M E M O R A N D U M

cc: J. Van Zee
C. Van Zee
T. Lovell
T. Wright
P. Perry
R. Gossom
R. Thomas
D. McElmurray
K. Downs (D-5)
D. Deitz (Palmer)

TO: Michael Carpenter P.E.
Director, Division of Structural Design

FROM: Geotechnical Branch

BY: Tyler Sheffield, P.E.
Geotechnical Branch, Structure Foundation Section

DATE: November 5, 2021

SUBJECT: **Jefferson County**
12F0 FD52 056 0264 021-023D
Mars #:8556402D
Item #: 5-804.00
RECONSTRUCT THE WATTERSON EXPRESSWAY INTERCHANGE @US 42 INCLUDING SLIP RAMP TO KY 22
5'x4' RCBC Extension at I-71 NB Ramp Sta. 85+73 (25' Lt.)
Geotechnical Engineering Structure Foundation Report

1.0 LOCATION AND DESCRIPTION

The geotechnical investigation for this structure has been completed. The DGN file for the subsurface data sheet has been made available on Projectwise and through email for use in development of structure plans. The onsite geotechnical exploration for the project was performed by the consulting firm of American Engineers Inc.

The proposed 5'x4' culvert extension will be a part of the proposed improvements on I-264 in Jefferson County. The structure is located at approximate M.P. 0.2 on the I-71 Northbound ramp from I-264. The structure is located in Louisville, KY.

2.0 SITE GEOLOGIC CONDITIONS

This structure is located in the Jeffersonville, new Albany, and Charlestown Geologic Quadrangle (GQ# 1211). The geologic mapping indicates that this site consists of the Louisville Limestone Formation.

3.0 FIELD INVESTIGATION

One (1) sample and core hole was taken at this structure's location as part of the structural geotechnical investigation. After drilling, the rock cores and soil samples were delivered to the KYTC Geotechnical Branch in Frankfort, KY where a geologist logged the rock and the soils were classified and tested in the Branch's laboratory.

4.0 LABORATORY TESTING

The laboratory soil testing for the investigation was completed by the Branch's laboratory. The soil samples obtained from the boring were determined to consist of low plasticity clays and silts. The soil samples were designated as CL and ML by the Unified Soil Classification System.

5.0 SUBSURFACE CONDITIONS

Depth to rock/refusal was 7.2 ft. The rock core taken at this site consisted of gray, fine to medium grain, crystalline limestone with few fossils, stylolites, and chert nodules. The KY RQD

value for the rock core taken at this proposed culvert location was 90% and core recovery was 96%. The top of rock/refusal elevation at this site was 525.6 ft.

6.0 ENGINEERING ANALYSIS

Due to the depth of the bedrock, embankment stability and settlement analyses were not performed. Please refer to Geotechnical Engineering Roadway Report R-001-2012 and R-003-2018 for geotechnical information related to construction of the roadway embankments.

Due to the rock depths and the proposed flow line elevations the culvert can be designed for a **yielding** foundation.

7.0 FOUNDATION RECOMMENDATIONS:

7.1 Design this culvert for a **yielding** foundation. For a yielding foundation, any bedrock or boulders encountered within 2 ft. of the bottom slab must be excavated and backfilled with soil to the base of the footing elevation.

7.2 The culvert wingwalls shall be founded on soil. Size the footing at a service limit state using the factored nominal resistance of 2.4 ksf. For checking strength and extreme limit states, the nominal bearing resistance has been determined to be 7.1 ksf. Use a resistance factor of 0.45 for strength limit state analysis and a resistance factor of 1.0 for extreme limit state analysis.

7.3 This culvert should be designed with a paved flowline. The paved flowline shall also include the inlet and outlet apron portions of the culvert's flowline. The ends of the aprons shall incorporate a toe-wall designed in accordance with Exhibit 513 of the KYTC Division of Structural Design Guidance Manual.

7.4 The wingwalls should be designed using Soil Type 3 of Exhibit 413 in the Division of Structural Design Guidance Manual. It should be noted that the backfill slope being referred to is that which is perpendicular to the wingwall.

8.0 Plan Notes

(Include the notes below at appropriate locations in the Plans, if applicable.)

