TE-05 (FORMERLY TE-54-A)
2000-10-01

GENERAL INFORMATION

INTRODUCTION

The project consists of the relocation of SR 18, approximately 3 miles in length, beginning at the west shore of the Meander Reservoir 4500 feet north of existing SR 18, extending eastward, terminating approximately 2200 feet east of SR 46. Also included in this report are the profiles of Turner, Ohltown Roads, SR 46, Interchange, and associated ramps.

The proposed grade indicates the following:

Mainline (SR 18) - cuts, maximum 10 feet in depth; fill embankments, maximum 30 feet in height.

Turner Road - cut, maximum 17 feet in depth.

Ohltown Road - cut, maximum 6 feet in depth.

SR 46 Interchange

SR 46 - fill embankment, maximum 19 feet in height.

Ramp A - fill embankment, maximum 10 feet in height.

Ramp B - cut, maximum 12 feet in depth

Ramp C - fill embankment, maximum 23 feet in height

Ramp D - cut, maximum 6 feet in depth; fill embankment, maximum 15 feet in height.

EXPLORATION

The exploration was made by means of truck-mounted mechanical soil auger and hand auger (in areas of difficult access), during May and August, 1962 and February, May, and June, 1963. Also included in this report are the logs of borings made in conjunction with an investigation across Meander Creek Reservoir, and structure foundation investigations along the project.

GEOLOGY AND OBSERVATIONS OF THE PROJECT

The project is located on the gently rolling, glaciated Allegheny Plateau Region. The alignment begins on the west shore of the Meander Reservoir crosses the Reservoir, and terminates in the uplands east of the valley. Several areas of poor surface drainage and spring horizons were observed along the project. Moderately deep to shallow glacial-derived soil and deep alluvium, overlie bedrock, of lower Pennsylvanian and Upper Mississippian ages.

INVESTIGATIONAL DISCLOSURES

Mainline (SR 18)

Materials occurring immediately below proposed grade consist predominantly of silt clays and clays, in the A-6 classification, generally having moisture contents in the lower portions of the plastic range, as well as shale, sandstone, and indurated clay bedrock.

Bedrock is anticipated to be encountered in the following areas of excavation:

Stations 653+00 and 659+00 - possible shale at grade and in the ditches.

Borings disclose materials occurring in the embankment foundation areas are predominantly comprised of sandy silts and silt clays, in the A-4a and A-6a classifications, having moisture contents in the lower portion of the plastic range, however, generally wet and unstratified with intervals of gravels, sands, and silt in the immediate vicinity of the reservoir.

Turner Road

Borings disclose that materials occurring immediately below proposed grade consist predominantly of shale bedrock, anticipated in the excavation at grade and in the backslopes between approximately stations 42+00 and 52+00. Random fill, consisting of cinders, ashes, and stone fragments was encountered at station 52+50. Frost susceptible silt, in the A-4b classification, was encountered at station 54+60.

Ohltown Road

Materials occurring at proposed grade, in the ditches, and lower portions of the backslopes consist of sandstone and shale bedrock.

SR 46 Interchange

SR 46, Ramp A, B, C, D, and E - Materials occurring immediately below grade consist predominantly of sandy silts and silts, in the A-4 classification, generally having moisture contents in the lower portion of the plastic range, as well as sandstone and shale bedrock, anticipated to occur at the following excavation areas:

Ramp B - stations 5+00 to ~~8+50~~ 10+50

~~Ramp B - stations 8+50 to 10+50~~

Ramp E - stations 0+00 to 7+00

Frost susceptible silts were encountered at stations 35+50, SR 46; station 12+00, Ramp D.

LEGEND FOR PROJECT-AVERAGE RESULTS OF TESTS- 372 SAMPLES TESTED

DESCRIPTION	H. R. B. CLASS	OHIO CLASS	% AGG.	% C. SAND	% F. SAND	% SILT	% CLAY	LIQUID LIMIT	PLASTICITY INDEX	WATER CONTENT	SAMPLES TESTED
Stone fragments	A-1-a(0)	A-1-a	83	1	2	7	7	NP	NP	12	1
Gravel and/or stone fragments with sand	A-1-b(0)	A-1-b	56	10	13	12	9	25	1	15	5
Coarse and fine sand	-------	A-3a	13	17	36	25	9	NP	NP	9	1
Stone fragments with sand and silt	A-2-4(0)	A-2-4	44	8	18	15	5	24	6	15	7
Sandy silt	A-4(8)	A-4a	24	7	17	29	23	24	5	16	58
Silt	A-4(8)	A-4b	1	2	7	61	29	27	8	21	21
Silt and clay	A-6(9)	A-6a	11	3	8	33	45	32	12	19	150
Silty clay	A-6(11)	A-6b	12	2	6	30	50	38	17	21	21
Elastic clay	A-7-5(17)	A-7-5	7	1	3	29	60	57	23	32	6
Clay	A-7-6(12)	A-7-6	7	2	5	27	59	44	19	23	21
Random fill			VISUAL CLASSIFICATION								-
Weathered indurated clay			VISUAL CLASSIFICATION								3
Weathered shale			VISUAL CLASSIFICATION								51
Weathered sandstone			VISUAL CLASSIFICATION								17
Shale			VISUAL CLASSIFICATION								8
Sandstone			VISUAL CLASSIFICATION								2
Various other materials			VISUAL CLASSIFICATION								-

Sod and/or Topsoil -X'-Approximate depth.

Berm material.

Auger boring - plan view.

Drive sample and/or press and/or core boring

Auger boring plotted to vertical scale only.

Drive sample and/or press and/or core boring plotted to vertical scale only.

Number of blows for "Standard Penetration" test.
X=number of blows for the first 6 inches.
Y=number of blows for the second 6 inches.

Water content nearly equal to or greater than liquid limit.

Indicates a non-plastic material with high water content.

Free water.

Static water level.

B — Indicates broken rock interval.

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

SOIL PROFILE

MAHONING COUNTY

MAH-18-2.85 (7.82)

OHIO STATE HIGHWAY TESTING LABORATORY

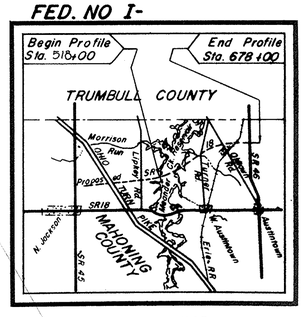
1620 W. BROAD ST., COLUMBUS 23, OHIO

1/33

33

NOTE: INFORMATION SHOWN BY THIS SUBGRADE PROFILE WAS OBTAINED SOLELY FOR 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.

FED. NO I-



LOCATION MAP

Recon - N.P.L. - 2/4/63

Drilling
Auger - J.M.M., K.D.E., L.M.D., R.L.J., F.D.C., J.A.G.
5/3/62, 8/8/62 to 8/9/62, 8/21/62, 2/13/63 to 2/14/63, 5/22/63 to 5/24/63, 6/3/63 to 6/5/63

Drafting - A.F., C.L.I., E.A., S.J.H.
7/9/63

TE 94-A
100-10-60

SOIL PROFILE
MAHONING COUNTY
MAH-18-9.89 (7.82)

OHIO STATE HIGHWAY TESTING LABORATORY
COLUMBUS OHIO

SUMMARY OF SOIL TEST DATA

NOTE: NP shown in Liquid Limit and Plasticity Index columns indicates that the material is non-plastic.
*Denotes sample taken at or near grade.

MAH-18-7.01

MAINLINE

Station	Offset	Depth From-To	% Agg.	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	% W.C.	SHTL Class.
417+00	CL	0.5-1.5	0	2	8	53	37	26	7	19	A-4b
		1.5-4.0	Gray Weathered Sandstone							9	Visual
420+00	CL	0.5-2.0	33	2	3	26	31	33	13	18	A-6a
		2.0-4.0	Gray Weathered Sandstone							9	Visual
423+00	CL	0.5-1.5	0	3	8	42	47	31	12	23	A-6a
		1.5-4.5	29	3	8	28	32	25	11	16	A-6a
		4.5-6.5	Gray Broken Shale							11	Visual
426+50	CL	0.5-2.0	25	4	8	32	31	32	13	27	A-6a
		2.0-4.5	Gray Weathered Sandstone							12	Visual
428+00	CL	0.5-1.5	24	2	6	34	34	35	11	25	A-6a
		1.5-4.0	21	3	8	31	37	28	11	15	A-6a
		4.0-10.0	Gray Weathered Shale							6	Visual
		10.0-11.0	Gray Weathered Shale							7	Visual
431+00	CL	0.5-5.0	0	4	9	40	47	32	11	18	A-6a
		5.0-8.0	Gray Weathered Shale							10	Visual
434+00	CL	0.5-4.5	0	2	8	43	47	30	11	19	A-6a
		4.5-9.0	Gray Weathered Shale							9	Visual
		9.0-12.0	Gray Weathered Shale							7	Visual
437+00	CL	0.5-1.5	0	3	9	39	49	35	18	21	A-6b
		1.5-9.0	Gray Weathered Shale							7	Visual
		9.0-11.0	Gray Weathered Shale							8	Visual
440+00	CL	0.6-5.0	21	3	8	35	33	28	12	15	A-6a
		5.0-6.0	27	8	9	31	25	23	3	16	A-4a
		6.0-8.5	Gray Weathered Shale							8	Visual
442+00	CL	0.6-2.0	45	2	6	22	25	38	21	21	A-6b
		2.0-4.0	27	3	7	28	35	27	11	14	A-6a
		4.0-6.0	23	4	9	38	26	24	5	15	A-4a
		6.0-8.0	14	3	14	45	24	NP	NP	17	A-4a
		8.0-10.0	Gray Broken Shale							8	Visual
		10.0-14.0	Gray Broken Shale							15	Visual
445+00	CL	0.5-2.0	0	3	9	38	50	28	13	16	A-6a
		2.0-4.5	29	2	7	29	33	28	11	13	A-6a
		4.5-8.0	Gray Weathered Shale							7	Visual
		8.0-14.0	Gray Weathered Shale							6	Visual
447+00	CL	0.5-2.0	25	2	8	23	36	32	13	22	A-6a
		2.0-7.0	Gray Weathered Shale							9	Visual
		7.0-11.0	Gray Weathered Shale							9	Visual
450+00	CL	0.5-2.0	26	2	8	28	36	35	15	18	A-6a
		2.0-4.0	Gray Broken Shale							19	Visual
		4.0-5.0	Gray Weathered Shale							16	Visual
		5.0-10.0	Gray Weathered Shale							8	Visual
453+00	CL	0.5-3.0	30	2	6	32	30	31	14	22	A-6a
457+00	CL	0.5-5.0	0	3	9	26	62	43	19	24	A-7-6
		5.0-10.5	12	3	7	29	49	30	11	14	A-6a
		10.5-14.0	24	5	14	34	23	19	4	22	A-4a
		14.0-17.0	35	5	10	27	23	20	5	15	A-4a *
460+00	CL	0.5-4.0	24	2	6	28	40	38	19	23	A-6b
		4.0-11.0	18	4	8	31	39	28	11	17	A-6a
		11.0-16.5	11	7	29	24	29	NP	NP	22	A-4a *
		16.5-20.0	52	6	13	20	9	NP	NP	13	A-2-4
463+00	CL	0.8-5.0	16	5	20	22	37	35	17	29	A-6b
		5.0-8.5	15	3	8	32	42	32	14	25	A-6a *
465+10	CL	1.2-5.0	21	8	20	24	27	23	5	20	A-4a
		5.0-7.0	16	6	16	31	31	21	5	14	A-4a *
465+25	15'Lt	0.4-5.0	15	5	8	33	39	30	11	21	A-6a
		5.0-8.0	22	6	11	30	31	28	11	15	A-6a
		8.0-12.0	0	2	14	57	27	NP	NP	16	A-4b *
		12.0-16.5	25	6	18	28	23	NP	NP	15	A-4a
469+00	CL	1.0-4.0	17	5	13	37	28	25	7	13	A-4a *
		4.0-5.5	Gray Stone Fragments							-	Visual *
470+00	CL	0.3-5.0	0	3	8	39	50	38	13	14	A-6a
		5.0-9.0	40	4	8	28	20	26	7	13	A-4a
472+00	CL	0.3-2.5	15	6	16	28	35	28	11	15	A-6a
		2.5-8.0	12	3	8	35	42	32	12	15	A-6a
		8.0-10.5	Gray Weathered Shale							9	Visual
		10.5-11.5	Gray Weathered Shale							7	Visual
475+00	CL	1.2-4.0	0	1	12	44	43	31	11	24	A-6a *
475+00	50'Rt	1.5-3.0	Gray Broken Shale							17	Visual
476+50	CL	0.0-3.0	32	5	11	24	28	31	11	19	A-6a
		3.0-6.0	Gray Weathered Shale							13	Visual
		6.0-11.5	Gray Weathered Shale							9	Visual
480+00	CL	0.3-3.0	29	4	8	21	38	37	15	20	A-6a
		3.0-6.0	44	9	14	13	20	27	10	16	A-2-4
		6.0-9.0	Gray Weathered Shale							7	Visual *
483+00	CL	0.3-3.0	32	5	11	21	31	31	11	17	A-6a
		3.0-8.0	Gray Weathered Shale							13	Visual *
		8.0-9.5	Gray Weathered Shale							8	Visual
487+00	CL	0.3-3.0	19	3	8	33	37	28	11	20	A-6a
		3.0-7.5	22	3	8	31	36	29	11	14	A-6a
		7.5-9.5	83	1	2	7	7	NP	NP	12	A-1-a
491+60	CL	0.2-4.0	0	2	6	33	59	37	15	20	[illegible]
		4.0-8.0	0	4	7	32	57	35	13	15	A-6a
		8.0-12.0	0	4	53	23	20	NP	NP	19	A-4a
		12.0-14.5	14	7	21	34	24	NP	NP	14	A-4a
495+85	CL	0.4-5.0	13	3	6	31	47	38	18	18	A-6b
		5.0-11.0	10	6	15	34	35	23	6	14	A-4a
		11.0-16.0	7	3	9	52	29	22	4	18	A-4b
		16.0-20.0	21	7	16	33	23	NP	NP	16	A-4a
		20.0-22.0	36	7	11	23	18	20	1	13	A-4a
499+00	30'Lt	0.0-2.0	0	2	7	51	40	30	18	20	A-6a
		2.0-7.0	4	3	7	20	66	34	13	16	A-6a
		7.0-14.0	0	1	1	34	64	35	14	19	A-6a
		14.0-18.0	3	5	9	40	43	24	11	13	A-6a
		18.0-20.0	0	1	13	63	23	NP	NP	17	A-4b
502+00	CL	0.0-5.0	[illegible]	2	3	34	40	33	12	14	A-6a
		5.0-10.0	0	1	1	35	63	35	15	16	A-6a
		10.0-14.0	0	0	0	34	66	43	18	21	A-7-6
		14.0-20.0	0	1	1	25	73	38	14	22	A-6a
		20.0-22.0	0	3	7	36	54	25	11	17	A-6a
		22.0-28.0	29	5	11	42	13	NP	NP	11	A-4a
505+15	20'Rt.	0.0-5.0	21	5	15	35	24	23	4	12	A-4a
		5.0-10.0	0	3	32	28	37	25	5	17	A-4a
		10.0-15.0	0	1	3	26	70	38	17	28	A-6b
		15.0-20.0	0	2	7	38	53	28	11	20	A-6a
		20.0-24.0	0	2	5	32	61	33	11	37	A-6a
		24.0-29.0	0	7	19	44	30	13	1	13	A-4a
508+00	CL	0.0-5.0	0	1	5	33	61	35	14	15	A-6a
		5.0-11.0	0	1	3	47	49	35	12	19	A-6a
		11.0-17.0	0	2	4	49	45	29	11	20	A-6a
		17.0-20.0	0	1	3	42	54	34	12	21	A-6a
		20.0-24.0	0	2	9	50	39	20	2	23	A-4b
		24.0-30.0	16	5	12	46	21	19	1	8	A-4a
512+00	CL	0.0-4.0	0	2	6	63	29	NP	NP	21	A-4b *
		4.0-8.0	0	36	22	10	32	35	10	20	A-4a
515+20	CL	0.8-5.0	18	21	19	16	26	30	12	23	A-6a *
		5.0-9.0	0	2	2	18	78	44	16	32	A-7-6
517+50	CL	0.5-4.5	0	1	3	20	76	35	52	64	A-7-5 *
		4.5-9.0	0	0	1	41	58	54	23	26	A-7-5
520+00	CL	0.0-4.0	34	11	13	22	20	NP	NP	13	A-4a
		4.0-8.5	45	16	17	9	13	22	8	20	A-2-4
546+58	115'Rt	0.0-5.0	19	4	17	25	35	28	11	12	A-6a
		5.0-9.0	0	4	6	30	60	34	11	12	A-6a
		9.0-15.0	0	1	2	26	71	44	17	19	A 7-6
		15.0-20.0	0	1	3	33	63	38	17	22	A-6b
		20.0-25.0	0	2	4	33	61	34	13	24	A-6a
		25.0-30.0	0	1	3	39	57	31	11	22	A-6a
551+00	CL	0.5-3.0	0	1	5	25	69	47	20	27	A-7-6
		3.0-4.0	0	1	2	28	69	41	16	21	A-7-6
557+00	10'Rt	0.0-5.0	25	14	28	16	17	20	3	10	A-2-4
		5.0-9.0	0	0	1	74	25	NP	NP	23	A-4b
		9.0-15.0	0	1	2	25	72	41	12	21	A-7-6
		15.0-20.0	0	1	3	29	67	35	13	22	A-6a
	**	20.0-30.0									
560+00	CL	0.0-3.0	0	2	2	23	73	39	15	22	A-6a
		3.0-4.0	0	0	0	67	33	NP	NP	25	A-4b
		4.0-5.0	0	2	1	25	72	38	13	26	A-6a
		5.0-5.5	0	0	0	75	25	NP	NP	25	A-4b
		5.5-6.5	0	0	1	31	68	37	14	24	A-6a
564+60	CL	0.0-5.0	0	1	1	19	79	47	18	19	A-6b
		5.0-10.0	0	0	1	32	67	34	11	23	A-6a
		10.0-15.0	0	1	3	23	73	44	17	24	A-7-6
		15.0-20.0	0	3	4	27	66	38	12	25	A-6a
		20.0-24.0	0	1	2	35	62	40	17	24	A-6b
		24.0-30.0	0	3	6	50	41	22	6	19	A-4b
570+00	75'Lt	0.3-2.0	6	6	20	28	40	34	16	30	A-6b
		2.0-12.0	6	3	5	25	61	-	-	19	A-6a
		12.0-18.0	0	0	0	29	71	39	11	26	A-6a
		18.0-25.0	0	1	1	22	76	42	19	26	A-7-6
		25.0-30.0	0	1	2	28	69	38	13	25	A-6a
572+10	CL	0.0-5.0	22	3	5	30	40	35	15	11	A-6a *
		5.0-9.0	32	2	4	17	45	39	16	15	A-6b
		9.0-15.0	0	0	0	24	76	33	11	23	A-6a
		15.0-18.0	0	0	1	54	45	29	3	21	A-4b
		18.0-20.0	0	0	1	27	72	37	12	27	A-6a
		20.0-23.0	0	0	0	77	23	NP	NP	23	A-4b
		23.0-30.0	0	2	2	34	62	32	11	17	A-6a
574+00	100'Rt	0.3-1.0	13	13	33	17	19	26	3	18	A-4a
		1.0-7.0	18	3	6	31	42	33	16	19	A-6b
		7.0-10.0	0	2	4	36	58	43	13	19	A-7-6
		10.0-15.0	0	3	6	26	65	39	15	19	A-6a
		15.0-20.0	0	0	0	44	56	33	13	23	A-6a
		20.0-27.0	0	1	0	43	56	35	11	22	A-6a
576+00	CL	0.5-2.0	0	2	17	33	48	36	15	25	A-6a *
		2.0-3.0	17	2	12	31	38	30	11	20	A-6a *
585+25	CL	0.0-5.0	23	10	21	19	22	26	3	11	A-4a
		5.0-10.0	29	5	5	33	28	31	11	9	A-6a
		10.0-15.5	76	3	4	9	8	27	4	9	A-1-b
585+75	CL	0.4-3.0	31	13	16	24	16	23	7	13	A-4a
		3.0-4.0	41	8	15	20	16	26	8	12	A-4a
** 557+00	10'Rt.	20.0-25.0	0	1	2	34	63	33	11	23	A-6a
		25.0-30.0	0	1	3	47	49	35	13	23	A-6a
587+00	CL	0.5-2.0	40	2	9	31	18	NP	NP	19	A-4a
590+00	CL	0.5-1.0	Gray Broken Shale							10	Visual
593+00	CL	0.4-4.0	23	2	4	20	51	40	16	18	A-6b *
		4.0-10.0	27	15	18	19	21	27	8	13	A-4a *
		10.0-13.0	46	5	12	17	20	27	8	14	A-4a
		13.0-14.0	Gray Weathered Shale							8	Visual
596+00	CL	0.4-2.0	27	2	5	19	47	47	20	23	A-7-6
		2.0-4.0	13	1	2	24	60	51	21	22	A-7-5 *
		4.0-7.0	Gray Weathered Shale							12	Visual *
		7.0-10.5	Gray Broken Clay Shale							10	Visual
		10.5-12.0	Gray Weathered Shale							11	Visual
598+00	CL	0.5-2.0	0	2	25	33	40	23	11	12	A-6a *
		2.0-4.0	Gray Weathered Sandstone							9	Visual
600+00	CL	0.5-1.5	Gray Weathered Sandstone							11	Visual
		1.5-3.0	Gray Broken Sandstone							7	Visual
602+00	CL	0.5-3.0	43	2	4	17	34	43	20	20	A-7-6 *
		3.0-4.0	40	2	2	18	38	38	17	17	A-6b *
		4.0-8.0	Gray Weathered Shale							12	Visual *
		8.0-11.0	Gray Weathered Shale							10	Visual
		11.0-12.0	Gray Broken Shale							6	Visual
605+50	CL	0.5-1.5	14	1	11	50	24	NP	NP	18	A-4b
		1.5-4.0	35	5	10	20	30	30	11	25	A-6a *
		4.0-8.0	36	9	15	20	20	22	7	12	A-4a *
		8.0-10.0	Gray Weathered Shale							7	Visual
		10.0-12.5	Gray Weathered Shale							6	Visual
608+00	CL	0.5-3.5	42	1	4	25	28	34	14	16	A-6a
		3.5-6.0	Gray Weathered Shale							10	Visual
		6.0-7.0	Gray Weathered Shale							6	Visual
611+00	CL	0.3-1.5	30	5	9	25	31	30	11	17	A-6a *
		1.5-3.5	Gray Weathered Sandstone							8	Visual *
613+00	35'Lt	0.5-1.5	24	4	9	31	32	33	12	17	A-6a
		1.5-3.5	Brown Sandstone Fragments								Visual
615+00	CL	0.5-2.5	31	2	6	37	24	25	11	22	A-6a
		2.5-4.0	Gray Broken Sandstone							10	Visual
617+00	CL	0.5-1.5	Gray Weathered Sandstone							9	Visual
		1.5-5.0	Gray Weathered Sandstone							6	Visual *
		5.0-6.0	Gray Weathered Indurated Clay							17	Visual *
		6.0-9.0	Gray Weathered Shale							11	Visual
		9.0-12.0	Gray Weathered Shale							9	Visual
619+00	CL	0.5-1.5	35	1	5	34	25	26	11	23	A-6a *
		1.5-2.5	Gray Weathered Sandstone							8	Visual *
622+00	CL	0.5-1.5	0	3	3	53	36	31	9	19	A-4b
		1.5-5.0	Gray Weathered Shale							12	Visual
		5.0-9.5	Gray Weathered Shale							12	Visual
		9.5-13.0	Gray Weathered Shale							7	Visual
623+50	CL	0.5-4.0	0	1	11	52	36	32	9	21	A-4b
		4.0-5.0	0	0	3	62	35	NP	NP	24	A-4b
		5.0-8.0	0	0	1	32	67	40	18	25	A-6b
		8.0-13.5	0	0	0	30	70	40	13	27	A-6a
		13.5-15.5	Gray Weathered Shale							8	Visual
626+50	CL	0.4-2.0	0	1	5	25	69	46	16	25	A-7-5
		2.0-6.0	28	0	3	26	43	45	14	17	A-7-5
		6.0-9.0	Gray Weathered Shale							13	Visual
		9.0-12.0	Gray Weathered Shale							10	Visual
62[illegible]+00	CL	0.5-3.0	0	2	8	34	56	43	18	26	A-7-6
630+00	CL	0.5-2.0	46	3	21	13	17	25	8	26	A-2-4
631+50	CL	0.5-2.0	8	4	12	38	38	44	24	29	A-7-6
		2.0-4.0	0	7	17	42	32	30	12	21	A-6a
		4.0-6.5	0	3	6	38	53	51	13	35	A-7-5
		6.5-7.5	Black Carbonaceous Shale Fragments								Visual
635+00	CL	0.5-1.5	0	4	9	55	32	31	9	17	A-4b
		1.5-6.0	14	3	7	31	45	30	11	17	A-6a
		6.0-8.0	Gray Weathered Sandstone							16	Visual
638+00	CL	0.4-3.0	0	8	13	38	41	34	11	20	A-6a
		3.0-8.0	0	3	8	31	58	34	12	17	A-6a
641+00	CL	0.4-2.0	19	6	14	34	27	28	7	25	A-4a
		2.0-8.0	0	4	11	39	46	27	11	16	A-6a
		3.0-9.5	Gray Weathered Sandstone							11	Visual
648+00	CL	0.8-3.0	43	6	11	19	21	29	12	11	A-6a
651+00	CL	0.8-2.0	13	2	19	23	38	33	15	22	A-6a
653+00	CL	0.8-3.0	9	4	10	36	41	48	21	23	A-7-6 *
657+09	10'Rt	0.6-4.5	0	3	7	42	48	34	12	16	A-6a
657+50	CL	0.5-1.5	17	2	7	35	39	41	19	19	A-7-6
		1.5-7.5	12	3	6	35	44	36	16	17	A-6b
		7.5-9.0	64	2	9	13	12	26	3	9	A-2-4
660+00	CL	0.3-4.0	0	2	7	40	51	34	13	22	A-6a
		4.0-8.5	10	3	8	32	47	28	11	21	A-6a *
664+00	CL	0.5-4.0	11	5	11	30	43	31	11	16	A-6a
		4.0-6.5	4	3	11	29	53	34	12	18	A-6a *
667+00	CL	0.3-4.0	5	4	11	42	38	36	11	21	A-6a *
		4.0-9.0	16	2	6	23	53	38	15	20	A-6a *
671+00	3'Rt	0.4-4.0	0	3	11	36	50	34	14	26	A-6a
		4.0-9.0	6	4	10	34	46	27	11	16	A-6a
		9.0-12.0	0	1	4	23	72	35	14	22	A-6a
675+00	CL	0.6-3.0	0	1	6	37	56	46	19	28	A-7-6
		3.0-8.0	13	4	9	30	44	31	11	18	A-6a
		8.0-13.0	4	1	4	27	64	36	11	20	A-6a

