

**Ohio Department of Transportation**

**Inter-Office Communication**

**Office of Geotechnical Engineering**

**Division of Engineering**

**Date:** December 14, 2016

**To:** Dan Grilliot, P.E. – District 07 DGE

**From:** P. Paul Painter

**Subject:** MER-29-0780 PID 98642 Subsurface Information

It is our understanding that the District plans on a structure replacement at MER-29-0780 over Beaver Creek. The existing structure is a single span bridge which was originally constructed in 1936 (plan set) that was rehabbed and widened in 1960 (plan set). In 2010 (plan set) the roadway was resurfaced, but no work to the structure was completed. The District requested assistance with evaluation of the existing subsurface data to determine what additional exploration would be necessary, if any, for the structure replacement.

The 1936 plan set identified shallow bedrock into which the abutment footings were extended onto for support through spread footings. The footing elevations were established at elevation 841.56 for the rear abutment and elevation 841.30 for the forward abutment. The existing flow line (1936) was elevation 843.78 which was to be reestablished at elevation 845.78. Four test holes were completed for the development of the 1936 plan set. The following is the summary of the test holes:

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| --- | --- | --- | --- |
| Hole # | Location | Elev. Broken Limestone (Ft) | Elev. Solid Limestone (Ft.) |
| TH #1 | Rear Abut. – Left Side | 843.22 | 840.22 |
| TH #2 | Forward Abut. – Right Side | 843.37 | 843.37 |
| TH #3 | Forward Abut. – Left Side | NR | 842.82 |
| TH #4 | Rear Abut. – Right Side | NR | 843.02 |

The following is the plan and profile view for the 1936 plan.

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| --- | --- |
|  | Test Hole Location From 1936 Plan Set |
|  | Test Hole Data From 1936 Plan Set |

The 1960 plan set indicated widening of the structure by support on spread footings founded at the same elevation as the existing structure. No additional geotechnical data was developed for this proposed widening.

In October 2016 the District requested guidance from OGE to determine if any additional explorations were needed for the proposed structure replacement. The OGE foundations and retaining walls section at that time indicated that since the existing bridge was founded on bedrock and appears to be preforming well, that no additional exploration would be necessary. The District requested if OGE could perform a confirmation of the bedrock as indicated in the 1936 plan set. OGE completed one boring, B-001-0-16, 5 ft. in front of the forward abutment (≈Sta. 413+40, 5 ft. Right) at the edge of water to confirm the presence of bedrock.

The boring was advanced utilizing post hole diggers until a cobble obstruction was encountered. Then a portable hand operated gas powered core machine was utilized to determine the top of rock, and collect samples of the bedrock material.  Approximately 3 feet of Silt and Clay (A-6a) that contained large gravel and cobbles was encountered to elevation 844.75 ft. where bedrock was encountered.  The bedrock material encountered consisted of white with gray Dolomite which was moderately weathered, strong, vuggy and broken consistent with Lockport Dolomite of Silurian Age.  The bedrock was penetrated 1 ft. to elevation 843.75 ft.  As the boring was further advanced, the compression ring was broken resulting in loss of the core barrel in the hole.  A point load strength index (Sc) test was completed on the core recovered.  The resulting estimated compressive strength value was 11,813 psi for the broken bedrock.

Elevations were estimated based on field measurements relative to the existing structure and elevations presented in 1960 rebuild plans. A field sketch is presented below as well as a plan view based on the 1960 plans.

An active quarry is present approximately 0.5 miles south-southwest of the structure.  This quarry is being operated by Stoneco and is mining the Lockport dolomite which corresponds well to our findings.  Also, the estimated elevation correlates with the broken limestone layer presented in the 1936 plans.  The footings were to be extended through the surficial broken layer of rock to elevation 841.3 ft.

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| --- | --- |
|  | Plan View for B-001-0-16. |
|  | Field sketch for B-001-0-16, completed 11/01/2016 |

Based on the field findings, OGE feels that the bedrock elevations presented in the 1936 plans are adequate to be utilized in the design of the new structure. If you have any questions, please let us know.

PPP/SAT

pc: Reading File, File, Chris Merklin – OGE,