ROCK																
911.7	8	22/31		2.6	2.4	Shale, gray, argillaceous, fissile, medium-firm, very badly jointed and broken, with few clay seams, slightly weathered. *Core Loss 47%															
909.7	10					Clay shale, brownish-gray, fissile, soft and crumbly, slightly weathered. Core Loss 50%															
	12		4.6	0.4																	
	14																				
	16																				
	18																				
	20		4.9	0.1																	
	22																				
	24																				
	26		9.9	0.1																	
	28																				
	30																				
	32																				
	34		4.7	0.3																	
884.7																					

*High Core Loss partially due to mechanical difficulties.

LOG OF BORING
Date Started 6-30-66, Date Completed 7-1-66, Boring No. B-13, Station & Offset 342+70, 80' Rt. (Forward Abutment), Surface Elev. 925.3', Water Elev. _____, Sampler Type SS Dia. 1 3/8", Casing Length 101, Dia. 1 1/2"

Elev.	Depth	Std. Pen (N)	Rec. ft.	Loss ft.	Description	Physical Characteristics											SHTL Class.				
						Sample No.	% Agg.	% C.S.	% F.S.	% Silt	% Clay	LL	PI	W.C.	Class.						
925.3	0																				
920.3	4																				
915.3	10																				
	12																				
911.8	14		4.1	0.9																	
	16																				
	18																				
	20		4.9	0.1																	
	22																				
	24																				
	26		9.8	0.2																	
	28																				
	30																				
	32																				
	34																				
	36																				
	38																				
	40		9.9	0.1																	

LOG OF BORING
Date Started 2-15-66, Date Completed 2-15-66, Boring No. 1A, Station & Offset 343+00, CL, Surface Elev. 924.2', Water Elev. Immediate, After _____ Hours

Elev.	Depth	Description	Field No.	Lab. Nos	Physical Characteristics							SHTL Class.	
					% Agg.	% C.S.	% F.S.	% Silt	% Clay	LL	PI		W.C.
924.2	0												
	2												
919.2	4	Brown Silty Clay	1	0	1	1	27	71	44	17	20	A-7-G	
917.2	6	Brown Silty Clay	2	0	2	3	34	61	43	19	20	A-7-G	
	8												
914.2	10	Brown Weathered Shale	3	V	I	S	U	A	L				

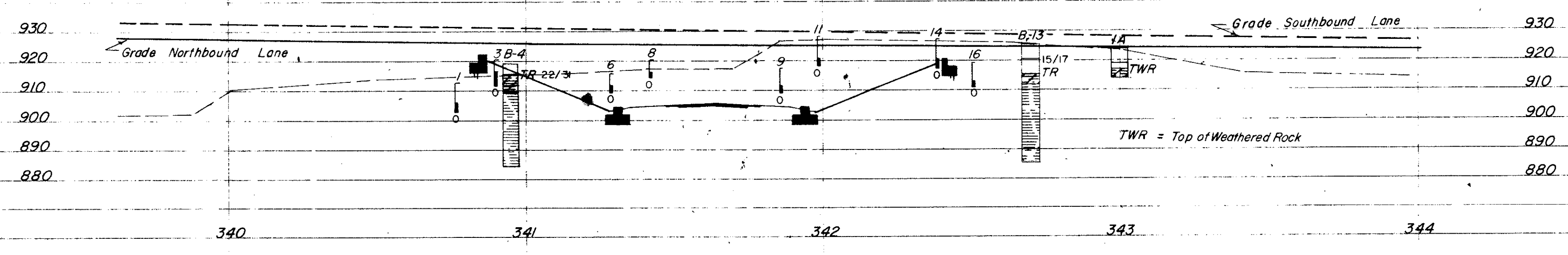
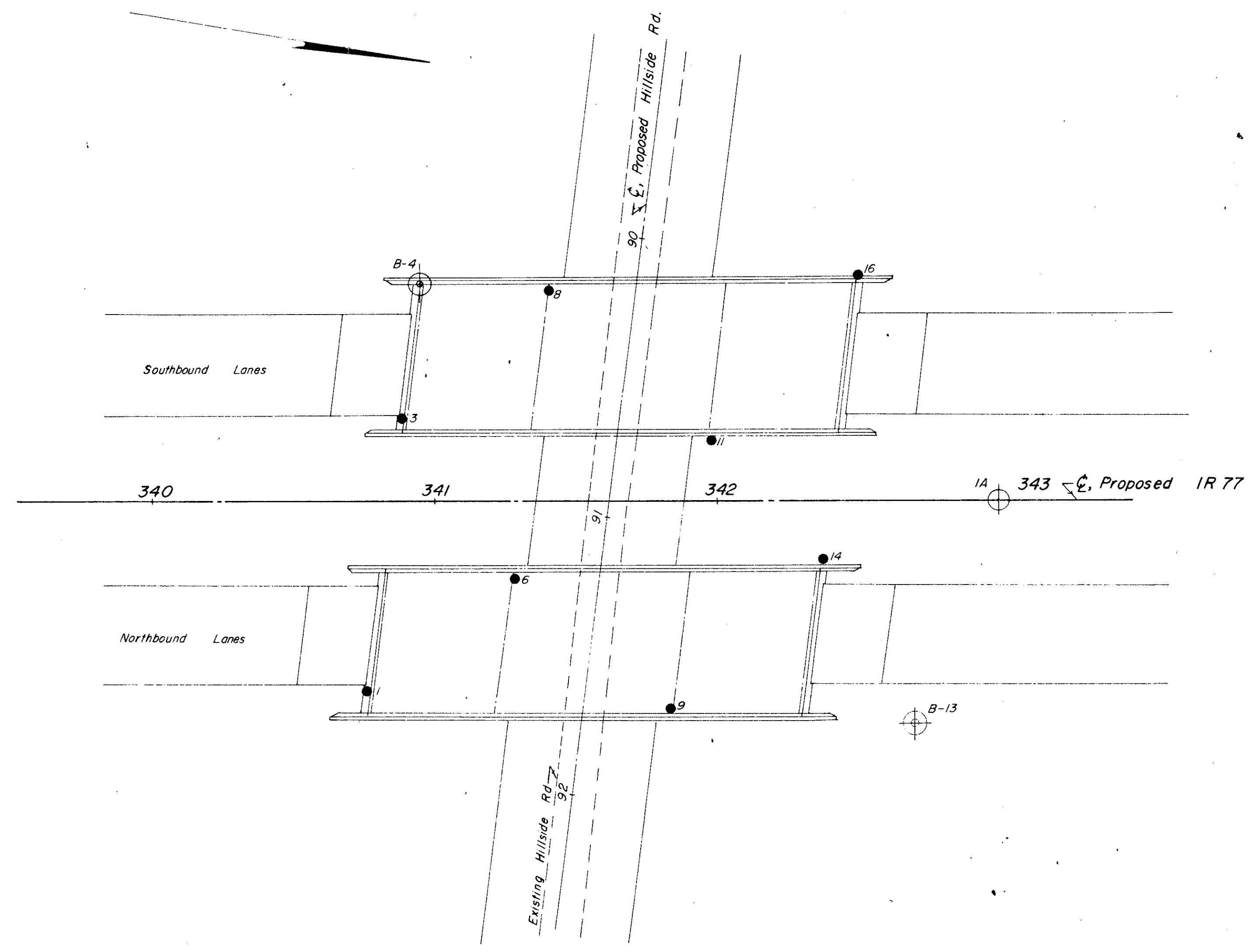
BOTTOM OF BORING

NOTE: Information shown by this subsurface investigation was obtained solely for the use in establishing design controls for the project. The State of Ohio does not guarantee the accuracy of this data and it is not to be construed as a part of the plans governing construction of the project.

OHIO DEPARTMENT OF HIGHWAYS
TESTING LABORATORY
1620 WEST BROAD STREET, COLUMBUS 23, OHIO

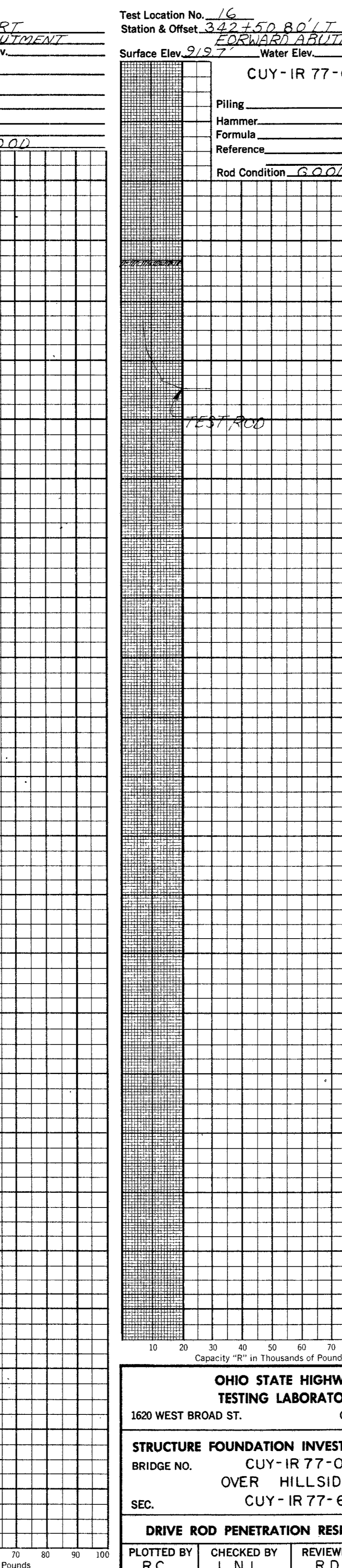
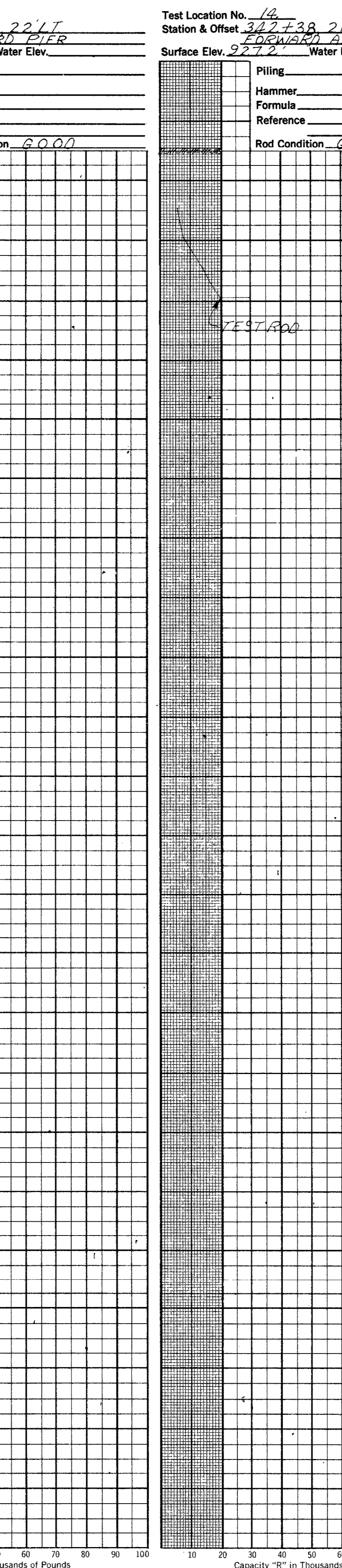
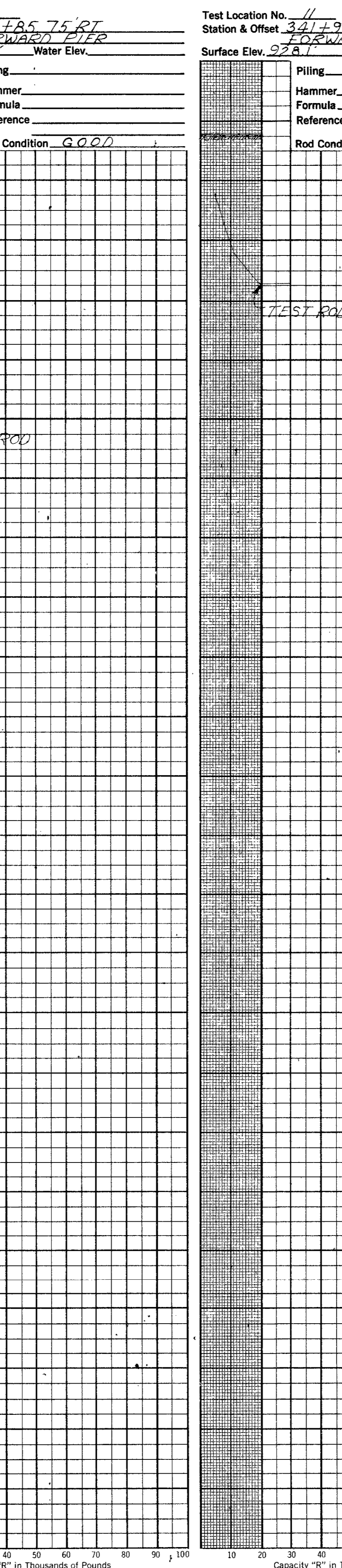
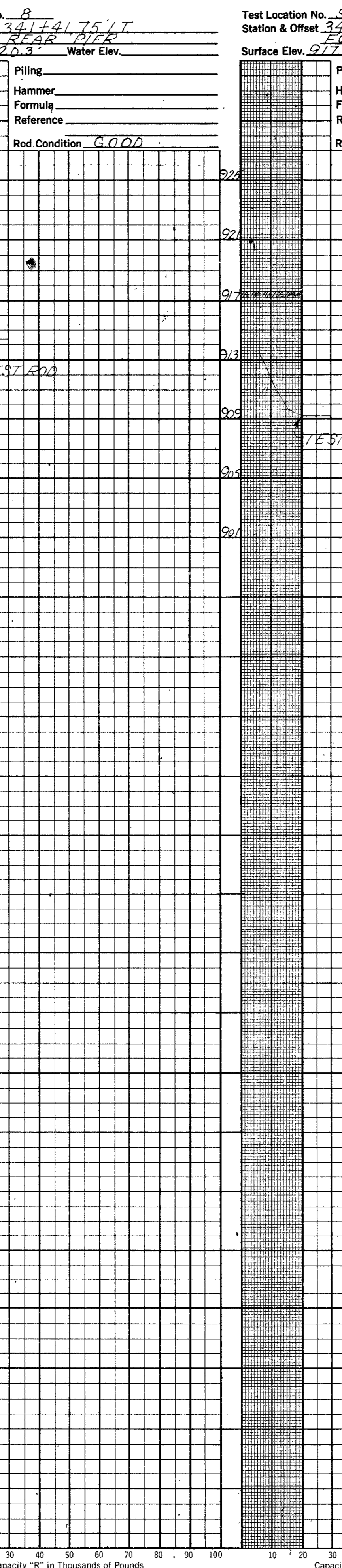
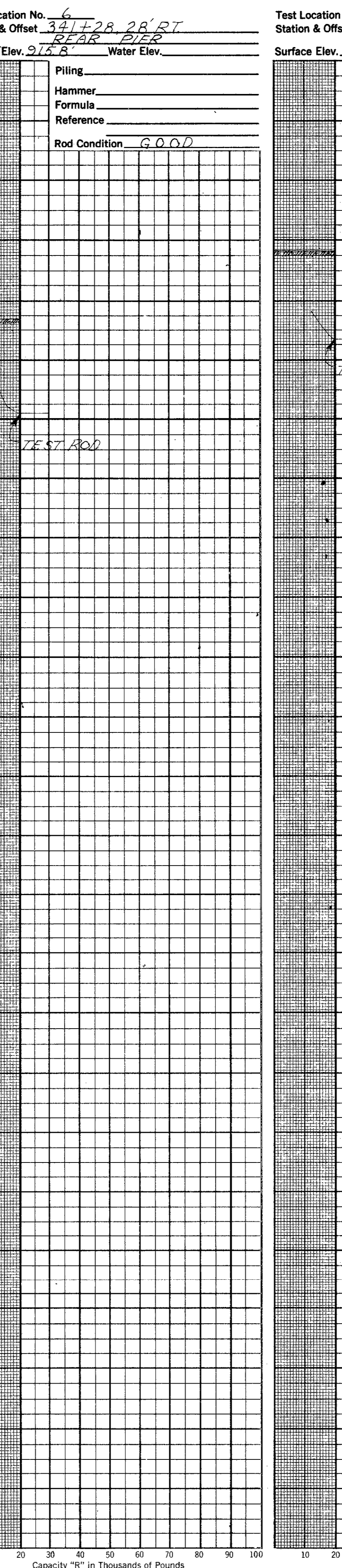
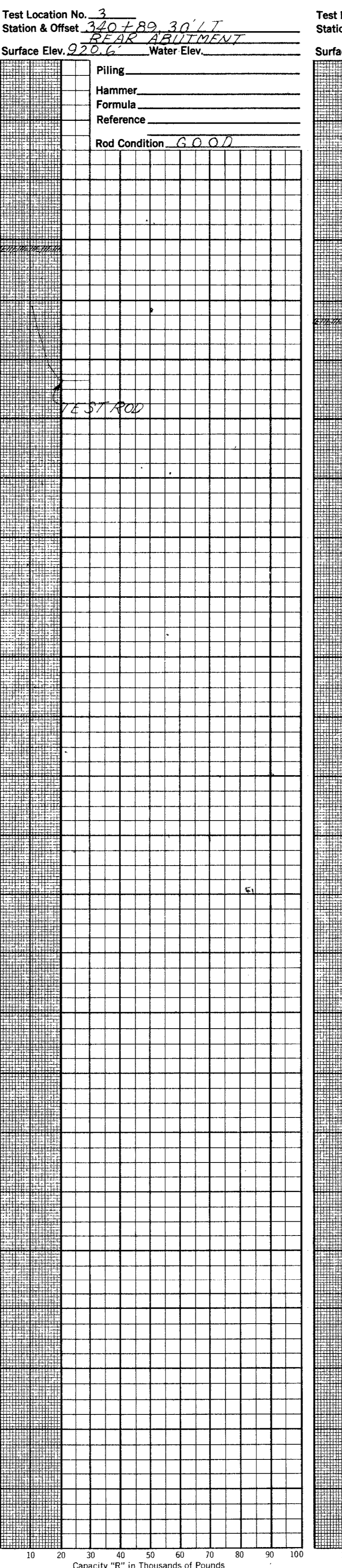
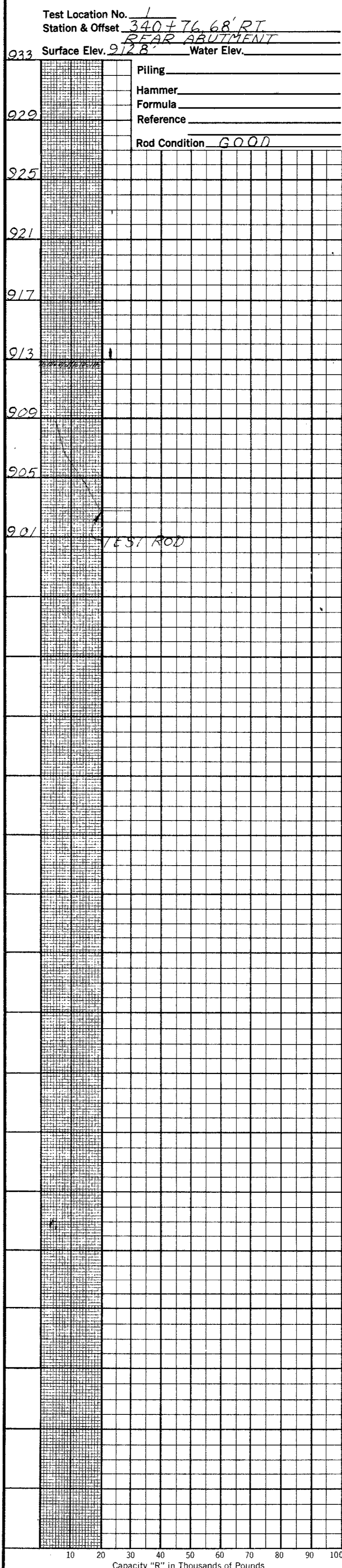
STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. CUY-IR 77-0645 L/R
OVER HILLSIDE RD.
SEC. CUY-IR 77-6.45

