

MEMORANDUM

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

cc: J. Van Zee
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T. Wright
P. Perry
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K. Downs (D-5)
D. Deitz (Palmer)

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
7'x4' RCBC Extension at I-71 SB Ramp Sta. 50+66 (120' 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 7'x4' culvert extension will be a part of the proposed improvements on I-264 in Jefferson County. The structure is located at M.P. 0.1 on the I-71 Southbound 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

Two (2) core holes was taken at this structure's location as part of the structural geotechnical investigation. After drilling, the rock cores were delivered to the KYTC Geotechnical Branch in Frankfort, KY where a geologist logged the rock.

4.0 SUBSURFACE CONDITIONS

Depth to rock/refusal ranged from 16.5 ft. to 19.1 ft. The rock core taken at this site consisted of gray and gray to yellowish gray, fine to medium grain, crystalline limestone with few fossils, stylolites, vugs, and chert nodules. The KY RQD value for the rock core taken at this proposed culvert location ranged from 69% to 90% and core recovery was 100%. The top of rock/refusal elevation at this site ranged from 496.9 ft. to 502.5 ft.

5.0 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 **non-yielding** foundation.

6.0 FOUNDATION RECOMMENDATIONS:

Alternate #1 (non-yielding)

- 6.1 Design this culvert for a **non-yielding** foundation. The culvert should be extended to bedrock or the overburden excavated to rock and backfilled with “Granular Embankment”, non-erodible only, meeting the materials requirements of Section 805 of the Standard Specifications for Road and Bridge Construction, current edition. Contrary to the Standard Specifications, the maximum size for “Granular Embankment” should be 4”.
- 6.2 If the spread footings are to be founded on granular embankment extended to bedrock, size the footings at a service limit state using a factored bearing resistance of 8 ksf on “Granular Embankment”. If the applied pressures are greater than 8ksf, the The Designer shall provide a note in the plans directing that the footings be extended to rock and prohibiting the use of granular replacement. The note would indicate that the Presumptive Factored Bearing Resistance at the Service Limit State is 24 ksf for spread footings on Competent Unweathered Bedrock. Contact this Branch for a more detailed analysis of nominal bearing resistance if the strength or extreme limit states control the footing design.
- 6.3 This culvert should be designed with a paved flowline. The footings of the barrel of the culvert will require no embedment and bear directly on competent/unweathered bedrock.

7.0 Plan Notes

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

- 7.1 Solid rock excavation may be required to reach required footing elevations.
- 7.2 Temporary sheeting or shoring/cofferdams and/or a dewatering method will be required for installation of the footings.
- 7.3 All footing excavations in bedrock shall be cut neatly so that no forming or backfilling is necessary in the construction of the portions of the footings located in rock. Concrete should be placed directly against the cut rock faces. Mass concrete should be placed in the excavation from the top of the footing to the bedrock surface where the footing does not extend to the bedrock surface.
- 7.4 If bedrock becomes softened at bearing elevation, the softened material shall be undercut to unweathered material prior to placing concrete.