LIPKEY ROAD

Station	Offset	Depth From-To	% Agg.	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	% W.C.	SHTL Class.
43+00	12'Lt	0.4-3.0	26	8	22	26	18	NP	NP	23	A-4a *
		3.0-8.0	16	12	23	29	15	NP	NP	13	A-4a
		8.0-10.0	Gray Clayey Silty Sand and Stone Fragments								Visual
46+00	12'Rt	0.4-2.0	0	3	5	41	51	37	19	23	A-6b
		2.0-5.0	10	5	13	42	30	28	11	22	A-6a *
		5.0-7.0	47	11	4	19	19	27	8	10	A-4a
		7.0-10.0	27	5	6	33	29	30	11	13	A-6a
		10.0-12.0	31	2	4	28	35	28	11	9	A-6a
49+00	12'Lt	0.4-5.0	22	3	7	29	39	33	12	21	A-6a
		5.0-6.0	42	17	19	11	11	NP	NP	14	A-1-b
		6.0-10.0	19	7	10	41	23	21	3	13	A-4a
		10.0-12.0	15	8	14	37	26	23	8	13	A-4a
		12.0-17.0	7	2	16	56	19	NP	NP	19	A-4b *
		17.0-19.0	25	4	10	37	24	NP	NP	16	A-4a *
		19.0-19.5	17	5	14	48	16	NP	NP	19	A-4a
51+00	12'Lt	0.4-5.0	0	3	6	35	56	36	17	19	A-6b
		5.0-10.0	13	6	13	38	30	21	3	15	A-4a
		10.0-12.0	20	5	10	34	31	26	5	13	A-4a
		12.0-16.0	13	17	36	25	9	NP	NP	9	A-3a *
		16.0-18.0	50	16	16	11	7	NP	NP	3	A-1-b
		18.0-20.0	41	7	12	26	14	NP	NP	13	A-4a
54+00	12'Rt	0.4-2.0	15	3	7	31	44	36	14	20	A-6a *
		2.0-7.0	7	6	11	44	32	31	15	23	A-6a *
		7.0-13.0	34	3	13	25	20	24	7	21	A-4a
		13.0-15.0	34	5	8	32	21	23	6	14	A-4a

TURNER ROAD

Station	Offset	Depth From-To	% Agg.	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	% W.C.	SHTL Class.
42+00	10'Lt	0.6-4.0	Gray Weathered Shale							6	Visual *
45+00	10'Rt	0.6-4.0	0	3	9	25	63	44	20	17	A-7-6
		4.0-6.0	Gray Weathered Shale							6	Visual
48+00	10'Rt	0.6-4.0	0	4	14	36	46	35	14	21	A-6a
		4.0-8.0	43	2	4	27	24	37	13	10	A-6a
51+00	12'Lt	0.6-3.0	13	5	5	44	33	28	11	12	A-6a
52+30	12'Rt	0.6-8.0	Cinders, Ashes and Stone Fragments							-	Visual *
		8.0-12.0	45	16	16	15	8	NP	NP	28	A-1-b
54+60	12'Rt	0.6-5.5	0	1	20	64	15	NP	NP	26	A-4b *
		5.5-8.5	Gray Weathered Indurate Clay							8	Visual
57+00	10'Lt	0.6-5.0	26	10	24	20	20	22	10	15	A-4a *
		5.0-8.5	23	11	26	19	21	23	7	15	A-4a
		8.5-12.5	28	3	27	26	10	NP	NP	10	A-4a
		12.5-18.5	0	0	2	38	10	NP	NP	29	A-4b
		18.5-20.0	0	3	6	31	60	36	15	20	A-6a

OHLTOWN ROAD

Station	Offset	Depth From-To	% Agg.	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	% W.C.	SHTL Class.
46+00	12'Rt	1.5-3.5	Gray Weathered Sandstone							10	Visual *
49+00	12'Rt	0.3-2.5	0	3	8	22	67	41	16	22	A-7-6
		2.5-6.0	Gray Weathered Shale							15	Visual
52+00	12'Rt	0.3-4.5	Gray Wheathered Shale							10	Visual

SR 46

Station	Offset	Depth From-To	% Agg.	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	% W.C.	SHTL Class.
35+50	12'Rt	0.4-4.0	21	4	18	27	30	26	7	15	A-4a *
38+50	12'Rt	0.4-3.0	21	6	21	26	26	25	8	19	A-4a *
		3.0-5.0	38	6	4	7	45	47	19	21	A-7-6
41+00	12'Rt	0.4-4.0	44	5	12	18	21	30	11	21	A-6a
		4.0-6.0	26	2	8	29	35	35	11	22	A-6a
		6.0-10.0	41	2	3	26	28	33	11	14	A-6a
		10.0-15.0	Gray Weathered Shale							3	Visual
44+00	12'Rt	0.4-4.0	35	5	25	18	17	23	5	11	A-2-4
		4.0-6.0	44	7	6	20	23	38	11	20	A-6a
		6.0-9.0	Gray Weathered Shale							12	Visual
48+00	12'Rt	0.4-3.0	38	5	10	28	19	27	6	21	A-4a
		3.0-5.5	60	4	14	11	11	23	4	8	A-1-b
52+00	12'Rt	0.4-5.0	15	4	7	32	42	32	12	14	A-6a
		5.0-10.0	36	4	12	26	22	28	9	10	A-4a
56+00	12'Rt	0.4-2.0	Gray Weathered Sandstone							10	Visual *
60+00	12'Rt	0.4-3.0	0	3	6	43	48	36	12	31	A-6a *

TE 94-A
100-10-60

SOIL PROFILE
MAHONING COUNTY
MAH-18-9.89 (7.82)
OHIO STATE HIGHWAY
TESTING LABORATORY
COLUMBUS, OHIO

3
33

SUMMARY OF SOIL TEST DATA (Cont'd)

NOTE: NP shown in Liquid Limit and Plasticity Index columns indicates that the material is non-plastic.
*Denotes sample taken at or near grade...

STATION & OFFSET		DEPTH FROM-TO	% AGG.	% C.S.	% F.S.	% SILT	% CLAY	L.L.	P.I.	% W.C.	SHTL CLASS.
		RAMP A									
2+25	BL	0.5-3.5	8	3	7	35	47	33	12	14	A-6a *
4+00	BL	0.5-1.5	0	3	7	45	45	30	11	18	A-6a *
		1.5-5.0	Gray Weathered Shale							8	Visual
7+00	BL	0.4-2.0	6	3	8	35	48	32	13	15	A-6a *
		2.0-5.0	0	3	8	32	57	29	11	19	A-6a
		5.0-7.0	Gray Weathered Shale							3	Visual
		7.0-9.0	Gray Weathered Shale							10	Visual
11+00	BL	0.6-4.0	39	3	14	22	22	29	8	17	A-4a
		4.0-5.0	Gray Weathered Sandstone							11	Visual
15+00	25'Lt	0.5-3.0	13	2	9	34	42	32	12	20	A-6a
		3.0-7.0	7	3	3	40	47	29	11	16	A-6a
		7.0-10.0	3	3	5	34	51	40	15	19	A-6a
		10.0-14.0	22	3	7	33	35	32	11	18	A-6a
18+30	BL	0.4-2.5	6	3	8	39	44	31	11	22	A-6a
		2.5-10.0	7	4	11	40	38	29	11	17	A-6a
		10.0-11.0	Gray Weathered Sandstone							7	Visual
		RAMP B									
2+00	BL	0.4-3.0	7	4	13	32	44	36	15	27	A-6a *
		3.0-8.0	0	21	18	28	33	35	15	18	A-6a *
		8.0-9.5	0	2	5	25	68	31	11	23	A-6a
5+00	BL	0.3-4.0	9	9	15	30	37	29	11	18	A-6a
		4.0-7.0	8	6	17	32	37	27	11	16	A-6a
8+00	BL	0.5-6.5	4	6	31	29	30	24	6	15	A-4a
11+00	BL	0.3-4.0	6	5	15	34	40	26	11	16	A-6a *
13+00	BL	0.5-3.5	3	3	7	23	64	40	17	23	A-6b *
15+00	BL	0.0-2.0	4	5	9	41	41	30	11	25	A-6a *
17+00	BL	0.3-1.5	22	4	30	23	21	NP	NP	22	A-4a
		RAMP C									
1+00	BL	0.4-2.0	7	5	15	38	35	31	11	18	A-6a
		2.0-7.0	6	3	9	39	43	30	11	16	A-6a
		7.0-8.0	34	8	13	21	24	26	6	15	A-4a
		8.0-11.0	12	8	14	33	33	25	6	16	A-4a
		11.0-13.5	23	4	10	28	35	26	11	17	A-6a
5+00	BL	0.4-2.0	7	5	12	39	37	30	11	17	A-6a
		2.0-8.0	0	5	9	38	48	32	12	16	A-6a
9+00	BL	0.5-1.5	0	5	18	36	41	33	15	24	A-6a
13+00	BL	0.4-3.5	0	1	26	35	38	29	11	27	A-6a
		RAMP D									
2+00	BL	0.3-3.0	8	7	12	28	45	38	14	23	A-6a
		3.0-5.5	Gray Weathered Shale							12	Visual
5+00	BL	0.3-3.0	5	5	12	40	38	28	11	16	A-6a
		3.0-5.5	0	4	9	40	47	33	11	19	A-6a
8+00	BL	0.5-4.0	0	3	7	37	53	36	12	20	A-6a
		4.0-5.5	21	14	13	22	30	29	10	17	A-4a *
		5.5-7.0	Gray Weathered Shale							11	Visual
12+00	BL	0.4-3.0	0	3	11	36	30	43	19	28	A-7-6
		3.0-6.0	0	3	7	63	27	NP	NP	23	A-4b *
		6.0-7.0	29	6	16	26	23	22	7	20	A-4a *
		7.0-8.5	6	6	13	33	42	31	11	19	A-6a *
16+00	BL	0.5-4.0	4	3	7	38	48	34	14	22	A-6a *
		4.0-9.0	15	3	11	31	40	23	11	15	A-6a *
		9.0-13.0	0	2	4	40	54	38	11	22	A-6a

STATION & OFFSET		DEPTH FROM-TO	% AGG.	% C.S.	% F.S.	% SILT	% CLAY	L.L.	P.I.	% W.C.	SHTL CLASS.
		RAMP E									
6+00	35'Rt	0.5-3.0	Gray Weathered Shale							18	Visual
		3.0-7.0	Gray Weathered Sandstone							12	Visual *
8+00	50'Rt	0.5-2.0	0	4	11	38	47	33	15	20	A-6a *
		2.0-4.0	9	3	3	29	51	33	14	16	A-6a
		4.0-6.0	Gray Weathered Shale							7	Visual
11+00	BL	0.5-2.0	18	2	6	31	43	28	11	18	A-6a
		2.0-5.0	10	3	7	41	39	34	17	13	A-6b *
		5.0-7.0	Gray Weathered Sandstone							9	Visual *
14+00	BL	0.5-2.0	0	2	6	44	48	39	18	19	A-6b *
17+00	BL	0.3-3.0	14	3	6	35	42	33	13	18	A-6a
		3.0-9.0	Gray Weathered Incurated Clay							11	Visual
		DRIVE SAMPLE SOIL TEST DATA									
		MAINLINE									
454+22	68'Lt	5.0-6.0	11	3	7	35	44	36	11	18	A-6a
		10.0-11.0	12	9	14	39	26	24	8	16	A-4a
466+31	69'Rt	5.0-6.0	64	8	9	12	16	-	-	22	A-2-4
		10.0-11.0	0	5	9	46	40	33	12	17	A-6a
		15.0-16.0	17	14	22	29	13	22	6	13	A-4a
		20.0-21.0	29	8	4	33	26	31	9	15	A-4a
525+00	CL	0.0-1.0	0	0	4	59	37	38	7	51	A-4b
		5.0-6.0	0	0	21	50	29	38	2	22	A-4a
		10.0-11.0	70	16	7	- 7 -		NP	NP	13	A-1-a
		15.0-16.0	0	3	4	36	58	31	12	20	A-6a
		20.0-21.0	0	3	5	27	65	33	13	24	A-6a
		25.0-26.0	0	2	6	35	57	31	11	24	A-6a
		30.0-31.0	0	2	4	31	63	31	11	23	A-6a
		35.0-36.0	0	2	2	34	62	35	11	41	A-6a
		40.0-41.0	0	2	1	26	71	41	16	44	A-7-6
		45.0-46.0	0	1	1	17	81	47	21	36	A-7-6
		50.0-51.0	0	0	0	29	71	42	16	39	A-7-6
		55.0-56.0	0	0	0	15	85	45	19	38	A-7-6
		60.0-61.0	0	0	0	41	59	34	14	29	A-6a
		65.0-66.0	0	0	0	67	33	31	8	27	A-4b
		70.0-71.0	0	0	2	1	64	33	NP	31	A-4b
		75.0-76.0	0	0	1	8	80	19	NP	19	A-4b
		80.0-81.0	42	8	8	22	20	24	7	11	A-4a
		85.0-86.0	17	27	7	24	25	27	8	24	A-4a
		90.0-91.0	17	32	24	18	9	NP	NP	11	A-2a
		99.0-99.2	Gray Sand and Stone Fragments							-	Visual
		110.0-110.7	12	5	11	41	31	18	5	14	A-4a

STATION & OFFSET		DEPTH FROM-TO	% AGG.	% C.S.	% F.S.	% SILT	% CLAY	L.L.	P.I.	% W.C.	SHTL CLASS.
534+18	100'Lt	5.0-6.0	21	2	4	17	56	33	12	21	A-6a
		10.0-11.0	18	3	3	22	54	33	12	20	A-6a
		15.0-16.0	6	3	1	74	16	NP	NP	13	A-4b
		20.0-21.0	9	3	5	23	60	28	12	22	A-6a
		25.0-26.0	3	3	6	28	60	34	12	21	A-6a
		30.0-31.0	10	0	0	25	65	NP	NP	13	A-4b
		35.0-36.0	3	3	5	27	62	33	12	19	A-4a
		41.5-42.5	Gray Silty Clay, Trace of Gravel							31	Visual
		45.0-46.0	0	0	0	40	60	43	13	31	A-7-6
		55.0-56.0	0	0	0	45	55	37	15	35	A-6b
		60.0-61.0	0	0	0	45	55	40	13	27	A-6b
		65.0-66.0	0	0	0	36	64	38	23	31	A-7-6
		71.0-72.0	0	0	0	37	63	38	14	18	A-6a
		75.0-76.0	0	0	0	60	40	29	9	21	A-4a
		80.0-81.0	0	0	0	68	32	21	11	9	A-6a
		85.0-86.0	0	0	1	44	55	32	5	19	A-4a
		90.0-91.0	0	0	1	64	35	NP	NP	16	A-4b
		96.0-96.0	0	0	2	19	79	NP	NP	24	A-4b
		100.0-101.0	0	0	6	75	19	NP	NP	28	A-4b
		105.0-106.0	Gray Sandy Silt							38	Visual
		110.0-111.0	Gray Sand							-	Visual
		115.0-116.0	Gray Sand							-	Visual
		120.0-121.0	Gray Sand							-	Visual
		125.0-126.0	Gray Sand							-	Visual
		130.0-131.0	Gray Sand							-	Visual
		135.0-136.0	Gray Sand and Gravel							-	Visual
554+63	CL	1.0-2.0	0	10	16	23	49	38	13	18	A-6a
		6.0-7.0	0	3	4	23	69	28	11	17	A-7-6
		11.0-12.0	0	3	4	24	69	24	-	-	A-6b
		16.0-17.0	0	1	6	47	46	28	11	24	A-6a
		21.0-22.0	0	2	5	22	71	38	15	22	A-6a
		31.0-32.0	0	2	5	26	67	38	13	22	A-6b
		36.0-37.0	0	0	1	19	80	38	11	38	A-6a
		41.0-42.0	0	0	0	19	81	49	20	33	A-7-6
		46.0-47.0	0	0	1	39	60	34	17	29	A-6b
		51.0-52.0	0	7	9	36	28	18	4	18	A-4a
		56.0-57.0	0	4	11	51	34	23	5	17	A-4b
		61.0-61.5	64	5	11	13	7	NP	NP	13	A-1-b
		66.0-66.3	32	8	16	14	10	NP	NP	13	A-1-b
584+73	36'Rt	2.5-3.5	0	5	11	46	38	24	6	14	A-4a
		5.0-5.5	25	4	6	28	37	32	11	17	A-6a
621+00	CL	5.0-6.0	0	11	10	49	30	32	7	13	A-4a
645+00	CL	5.0-6.0	Brown Silty Clay							-	Visual
		10.0-11.0	0	13	13	30	44	31	11	22	A-6a
		13.0-16.0	18	9	33	21	19	NP	NP	13	A-4a
		LIPKEY ROAD									
49+27	55'Rt	2.5-3.5	0	5	7	31	57	36	11	19	A-6a
		5.0-6.0	0	3	5	40	52	31	11	17	A-6a
		7.5-8.5	0	4	4	39	57	33	12	12	A-4a
		10.0-11.0	10	0	3	36	30	NP	NP	18	A-4b
		12.5-13.5	21	5	9	34	31	NP	NP	14	A-4a
		15.0-16.0	0	1	3	58	38	NP	NP	24	A-4b
		17.5-18.5	15	9	22	44	14	NP	NP	15	A-4a
		TURNER ROAD									
49+37	62'Rt	2.5-3.5	32	11	21	15	21	21	5	16	A-4a

FORMERLY TE-54-B)
-61

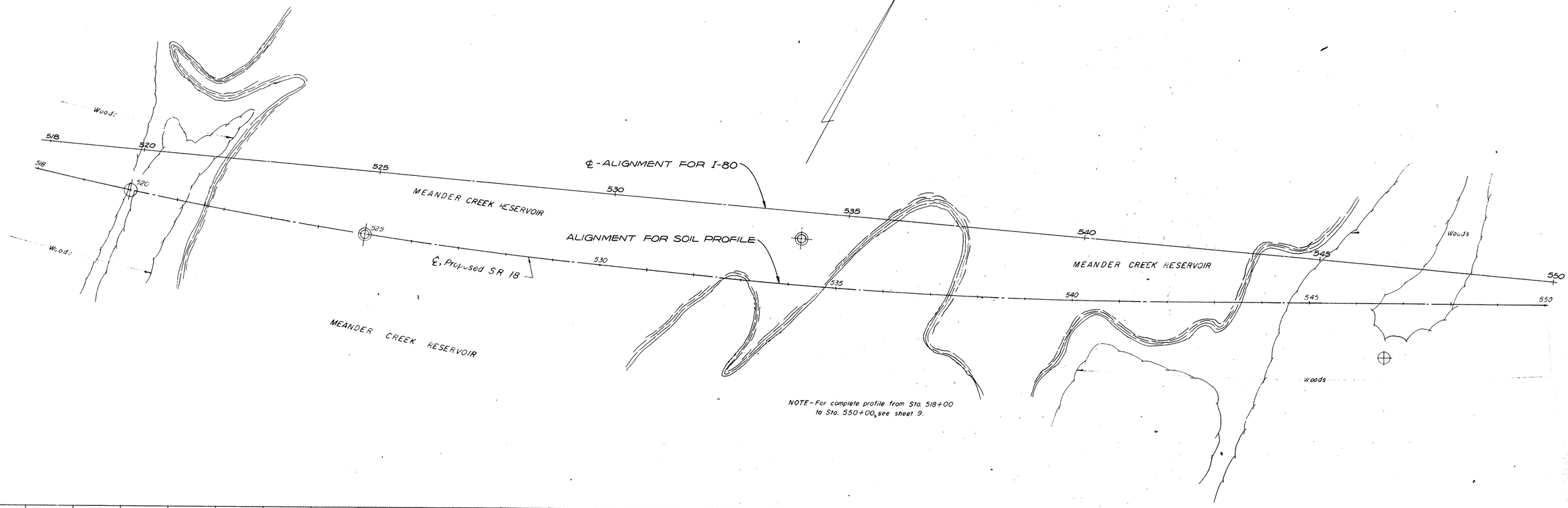
SOIL PROFILE

MAHONING COUNTY

MAH-18-9.89

OHIO STATE HIGHWAY
TESTING LABORATORY
1520 W. BROAD ST., COLUMBUS 23, OHIO

4
33



NOTE- For complete profile from Sta. 518+00 to Sta. 550+00, see sheet 9.

