Osborn Park Seismic Investigation

Date: 9 October, 2002 **OGS File Number**: 340439000324

Survey Type: Compressional (P) seismic refraction
Survey Crew: Glenn Larsen, E. Mac Swinford, and Richard Pavey.

Site Location: Northwest soccer field, south of the north parking area, 850 ft south of Perkins Rd. and 790 ft. west of park entrance.
County: Erie **Township:** Huron **USGS 7½' Quadrangle:** Sandusky
Latitude: N 41° 25' 03.70" **Longitude:** W 82° 38' 19.27' **Reference Datum:** NAD83
Ohio State Plane, X: 1,930,462 ft. **Y:** 637,978 ft. **Zone:** North
Line Direction: South to north
Note: Coordinates were determined at location of geophone no. 1, line direction measured from geophone no.1.

Purpose: This seismic refraction survey was a test case study in determining depth to bedrock, seismic velocities, and the depths of lacustrine silt and till lithologies overlying the bedrock, in an area where the local geology is fairly well documented. Three different spreads were laid out at the site. Each spread contained 24 geophones but were laid out with different geophone spacing. Spread 1 had a geophone spacing of 10 feet, Spread 2 had a spacing of 5 feet, and Spread 3 had a spacing of 3 feet. This was done to test the performance of different resolutions on data acquisition for future seismic investigations in the area.

Geologic Overview: The geology of the area is documented from nearby bore hole data obtained from Ohio Department of Transportation and Bureau of Underground Storage Tank Regulations (BUSTR), water well data from ODNR Division of Water and from geologic mapping by the Ohio Geological Survey. From this data it is estimated that limestone bedrock is about 50 feet deep and overlain by (in ascending order) about 20 feet of clayey till and 30 feet lacustrine silts, sands, and clays.

Site Conditions: The site was relatively level in elevation so no elevation survey along the seismic line was made. Site was susceptible to automobile, pedestrian, and railroad noise.

Seismic Refraction Survey: The survey was laid out along a straight, east to west, line 115 feet in length. P-wave refraction data were collected from three individual linear spreads of 24 geophones with distances of 3, 5, and feet between geophones. Seismic energy for the survey was generated by striking a metal plate with a 12-pound sledgehammer. The P-waves were detected by geophones that were sensitive to vertical ground motion, and had a natural frequency of 14 Hz. The seismic data were stacked 1 to 8 times at each source point to increase the signal-to-noise ratio to overcome any background noise affecting the survey. The digitally recorded data were stored in the SEG-2 format (Subcommittee of the SEG Engineering and Groundwater Geophysics Committee, 1990).

Results: The seismic refraction data was processed with Oyo Corp. SeisImager/2D software using the time-term inversion method. Comparing the data only Spread 1 (10-foot geophone spacing) recorded refractions from the bedrock surface. Spreads 2 and 3 did not record refractions below the water table, thus resolution comparisons were not possible from this data set. The reason for this was only Spread 1 was long enough to record refractions from the bedrock. In order to record to a depth of 50 feet, with shorter geophone spacing, a longer line with 48 to 72 geophones would be required.

Spread 1 (10-foot geophone spacing) recorded three main velocity layers. The seismic velocity in the first layer (near-surface layer) was determined to be 800 ft/s, in the second layer 5,050 ft/s, and in the third layer 18,810 ft/s. These layers represent, in descending order, 1) clayey to sandy silts above the ground water table, 2) silts and clays below the ground water table, and 3)

limestone bedrock. The contact between layers 1 and 2 represents the ground water table. Depth to bedrock was calculated to be 53-61 feet deep, within the expected range. The refraction data did not differentiate between the lacustrine and till lithologies. It is possible the clayey nature of the till did not provide a significant velocity contrast for refractions to occur at the lacustrine/till contact and the 5,050 ft/s velocity is an average of the two lithologies. Another possibility is the till layer may be thinner than expected at this locality and is behaving as a hidden layer above the bedrock.

References

Larsen, G.E., 1995, Preliminary bedrock geology of the Sandusky, Ohio, Quadrangle: Ohio Department of Natural Resources, Division of Geological Survey, Open-file Map BG-D3D6, Scale 1:24,000.

Larsen, G.E., Pavey, R.R., and Kriz, J., 1999, Preliminary bedrock topography of the Sandusky, Ohio, Quadrangle: Ohio Department of Natural Resources, Division of Geological Survey, Open-file Map BT-D3D6, Scale 1:24,000.

Pavey, R.R., Larsen, G.E., Swinford, E.M., and Vorbau, K.E., 2003, Surficial Geology of the Lorain and Put-in-Bay, Ohio, 30 X 60 Minute Quadrangle: Ohio Department of Natural Resources, Division of Geological Survey, Map SG-2 Lorain - Put-in-Bay.

Redmond, C.E., Hole, T.J.F., Innis, C.H., and Wachtman, M., 1971, Soil survey of Erie County, Ohio: U.S. Department of Agriculture, Soil Conservation Service, 166 p.

Subcommittee of the SEG Engineering and Groundwater Geophysics Committee, Pullan, S.E., Chairman, 1990, Recommended standard for seismic (/radar) files in the personal computer environment: Geophysics, vol. 55, no. 9, p. 1260-1271.