CHECKED BY L.N.L. REVIEWED BY R.D.R. DATE 7/14/66



OHIO DEPARTMENT OF HIGHWAYS TESTING LABORATORY 1620 WEST BROAD STREET, COLUMBUS 23, OHIO			
STRUCTURE FOUNDATION INVESTIGATION			
BRIDGE NO.	CUY-IR 77-0645	L/R	
	OVER HILLSIDE RD.		
SEC.	CUY-IR 77- 6.45		
PLAN AND PROFILE			
DRAWN BY	CHECKED BY	REVIEWED BY	DATE
RLF	L.N.L.	R.D.R.	7/14/66

SCALE: 1" = 30'



Test Location No. 16
Station & Offset 342+50.80' LT
FORWARD ABUTMENT
Surface Elev. 929.7 Water Elev. _____

CUY-IR 77-6.45

Piling _____
Hammer _____
Formula _____
Reference _____
Rod Condition GOOD

OHIO STATE HIGHWAY
TESTING LABORATORY
1620 WEST BROAD ST. COLUMBUS 23, OHIO

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. CUY-IR 77-0645 L/R
OVER HILLSIDE RD.
SEC. CUY-IR 77-6.45

DRIVE ROD PENETRATION RESISTANCE DATA

PLOTTED BY R.C. CHECKED BY L.N.L. REVIEWED BY R.D.R. DATE 7/14/66

25
41
3
3

GEOLOGY OF THE SITE

The structure site is located on the relatively flat portion of the glaciated Mississippi Valley Plain, in an area where shallow glacial drift overlies shale bedrock, of Mississippian age.

EXPLORATION








The exploration consisted of two drive sample-core borings and six drive rod penetration tests, made between June 6 and 10, 1966.

INVESTIGATIONAL FINDINGS










The borings disclose that relatively flat-lying bedrock surface, encountered at 10 and 11-foot depths, elevation 841 feet, is overlain by stiff silty clays and very dense gravel. The borings were terminated 24 and 25 feet below bedrock surface, at elevations 818 and 817 feet.

Rod soundings met rapid increase in penetration resistance with increase in depth and were terminated upon encounter with rather abrupt refusal to penetration 11 to 15 feet below ground surface, elevations 842 to 837 feet, considered to be on or slightly below bedrock surface, as revealed by the borings.












No free water was observed in any of the rod sounding holes.

-  Auger Boring Location - Plan View.
-  Press and / or Drive Sample and / or Core Boring Location - Plan View.
-  Drive Rod Penetration Resistance Sounding Location - Plan View.
-  Capped Pile
-  Footing
-  Footing on Pile
-  Top of Rock

LEGEND

-  Horizontal Bar on Boring Log Indicates the Depth the Sample Was Taken.
-  Figures Beside the Boring Log in Profile Indicate the Number of Blows for Standard Penetration Test.
X = Number of Blows for First 6 inches.
Y = Number of Blows for Second 6 inches.
-  Drive Rod Penetration Resistance Sounding Log - Profile
-  Casing
-  Resistance "R" < 10,000 lbs.
-  Resistance "R" > 10,000 lbs.
-  Indicates Final Measurement of Penetration, in Inches.
-  Indicates Free Water Elevation.
-  Indicates Static Water Elevation.

SYMBOLS OF ROCK TYPES

-  Coal
-  Weathered Indurated Clay
-  Indurated Clay
-  Weathered Shale
-  Shale
-  Weathered Sandstone
-  Sandstone
-  Leached Dolomite
-  Dolomite
-  Leached Limestone
-  Limestone

GENERAL INFORMATION

Drive Rod Penetration Sounding Tests

Drive rod penetration resistance tests constitute driving a 1.315-inch diameter steel rod, with a 45° cone point, into the ground, using a 122-pound drop-hammer with a free fall of five feet. At one or two-foot depth intervals, a measurement is taken to determine the amount of penetration achieved in three hammer drops. This reading is converted to an empirical value for capacity "R", in thousands of pounds (which is a measure of both the point resistance and frictional resistance on the rod), by using charts prepared by the Ohio Department of Highways, Bureau of Bridges, on the basis of correlation study of rod penetration with past performance of pile driving. For interpretation, a graph is prepared by plotting the value "R" against the depth at which the reading was taken, and connecting the plotted points. The curve so obtained reflects the density of subsurface materials in a manner that can be readily compared with data from similar tests at other locations on the structure site. From this comparison, the overall uniformity of subsurface condition may be evaluated.

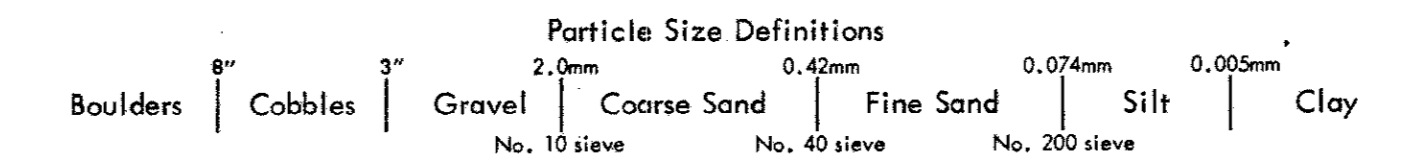
Drive Sample Borings - Drive-Press Sample Borings

Drive sample borings are made by means of a rotary-type drill rig, employing a 2" O.D., 1-3/8" I.D. sampler, at 2-1/2 and / or 5-foot depth intervals, driven by means of a 140 - pound drop-hammer with a free fall of 30 inches. The number of blows required to drive the sampler 12 inches is considered the standard penetration test.

Drive-press sample borings are made by means of a rotary-type drill rig, employing a 2" O.D., 1-3/8" I.D. drive sampler, and 3" O.D. thin-wall press sampler. The press sampler is advanced by continuous uniform pressure, applied by the drill rig.

The boring log sheets show a graphic plot of the information obtained, including depth and elevation of the sample, number of blows for the standard penetration tests in two 6-inch increments, depth of press samples, field sample number, sample description - based on laboratory tests and the Casagrande AC classification system - and gradation, plasticity, and moisture content determinations. Results of strength and consolidation testing, if performed, appear on separate enclosures.

At depths where materials are bouldery or gravelly to the extent that the sampler can not be driven, a wash sample is procured for visual classification, in order to determine the general character of the material. These samples are not considered sufficiently representative to warrant laboratory testing.



LOG OF BORING

Date Started 6-8-66 Sampler Type SS Dia. 1 3/8" Water Elev. _____
 Date Completed 6-9-66 Casing Length _____ Dia. _____
 Boring No. B-1 Station & Offset 86+82, 17' Lt. (Rear Abutment) Surface Elev. 852.8'

Elev.	Depth	Std. Pen. (N)	Rec. Ft.	Loss Ft.	Description	Sample No.	Physical Characteristics							SHTL Class.	
							% Agg.	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.		W.C.
852.8	0														
847.8	2														
	4														
	6	6/11			Brown Silt and Clay	1	0	4	5	25	66	36	14	18	A-6
	8														
842.8	10				Brown Silty Sandy Gravel	2	48	2	39	5	6	NP	NP	19	A-1-b
841.8	11	20/25			TOP OF ROCK										
	12		3.1	0.9											
	14														
	16														
	18		4.9	0.1											
	20														
	22														
	24		4.9	0.1	Sandstone, brown to gray, fine-grained, thin-bedded, firm, slightly jointed, slightly weathered and friable.										
	26														
	28		4.5	0.5											
	30														
	32														
817.8	34		4.6	0.4											

LOG OF BORING

Date Started 6-7-66 Sampler Type SS Dia. 1 3/8" Water Elev. _____
 Date Completed 6-8-66 Casing Length _____ Dia. _____
 Boring No. B-6 Station & Offset 88+39, 30' Rt. (Forward Abutment) Surface Elev. 852.4'

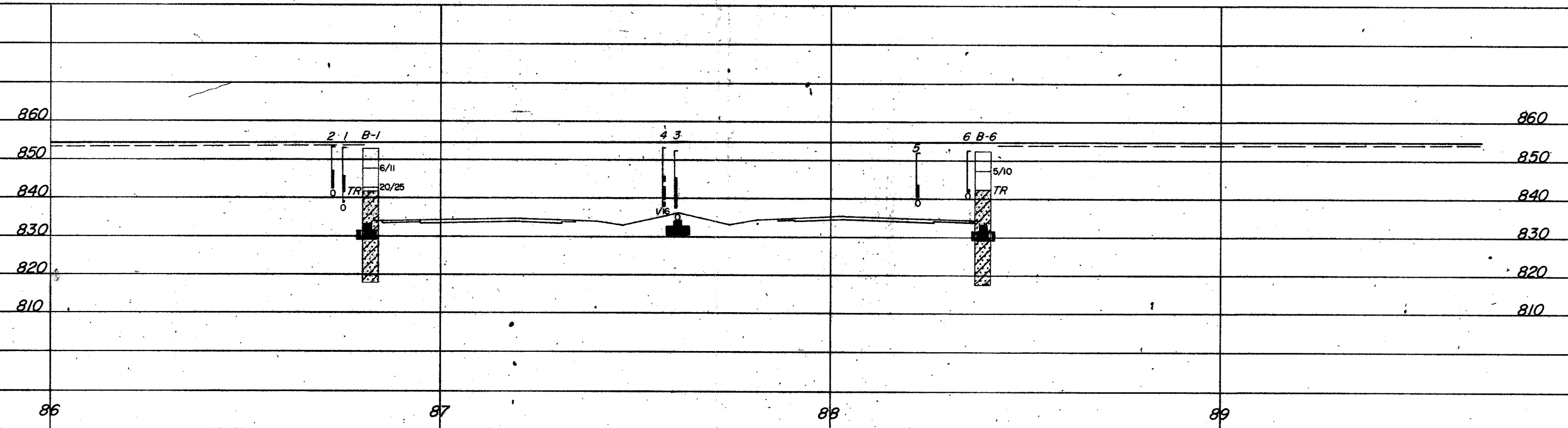
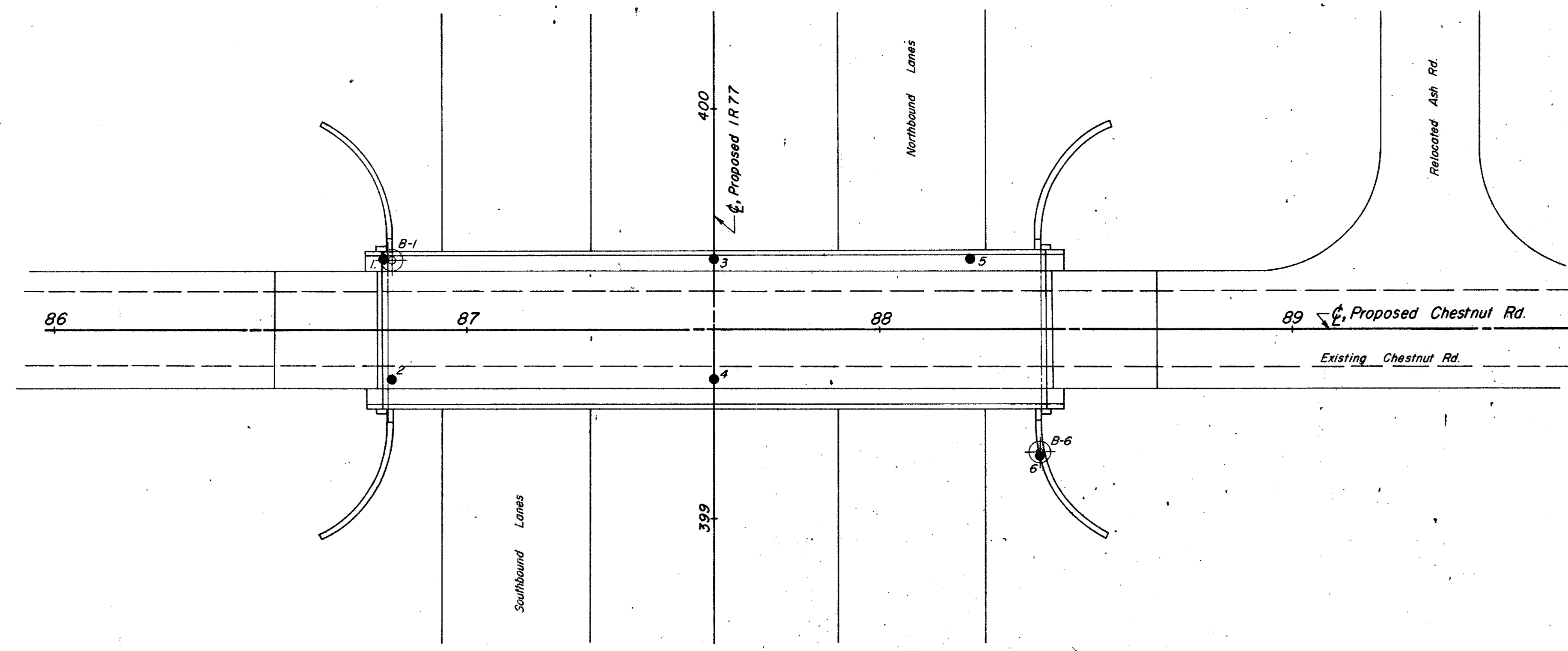
Elev.	Depth	Std. Pen. (N)	Rec. Ft.	Loss Ft.	Description	Sample No.	Physical Characteristics							SHTL Class.	
							% Agg.	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.		W.C.
852.4	0														
	2														
	4														
847.4	6	5/10			Brown Silty Clay	1	0	0	1	29	70	39	16	28	A-6
	8														
842.4	10				TOP OF ROCK										
	12		3.8	1.2											
	14														
	16														
	18		4.9	0.1											
	20														
	22														
	24		4.9	0.1	Sandstone, gray, fine-grained, firm, thin-bedded, slightly jointed, slightly friable and weathered.										
	26														
	28		4.9	0.1											
	30														
	32														
817.4	34		4.5	0.5											

NOTE: Information shown by this subsurface investigation was obtained solely for the use in establishing design controls for the project. The State of Ohio does not guarantee the accuracy of this data and it is not to be construed as a part of the plans governing construction of the project.

