COSHOCTON COUNTY ENGINEER
(740) 622-2135 FAX: (740) 623-6512
Frederick T. Wachtel, P.E., P.S.

Coshocton County Engineer's Office
COS-CR 365-00.08 PID #108777

Addendum Number 1 – June 3, 2025

Issue Date	Tuesday, June 3, 2025
Issued By:	Joshua D. Kempf Deputy County Engineer
Bid Date:	Monday, June 16, 2025
Bid Time:	9:00 a.m. Local Time

Addendum 1

1. Attached legal advertisement for clarification of bid opening details.
2. Attached project geotechnical report.
3. Addition of Dynamic Load Testing and Steel Points or Shoes quantities.
4. Change of 14" Cast-in-Place Reinforced Concrete Piles, Furnished quantity.

Replace plan and bid document sheets with corresponding sheets attached.

All other materials contained within the original bid documents remain the same and unchanged unless noted in subsequent addendums.

As per the bidding requirements, all addendums must be acknowledged on page 14 of the contract document.

23194 CR 621 • Coshocton, Ohio 43812

COSHOCTON COUNTY COMMISSIONERS
COSHOCTON COUNTY ENGINEER
COS-CR 365-00.08 BRIDGE REPLACEMENT
INVITATION TO BID

Sealed proposals for improvements by constructing the **COS-CR 365-00.08 Bridge Replacement**, Coshocton, Ohio, will be received by the Coshocton County Commissioners, Coshocton, Ohio at 401½ Main St., **9:00 a.m., local time, Monday, June 16, 2025**, and then and there publicly opened and read. The work under this improvement consists of everything necessary to complete the project as shown by the plans and specifications for said items on file in the office of the County Engineer, 23194 County Road 621, Coshocton, Ohio 43812.

Complete specifications, including contract and proposal forms and full information for bidders may be obtained via the web at *www.coshoctoncounty.net/engineer/currentbiddingprojects/* or from the office of the County Engineer. Prospective bidders are required to register with Coshocton County in order to receive any addenda information. Only contractors prequalified with the Ohio Department of Transportation will be eligible to submit bids for this project.

Each proposal must be accompanied by a bond with an approved surety company as surety, in the sum of 100 percent of the amount of the bid as surety for the execution of the contract, or certified check for the amount of 10% of the bid on some solvent bank within the City of Coshocton, and made payable to the Coshocton County Treasurer, Coshocton, Ohio. **Please mark all envelopes COS-CR 365-00.08, June 16, 2025.**

The Owner reserves the right to waive any formalities or to reject any and all bids.

Board of County Commissioners
Coshocton County, Ohio.

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ADVERTISED: May 22, 2025, May 29, 2025 and online

INNOVATIVE IDEAS
EXCEPTIONAL DESIGN
UNMATCHED CLIENT SERVICE

FINAL REPORT
OF
STRUCTURE FOUNDATION EXPLORATION

PID 108777, COS-CR365-0080 Bridge Replacement

Coshocton County, Ohio

Prepared For:

Coshocton County Engineer's Office (CCEO)
23194 Co Rd 621
Coshocton, OH 43812

Prepared By:

DLZ OHIO, INC.

DLZ Job No. 2322-1204.01

July 31, 2024

6121 Huntley Road, Columbus, OH 43229 | OFFICE 614.888.0040 | ONLINE WWW.DLZ.COM

EXECUTIVE SUMMARY

This report presents the findings of the geotechnical exploration performed for the proposed bridge replacement project at the crossing of County Road 365, CR365 over the Mohican River in Tiverton Township, Coshocton County, Ohio. It is understood that the plan is to replace the existing 200' (+/-) long, two-span, one-lane pony truss bridge (SFN 1630016) with a single-span prefabricated steel truss bridge with new abutments located behind the existing. Based on available information from the preliminary bridge site plan, it is understood the proposed horizontal and vertical alignment of CR365 centerline is relatively similar to the existing.

The field exploration consisted of drilling and sampling four (4) structure borings, abutment borings B-001-0-23 (B-001) and B-004-0-23 (B-004) located behind the existing rear and forward abutment, respectively, and pier borings B-002-0-23 (B-002) and B-003-0-23 (B-003) located within the channel (see the Boring Location Plan in Appendix I). At the ground surface, the abutment borings encountered 4 inches of asphalt pavement. Beneath the pavement material, borings B-001 and B-004 encountered fill to depths of approximately 12.0 feet below the existing ground surface. The fill consisted of medium stiff cohesive soil (A-4a) and loose to very dense granular soil (A-1-b, A-2-4, A-3a) that contains broken gravel intermixed with asphalt. A slight topsoil odor was noted in Sample S-1 from boring B-004 obtained at a depth of 1.5 to 3.0 feet within the fill. Underlying the fill, the abutment borings encountered natural soils generally consisting of medium stiff and loose to medium dense alluvium (A-4a and A-2-4) to depths of 20 to 22.5 feet underlain by medium dense to very dense granular soils (A-1-a, A-1-b, A-3a) to the termination depth of the borings. Borings B-002 and B-003 located within the channel encountered loose to very loose peat sedimentary that contained woods, shells, and large broken gravels to depths of approximately 8.5 and 1.5 feet below the streambed, respectively, underlain by medium dense to very dense granular soils (A-1-a, A-1-b, A-3a) to the termination depth of the borings. During drilling, observations of sand heave as well as auger chatter/scraping/stone fragments indicating possible cobbles/boulders were noted in all four borings at numerous depths.

Free groundwater was observed during drilling at depths of 20.0 and 21.4 feet in borings B-001 and B-004 (approximate elevations 840.0 and 841.9, respectively) prior to adding water to the augers. Borings B-002 and B-003 were performed through the bridge deck and encountered water at 21.3 and 22.5 feet, respectively below the top of bridge deck at the respective boring location. Water was added to the augers during drilling as part of the drilling process and therefore the water levels at completion may not be representative of actual groundwater levels and therefore are not reported on the boring logs.

