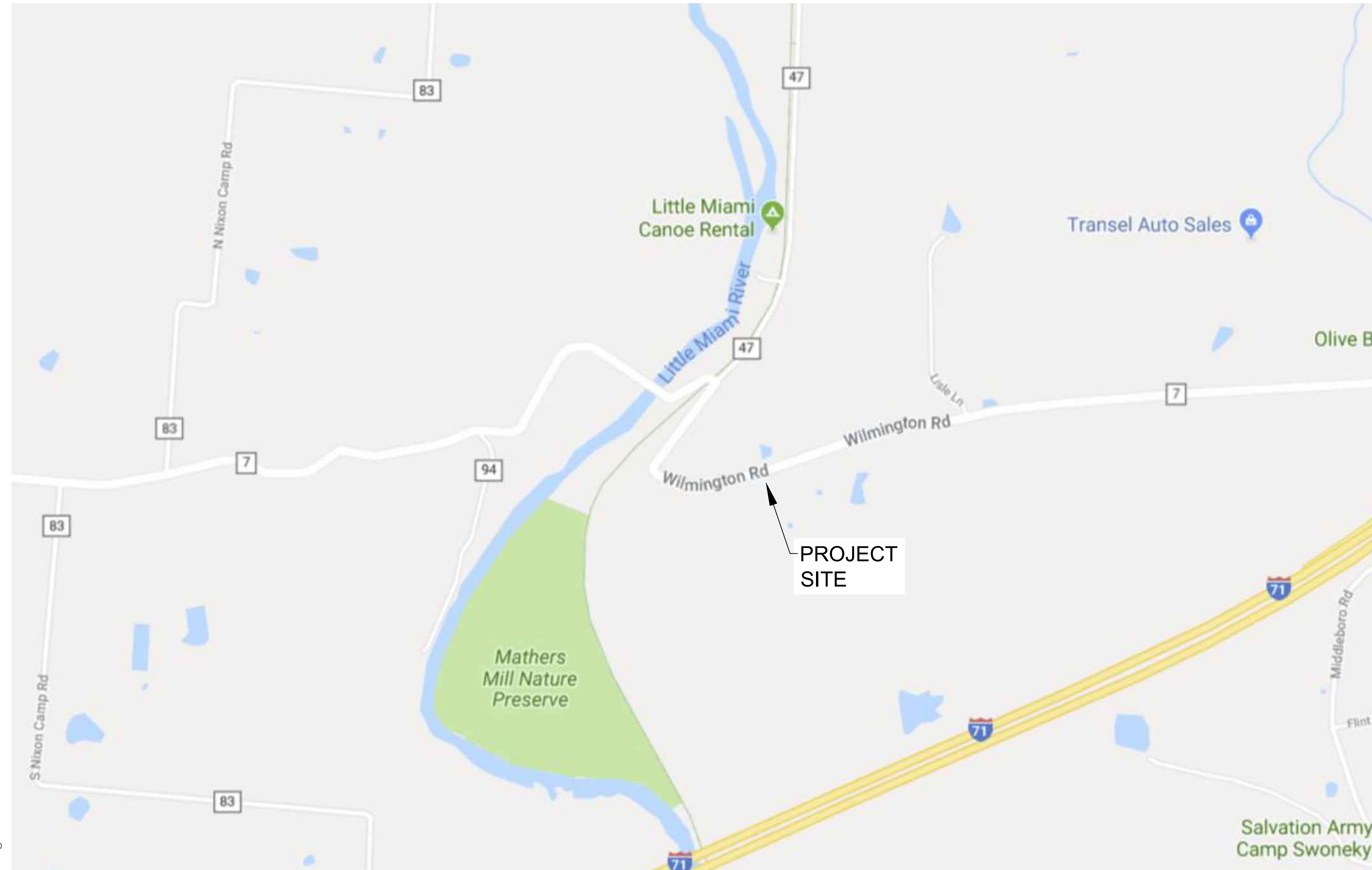


# WARREN COUNTY ENGINEER'S OFFICE

## CR-7 LANDSLIDE 2

### WILMINGTON ROAD, WARREN COUNTY, OHIO

### LANDSLIDE CORRECTION (PHASE II)



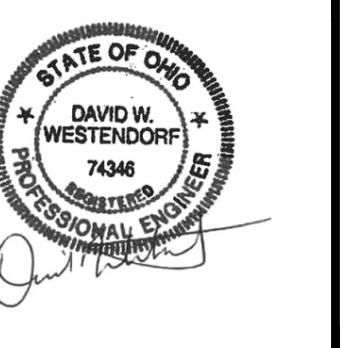
VICINITY MAP

APPROVED: \_\_\_\_\_ WARREN COUNTY ENGINEER  
 DATE: \_\_\_\_\_ KURT WEBER, P.E., P.S.

REV. DATE BY DESCRIPTION

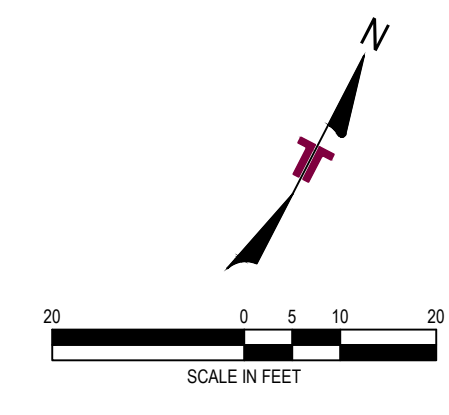
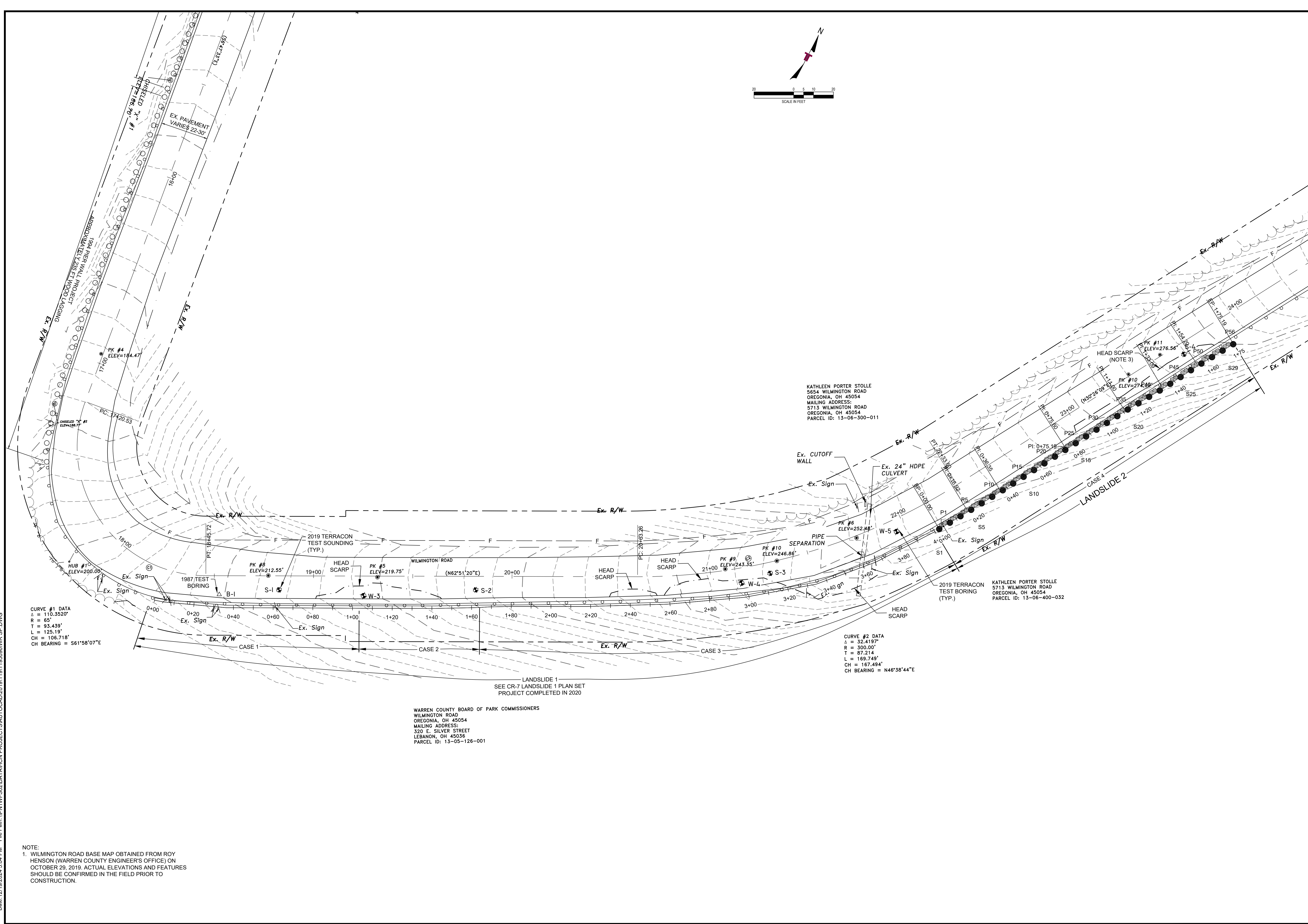
LANDSLIDE CORRECTION (PHASE II)  
 CR-7 LANDSLIDE 2  
 WARREN COUNTY ENGINEER'S OFFICE  
 WILMINGTON ROAD  
 WARREN COUNTY, OHIO