(FORMERLY TE-54-B)
10-61

SOIL PROFILE

MAHONING COUNTY

MAH-18-9.89

OHIO STATE HIGHWAY TESTING LABORATORY

1620 W. BROAD ST. COLUMBUS 23, OHIO

5
33

MAH.18-7.01 | MAH.18-9.89

BEGIN PROJECT MAH. 18-9.89 STA. 520+80.75

930
920
910
900
890
880
870
860
850
840
830
820
810
800
790
780
770
760
750

518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550

℄ 13 W 20 ●
Refusal (Hand auger)

Normal water elev 897.6'

℄ 51⊖ 22● 13 20 24 24 23 41● 44● 36 39● 38 29 27 31⊖ 19 11 24● 11

50/4 Gray sand and stone fragments

Gray sandy silt with stone fragments

50/4 12± Top of rock-in-Place
Shale, gray, argillaceous, siliceous, hard, broken. No core loss.

* 2" = Penetration

100' Lt.

21 29 23⊖ 22 21 20 22

Gray silty clay, trace of gravel

31 35● 37● 31 33 29● 27 35 36⊖ 24⊖ 22⊖

Gray sandy silt

Gray sand

Gray sand

Gray sand

Gray sand

Gray sand

Gray sand and gravel

Normal water elev 897.6'

115' Rt.

12 12 19 22 24 22

-96 (FORMERLY TE-54-B)
00-10-61

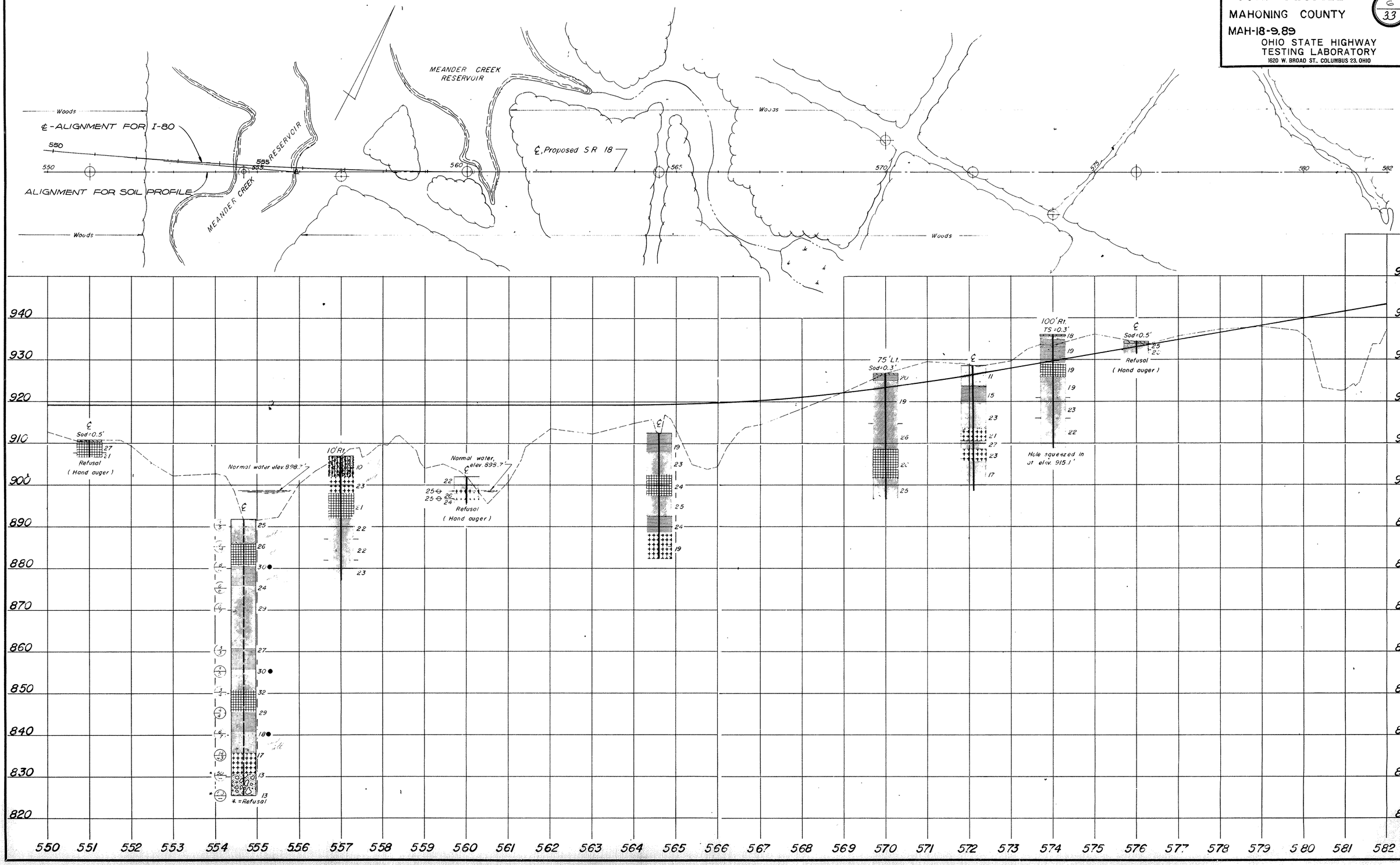
SOIL PROFILE

MAHONING COUNTY

6/33

MAH-18-9.89

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



SOIL PROFILE

MAHONING COUNTY

MAH-18-9.89

OHIO STATE HIGHWAY TESTING LABORATORY

1620 W. BROAD ST., COLUMBUS 23, OHIO

7 / 33

NOTE For complete plan view and profile of Turner Rd., see sheet 15

℄ Proposed Turner Rd.

℄ Proposed SR 18

Existing Turner Rd.

Sta. 585+61.96, ℄ Proposed SR 18
Sta. 50+00, ℄ Proposed Turner Rd.

Woods, Cultivated, Spring, Tree row

Brown sandstone fragments

36' Rt.

Top of Rock-In-Place

Proposed grade, Turner Rd.

Refusal

Refusal (Hand auger)

Sod=0.3', Sod=0.4', Sod=0.5'

WESTBOUND, EASTBOUND

* = Refusal

A. Sandstone, brownish-gray, fine-grained, friable, with clay seams, jointed and badly broken. No core loss

B. Shale, argillaceous, soft, fissile, crumbly, badly broken. No core loss.

C. Shale, gray, arenaceous, slightly micaceous, occasionally grading into argillaceous shale, generally firm, jointed and broken. No core loss.

