LAKE COUNTY
LAK-91-3.84

GEOLOGY AND CONDITIONS AT THE SITE

The structure site is located on the flat glaciated Lake Plain, where shallow lacustrine deposits overlie shale bedrock, of Devonian age. An area of poor surface drainage was observed to occur in the rear portion of the structure site.

EXPLORATION

The exploration consisted of two drive sample-core borings and fourteen drive rod penetration tests, made between March 17 and 23, 1964.

SUBSURFACE CONDITIONS

Borings disclosed that bedrock surface, encountered at 7 and 11-feet depths, elevations 638 and 637 feet, is overlain by stiff clay and shale fragments. The borings were terminated 13 and 15 feet below bedrock surface, elevations 625 and 622 feet.

Rod soundings met rapid increase in penetration resistance with increase in depth and were terminated because of refusal to penetration at 8 and 12-foot depths, elevations 638 and 632 feet, upon encounter with firm bedrock surface, as much as 4 feet below bedrock surface, as revealed by the borings.

If it is the intention to found pier substructure units on bedrock, it is considered advisable that the open excavations be inspected in the field in order to insure that the conditions here 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 kept drained at all times, due particularly to the fact that while this shale bedrock is generally firm in place, it is susceptible to disintegration upon exposure to the atmosphere and water.

Unconfined compression tests on similar weathered shale and firm shale bedrock indicates a crushing strength on the order of 50 and 100 tons per square foot, respectively.

Free water was encountered in the rod sounding holes between elevations 642 and 639 feet.

LEGEND

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

SYMBOLS OF ROCK TYPES

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

GENERAL INFORMATION

Drive Rod Penetration Sounding Tests

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

Drive Sample Borings - Drive-Press Sample Borings

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

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

The boring log sheets show a graphic plot of the information obtained, including depth and elevation of the sample, number of blows for the standard penetration tests in two 6-inch increments, depth of press samples, field sample number, sample description - based on laboratory tests and the Casagrande AC classification system - and gradation, plasticity, and moisture content determinations. Results of strength and consolidation testing 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 3-19-64 — Sampler Type SS — Dia 1 3/8" — Water Elev —
Date Completed 3-20-64 — Casing Length 10' — Dia 3 1/2"
Boring No B-2 — Station & Offset 223+50, 7' Lt (REAR ABUTMENT) — Surface Elev 644.8'

Elev.	Depth	Std. Pen (N)	Rec ft.	Loss ft.	Description	Sample No.	Physical Characteristics	Wat. Class.
644.8	0							
	2							
	4							
639.8	6	17/33			Brown and Gray Weathered Shale Fragments	1	V I S U A L	16
637.8	8		3.6	0.4	TOP OF ROCK			
	10				Shale, dark-gray, firm, carbonaceous, argillaceous, fissile, with clay seams, broken and jointed. Core loss 7%.			
	12							
	14		5.0	0.0				
	16							
	18		5.0	0.0				
624.8	20				BOTTOM OF BORING			

LOG OF BORING

Date Started 3-18-64 — Sampler Type SS — Dia 1 3/8" — Water Elev —
Date Completed 3-19-64 — Casing Length — Dia —
Boring No B-10 — Station & Offset 226+95, 28' Rt (FORWARD PIER) — Surface Elev 646.6'

Elev.	Depth	Std. Pen (N)	Rec ft.	Loss ft.	Description	Sample No.	Physical Characteristics	Wat. Class.
646.6	0							
	2							
	4							
641.6	6	4/7			Mottled Brownish-Gray Silty Clay	1	0 1 8 38 53 37 16 18	
	8							
636.6	10				TOP OF WEATHERED ROCK			
635.6	12	26/30			Gray Weathered Shale	2	V I S U A L	10
	14		1.0	3.0	TOP OF ROCK			
	16				Shale, dark-gray, firm, carbonaceous, argillaceous, fissile, few clay seams, broken and jointed due to mechanical difficulties between 11' and 15'. Core loss 25%.			
	18		5.0	0.0				
	20							
	22		5.0	0.0				
621.6	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.

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STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO [redacted]
SR 91 OVER N&W [redacted]
SEC LAK-91-3.84

CHECKED BY [redacted] — REVIEWED BY [redacted] — DATE [redacted]