**Terracon**  
 Consulting Engineers and Scientists  
 611 LUNKEN PARK DRIVE  
 PH. (513) 321-5816  
 CINCINNATI, OHIO 45226  
 FAX. (513) 321-4540



SHEET 1

DESIGNED BY:	ASK/DWW
DRAWN BY:	BM
APPVD. BY:	JDD
SCALE:	AS SHOWN
DATE:	1/6/2025
JOB NO.:	N1245308
ACAD NO.:	WR SP.DWG
SHEET NO.:	1



CURVE #1 DATA  
 $\Delta = 110.3520^\circ$   
 $R = 65'$   
 $T = 93.439'$   
 $L = 125.19'$   
 $CH = 106.718'$   
 $CH BEARING = S61^\circ58'07"E$

CURVE #2 DATA  
 $\Delta = 32.4197^\circ$   
 $R = 300.00'$   
 $T = 87.214'$   
 $L = 169.749'$   
 $CH = 167.494'$   
 $CH BEARING = N46^\circ38'44"E$

WARREN COUNTY BOARD OF PARK COMMISSIONERS  
 WILMINGTON ROAD  
 OREGONIA, OH 45054  
 MAILING ADDRESS:  
 320 E. SILVER STREET  
 LEBANON, OH 45036  
 PARCEL ID: 13-05-126-001

KATHLEEN PORTER STOLLE  
 5654 WILMINGTON ROAD  
 OREGONIA, OH 45054  
 MAILING ADDRESS:  
 5713 WILMINGTON ROAD  
 OREGONIA, OH 45054  
 PARCEL ID: 13-06-300-011

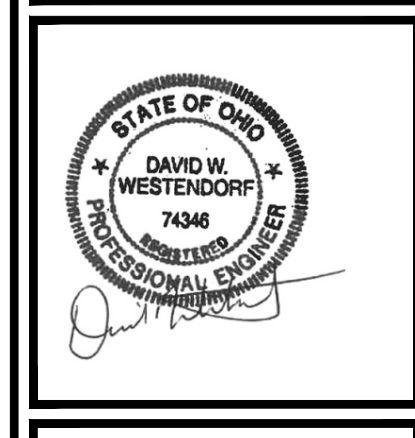
2019 TERRACON TEST BORING (TYP.)  
 KATHLEEN PORTER STOLLE  
 5713 WILMINGTON ROAD  
 OREGONIA, OH 45054  
 PARCEL ID: 13-06-400-032

NOTE:  
 1. WILMINGTON ROAD BASE MAP OBTAINED FROM ROY HENSON (WARREN COUNTY ENGINEER'S OFFICE) ON OCTOBER 29, 2019. ACTUAL ELEVATIONS AND FEATURES SHOULD BE CONFIRMED IN THE FIELD PRIOR TO CONSTRUCTION.

REV.	DATE	BY	DESCRIPTION

OVERALL PROJECT SITE PLAN  
 CR-7 LANDSLIDE 2  
**WARREN COUNTY ENGINEER'S OFFICE**  
 WILMINGTON ROAD  
 WARREN COUNTY, OHIO

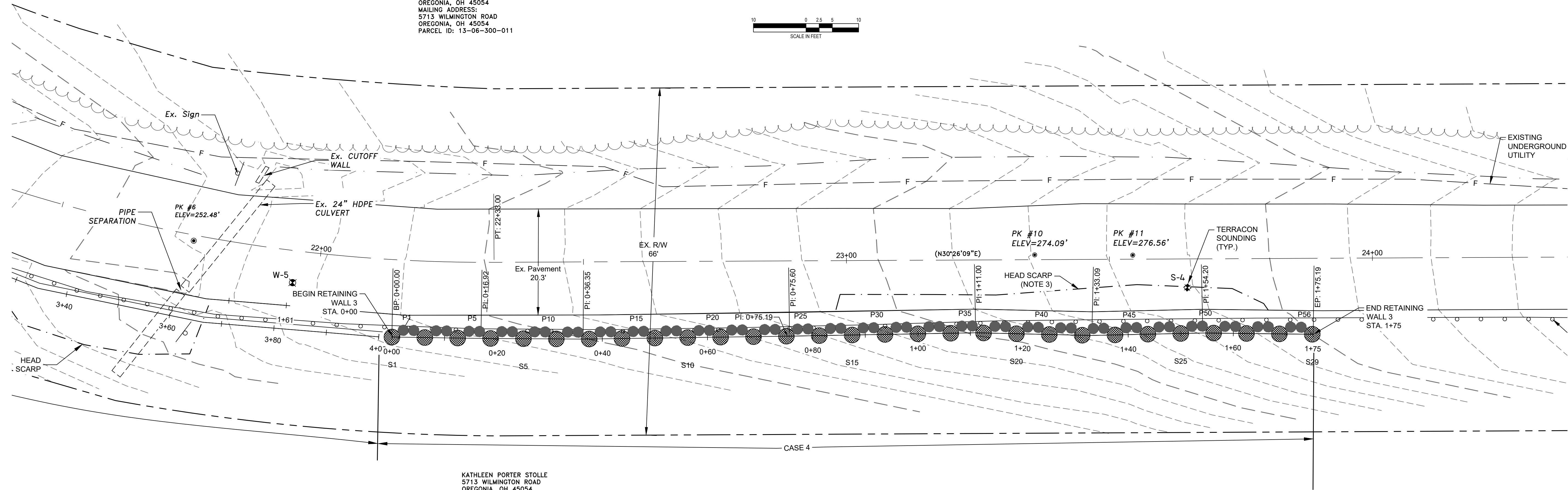
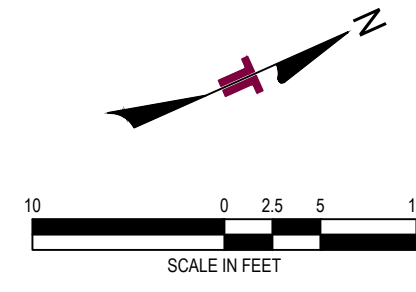
**Terracon**  
 Consulting Engineers and Scientists  
 611 LUNKEN PARK DRIVE  
 CINCINNATI, OHIO 45226  
 PH: (513) 321-5516  
 FAX: (513) 321-4540



**SHEET 2**

DESIGNED BY:	ASK/DWW
DRAWN BY:	BM
APPVD BY:	JDD
SCALE:	AS SHOWN
DATE:	1/6/2025
JOB NO.	N1245308
ACAD NO.	WR SP.DWG
SHEET NO.:	2

KATHLEEN PORTER STOLLE  
 5654 WILMINGTON ROAD  
 OREGONIA, OH 45054  
 MAILING ADDRESS:  
 5713 WILMINGTON ROAD  
 OREGONIA, OH 45054  
 PARCEL ID: 13-06-300-011