The proposed bridge will be supported by driven piles, as bedrock was not encountered in the borings. Closed-end cast-in-place (CIP) reinforced concrete pipe piles are recommended, designed as "friction" piles in accordance with ODOT BDM 305.3.4. These piles should be installed in accordance with ODOT CMS Item 507 guidelines, with pile points recommended due to the potential for encountering cobbles. Piles should be spaced at a center-to-center spacing of not less than 30 inches or 2.5 pile diameters and a maximum spacing in accordance with the guidance provided in the commentary of ODOT BDM section 305.3.5.1. No group effect for axial pile loading is considered since the foundation soil is predominantly cohesionless and pile spacing is ≥2.5B, as per ODOT BDM 305.3.4. Estimated Pile Length and UBV for Friction Piles, assuming a design abutment scour depth of 14.5 feet below the bottom of the abutment footing (with contraction scour not below the

footing), is provided in Table A. Scour depths are determined DLZ Hydrological Studies report dated December 22, 2023. Pile spacing guidelines and considerations for axial compression and lateral group efficiency are detailed, following AASHTO LRFD and ODOT BDM specifications.

Table A: Estimated Pile Length and Ultimate Bearing Value (UBV) for Friction Piles

Pile Diameter[1]	R_{ssc}[2] (kips)	UBV[2] (kips)	Est. Pile Length[3]	Pile Points Required	Pre-Bore Elevation
14-inch	1.7	303.7	65 ft	Yes	No

[1]Nominal outside diameter (OD) for driven piles as described elsewhere in the report.

[2]UBV and R_{ssc} defined and calculated per ODOT BDM C305.3.2. Design loads are based on information provided by Coshocton County Engineer's Office (CCEO).

[3]Estimated Pile length for vertical piles (non-battered) based upon estimated pile cutoff less pile tip elevation and rounded to the nearest 5 feet per ODOT BDM section 305.3.5.2.

The existing subgrade soils were evaluated for suitability for pavement subgrade support according to the guidelines in GDM section 600 "Subgrade" with the exception that no sulfate testing was performed. The Subgrade analysis spreadsheet is presented in the Appendix II. The subgrade soils encountered in the borings consisted of sandy silt (A-4a) and gravel and/or stone fragments with sand and silt (A-2-4) and had group index values ranging from 2 to 8. Results of the Subgrade analysis indicated an average design California Bearing Ratio (CBR) value of 10 may be used for the pavement design at the site. It is understood that the actual pavement design will be performed by others. Material used for embankment fill within 3 feet of the proposed pavement subgrade should have an average CBR equal to or higher than the design CBR. Laboratory testing indicated that the subgrade soils typically had moisture contents 0 to 4 percent less than the estimated optimum moisture content and pavement subgrade within 3 feet vertically of the existing grade will likely require a 15-inch undercut due to unstable soils and replacement with Item 204 Granular Material Type B with Item 204 Geotextile. Generally, low N_{60} values are considered to be problematic and may require some form of subgrade treatment. Subgrade stabilization is typically achieved by undercutting and replacing with suitable material or lime stabilization / cement stabilization of the existing subgrade soils.

It should be noted that loose/medium stiff granular soils and sandy silt were encountered in the borings within the anticipated excavation depth of the abutment. These soils are susceptible to erosion (i.e. surface and internal/"piping") and sloughing and caving. Excavations extending below the water table into granular deposits can result in "quick conditions" and complete loss of soil strength or bottom heave when the confining effect of the overburden is removed, and groundwater is not properly controlled. To prevent this occurrence, areas of proposed excavation should be properly dewatered, and the water level maintained at least two feet below the bottom of the proposed excavation during construction. It is recommended that a dewatering specialist be consulted to develop an appropriate construction dewatering plan.

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1.0 INTRODUCTION

This report presents the findings of the geotechnical exploration performed for the proposed bridge replacement project at the crossing of County Road 365, CR365 over the Mohican River in Tiverton Township, Coshocton County, Ohio. It is understood that the plan is to replace the existing 200' (+/-) long, two-span, one-lane pony truss bridge (SFN 1630016) with a single span prefabricated steel truss bridge with new abutments located behind the existing. Based on available information from the preliminary bridge site plan, it is understood the proposed horizontal and vertical alignment of CR365 centerline is relatively similar to the existing.

The purpose of this exploration was to 1) explore the subsurface conditions to the depths of the borings, 2) evaluate the engineering characteristics of the subsurface materials, and 3) provide foundation recommendations for the proposed bridge replacement. The exploration presented in this report was performed essentially in accordance with DLZ Ohio, Inc.'s (DLZ) proposal to E.P. Ferris (EPF) dated August 22, 2023 and DLZ proposal to Coshocton County Engineer's Office (CCEO) dated June 25, 2024. All work was performed in general accordance with the Ohio Department of Transportation's (ODOT's) Specifications for Geotechnical Exploration (SGE) dated July 2023. Environmental work was beyond the scope of this exploration.

The analysis and recommendations presented in this report have been made based on the foregoing information. If the concept of the project is changed or differs from that assumed, DLZ should be contacted to review the information and confirm whether revised recommendations are warranted, as necessary. The recommendations provided in this report have been made under the assumption that construction will be performed in accordance with the 2024 edition of the Ohio Department of Transportation (ODOT) Construction and Materials Specifications (CMS).

The geotechnical engineer has planned and supervised the performance of the geotechnical engineering services, has considered the findings, and has prepared this report in accordance with generally accepted geotechnical engineering practices. No other warranties, either expressed or implied, are made as to the professional advice included in this report.