970 960 950 940 930 920

1020 1010 1000 990 980 970 960 950 940 930 920

582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614

SOIL PROFILE

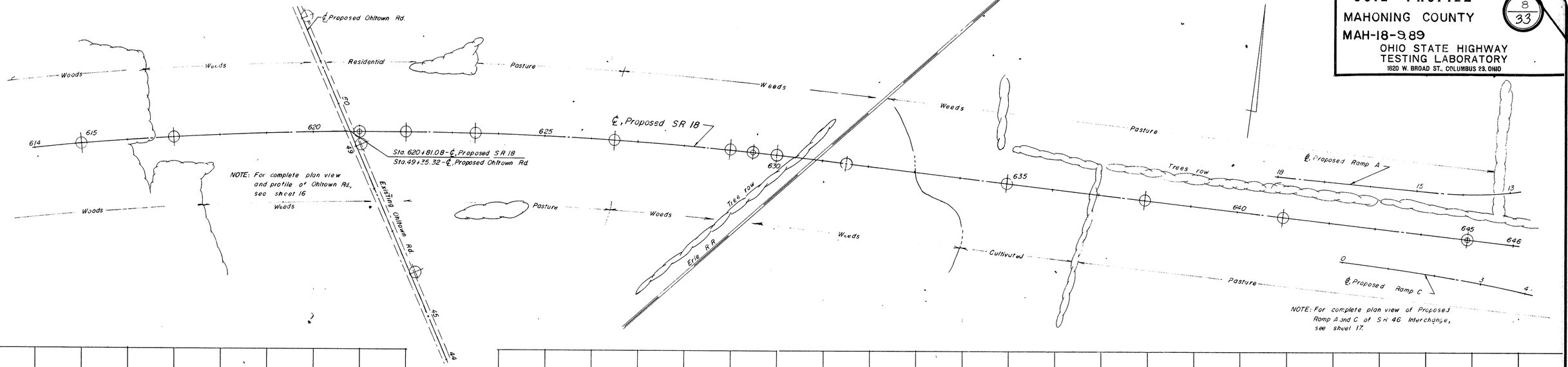
MAHONING COUNTY

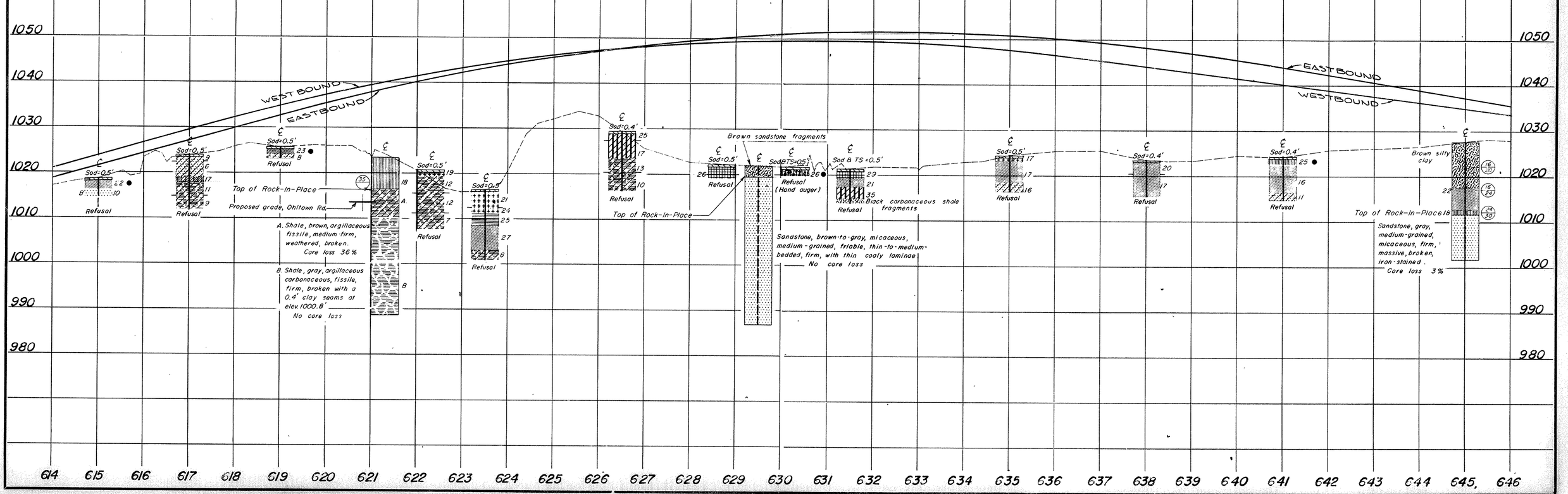
MAH-18-9.89

OHIO STATE HIGHWAY TESTING LABORATORY

1620 W. BROAD ST., COLUMBUS 23, OHIO

8
33





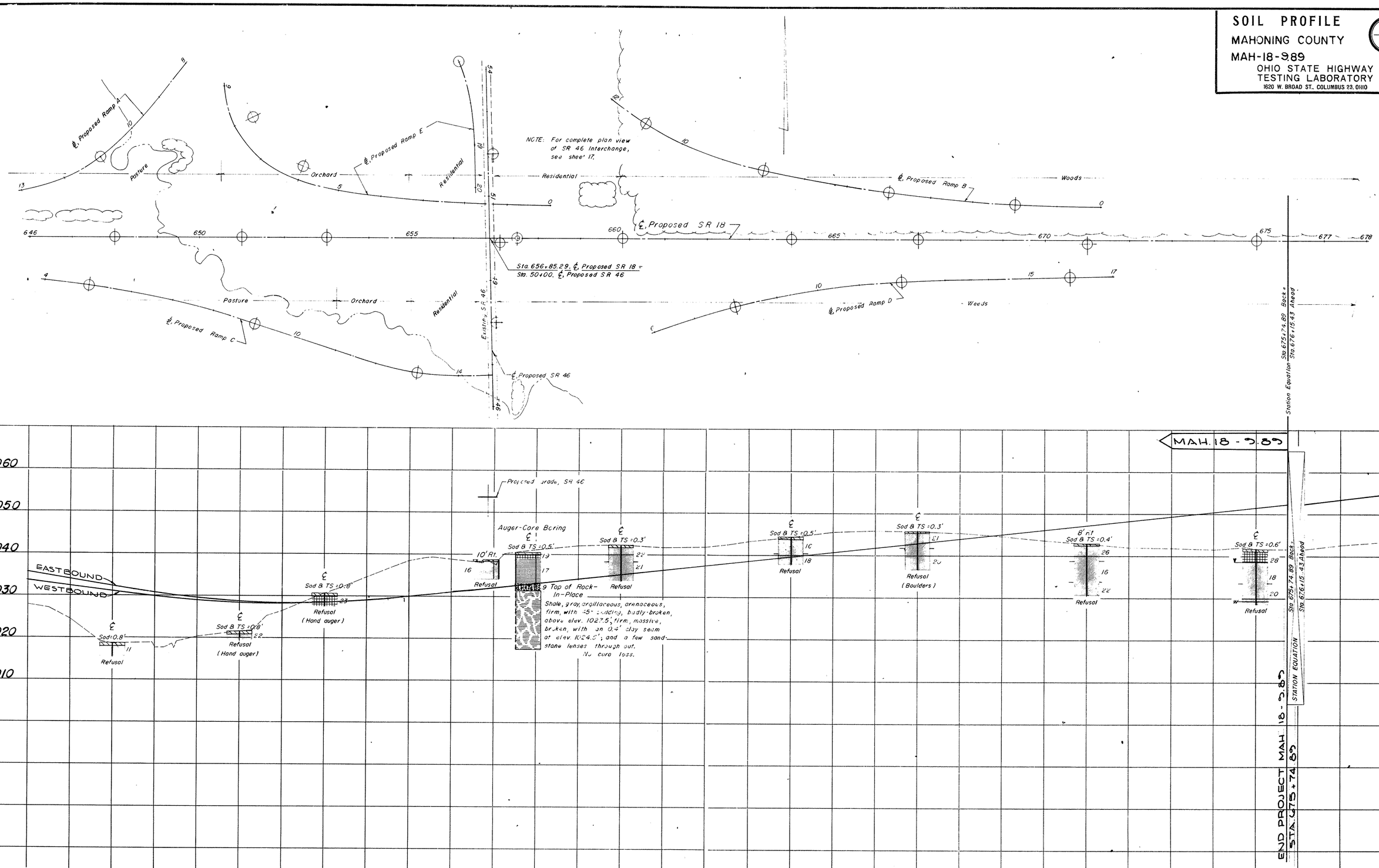
FORMERLY TE-54-83
61

SOIL PROFILE

MAHONING COUNTY

MAH-18-9.89

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



(FORMERLY TE-54-B)
10-61

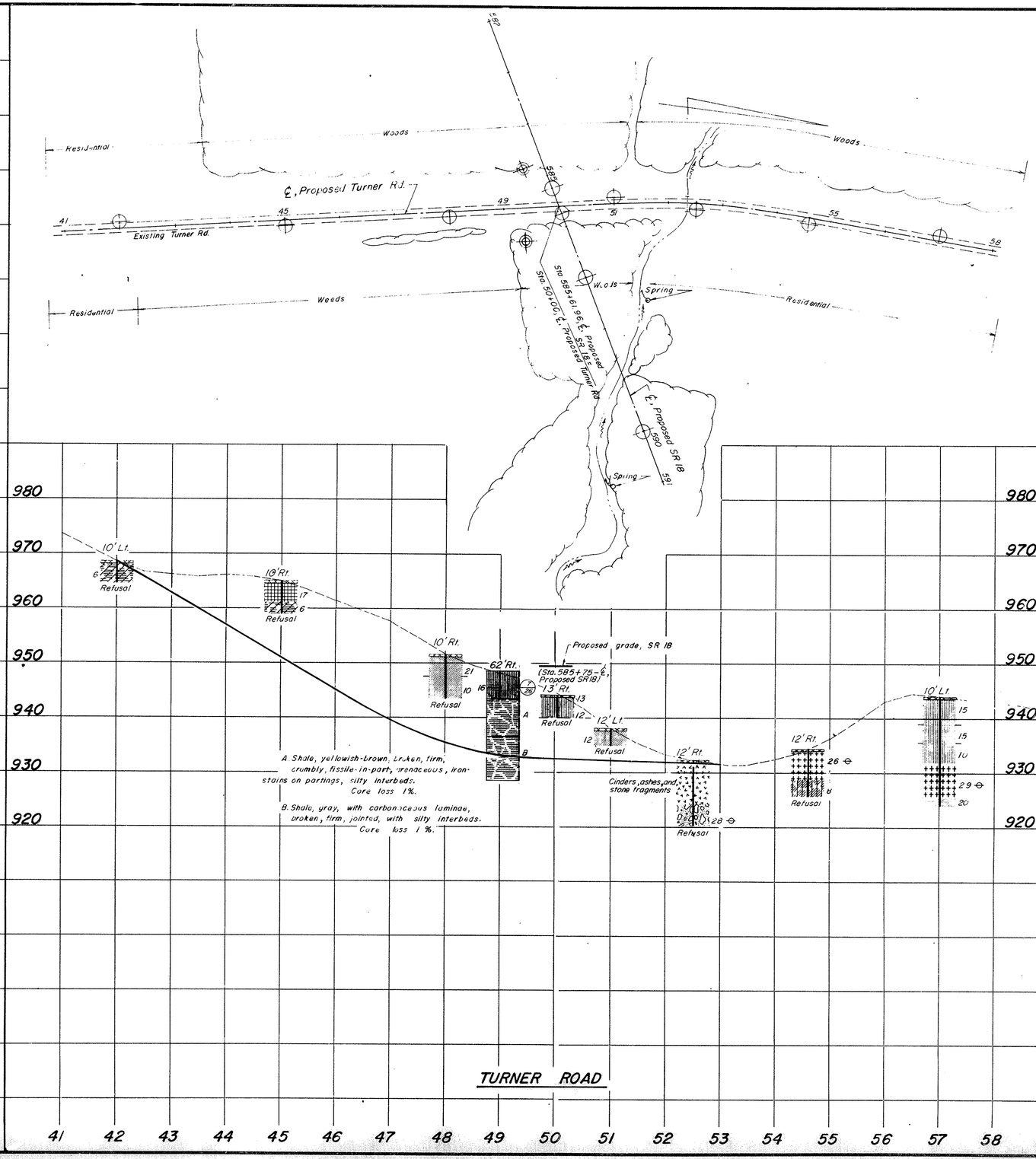
SOIL PROFILE

MAHONING COUNTY

MAH-18-9.89

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

10
33



SOIL PROFILE

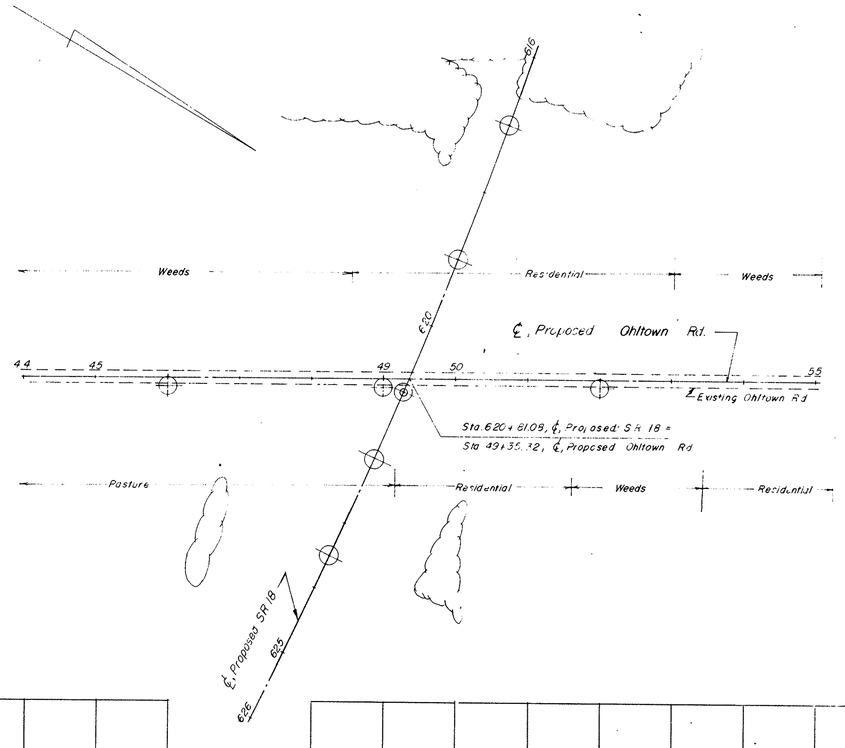
MAHONING COUNTY

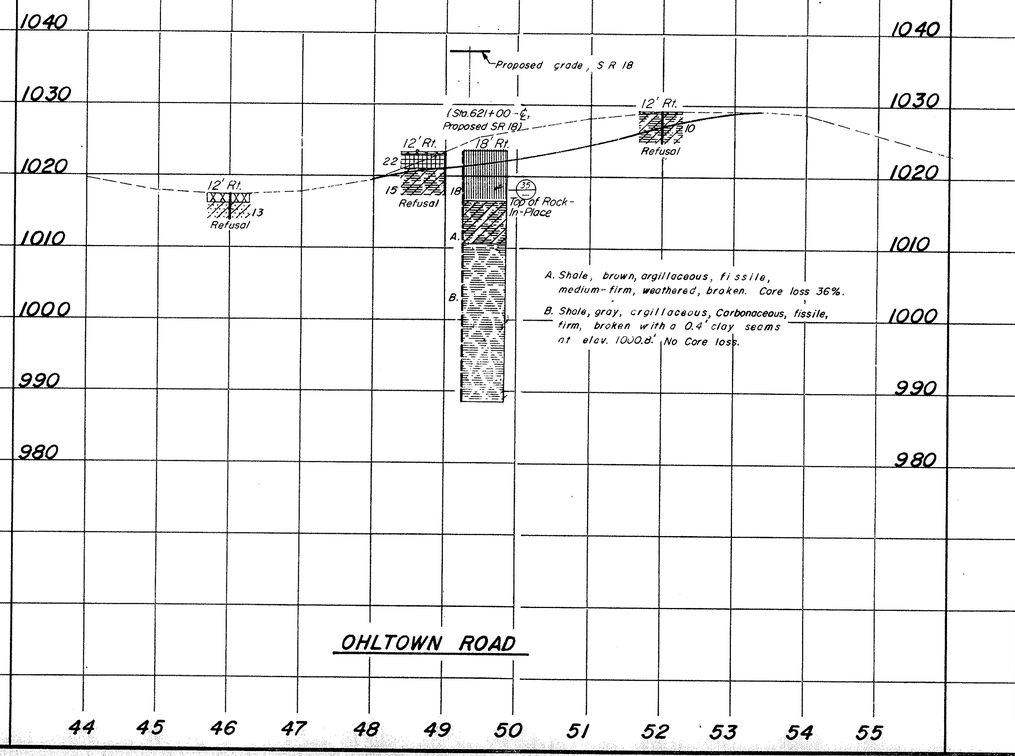
MAH-18-9.89

OHIO STATE HIGHWAY TESTING LABORATORY

1620 W. BROAD ST., COLUMBUS 23, OHIO

11 / 3.3





TE-95 (FORMERLY TE-54-A)
2000-10-01

PROFILE INDEX	
PROFILE	SHEET
SR 46	18
Ramp A	19
Ramp B	19
Ramp C	20
Ramp D	20
Ramp E	21

SOIL PROFILE

MAHONING COUNTY

MAH-18-9.89

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

12
33

MATCH Sta. 59+50 LINE B

℄ Proposed Ramp A

℄ Proposed Ramp E

℄ Proposed SR 18

℄ Proposed Ramp B

℄ Proposed Ramp C

℄ Proposed Ramp D

℄ Proposed SR 46

Sta. 656+85.29 - ℄ Proposed SR 18 =
Sta. 50+00 - ℄ Proposed SR 46

Residential

Woods

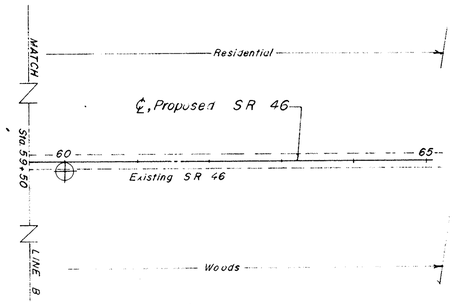
Pasture

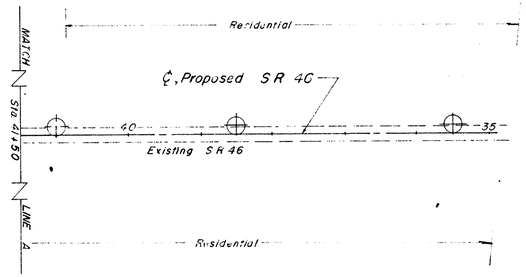
Orchard

Existing S R 46

MATCH Sta. 41+50 LINE A

SR 46 INTERCHANGE





SOIL PROFILE

MAHONING COUNTY

MAH-18-9.89

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

13
33

1100
1090
1080
1070
1060
1050
1040
1030
1020
1010
1000
990
980
970

12' Rt.
15
Refusal

12' Rt.
19
21
Refusal

12' Rt.
21
22
14
3

12' Rt.
11
20
12
Refusal

12' Rt.
21
8
Refusal
(Boulders)

Top of Rock-In-Place

Proposed grade, SR 18

Auger-Core Boring
(Sta. 657+50-℄,
Proposed SR 18)
50' Rt.
Sod & TS=0.5'

12' Rt.
19
17
9

12' Rt.
14
10
Refusal

Shale, gray, argillaceous, arenaceous, firm, with <5° bedding, badly broken above elev. 1027.5', firm massive, broken, with ca. 0.1' clay seam at elev. 1024.5'; and a few sandstone lenses throughout.

12' Rt.
10
Refusal

12' Rt.
31
Refusal

SR 46

35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65

FORMERLY TE-54-B)
GI

SOIL PROFILE

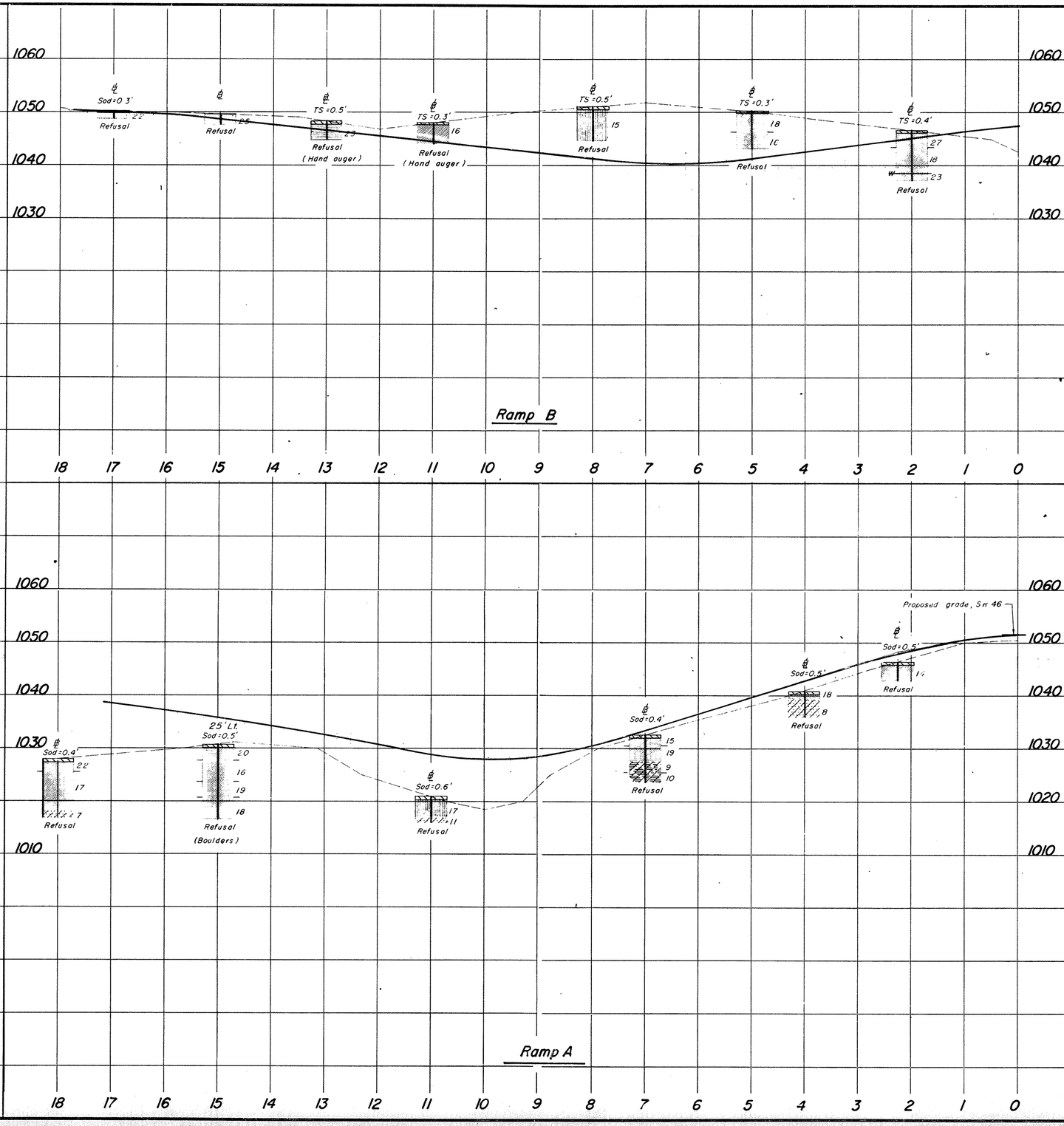
MAHONING COUNTY

MAH-18-9.89

OHIO STATE HIGHWAY TESTING LABORATORY

1620 W. BROAD ST., COLUMBUS 23, OHIO

14/33



FORMERLY TE-54-83

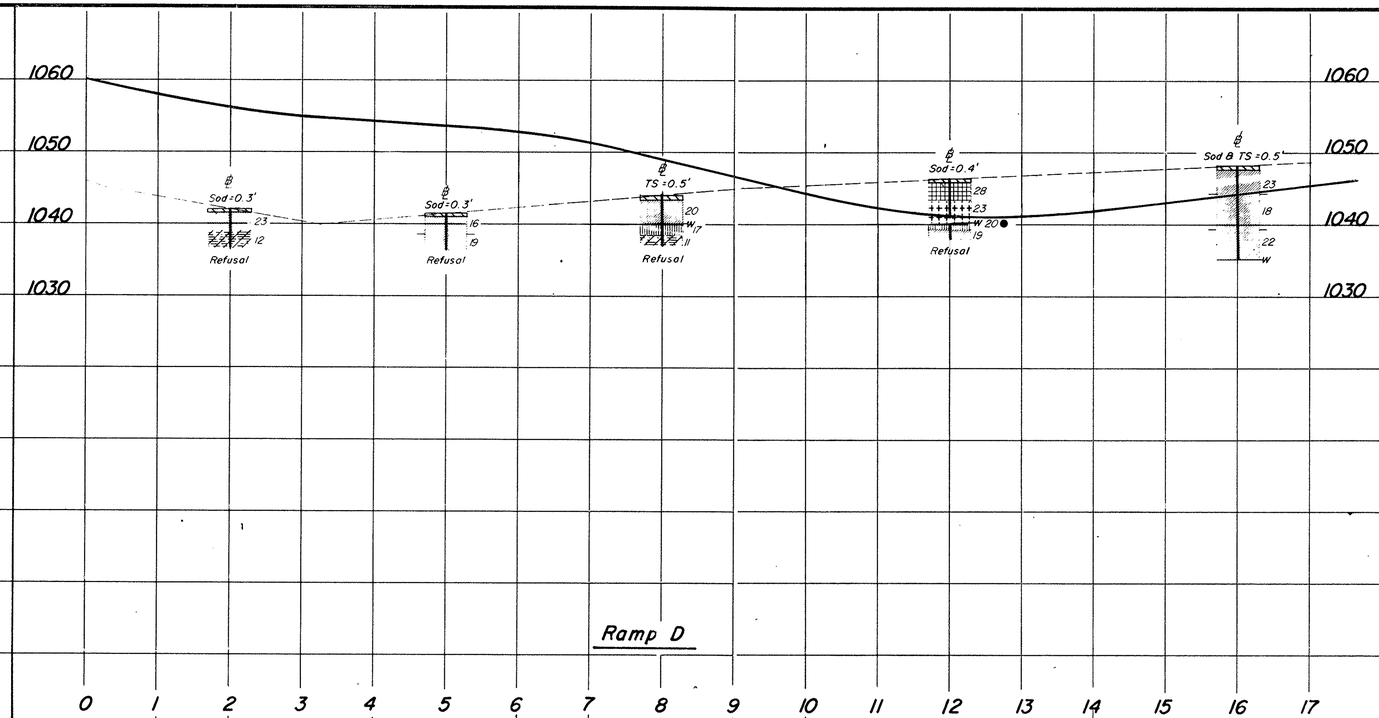
SOIL PROFILE

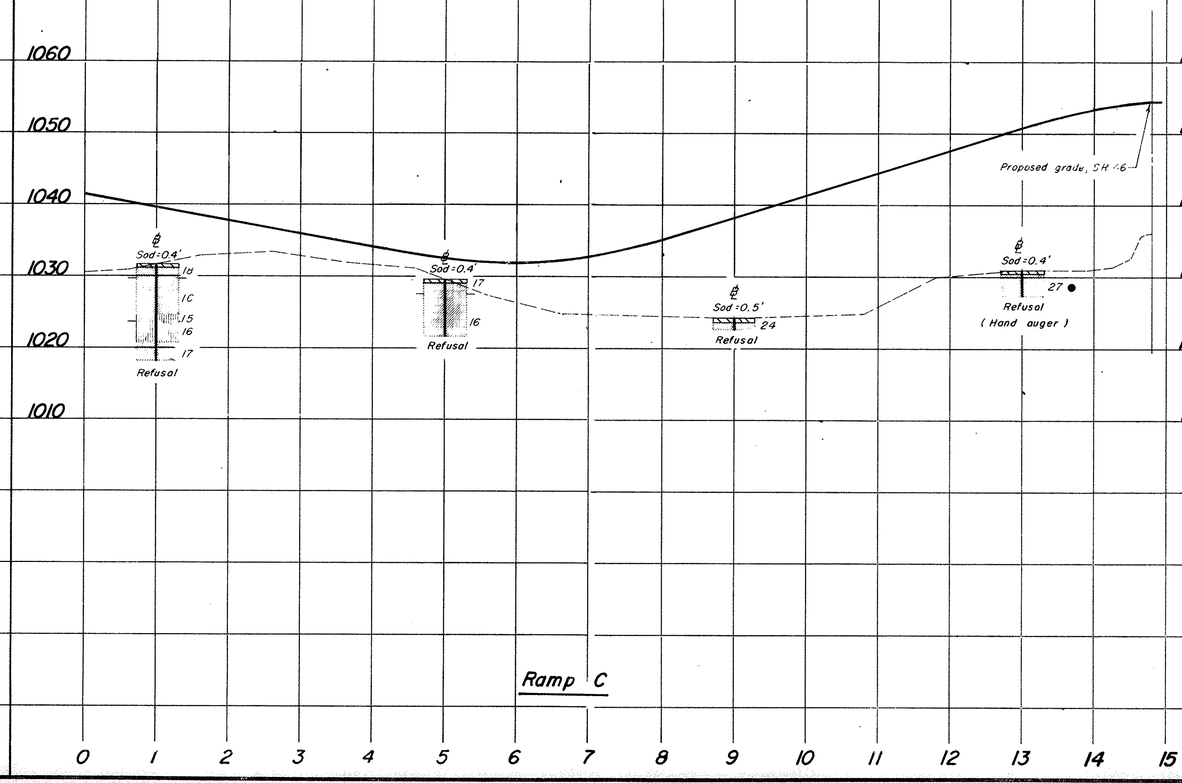
MAHONING COUNTY

MAH-18-9.89

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

15
33





FORMERLY TTE-54-83
31

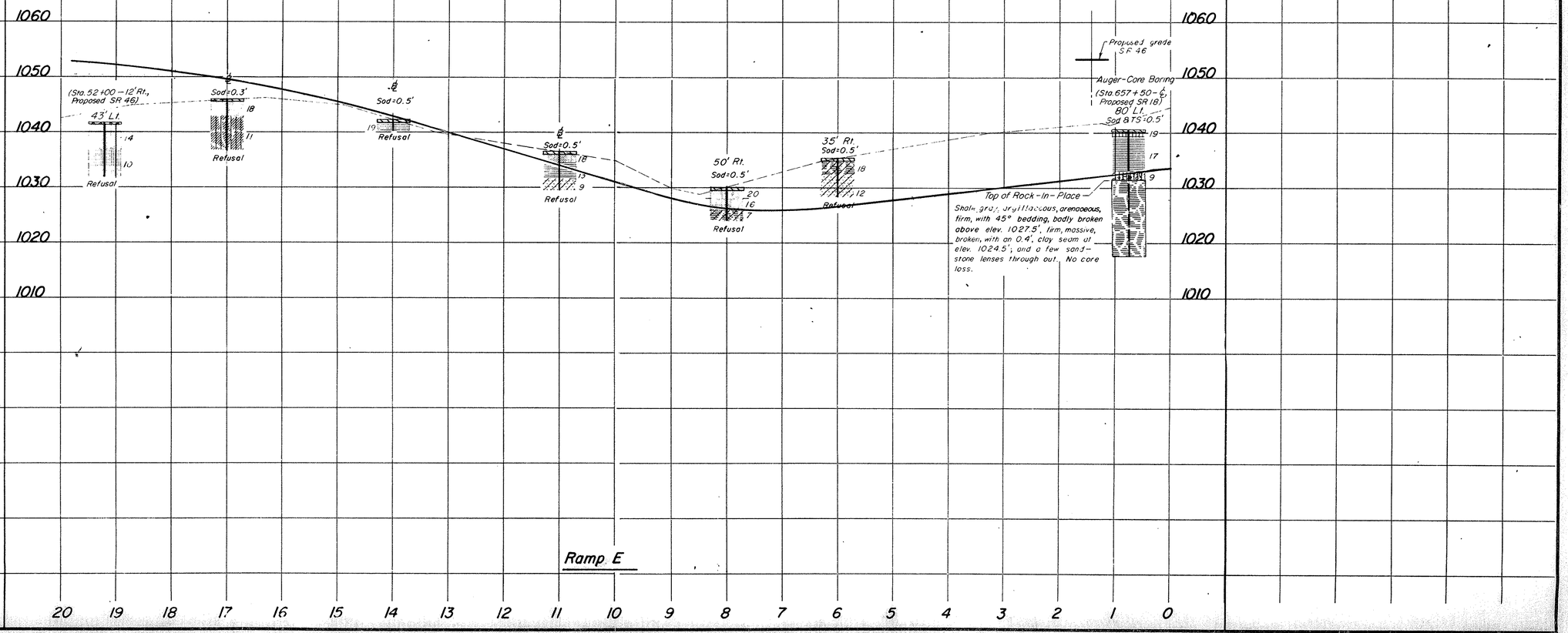
SOIL PROFILE

MAHONING COUNTY

MAH-18-989

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

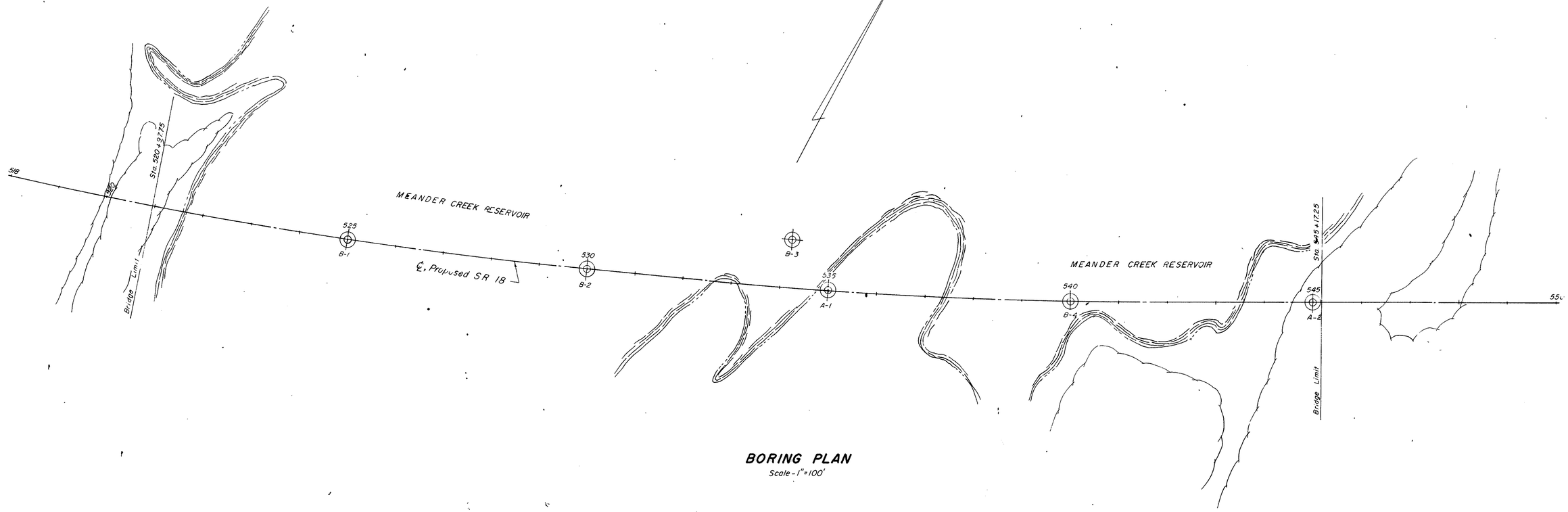
16
33



(FORMERLY TE-54-B)
0-61

BRIDGE FDN. INVEST.
MAH-18-989
OVER MEANDER CR. RES.
OHIO STATE HIGHWAY
TESTING LABORATORY
1620 W. BROAD ST., COLUMBUS 23, OHIO