**OHIO DEPARTMENT OF HIGHWAYS
TESTING LABORATORY**
1620 WEST BROAD STREET, COLUMBUS 23, OHIO

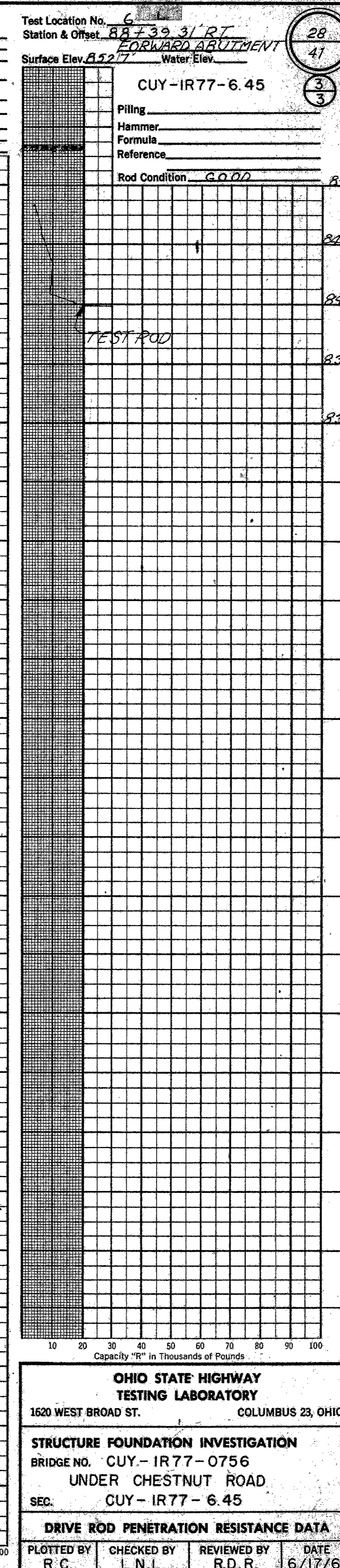
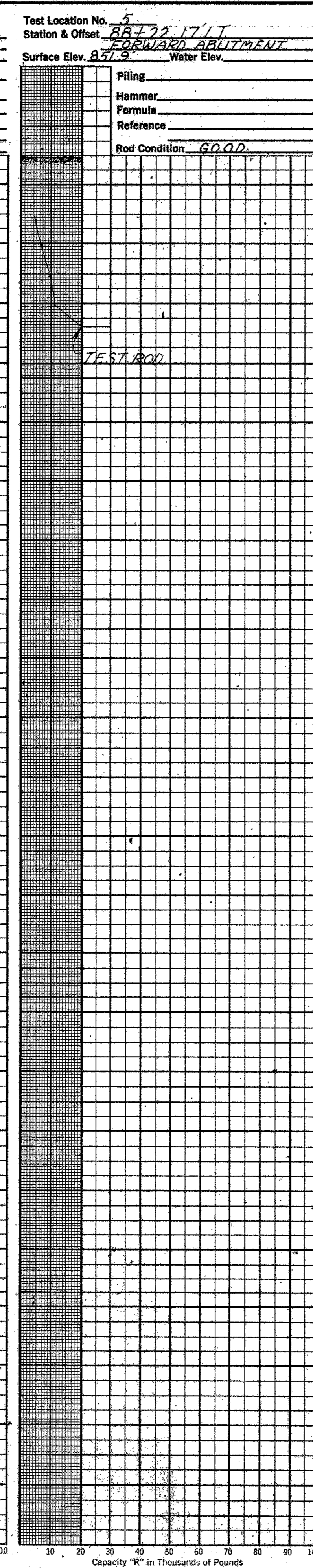
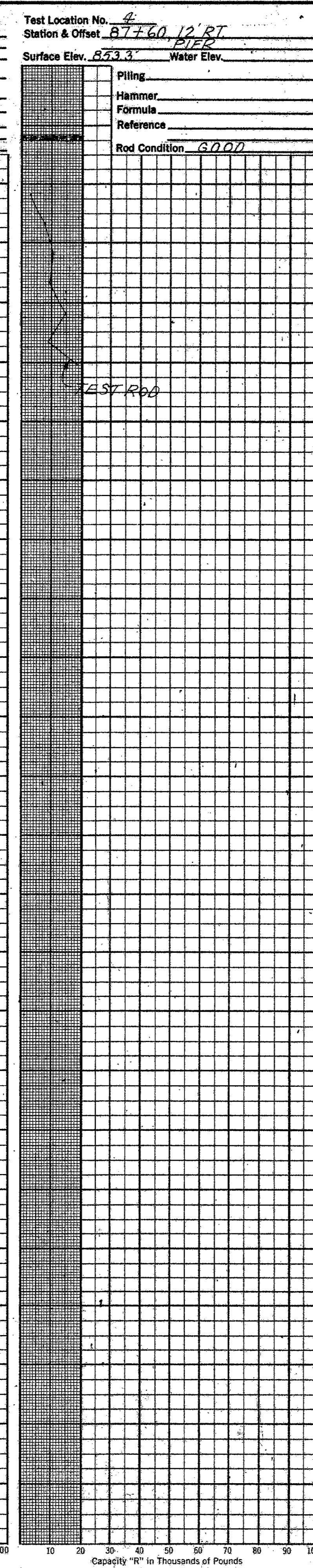
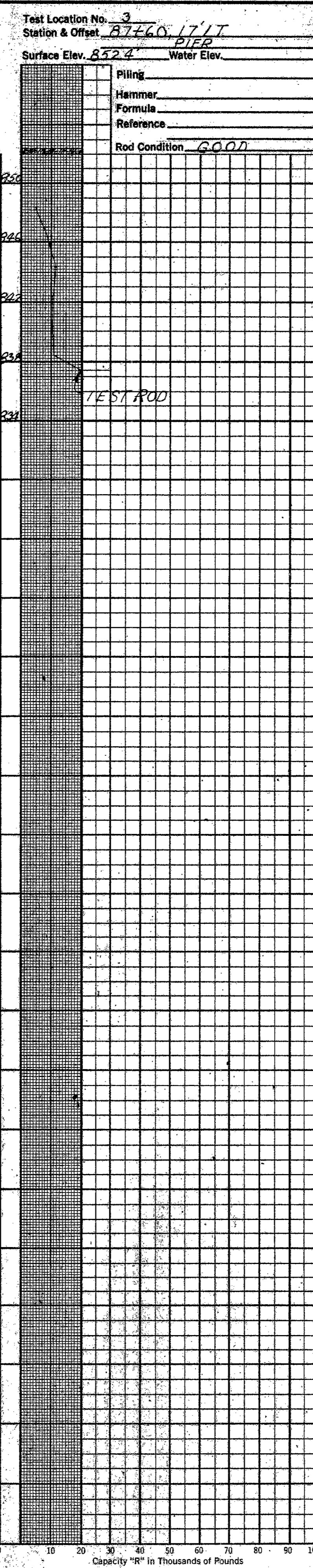
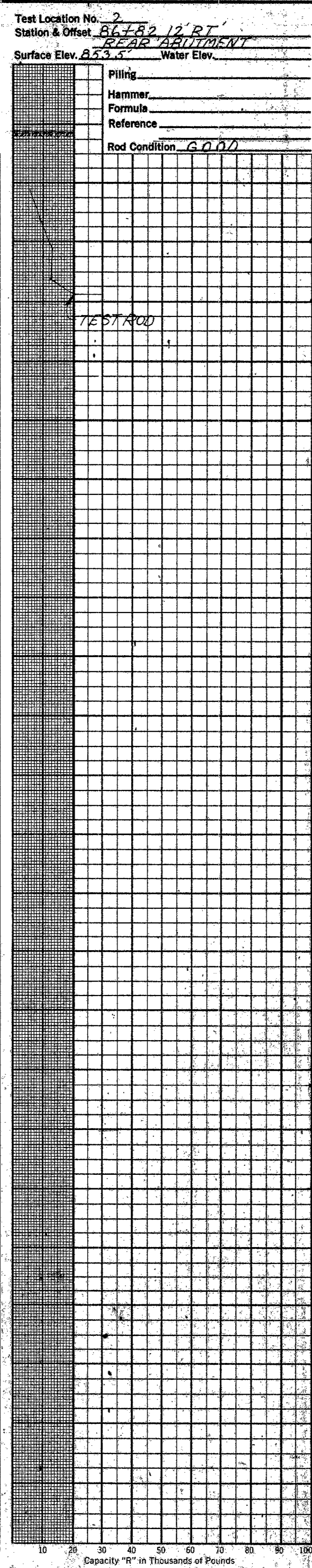
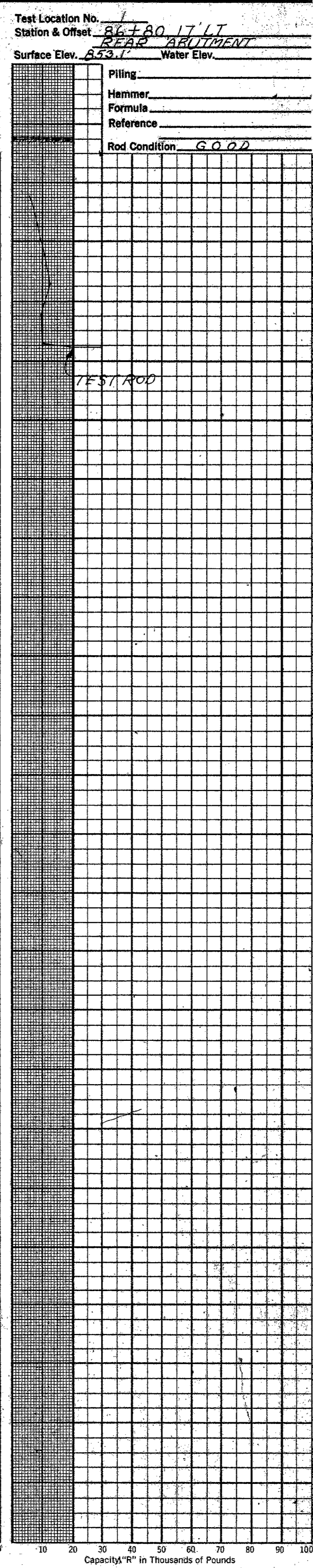
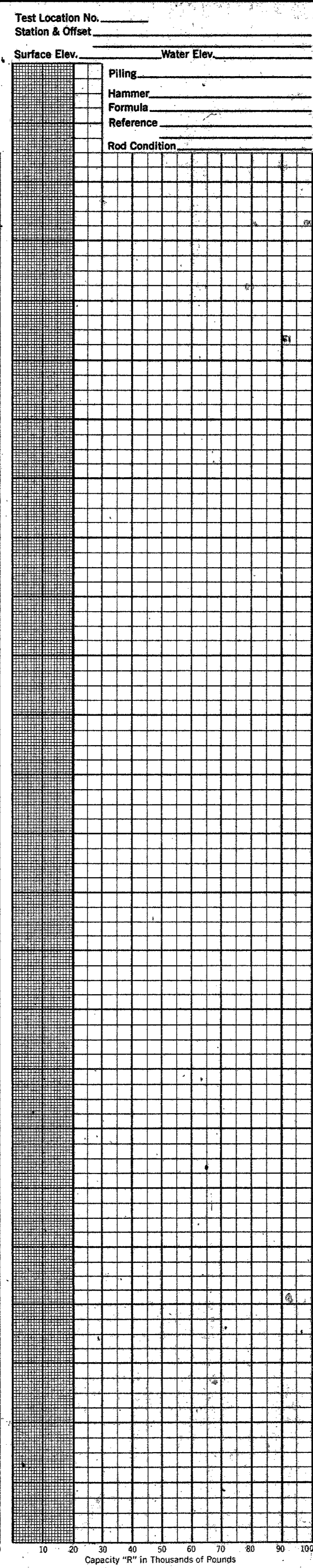
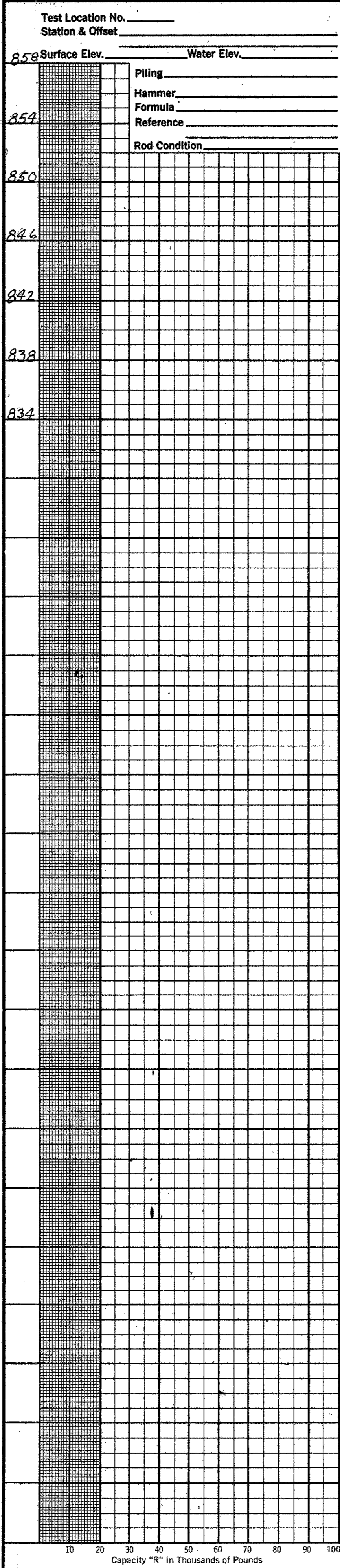
STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. CUY-IR77-0756
UNDER CHESTNUT ROAD
SEC. CUY-IR77-6.45

CHECKED BY L.N.L.	REVIEWED BY R.D.R.	DATE 6/17/66
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OHIO DEPARTMENT OF HIGHWAYS TESTING LABORATORY 1620 WEST BROAD STREET, COLUMBUS 23, OHIO			
STRUCTURE FOUNDATION INVESTIGATION BRIDGE NO. CUY - IR 77 - 0756 UNDER CHESTNUT ROAD SEC. CUY - IR 77 - 6.45			
PLAN AND PROFILE			
DRAWN BY R.L.D.	CHECKED BY L.N.L.	REVIEWED BY R.D.R.	DATE 6/17/66

SCALE: 1" = 20'



28
47
3
3

OHIO STATE HIGHWAY TESTING LABORATORY
 1620 WEST BROAD ST. COLUMBUS 23, OHIO

STRUCTURE FOUNDATION INVESTIGATION
 BRIDGE NO. CUY-IR77-0756
 UNDER CHESTNUT ROAD
 SEC. CUY-IR77-6.45

DRIVE ROD PENETRATION RESISTANCE DATA

PLOTTED BY R.C.	CHECKED BY L.N.L.	REVIEWED BY R.D.R.	DATE 6/17/66
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GEOLOGY OF THE SITE

The structure site is located in a flat portion of the dissected glaciated Mississippi Valley Plain, on the sloping west valley wall of the Cuyahoga River, in an area where moderately deep glacial drift overlies shale bedrock, of Mississippian age.

EXPLORATION

The exploration consisted of four drive sample-core borings and twelve drive rod penetration tests, made between June 15 and 29, 1966.

INVESTIGATIONAL FINDINGS

The borings disclosed that gently sloping bedrock surface, encountered at 10 and 12-foot depths, elevations 771 to 758 feet, is overlain by stiff clays and shale fragments. The borings were terminated 13 and 15 feet below bedrock surface, elevations 756 to 743 feet.








Rod soundings met rapid increase in penetration resistance with increase in depth, and were terminated upon encounter with abrupt refusal to penetration at 9 to 16-foot depths, elevations 775 to 757 feet, considered to be on or slightly below bedrock surface, as revealed by the borings.







On the basis of the tests, bedrock surface is considered to slope downward from the rear to the forward portion of the structure site between approximate elevations 775 and 758 feet.

If it is the intention to found pier substructure units on bedrock, it is considered advisable that the open excavations be inspected in the field in order to insure that the excavations have been extended to rock throughout the entire founding area. It is further suggested that the area of the footing contact not be subjected to prolonged atmospheric exposure, and that the excavations be kept drained at all times, due particularly to the fact that while this bedrock is generally firm in place, it is susceptible to disintegration upon exposure to the atmosphere and water.


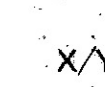



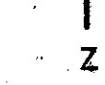
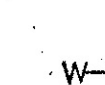
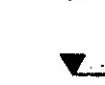

Unconfined compression tests on similar shale and sandstone bedrock indicate a crushing strength on the order of 100 and 150 tons per square foot, respectively.

No free water was observed in any of the rod sounding holes.



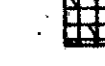


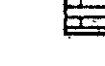
-  Auger Boring Location - Plan View.
-  Press and/or Drive Sample and/or Core Boring Location - Plan View.
-  Drive Rod Penetration Resistance Sounding Location - Plan View.
-  Capped Pile
-  Footing
-  Footing on Pile
-  7R Top of Rock

-  Coal
-  Weathered Indurated Clay
-  Indurated Clay
-  Weathered Shale
-  Shale
- 

LEGEND

-  Horizontal Bar on Boring Log Indicates the Depth the Sample Was Taken.
-  Figures Beside the Boring Log in Profile Indicate the Number of Blows for Standard Penetration Test.
X = Number of Blows for First 6 inches.
Y = Number of Blows for Second 6 inches.
-  Drive Rod Penetration Resistance Sounding Log - Profile
-  Casing
-  Resistance "R" < 10,000 lbs.
-  Resistance "R" > 10,000 lbs.
-  Z Indicates Final Measurement of Penetration, in Inches.
-  W Indicates Free Water Elevation.
-  Indicates Static Water Elevation.

SYMBOLS OF ROCK TYPES

-  Weathered Sandstone
-  Sandstone
-  Leached Dolomite
-  Dolomite
-  Leached Limestone
-  Limestone

GENERAL INFORMATION

Drive Rod Penetration Sounding Tests

Drive rod penetration resistance tests constitute driving a 1.315-inch diameter steel rod, with a 45° cone point, into the ground, using a 122-pound drop-hammer with a free fall of five feet. At one or two-foot depth intervals, a measurement is taken to determine the amount of penetration achieved in three hammer drops. This reading is converted to an empirical value for capacity "R", in thousands of pounds (which is a measure of both the point resistance and frictional resistance on the rod), by using charts prepared by the Ohio Department of Highways, Bureau of Bridges, on the basis of correlation study of rod penetration with past performance of pile driving. For interpretation, a graph is prepared by plotting the value "R" against the depth at which the reading was taken, and connecting the plotted points. The curve so obtained reflects the density of subsurface materials in a manner that can be readily compared with data from similar tests at other locations on the structure site. From this comparison, the overall uniformity of subsurface condition may be evaluated.

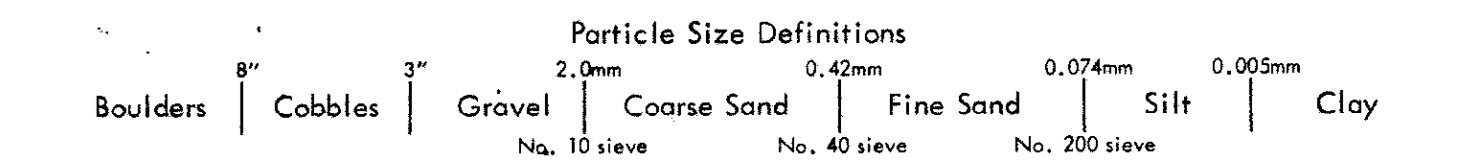
Drive Sample Borings - Drive-Press Sample Borings

Drive sample borings are made by means of a rotary-type drill rig, employing a 2" O.D., 1-3/8" I.D. sampler, at 2-1/2 and/or 5-foot depth intervals, driven by means of a 140 - pound drop-hammer with a free fall of 30 inches. The number of blows required to drive the sampler 12 inches is considered the standard penetration test.

Drive-press sample borings are made by means of a rotary-type drill rig, employing a 2" O.D., 1-3/8" I.D. drive sampler, and 3" O.D. thin-wall press sampler. The press sampler is advanced by continuous uniform pressure, applied by the drill rig.

The boring log sheets show a graphic plot of the information obtained, including depth and elevation of the sample, number of blows for the standard penetration tests in two 6-inch increments, depth of press samples, field sample number, sample description - based on laboratory tests and the Casagrande AC classification system - and gradation, plasticity, and moisture content determinations. Results of strength and consolidation testing, if performed, appear on separate enclosures.