2.0 GEOLOGY AND OBSERVATIONS OF THE PROJECT

The project area is located in the Allegheny (Kanawha) Plateaus Section of the Appalachian Plateau Physiographic Region. The project location is within the Muskingum-Pittsburgh Plateau, which is characterized by moderately high to high relief dissected plateau having broad major valleys that contain outwash terraces. The underlying bedrock consists of Mississippian-aged limestone from the Maxville Limestone Formation overlying interbedded shale and sandstone from the Logan and Cuyahoga Formations. Geologic mapping of the area indicated that he depth to the bedrock is variable and approximately 70 feet or greater below existing grades. According to the NRCS Web Soil Survey of Coshocton County, Ohio, the near surface soils in the project area consist primarily of Tioga fine sandy loam and are occasionally flooded.

Site reconnaissance was performed by DLZ personnel on September 9, 2023. The project area is within a primarily wooded rural area with some cultivated land. The surrounding area is relatively "hilly" with ground surface elevations of the approach pavement within approximately 300 feet from the existing bridge ranging from approximately 850 feet to 880 feet above mean sea level (msl); however, the ground along the existing

streambed is relatively flat with boring ground surface elevations at approximately 835 to 840 feet above msl. The existing pavement appeared to be in fair condition with some signs of isolated longitudinal and transverse cracking. The existing bridge structure was posted with 10 ton load limit. The abutments are reinforced concrete on stone masonry and the pier is supported on Hpiles. According to the Bridge Inventory and Appraisal Report from ODOT's TIMS website (Report Date 11/27/2023) the existing abutments are supported on spread footings on soil and the piers are capped piles on steel Hpile foundations. A sheet pile wall is located immediately in front of the rear abutment as shown in Figures 2(a) and 2(b). Scour was observed along the slope in front of the forward abutment which was relatively absent of channel protection. The existing streambanks adjacent the bridge are slightly undercut from stream erosion as shown in Figures 1 and 2(a) . There is significant accumulation of debris (brush and timber) on the upstream side of the existing pier as shown in Figures 1 and 2(a). The depth of the stream bed from the top of the bridge deck was measured to be 27.4 feet at Boring B-002.

Figure 1 Photo of North Side of Existing Pier and Forward Abutment

Figure 2(a) Photo of Existing Pier and Rear Abutment and 2(b) Photo of Rear Abutment and Sheeting

3.0 EXPLORATION

3.1 FIELD EXPLORATION

A total of four (4) structure borings were performed for this geotechnical exploration between September 26 through October 12, 2023. The field exploration consisted of abutment borings B-001-0-23 (B-001) and B-004-0-23 (B-004) located behind the existing rear and forward abutment, respectively, and pier borings B-002-0-23 (B-002) and B-003-0-23 (B-003) located within the channel (see the Boring Location Plan in Appendix I). Borings were drilled to depths between 77.5 and 81.5 feet. The borings were performed within the existing roadway pavement and bridge deck using an all-terrain-vehicle (ATV) mounted rotary drill rig. The hammer system for the drill rig was last calibrated on June 13, 2023 and has a hammer efficiency of 74.7 percent. The borings were advanced through the soil overburden with 3.25-inch ID Hollow-Stem Augers (HSA). Disturbed soil samples were obtained with a 2-inch OD split-barrel sampler in general accordance with the Standard Penetration Test (SPT) ASTM D-1586 (AASHTO T206) methods at regular intervals of 5 feet or less. Six feet of continuous sampling was performed below the assumed pavement subgrade and top of slope (TS) elevation/streambed for scour sampling per the ODOT SGE.

A field log was prepared for each boring. These logs contain visual classifications of the materials encountered during drilling as well as an interpolation for the subsurface conditions between samples. Boring logs, included in Appendix I, represent DLZ's interpretation of the field logs and may include modifications based on laboratory observations and tests of the field samples. The boring logs describe the materials encountered, their estimated thicknesses, and the depths where samples were obtained.

Water level measurements were taken in each boring during drilling, and upon completion of drilling. After final water measurements were taken, the augers were withdrawn and the boreholes were sealed/backfilled and the pavement patched with asphalt cold patch with the exception of borings B-002 and B-003 which were drilled in the channel in granular soils below the water and therefore allowed to backfill naturally per the ODOT SGE. The bridge deck at borings B-002 and B-003 was repaired with a steel plate and fast-setting Portland Cement per the ODOT SGE.

Information concerning the drilling procedures is presented in Appendix I. The boring locations were selected by DLZ and the approximate as-drilled boring locations were obtained by DLZ by measuring with respect to existing site features and shown on the boring location plan presented in Appendix I. Boring logs and information concerning the drilling procedures are also presented in Appendix I. The ground surface elevation and project station of the borings shown on the boring logs in Appendix I were estimated using the field measurements in conjunction with the existing information on the Bridge Site Plan.

3.2 LABORATORY TESTING PROGRAM

The laboratory testing program consisted of visual classifications of all soil samples, ODOT full classification testing on “scour samples” per the ODOT SGE and visual descriptions and moisture content testing on all samples. The soils were classified in general accordance with the ODOT SGE Section 600 Laboratory Testing. The full classification testing consisted of grain-size analyses, moisture content, and plasticity determinations. Loss-on-ignition (LOI) testing was performed on two (2) different samples of peat. The LOI and moisture content test results on the peat samples were likely skewed by the proportion of gravel and stone fragments retained in the split-spoon. Results of the classifications, grain-size analyses, moisture content, and plasticity determinations are shown on the boring logs and in Appendix I.

4.0 FINDINGS

The subsurface conditions consisted of pavement materials underlain by natural granular soils with lesser amounts of natural cohesive soils. The following section presents the generalized subsurface conditions encountered by the borings. For more detailed information, please refer to the boring logs presented in Appendix I. Please note that the strata contact lines shown on the boring logs represent approximate boundaries between soil types. In the field, the actual soil, and water level transitions might be different both vertically and laterally.