17
33



BORING PLAN
Scale - 1"=100'

FORMERLY TE-54-83
-81

BRIDGE FDN. INVEST.
MAH-18-9.89
OVER MEANDER CR. RES.
OHIO STATE HIGHWAY TESTING LABORATORY
1620 W. BROAD ST., COLUMBUS 23, OHIO

18/33

Normal water, elev. 897.6'

B-1

23/5"	PS	Organic
21/22	PS	Trace of Organic
NP/13	13/12	
19/20	PS	
20/24	2/3	
19/24	2/2	
20/23	8/8	
24/41	PS	
25/44	PS	
26/36	2/3	
24/39	1/1	
24/38	PS	
20/29	PS	
23/27	PS	
NP/31	10/14	
NP/19	12/16	
17/11	15/29	
10/24	12/25	
NP/11	25/52	Quartzite Cobbles
		* Gray Sand and Stone Fragments
		Sandstone Cobbles and Fragments
		* Gray Sandy Silt with Stone Fragments
13/19 TR	32/*	Gray Sandy Silt with Cobbles and Stone Fragments

* Denotes Refusal
TR - Top of Rock

B-2

Muck

NP/18	V	Trace of Organic
20/21	5/6	
21/20	3/6	
17/24	6/6	SF
20/23	3/6	
21/26	6/9	
21/23	8/13	
20/22	14/18	
18/23	4/9	SF
NP/19	11/19	SF
INF/14	13/32	
22/30	4/6	
25/3[illegible]	3/4	
24/36	4/8	
23/32	1/1	
24/36	T/5	
22/28	6/10	

A-1

NP/18		
NP/13		
NP/18		
23/25		
29/25		
22/25		

Refusal (Retractable Piston Sampler)

B-3

20/21	PS	SF
24/29	PS	
NP/23	PS	
22/22	PS	
23/21	PS	
NP/20	PS	
21/22	PS	
-/32	10/13	Gray Silty Clay, Trace of Gravel
23/31	6/6	
21/35	4/6	
22/37	4/6	
25/31	5/5	
24/33	6/7	
22/29	PS	
21/27	4/7	
24/35	2/6	
NP/36	5/7	
NP/28	T/14	
NP/22	T/13	
-/30	12/29	Gray Sandy Silt
	17/41	Gray Sand
	21/45	Gray Sand
	27/38	Gray Sand
		Gray Sand
		Gray Sand
		Gray Sand and Gravel

Normal water, elev. 897.6'

B-4

Muck

23/23	5/8	
25/21	5/9	
23/20	9/14	
24/28	10/13	SF
20/30	8/8	
NP/25	9/11	
NP/24	13/19	
19/23	12/7	
-/18	8/12	Gray Sandy Silty Clay w/ little Stone Fragments
18/21	5/8	
20/22	5/8	SF
20/23	4/8	
13/22	6/8	
21/21	6/10	
-/20	6/9	Gray Sandy Clayey Silt and Stone Fragments
23/30	3/6	
29/8	4/5	
28/42	3/4	
25/37	1/2	
24/36	2/3	Trace of Organic
21/29	3/4	
23/26	1/1	
15/26	1/1	
NP/35	6/6	
NP/26	5/6	
NP/32	7/10	
NP/20	9/21	

A-2

NP/8		
NP/6		

Refusal (Hand Auger)

SUBSURFACE PROFILE

Horiz. Scale - 1" = 100'
Vert. Scale - 1" = 10'

930 920 910 900 890 880 870 860 850 840 830 820 810 800 790 780 770 760 750

518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550

MAHONING COUNTY
MAH-18-9.89

GEOLOGY OF THE SITE

The structure site is located in the Allegheny Plateau region, upon a dissected ground moraine. Shallow overburden overlies sandstone and shale bedrock, of Pennsylvanian age.

EXPLORATION

The exploration consisted of four drive sample-core borings and thirteen drive rod penetration tests, made between April 2 and May 1, 1963.

INVESTIGATIONAL FINDINGS

The borings disclosed that bedrock surface, encountered at 3 to 7-foot depths, elevations 943 to 933 feet, is overlain by moist, medium-dense to very dense silts, gravel and hard clays. The borings were terminated at 20-foot depth, elevations 928 to 920 feet.

The rod soundings generally met rapidly increasing resistance to penetration with increase in depth and were terminated upon encounter with refusal or abrupt refusal to penetration at 5 to 11-foot depths, elevations 940 to 933 feet, considered to be on, or below bedrock surface, as revealed by the borings.

If it is the intention to found substructure units on bedrock, it is considered advisable that the open excavation 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 excavation be well drained at all times.

Unconfined compression tests on similar shale bedrock indicates a crushing strength on the order of 150 tons per square foot.

Free water level was observed in rod sounding hole number 6, at elevation 940 feet.

LEGEND

- Auger Boring - Plan View.
- Press and/or Drive Sample and/or Core Boring - Plan View.
- Drive Rod Penetration Resistance - Soundings - Plan View
- Electrical Resistivity Probe - Plan View.
- A — Indicates Auger Boring.
- B — Indicates Press and/or Drive Sample and/or Core Boring.
- Electrical Resistivity Probe plotted to vertical scale only.
- TR — Top of Rock
- Water saturated zone.
- TD — Total Depth.
- Horizontal bar on log indicates the depth the sample was taken.
- X-Y — Figures to the right of boring log in profile view indicate the number of blows for "Standard Penetration" test. X = First 6 inches, Y = Second 6 inches
- Casing
- Resistance "R" ≤ 10,000 lbs.
- Resistance "R" ≥ 10,000 lbs.
- 1/16 — Indicates final measurement of penetration in inches.
- W — Indicates Free Water elevation.
- Indicates Static Water elevation
- Footing / Capped pile
- Footing on pile

SYMBOLS OF ROCK TYPES

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

GENERAL INFORMATION

Drive Rod Penetration Tests

Drive rod penetration resistance tests constitute driving a 1 3/5-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 conditions may be evaluated.

Drive Sample Borings - Drive - Press Sample Borings

Drive sample borings are 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, depths of press samples, field sample number, sample description based on laboratory test results and the Casagrande A-C classification system - and gradation, plasticity and moisture content determinations. Results of strength and consolidation testing 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.

Particle Size Definitions

Boulders	Cobbles	Gravel	Coarse Sand	Fine Sand	Silt	Clay
8"	3"	2.0mm (No 10 sieve)	0.42mm (No 40 sieve)		0.074mm (No 200 sieve)	0.005mm

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 STATE HIGHWAY
TESTING LABORATORY
1620 WEST BROAD STREET, COLUMBUS 23, OHIO

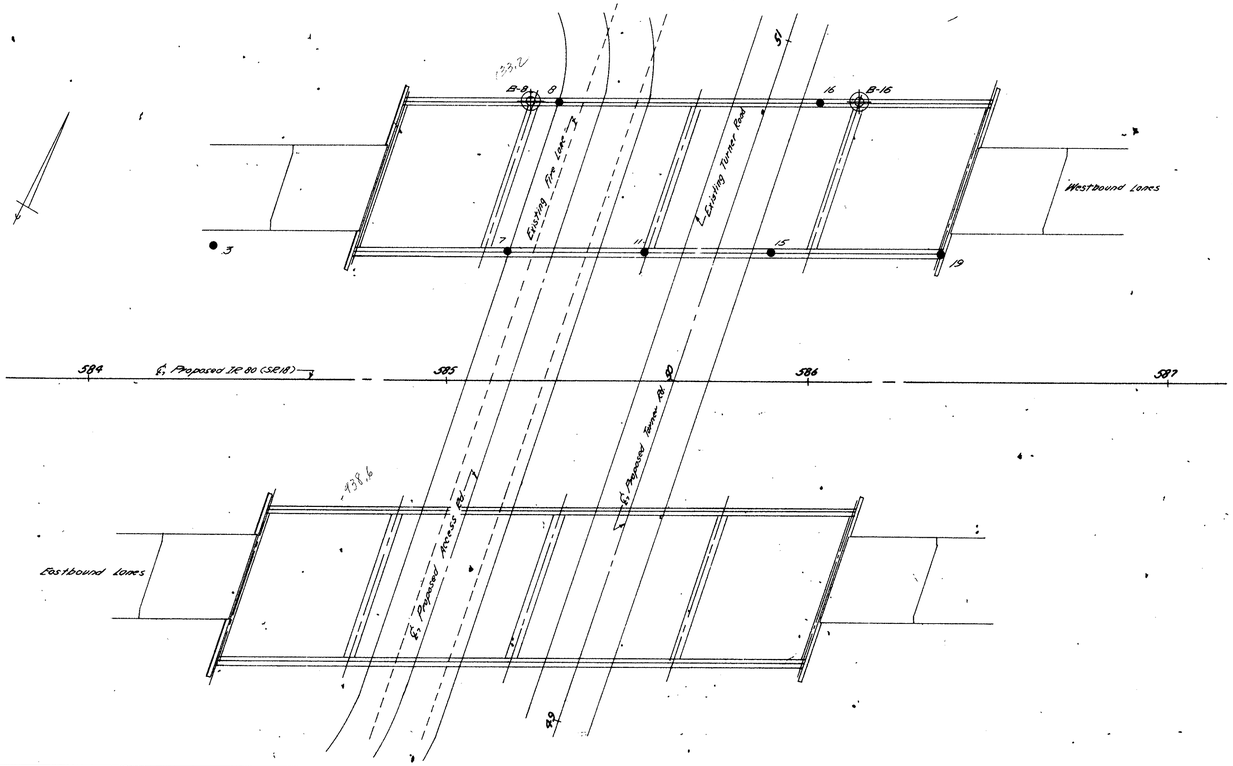
STRUCTURE FOUNDATION INVESTIGATION

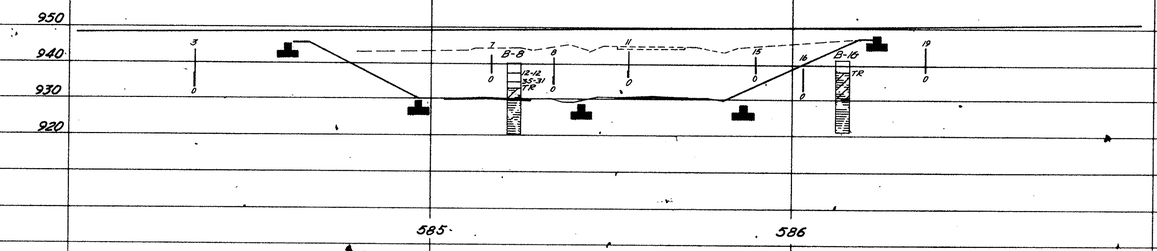
BRIDGE NO. MAH-18-1112, L & R
OVER TURNER ROAD

SEC MAH-18-9.02

CHECKED BY	REVIEWED BY	DATE
FLR	RDR	5-24-63

MAH-18-9.89





SCALE: 1" = 20'

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

STRUCTURE FOUNDATION INVESTIGATION

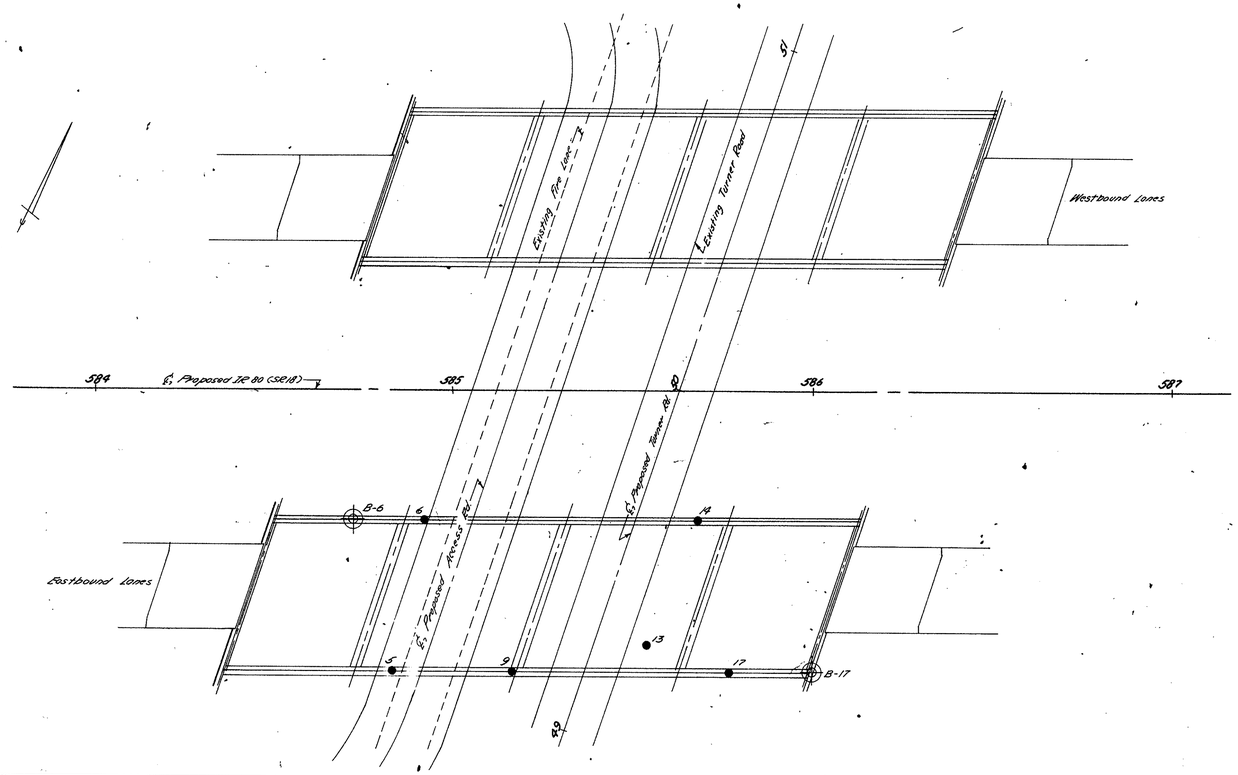
BRIDGE NO MAH-18-1112 L
OVER TURNER ROAD

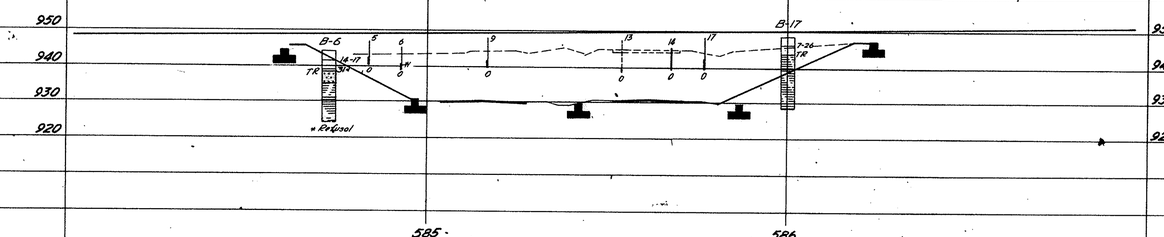
SEC MAH-18-9.02

PLAN AND PROFILE

DRAWN BY	CHECKED BY	REVIEWED BY	DATE
R.L.F	F.L.R	R.D.B	5-29-63

MAH-18-9.89





SCALE: 1" = 20'

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

STRUCTURE FOUNDATION INVESTIGATION

BRIDGE NO MAH-18-11.12 R
OVER TURNER ROAD

SEC MAH-18-9.02

PLAN AND PROFILE

DRAWN BY	CHECKED BY	REVIEWED BY	DATE
R.L.F.	R.L.R.	R.O.R.	5-24-63

MAH-18-9.89

LOG OF BORING

Date Started 5-1-63 | Sampler Type SS Dia. 1 3/8" | Water Elev.
Date Completed 5-1-63 | Casing: Length Dia.
Boring No. B-6 | Station & Offset 584+73, 36' Rt. (REAR PIER) | Surface Elev. 944.1'

Elev.	Depth	Std. Pen. (N)	Rec. ft.	Loss ft.	Description	Sample No.	% Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	Pl.	W. C.	SHTL Class.
944.1	0														
941.6	2	14/17			Brown and Gray Silt	1	0	5	11	46	38	24	6	14	
939.1	4	31/*			TOP OF ROCK										
938.6	6				Brown and Gray Gravelly Clay	2	25	4	6	28	37	32	11	17	
	8		4.5	0.0	Sandstone, brownish-gray, fine-grained, friable, with clay seams, jointed and badly broken. No core loss.										
935.1	10														
	12		5.0	0.0	Shale, argillaceous, soft, fissile, crumbly, badly broken. No core loss.										
931.1	14														
	16														
	18		5.0	0.0	Shale, gray, arenaceous, slightly micaceous, occasionally grading into argillaceous shale, generally firm, jointed and broken. No core loss.										
924.1	20														

*REFUSAL

BOTTOM OF BORING

LOG OF BORING

Date Started 4-30-63 | Sampler Type SS Dia. 1 3/8" | Water Elev.
Date Completed 4-30-63 | Casing: Length Dia.
Boring No. B-16 | Station & Offset 586+14, 75' Lt. (FORWARD PIER) | Surface Elev. 941.0'

Elev.	Depth	Std. Pen. (N)	Rec. ft.	Loss ft.	Description	Sample No.	% Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	Pl.	W. C.	SHTL Class.
941.0	0														
	2				Brown Clay (Driller's Description)										
938.0	4				TOP OF ROCK										
	6		0.4	2.1	Shale, brownish gray, argillaceous, weathered,(broken, firm in top 1.4') some iron stain on fractures and vertical joints, very crumbly, broken, slightly fissile, carbonaceous laminae. Core loss 10%.										
	8		4.8	0.2											
930.5	10														
	12		5.0	0.0	Shale, black to dark gray, firm to soft, open vertical joints (some coated with limonite), broken, arenaceous zones and laminae, slightly fissile, few silt zones. No core loss.										
	14														
	16														
	18		5.0	0.0											
921.0	20														

BOTTOM OF BORING

LOG OF BORING

Date Started 5-1-63 | Sampler Type SS Dia. 1 3/8" | Water Elev.
Date Completed 5-1-63 | Casing: Length Dia.
Boring No. B-8 | Station & Offset 585+23, 78' Lt. (REAR PIER) | Surface Elev. 940.1'

Elev.	Depth	Std. Pen. (N)	Rec. ft.	Loss ft.	Description	Sample No.	% Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	Pl.	W. C.	SHTL Class.
940.1	0														
937.6	2	12/12			Brown and Gray Silt	1	0	3	5	61	31	28	5	26	
935.1	4	35/31			Brown and Gray Gravelly Silt Clay, brown, firm with sandstone fragments.	2	32	3	3	30	32	30	5	19	
933.2	6				TOP OF ROCK										
	8		3.9	0.1											
	10														
	12		5.0	0.0	Shale, brown, soft to firm, crumbly, broken, iron stained with firm silty interbeds, carbonaceous, slightly fissile laminae,generally weathered to 10.0'. From 11.0' to base - dark gray,moderately fissile, carbonaceous laminae, some silty interbeds, firm, hard. Core loss 2%.										
	14														
	16														
	18		4.9	0.1											
920.1	20														

BOTTOM OF BORING

LOG OF BORING

Date Started 4-30-63 | Sampler Type SS Dia. 1 3/8" | Water Elev.
Date Completed 4-30-63 | Casing: Length Dia.
Boring No. B-17 | Station & Offset 586+00, 78' Rt. (FORWARD ABUTMENT) | Surface Elev. 948.5'

Elev.	Depth	Std. Pen. (N)	Rec. ft.	Loss ft.	Description	Sample No.	% Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	Pl.	W. C.	SHTL Class.
948.5	0														
946.0	2	7/26			Brown Silty Sandy Gravel	1	32	11	21	15	21	21	5	16	
943.5	4				TOP OF ROCK										
	6		4.9	0.1											
	8														
	10		5.0	0.0	Shale, yellowish-brown, broken, firm, crumbly, fissile-in-part, arenaceous, iron stains on partings, silty interbeds, some soft clayey interbeds gray and slightly fissile. Basal 8.0' shale, gray,carbonaceous laminae, broken, vertical open fractures, some silty interbeds. Core loss 2%.										
	12														
	14														
	16														
	18		4.9	0.1											
928.5	20														

BOTTOM OF BORING

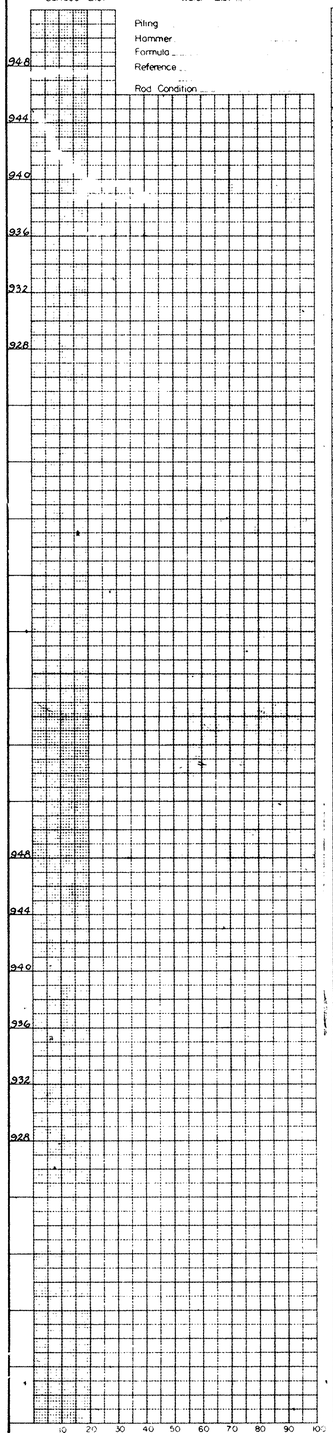
OHIO STATE HIGHWAY
TESTING LABORATORY
1620 WEST BROAD ST., COLUMBUS 23, OHIO

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. MAH-18-1112 L&R
OVER TURNER ROAD
SEC. MAH-18-9.02