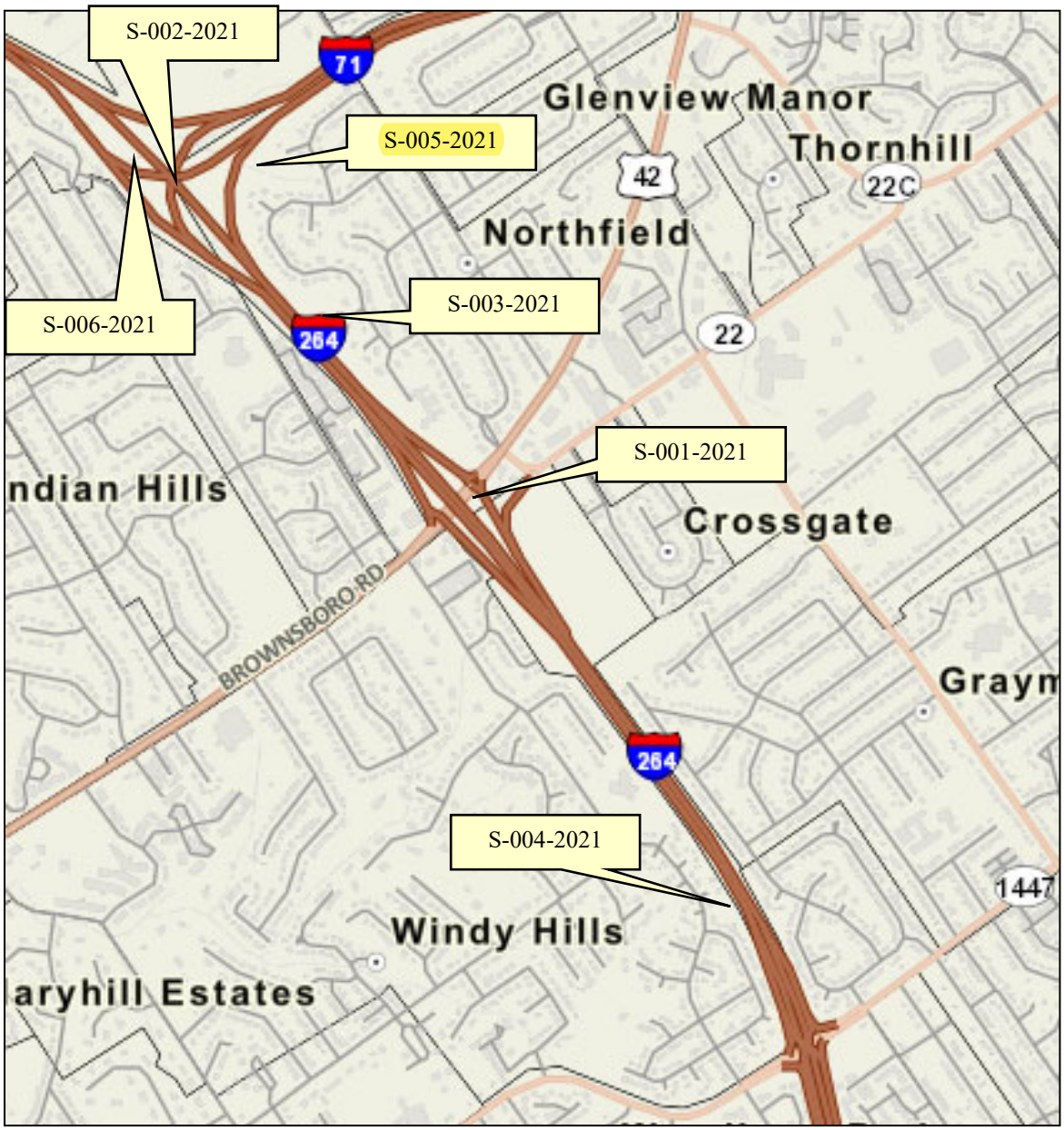
8.1 Temporary sheeting or shoring/cofferdams and/or a dewatering method will be required for installation of the footings.

The designer should feel free to contact the Geotechnical Branch for further recommendations, or for any additional questions that arise pertaining to this project, at (502)564-2374.