4.1 SOILS CONDITIONS

At the ground surface, the abutment borings (B-001 and B-004) encountered 4 inches of asphalt pavement. Beneath the pavement material, borings B-001 and B-004 encountered fill to depths of approximately 12.0 feet below the existing ground surface. The fill consisted of medium stiff cohesive soil (A-4a) and loose to very dense granular soil (A-1-b, A-2-4, A-3a) that contains broken gravel intermixed with asphalt. A slight topsoil odor was noted in Sample S-1 from boring B-004 obtained at a depth of 1.5 to 3.0 feet within the fill. Underlying the fill, the abutment borings encountered natural soils generally consisting of medium stiff and loose to medium dense alluvium (A-4a and A-2-4) to depths of 20 to 22.5 feet underlain by medium dense to very dense granular soils (A-1-a, A-1-b, A-3a) to the termination depth of the borings. Borings B-002 and B-003 located within the channel encountered loose to very loose peat sedimentary that contained woods, shells, and large broken gravels to depths of approximately 8.5 and 1.5 feet below the streambed, respectively, underlain by

medium dense to very dense granular soils (A-1-a, A-1-b, A-3a) to the termination depth of the borings. During drilling, observations of sand heave as well as auger chatter/scraping/stone fragments indicating possible cobbles/boulders were noted in all four borings at numerous depths.

4.2 BEDROCK CONDITIONS

Bedrock was not encountered by any of the borings performed for this exploration.

4.3 GROUNDWATER CONDITIONS

Free groundwater was observed during drilling at depths of 20.0 and 21.4 feet in borings B-001 and B-004 (approximate elevations 840.0 and 841.9, respectively) prior to adding water to the augers. Borings B-002 and B-003 were performed through the bridge deck and encountered water at 21.3 and 22.5 feet, respectively below the top of bridge deck at the respective boring location. Water was added to the augers during drilling as part of the drilling process and therefore the water levels at completion may not be representative of actual groundwater levels and therefore are not reported on the boring logs.

It should be noted that water level measurements were made inside hollow-stem augers, which could have isolated seepage from seams inside the borings. Additionally, groundwater levels may fluctuate with seasonal variations and following periods of heavy or prolonged precipitation and changes in the river level. Therefore, the readings indicated on the boring logs may not be representative of the long-term groundwater level. Long-term monitoring would be needed to obtain a more accurate estimate of the groundwater table elevation.

5.0 ANALYSES AND RECOMMENDATIONS

5.1 GENERAL INFORMATION

This report presents the findings of the geotechnical exploration performed for the proposed bridge replacement project located along County Road 365 (CR365) over the Mohican River in Coshocton County, Ohio. It is understood that the plan is to replace the existing 200’ (+/-) long, two-span, one lane pony truss bridge (SFN 1630016) with a single span prefabricated steel truss bridge with new abutments located behind the existing. It is assumed that the vertical and horizontal alignment of CR365 centerline associated with the replacement bridge will essentially be unchanged from the current conditions at the site.

Recommendations relative to foundation support, lateral earth pressures, pavement subgrade, excavations, and groundwater considerations are presented below. This report, and the recommendations contained herein, has been written under the consideration that the construction will be performed in accordance with the 2024 version of the ODOT Construction and Materials Specifications (CMS).

5.2 FOUNDATION RECOMMENDATIONS

Based on our previous discussion, DLZ understand the proposed structure will be a single span bridge with prefabricated steel truss superstructure and semi-integral stub abutments for substructures for the purposes of our geotech report/recommendations. The analysis focused on the rear abutment due to the subsurface conditions encountered in Boring B-001, which govern the foundation analysis and recommendations. Driven piles are recommended for the replacement bridge foundations. Bedrock was not encountered by the borings, therefore consider “friction” piles per ODOT BDM 305.3.4 using closed-end cast-in-place (CIP) reinforced

concrete pipe piles. Piles should be designed in accordance with BDM 305.3, installed in accordance with ODOT CMS Item 507, "Bearing Piles". Pile points are recommended due to potential for encountering cobbles in the overburden. See Table 1 for Estimated Pile Length and UBV for Friction Piles, which assumes a design abutment scour depth of 14.5 feet below the bottom of the abutment footing (with contraction scour not below the footing). Scour depths are determined DLZ Hydrological Studies report dated December 22, 2023. The abutment loads and bridge configuration provided by CCEO were utilized in conjunction with the boring information to provide the estimated R_{ndr} and pile lengths in Table 1. A resistance factor (Φ_{DYN}) of 0.7 may be considered for axial pile resistance in compression, provided dynamic load testing is specified in accordance with BDM 305.7.1 and performed in accordance with CMS 523.

Table 1: Estimated Pile Length and Ultimate Bearing Value (UBV) for Friction Piles

Pile Diameter[1]	R_{ssc}[2] (kips)	UBV[2] (kips)	Est. Pile Length[3]	Pile Points Required	Pre-Bore Elevation
14-inch	1.7	303.7	65 ft	Yes	No

[1]Nominal outside diameter (OD) for driven piles as described elsewhere in the report.

[2]UBV and R_{ssc} defined and calculated per ODOT BDM C305.3.2. Design loads are based on information provided by CCEO.

[3]Estimated Pile length for vertical piles (non-battered) based upon estimated pile cutoff less pile tip elevation and rounded to the nearest 5 feet per ODOT BDM section 305.3.5.2.

Piles should be spaced at a center-to-center spacing of not less than 30 inches or 2.5 pile diameters and a maximum spacing in accordance with the guidance provided in the commentary of ODOT BDM section 305.3.5.1. For axial compression, pile group effects should be in accordance with AASHTO LRFD Section 10.7.9. For lateral group efficiency, the guidance in section 305.1.2 of the ODOT BDM including guidance provided in the commentary should be followed.