BORING DATA

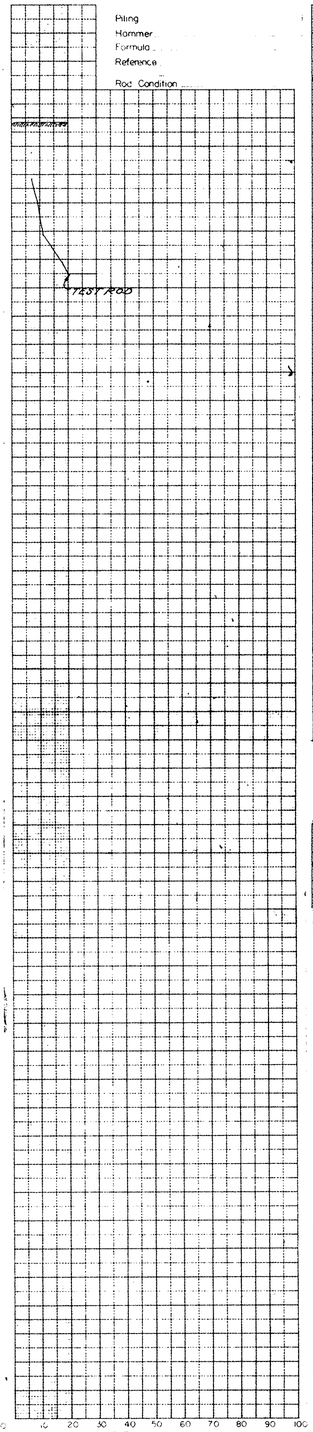
TYPED BY	CHECKED BY	REVIEWED BY	DATE
C.N.	F.L.R.	R.L.R.	5-28-63

Test Location No. —
Station & Offset —
Surface Elev. — Water Elev. —
Piling —
Hammer —
Formula —
Reference —
Rod Condition —



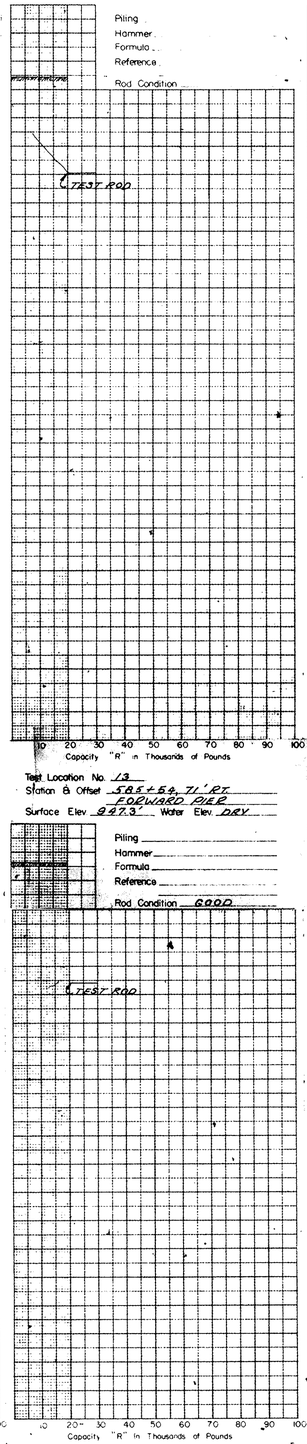
10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No. 3
Station & Offset 584+35, 36' LT.
REAR ABUTMENT
Surface Elev. 943.7' Water Elev. —
Piling —
Hammer —
Formula —
Reference —
Rod Condition —



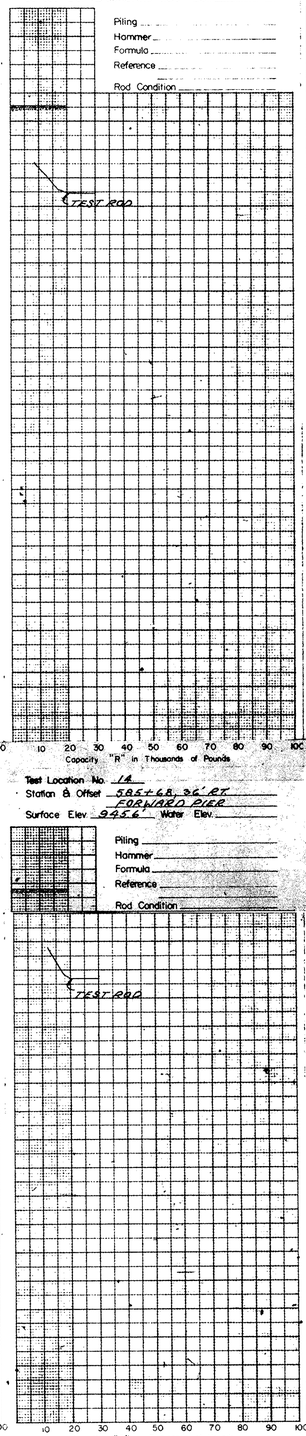
10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No. 5
Station & Offset 584+84, 78' RT.
REAR PIER
Surface Elev. 946.9' Water Elev. —
Piling —
Hammer —
Formula —
Reference —
Rod Condition —



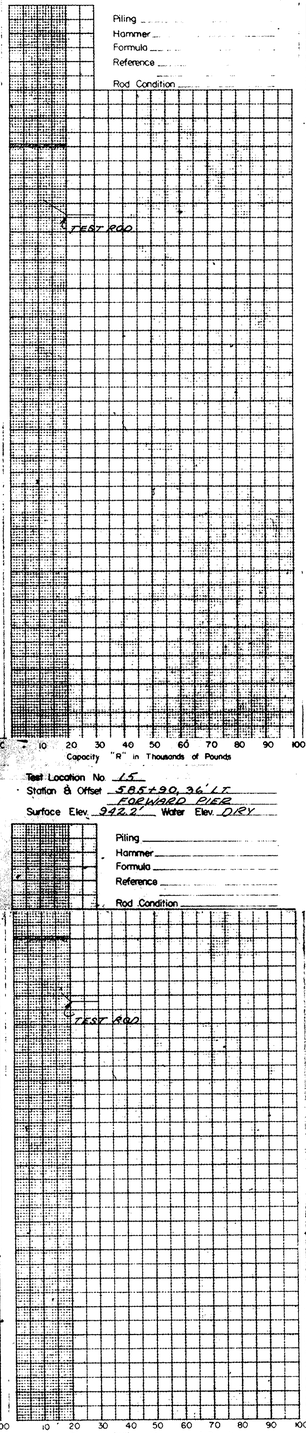
10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No. 6
Station & Offset 584+93, 36' RT.
REAR PIER
Surface Elev. 945.1 Water Elev. 940.1'
Piling —
Hammer —
Formula —
Reference —
Rod Condition —



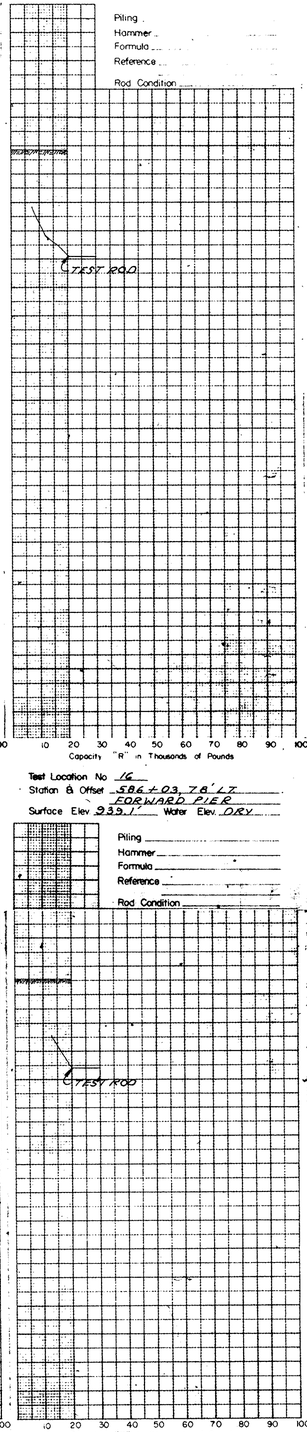
10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No. 7
Station & Offset 585+17, 36' LT.
REAR PIER
Surface Elev. 942.2' Water Elev. —
Piling —
Hammer —
Formula —
Reference —
Rod Condition —



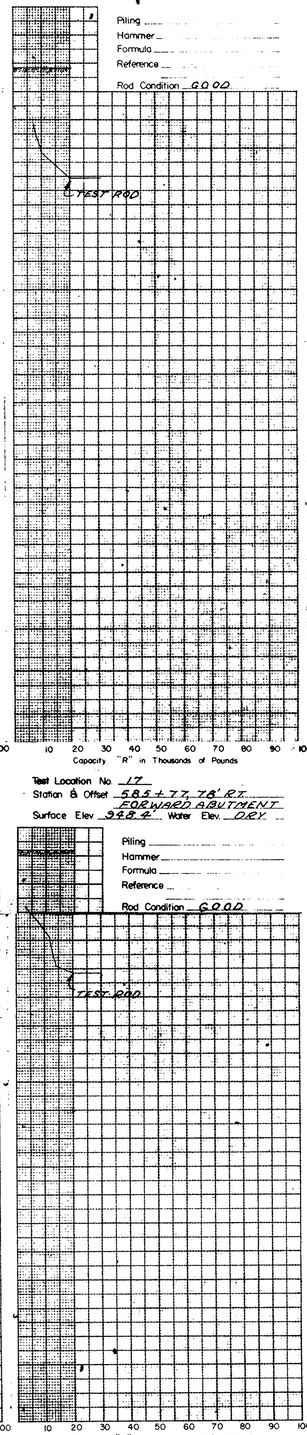
10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No. 8
Station & Offset 585+31, 78' LT.
REAR PIER
Surface Elev. 941.7' Water Elev. —
Piling —
Hammer —
Formula —
Reference —
Rod Condition —



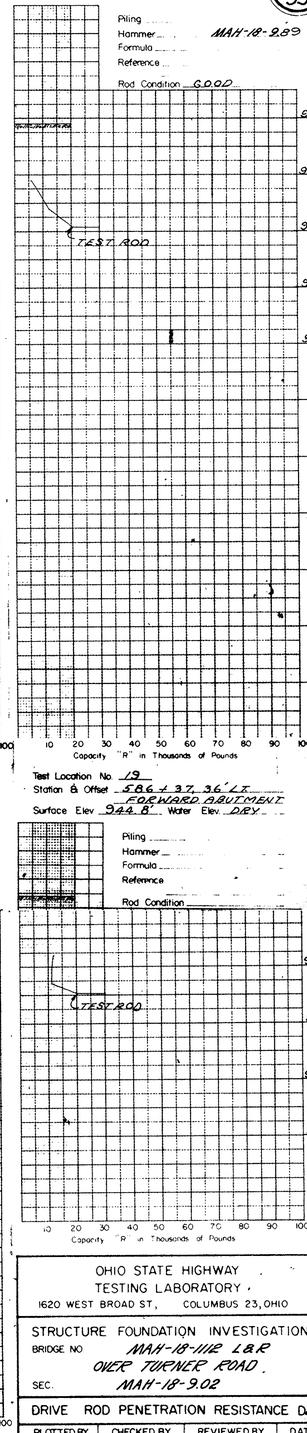
10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No. 9
Station & Offset 585+17, 78' RT.
CENTER PIER
Surface Elev. 947.7' Water Elev. DRY.
Piling —
Hammer —
Formula —
Reference —
Rod Condition GOOD



10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No. 11
Station & Offset 585+55, 36' LT.
CENTER PIER
Surface Elev. 943.6 Water Elev. DRY.
Piling —
Hammer — MAH-18-9.89
Formula —
Reference —
Rod Condition GOOD



10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No. 13
Station & Offset 585+54, 71' RT.
FORWARD PIER
Surface Elev. 947.9 Water Elev. DRY
Piling —
Hammer —
Formula —
Reference —
Rod Condition GOOD

10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No. 14
Station & Offset 585+68, 36' RT.
FORWARD PIER
Surface Elev. 945.6 Water Elev. —
Piling —
Hammer —
Formula —
Reference —
Rod Condition —

10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No. 15
Station & Offset 585+90, 36' LT.
FORWARD PIER
Surface Elev. 942.2' Water Elev. DRY
Piling —
Hammer —
Formula —
Reference —
Rod Condition —

10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No. 16
Station & Offset 586+03, 78' LT.
FORWARD PIER
Surface Elev. 939.1' Water Elev. DRY
Piling —
Hammer —
Formula —
Reference —
Rod Condition —

10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No. 17
Station & Offset 585+77, 78' RT.
FORWARD ABUTMENT
Surface Elev. 948.4' Water Elev. DRY
Piling —
Hammer —
Formula —
Reference —
Rod Condition GOOD

10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No. 19
Station & Offset 586+37, 36' LT.
FORWARD ABUTMENT
Surface Elev. 944.8' Water Elev. DRY
Piling —
Hammer —
Formula —
Reference —
Rod Condition —

10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

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

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. MAH-18-11.12 L&R
OVER TURNER ROAD.
SEC. MAH-18-9.02

DRIVE ROD PENETRATION RESISTANCE DATA

PLOTTED BY	CHECKED BY	REVIEWED BY	DATE
R.C.	F.L.R.	R.D.R.	5-24-63

MAHONING COUNTY
MAH-18-2.89

GEOLOGY OF THE SITE

The structure site is located in the Allegheny Platesu region upon dissected ground moraine. Thin overburden overlies sandstone and shale bedrock, of Pennsylvanian age.

EXPLORATION

The exploration consisted of one drive sample-core boring, one core boring, and twelve drive rod penetration tests, made on April 3, 4, and 25, 1963.

INVESTIGATIONAL FINDINGS

The borings disclosed that bedrock surface, encountered at 2 and 6-foot depths, elevations 1022 and 1013 feet, is overlain by moist, hard clays. The borings were terminated at 20-foot depth, elevations 1005 and 999 feet, after penetrating 14 and 18 feet below bedrock surface.

The rod soundings generally met rapidly increasing resistance to penetration with increase in depth and were terminated upon encounter with abrupt refusal or refusal to penetration at 3 to 9-foot depths, elevations 1023 to 1010 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 left rear area of the site to the right and forward portions of the structure site, between elevations 1022 to 1013 feet.

If it is the intention to found substructure units on bedrock, it is considered advisable that the open excavation 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 excavation be wall drained at all times.

Unconfined compression tests on similar weathered and firm shale bedrock indicates a crushing strength on the order of 100 to 150 tons per square foot, respectively.

No free water was observed in the rod sounding holes.

LEGEND

- Auger Boring - Plan View.
- Press and/or Drive Sample and/or Core Boring - Plan View.
- Drive Rod Penetration Resistance - Soundings - Plan View.
- Electrical Resistivity Probe - Plan View.
- A — Indicates Auger Boring.
- B — Indicates Press and/or Drive Sample and/or Core Boring.
- Electrical Resistivity Probe plotted to vertical scale only.
- TR — Top of Rock
- Water saturated zone.
- TD — Total Depth.
- Horizontal bar on log indicates the depth the sample was taken.
- X-Y — Figures to the right of boring log in profile view indicate the number of blows for "Standard Penetration" test. X = First 6 inches, Y = Second 6 inches
- Casing
- Resistance "R" < 10,000 lbs.
- Resistanoe "R" => 10,000 lbs.
- 1/16 — Indicates final measurement of penetration in inches.
- W — Indicates Free Water elevation.
- Indicates Static Water elevation.
- Footing — Capped pile
- Footing on pile

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 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 conditions may be evaluated.

Drive Sample Borings - Drive - Press Sample Borings

Drive sample borings are 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, depths of press samples, field sample number, sample description -- based on laboratory test results and the Casagrande A.C classification system - and gradation, plasticity and moisture content determinations. Results of strength and consolidation testing 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.

Particle Size Definitions

Boulders	Cobbles	Gravel	Coarse Sand	Fine Sand	Silt	Clay
8"	3"	2.0mm (No. 10 sieve)	0.42mm (No. 40 sieve)	0.074mm	0.005mm (No. 200 sieve)	

LOG OF BORING

Date Started 4-25-63 — Sampler Type SS — Dia. 1 3/8" — Water Elev. —
Date Completed 4-25-63 — Casing: Length — Dia. —
Boring No. B-5 — Station & Offset 620+21, 78' Lt. (REAR PIER) — Surface Elev. 1024.9'

Elev.	Depth	Std. Pen. (N)	Rec. ft.	Loss ft.	Description	Sample No.	% Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	Pl.	W.C.	SHTL Class.
1024.9	0				Brown Clay (Driller's Description)										
1022.4	2				TOP OF ROCK										
	4		0.9	1.6	Sandstone, light-gray, medium-grained, friable, with clay seams and thin carbonaceous partings, broken. Core loss 30%.										
1017.4	6														
	8		3.9	1.1											
	10														
	12		5.0	0.0	Shale, gray, to dark-gray, generally firm, fissile, carbonaceous, with clay seams above 14.5', badly broken. No core loss.										
	14														
	16														
	18		5.0	0.0											
1004.9	20				BOTTOM OF BORING										

LOG OF BORING

Date Started 4-25-63 — Sampler Type SS — Dia. 1 3/8" — Water Elev. —
Date Completed 4-25-63 — Casing: Length — Dia. —
Boring No. B-12 — Station & Offset 621+42, 78' Rt. (FORWARD PIER) — Surface Elev. 1019.3'

Elev.	Depth	Std. Pen. (N)	Rec. ft.	Loss ft.	Description	Sample No.	% Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	Pl.	W.C.	SHTL Class.
1019.3	0														
1016.8	2														
	4	17/27			Brown and Gray Gravelly Clay	1	43	1	1	24	31	36	12	21	
1014.3	6	16/19			Brown and Gray Gravelly Clay	2	57	0	1	13	29	46	20	19	
1013.3	8				TOP OF ROCK										
	10		3.2	0.8	Shale, brown and gray, argillaceous, fissile, weathered, soft to medium-firm, very badly broken and jointed. Core loss 12%.										
1006.7	12														
	14		5.0	0.0											
	16				Shale, gray, argillaceous, fissile, slightly weathered in top 1.0', firm, badly broken and jointed above 16.3', broken and jointed intervals in remainder. No core loss.										
999.3	18		5.0	0.0											
	20				BOTTOM OF BORING										

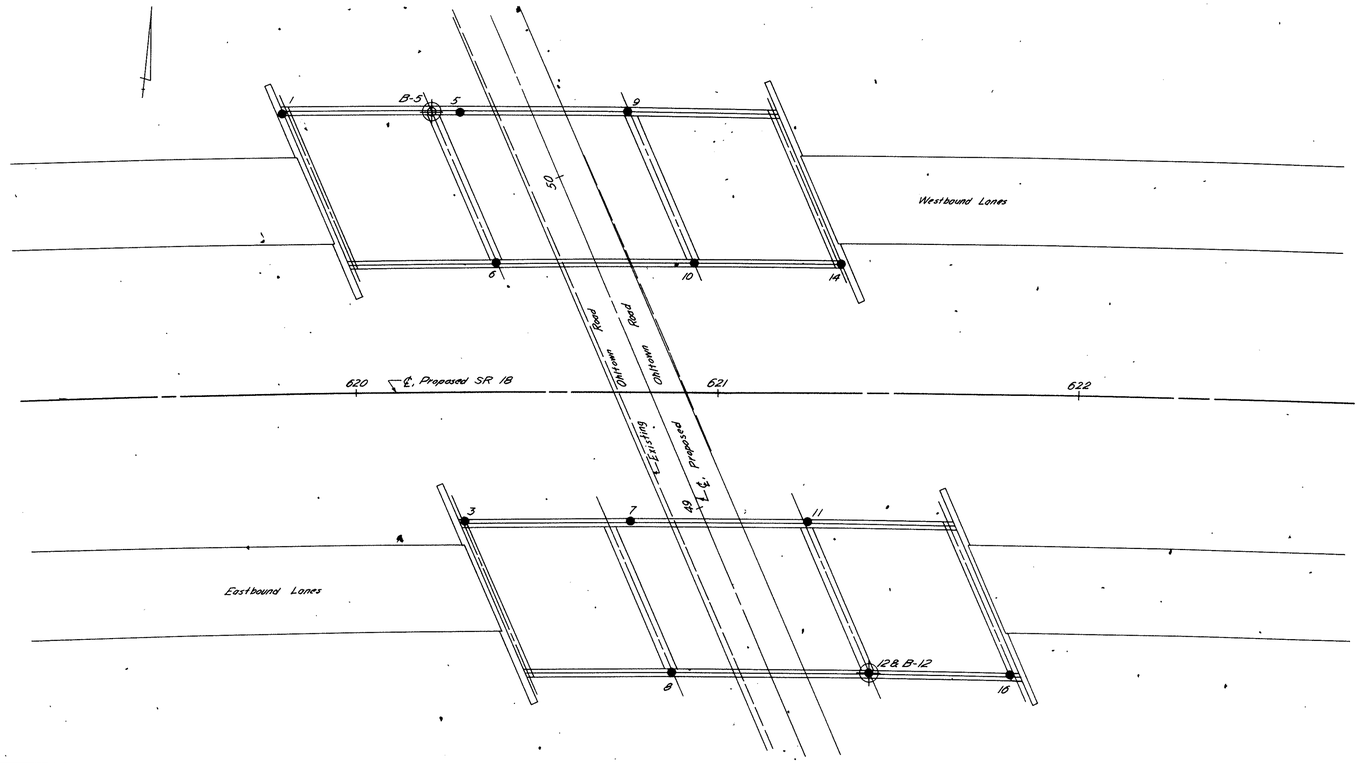
NOTE: Information shown by this subsurface investigation was obtained solely for the use in establishing design controls for the project. The State of Ohio does not guarantee the accuracy of this data and it is not to be construed as a part of the plans governing construction of the project.