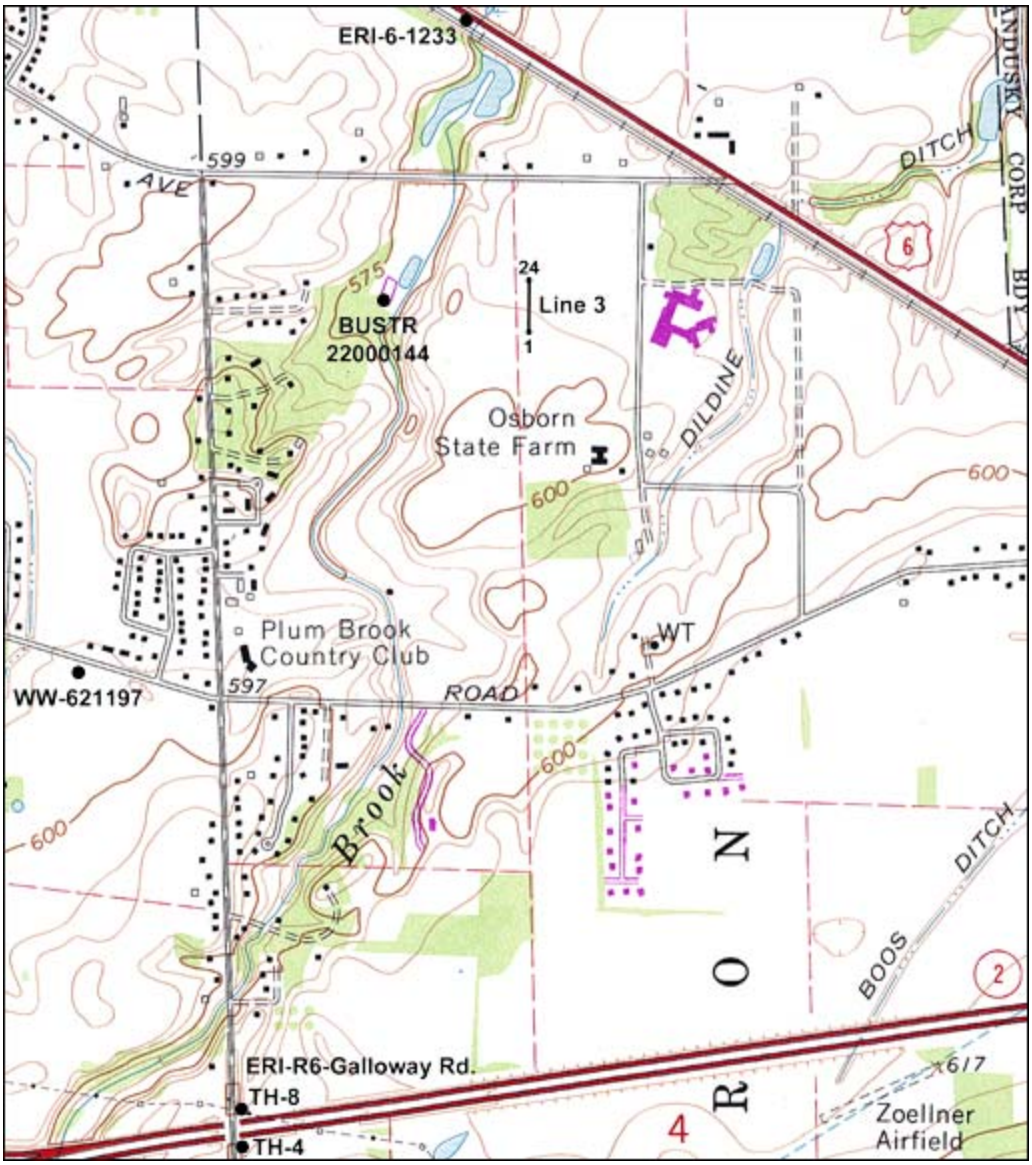


Figure 1. Location map of seismic refraction line 340439000324 at Osborn Park, Erie County, Ohio. Also shown on the map are the location of the ODOT, BUSTR, and water well borings used in the geologic interpretation of the seismic-refraction data. Numbers on the seismic line refer to the location of geophones 1 and 24.

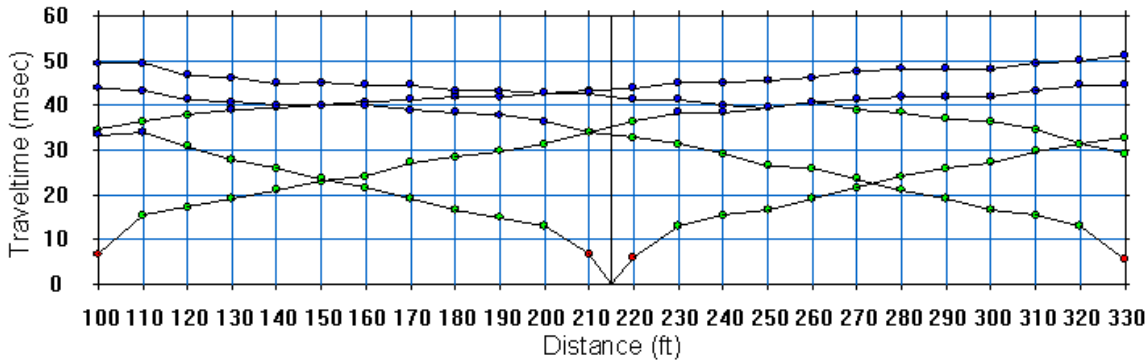


Figure 2. Travel time vs. distance plot of seismic refraction data recorded at Osborn Park, Sandusky, Ohio. Red data points are P-wave travel times for velocity layer 1, green data points are travel times for velocity layer 2, and blue data points are travel times for velocity layer 3. Geophone spacing was 10-feet.