Note that the depth to streambed from the top of existing bridge deck at borings B-002 and B-003 was 27.4 feet and 27.1 feet respectively which is lower than the "streambed" shown on the latest bridge site plan. There appears to be more significant variation of the streambed elevation than shown on the site plan based on visual observations during site reconnaissance (see attached pic for example) and there may be lower streambed elevations at/adjacent the piers than at the borings; however, it was beyond the geotechnical scope to determine this.

5.2.1 DRIVABILITY

Drivability of the piles was analyzed using the software GRLWeap 14 by Pile Dynamics Inc. (PPI). Analysis was performed on the rear abutment piles. The results of the drivability analysis indicate that the proposed pile foundations cannot be driven to the required bearing conditions using the commonly available pile hammer listed in ODOT BDM C305.3.1.2. Therefore, specify a pile driving hammer with minimum rated energy of 62 kip-ft. See general notes 606.7-1 in the ODOT BDM. Based on drivability analysis, specify ASTM 252 Grade 3 steel for the piles with nominal wall thickness not less than ½-inches. As indicated previously, pile points should be required on all piles and specified in the plan notes due to cobbles and boulders.

Due to the very dense granular layer within the medium dense to dense soils (i.e. "nose" in the graphic results of static and drivability analysis as described in the ODOT GDM), additional drivability analysis was performed considering pre-bored piles to depth of 35 feet and backfilled with loose sand . The pre-bored depth was selected intentionally to leave 3 feet of very dense soils remaining to model potential variation in the very dense layer (and cobbly zones). Results of the drivability analysis for the pre-bored pile case indicate that same requirements for piles without pre-boring are needed (minimum hammer, pile wall thickness, and steel grade). Results of the drivability analysis are included in Appendix II.

5.3 GEOTECHNICAL SCOUR PARAMETERS

Particle size analyses were performed on selected samples for use in scour analysis by others. Table 2 presents the sample locations by boring number and depth, along with the scour critical shear stresses from the analyses.

Table 2: Geotechnical Scour Parameters

Boring ID	Sample	Elevation	D_{50} (mm)	T_c (psf)	$D_{50,equiv}$ (mm)	Erosion Category (EC)
B-001	S-6	851.0 - 849.5	0.200	0.004	0.200	1.362
	S-7	849.5 - 848.0	0.297	0.006	0.297	1.567
	S-8	848.0 - 846.5	0.083	0.017	0.827	2.211
	S-9	846.5 - 845.0	0.128	0.015	0.703	2.211
	S-11	842.5 - 841.0	0.050	0.025	1.186	2.361
	S-17	825.0 - 823.5	2.079	0.043	2.079	2.581
B-002	S-1	833.9 - 832.4	*PEAT - ASSUME SEVERELY ERODIBLE*			
	S-2	832.4 - 830.9				
	S-3	830.9 - 829.4				
	S-4	829.4 - 827.9				
	S-5	827.9 - 826.4				
	S-6	823.9 - 822.4	5.548	0.116	5.548	3.093
	S-7	819.9 - 818.4	3.442	0.072	3.442	2.844
	S-8	815.9 - 814.4	2.033	0.042	2.033	2.570
	S-9	811.9 - 810.4	10.562	0.221	10.562	3.428
	S-14	802.9 - 801.4	0.916	0.019	0.916	2.154
	S-18	782.9 - 781.4	4.817	0.101	4.817	3.019
	S-20	772.9 - 771.4	1.464	0.031	1.464	2.399
B-003	S-1	835.3 - 833.8	*PEAT - ASSUME SEVERELY ERODIBLE*			
	S-2	833.8 - 832.3	1.430	0.030	1.430	2.386
	S-3	832.3 - 830.8	2.276	0.048	2.276	2.629
	S-5	829.3 - 827.8	3.247	0.068	3.247	2.814
	S-13	809.3 - 807.8	0.239	0.005	0.239	1.454
	S-17	789.3 - 787.8	5.430	0.113	5.430	3.082
	S-21	769.3 - 767.8	0.585	0.012	0.585	1.920
	S-23	759.3 - 757.8	3.243	0.068	3.243	2.813
B-004	S-4	857.3 - 855.8	0.738	0.015	0.738	2.042
	S-5	855.8 - 854.3	0.086	0.161	7.687	2.754
	S-6	854.3 - 852.8	2.017	0.042	2.017	2.566
	S-7	852.8 - 851.3	1.495	0.031	1.495	2.410
	S-8	851.3 - 849.8	0.043	0.078	3.732	2.632
	S-9	849.8 - 848.3	0.369	0.008	0.369	1.681
	S-10	847.3 - 845.8	0.826	0.017	0.826	2.100
	S-11	844.8 - 843.3	0.369	0.008	0.369	1.681
	S-13	840.8 - 839.3	4.825	0.101	4.825	3.020
	S-15	835.8 - 834.3	2.269	0.047	2.269	2.627
	S-23	798.3 - 796.8	0.523	0.011	0.523	1.862
	S-24	793.3 - 791.8	3.298	0.069	3.298	2.822

5.4 LATERAL EARTH PRESSURES

The abutments should be designed to resist the lateral loads imposed by the soil backfill, groundwater behind the wall, and surcharge effects of adjacent structures, equipment, or materials. In order to minimize the lateral earth pressure behind the walls, provide drainage per ODOT BDM 306.2.3 and backfill per ODOT CMS 503.08.