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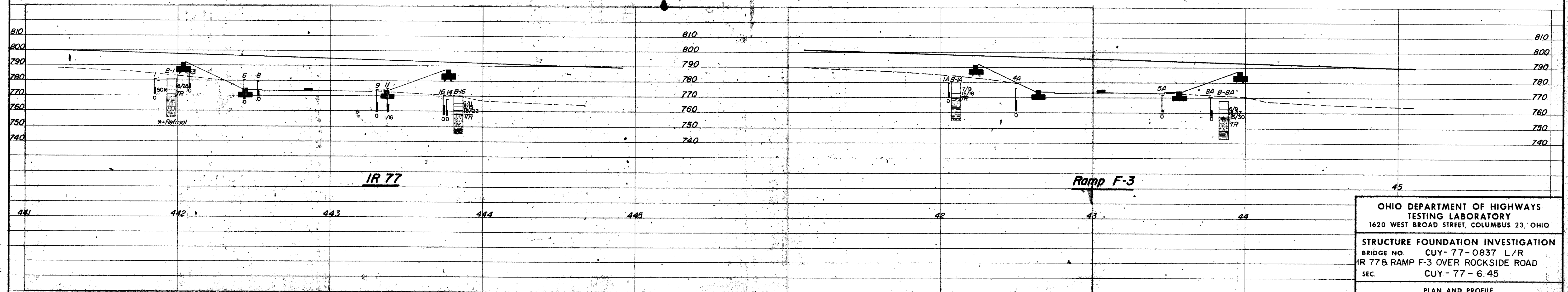
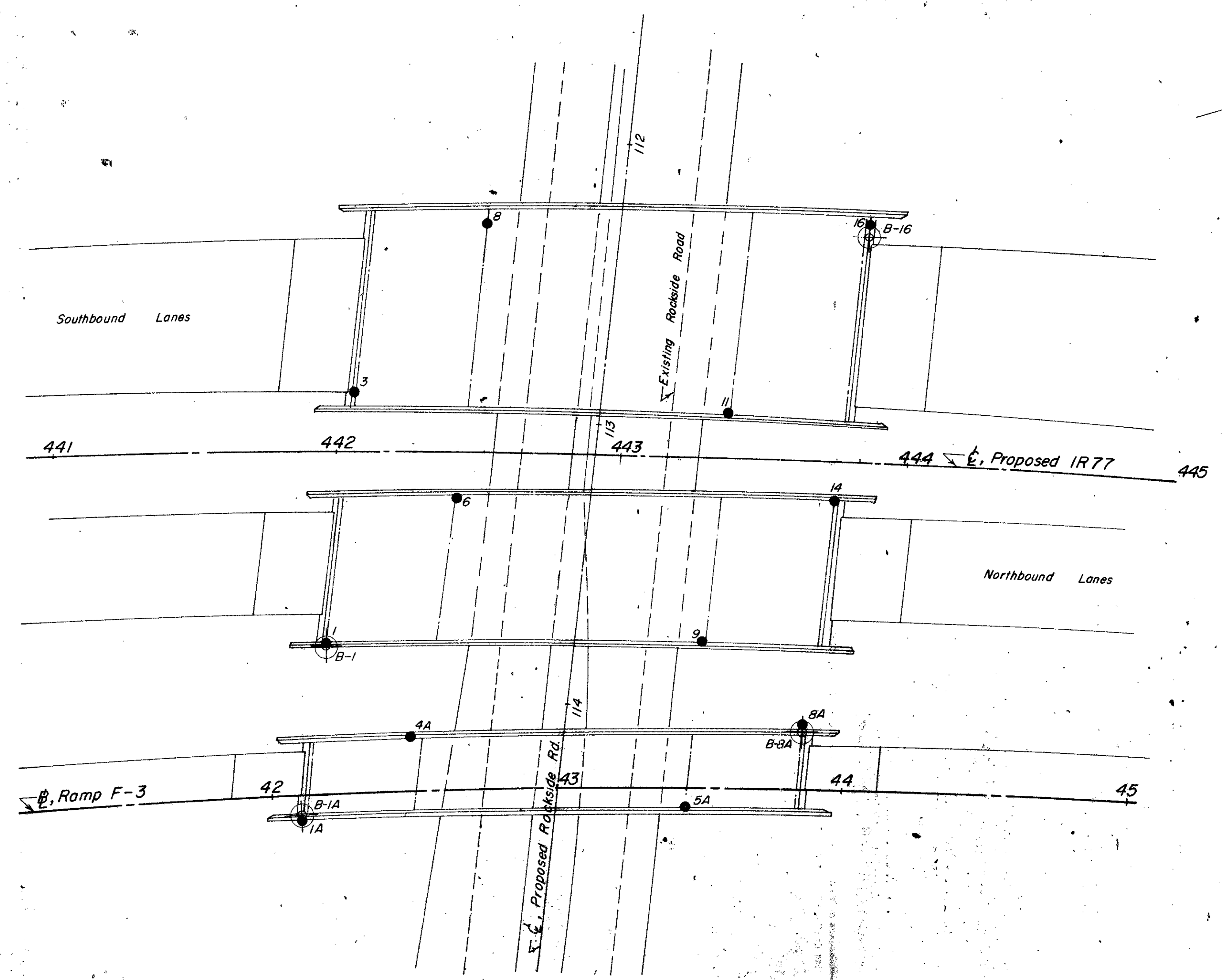


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**OHIO DEPARTMENT OF HIGHWAYS
TESTING LABORATORY**
1620 WEST BROAD STREET, COLUMBUS 23, OHIO

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. CUY- 77 - 0837 L/R
IR 77 & RAMP F-3 OVER ROCKSIDE ROAD
SEC. CUY- 77 - 6.45

CHECKED BY R.H.P.	REVIEWED BY R.D.R.	DATE 7/27/66
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OHIO DEPARTMENT OF HIGHWAYS
TESTING LABORATORY
1620 WEST BROAD STREET, COLUMBUS 23, OHIO

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. CUY- 77 - 0837 L/R
IR 77 & RAMP F-3 OVER ROCKSIDE ROAD
SEC. CUY - 77 - 6. 45

PLAN AND PROFILE

DRAWN BY R.L.F.	CHECKED BY R.H.P.	REVIEWED BY R.D.R.	DATE 7/27/66
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SCALE: 1" = 30'

LOG OF BORING

Date Started 6-23-66 Sampler Type SS Dia. 1 3/8" Water Elev. _____
 Date Completed 6-27-66 Casing Length _____ Dia. _____
 Boring No. B-1 Station & Offset 441+96, 69' Rt. (Rear Abutment) Surface Elev. 781.2'

Elev.	Depth	Std. Pen. (N)	Rec. ft.	Loss ft.	Description	Sample No.	Physical Characteristics							SHTL Class.	
							% Agg.	% C.S.	% F.S.	% Silty Clay	LL	PI	W.C.		
781.2	0														
776.2	5	18/28			Brownish-Gray Clay with Shale Fragments	1	40	2	2	21	35	46	21	19	A-7-6
773.7	8	50* (0.6)			Brownish-Gray Clay with Shale Fragments	2	36	7	4	19	34	39	14	20	A-6a
771.2	10				TOP OF ROCK										
762.7	18		2.8	2.2	Shale, gray, argillaceous and arenaceous, fissile, medium-firm, badly broken and jointed, with many thin sandstone and clay seams. Core Loss 25%										
756.2	24		4.9	0.1	Sandstone, gray, fine-grained, firm, with many thin shale seams. Core Loss 7%										
	24		4.6	0.4	Sandstone, gray, fine-grained, firm, with many thin shale seams. Core Loss 7%										

*Refusal
 BOTTOM OF BORING

LOG OF BORING

Date Started 6-22-66 Sampler Type SS Dia. 1 3/8" Water Elev. _____
 Date Completed 6-23-66 Casing Length _____ Dia. _____
 Boring No. B-16 Station & Offset 443+81, 80' Lt. (Forward Abutment) Surface Elev. 776.2'

Elev.	Depth	Std. Pen. (N)	Rec. ft.	Loss ft.	Description	Sample No.	Physical Characteristics							SHTL Class.	
							% Agg.	% C.S.	% F.S.	% Silty Clay	LL	PI	W.C.		
776.2	0														
765.2	11	6/11			Gray Silt and Clay	1	0	2	15	40	43	32	14	15	A-6a
762.7	14	8/15			Brownish-Gray Clay with shale Fragments	2	22	6	2	16	54	45	19	23	A-7-6
760.2	16				TOP OF ROCK										
759.2	17	18/22			Brownish-Gray Clay with Shale Fragments	3	25	2	2	27	44	44	18	17	A-7-6
757.7	19				Brown silty clay and shale fragments.										
748.2	28		3.2	0.8	Sandstone, gray, fine-grained, firm, jointed, with shale seams. Core Loss 12%										
747.2	30		3.9	1.8	Sandstone, gray, fine-grained, firm, jointed, with shale seams. Core Loss 12%										
746.7	31		4.9	0.1	Shale, black, carbonaceous, fissile, medium-firm, broken. No Core Loss.										
745.2	32				Shale, black, carbonaceous, medium-firm, fissile, jointed and broken. Core Loss 7%.										

BOTTOM OF BORING

*Clay shale, brown, fissile, soft and crumbly, moderately weathered. Core Loss 46%.
 **Sandstone, gray, fine-grained, firm. No Core Loss.

LOG OF BORING

Date Started 6-28-66 Sampler Type SS Dia. 1 3/8" Water Elev. _____
 Date Completed 6-28-66 Casing Length _____ Dia. _____
 Boring No. B-1A Station & Offset 42+10, 7' Rt. (Rear Abutment) Surface Elev. 772.9'

Elev.	Depth	Std. Pen. (N)	Rec. ft.	Loss ft.	Description	Sample No.	Physical Characteristics							SHTL Class.	
							% Agg.	% C.S.	% F.S.	% Silty Clay	LL	PI	W.C.		
772.9	0														
771.9	1	7/9			Brownish-Gray Silty Clay	1	0	5	3	27	65	44	19	18	A-7-6
772.9	8	15/18			Brownish-Gray Weathered Shale Fragments	2	0	2	5	30	63	37	14	13	A-6a
769.2	10				TOP OF ROCK										
762.7	18		2.3	2.7	Shale, gray, argillaceous and arenaceous, fissile, medium-firm, jointed and badly broken, with many thin sandstone and clay seams. Core Loss 25%										
756.2	24		4.4	0.6	Sandstone, gray, fine-grained, firm, with many thin shale seams. No Core Loss.										
750.2	28		5.0	0.0	Sandstone, gray, fine-grained, firm, with many thin shale seams. No Core Loss.										

BOTTOM OF BORING

LOG OF BORING

Date Started 6-29-66 Sampler Type SS Dia. 1 3/8" Water Elev. _____
 Date Completed 6-29-66 Casing Length _____ Dia. _____
 Boring No. B-8A Station & Offset 4348, 2' Lt. (Forward Abutment) Surface Elev. 768.0'

Elev.	Depth	Std. Pen. (N)	Rec. ft.	Loss ft.	Description	Sample No.	Physical Characteristics							SHTL Class.	
							% Agg.	% C.S.	% F.S.	% Silty Clay	LL	PI	W.C.		
768.0	0														
763.0	5	6/9			Brown Silt and Clay	1	0	4	14	31	51	33	15	16	A-6a
760.5	8	15/17			Brownish-Gray Silt and Clay	2	0	5	4	37	54	41	15	17	A-7-6
758.0	10				TOP OF ROCK										
756.0	12	15/30			Clay shale, brownish-gray, fissile, soft and crumbly, moderately weathered. Core Loss 25%										
748.5	18		3.5	0.5	Sandstone, gray, fine-grained, firm, jointed, with many thin shale seams. Core Loss 4%										
743.0	24		4.4	0.6	Shale, black, carbonaceous, fissile, firm, badly jointed and broken, with sandstone seams. Core Loss 6%										
743.0	24		5.0	0.0	Shale, black, carbonaceous, fissile, firm, badly jointed and broken, with sandstone seams. Core Loss 6%										

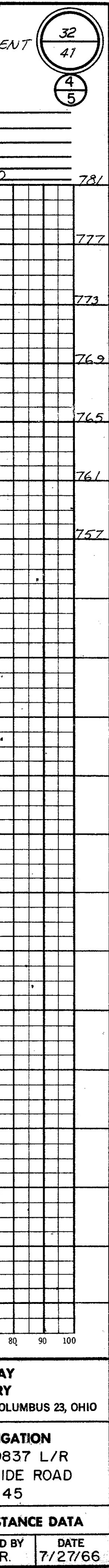
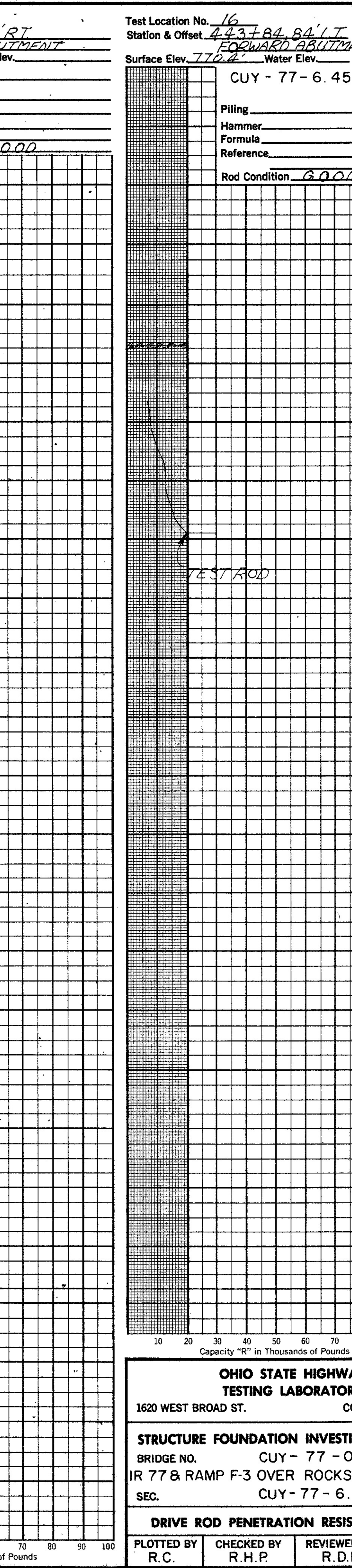
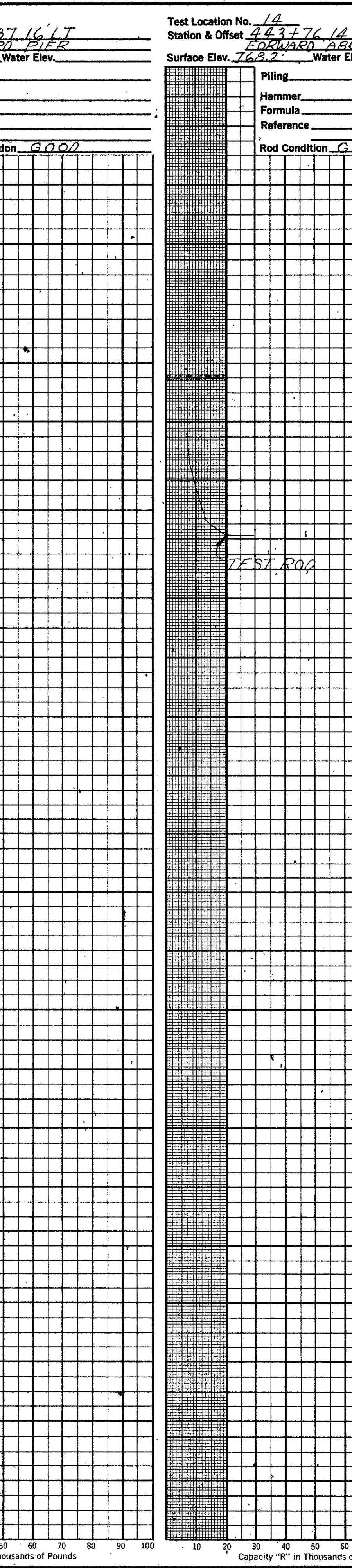
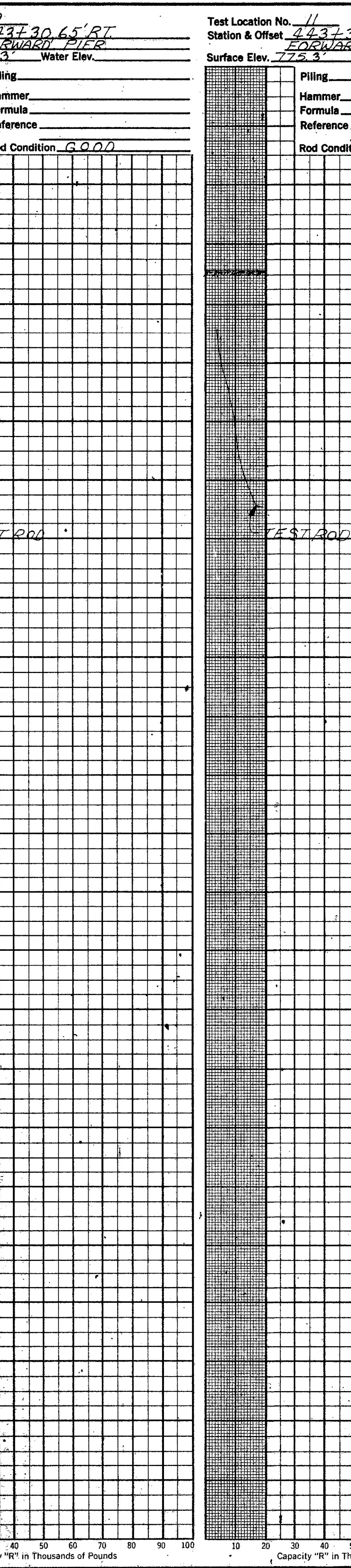
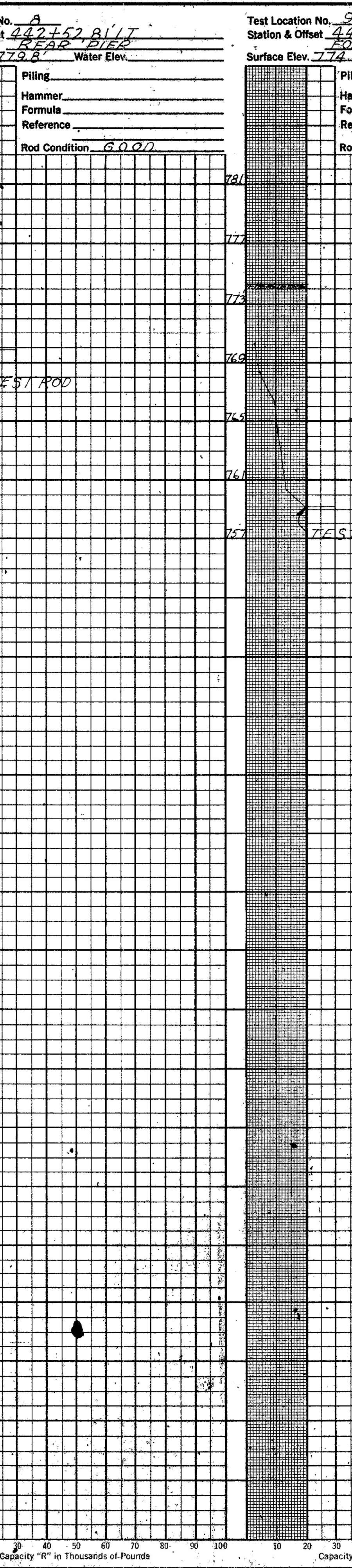
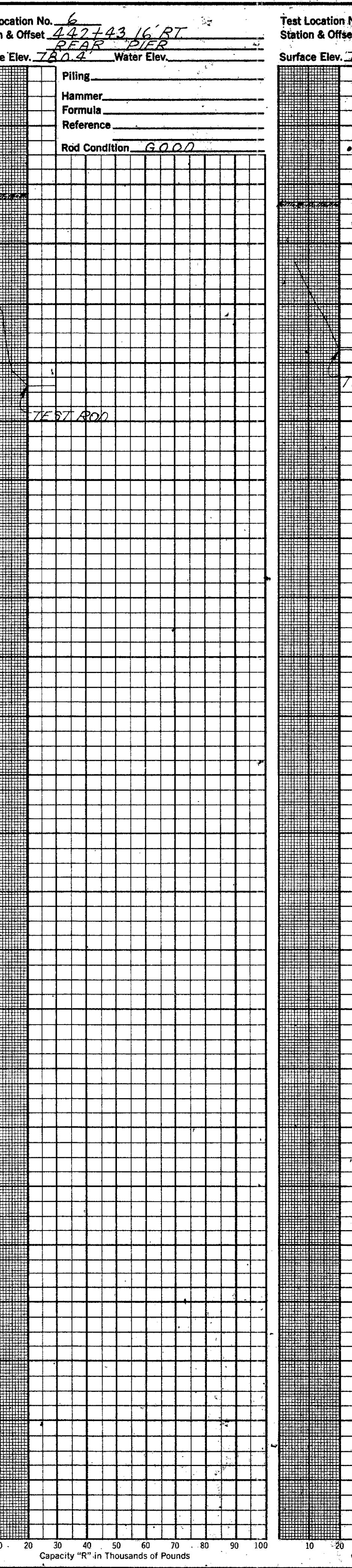
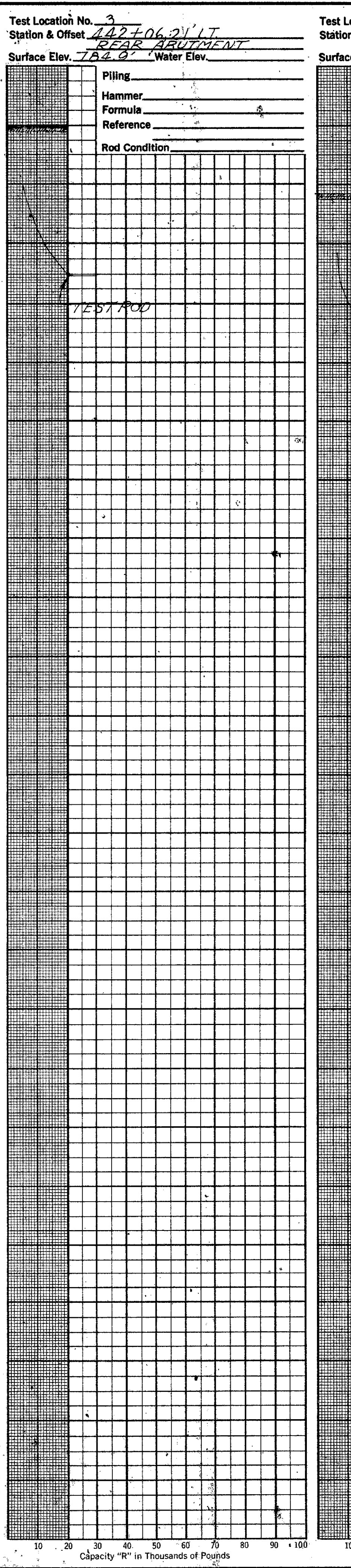
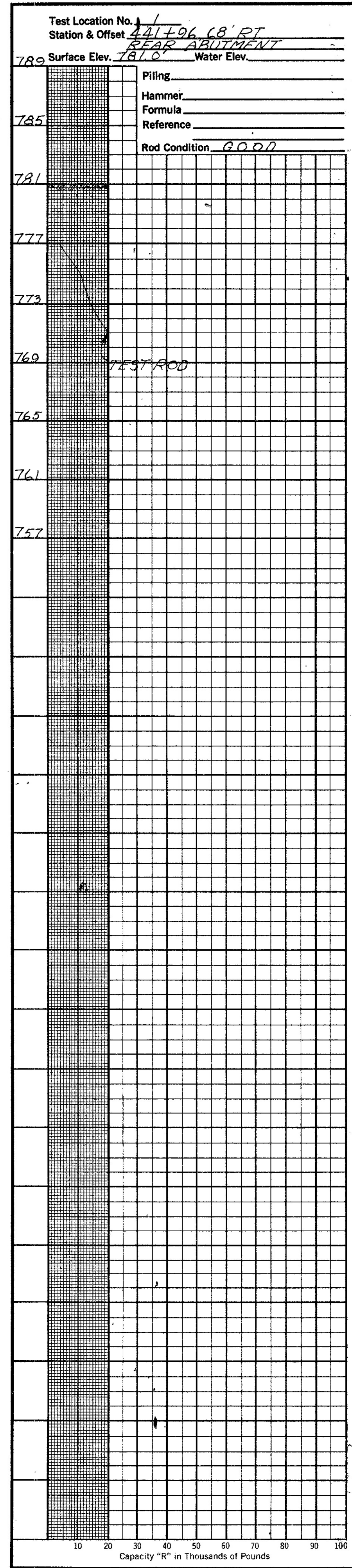
BOTTOM OF BORING