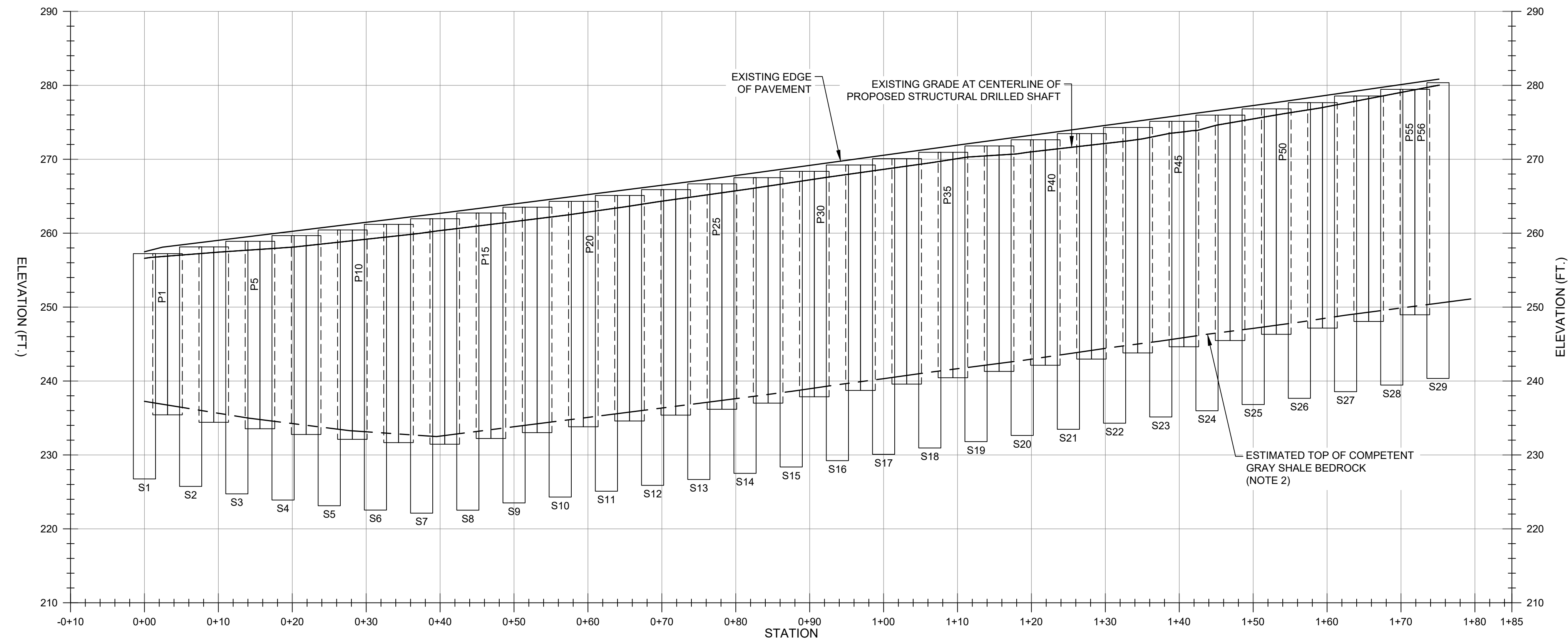


KATHLEEN PORTER STOLLE  
 5713 WILMINGTON ROAD  
 OREGONIA, OH 45054  
 PARCEL ID: 13-06-400-032

PLAN VIEW - WALL 2  
 SCALE: 1"=10'

PLAN AND ELEVATION NOTES:

1. WILMINGTON ROAD BASE MAP OBTAINED FROM ROY HENSON (WARREN COUNTY ENGINEER'S OFFICE) ON OCTOBER 29, 2019. ACTUAL ELEVATIONS AND FEATURES SHOULD BE CONFIRMED IN THE FIELD PRIOR TO CONSTRUCTION.
2. APPROXIMATE TOP OF COMPETENT GRAY SHALE BEDROCK SURFACE IS ANTICIPATED TO BE ABOUT 30 FEET BELOW EXISTING SITE GRADES BASED ON SOUNDING S-4. ACTUAL TOP OF COMPETENT GRAY SHALE MAY VARY.
3. HEAD SCARP LOCATION SHOWN WAS PROVIDED ON OCTOBER 29, 2019. HEAD SCARP LOCATION MAY HAVE CHANGED AND SHOULD BE CONFIRMED PRIOR TO CONSTRUCTION. IF HEAD SCARP AT THE TIME OF CONSTRUCTION IS BEYOND DRILLED SHAFT WALL LIMITS, TERRACON SHOULD BE IMMEDIATELY NOTIFIED.
4. DRILLED SHAFT WALL TO BE INSTALLED SUCH THAT BACK OF THE STRUCTURAL SHAFTS ARE SPACED AT A MINIMUM DISTANCE OF 3 1/2 FEET FROM EDGE OF PAVEMENT.



ELEVATION VIEW - RETAINING WALL 2  
 SCALE: 1"=10' H&V

REVISIONS

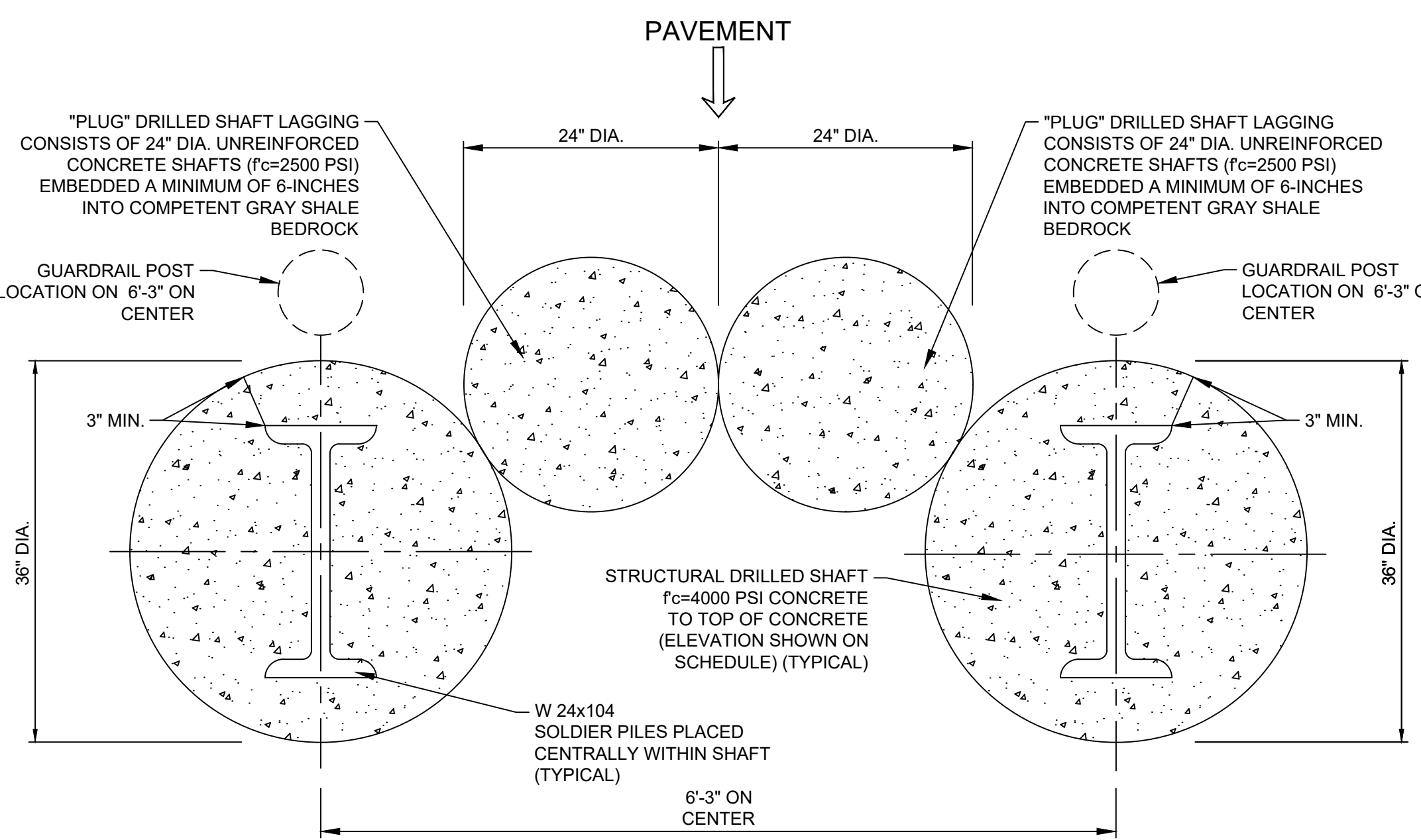
PLAN AND ELEVATION  
 CR-7 LANDSLIDE 2  
 WARREN COUNTY ENGINEER'S OFFICE  
 WILMINGTON ROAD  
 WARREN COUNTY, OHIO

**Terracon**  
 Consulting Engineers and Scientists  
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 PH: (513) 321-5516 FAX: (513) 321-4540