Below-grade structures should be designed to resist lateral loads imposed by the soil, groundwater, and the surcharge effect of adjacent structures, materials, or equipment. For rigid structures, the lateral earth pressures may be calculated using the "at-rest" condition. For structures that can deflect, the lateral earth pressures should be calculated using the "active" condition or, if applicable, the "passive" condition if the structure moves back into the soil/backfill. The amount of movement necessary to develop the "active" condition is typically 0.2 percent of the wall height (i.e. roughly ¼ inch lateral movement per 10 feet of wall height) for compacted granular backfill as specified in ODOT CMS 503.08. Per Table 307-1 of the ODOT BDM consider a friction angle of 32 degrees and unit weight of 120 pcf for ODOT Granular Material Type B per CMS 703.16.C which is used for the proposed abutment backfill. Depending on the anticipated amount of lateral movement of the abutments, consider an at-rest earth pressure coefficient, K_o, of 0.5, an active earth pressure coefficient, K_a, of 0.27, and passive earth pressure coefficient, K_p, of 6.6 for the abutment backfill (assuming level backfill and Coulomb earth pressure theory with an interface friction angle of 0.67 times the backfill friction angle for K_a and K_p and logarithmic spiral reduction for K_p).

Soil parameters for lateral load analysis of deep foundations using the p-y method (i.e. analysis using LPile and/or GROUP software) can be provided upon request.

5.5 PAVEMENT SUBGRADE RECOMMENDATIONS

The existing subgrade soils were evaluated for suitability for pavement subgrade support according to the guidelines in GDM section 600 "Subgrade" with the exception that no sulfate testing was performed. The Subgrade analysis spreadsheet is presented in the Appendix II. The subgrade soils encountered in the borings consisted of sandy silt (A-4a) and gravel and/or stone fragments with sand and silt (A-2-4) and had group index values ranging from 2 to 8. Results of the Subgrade analysis indicated an average design California Bearing Ratio (CBR) value of 10 may be used for the pavement design at the site. It is understood that the actual pavement design will be performed by others. Material used for embankment fill within 3 feet of the proposed pavement subgrade should have an average CBR equal to or higher than the design CBR. Laboratory testing indicated that the subgrade soils typically had moisture contents 0 to 4 percent less than the estimated optimum moisture content and pavement subgrade within 3 feet vertically of the existing grade will likely require a 15-inch undercut due to unstable soils and replacement with Item 204 Granular Material Type B with Item 204 Geotextile. Generally, low N60 values are considered to be problematic and may require some form of subgrade treatment. Subgrade stabilization is typically achieved by undercutting and replacing with suitable material or lime stabilization / cement stabilization of the existing subgrade soils.

5.6 EXCAVATIONS AND GROUNDWATER CONSIDERATIONS

The removal of the existing bridge and placement of any backfill to the proposed bridge structure elevation to the roadway surface should be conducted in accordance with ODOT CMS Items 202 and 503.

Based on information shown on the site plan, the proposed abutment footing elevations are 3-feet above the Ordinary High Water Mark (OHWM) elevation. Therefore, per ODOT BDM 307.10.3, include a pay item for cofferdams and excavations on the plans. It is anticipated that street sheet piling could be used for support of excavation, if needed. All excavations should be constructed in accordance with applicable local, state, and federal safety regulations including the current OSHA Excavation and Trench Safety Standards (29 CFR Part 1926). The above information is provided only for general guidance. Under no circumstances should the information provided be interpreted to mean that anyone other than the construction contractor assumes responsibility for construction site safety. The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom.

Free groundwater was observed during drilling at depths of 20.0 and 21.4 feet in borings B-001 and B-004 (approximate elevations 840.0 and 841.9, respectively) prior to adding water to the augers and in borings B-002 and B-003 water was observed from the stream elevation and below. Groundwater levels may fluctuate with seasonal variations and following periods of heavy or prolonged precipitation. It is anticipated that water levels will correspond roughly with the water level in the Mohican River. The contractor should be equipped to deal with groundwater and surface water that may accumulate in the open excavations during construction.

It should be noted that loose/medium stiff granular soils and sandy silt were encountered in the borings within the anticipated excavation depth of the abutments. These soils are susceptible to erosion (i.e. surface and internal/"piping") and sloughing and caving. The Contractor should be prepared to deal with any water from seepage or precipitation which enters the excavations. Excavations extending below the water table into granular deposits can result in "quick conditions" and complete loss of soil strength or bottom heave when the confining effect of the overburden is removed, and groundwater is not properly controlled. To prevent this occurrence, areas of proposed excavation should be properly dewatered, and the water level maintained at least two feet below the bottom of the proposed excavation during construction. It is recommended that a dewatering specialist be consulted to develop an appropriate construction dewatering plan.

Construction site safety generally is the sole responsibility of the Contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations. The above information is provided only for general guidance. Under no circumstances should the information provided be interpreted to mean that anyone other than the construction Contractor assumes responsibility for construction site safety. The Contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom, and to protect adjacent structures and site features. Where existing structures, roadways, buried installations, etc., exist adjacent to and within the zone of influence of the excavations, care must be taken to protect these structures, roadways, buried installations, etc., from possible damage due to construction. It is the Contractor's responsibility to monitor and prevent any detrimental surface settlements or ground movements caused by construction of excavation supports, and/or damage to existing structures by undermining of existing foundations.

5.7 SEISMIC SITE CLASS

Given the results of the structure foundation exploration and the provisions described the ODOT BDM section 301.1.4.1 and 1003.13 as well as the site class definitions provided in Article 3.10.3.1 of the AASHTO LRFD BDS 9th Ed, 2020, the site is classified as Seismic Site Class D.

6.0 CLOSING REMARKS

We appreciate having the opportunity to be of service to you on this project. Please do not hesitate to call if you have any questions concerning this report.

Respectfully submitted,

DLZ OHIO, INC.