OHIO DEPARTMENT OF HIGHWAYS
 TESTING LABORATORY
 1620 WEST BROAD STREET, COLUMBUS 23, OHIO

STRUCTURE FOUNDATION INVESTIGATION
 BRIDGE NO. CUY - 77 - 0837 L/R
 IR 77 & RAMP F-3 OVER ROCKSIDE ROAD
 SEC. CUY - 77 - 6.45

BORING DATA

TYPED BY S.A.J.	CHECKED BY R.H.P.	REVIEWED BY R.D.R.	DATE 7/27/66
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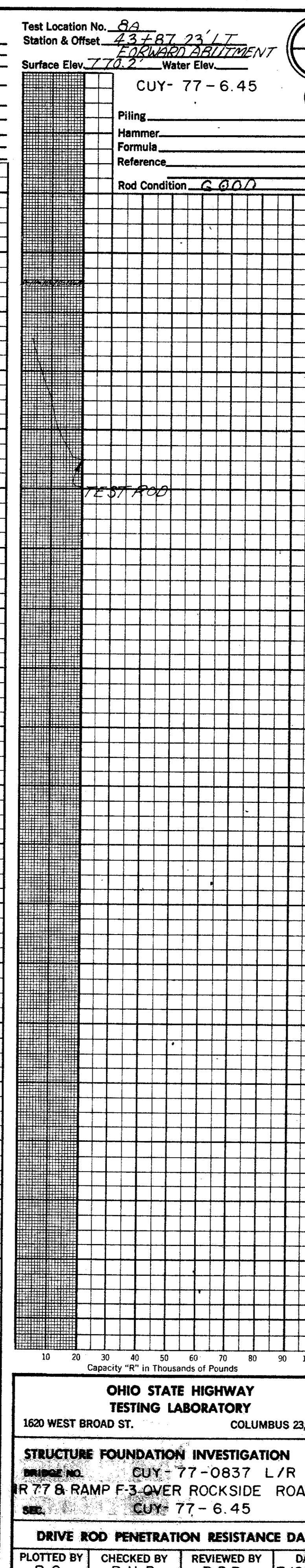
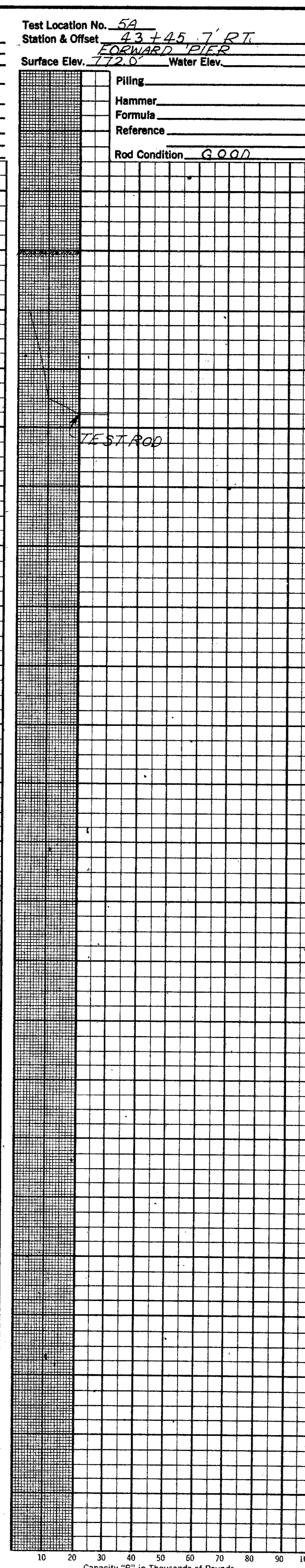
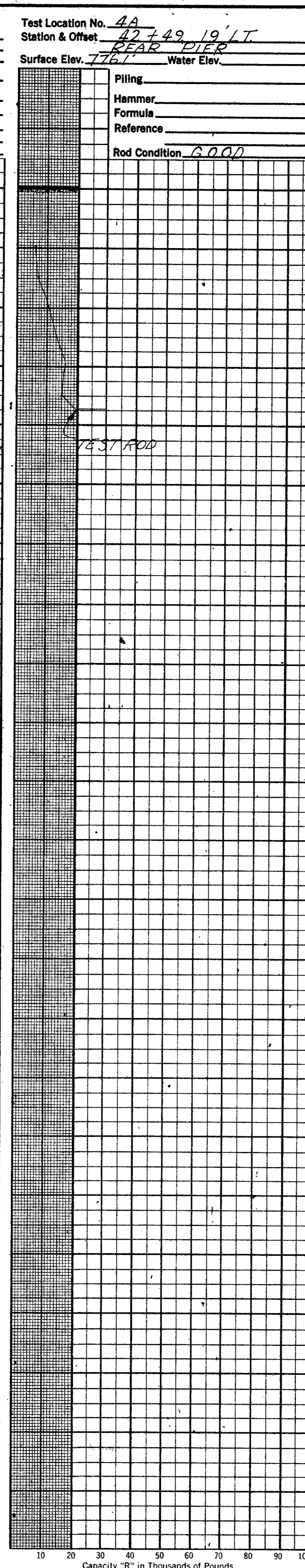
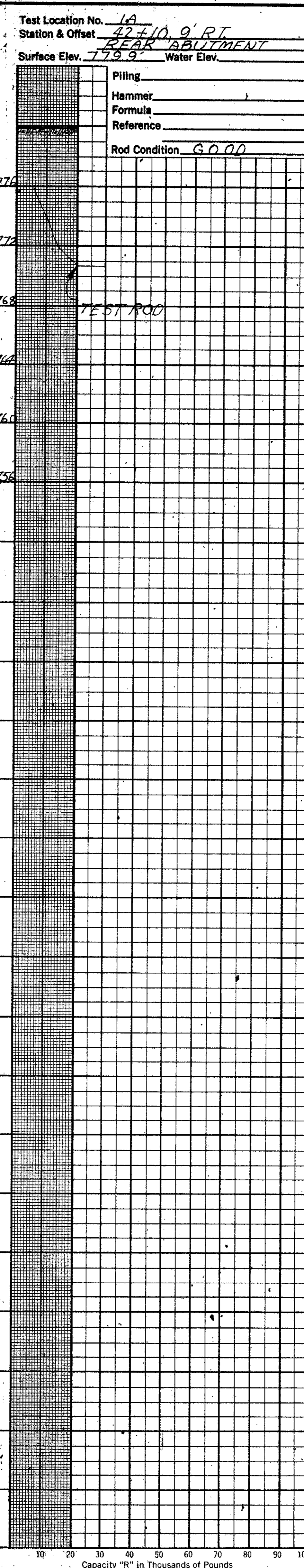
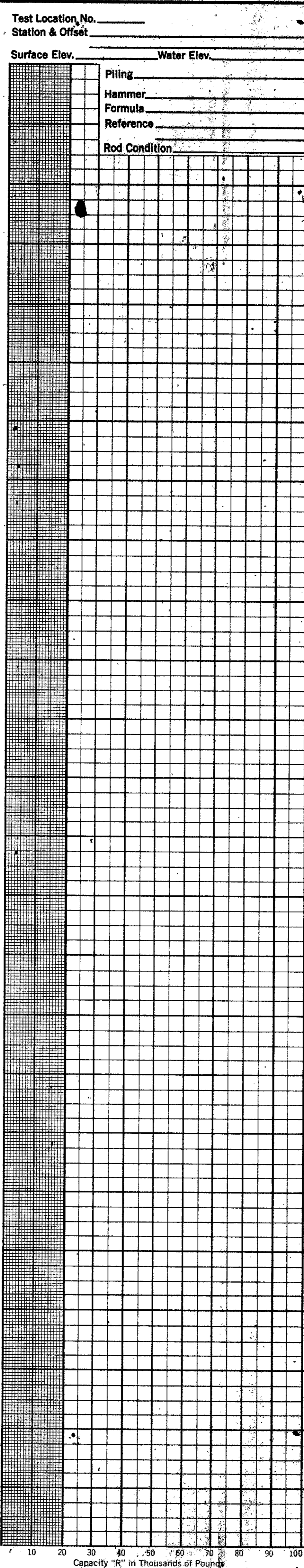
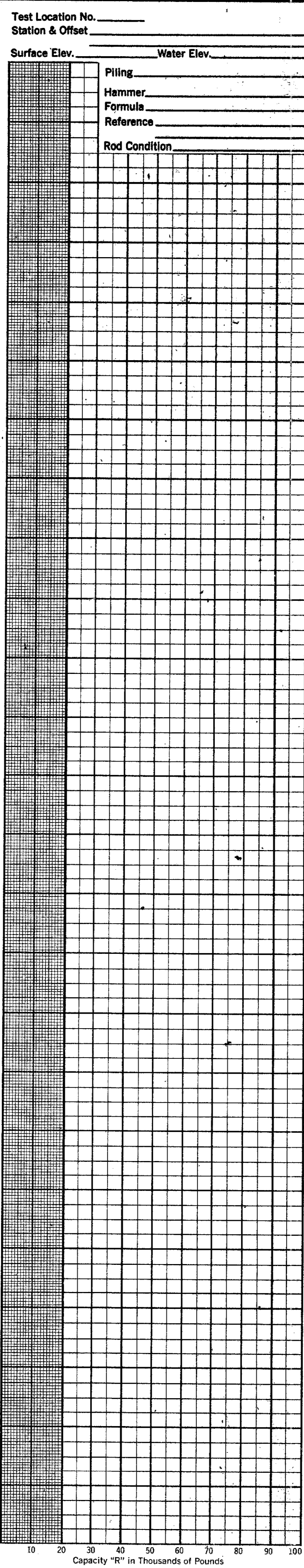
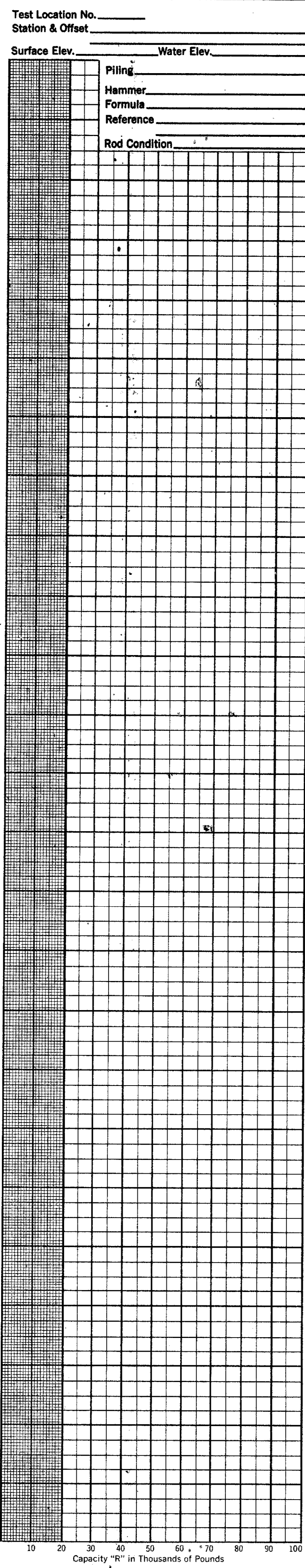
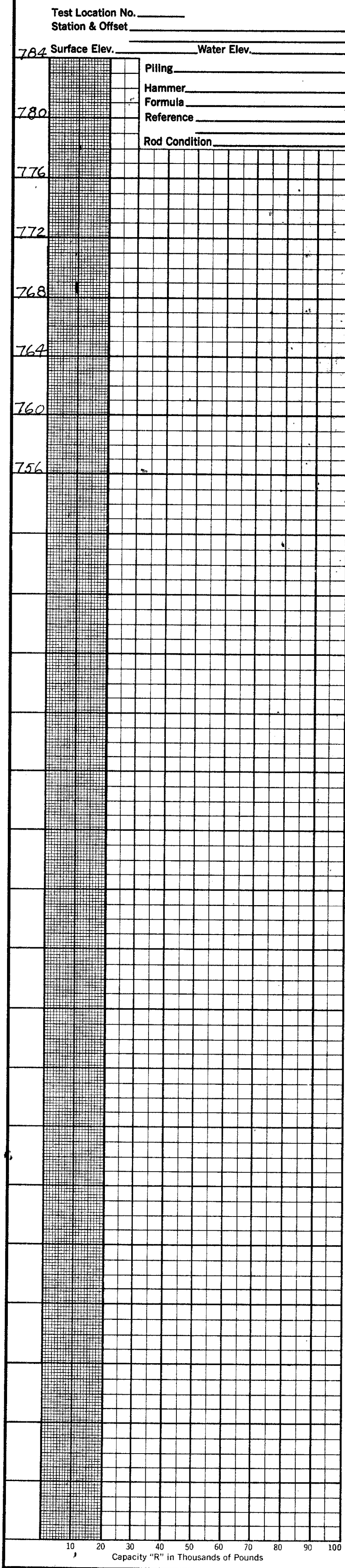
32
41
4
5

OHIO STATE HIGHWAY TESTING LABORATORY
 1620 WEST BROAD ST. COLUMBUS 23, OHIO

STRUCTURE FOUNDATION INVESTIGATION
 BRIDGE NO. CUY - 77 - 0837 L/R
 IR 77 & RAMP F-3 OVER ROCKSIDE ROAD
 SEC. CUY - 77 - 6.45

DRIVE ROD PENETRATION RESISTANCE DATA

PLOTTED BY R.C.	CHECKED BY R.H.P.	REVIEWED BY R.D.R.	DATE 7/27/66
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33
41
5
5

OHIO STATE HIGHWAY TESTING LABORATORY
1620 WEST BROAD ST. COLUMBUS 23, OHIO

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. CUY-77-0837 L/R
R 77 & RAMP F-3 OVER ROCKSIDE ROAD
SEC. CUY-77-6.45

DRIVE ROD PENETRATION RESISTANCE DATA

PLOTTED BY R.C.	CHECKED BY R.H.P.	REVIEWED BY R.D.R.	DATE 7/27/66
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GEOLOGY OF THE SITE

The structure site is located in a flat portion of the dissected glaciated Mississippi Valley Plain, on the sloping west valley wall of the Cuyahoga River, in an area where moderately deep glacial drift overlies shale bedrock, of Mississippian age.

EXPLORATION

The exploration consisted of two drive sample-core borings, made between June 27 and July 1, 1966, and four drive rod penetration tests, made on June 23 and 28, 1966.







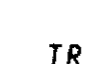
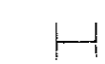


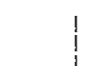


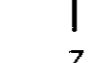


INVESTIGATIONAL FINDINGS

The borings disclosed that gently sloping bedrock surface, encountered at 49-foot depth, elevation 646 feet, in the rear portion of the structure site, and 35-foot depth, elevation 639 feet, in the forward portion, is overlain by loose to dense silts and stiff clays. The borings were terminated 10 and 11 feet below bedrock surface, elevations 634 and 629 feet.