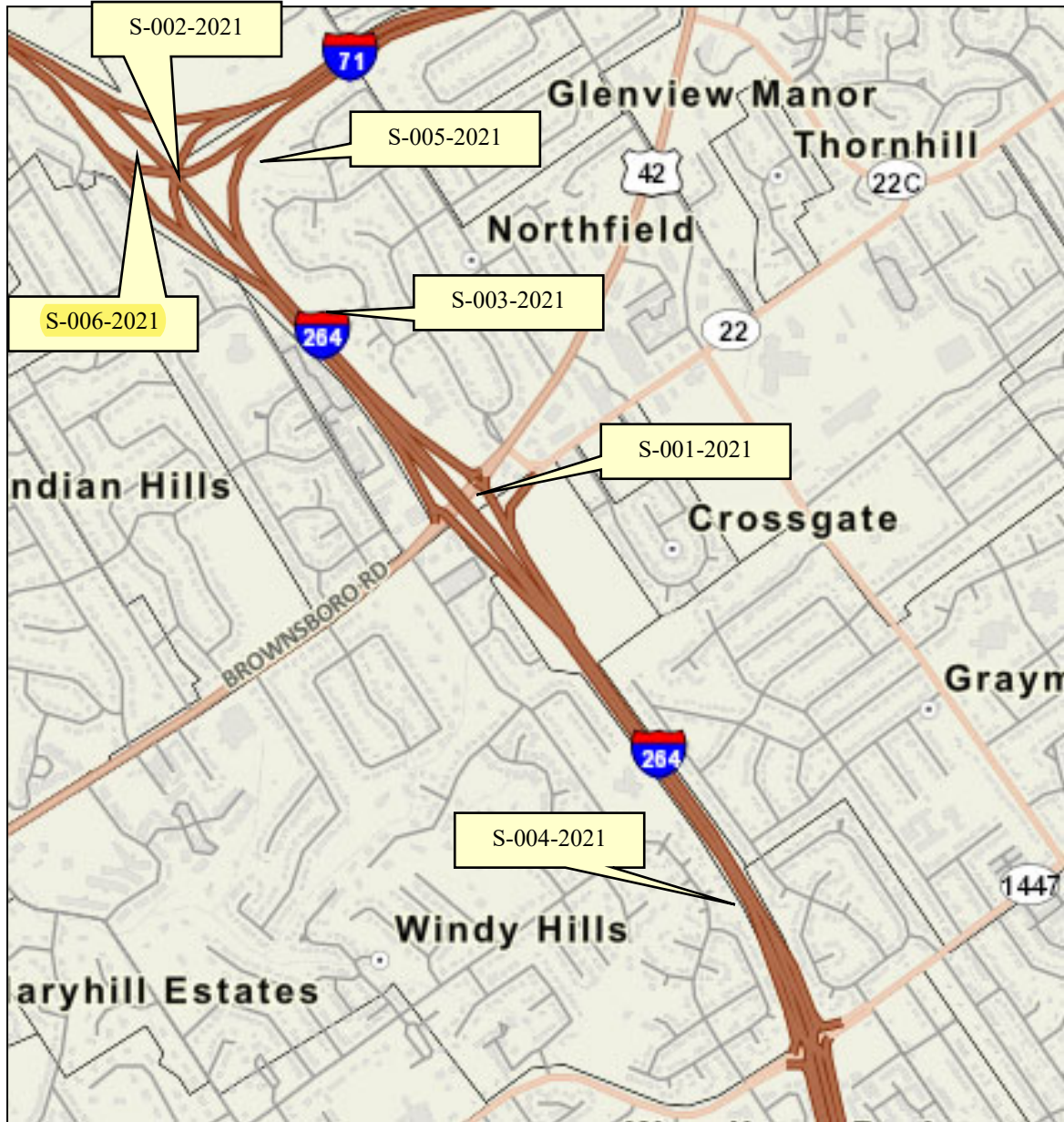
The designer should feel free to contact the Geotechnical Branch for further recommendations, or for any additional questions that arise pertaining to this project, at (502)564-2374.

Attachments:

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

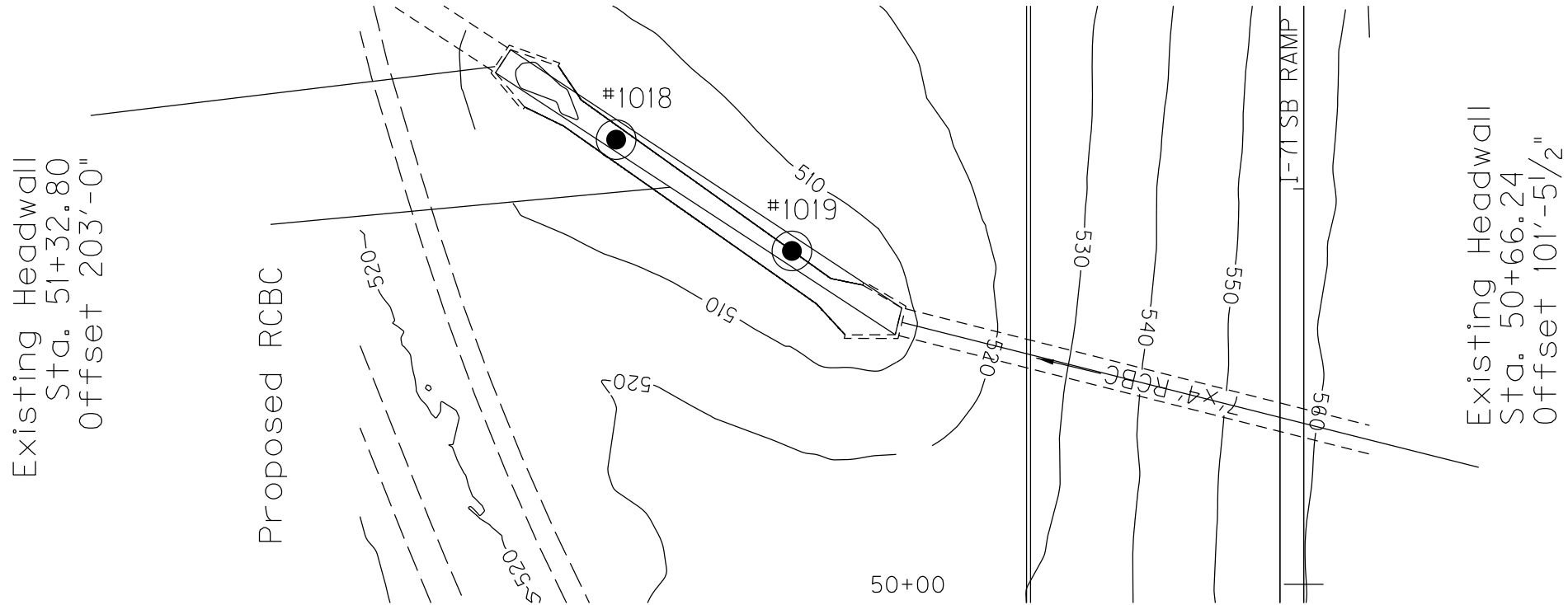
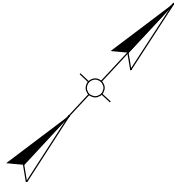
Structure Location Map:

Approximate Lat./Long: 38.289169/-85.647339



SUBSURFACE DATA

Plan Scale 1" = 20'



Existing Headwall
Sta. 51+32.80
Offset 203'-0"

Existing Headwall
Sta. 50+66.24
Offset 101'-5 1/2"

Proposed RCBC

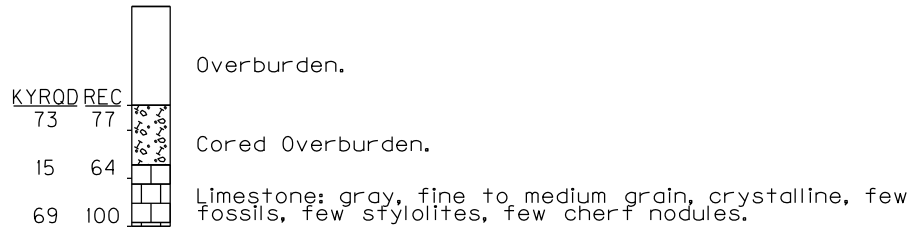
I-71 SB RAMP

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

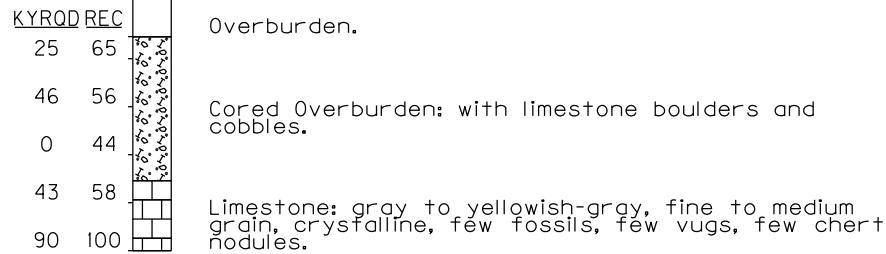
Hole No.
Station
Offset
Elev.
(NAVD 88
datum)

1018
50+84.30
129.3' Lt.
519.00

1019
51+12.40
113.7' Lt.
516.00



Top of Rock elev. = 502.50
Base of weathered rock elev. = 501.20



Top of Rock elev. = 496.90
No weathered rock

Datum

The Presumptive Factored Bearing Resistance at the Service Limit State is
24 ksf for Spread Footings on Competent Unweathered Bedrock



REVISION	DATE

S-006-2021 05-0804.00 Kentucky Transportation Cabinet

ID	Latitude	Longitude	Hole	Station	Offset	Elevation(ft)	Comments
1	38.2891419	-85.647447	1018	50+84.3	-129.3	519	
2	38.2891155	-85.6476268	1019	51+12.4	-113.7	516	