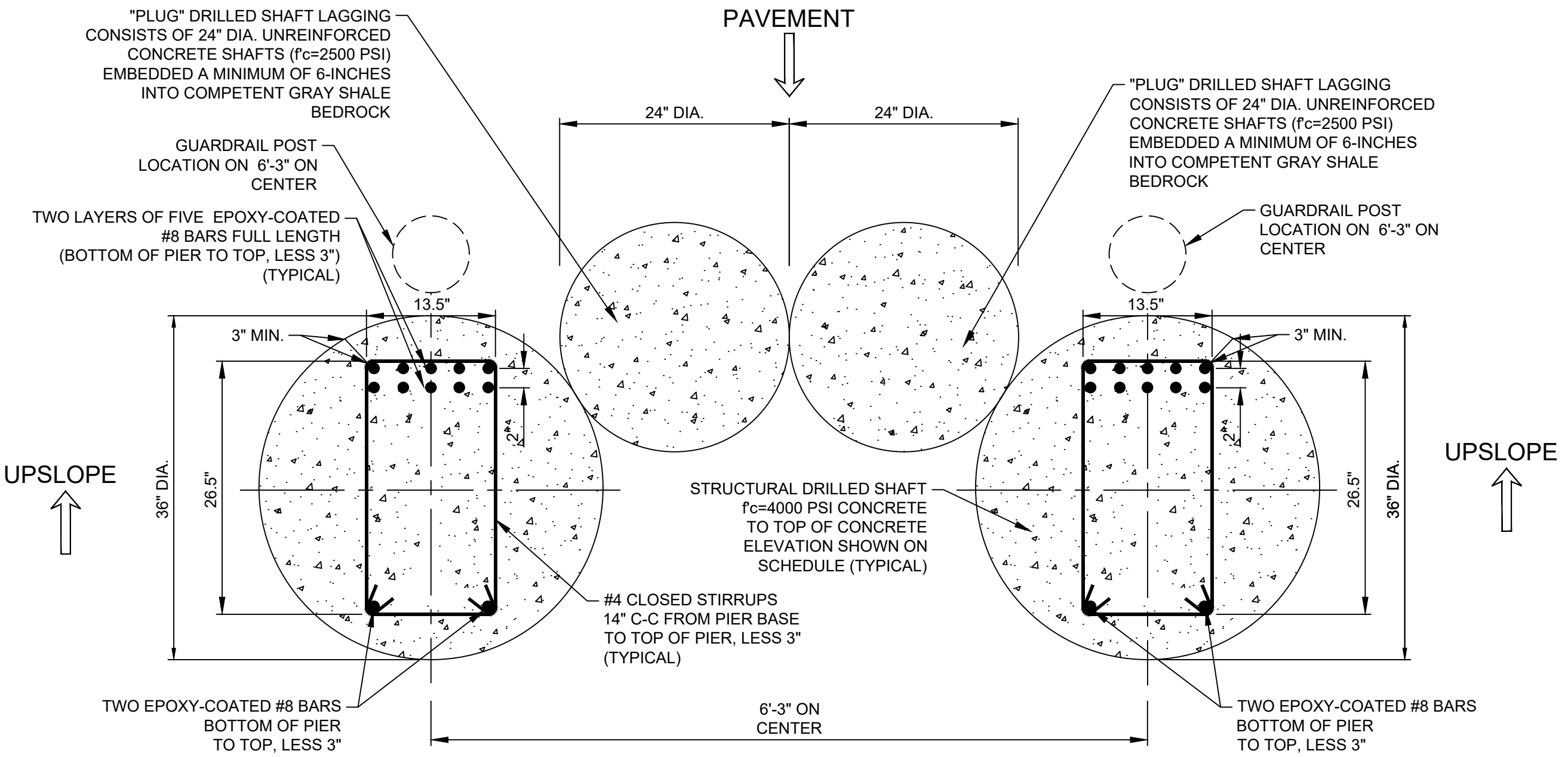


SHEET 3

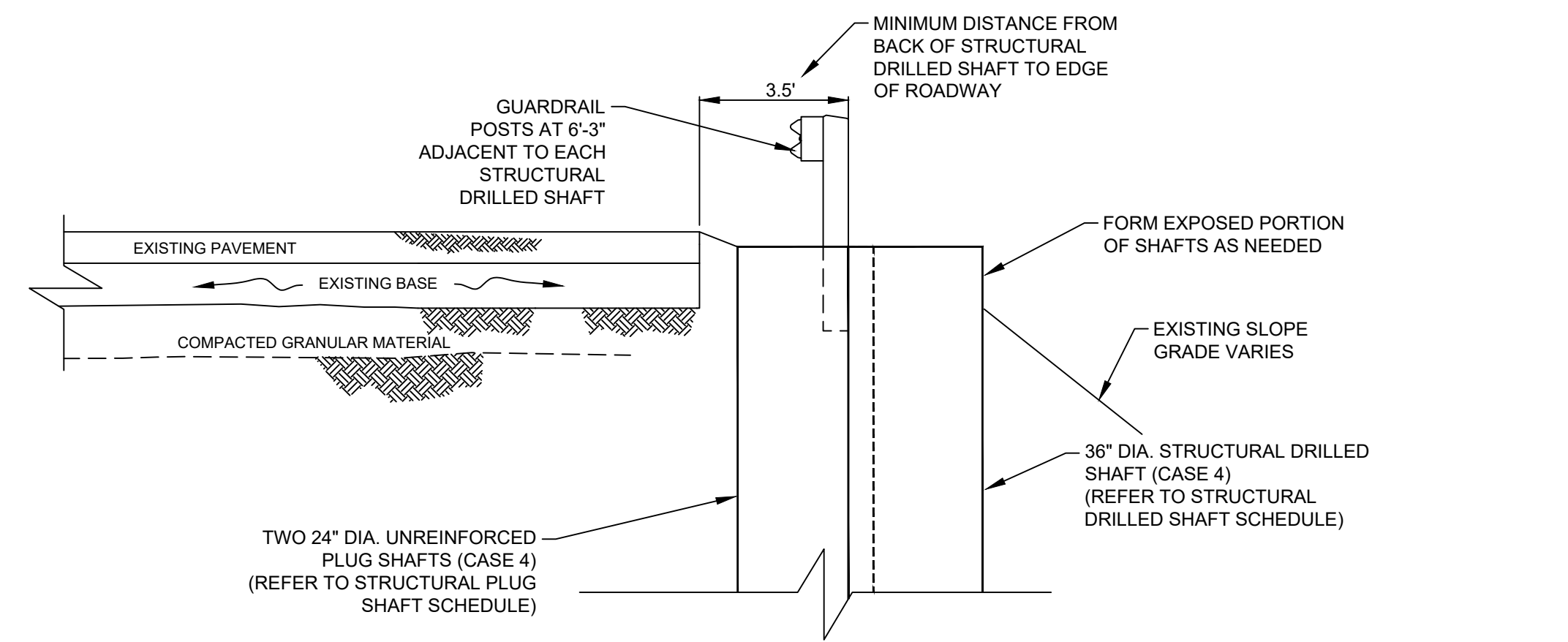
DESIGNED BY: ASK/DWW  
 DRAWN BY: BM  
 APP'D BY: JDD  
 SCALE: AS SHOWN  
 DATE: 1/6/2025  
 JOB NO.: N1245308  
 ACAD NO.: WR SP DWG  
 SHEET NO.: 3



CASE 4 (ALTERNATE 1): STRUCTURAL DRILLED SHAFT WITH W 24x104 (CASE 4) REINFORCEMENT DETAIL AND "PLUG" SHAFT LAGGING SCALE: 1"=1'



CASE 4 (ALTERNATE 2): STRUCTURAL DRILLED SHAFT WITH CAGE REINFORCEMENT DETAIL AND "PLUG" SHAFT LAGGING SCALE: 1"=1'



DRILLED SHAFT RETAINING WALL SECTION (TYPICAL) SCALE: NOT TO SCALE

Case No. <sup>(1)</sup>	Shaft No.	Diameter	Station	Approx. Top of Shaft Concrete Elevation		Estimated Socket Length into Gray Bedrock <sup>(4)</sup>	Design Drilled Shaft Bottom Elevation		Design Drilled Shaft Length	
				Feet	Feet		Feet	Feet	Feet	Feet
4	S01	36	0+00.00	257.2	237.2	10.5	226.7	31.0		
	S02	36	0+06.25	258.1	236.2	10.5	225.7	32.0		
	S03	36	0+12.50	258.9	235.2	10.5	224.7	34.0		
	S04	36	0+18.75	259.7	234.4	10.5	223.9	35.5		
	S05	36	0+25.00	260.4	233.6	10.5	223.1	37.5		
	S06	36	0+31.25	261.2	233.0	10.5	222.5	38.5		
	S07	36	0+37.50	262.0	232.6	10.5	222.1	40.0		
	S08	36	0+43.75	262.7	233.0	10.5	222.5	40.0		
	S09	36	0+50.00	263.5	234.0	10.5	223.5	40.0		
	S10	36	0+56.25	264.3	234.8	10.5	224.3	40.0		
	S11	36	0+62.50	265.1	235.6	10.5	225.1	40.0		
	S12	36	0+68.75	265.9	236.4	10.5	225.9	40.0		
	S13	36	0+75.00	266.7	237.2	10.5	226.7	40.0		
	S14	36	0+81.25	267.5	238.0	10.5	227.5	40.0		
	S15	36	0+87.50	268.4	238.9	10.5	228.4	40.0		
	S16	36	0+93.75	269.2	239.7	10.5	229.2	40.0		
	S17	36	1+00.00	270.1	240.6	10.5	230.1	40.0		
	S18	36	1+06.25	270.9	241.4	10.5	230.9	40.0		
	S19	36	1+12.50	271.8	242.3	10.5	231.8	40.0		
	S20	36	1+18.75	272.6	243.1	10.5	232.6	40.0		
	S21	36	1+25.00	273.5	244.0	10.5	233.5	40.0		
	S22	36	1+31.25	274.3	244.8	10.5	234.3	40.0		
	S23	36	1+37.50	275.1	245.6	10.5	235.1	40.0		
	S24	36	1+43.75	276.0	246.5	10.5	236.0	40.0		
	S25	36	1+50.00	276.8	247.3	10.5	236.8	40.0		
	S26	36	1+56.25	277.7	248.2	10.5	237.7	40.0		
	S27	36	1+62.50	278.6	249.1	10.5	238.6	40.0		
	S28	36	1+68.75	279.5	249.9	10.5	239.5	40.0		
	S29	36	1+75.00	280.4	250.8	10.5	240.4	40.0		

1) CASE 4 WAS DESIGNED AS A MAINTENANCE WALL TO HELP REDUCE FURTHER MOVEMENT IN THE AREA. IF A DRILLED SHAFT RETAINING WALL IS REQUIRED FOR LANDSLIDE PREVENTION, ADDITIONAL TEST BORINGS AND/OR INCLINOMETERS WILL NEED TO BE INSTALLED IN THE AREA.  
 2) TOP OF SHAFT CONCRETE ELEVATION IS 3" BELOW THE APPROXIMATE EDGE OF ROADWAY SURFACE ELEVATION.  
 3) APPROXIMATE TOP OF COMPETENT GRAY SHALE BEDROCK SURFACE IS ANTICIPATED TO BE ABOUT 30 FEET BELOW EXISTING SITE GRADES BASED ON SOUNDINGS S-4. INSUFFICIENT INFORMATION IS AVAILABLE AT THIS TIME TO DETERMINE APPROXIMATE TOP OF COMPETENT BEDROCK SURFACE ALONG PROPOSED WALL ALIGNMENT.  
 4) ACTUAL SOCKET LENGTH TO BE DETERMINED BY CONDITIONS ENCOUNTERED IN FIELD. CASE 4 WAS DESIGNED FOR A MINIMUM SOCKET DEPTH OF 9 FEET INTO COMPETENT GRAY SHALE BEDROCK.