Rod soundings met rapid increase in penetration resistance with increase in depth, and with exception of sounding number 8, were terminated upon encounter with near refusal to penetration at 34 and 36-foot depths, elevations 663 to 647 feet, considered to be in dense clayey silts, as revealed by the borings. Rod sounding number 8 terminated upon encounter with abrupt refusal to penetration at 34-foot depth, elevation 639 feet, considered to be on bedrock surface.

No free water was observed in any of the rod sounding holes.

LEGEND

-  Auger Boring Location - Plan View.
-  Press and / or Drive Sample and / or Core Boring Location - Plan View.
-  Drive Rod Penetration Resistance Sounding Location - Plan View.
-  Capped Pile
-  Footing
-  Footing on Pile
-  TR Top of Rock
-  Horizontal Bar on Boring Log Indicates the Depth the Sample Was Taken.
-  Figures Beside the Boring Log in Profile Indicate the Number of Blows for Standard Penetration Test.
X = Number of Blows for First 6 inches.
Y = Number of Blows for Second 6 inches.
-  Drive Rod Penetration Resistance Sounding Log - Profile
-  Casing
-  Resistance " R'' " < 10,000 lbs.
-  Resistance " R'' " > 10,000 lbs.
-  Z Indicates Final Measurement of Penetration, in Inches.
-  W Indicates Free Water Elevation.
-  Indicates Static Water Elevation.

SYMBOLS OF ROCK TYPES

-  Coal
-  Weathered Indurated Clay
-  Indurated Clay
-  Weathered Shale
-  Shale
- 
-  Weathered Sandstone
-  Sandstone
-  Leached Dolomite
-  Dolomite
-  Leached Limestone
-  Limestone

GENERAL INFORMATION

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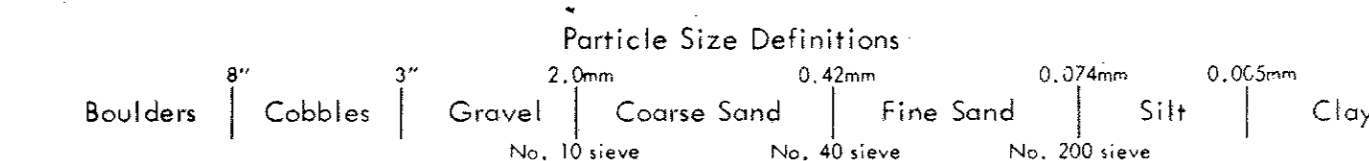
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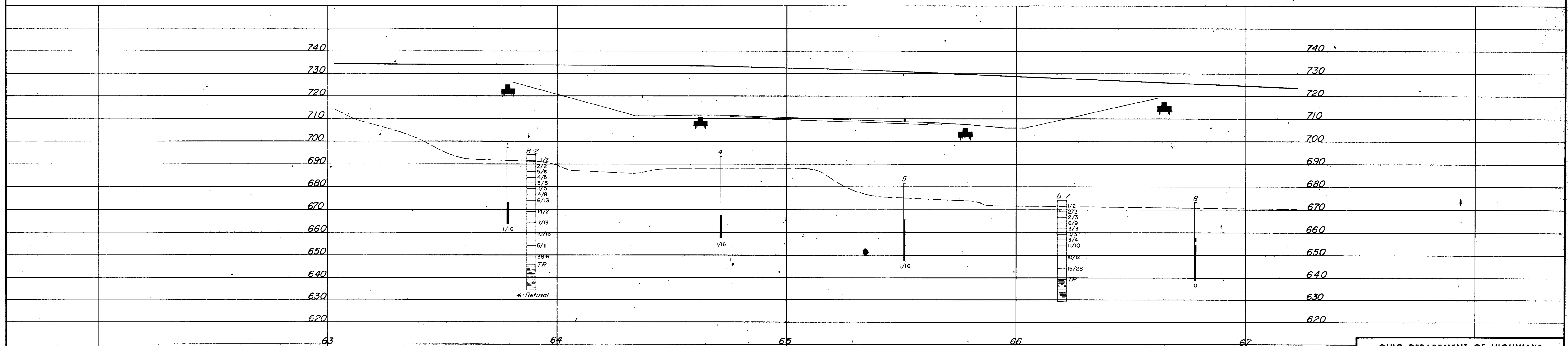
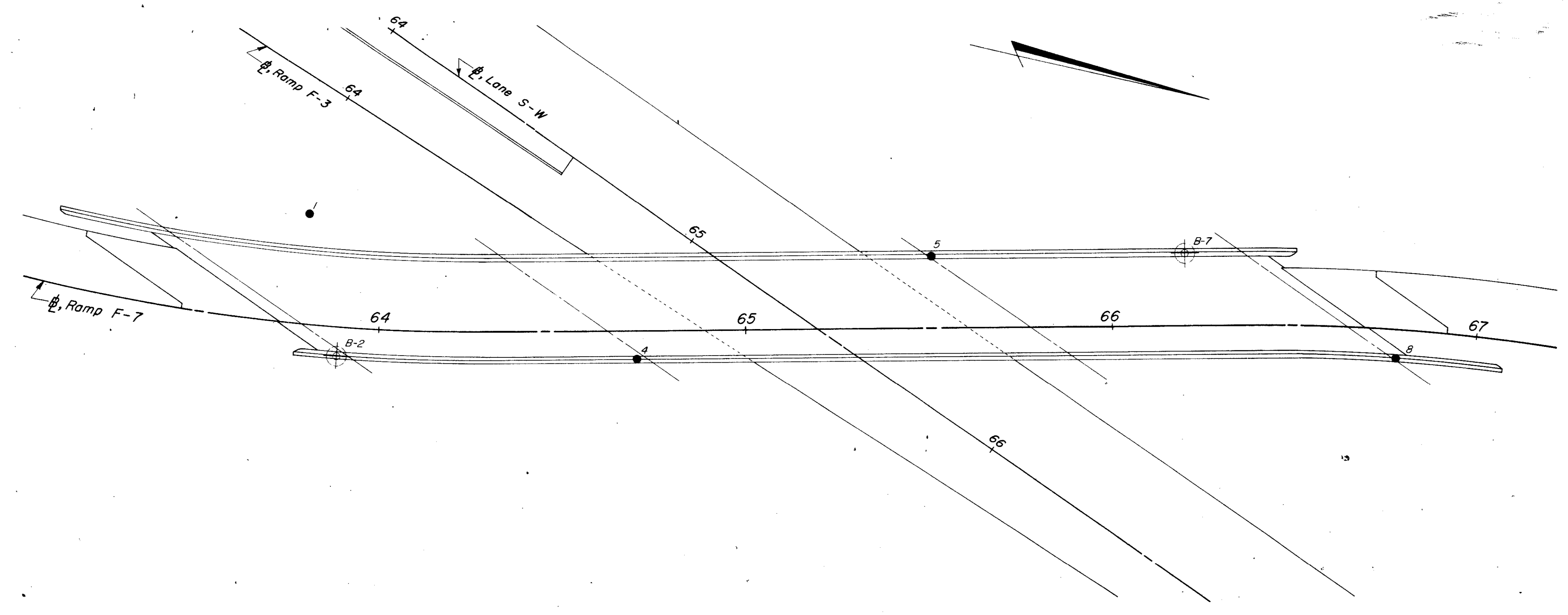


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**OHIO DEPARTMENT OF HIGHWAYS
TESTING LABORATORY**
1620 WEST BROAD STREET, COLUMBUS 23, OHIO

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. CUY-IR77-
RAMP F-7 OVER LANE S-W
SEC. CUY-IR77-6.45

CHECKED BY L.N.L. REVIEWED BY R.D.R. DATE 7/14/66



OHIO DEPARTMENT OF HIGHWAYS
TESTING LABORATORY
1620 WEST BROAD STREET, COLUMBUS 23, OHIO

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE No. CUY-IR 77-
RAMP F-7 OVER LANE S-W
SEC. CUY-IR 77-6.45

PLAN AND PROFILE

DRAWN BY R.L.D.	CHECKED BY L.N.L.	REVIEWED BY R.D.R.	DATE 7/14/66
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SCALE: 1" = 20'

LOG OF BORING
 Date Started 6-29-66 Sampler Type SS Dia. 1 3/8" Water Elev. _____
 Date Completed 7-1-66 Casing Length 30' Dia. 3 1/2" Surface Elev. 694.2'
 Boring No. B-2 Station & Offset 63+89, 8' Rt. (Rear Abutment)

Elev.	Depth	Std. Pen. (N)	Rec. ft.	Loss ft.	Description	Sample No.	Physical Characteristics							SHTL Class.			
							% Agg.	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.		W.C.		
694.2	0																
691.7	2				Gray Silt	1	0	5	9	50	36	23	4	24	A-4b		
689.2	4	1/2			Gray Silt	2	0	4	8	50	38	22	2	20	A-4b		
686.7	6	2/2			Gray Silt and Clay	3	0	2	6	25	67	33	11	26	A-6a		
684.2	8	5/6			Gray Silt and Clay	4	0	1	2	16	81	42	15	32	A-7-6		
681.7	10	4/5			Gray Silt and Clay	5	0	1	2	21	76	36	13	29	A-6a		
679.2	12	3/5			Gray Silty Clay	6	0	1	1	13	85	43	17	31	A-7-6		
676.7	14	3/5			Gray Silt and Clay	7	0	1	2	31	66	34	12	28	A-6a		
674.2	16	4/8			Gray Silt	8	0	0	2	52	46	25	6	22	A-4b		
669.2	20	6/13			Gray Silt	9	0	0	4	64	32	NP	NP	23	A-4b		
664.2	24	14/21			Gray Clayey Silt	10	0	2	4	36	58	27	8	19	A-4a		
659.2	28	7/13			Gray Silt	11	0	1	3	50	46	26	3	21	A-4b		
654.2	32	10/16			Gray Gravelly silt	12	29	3	4	24	40	26	8	19	A-4a		
649.2	36	6/11			Gray Clayey Silt	13	0	7	8	33	52	26	10	12	A-4a		
645.7	38	38* (0.6)	1.5	3.0	TOP OF ROCK												
634.2	40		4.9	0.1	Shale, gray, slightly arenaceous and argillaceous, fissile, medium-firm to firm, jointed, badly broken in top 2.0', with very few thin sandstone seams. Core Loss 1%												
	42		5.0	0.0	BOTTOM OF BORING												
	44																

LOG OF BORING
 Date Started 6-27-66 Sampler Type SS Dia. 1 3/8" Water Elev. _____
 Date Completed 6-29-66 Casing Length 25' Dia. 3 1/2" Surface Elev. 674.2'
 Boring No. B-7 Station & Offset 66+20, 20' Lt. (Forward Abutment)

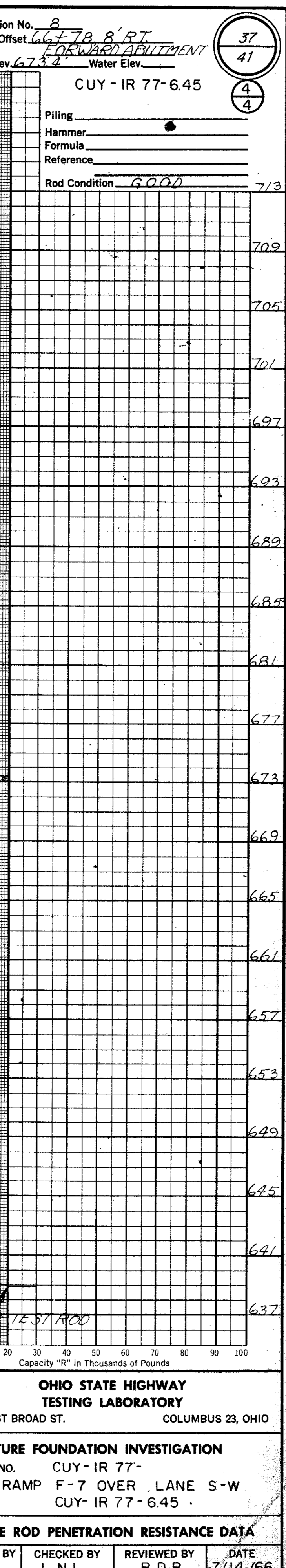
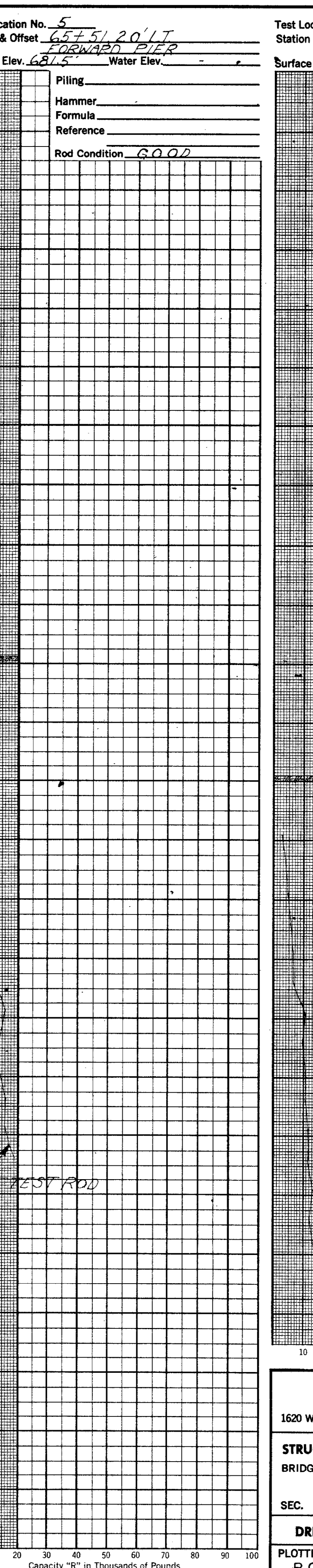
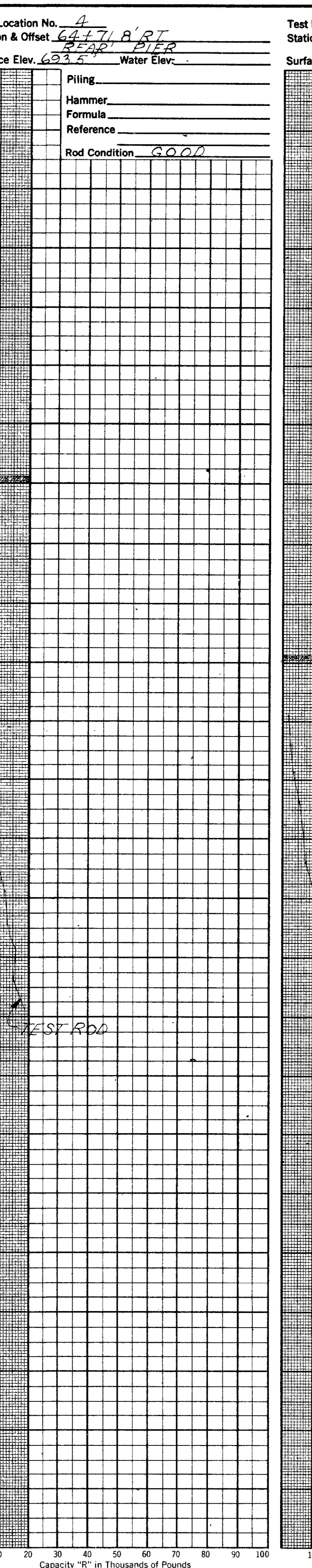
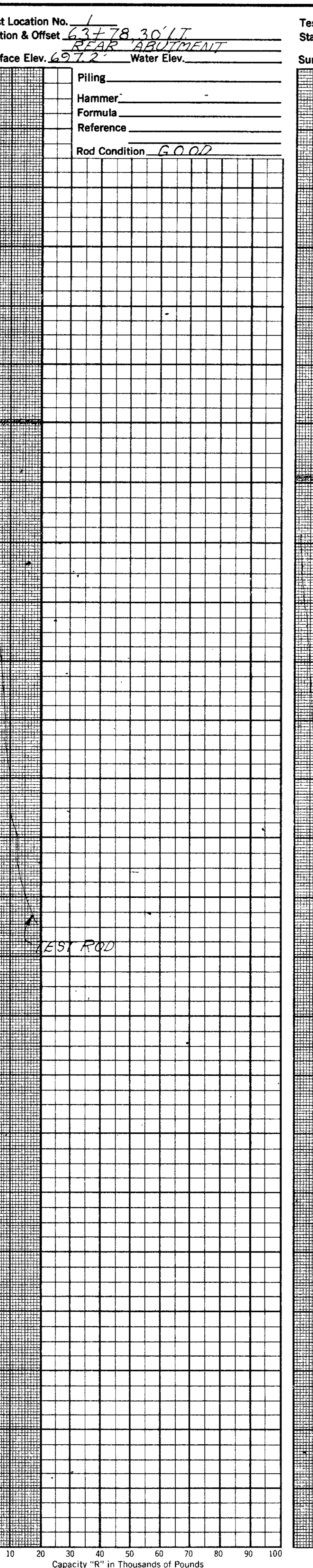
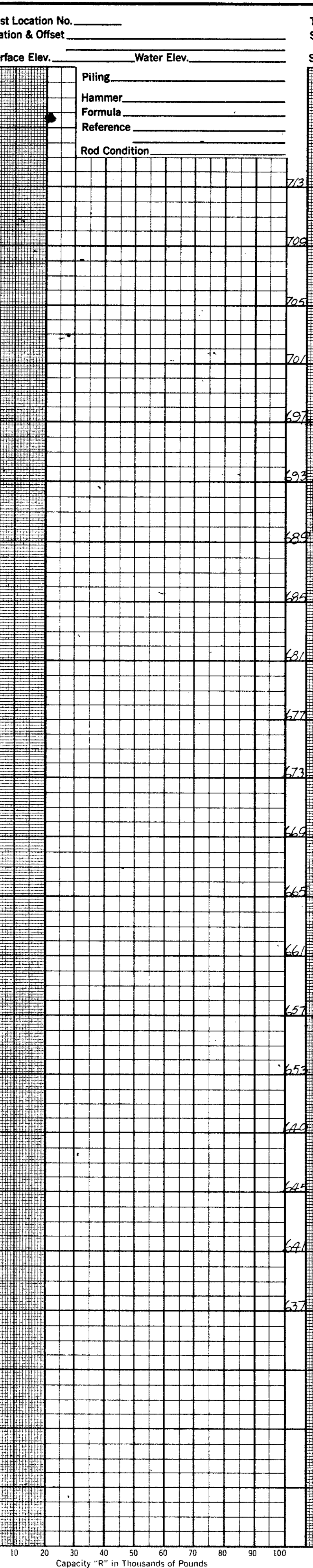
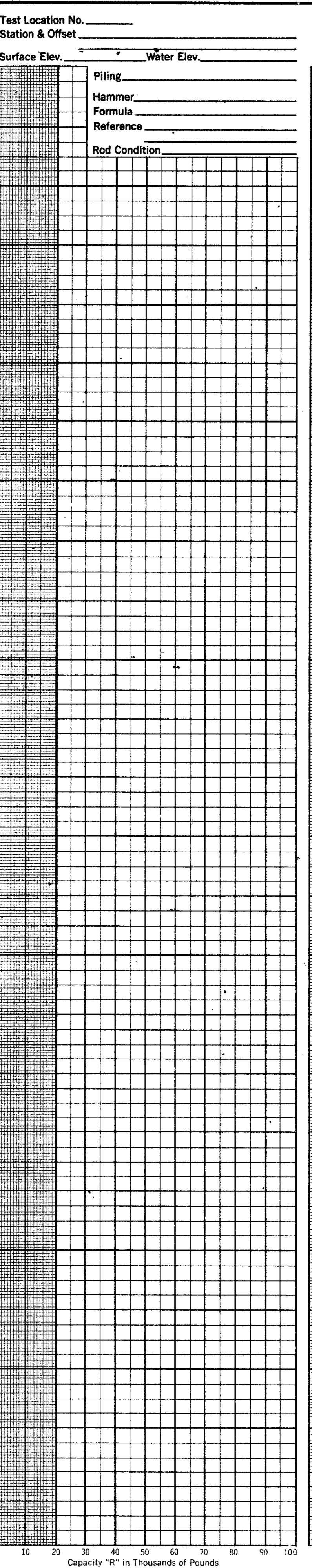
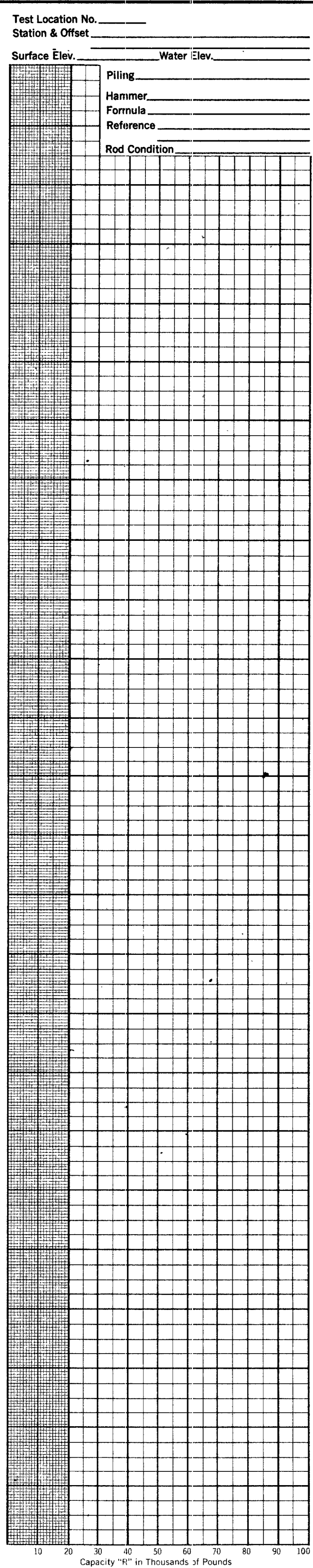
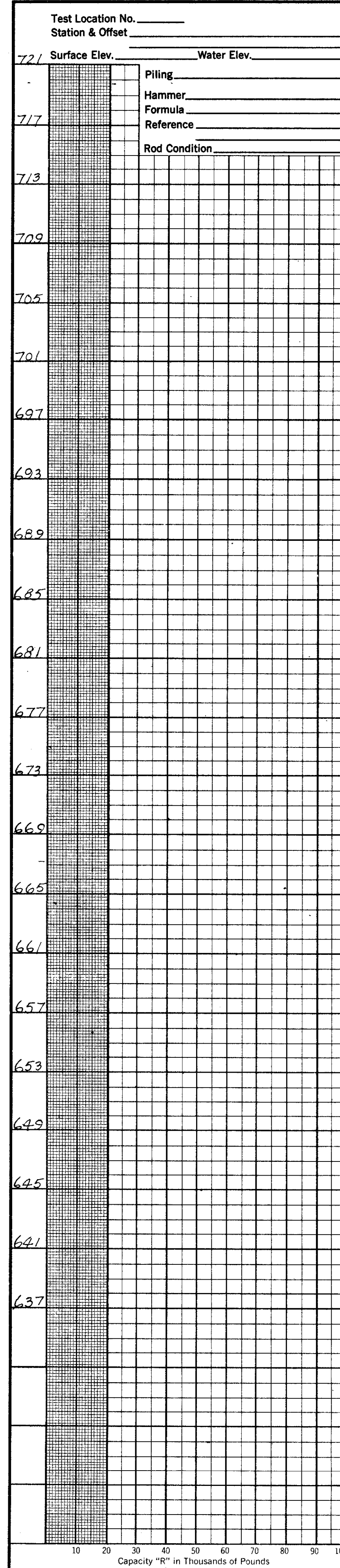
Elev.	Depth	Std. Pen. (N)	Rec. ft.	Loss ft.	Description	Sample No.	Physical Characteristics							SHTL Class.			
							% Agg.	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.		W.C.		
674.2	0																
671.7	2				Gray Silt	1	0	3	6	52	39	23	6	21	A-4b		
669.2	4	1/2			Gray Clayey Silt	2	0	1	1	40	58	26	7	33	A-4a		
666.7	6	2/2			Gray Clayey Silt	3	0	0	1	44	55	26	8	31	A-4a		
664.2	8	2/3			Gray Silt	4	0	0	2	61	37	24	4	27	A-4b		
661.7	10	6/9			Gray Silt	5	0	0	1	60	39	24	3	25	A-4b		
659.2	12	3/3			Gray Silt and Clay	6	0	2	5	19	74	33	14	28	A-6a		
656.7	14	3/5			Gray Silt and Clay	7	0	2	4	20	74	37	14	31	A-6a		
654.2	16	3/4			Gray Silt	8	0	2	16	14	68	22	5	22	A-4a		
649.2	20	11/10			Gray Silt	9	0	0	0	55	45	NP	NP	23	A-4b		
644.2	24	10/12			Gray Clayey Silt	10	0	3	7	33	57	28	8	16	A-4a		
639.2	28	15/28															
	30				TOP OF ROCK												
	32		4.3	0.7	Shale, gray, slightly arenaceous and argillaceous, poorly fissile, firm. Core Loss 10%												
629.2	34		4.7	0.3	BOTTOM OF BORING												