Attachments:

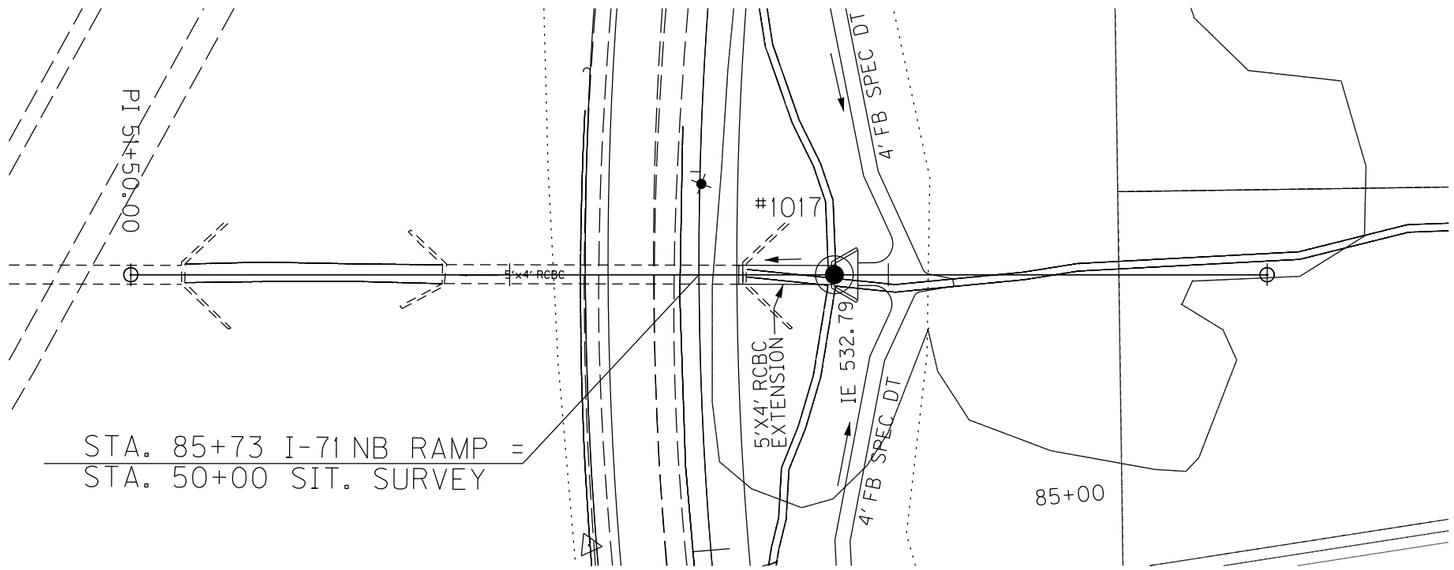
- Structure Location Map
- Subsurface Data Sheet
- Coordinate Data Sheet

Structure Location Map:
Approximate Lat./Long: 38.289064/-85.643644



SUBSURFACE DATA

Plan Scale 1" = 20'



Profile Scale:
Vertical 1" = 10'
Horizontal not to scale

1017
85+72.70
35.7' Rt.
532.85

Hole No.
Station
Offset
Elev.
(NAVD 88 datum)

D50 (mm)	w%	LI		
0.005	24	-0.28		A-7-6(20), ML, S+C=94(57+37)
0.065	4	-0.80		N=13, A-7-6(8), CL, S+C=51(33+18)
0.065	4	-0.80		N=R/0.30', A-7-6(8), CL, S+C=51(33+18)
	87	100		Cored Overburden.
	90	96		Limestone: gray, fine to medium grain, crystalline, few fossils, few chert nodules, shale parting at 11.3'.
	KYRQD	REC		

Top of Rock elev. = 525.65
Base of weathered rock elev. = 524.65

550 540 530 520 510 500 490

Datum

COMMONWEALTH OF KENTUCKY DEPARTMENT OF HIGHWAYS	REVISION	DATE	PREPARED BY Division of Structural Design Geotechnical Branch	DATE: 04-NOVEMBER-2021	CHECKED BY	CROSSING 5'x4' RCBC Ext. at I-71 NB Ramp Sta. 85+73	ROUTE I-264	ITEM NO. 5-804.00	COUNTY OF JEFFERSON
				DESIGNED BY:				SHEET NO.	DRAWING NUMBER S-005-2021
				DETAILED BY: T. SHEFFIELD					

S-005-2021 05-0804.00 Kentucky Transportation Cabinet

ID	Latitude	Longitude	Hole	Station	Offset	Elevation(ft)	Comments
1	38.2890079	-85.6436451	1017	85+72.7	35.7	532.847	