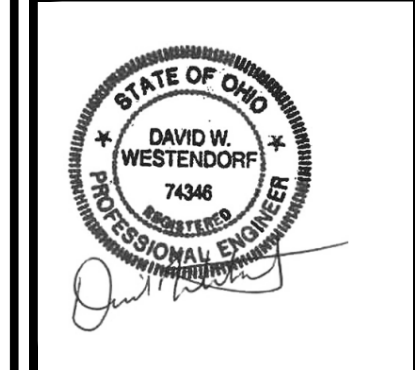
Shaft No.	Diameter	Approx. Top of Shaft Concrete Elevation (1)	Estimated Drilled Shaft Bottom Elevation	Estimated Drilled Shaft Length (2)
P1	24	257.2	235.4	22.0
P2	24	257.2	235.4	22.0
P3	24	258.1	234.4	23.5
P4	24	258.1	234.4	23.5
P5	24	258.9	233.5	25.5
P6	24	258.9	233.5	25.5
P7	24	259.7	232.8	27.0
P8	24	259.7	232.8	27.0
P9	24	260.4	232.1	28.5
P10	24	260.4	232.1	28.5
P11	24	261.2	231.7	29.5
P12	24	261.2	231.7	29.5
P13	24	262.0	231.5	30.5
P14	24	262.0	231.5	30.5
P15	24	262.7	232.2	30.5
P16	24	262.7	232.2	30.5
P17	24	263.5	233.0	30.5
P18	24	263.5	233.0	30.5
P19	24	264.3	233.8	30.5
P20	24	264.3	233.8	30.5
P21	24	265.1	234.6	30.5
P22	24	265.1	234.6	30.5
P23	24	265.9	235.4	30.5
P24	24	265.9	235.4	30.5
P25	24	266.7	236.2	30.5
P26	24	266.7	236.2	30.5
P27	24	267.5	237.0	30.5
P28	24	267.5	237.0	30.5
P29	24	268.4	237.9	30.5
P30	24	268.4	237.9	30.5
P31	24	269.2	238.7	30.5
P32	24	269.2	238.7	30.5
P33	24	270.1	239.6	30.5
P34	24	270.1	239.6	30.5
P35	24	270.9	240.4	30.5
P36	24	270.9	240.4	30.5
P37	24	271.8	241.3	30.5
P38	24	271.8	241.3	30.5
P39	24	272.6	242.1	30.5
P40	24	272.6	242.1	30.5
P41	24	273.5	243.0	30.5
P42	24	273.5	243.0	30.5
P43	24	274.3	243.8	30.5
P44	24	274.3	243.8	30.5
P45	24	275.1	244.6	30.5
P46	24	275.1	244.6	30.5
P47	24	276.0	245.5	30.5
P48	24	276.0	245.5	30.5
P49	24	276.8	246.3	30.5
P50	24	276.8	246.3	30.5
P51	24	277.7	247.2	30.5
P52	24	277.7	247.2	30.5
P53	24	278.6	248.1	30.5
P54	24	278.6	248.1	30.5
P55	24	279.5	249.0	30.5
P56	24	279.5	249.0	30.5

1) TOP OF PLUG SHAFT CONCRETE ELEVATION IS 3" BELOW THE APPROXIMATE EDGE OF ROADWAY SURFACE ELEVATION.  
 2) ACTUAL PLUG SHAFT LENGTH TO BE DETERMINED BY CONDITIONS ENCOUNTERED IN FIELD. PLUG SHAFTS SHOULD EXTEND A MINIMUM OF 6" INTO COMPETENT GRAY SHALE BEDROCK.