OHIO DEPARTMENT OF HIGHWAYS
 TESTING LABORATORY
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STRUCTURE FOUNDATION INVESTIGATION
 BRIDGE NO. CUY - IR 77 -
 RAMP F-7 OVER LANE S-W
 SEC. CUY-IR 77-6.45

BORING DATA

TYPED BY S.A.J.	CHECKED BY L.N.L.	REVIEWED BY R.D.R.	DATE 7/14/66
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37
41
4
4

OHIO STATE HIGHWAY TESTING LABORATORY
1620 WEST BROAD ST. COLUMBUS 23, OHIO

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. CUY-IR 77-
RAMP F-7 OVER LANE S-W
SEC. CUY-IR 77-6.45

DRIVE ROD PENETRATION RESISTANCE DATA

PLOTTED BY R.C.	CHECKED BY L.N.L.	REVIEWED BY R.D.R.	DATE 7/14/66
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GEOLOGY OF THE SITE

The structure site is located in a flat portion of the dissected glaciated Mississippi Valley Plain, on the sloping west valley wall of the Cuyahoga River, in an area where moderately deep glacial drift overlies shale bedrock, of Mississippian age.

EXPLORATION

The exploration consisted of two drive sample-core borings and four drive rod penetration tests, made between June 21 and 24, 1966.








INVESTIGATIONAL FINDINGS










The borings disclosed that gently sloping bedrock surface, encountered at 31-foot depth, elevation 626 feet, in the rear portion of the structure site, and 75-foot depth, elevation 611 feet, in the forward portion, is overlain by loose to dense silts and stiff clays. The borings were terminated 10 and 15 feet below bedrock surface, elevations 611 and 601 feet.

Rod soundings met rapid increase in penetration resistance with increase in depth, and with exception of sounding number 4, were terminated upon encounter with near-refusal to penetration at 30 and 35-foot depths, elevations 647 to 624 feet, considered to be in dense clayey silts, as revealed by the borings. Rod sounding number 4 terminated upon encounter with abrupt refusal to penetration at 31-foot depth, elevation 624 feet, considered to be on bedrock surface.

No free water was observed in any of the rod sounding holes.

LEGEND

-  Auger Boring Location - Plan View.
-  Press and / or Drive Sample and / or Core Boring Location - Plan View.
-  Drive Rod Penetration Resistance Sounding Location - Plan View.
-  Capped Pile
-  Footing
-  Footing on Pile
-  TR Top of Rock

-  Horizontal Bar on Boring Log Indicates the Depth the Sample Was Taken.
-  Figures Beside the Boring Log in Profile Indicate the Number of Blows for Standard Penetration Test.
X = Number of Blows for First 6 inches.
Y = Number of Blows for Second 6 inches.
-  Drive Rod Penetration Resistance Sounding Log - Profile
-  Casing
-  Resistance "R" < 10,000 lbs.
-  Resistance "R" > 10,000 lbs.
-  Z Indicates Final Measurement of Penetration, in Inches.
-  W Indicates Free Water Elevation.
-  Indicates Static Water Elevation.

SYMBOLS OF ROCK TYPES

- | | | | |
|---|--------------------------|---|---------------------|
|  | Coal |  | Weathered Sandstone |
|  | Weathered Indurated Clay |  | Sandstone |
|  | Indurated Clay |  | Leached Dolomite |
|  | Weathered Shale |  | Dolomite |
|  | Shale |  | Leached Limestone |
|  | |  | Limestone |

GENERAL INFORMATION

Drive Rod Penetration Sounding Tests

Drive rod penetration resistance tests constitute driving a 1.315-inch diameter steel rod, with a 45° cone point, into the ground, using a 122-pound drop-hammer with a free fall of five feet. At one or two-foot depth intervals, a measurement is taken to determine the amount of penetration achieved in three hammer drops. This reading is converted to an empirical value for capacity "R", in thousands of pounds (which is a measure of both the point resistance and frictional resistance on the rod), by using charts prepared by the Ohio Department of Highways, Bureau of Bridges, on the basis of correlation study of rod penetration with past performance of pile driving. For interpretation, a graph is prepared by plotting the value "R" against the depth at which the reading was taken, and connecting the plotted points. The curve so obtained reflects the density of subsurface materials in a manner that can be readily compared with data from similar tests at other locations on the structure site. From this comparison, the overall uniformity of subsurface condition may be evaluated.

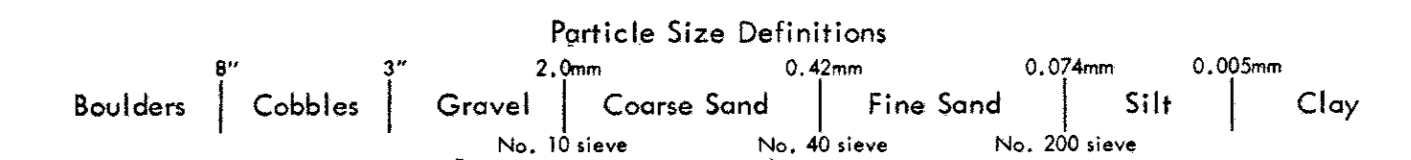
Drive Sample Borings - Drive-Press Sample Borings

Drive sample borings are made by means of a rotary-type drill rig, employing a 2" O.D., 1-3/8" I.D. sampler, at 2-1/2 and / or 5-foot depth intervals, driven by means of a 140 - pound drop-hammer with a free fall of 30 inches. The number of blows required to drive the sampler 12 inches is considered the standard penetration test.

Drive-press sample borings are made by means of a rotary-type drill rig, employing a 2" O.D., 1-3/8" I.D. drive sampler, and 3" O.D. thin-wall press sampler. The press sampler is advanced by continuous uniform pressure, applied by the drill rig.

The boring log sheets show a graphic plot of the information obtained, including depth and elevation of the sample, number of blows for the standard penetration tests in two 6-inch increments, depth of press samples, field sample number, sample description - based on laboratory tests and the Casagrande AC classification system - and gradation, plasticity, and moisture content determinations. Results of strength and consolidation testing, if performed, appear on separate enclosures.

At depths where materials are bouldery or gravelly to the extent that the sampler can not be driven, a wash sample is procured for visual classification, in order to determine the general character of the material. These samples are not considered sufficiently representative to warrant laboratory testing.

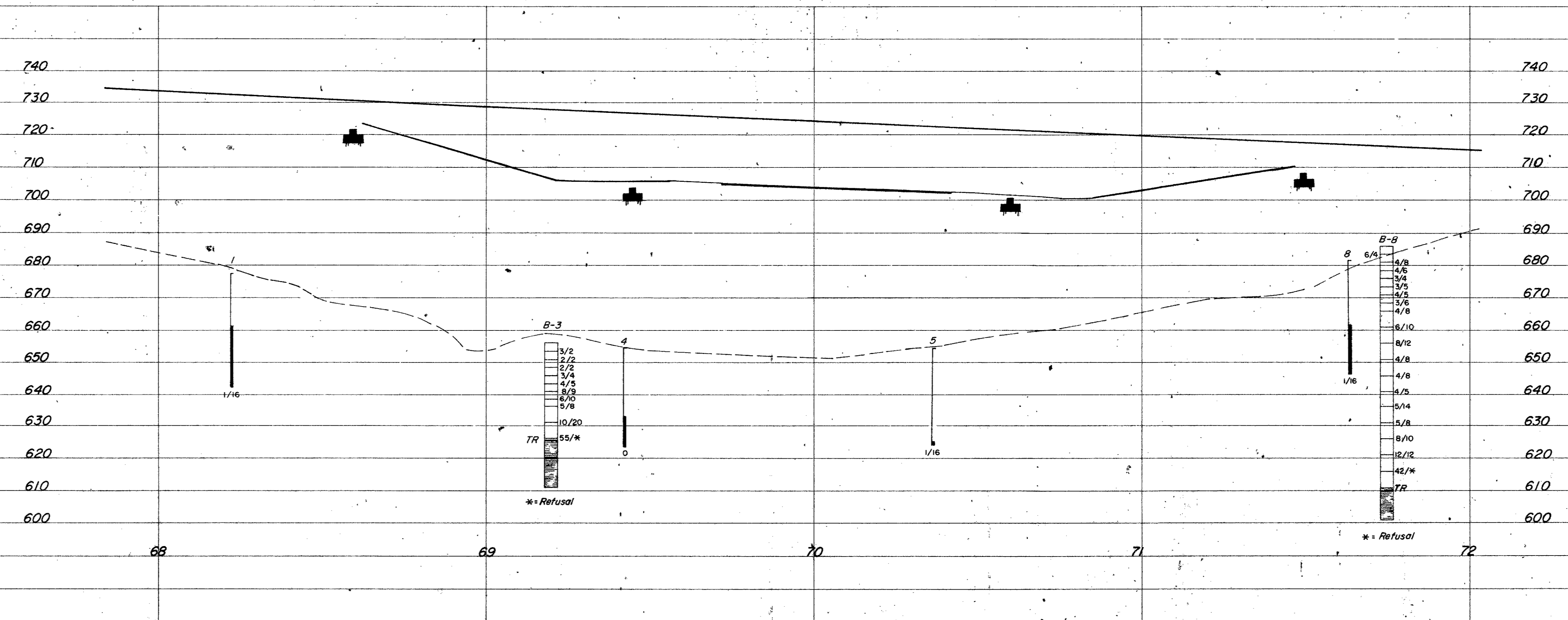
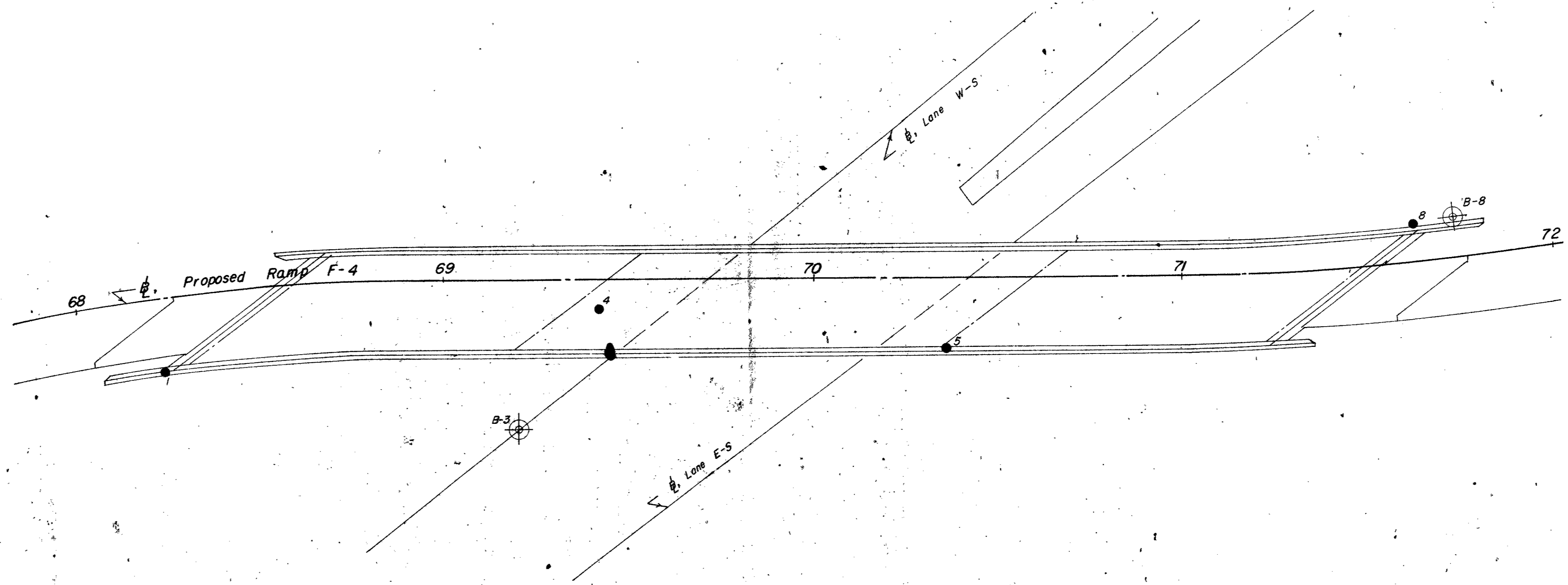


NOTE: Information shown by this subsurface investigation was obtained solely for the use in establishing design controls for the project. The State of Ohio does not guarantee the accuracy of this data and it is not to be construed as a part of the plans governing construction of the project.