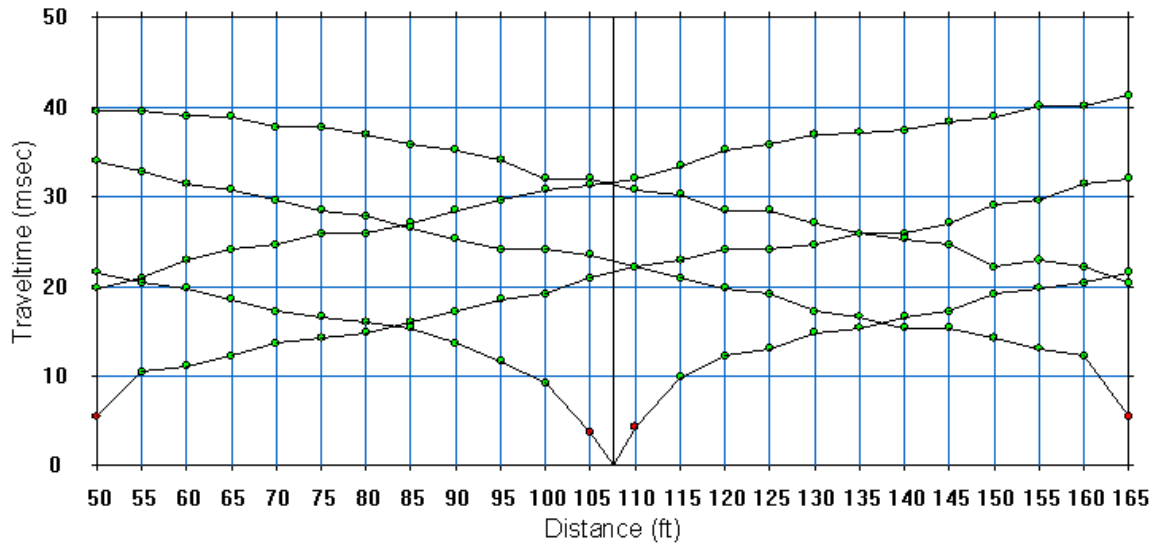


Figure 3. Travel time vs. distance plot of seismic refraction data recorded at Osborn Park, Sandusky, Ohio. Red data points are P-wave travel times for velocity layer 1, green data points are travel times for velocity layer 2. Geophone spacing was 5-feet.

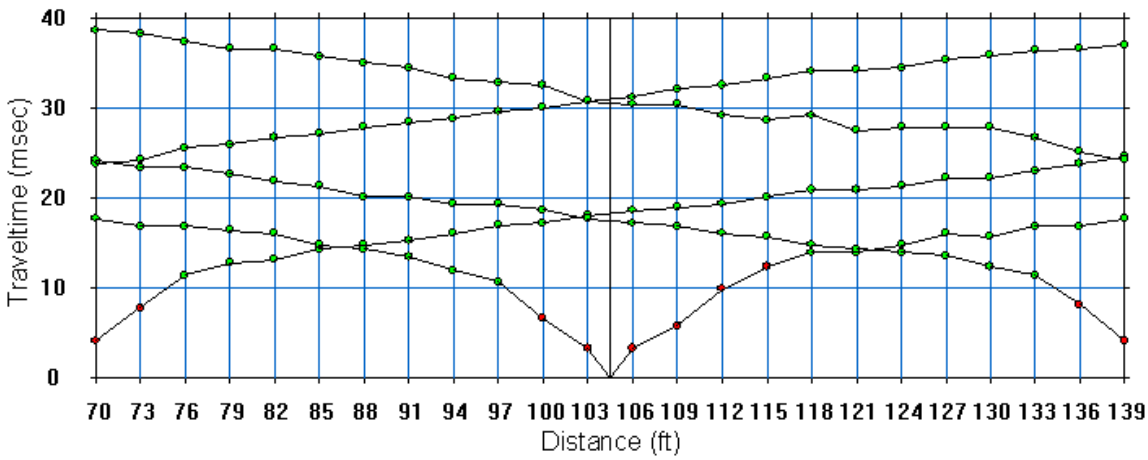


Figure 4. Travel time vs. distance plot of seismic refraction data recorded at Osborn Park, Sandusky, Ohio. Red data points are P-wave travel times for velocity layer 1, green data points are travel times for velocity layer 2. Geophone spacing was 3-feet.