- DRILLED SHAFT CONSTRUCTION NOTES**
- DRILLED SHAFT INSTALLATION**
- CONSTRUCT THE 36-INCH DIAMETER DRILLED STRUCTURAL SHAFTS WITH PLUG SHAFT LAGGING RETAINING WALL USING ROLLED STEEL SECTIONS OR STEEL CAGE REINFORCEMENT AS SHOWN AND DESCRIBED ON PLANS. THE PURPOSE OF THIS WORK IS TO STOP LATERAL CREEP-TYPE MOVEMENT ON THE DOWNSLOPE (SOUTH) SIDE OF WILMINGTON ROAD. CONTRACTOR IS RESPONSIBLE FOR CLEARING OVERHEAD AND UNDERGROUND UTILITIES AND PROVIDING ACCESS FOR EQUIPMENT. THE SHAFT EXCAVATION SHALL BE UNCLASSIFIED.
  - THE REINFORCED DRILLED SHAFT RETAINING WALL WILL CONSIST OF DRILLED SHAFTS SPACED APPROXIMATELY 6 FEET - 3 INCHES (6'-3") ON CENTER, AS SHOWN ON THE SITE PLAN DRAWING. ESTIMATED EMBEDMENT DEPTHS INTO SHALE BEDROCK ARE SHOWN ON THE DRILLED SHAFT SCHEDULE TABLE ON THIS SHEET; HOWEVER, ACTUAL EMBEDMENT DEPTHS WILL BE BASED ON ACTUAL FIELD CONDITIONS AS DETERMINED BY THE GEOTECHNICAL CONSULTANT.
  - THE SHAFTS SHALL BE LOCATED AS SHOWN ON PLAN WITHIN 6" OF PLAN LOCATION. THE SHAFTS SHALL MAINTAIN A PLUMBNESS DEVIATION OF A MAXIMUM OF 1" IN 12 FT. VERTICAL HEIGHT. A MINIMUM 3" CONCRETE COVER BETWEEN THE REINFORCING STEEL AND THE EXTERIOR (SIDES AND TOP) OF THE DRILLED SHAFT SHALL BE PROVIDED.
  - TWO ALTERNATIVES FOR REINFORCEMENT OF STRUCTURAL SHAFTS HAVE BEEN PROVIDED. REINFORCEMENT FOR THE STRUCTURAL SHAFTS SHALL CONSIST OF EITHER ROLLED STEEL SECTIONS HAVING YIELD STRENGTH OF 50 KSI OR CAGE REINFORCING STEEL HAVING A YIELD STRENGTH OF 60 KSI. ROLLED STEEL SECTIONS (ALTERNATIVE 1) SHOULD CONSIST OF W24x104 AS NOTED ON THESE PLANS. THE CONFIGURATION OF THE STEEL REINFORCING CAGE (ALTERNATIVE 2) FOR THE FOUR CASES HAS BEEN SHOWN ON THESE PLANS. ALL REBAR MUST BE EPOXY COATED.
  - THE PRE-DRILLED SHAFT WILL BE BACKFILLED WITH CONCRETE TO THE TOP OF CONCRETE ELEVATION. THE TOP OF SHAFT CONCRETE ELEVATION SHALL BE ABOUT 3 INCHES BELOW THE EDGE OF PAVEMENT ELEVATION, TO AVOID CONTACT BY SNOW PLOWS. STRUCTURE SHAFT CONCRETE SHALL BE CONCRETE (FC = 4000 PSI, MAXIMUM SLUMP = 4 INCHES, 4% TO 6% AIR ENTRAINMENT) PLACED USING FREE FALL METHOD OF PLACEMENT. CONCRETE SHALL BE PLACED INTO EACH SHAFT EXCAVATION ON THE SAME DAY THAT THE DRILLING IS COMPLETED. SEE ITEM 9 BELOW.
  - TEMPORARY STEEL CASING SHOULD BE ON-SITE AND USED WHEREVER REQUIRED TO STABILIZE LOOSE OR CAVING MATERIALS, OR TO SEAL OFF WATER BEARING ZONES ENCOUNTERED DURING CONSTRUCTION.
  - THE WALL DESIGN IS BASED ON MAXIMUM DEPTH TO COMPETENT GRAY SHALE BEDROCK ABOUT 30 FEET BELOW GRADE. AS NOTED IN THE DRILLED SHAFT SCHEDULE. HOWEVER, IF BEDROCK IS ENCOUNTERED MORE THAN 1.0 FT. BELOW PLAN DESIGN ELEVATION, TERRACON SHALL BE NOTIFIED IMMEDIATELY TO REVIEW AND PROVIDE ADDITIONAL RECOMMENDATIONS. EACH SHAFT SHALL BE SOCKETED INTO SHALE BEDROCK WITH LIMESTONE LAYERS A MINIMUM OF 9 FEET, AS DESCRIBED ON THE PLANS.
  - THE CONTRACTOR SHALL MAINTAIN A RECORD OF EACH SHAFT DRILLED, WHICH WILL INCLUDE AS A MINIMUM: SHAFT NUMBER; GROUND ELEVATION; SHAFT TOP ELEVATION; TOP OF BROWN WEATHERED SHALE ELEVATIONS; TOP OF GRAY SHALE ELEVATIONS; AS-BUILT ROCK SOCKET DEPTH; ELEVATION OF THE TOP OF THE SHAFT CONCRETE; DATE DRILLED; DATE COMPLETED; AND WEATHER CONDITIONS.
  - IT IS ANTICIPATED THAT WATER MAY ENTER SOME OF THE SHAFT EXCAVATIONS. THE DEPTH OF PONDED WATER AT THE BOTTOM OF THE SHAFT EXCAVATIONS SHOULD NOT EXCEED 2 INCHES. PRIOR TO PLACING CONCRETE, IF THE WATER CANNOT BE PUMPED DOWN, TREMIE PLACEMENT METHODS WILL BE REQUIRED.
  - THE DRILLED SHAFT EXCAVATIONS SHOULD BE INSPECTED BY A QUALIFIED GEOTECHNICAL REPRESENTATIVE TO CONFIRM THAT THE DRILLED SHAFTS ARE SOCKETED INTO BEDROCK ACCORDING TO DESIGN, AND THAT THE DRILLED SHAFTS HAVE BEEN CONSTRUCTED PER SPECIFICATIONS.
  - SHAFT SPOILS SHALL BE TRUCKED FROM THE SITE (NOT WASTED ON THE HILLSIDE). NO FILL PLACEMENT SHOULD BE ALLOWED DOWNSLOPE OF THE SLOPE FACE.
- PLUG SHAFT INSTALLATION**
- TWO 24-INCH DIAMETER PLUG SHAFTS CONSISTING OF UNREINFORCED CONCRETE (FC = 2500 PSI, MAXIMUM SLUMP = 4 INCHES; 4% TO 6% AIR ENTRAINMENT) AS NOTED ON THE CROSS-SECTION DETAILS WILL ACT AS LAGGING FOR THE SHAFT WALL.
  - PLUG SHAFT INSTALLATION FOR THE DRILLED SHAFT RETAINING WALL SHALL BEGIN AFTER THE STRUCTURAL SHAFT ELEMENTS HAVE GAINED STRENGTH (AT LEAST 24 HOURS AFTER PLACEMENT OF STRUCTURAL SHAFT CONCRETE).
  - THE TOP OF THE PLUG SHAFT CONCRETE SHALL BE ABOUT 3 INCHES BELOW THE EDGE OF PAVEMENT.
  - THE BOTTOM OF ALL THE PLUG SHAFTS INSTALLED SHOULD EXTEND TO THE ELEVATIONS DETAILED IN THE DRILLED SHAFT SCHEDULE (A MINIMUM OF 6 INCHES BELOW TOP OF GRAY SHALE BEDROCK).
  - PLUG SHAFT SPOILS SHALL BE TRUCKED FROM THE SITE (NOT WASTED ON THE HILLSIDE).
- DRAINAGE AND OTHER CONSTRUCTION CONSIDERATIONS**
- NEW STRUCTURAL FILL MAY BE PLACED ON UPSLOPE SIDE OF SHAFTS TO RETAIN GRADE NEXT TO THE EDGE OF PAVEMENT. SONOTUBES OR EQUIVALENT WILL BE REQUIRED IN SOME AREAS, DUE TO THE STEEPLY SLOPING HILLSIDE BELOW THE WALL. FILL SHOULD BE PLACED AND COMPACTED PER ODOT SPECIFICATIONS (ITEM 203). ONLY HAND-OPERATED EQUIPMENT SHOULD BE USED WITHIN 5 FEET OF THE FRONT OF THE SHAFTS.
- FIELD QUALITY CONTROL**
- A. OWNER WILL COORDINATE FIELD CONSTRUCTION INSPECTION AND REPORTING THROUGH IN-HOUSE PERSONNEL OR EXTERNAL TESTING AGENCY.
- DOCUMENTATION SHALL INCLUDE THE FOLLOWING AT EACH DRILLED SHAFT:
- GROUND ELEVATION
  - AS-BUILT SHAFT DIAMETER AND TOP AND BOTTOM SHAFT ELEVATIONS.
  - TOP OF WEATHERED BROWN SHALE ELEVATION.
  - TOP OF GRAY SHALE ELEVATION.
  - DESCRIPTION OF ENCOUNTERED SOIL MATERIALS.
  - DESCRIPTION, LOCATION, AND DIMENSIONS OF OBSTRUCTIONS.
  - FINAL TOP CENTERLINE LOCATION AND DEVIATIONS FROM REQUIREMENTS.
  - VARIATION OF SHAFT FROM PLUMB.
  - DRILLED SHAFT EXCAVATING METHOD.
  - LENGTH OF ROCK SOCKET.
  - LEVELNESS OF SHAFT BOTTOM AND ADEQUACY OF CLEANOUT.
  - GROUND-WATER CONDITIONS AND WATER-INFILTRATION RATE, DEPTH, AND PUMPING.
  - DESCRIPTION, DIAMETER, AND TOP AND BOTTOM ELEVATIONS OF TEMPORARY OR PERMANENT CASINGS.
  - DESCRIPTION OF SOIL OR WATER MOVEMENT, SIDEWALL STABILITY, LOSS OF GROUND, AND MEANS OF CONTROL.
  - DATE AND TIME OF STARTING AND COMPLETING DRILLED SHAFT EXCAVATION.
  - POSITION OF REINFORCING STEEL.
  - CONCRETE PLACEMENT METHOD, INCLUDING DELAYS.
  - ELEVATION OF CONCRETE DURING REMOVAL OF CASINGS.
  - LOCATIONS OF CONSTRUCTION JOINTS, IF ANY.
  - REMARKS, UNUSUAL CONDITIONS ENCOUNTERED, AND DEVIATIONS FROM REQUIREMENTS.

**DETAILS, SCHEDULES, AND CONSTRUCTION NOTES**  
 CR-7 LANDSLIDE 2  
**WARREN COUNTY ENGINEER'S OFFICE**  
 WILMINGTON ROAD  
 WARREN COUNTY, OHIO

**Terracon**  
 Consulting Engineers and Scientists  
 611 LUNKEN PARK DRIVE  
 CINCINNATI, OHIO 45226  
 PH: (513) 321-8516  
 FAX: (513) 321-4540



**SHEET 4**  
 DESIGNED BY: ASK/DWW  
 DRAWN BY: BM  
 APPVD BY: JDD  
 SCALE: AS SHOWN  
 DATE: 1/6/2025  
 JOB NO. N1245308  
 ACAD NO. WR SP DWG  
 SHEET NO. 4

Date: 12/19/2024 3:04 PM File Path: U:\P1\WFS\2024\DATA\HCHN PROJECTS\AUTOCAD\20181191\185066\WR SP DWG

SOUNDING LOG NO. S-4										
PROJECT: Wilmington Road Landslide Remediation					CLIENT: Warren County OH Lebanon, OH					
SITE: Wilmington Road Eagle Township, OH										
LOCATION: See Exploration Plan Latitude: 39.4278° Longitude: -84.1031° Northing: 524047.336 Easting: 1515697.08	DEPTH (FT.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	FIELD TEST RESULTS	ROCK	LABORATORY HP (HP)	UNCONFINED COMPRESSIVE STRENGTH (UCS)	WATER CONTENT (%)	DRY UNIT WEIGHT (GPT)
Approximate Surface Elev.: 867 (ft.) +/-										
Augered to 30 feet. No soil/rock samples were collected. Rock sounding was terminated upon encountering gray shale bedrock.	5									
	10									
	15									
	20									
	25									
	30									
Sounding Terminated at 30 Feet										
Stratification lines are approximate. In-situ, the transition may be gradual.										
Advancement Method: Boring backfilled with auger cuttings upon completion.	See General Notes and Description of Rock Properties for explanation of symbols and abbreviations.				Notes:					
WATER LEVEL OBSERVATIONS No water observed during drilling No water observed after drilling	Terracon 611 Lunken Park Dr Cincinnati, OH				Probe Started: 02-27-2019	Drill Rig: D90		Project No.: N1195052		
				Probe Completed: 02-27-2019		Driller: AM				

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO BARRANTI LOG NO. WELL IN 190625 WILMINGTON ROAD, GPT, MODEL NUMBER, GPT, 32219