Jeff Chou, E.I.
Geotechnical Engineer

H. Jason Hughes, P.E.
Civil Engineer

JC/HJH

GALVANIZED COATING SYSTEM FOR STRUCTURAL STEEL BRIDGES (CONTINUED)

WHEN SCAFFOLDING IS MORE THAN TWO AND ONE HALF FEET [0. 75 M] ABOVE THE GROUND, THE CONTRACTOR MUST PROVIDE A LADDER FOR ACCESS ONTO THE SCAFFOLDING. THE LADDER AND ANY EQUIPMENT USED TO ATTACH THE LADDER TO THE STRUCTURE MUST BE CAPABLE OF SUPPORTING 250 POUNDS [115 KG] WITH A SAFETY FACTOR OF AT LEAST FOUR (4). ALL RUNGS, STEPS, CLEATS, OR TREADS MUST HAVE UNIFORM SPACING AND MUST NOT EXCEED 12" [305 MM] ON CENTER. AT LEAST ONE SIDE RAIL MUST EXTEND AT LEAST 36" [915 MM] ABOVE THE LANDING NEAR THE TOP OF THE LADDER.

AN ADDITIONAL LANDING MUST BE REQUIRED WHEN THE DISTANCE FROM THE LADDER TO THE POINT WHERE THE SCAFFOLDING MAY BE ACCESSED, EXCEEDS 12" [305 MM]. THE LANDING MUST BE A MINIMUM OF AT LEAST 24" [610 MM] WIDE AND 24" [610 MM] LONG. IT MUST ALSO BE OF ADEQUATE SIZE AND SHAPE SO THAT THE DISTANCE FROM THE LANDING TO THE POINT WHERE THE SCAFFOLDING IS ACCESSED DOES NOT EXCEED 12" [305 MM]. THE LANDING MUST BE RIGID AND FIRMLY ATTACHED TO THE LADDER; HOWEVER, IT MUST NOT BE SUPPORTED BY THE LADDER. THE SCAFFOLDING MUST BE CAPABLE OF SUPPORTING A MINIMUM OF 1000 LBS [455 KG].

IN ADDITION TO THE AFOREMENTIONED REQUIREMENTS, THE CONTRACTOR IS STILL RESPONSIBLE TO OBSERVE AND COMPLY WITH ALL FEDERAL, STATE AND LOCAL LAWS, ORDINANCES, REGULATIONS, ORDERS AND DECREES. THE CONTRACTOR MUST FURNISH ALL NECESSARY TRAFFIC CONTROL TO PERMIT INSPECTION DURING AND AFTER ALL PHASES OF THE PROJECT.

1.1.10 PROTECTION OF PERSONS AND PROPERTY

THE CONTRACTOR MUST INSTALL AND MAINTAIN SUITABLE SHIELDS OR ENCLOSURES TO PREVENT DAMAGE TO ADJACENT BUILDINGS, PARKED CARS, TRUCKS, BOATS, OR VEHICLES TRAVELING ON, OVER, OR UNDER STRUCTURES HAVING GALVANIZED REPAIRS. THEY MUST BE SUITABLY ANCHORED AND REINFORCED TO PREVENT INTERFERING WITH NORMAL TRAFFIC OPERATIONS IN THE OPEN LANES.

PAYMENT FOR THE SHIELDS MUST BE INCLUDED AS INCIDENTAL TO THE APPLICABLE FIELD COATING OPERATION. WORK MUST BE SUSPENDED WHEN DAMAGE TO ADJACENT BUILDINGS, MOTOR VEHICLES, BOATS, OR OTHER PROPERTY IS OCCURRING.

WHEN OR WHERE ANY DIRECT OR INDIRECT DAMAGE OR INJURY IS DONE TO PUBLIC OR PRIVATE PROPERTY, THE CONTRACTOR MUST RESTORE, AT HIS OWN EXPENSE, SUCH PROPERTY, TO A CONDITION SIMILAR OR EQUAL TO THAT EXISTING BEFORE SUCH DAMAGE OR INJURY WAS DONE.

1.1.11 POLLUTION CONTROL

THE CONTRACTOR MUST TAKE ALL NECESSARY PRECAUTIONS TO COMPLY WITH POLLUTION CONTROL LAWS, RULES OR REGULATIONS OF FEDERAL, STATE OR LOCAL AGENCIES.

1.1.12 WARRANTY

THE STEEL GALVANIZER OF THE BRIDGE ELEMENTS (OTHER THAN BRIDGE FLOORING) SHALL BE A MEMBER OF THE AMERICAN GALVANIZER'S ASSOCIATION AND SHALL PROVIDE THE BRIDGE OWNER A WRITTEN LIMITED WARRANTY AGAINST CORROSION OF THE SUPERSTRUCTURE COMPONENTS FOR A PERIOD OF NOT LESS THAN 35 YEARS.

ESTIMATED QUANTITIES								SPEC & AS PER PLAN BRIDGE SHEET NO.
ITEM	ITEM EXT.	TOTAL	UNIT	DESCRIPTION	ABUTS.	SUPER.	GEN'L	
202	11203	LS		PORTIONS OF STRUCTURE REMOVED, OVER 20 FOOT SPAN, AS PER PLAN			LS	11/26
203	35110	150	CY	GRANULAR MATERIAL, TYPE B			150	
503	11100	LS		COFFERDAMS AND EXCAVATION BRACING			LS	
503	21301	LS		UNCLASSIFIED EXCAVATION, AS PER PLAN			LS	11/26
505	11100	LS		PILE DRIVING EQUIPMENT MOBILIZATION	LS			
507	00650	1960	FT	14" CAST-IN-PLACE REINFORCED CONCRETE PILES, FURNISHED	1960 ADDENDUM 1			
507	00600	1820	FT	14" CAST-IN-PLACE REINFORCED CONCRETE PILES, DRIVEN	1820			
507	93300	28	EACH	STEEL POINTS OR SHOES	28 ADDENDUM 1			
509	10000	43491	LB	EPOXY COATED STEEL REINFORCEMENT	8341	35150		
511	32210	178	CY	CLASS QC2 CONCRETE, SUPERSTRUCTURE		178		
511	43510	135	CY	CLASS QC1 CONCRETE, ABUTMENT	135			
512	10050	877	SY	SEALING OF CONCRETE SURFACES (NON-EPOXY)	116	761		
513	10121	LS		STRUCTURAL STEEL MEMBERS, LEVEL 6, AS PER PLAN		LS		11/26
517	70001	463	FT	RAILING (TWIN STEEL TUBE), AS PER PLAN		463		20/26
516	11211	48	FT	STRUCTURAL EXPANSION JOINT INCLUDING ELASTOMERIC STRIP SEAL, AS PER PLAN		48		21/26
523	20000	1	EACH	DYNAMIC LOAD TESTING	1 ADDENDUM 1			
SPECIAL	51822301	442	FT	STEEL DRIP STRIP, AS PER PLAN		442		19/26