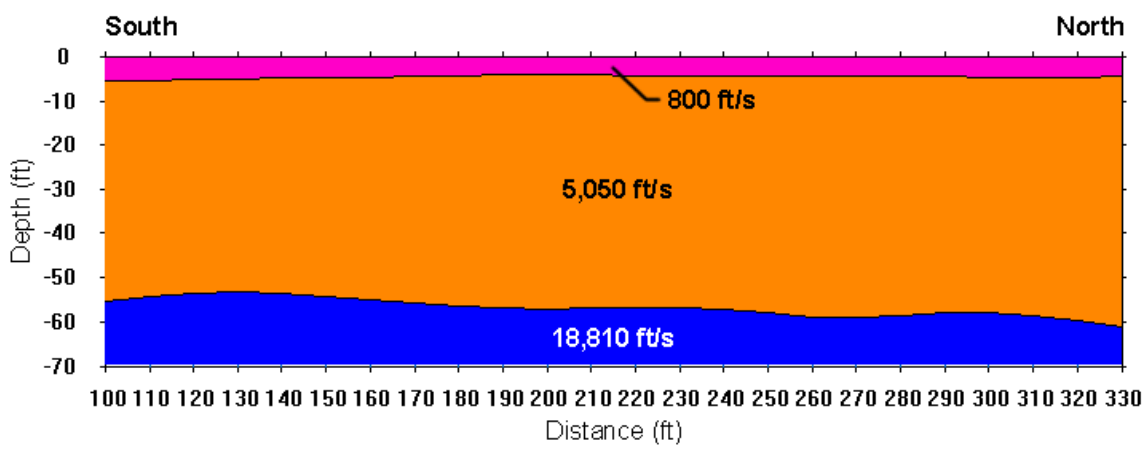


Figure 5. The velocity model of the seismic-refraction data, above, was constructed using the time-term inversion method. Three velocity layers were recorded and modeled. These layers represent, in descending order, 1) clayey to sandy silts above the ground water table, 2) silts and clays below the ground water table, and 3) limestone bedrock. The contact between layers 1 and 2 represents the ground water table.

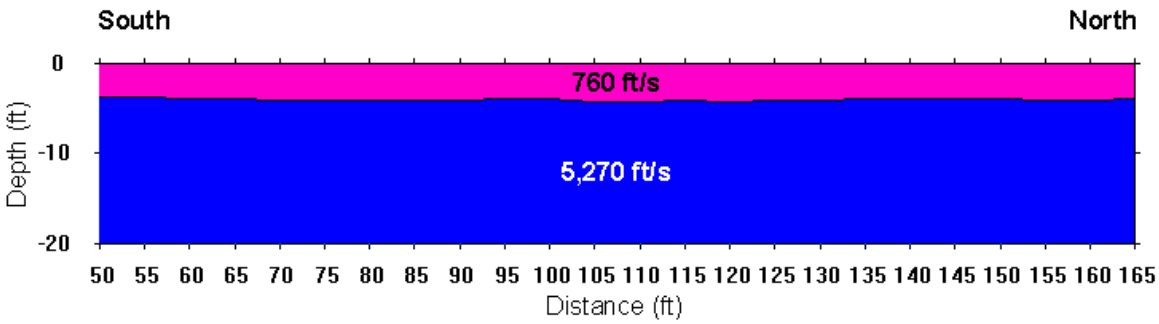
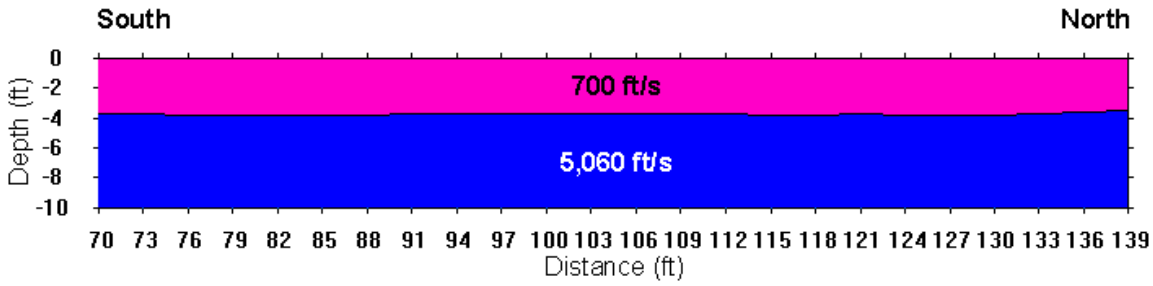


Figure 6. The velocity model of the seismic-refraction data, above, was constructed using the time-term inversion method. Three velocity layers were recorded and modeled. These layers represent, in descending order, 1) clayey to sandy silts above the ground water table and 2) silts and clays below the ground water table. The contact between layers 1 and 2 represents the ground water table.



The velocity model of the seismic-refraction data, above, was constructed using the time-term inversion method. Three velocity layers were recorded and modeled. These layers represent, in descending order, 1) clayey to sandy silts above the ground water table and 2) silts and clays below the ground water table. The contact between layers 1 and 2 represents the ground water table.

Geophone Location Data

Spread No: 1

Group Interval: 10 ft. P-wave

First Geophone No: 1 **X-Loc:** 100.0

Geophone Number	X-Location	Δ Elev.	Elevation
1	100.0	0.0	590.0
2	110.0	0.0	590.0
3	120.0	0.0	590.0
4	130.0	0.0	590.0
5	140.0	0.0	590.0
6	150.0	0.0	590.0
7	160.0	0.0	590.0
8	170.0	0.0	590.0
9	180.0	0.0	590.0
10	190.0	0.0	590.0
11	200.0	0.0	590.0
12	210.0	0.0	590.0
13	220.0	0.0	590.0
14	230.0	0.0	590.0
15	240.0	0.0	590.0
16	250.0	0.0	590.0
17	260.0	0.0	590.0
18	270.0	0.0	590.0
19	280.0	0.0	590.0
20	290.0	0.0	590.0
21	300.0	0.0	590.0
22	310.0	0.0	590.0
23	320.0	0.0	590.0
24	330.0	0.0	590.0