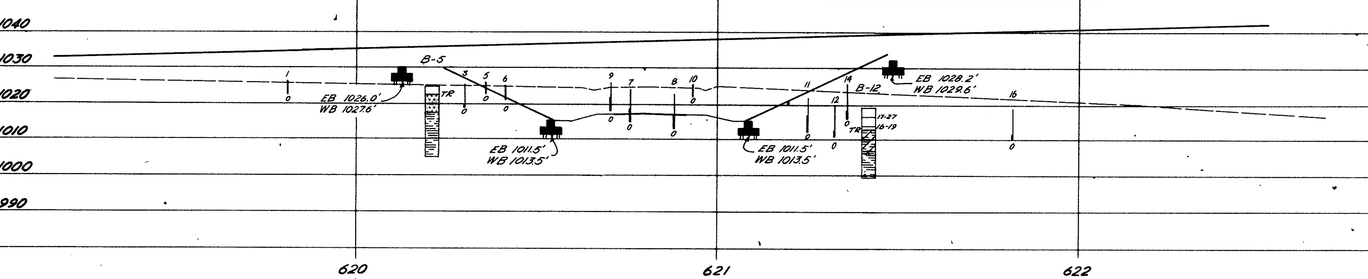
OHIO STATE HIGHWAY
TESTING LABORATORY
1620 WEST BROAD STREET, COLUMBUS 23, OHIO

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. MAH-18-1178
OVER OHLTOWN ROAD
SEC. MAH-18-2.02

CHECKED BY	REVIEWED BY	DATE
F.L.R.	R.D.R.	6-5-63

MAH-18-9.89





SCALE: 1" = 20'

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

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO MAH-18-1178
OVER OHLTOWN ROAD
SEC MAH-18-9.02

PLAN AND PROFILE

DRAWN BY	CHECKED BY	REVIEWED BY	DATE
R.P.W.	F.L.R.	R.D.R.	6-5-63

Test Location No 1
Station & Offset 619+81, 78' LT
REAR ABUTMENT
Surface Elev 1026.0' Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition
1030 1026 1022 1018 1014 1010
TEST ROD
10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No 3
Station & Offset 620+30, 36' RT
REAR ABUTMENT
Surface Elev 1025.3' Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition
TEST ROD
10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No 5
Station & Offset 620+29, 78' LT
REAR PIER
Surface Elev 1025.8' Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition
TEST ROD
10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No 6
Station & Offset 620+39, 36' LT
REAR PIER
Surface Elev 1025.1' Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition
TEST ROD
10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No 7
Station & Offset 620+76, 36' RT
REAR PIER
Surface Elev 1023.9' Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition
TEST ROD
10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No 8
Station & Offset 620+88, 78' RT
REAR PIER
Surface Elev 1022.6' Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition
TEST ROD
10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No 9
Station & Offset 620+75, 78' LT
FORWARD PIER
Surface Elev 1025.9' Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition
TEST ROD
10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No 10
Station & Offset 620+93, 36' LT
FORWARD PIER
Surface Elev 1025.6' Water Elev.
Piling MAH-18-989
Hammer
Formula
Reference
Rod Condition
1030 1026 1022 1018 1014 1010
TEST ROD
10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No 11
Station & Offset 621+25, 36' RT
FORWARD PIER
Surface Elev 1021.6 Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition
1030 1026 1022 1018 1014 1010
TEST ROD
10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No 12
Station & Offset 621+42, 78' RT
FORWARD PIER
Surface Elev 1019.9 Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition
TEST ROD
10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No 14
Station & Offset 621+39, 36' LT
FORWARD ABUTMENT
Surface Elev 1023.5' Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition
TEST ROD
10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

Test Location No 16
Station & Offset 621+82, 78' RT
FORWARD ABUTMENT
Surface Elev 1019.1' Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition
TEST ROD
10 20 30 40 50 60 70 80 90 100
Capacity "R" in Thousands of Pounds

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

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. MAH-18-1178
OVER OHLTOWN ROAD
SEC. MAH-18-902

DRIVE ROD PENETRATION RESISTANCE DATA

PLOTTED BY	CHECKED BY	REVIEWED BY	DATE
R.C.	F.L.R.	R.O.E.	6-5-63

MAHONING COUNTY
MAH-18-9.89

GEOLOGY OF THE SITE

The structure site is located in the Allegheny Plateau region upon dissected ground moraine. Thin glacial drift overlies sandstone and shale bedrock, of Pennsylvanian age.

EXPLORATION

The exploration consisted of two drive sample-core borings, eight drive rod penetration tests, and eight hand-driven probes, made on April 23 and 24, 1963.

INVESTIGATIONAL FINDINGS

The borings disclosed that bedrock surface, encountered at 7-foot depth, elevation 1013 feet, is overlain by very stiff clay and medium-dense to very dense silts, cobbles, and stone fragments. The borings were terminated at 20 and 25-foot depths, elevations 1000 and 995 feet, after penetrating 13 and 18 feet below bedrock surface.

The rod soundings and hand-driven probes generally met rapidly increasing resistance to penetration with increase in depth, and were terminated upon encounter with refusal to penetration at 1 to 8-foot depths, elevations 1019 to 1012 feet, considered to be aboys, on, or slightly below bedrock surface, as revealed by the borings.

On the basis of the borings, bedrock surface is considered to be essentially flat-lying across the structure site, at elevation 1013 feet.

If it is the intention to found substructure units on bedrock, it is considered advisable that the open excavation 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 excavation be well drained at all times.

Unconfined compression tests on similar shale bedrock indicates a crushing strength on the order of 150 tons per square foot.

Free water level was observed in rod sounding holes numbers 9, 10, and 11, between elevations 1017 and 1016 feet.

LEGEND

- Auger Boring - Plan View.
- Press and/or Drive Sample and/or Core Boring - Plan View.
- Drive Rod Penetration Resistance - Soundings - Plan View
- (R) Electrical Resistivity Probe - Plan View.
- A — Indicates Auger Boring.
- B — Indicates Press and/or Drive Sample and/or Core Boring.
- Electrical Resistivity Probe plotted to vertical scale only.
- TR — Top of Rock
- Water saturated Zone.
- TD — Total Depth.
- Horizontal bar on log indicates the depth the sample was taken.
- X-Y — Figures to the right of boring log in profile view indicate the number of blows for "Standard Penetration" test. X = First 6 inches; Y = Second 6 inches
- Casing
- Resistance "R" = 10,000 lbs.
- Resistance "R" = 10,000 lbs.
- 1/16 — Indicates final measurement of penetration in inches
- W — Indicates Free Water elevation.
- Indicates Static Water elevation.
- Footing; Capped pile
- Footing on pile

SYMBOLS OF ROCK TYPES

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

GENERAL INFORMATION

Drive Rod Penetration Tests

Drive rod penetration resistance tests constitute driving a 1-3/8 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 of other locations on the structure site. From this comparison, the overall uniformity of subsurface conditions may be evaluated.

Drive Sample Borings - Drive - Press Sample Borings

Drive sample borings are 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, depths of press samples, field sample number, sample description based on laboratory test results and the Casagrande A-C classification system and gradation, plasticity and moisture content determinations. Results of strength and consolidation testing 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.

Particle Size Definitions

Boulders	Cobbles	Gravel	Coarse Sand	Fine Sand	Silt	Clay
		No 10 sieve	No 40 sieve	No 200 sieve		
8"	3"	76mm	0.42mm	0.074mm	0.005mm	

LOG OF BORING

Date Started 4-24-63 — Sampler Type SS — Dia. 1 3/8" — Water Elev. —
Date Completed 4-24-63 — Casing: Length — Dia. —
Boring No. B-4 — Station & Offset 630+68, 78' Lt. (REAR ABUTMENT) — Surface Elev. 1020.5'

Elev.	Depth	Std. Pen. (N)	Rec. ft.	Loss ft.	Description	Sample No.	Physical Characteristics: % Agg	% G.S.	% F.S.	% Silt	% Clay	L.L.	Pl.	W.C.	SHTL Class.
1020.5	0														
	2														
1018.0	4	25/*			Brown & Gray Clay with Stone Fragments	1	71	4	8	6	11	PL= 18		16	
1015.5	6				Igneous cobbles and sandstone fragments										
1014.5					Brown Sandy Silt with trace of Stone Fragments										
1013.3	8		4.5	0.5	TOP OF ROCK										
	10				Shale, black, extremely carbonaceous, with few coal laminae, slightly pyritiferous in bottom 1.0', soft in top 0.2', firm in remainder, fissile, platy and brittle, jointed and broken-in-part. No core loss.										
1007.4	12														
	14		5.0	0.0											
	16				Sandstone, gray, coarse-grained, with few carbonaceous laminae, massive, firm, with 0.2' shale pebble conglomerate at top. No core loss.										
	18		5.0	0.0											
1000.5	20														

*REFUSAL — BOTTOM OF BORING

LOG OF BORING

Date Started 4-24-63 — Sampler Type SS — Dia. 1 3/8" — Water Elev. —
Date Completed 4-24-63 — Casing: Length — Dia. —
Boring No. B-9 — Station & Offset 630+44, 78' Rt. (FORWARD PIER) — Surface Elev. 1020.9'

Elev.	Depth	Std. Pen. (N)	Rec. ft.	Loss ft.	Description	Sample No.	Physical Characteristics: % Agg	% G.S.	% F.S.	% Silt	% Clay	L.L.	Pl.	W.C.	SHTL Class.
1020.9	0														
	2														
1018.4	4	8/9			Mottled Brown and Gray Sandy Gravelly Clay	1	35	5	12	24	24	29	13	14	
1015.9	6	6/8			Mottled Brown and Gray Sandy Gravelly Silt	2	38	6	9	24	23	33	8	24	
1013.4	8				TOP OF ROCK										
	10		0.7	1.8											
1008.6	12				Shale, dark-gray, carbonaceous, fissile, firm, badly broken. Core loss 25%.										
	14		5.0	0.0											
	16														
	18		5.0	0.0	Sandstone, gray, medium-grained, with carbonaceous partings thoughout, firm, broken. No core loss.										
	20														
	22		5.0	0.0											
995.9	24														

BOTTOM OF BORING

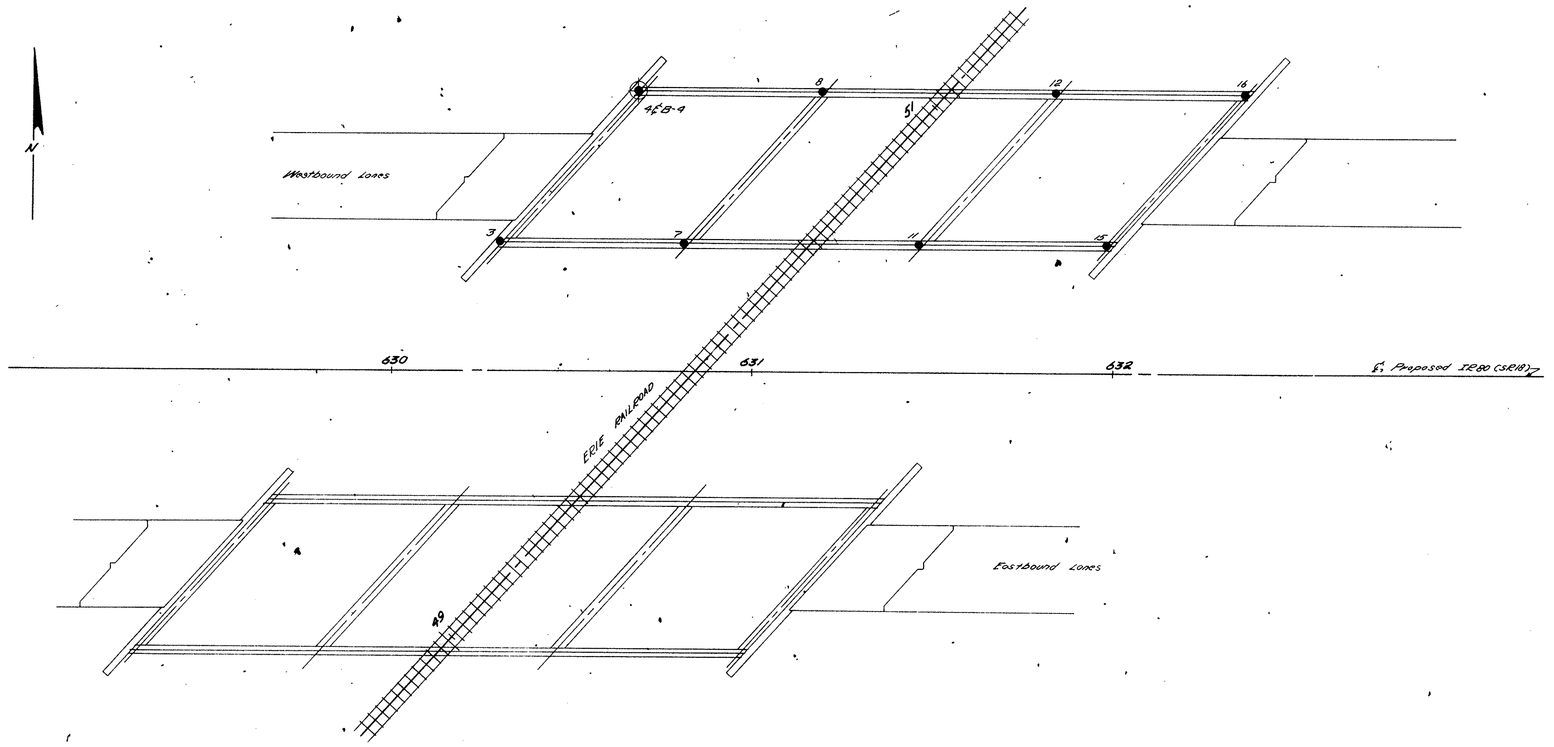
NOTE Information shown by this subsurface investigation was obtained solely for the use in establishing design controls for the project. The State of Ohio does not guarantee the accuracy of this data and it is not to be construed as a part of the plans governing construction of the project.

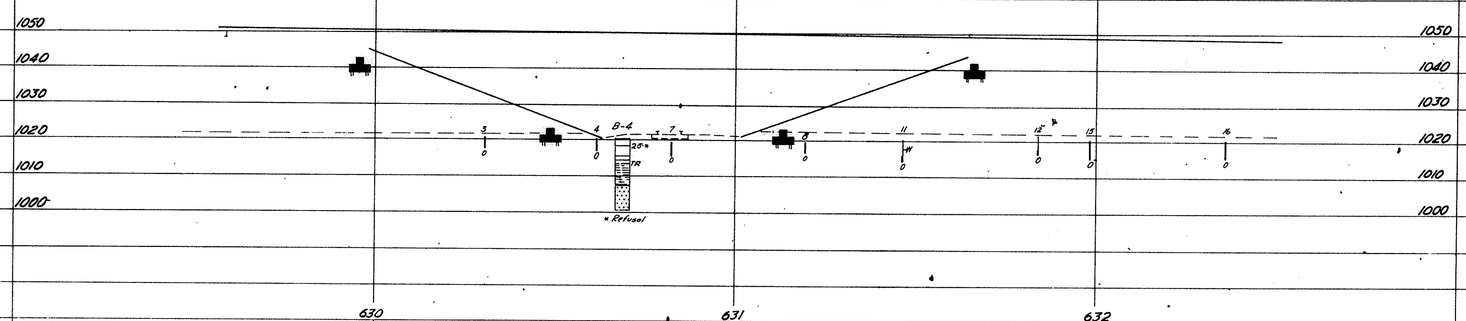
OHIO STATE HIGHWAY
TESTING LABORATORY
1620 WEST BROAD STREET, COLUMBUS 23, OHIO

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO MAH-18-1197 L&R OVER ERIE RAILROAD
SEC MAH-18-9.02

THE	DRAWN	CHECKED	DATE
F.L.R.		R.D.B.	5-15-63

MAH-18-9.89





SCALE: 1" = 20'

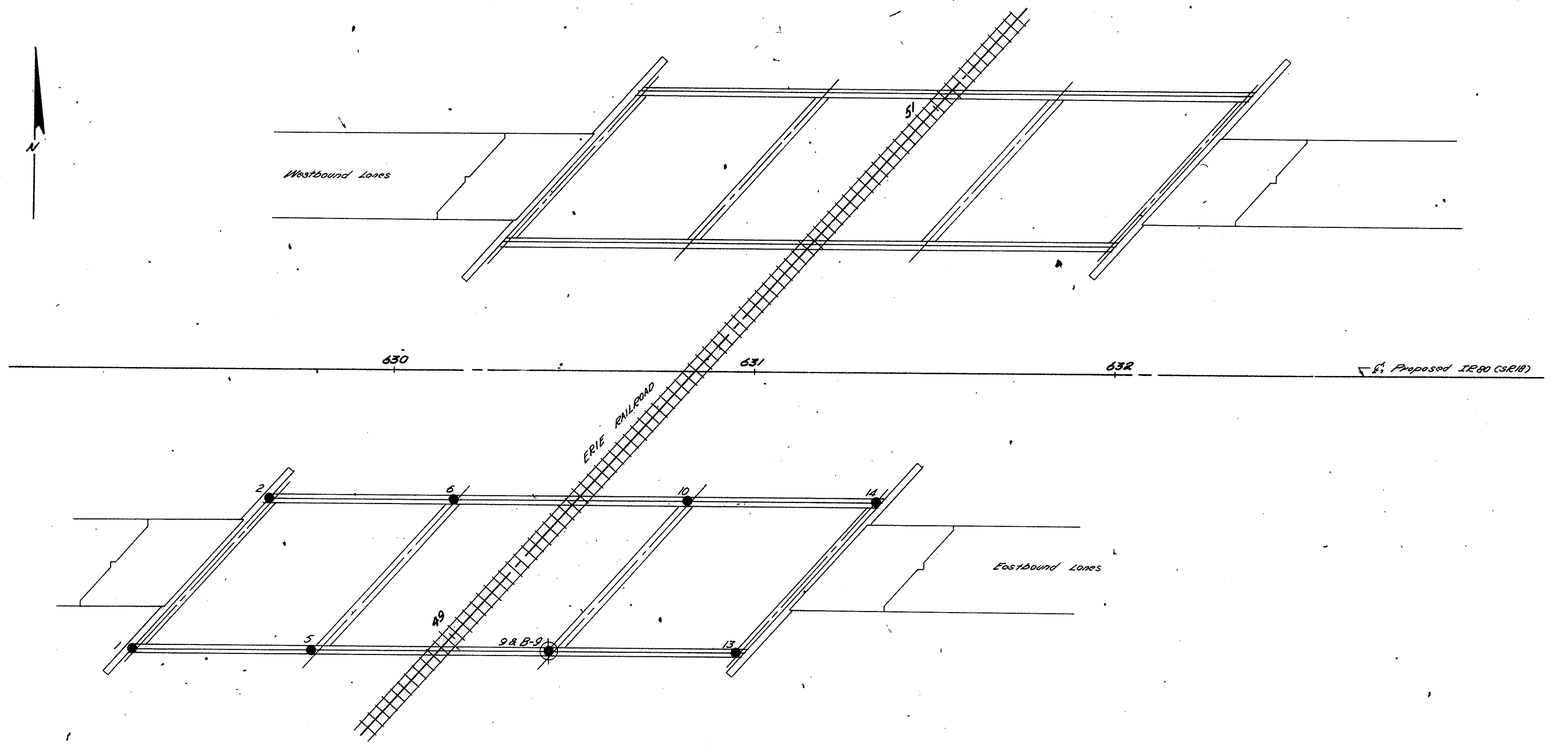
OHIO STATE HIGHWAY
TESTING LABORATORY
1620 WEST BROAD ST., COLUMBUS 23, OHIO

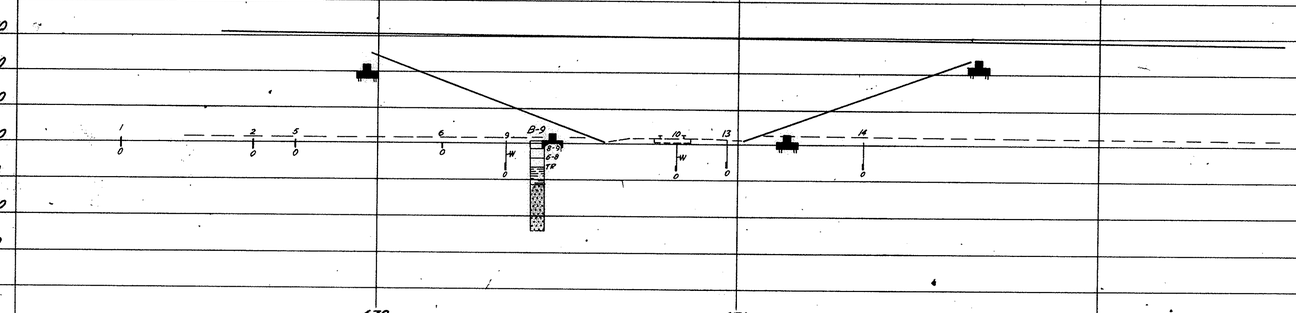
STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. MAH-18-1197 L
OVER ERIE RAILROAD
SEC MAH-18-9.02

PLAN AND PROFILE

DRAWN BY	CHECKED BY	REVIEWED BY	DATE
R.L.F., R.P.W.	F.L.R.	R.D.R.	5-15-03

MAH-18-9.89





SCALE: 1" = 20'

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

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO MAH-18-1197 R
OVER ERIE RAILROAD
SEC MAH-18-9.02

PLAN AND PROFILE

DRAWN BY	CHECKED BY	REVIEWED BY	DATE
R.L.F., R.P.H.	F.L.R.	R.D.R.	5-13-63

Test Location No 1
Station & Offset 629+29, 78' RT.
REAR ABUTMENT
Surface Elev 1021.1' Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition
HAND ROD
Capacity "R" in Thousands of Pounds

Test Location No 2
Station & Offset 629+66, 36' RT.
REAR ABUTMENT
Surface Elev 1020.9' Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition
HAND ROD
Capacity "R" in Thousands of Pounds

Test Location No 3
Station & Offset 630+30, 36' LT.
REAR ABUTMENT
Surface Elev 1020.6' Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition
HAND ROD
Capacity "R" in Thousands of Pounds

Test Location No 4
Station & Offset 630+68, 78' LT.
REAR ABUTMENT
Surface Elev 1029.5' Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition
HAND ROD
Capacity "R" in Thousands of Pounds

Test Location No 5
Station & Offset 629+78, 78' RT.
REAR PIER
Surface Elev 1029.8' Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition
HAND ROD
Capacity "R" in Thousands of Pounds

Test Location No 6
Station & Offset 630+17, 36' RT.
REAR PIER
Surface Elev 1019.8' Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition
HAND ROD
Capacity "R" in Thousands of Pounds

Test Location No 7
Station & Offset 630+81, 36' LT.
REAR PIER
Surface Elev 1018.6' Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition
HAND ROD
Capacity "R" in Thousands of Pounds

Test Location No 8
Station & Offset 631+19, 78' LT.
REAR PIER
Surface Elev 1019.4' Water Elev.
Piling
Hammer MAH-18-9.89
Formula
Reference
Rod Condition
HAND ROD
Capacity "R" in Thousands of Pounds

Test Location No 9
Station & Offset 630+44, 78' RT.
FORWARD PIER
Surface Elev 1020.9' Water Elev. 1016.9'
Piling
Hammer
Formula
Reference
Rod Condition GOOD
TEST ROD
Capacity "R" in Thousands of Pounds

Test Location No 10
Station & Offset 630+82, 36' RT.
FORWARD PIER
Surface Elev 1020.4' Water Elev. 1016.4'
Piling
Hammer
Formula
Reference
Rod Condition GOOD
TEST ROD
Capacity "R" in Thousands of Pounds

Test Location No 11
Station & Offset 631+46, 36' LT.
FORWARD PIER
Surface Elev 1020.4' Water Elev. 1017.4'
Piling
Hammer
Formula
Reference
Rod Condition GOOD
TEST ROD
Capacity "R" in Thousands of Pounds

Test Location No 12
Station & Offset 631+84, 78' LT.
FORWARD PIER
Surface Elev 1021.9' Water Elev. DRY
Piling
Hammer
Formula
Reference
Rod Condition GOOD
TEST ROD
Capacity "R" in Thousands of Pounds

Test Location No 13
Station & Offset 630+96, 78' RT.
FORWARD ABUTMENT
Surface Elev 1021.6' Water Elev. DRY
Piling
Hammer
Formula
Reference
Rod Condition GOOD
TEST ROD
Capacity "R" in Thousands of Pounds

Test Location No 14
Station & Offset 631+34, 36' RT.
FORWARD ABUTMENT
Surface Elev 1021.1' Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition GOOD
TEST ROD
Capacity "R" in Thousands of Pounds

Test Location No 15
Station & Offset 631+98, 36' LT.
FORWARD ABUTMENT
Surface Elev 1020.6' Water Elev. DRY
Piling
Hammer
Formula
Reference
Rod Condition GOOD
TEST ROD
Capacity "R" in Thousands of Pounds

Test Location No 16
Station & Offset 632+36, 78' LT.
FORWARD ABUTMENT
Surface Elev 1020.5' Water Elev. DRY
Piling
Hammer
Formula
Reference
Rod Condition
(CONT'D)
1016
TEST ROD
Capacity "R" in Thousands of Pounds

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

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. MAH-18-11.97
OVER ERIE RAILROAD
SEC. MAH-18-9.02

DRIVE ROD PENETRATION RESISTANCE DATA

PLOTTED BY	CHECKED BY	REVIEWED BY	DATE
P.C.	F.L.K.	R.D.P.	5-15-63

MAHONING COUNTY
MAH-18-9.89

GEOLOGY OF THE SITE

The structure site is located upon relatively flat ground moraine. Shallow glacial drift overlies sandstone and shale bedrock, of Pennsylvanian age.