OHIO DEPARTMENT OF HIGHWAYS
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RAMP F-4 OVER LANE, E-S
SEC. CUY-IR 77-6.45

CHECKED BY R.H.P.	REVIEWED BY R.D.R.	DATE 7/26/66
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OHIO DEPARTMENT OF HIGHWAYS
TESTING LABORATORY
1620 WEST BROAD STREET, COLUMBUS 23, OHIO

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SEC. CUY-IR 77-6.45

PLAN AND PROFILE

DRAWN BY R.L.F.	CHECKED BY R.H.P.	REVIEWED BY R.D.R.	DATE 7/26/66
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SCALE: 1"=20'

LOG OF BORING

Date Started: 6-21-66 Sampler Type: SS Dia: 1 3/8" Water Elev. _____
 Date Completed: 6-22-66 Casing Length: 25' Dia: 1 1/2" _____
 Boring No.: B-3 Station & Offset: 69+20, 41' Rt. (Rear Pier) Surface Elev. 656.1'

Elev.	Depth	Sht. Pen. (ft.)	Rec. ft.	Loss ft.	Description	Sample No.	Physical Characteristics							SHTL Class.			
							% Agg.	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.		W.C.		
656.1	0																
653.6	2																
651.1	4	3/2			Gray Clayey Silt	1	0	4	6	65	25	31	8	30			A-4b
648.6	6	2/2			Gray Sandy Clay, Slightly Organic	2	0	11	22	53	14	43	17	39			A-7-6
646.1	8	2/2			Gray Sandy Clay	3	0	10	18	55	17	47	15	42			A-7-6
643.6	10	3/4			Gray Clayey Silt	4	0	1	2	42	55	29	9	23			A-4a
641.1	12	4/5			Gray Silty Clay	5	0	1	3	27	69	44	19	29			A-7-6
638.6	14	8/9			Gray Clayey Silt	6	0	3	9	43	45	27	9	31			A-4a
636.1	16	6/10			Gray Clayey Silt	7	5	2	5	44	44	29	10	23			A-4a
631.1	18	5/8			Gray Clayey Silt	8	0	2	2	49	47	28	7	28			A-4a
626.1	20	10/20			Gray Clay with Shale Fragments	9	13	5	6	32	44	31	11	18			A-6a
625.6	22	55/0			Gray Clay with Shale Fragments	10	51	6	2	24	17	29	7	14			A-4a
	24				TOP OF ROCK												
	32		3.0	1.5	Shale, gray, argillaceous, fissile, medium-firm, jointed and broken, with few clay seams. Core Loss 14%												
	34																
	36		4.6	0.4													
	38																
	40																
	42		4.8	0.2													
611.1	44				BOTTOM OF BORING												

LOG OF BORING

Date Started: 6-22-66 Sampler Type: SS Dia: 1 3/8" Water Elev. _____
 Date Completed: 6-24-66 Casing Length: _____ Dia: _____ _____
 Boring No.: B-8 Station & Offset: 71+75, 11' Lt. (Forward Abutment) Surface Elev. 656.0'

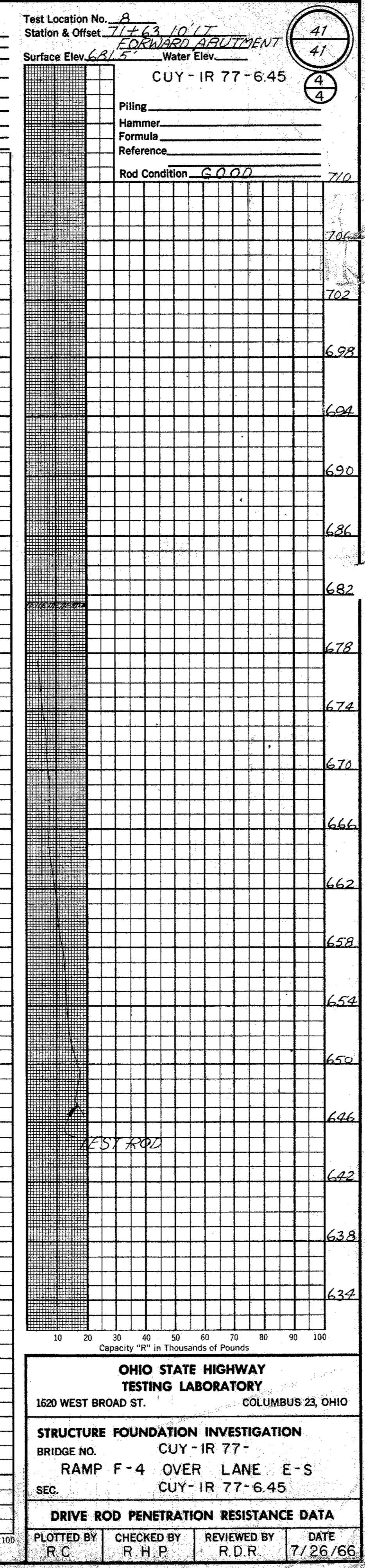
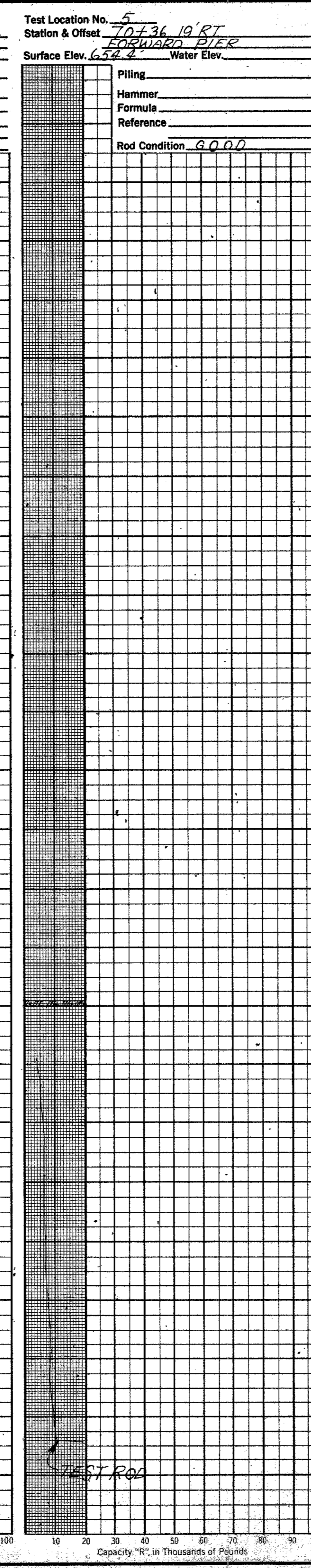
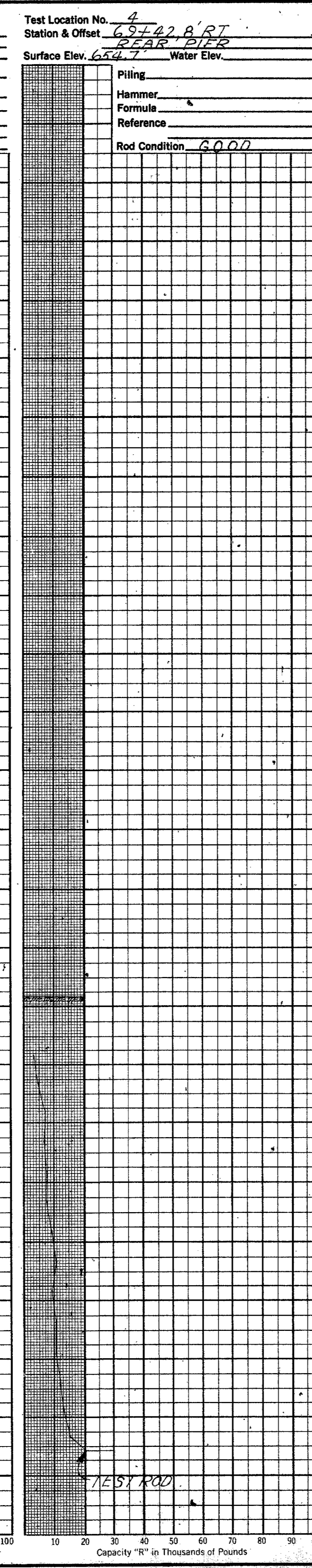
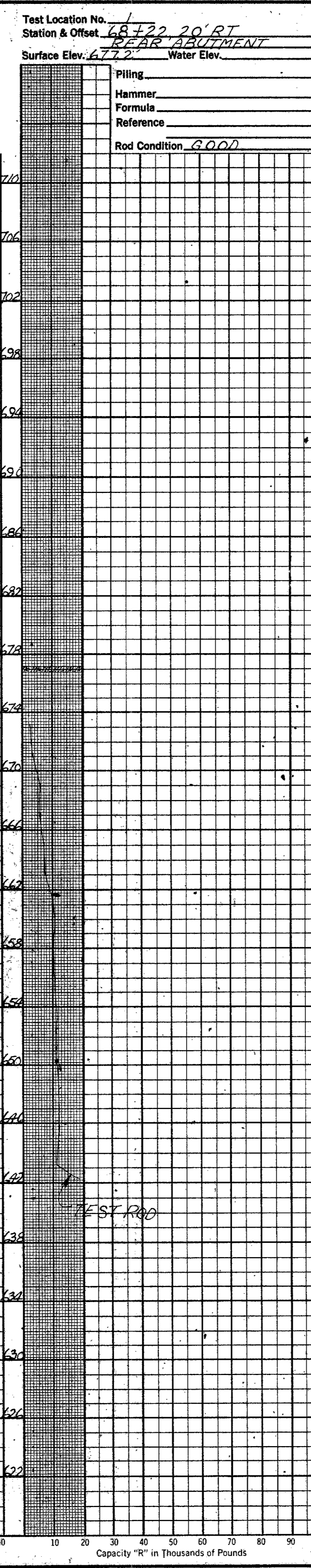
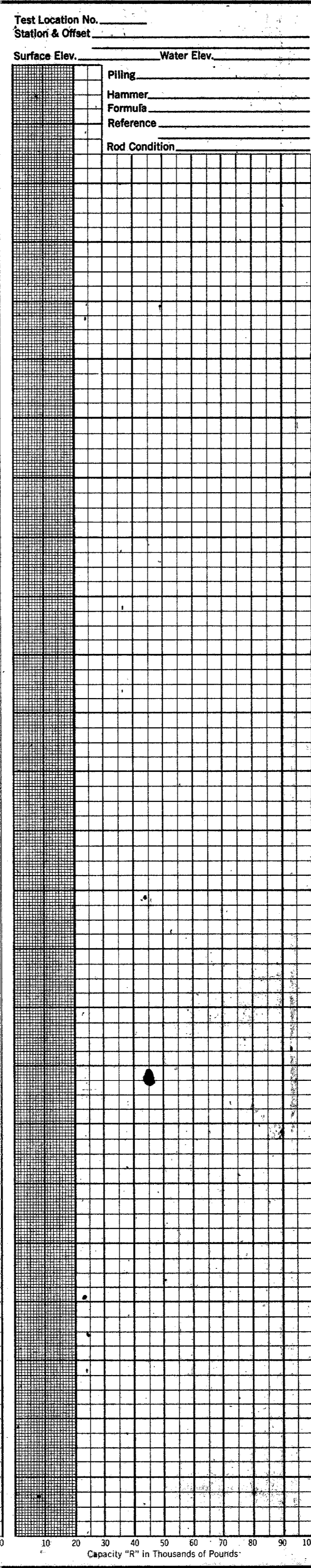
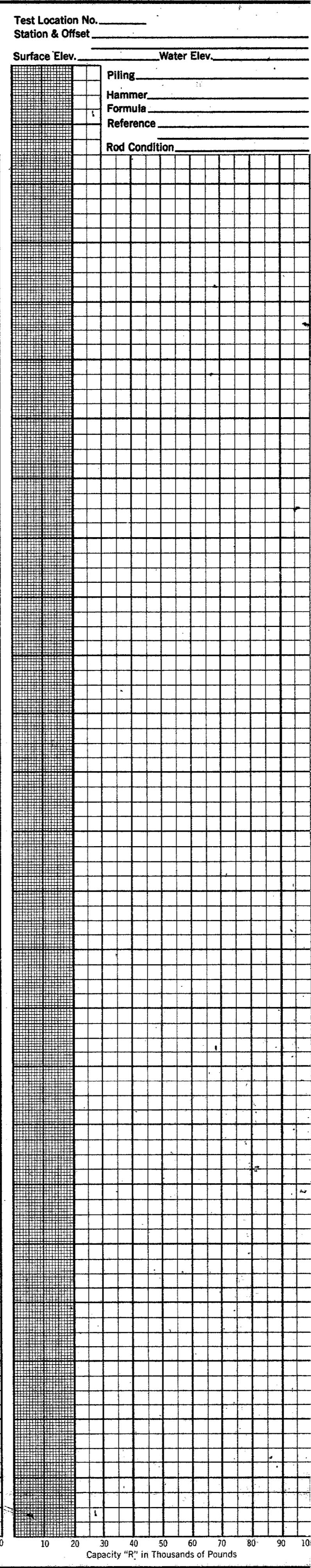
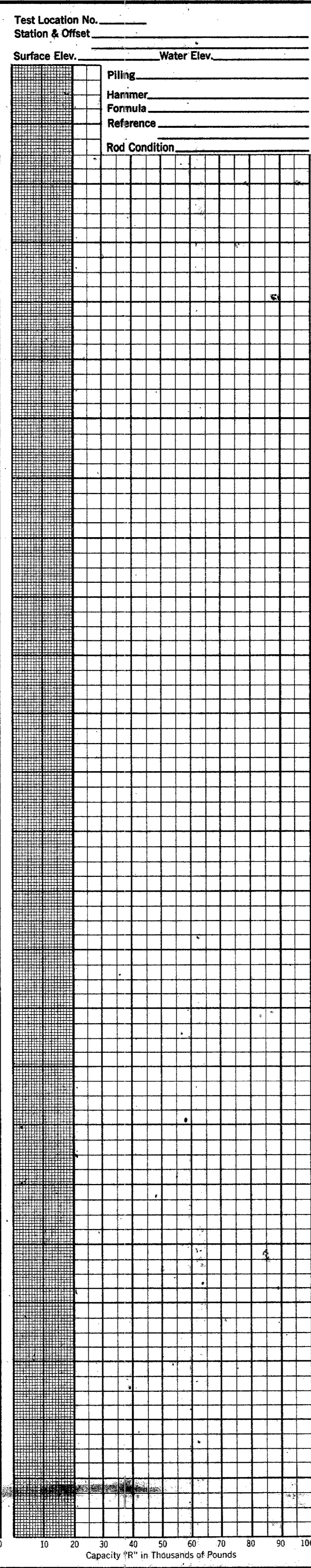
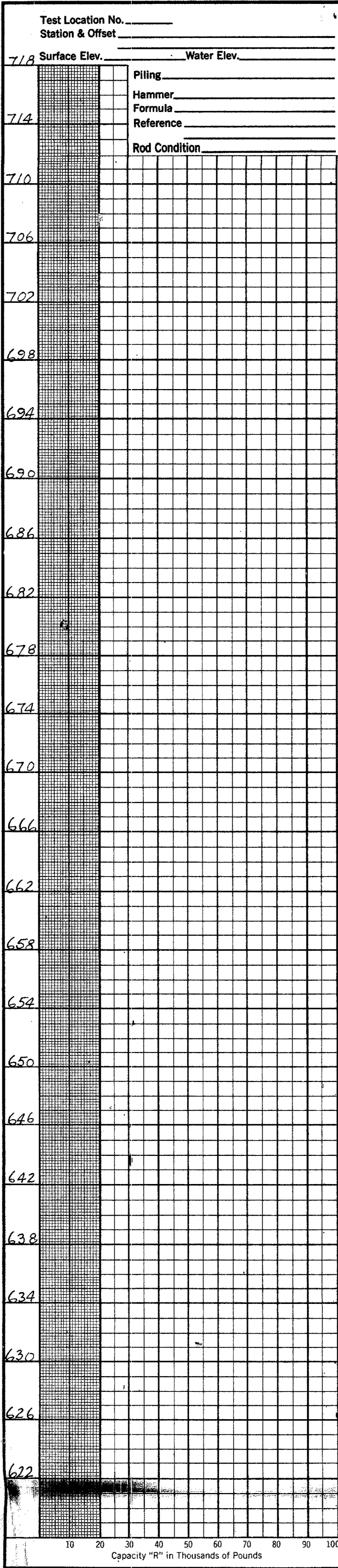
Elev.	Depth	Sht. Pen. (ft.)	Rec. ft.	Loss ft.	Description	Sample No.	Physical Characteristics							SHTL Class.			
							% Agg.	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.		W.C.		
656.0	0																
653.5	2																
651.0	4	6/4			Brownish-Gray Silt	1	0	0	1	70	29	28	5	32			A-4b
648.5	6	4/8			Brownish-Gray Clayey Silt	2	0	2	6	50	42	30	9	21			A-4b
646.0	8	4/6			Brownish-Gray Clayey Silt	3	0	5	11	47	37	26	7	16			A-4a
643.5	10	3/4			Brownish-Gray Silt and Clay	4	0	1	2	20	77	39	14	29			A-6a
641.0	12	3/5			Gray Silty Clay	5	0	1	3	22	74	39	16	31			A-6b
638.5	14	4/5			Gray Silty Clay	6	0	1	1	21	77	42	16	29			A-7-6
636.0	16	3/6			Gray Silty Clay	7	0	0	0	15	85	48	19	33			A-7-6
633.5	18	4/8			Gray Silt and Clay	8	0	1	2	37	60	34	11	28			A-6a
631.0	20	6/10			Gray Clayey Silt	9	0	0	0	47	53	31	9	27			A-4a
628.5	22	8/12			Gray Clayey Silt	10	0	0	0	58	42	29	8	29			A-4b
626.0	24	4/8			Gray Clayey Silt	11	0	0	0	37	63	29	8	30			A-4a
623.5	26	4/8			Gray Silty Clay	12	0	0	1	33	46	43	19	26			A-7-6
621.0	28	4/5			Gray Clay	13	0	0	1	25	74	48	23	31			A-7-6
618.5	30	5/14			Gray Silt	14	0	0	1	70	29	NP	NP	22			A-4b
616.0	32	5/8			Gray Silt and Clay	15	0	1	2	39	58	36	11	26			A-6a
613.5	34	8/10			Gray Silt and Clay	16	0	5	6	37	52	32	12	19			A-6a
611.0	36	12/12			Gray Clayey Silt	17	0	7	8	34	51	29	9	18			A-4a
608.5	38	42/5			Gray Clay with Shale Fragments	18	22	6	4	40	28	27	7	8			A-4a
606.0	40	1.6	2.9		Gray silty clay and Stone Fragments.												
	42				TOP OF ROCK												
	44		5.0	0.0	Shale, dark gray, slightly carbonaceous, fissile, medium-firm. Core Loss 3%												
	46																
	48																
	50		4.7	0.3													
601.0	52				BOTTOM OF BORING												

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BORING DATA

TYPED BY S.A.J.	CHECKED BY R.H.P.	REVIEWED BY R.D.R.	DATE 7/26/66
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41
41
4
4

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DRIVE ROD PENETRATION RESISTANCE DATA

PLOTTED BY R.C.	CHECKED BY R.H.P.	REVIEWED BY R.D.R.	DATE 7/26/66
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