Spread No: 2

Group Interval: 5 ft. P-wave

First Geophone No: 1 **X-Loc:** 50.0

Geophone Number	X-Location	Δ Elev.	Elevation
1	50.0	0.0	590.0
2	55.0	0.0	590.0
3	60.0	0.0	590.0
4	65.0	0.0	590.0
5	70.0	0.0	590.0
6	75.0	0.0	590.0
7	80.0	0.0	590.0
8	85.0	0.0	590.0
9	90.0	0.0	590.0
10	95.0	0.0	590.0
11	100.0	0.0	590.0
12	105.0	0.0	590.0
13	110.0	0.0	590.0
14	115.0	0.0	590.0
15	120.0	0.0	590.0
16	125.0	0.0	590.0
17	130.0	0.0	590.0
18	135.0	0.0	590.0
19	140.0	0.0	590.0
20	145.0	0.0	590.0
21	150.0	0.0	590.0
22	155.0	0.0	590.0
23	160.0	0.0	590.0
24	165.0	0.0	590.0

Horizontal and vertical measurements in U.S. Survey Feet

Δ Elev. is the difference in elevation relative to the lowest geophone or shot point elevation.

Geophone Location Data

Spread No: 3

Group Interval: 3 ft. P-wave

First Geophone No: 1 **X-Loc:** 70.0

Geophone Number	X-Location	Δ Elev.	Elevation
1	70.0	0.0	590.0
2	73.0	0.0	590.0
3	76.0	0.0	590.0
4	79.0	0.0	590.0
5	82.0	0.0	590.0
6	85.0	0.0	590.0
7	88.0	0.0	590.0
8	91.0	0.0	590.0
9	94.0	0.0	590.0
10	97.0	0.0	590.0
11	100.0	0.0	590.0
12	103.0	0.0	590.0
13	106.0	0.0	590.0
14	109.0	0.0	590.0
15	112.0	0.0	590.0
16	115.0	0.0	590.0
17	118.0	0.0	590.0
18	121.0	0.0	590.0
19	124.0	0.0	590.0
20	127.0	0.0	590.0
21	130.0	0.0	590.0
22	133.0	0.0	590.0
23	136.0	0.0	590.0
24	139.0	0.0	590.0

Group Interval: ft.

First Geophone No: **X-Loc:**

Geophone Number	X-Location	Δ Elev.	Elevation

Horizontal and vertical measurements in U.S. Survey Feet

Δ Elev. is the difference in elevation relative to the lowest geophone or shot point elevation.

Data Acquisition Parameters

Survey Type	Spread 1	Spread 2	Spread 3
Recording System	Geometrics Geode	Geometrics Geode	Geometrics Geode
Data Format	SEG-2	SEG-2	SEG-2 converted to KGS
Acquisition	24 channel	24 channel	24 channel
Source	12 lb sledgehammer	20 lb sledgehammer	20 lb sledgehammer
Geophones	14 Hz Vertical	14 Hz Horizontal	14 Hz Vertical
Geophone Array	Linear	Linear	Linear
Line length	230 ft	115 ft.	69 ft.
Geophone spacing	10 ft.	5 ft.	3 ft.
Source Offset	2 offend at 100 ft., 2 offend at 5 ft., and 1 center	2 offend at 50 ft., 2 offend at 5 ft., and 1 center	2 offend at 70 ft., 2 offend at 3 ft., and 1 center
Sampling Interval	0.250 msec	0.063 msec	0.032 msec
Record Length	0.200 sec	0.200 sec	0.200 sec
Preamp Gains	All geophones 36dB	All geophones 36 dB	All geophones 36 dB
Filters	None	None	None

P-wave Velocity Model Data

Geophone Location and Elevation Data			Velocity Layer Depth (Top)[1]		Velocity Layer Depth (Top)[2]		Velocity Layer Thickness	
Geo.	X-Loc.	Δ Elev.	2	3	2	3	1	2
1	100.0	0.0	-5.6	-55.2	-5.6	-55.2	5.6	49.6
2	110.0	0.0	-5.4	-54.3	-5.4	-54.3	5.4	48.9
3	120.0	0.0	-5.2	-53.5	-5.2	-53.5	5.2	48.4
4	130.0	0.0	-5.0	-53.2	-5.0	-53.2	5.0	48.3
5	140.0	0.0	-4.8	-53.5	-4.8	-53.5	4.8	48.7
6	150.0	0.0	-4.6	-54.2	-4.6	-54.2	4.6	49.5
7	160.0	0.0	-4.5	-54.9	-4.5	-54.9	4.5	50.4
8	170.0	0.0	-4.4	-55.7	-4.4	-55.7	4.4	51.3
9	180.0	0.0	-4.2	-56.3	-4.2	-56.3	4.2	52.2
10	190.0	0.0	-4.0	-56.8	-4.0	-56.8	4.0	52.8
11	200.0	0.0	-3.9	-57.0	-3.9	-57.0	3.9	53.1
12	210.0	0.0	-4.0	-56.8	-4.0	-56.8	4.0	52.8
13	220.0	0.0	-4.2	-56.6	-4.2	-56.6	4.2	52.4
14	230.0	0.0	-4.4	-56.6	-4.4	-56.6	4.4	52.2
15	240.0	0.0	-4.3	-57.1	-4.3	-57.1	4.3	52.8
16	250.0	0.0	-4.2	-57.9	-4.2	-57.9	4.2	53.7
17	260.0	0.0	-4.3	-58.7	-4.3	-58.7	4.3	54.4
18	270.0	0.0	-4.3	-58.9	-4.3	-58.9	4.3	54.7
19	280.0	0.0	-4.4	-58.5	-4.4	-58.5	4.4	54.1
20	290.0	0.0	-4.5	-57.9	-4.5	-57.9	4.5	53.4
21	300.0	0.0	-4.7	-57.8	-4.7	-57.8	4.7	53.2
22	310.0	0.0	-4.7	-58.5	-4.7	-58.5	4.7	53.8
23	320.0	0.0	-4.6	-59.7	-4.6	-59.7	4.6	55.1
24	330.0	0.0	-4.5	-61.1	-4.5	-61.1	4.5	56.6

[1] Datum 0.00 feet [2] Below surface (geophone elevation)
Horizontal and vertical measurements in U.S. Survey Feet.
Δ Elev. is the difference in elevation relative to the lowest geophone or shot point elevation.