CALCULATED JDK | CHECKED FTW

GENERAL NOTES AND ESTIMATED QUANTITIES
BRIDGE NO. COS-CR 365-00.08 OVER MOHICAN RIVER

COS-CR 365-00.08

Coshocton County Engineer
COS-CR 365-00.08
PID 108777

Section	0001		ROADWAY				
Line No.	**Item No.**	**Ext.**	**Item Dexcription**	**Quantity**	**Unit**	**Unit Price**	**Total Price**
1	201	11000	CLEARING AND GRUBBING	1	LS		
2	202	38000	GUARDRAIL REMOVED	172	FT		
3	203	10000	EXCAVATION	128	CY		
4	203	20000	EMBANKMENT	127	CY		
5	204	10000	SUBGRADE COMPACTION	362	SY		
6	606	15050	GUARDRAIL, TYPE MGS	236	FT		
7	606	25550	ANCHOR ASSEMBLY, MGS TYPE A	2	EACH		
8	606	26550	ANCHOR ASSEMBLY, MGS TYPE T	2	EACH		
9	606	35003	MGS BRIDGE TERMINAL ASSEMBLY, TYPE 1, AS PER PLAN	4	EACH		
Section	**0002**		**EROSION CONTROL**				
10	659	00530	SEEDING AND MULCHING, CLASS 3B	278	SY		
11	659	20000	COMMERCIAL FERTILIZER	0.04	TON		
12	659	31000	LIME	0.06	ACRE		
13	659	35000	WATER	3	MGAL		
14	832	30000	EROSION CONTROL	10000	EACH	$1.00	$10,000.00
Section	**0003**		**PAVEMENT**				
15	301	56000	ASPHALT CONCRETE BASE, PG64-22, (449)	60	CY		
16	304	20000	AGGREGATE BASE	60	CY		
17	407	10000	TACK COAT	18	GAL		
18	441	70000	ASPHALT CONCRETE SURFACE COURSE, TYPE 1, (449), PG64-22	13	CY		
19	441	70300	ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, (449)	18	CY		
20	643	00300	CENTER LINE	0.06	MILE		
Section	**0004**		**MAINTENANCE OF TRAFFIC**				
21	614	12421	DETOUR SIGNING, AS PER PLAN	1	LS		
Section	**0005**		**STRUCTURE OVER 20 FOOT SPAN (COS-CR 365-00.08)**				
22	202	11203	PORTIONS OF STRUCTURE REMOVED, OVER 20 FOOT SPAN, AS PER PLAN	1	LS		
23	203	35110	GRANULAR MATERIAL, TYPE B	150	CY		
24	503	11100	COFFERDAMS AND EXCAVATION BRACING	1	LS		
25	503	21301	UNCLASSIFIED EXCAVATION, AS PER PLAN	1	LS		
26	505	11100	PILE DRIVING EQUIPMENT MOBILIZATION	1	LS		
27	507	00650	14" CAST-IN-PLACE REINFORCED CONCRETE PILES, FURNISHED	1960	FT		
28	507	00600	14" CAST-IN-PLACE REINFORCED CONCRETE PILES, DRIVEN	1820	FT		
29	507	93300	STEEL POINT OR SHOES	28	EACH		
30	509	10000	EPOXY COATED STEEL REINFORCEMENT	43491	LB		
31	511	32210	CLASS QC2 CONCRETE, SUPERSTRUCTURE	178	CY		
32	511	43510	CLASS QC1 CONCRETE, ABUTMENT	135	CY		
33	512	10050	SEALING OF CONCRETE SURFACES (NON-EPOXY)	877	SY		
34	513	10121	STRUCTURAL STEEL MEMBERS, LEVEL 6, AS PER PLAN	1	LS		
35	517	70001	RAILING (TWIN STEEL TUBE), AS PER PLAN	463	FT		
36	516	11211	STRUCTURAL EXPANSION JOINT INCLUDING ELASTOMERIC STRIP SEAL, AS PER PLAN	48	FT		
37	523	20000	DYNAMIC LOAD TESTING	1	EACH		
38	SPECIAL	51822301	STEEL DRIP STRIP, AS PER PLAN	442	FT		
Section	**0006**		**INCIDENTALS**				
39	614	11000	MAINTAINING TRAFFIC	1	LS		
40	623	10000	CONSTRUCTION LAYOUT STAKES AND SURVEYING	1	LS		
41	624	10000	MOBILIZATION	1	LS		
					TOTAL BID		

TOTAL AMOUNT OF BID IN WORDS

COMPANY

ADDRESS

CITY **STATE** **ZIP**

SUBMITTED BY **TITLE**

COMPANY

TELEPHONE **FAX** **FEDERAL ID**

EMAIL ADDRESS **OAKS ID**

SIGNATURE