**GENERAL NOTES**  
DESCRIPTION OF SYMBOLS AND ABBREVIATIONS



SAMPLING	WATER LEVEL	FIELD TESTS
<input type="checkbox"/> Rock Core <input type="checkbox"/> Standard Penetration Test <input type="checkbox"/> Split Spoon	<input type="checkbox"/> Water Initially Encountered <input type="checkbox"/> Water Level After a Specified Period of Time <input type="checkbox"/> Water Level After a Specified Period of Time	N Standard Penetration Test Resistance (Blows/FT.) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer UC Unconfined Compressive Strength (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer

**DESCRIPTIVE SOIL CLASSIFICATION**  
Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

**LOCATION AND ELEVATION NOTES**  
Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance.		
Descriptive Term (Density)	Standard Penetration or N-Value Blows/FT.	Descriptive Term (Consistency)	Unconfined Compressive Strength Qu, (tsf)	Standard Penetration or N-Value Blows/FT.
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

RELATIVE PROPORTIONS OF SAND AND GRAVEL		RELATIVE PROPORTIONS OF FINES	
Descriptive Term(s) of other constituents	Percent of Dry Weight	Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	<15	Trace	<5
With	15-29	With	5-12
Modifier	>30	Modifier	>12

GRAIN SIZE TERMINOLOGY		PLASTICITY DESCRIPTION	
Major Component of Sample	Particle Size	Term	Plasticity Index
Boulders	Over 12 in. (300 mm)	Non-plastic	0
Cobbles	12 in. to 3 in. (300mm to 75mm)	Low	1 - 10
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)	Medium	11 - 30
Sand	#4 to #200 sieve (4.75mm to 0.075mm)	High	> 30
Silt or Clay	Passing #200 sieve (0.075mm)		

**DESCRIPTION OF ROCK PROPERTIES**



WEATHERING	
Term	Description
Unweathered	No visible sign of rock material weathering, perhaps slight discoloration on major discontinuity surfaces.
Slightly weathered	Discoloration indicates weathering of rock material and discontinuity surfaces. All the rock material may be discolored by weathering and may be somewhat weaker externally than in its fresh condition.
Moderately weathered	Less than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a continuous framework or as corestones.
Highly weathered	More than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a discontinuous framework or as corestones.
Completely weathered	All rock material is decomposed and/or disintegrated to soil. The original mass structure is still largely intact.
Residual soil	All rock material is converted to soil. The mass structure and material fabric are destroyed. There is a large change in volume, but the soil has not been significantly transported.

STRENGTH OR HARDNESS		
Description	Field Identification	Uniaxial Compressive Strength, psi (MPa)
Extremely weak	Indented by thumbnail	40-150 (0.3-1)
Very weak	Crumbles under firm blows with point of geological hammer, can be peeled by a pocket knife	150-700 (1-5)
Weak rock	Can be peeled by a pocket knife with difficulty, shallow indentations made by firm blow with point of geological hammer	700-4,000 (5-30)
Medium strong	Cannot be scraped or peeled with a pocket knife, specimen can be fractured with single firm blow of geological hammer	4,000-7,000 (30-50)
Strong rock	Specimen requires more than one blow of geological hammer to fracture it	7,000-15,000 (50-100)
Very strong	Specimen requires many blows of geological hammer to fracture it	15,000-36,000 (100-250)
Extremely strong	Specimen can only be chipped with geological hammer	>36,000 (>250)

DISCONTINUITY DESCRIPTION			
Fracture Spacing (Joints, Faults, Other Fractures)		Bedding Spacing (May Include Foliation or Banding)	
Description	Spacing	Description	Spacing
Extremely close	< ¼ in (<19 mm)	Laminated	< ½ in (<12 mm)
Very close	¼ in - 2-1/2 in (19 - 60 mm)	Very thin	½ in - 2 in (12 - 50 mm)
Close	2-1/2 in - 8 in (60 - 200 mm)	Thin	2 in - 1 ft. (50 - 300 mm)
Moderate	8 in - 2 ft. (200 - 600 mm)	Medium	1 ft. - 3 ft. (300 - 900 mm)
Wide	2 ft. - 6 ft. (600 mm - 2.0 m)	Thick	3 ft. - 10 ft. (900 mm - 3 m)
Very Wide	6 ft. - 20 ft. (2.0 - 6 m)	Massive	> 10 ft. (3 m)

Discontinuity Orientation (Angle): Measure the angle of discontinuity relative to a plane perpendicular to the longitudinal axis of the core. (For most cases, the core axis is vertical; therefore, the plane perpendicular to the core axis is horizontal.) For example, a horizontal bedding plane would have a 0-degree angle.

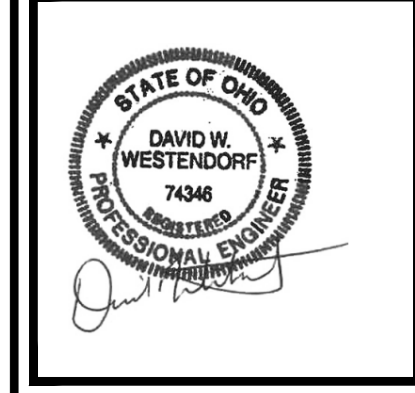
ROCK QUALITY DESIGNATION (RQD) 1	
Description	RQD Value (%)
Very Poor	0 - 25
Poor	25 - 50
Fair	50 - 75
Good	75 - 90
Excellent	90 - 100

1. The combined length of all sound and intact core segments equal to or greater than 4 inches in length, expressed as a percentage of the total core run length.

Reference: U.S. Department of Transportation, Federal Highway Administration, Publication No FHWA-NHI-10-034, December 2009 Technical Manual for Design and Construction of Road Tunnels - Civil Elements

BORING LOG, GENERAL NOTES, ROCK DESCRIPTION  
CR-7 LANDSLIDE 2  
WARREN COUNTY ENGINEER'S OFFICE  
WILMINGTON ROAD  
WARREN COUNTY, OHIO

Terracon  
Consulting Engineers and Scientists  
CINCINNATI, OHIO 45226  
PH: (513) 321-4516  
FAX: (513) 321-4590  
611 LUNKEN PARK DRIVE



SHEET 5	
DESIGNED BY:	ASK/DWW
DRAWN BY:	BM
APPVD BY:	JDD
SCALE:	AS SHOWN
DATE:	1/6/2025
JOB NO.:	N1245308
ACAD NO.:	WR SP DWG
SHEET NO.:	5

RIVER WORK COORDINATION

THE SOUTHWEST OHIO SCENIC RIVERS REGIONAL MANAGER SHALL RECEIVE A FINAL SET OF PLANS FOR REVIEW AND BE INVITED TO THE PRECONSTRUCTION MEETING. THE CONTRACTOR SHALL NOTIFY THE OHIO DEPARTMENT OF NATURAL RESOURCES SOUTHWEST OHIO SCENIC RIVERS REGIONAL MANAGER SEVEN DAYS PRIOR TO PERFORMING ANY WORK NEAR THE LITTLE MIAMI RIVER. CONTACT INFORMATION IS:

SOUTHWEST OHIO SCENIC RIVERS REGIONAL MANAGER  
 AARON ROURKE  
 1750 OSBORN ROAD  
 WILMINGTON, OHIO 45177  
 937-382-1096 (OFFICE)  
 614-230-8534 (CELL)

THE SOUTHWEST OHIO SCENIC RIVERS REGIONAL MANAGER SHALL CONDUCT A FINAL INSPECTION BEFORE THE COMPLETION OF THE PROJECT.

WHILE WORKING ADJACENT TO THE RIVER, THE CONTRACTOR SHALL NOT STORE ANY FUEL OR TOXIC/HAZARDOUS MATERIALS WITHIN THE 100 YEAR FLOODPLAIN OF THE LITTLE MIAMI RIVER. REFUELING OF EQUIPMENT SHALL NOT OCCUR IN THE FLOODPLAIN OR NEAR ANY DRAINAGE WAYS, DITCHES OR STREAMS. EQUIPMENT OPERATING ADJACENT TO THE RIVER SHALL BE INSPECTED DAILY FOR FUEL/LUBRICANT LEAKS AND PROMPTLY REPAIRED. THE CONTRACTOR SHALL TAKE PRECAUTIONS TO CONTAIN ACCIDENTAL SPILLAGE OF HAZARDOUS MATERIALS DURING REFUELING OR EQUIPMENT SERVICING BY PREPOSITIONING ABSORBENT PADS, BOOMS, OR PREVENTATIVE MEASURES. PRIOR TO CONSTRUCTION, WARREN COUNTY ENGINEER'S OFFICE WILL INFORM THE CONTRACTOR REGARDING PROTOCOL FOR NOTIFYING EMERGENCY RESPONSE PERSONNEL IN THE EVENT OF A SIGNIFICANT SPILL.