Spread 2 Velocity Model Data

Geophone Location and Elevation Data			Velocity Layer Depth (Top)[1]		Velocity Layer Depth (Top)[2]		Velocity Layer Thickness	
Geo.	X-Loc.	Δ Elev.	2	3	2	3	1	2
1	50	0.0	-3.7		-3.7		3.7	
2	55	0.0	-3.7		-3.7		3.7	
3	60	0.0	-3.9		-3.9		3.9	
4	65	0.0	-4.0		-4.0		4.0	
5	70	0.0	-4.1		-4.1		4.1	
6	75	0.0	-4.1		-4.1		4.1	
7	80	0.0	-4.1		-4.1		4.1	
8	85	0.0	-4.1		-4.1		4.1	
9	90	0.0	-4.1		-4.1		4.1	
10	95	0.0	-4.0		-4.0		4.0	
11	100	0.0	-4.0		-4.0		4.0	
12	105	0.0	-4.2		-4.2		4.2	
13	110	0.0	-4.2		-4.2		4.2	
14	115	0.0	-4.2		-4.2		4.2	
15	120	0.0	-4.2		-4.2		4.2	
16	125	0.0	-4.2		-4.2		4.2	
17	130	0.0	-4.1		-4.1		4.1	
18	135	0.0	-4.0		-4.0		4.0	
19	140	0.0	-3.9		-3.9		3.9	
20	145	0.0	-3.9		-3.9		3.9	
21	150	0.0	-4.0		-4.0		4.0	
22	155	0.0	-4.1		-4.1		4.1	
23	160	0.0	-4.0		-4.0		4.0	
24	165	0.0	-4.0		-4.0		4.0	

[1] Datum 0.00 feet [2] Below surface (geophone elevation)
Horizontal and vertical measurements in U.S. Survey Feet.
Δ Elev. is the difference in elevation relative to the lowest geophone.

Spread 3 Velocity Model Data

Geophone Location and Elevation Data			Velocity Layer Depth (Top)[1]		Velocity Layer Depth (Top)[2]		Velocity Layer Thickness	
Geo.	X-Loc.	Δ Elev.	2	3	2	3	1	2
1	70	0.0	-3.7		-3.7		3.7	
2	73	0.0	-3.7		-3.7		3.7	
3	76	0.0	-3.8		-3.8		3.8	
4	79	0.0	-3.8		-3.8		3.8	
5	82	0.0	-3.9		-3.9		3.9	
6	85	0.0	-3.8		-3.8		3.8	
7	88	0.0	-3.8		-3.8		3.8	
8	91	0.0	-3.7		-3.7		3.7	
9	94	0.0	-3.7		-3.7		3.7	
10	97	0.0	-3.7		-3.7		3.7	
11	100	0.0	-3.7		-3.7		3.7	
12	103	0.0	-3.7		-3.7		3.7	
13	106	0.0	-3.7		-3.7		3.7	
14	109	0.0	-3.7		-3.7		3.7	
15	112	0.0	-3.7		-3.7		3.7	
16	115	0.0	-3.8		-3.8		3.8	
17	118	0.0	-3.8		-3.8		3.8	
18	121	0.0	-3.7		-3.7		3.7	
19	124	0.0	-3.8		-3.8		3.8	
20	127	0.0	-3.9		-3.9		3.9	
21	130	0.0	-3.8		-3.8		3.8	
22	133	0.0	-3.7		-3.7		3.7	
23	136	0.0	-3.6		-3.6		3.6	
24	139	0.0	-3.5		-3.5		3.5	

[1] Datum 0.00 feet [2] Below surface (geophone elevation)
Horizontal and vertical measurements in U.S. Survey Feet.
Δ Elev. is the difference in elevation relative to the lowest geophone.

Structure Foundation Investigation
Ohio Department of Transportation
Office of Geotechnical Engineering
1600 West Broad Street
Columbus, Ohio 43223

Structure Foundation Investigation - Bridge Boring

Bridge Number: ERI-6-Galloway Rd. over U.S. 6 & S.R. 2 Reloc.
Sec: ERI-6-11.30

Boring Number: TH-4 **Surface Elev:** 612.2 ft. **Water Elev:**
County: Erie **Township:** Huron **Section Number:**
Date Started: ? **Sampler Type:** **Dia:**
Date Completed: ? **Casing Length:** **Dia:**
Station & Offset: 40+20, 35' RT (Rear Pier)

Log of Boring

Elev.	Top	Bottom	Std. Pen. (N)	Drillers Description	Geologic Interpretation
612.2	0.0	9.0		Brown & gray sandy silt	Alluvium?
603.2	9.0	16.5		shale, gray, soft, very argillaceous, weathered, broken & jointed. Core Loss: 0% Weathered zone 603.2' to 595.7'	Bedrock (9.0 ft)
595.7	16.5	20.0		Firm 595.7' to 592.2'	
592.2	20.0				

This record is a modified version of the original ODOT boring log. Geologic interpretation by the ODNR, Division of Geological Survey. Copies of the original ODOT record and location maps are on file at the Division of Geological Survey.