EXPLORATION

The exploration consisted of two drive sample-core borings and nine drive rod penetration tests, made between April 4 and 9, and on May 9, 1963

INVESTIGATIONAL FINDINGS

The borings disclosed that bedrock surface, encountered at 6 and 7-foot depths, elevations 1035 and 1030 feet, is overlain by moist, medium-dense and very dense sand, silt, gravel, and stone fragments. The borings were terminated at 20 and 21-foot depths, elevations 1021 and 1016 feet, after penetrating 14 feet below bedrock surface.

The rod soundings generally met rapidly increasing resistance to penetration with increase in depth and were terminated upon encounter with refusal or abrupt refusal to penetration at 7 to 10-foot depths, elevations 1033 to 1028 feet, considered to be on or slightly below bedrock surface, as substantiated by the borings, in broken or weathered bedrock.

On the basis of the tests, bedrock surface is considered to slope downward from the forward to the rear portion of the structure site, between elevations 1035 and 1030 feet.

If it is the intention to found substructure units on bedrock, it is considered advisable that the open excavation 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 excavation be well drained at all times.

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

No free water was observed in the test holes.

LEGEND

- Auger Boring - Plan View.
- Press and/or Drive Sample and/or Core Boring - Plan View.
- Drive Rod Penetration Resistance - Soundings - Plan View.
- (R) Electrical Resistivity Probe - Plan View.
- A — Indicates Auger Boring.
- B — Indicates Press and/or Drive Sample and/or Core Boring.
- (R) Electrical Resistivity Probe plotted to vertical scale only.
- TR — Top of Rock
- Water saturated zone.
- TD — Total Depth.
- Horizontal bar on log indicates the depth the sample was taken.
- X-Y — Figures to the right of boring log in profile view indicate the number of blows for "Standard Penetration" test. X = First 6 inches, Y = Second 6 inches
- Casing
- Resistance "R" < 10,000 lbs.
- Resistance "R" => 10,000 lbs.
- 1/16 — Indicates final measurement of penetration in inches.
- W — Indicates Free Water elevation.
- Indicates Static Water elevation.
- Footing / Capped pile
- Footing on pile

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 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 conditions may be evaluated.

Drive Sample Borings - Drive - Press Sample Borings

Drive sample borings are 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, depths of press samples, field sample number, sample description based on laboratory test results and the Casagrande A.C. classification system and gradation, plasticity and moisture content determinations. Results of strength and consolidation testing 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.

Particle Size Definitions

Boulders	Cobbles	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	8"	3" 2.0mm (No. 10 sieve)	0.42mm (No. 40 sieve)	0.074mm (No. 200 sieve)		0.005mm

LOG OF BORING

Date Started 5-9-63 — Sampler Type SS — Dia. 1 3/8" — Water Elev.
Date Completed — Casing: Length — Dia.
Boring No. B-1 — Station & Offset 48+63, 30' Rt. (REAR ABUTMENT) — Surface Elev. 1037.0'

Elev.	Depth	Std. Pen. (N)	Rec. ft.	Loss ft.	Description	Sample No.	% Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	Pl.	W.C.	SHTL Class.
1037.0	0														
1034.5	2														
	4	4/7			Brown and Gray Silty Gravelly Sand	1	54	4	17	12	13	NP	NP	17	
1032.0	6	10* (0.2')			Brown Broken Stone Fragments	2		V	I	S	U	A	L		
1029.7	8		2.6	2.2	TOP OF ROCK										
	10														
	12		4.9	0.1	Sandstone, light-gray, firm, medium-grained, micaceous, cross bedded with carbonaceous laminae, thin clay seams, iron stained and weathered to 14.0', breaks readily on diagonal laminae. Core loss 14%.										
	14														
	16														
	18		6.0	0.0											
1016.0	20														

*REFUSAL — BOTTOM OF BORING

LOG OF BORING

Date Started 5-9-63 — Sampler Type SS — Dia. 1 3/8" — Water Elev.
Date Completed 5-9-63 — Casing: Length — Dia.
Boring No. B-9 — Station & Offset 51+51, 15' Rt. (FORWARD ABUTMENT) — Surface Elev. 1041.0'

Elev.	Depth	Std. Pen. (N)	Rec. ft.	Loss ft.	Description	Sample No.	% Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	Pl.	W.C.	SHTL Class.
1041.0	0														
1038.5	2														
	4	8/14			Brown Sandy Silt	1	11	3	7	40	39	30	9	18	
1036.0	6	33/*			Brown Silty Clayey Gravel	2	81	2	7	3	7	NP	NP	18	
1035.0	8		3.9	0.6	TOP OF ROCK										
	10														
	12		5.0	0.0	Shale, gray, firm, broken, fissile, arenaceous, carbonaceous, dark iron stains on cleavage faces, with thin clay and sandstone interbeds and few shattered re-cemented silty interbeds. Very broken to 10.0', moderately broken to 17.5'. Basal 2.5' sandstone, gray, fine-grained, firm, micaceous, cross-bedded, with carbonaceous laminae. Core loss 1%.										
	14														
	16														
	18		5.0	0.0											
1021.0	20														

*REFUSAL — BOTTOM OF BORING

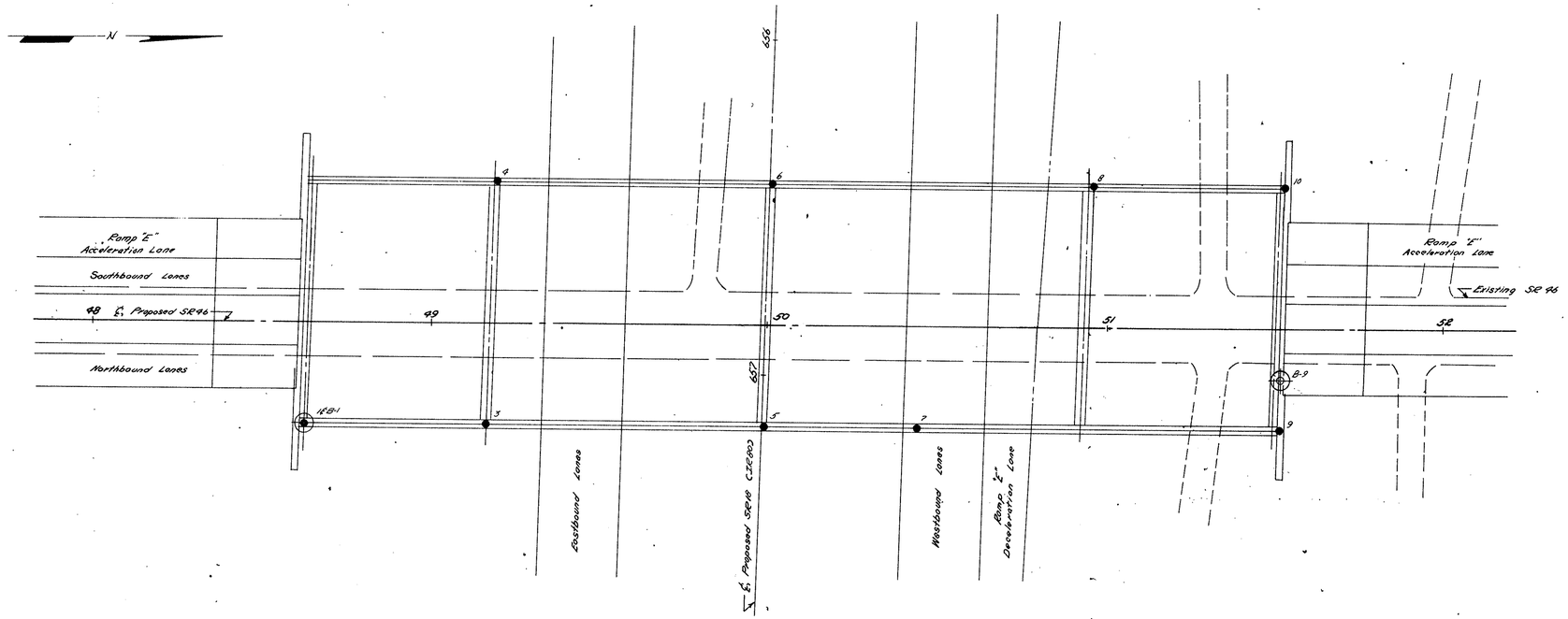
NOTE: Information shown by this subsurface investigation was obtained solely for the use in establishing design controls for the project. The State of Ohio does not guarantee the accuracy of this data and it is not to be construed as a part of the plans governing construction of the project.

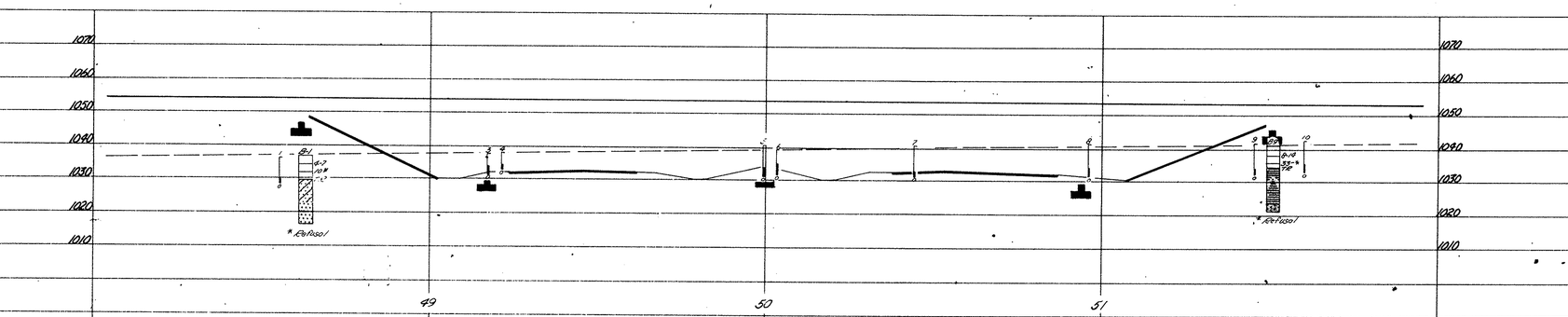
OHIO STATE HIGHWAY
TESTING LABORATORY
1620 WEST BROAD STREET, COLUMBUS 23, OHIO

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. MAH-18-12.96
UNDER SR 96
SEC. MAH-18-9.02

CHECKED BY	REVIEWED BY	DATE
F.L.R.	R.D.R.	5-29-63

MAH-18-9.89





SCALE: 1" = 20'

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

STRUCTURE FOUNDATION INVESTIGATION

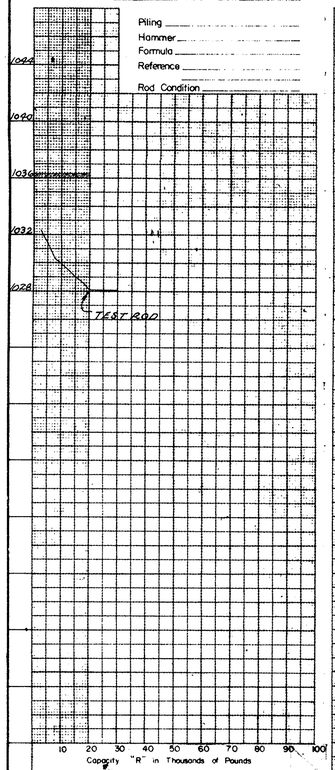
BRIDGE NO MAH-18-1296
UNDER SR 96

SEC MAH-18-9.02

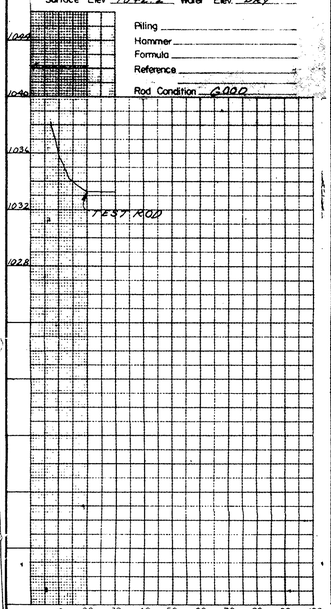
PLAN AND PROFILE

DRAWN BY	CHECKED BY	REVIEWED BY	DATE
E.L.F.	E.L.F.	F.D.A.	5-29-63

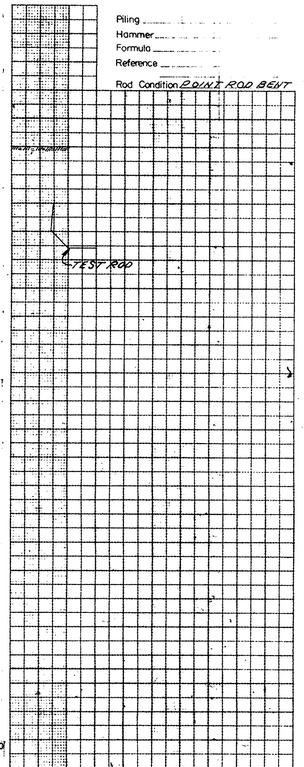
Test Location No. 1
Station & Offset 48+63, 30' RT.
REAR ABUTMENT
Surface Elev 1036.3 Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition



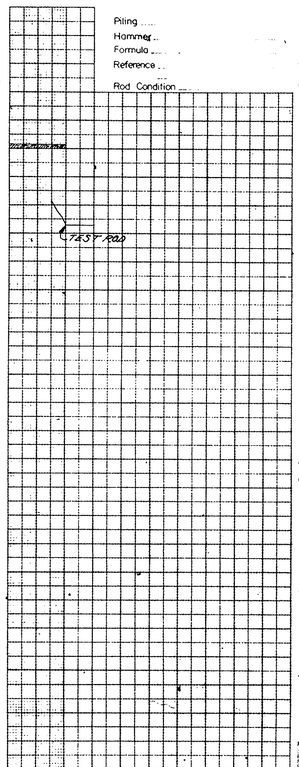
Test Location No. 10
Station & Offset 51+53, 42' LT.
FORWARD ABUTMENT
Surface Elev 1042.2 Water Elev. DRY
Piling
Hammer
Formula
Reference
Rod Condition GOOD



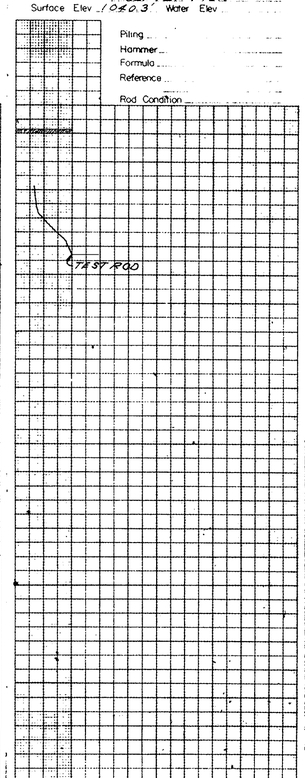
Test Location No. 3
Station & Offset 49+17, 30' RT.
REAR PIER
Surface Elev 1038.0 Water Elev. DRY
Piling
Hammer
Formula
Reference
Rod Condition POINT ROD BENT



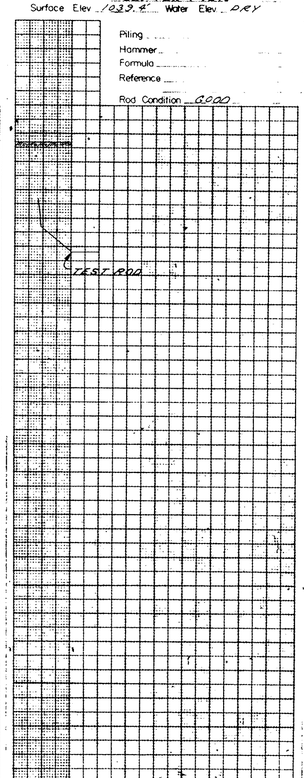
Test Location No. 4
Station & Offset 49+19, 42' LT.
REAR PIER
Surface Elev 1038.3 Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition



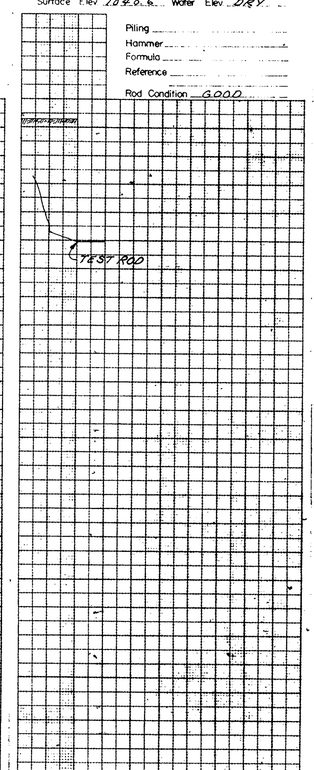
Test Location No. 5
Station & Offset 49+39, 30' RT.
CENTER PIER
Surface Elev 1040.3 Water Elev
Piling
Hammer
Formula
Reference
Rod Condition



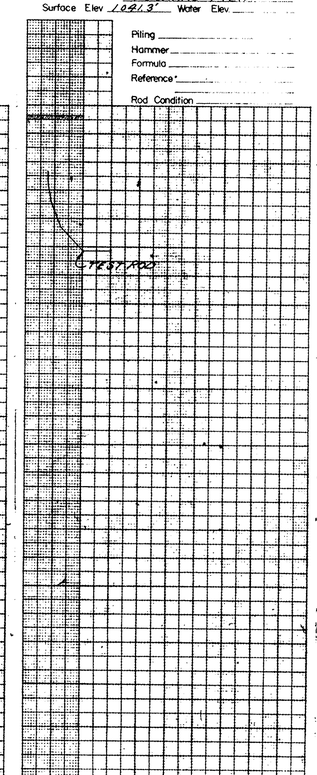
Test Location No. 6
Station & Offset 50+01, 42' LT.
CENTER PIER
Surface Elev 1033.4 Water Elev. DRY
Piling
Hammer
Formula
Reference
Rod Condition GOOD



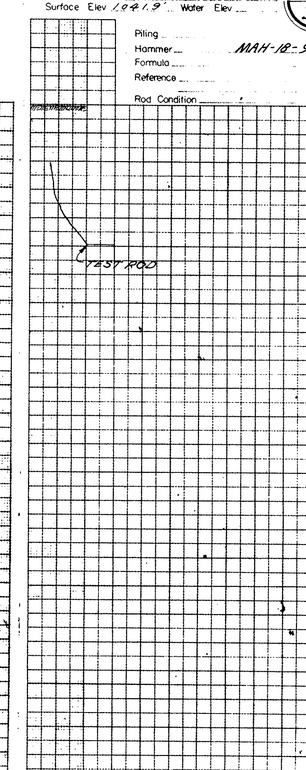
Test Location No. 7
Station & Offset 50+44, 30' RT.
FORWARD PIER
Surface Elev 1040.6 Water Elev. DRY
Piling
Hammer
Formula
Reference
Rod Condition GOOD



Test Location No. 8
Station & Offset 50+96, 42' LT.
FORWARD PIER
Surface Elev 1041.3 Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition



Test Location No. 9
Station & Offset 51+51, 30' RT.
FORWARD ABUTMENT
Surface Elev 1041.9 Water Elev.
Piling
Hammer
Formula
Reference
Rod Condition
MAH-18-989



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

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. MAH-18-12.96
UNDER SR 96
SEC. MAH-18-9.02

DRIVE ROD PENETRATION RESISTANCE DATA

PLOTTED BY	CHECKED BY	REVIEWED BY	DATE
R.C.	F.L.R.	P.D.P.	1-29-63