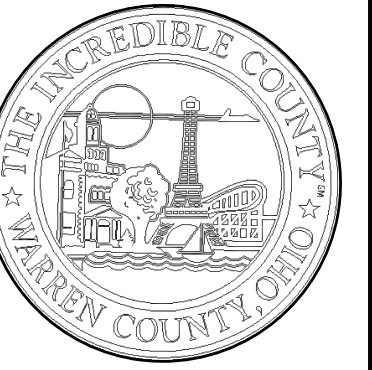
CARE SHALL BE TAKEN TO PREVENT MATERIAL FROM ENTERING THE RIVER. ANY MATERIAL WHICH ENTERS THE REIVER SHALL BE REMOVED BEFORE WORK COMMENCES TO ENSURE THAT ALL DEBRIS IS COMPLETELY REMOVED. ALL EXCESS CONSTRUCTION MATERIAL, EQUIPMENT AND OTHER DEBRIS SHALL BE REMOVED FROM THE PROJECT SITE UPON COMPLETION OF THE PROJECT AND DISPOSED OF AT A PROPER UPLAND FACILITY ABOVE THE 100 YEAR FLOOD ELEVATION. DISPOSAL WITHIN WETLANDS, FLOODPLAINS, OR WITHIN 1000 FEET OF THE LITTLE MIAMI RIVER IS PROHIBITED.

ALL STREAMBANK VEGETATION SHALL BE LEFT UNDISTURBED TO THE MAXIMUM EXTENT POSSIBLE. CUTTING OR CLEARING OF ANY RIPARIAN VEGETATION WITHIN 1000 FEET OF THE LITTLE MIAMI RIVER BEYOND THE EXISTING RIGHT-OF-WAY SHALL BE PROHIBITED. VERTICAL TREE TRIMMING IS PERMITTED WHERE NECESSARY INSIDE EXISTING RIGHT-OF-WAY, CARE SHALL BE TAKEN NOT TO GIRDLE OR SCUFF TREE TRUNKS OR DAMAGE ANY STANDING TREES.

IF DEWATERING IS NECESSARY FOR DRILLED PIER HOLES, ALL WASTE WATER SHALL BE PUMPED ONTO A VEGETATED AREA A SUFFICIENT DISTANCE FROM THE LITTLE MIAMI RIVER TO ALLOW FOR COMPLETE INFILTRATION. NO WASTEWATER OF ANY KIND SHALL BE DISCHARGED DIRECTLY INTO THE LITTLE MIAMI RIVER OR ANY OTHER DRAINAGE WAYS, DITCHES OR STREAMS. IF DISCHARGE TO A VEGETATED AREA IS NOT FEASIBLE, THEN WASTEWATER SHALL BE DISCHARGED INTO A SEDIMENT FILTER BAG.

PRECONSTRUCTION MEETING

PRIOR TO COMMENCEMENT OF THE CONSTRUCTION ACTIVITIES, THE WARREN COUNTY ENGINEER WILL ARRANGE A MEETING BETWEEN THE CONTRACTOR, SOUTHWEST OHIO SCENIC RIVERS REGIONAL MANAGER, AND THE WARREN COUNTY ENGINEER. THE TIME, DATE AND LOCATION OF SAID MEETING WILL BE DETERMINED AFTER THE AWARDED OF THE CONTRACT, AND ALL PARTIES WILL BE NOTIFIED BY THE WARREN COUNTY ENGINEER. AT THE PRECONSTRUCTION MEETING THE CONTRACTOR SHALL SUBMIT TO THE PROJECT MANAGER A CONSTRUCTION SCHEDULE, LIST OF SUBCONTRACTORS, AND A LIST OF SUPPLIERS.



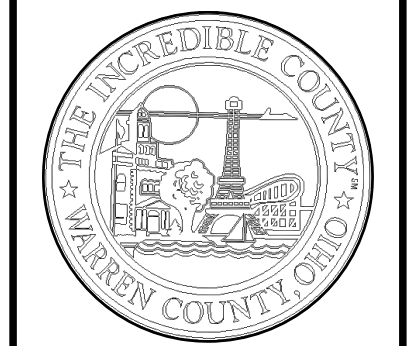
**Warren  
 County  
 Engineer's  
 Office**

*Neil J. Junison, P.E., P.S.*  
 Warren County Engineer  
 210 W. Main Street  
 Lebanon, Ohio 45036  
 513 695 3301 Phone  
 513 695 7714 Fax

GENERAL NOTES  
 WILMINGTON ROAD  
 DRILLED PIER WALL PROJECT  
 WASHINGTON TOWNSHIP

NO.	DATE	BY	DESCRIPTION

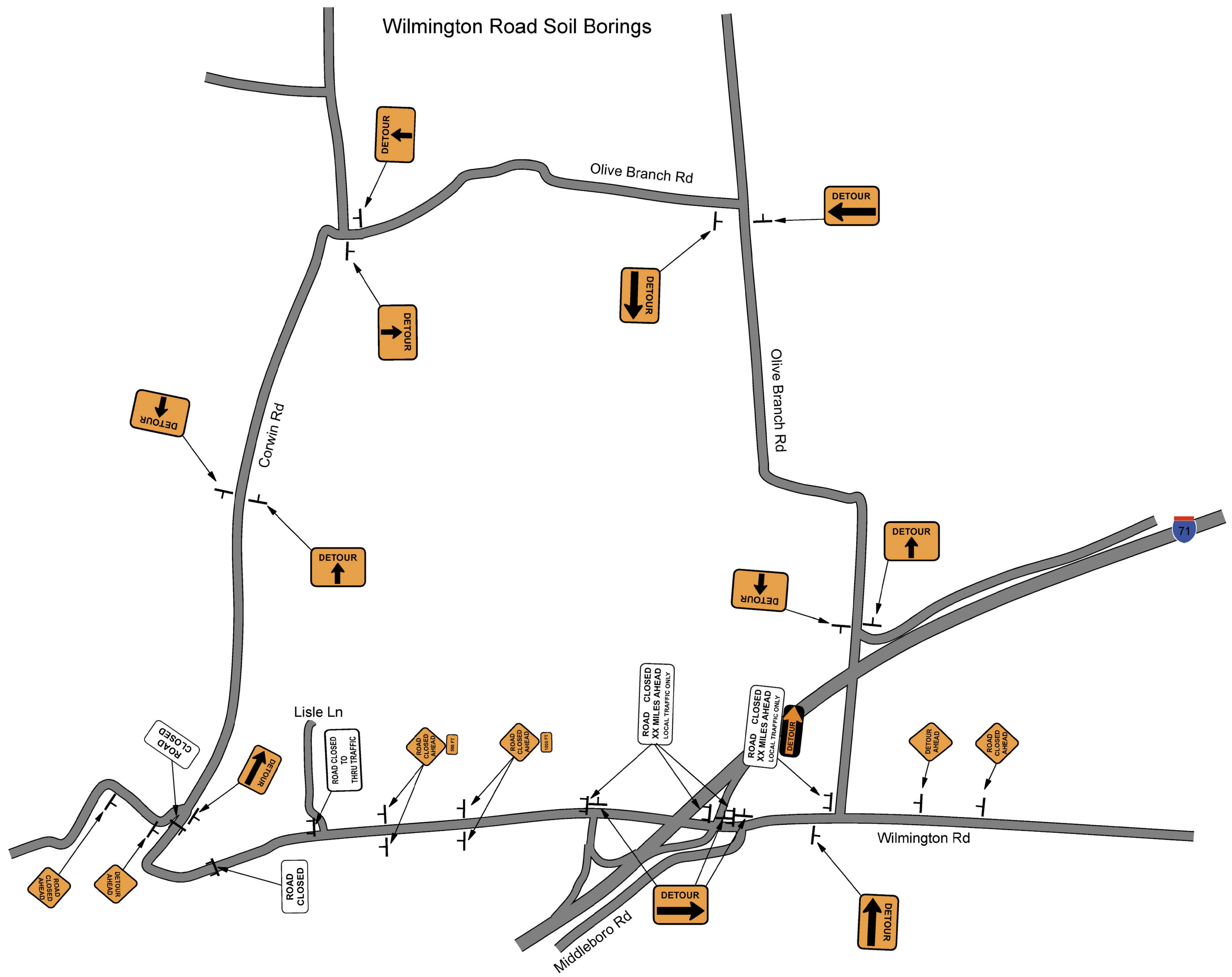
SCALE NONE	DATE 12/20/19
DRAWN BY CAH	CHECKED BY RCH
PROJECT NO. 027	FILE 027 Pier Wall
DRAWING NO. I:\ENGINEER\PROJECTS\Per Wall\027\027A.dwg	
SHEET 9 OF 9	



**Warren  
 County  
 Engineer's  
 Office**

Neil F. Junison, P.E., P.S.  
 Warren County Engineer  
 210 W Main Street  
 Lebanon, Ohio 45036  
 513 695 3301 Phone  
 513 695 7714 Fax

DETOUR SHEET  
 WILMINGTON ROAD  
 DRILLED PIER WALL PROJECT  
 WASHINGTON TOWNSHIP



REVISIONS		NO.	DATE	DESCRIPTION

SCALE	DATE
NONE	04/25/18
DRAWN BY	CHECKED BY
DWB	RCH
PROJECT NO.	FILE
CR 7	CR 7
DRAWING NO.	FILE
	Pier Wall

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SHEET 8 OF 8