Structure Foundation Investigation
Ohio Department of Transportation
Office of Geotechnical Engineering
1600 West Broad Street
Columbus, Ohio 43223

Structure Foundation Investigation - Bridge Boring

Bridge Number: ERI-6-Galloway Rd. over U.S. 6 & S.R. 2 Reloc.
Sec: ERI-6-11.30

Boring Number: TH-8 **Surface Elev:** 611.3 ft. **Water Elev:**
County: Erie **Township:** Huron **Section Number:**
Date Started: ? **Sampler Type:** **Dia:**
Date Completed: ? **Casing Length:** **Dia:**
Station & Offset: 50+84, 26' RT (Forward Pier)

Log of Boring

Elev.	Top	Bottom	Std. Pen. (N)	Drillers Description	Geologic Interpretation
611.3	0.0	10.0		Brown & gray sandy silt	Alluvium?
601.3	10.0	17.5		Shale, gray, soft, weathered, argillaceous, broken and jointed. Core loss: 40% Weathered zone 601.3' to 593.8'	Bedrock
593.8	17.5	20.0		Firm 593.8' to 591.3'	
591.3	20.0				

This record is a modified version of the original ODOT boring log. Geologic interpretation by the ODNR, Division of Geological Survey. Copies of the original ODOT record and location maps are on file at the Division of Geological Survey.

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Columbus, Ohio 43223

Structure Foundation Investigation - Bridge Boring

Bridge Number: ERI-6-1233, Over Plum Brook
Sec: ERI-6-12.31

Boring Number: B-1 **Surface Elev:** 583.4 ft. **Water Elev:**
County: Erie **Township:** Huron **Section Number:**
Date Started: 6/17/1987 **Sampler Type:** SS **Dia:** 1 3/8"
Date Completed: 6/17/1987 **Casing Length:** **Dia:**
Station & Offset: 99+76, 8' RT. (West Abutment)

Log of Boring

		Bottom	Std. Pen. (N)	Drillers Description	
583.4	0.0	1.0	Augered	Asphalt	
	1.0	2.0	Augered		
	2.0	5.0	1/2/2	Brown Clayey silt with coal blossom	Alluvium
	5.0	7.5	1/2/2	Gray clayey silt with coal blossom	
575.9	7.5	10.0	1/1/2	Gray clayey silt with decayed wood	
573.4	10.0	12.5	2/2/2	Black sedimentary peat	Peat
570.9	12.5	15.0	1/3/3	Gray sedimentary peat	
568.4	15.0	17.5	1/2/3		
565.9	17.5	20.0	1/2/4		Alluvium
563.4	20.0	25.0	2/2/3		
558.4	25.0	30.0	3/5/5	Gray and brown silt and clay	Till
553.4	30.0	35.0	3/5/5	Gray silt and clay	
548.4	35.0	40.0	1/3/6	Gray sandy silt	
543.4	40.0	41.5			
541.9	41.5	46.5	3/11/50	Shale, gray, hard, arenaceous, massive, broken. Core loss 10%	Bedrock (41.5 ft)
536.9		46.5			

This record is a modified version of the original ODOT boring log. Geologic interpretation by the ODNR, Division of Geological Survey. Copies of the original ODOT record and location maps are on file at the Division of Geological Survey.

Elev.	Top		Geologic Interpretation
582.4		Concrete	

WELL LOG AND DRILLING REPORT

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Fountain Square
Columbus, Ohio 43224

NO CARBON PAPER NECESSARY– SELF-TRANSCRIBING

621197

Well Drilled for Heat Pump only

COUNTY Erie TOWNSHIP Perkins SECTION OF TOWNSHIP

OWNER Shenigo Constr. ADDRESS P.O. Box 2475 Sandusky, O

LOCATION OF PROPERTY Meadows Sub Div. - Hull Rd

CONSTRUCTION DETAILS

Casing diameter 5 5/8" Length of casing 43'

Type of screen — Length of screen —

Type of pump Deep Well

Capacity of pump

Depth of pump setting 150

Date of completion 5-27-83

BAILING OR PUMPING TEST
(specify one by circling)

Test rate 15 gpm Duration of test 1 hrs

Drawdown 100 ft Date 5-27-83

Static level (depth to water) 15 ft

Quality (clear, cloudy, taste, odor) Black Sulfur

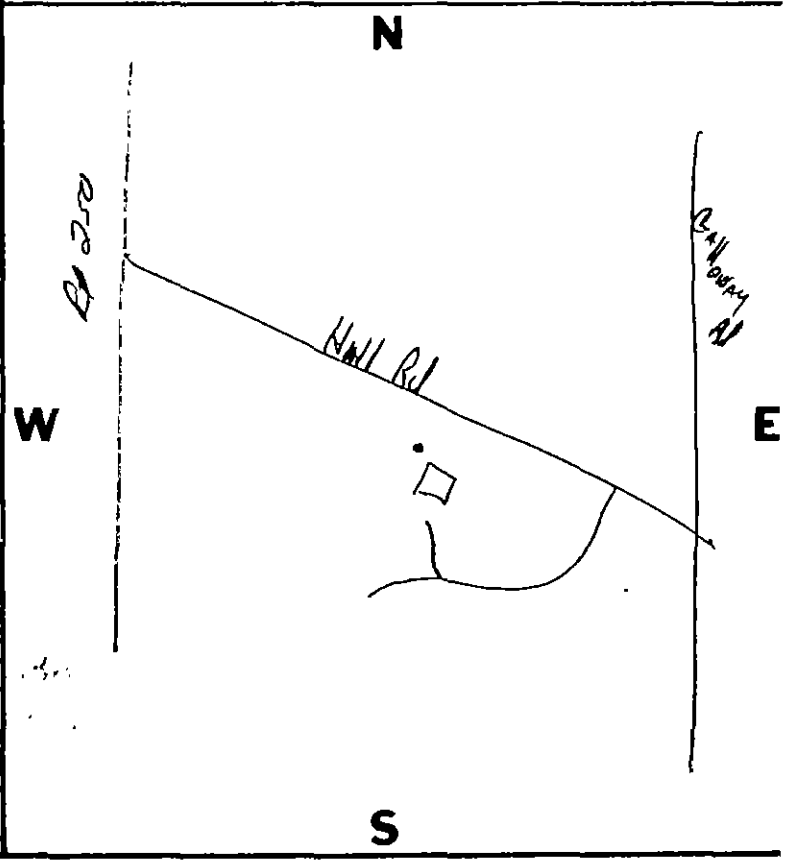
Pump installed by

WELL LOG*

Formations: sandstone, shale, limestone, gravel, clay	From	To
Sandy Clay	0 ft	10 ft
Blue Clay	10	41½
Hard Limestone	41½	160

SKETCH SHOWING LOCATION

Locate in reference to numbered state highways, street intersections, county roads, etc.



DRILLING FIRM TIBBOLES WELL DRILLING, INC.

ADDRESS 8277 No. St. Rt. 18 44211

DATE 5-27-83

SIGNED W M Tibboles

*If additional space is needed to complete well log, use next consecutive numbered form.

ORIGINAL COPY - ODNR, DIVISION OF WATER, FOUNTAIN SQ., COLS., OHIO 43224

10

Engineering-Science Well Log

BUSTR Facility ID Number: 22000144
Location: Plum Brook Country Club
Date Drilled: 8/23/1993
Drilling Method: 3.25" I.D. Hollow-stem auger
Drilling Company: Northcoast Drilling

Boring Number: MW-1
Total Depth:
Sampling Method: 2' Split-spoon
Casing Elevation:
Static Water Level:

Depth (Feet)	Geologic Description	Geologic Interpretation
0		
	Gravel driveway fill.	
	Brown, damp, well sorted silty fine sand, loose.	Alluvium
	Black, damp, moderately well sorted clay with some fine sand, soft, slightly pastic.	
5	Gray clay with some med. sand & minor peat layers, moderately sorted.	
	Brown, damp, well sorted medium sand.	
	Brown, moist, moderately well sorted sandy clay, plastic.	
	Gray, moist, very well sorted clay with minor thin sand seams, non plastic.	Lacustrine clay and silt
10	Yellow, moist clay.	
	Yellow, moist mottled gray clay with minor silt, very soft.	
15	Brownish Gray, wet clay with some silt, very soft, non-plastic.	
	Minor thin silt seams.	
20	End of boring	

This record is a modified version of the original record. Geologic interpretation by the ODNR, Division of Geological Survey. Copies of the original record and location maps are on file at Ohio Department of Commerce, Office of State Fire Marshal, Bureau of Underground Storage Tank Regulations (BUSTR).

Ohio Department of Natural Resources
Division of Geological Survey

Seismic Investigations

Explanation of Contents

The reports, analyses, documents, and data in this document were compiled as part of seismic investigations done in the state of Ohio by the Ohio Department of Natural Resources (ODNR), Division of Geological Survey. The seismic investigations measured compressional-wave (P-wave) and shear-wave (S-wave) velocities and surface wave phase velocities to produce depth models characterizing the subsurface geology of the buried bedrock surface and the overlying sediments. The data collected were also used to determine the in situ elastic and seismic properties of soils and bedrock.

The file numbering scheme used for these investigations follow an API code format:

File 341419000724

34 = API state code (Ohio in this example)
141 = API county code (Ross County in this example)
9 = blank
0007 = code for survey number (survey no. 7 in this example)
24 = code for refraction and MASW surveys

History

The seismic equipment was purchased in 2001 by the ODNR Division of Geological Survey, Geologic Mapping Group with grant monies from Central Great Lakes Geologic Mapping Coalition (CGLGMC). This equipment provides a rapid and inexpensive means of determining the depth to bedrock and characterizing the stratigraphy of surficial materials in geologically complex areas. The equipment is portable, can be used in a wide range of situations, requires no dedicated vehicle, and can be used with minimal personnel and travel expense. The ODNR Division of Geological Survey started using the seismic system July 2002

Data Set Credit

The seismic data was acquired for the Statewide Surficial Mapping Project, funded by STATEMAP Geologic Mapping Program, Central Great Lakes Geologic Mapping Coalition (CGLGMC), and Ohio Seismic Network (OhioSeis).

Use Constraints

This product of the ODNR Division of Geological Survey is intended to provide general geologic information only and should not be used for any other purpose. It is not intended for resale or to replace site-specific investigations. These data were compiled by the ODNR Division of Geological Survey, which reserves the publication rights to this material. If these data are used in the compilation of other data sets or maps for distribution or publication, this source must be referenced.

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