

MEMORANDUM

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

FROM: Adam Ross, P.E.
TEBM, Geotechnical Services Branch
Division of Structural Design

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

DATE: June 15, 2022

SUBJECT: **Marion County**
1100 FE02 078
078B00053N
4-40000
KY 1195
Culvert over Pleasant Run Creek
Geotechnical Engineering Structure Foundation Report

cc: J. VanZee
C. VanZee
B. Bottoms
J. Hornbeck
M. Walls
A. Ulrich
D. McElmurray
D. Alexander

1.0 LOCATION AND DESCRIPTION

The geotechnical investigation for this structure has been completed. The site investigation for the project was performed by the Geotechnical Services Branch.

The existing crossing consists of a triple 15'x5.5' (approx.) RCBC with an unpaved flowline. This culvert is being replaced as a maintenance project. It is located on KY 1195 over Pleasant Run Creek, at mile point 4.36, approximately 6.1 miles northeast of Lebanon in Marion County. Existing plans were not found.

2.0 SITE GEOLOGIC CONDITIONS

This structure is located in the Lebanon East Geologic Quadrangle (GQ# 1508). The geologic mapping indicates that the site consists of alluvium underlaid by the Calloway Creek Limestone Formation.

3.0 FIELD INVESTIGATION

No drilling or sampling was performed at this location. A visual site investigation and review of previous inspection reports and photos were performed by the Geotechnical Services Branch. Overhead utilities parallel the culvert about 10 ft. to the northwest. An overhead utility line also crosses KY 1195 about 40 ft. northeast of the culvert. These observations are shown on the attached site drawing.

4.0 LABORATORY TESTING

No laboratory testing was performed for this structure.

5.0 SUBSURFACE CONDITIONS

During the site investigation, limestone bedrock was observed throughout the streambed, and it appears that the culvert is founded directly on bedrock with an unpaved flowline. This bedrock was

measured to be about 7.5 ft. below the roadway elevation.

6.0 ENGINEERING ANALYSIS

Due to the shallow depth to bedrock, the culvert can be designed for a **non-yielding** foundation.

Embankment stability is not considered to be a concern at this location. Embankment is to be constructed at slopes the same as currently in existence or 2H: 1V, whichever is flatter. If any additional embankment is to be constructed at slopes steeper than recommended, please contact the Geotechnical Branch for further analysis.

In view of the minimal overburden at the culvert, settlement is not believed to be a concern at this location.

7.0 FOUNDATION RECOMMENDATIONS:

7.1 Design this culvert for a **non-yielding** foundation. The culvert should be extended to bedrock.

7.2 Spread footings shall be founded on unweathered bedrock. Size the footings at service limit state using a factored bearing resistance of 12 ksf. 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 12 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.

7.3 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.

7.4 This culvert can be designed with a paved or unpaved flowline.

Paved Flowline

7.5 If the culvert is designed with a paved flowline, the 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.

7.6 The footings of the barrel of the culvert will require no embedment and bear directly on competent/unweathered bedrock.

7.7 The footings of the wingwalls shall be embedded a minimum of 2.0 foot into unweathered bedrock.

Unpaved Flowline

7.8 If the culvert is designed with an unpaved flowline, the footings of the barrel of the culvert shall be embedded a minimum of 1.0 foot into unweathered bedrock.

7.9 The footings of the wingwalls shall be embedded a minimum of 2.0 foot into unweathered bedrock.

8.0 Plan Notes

(Include the notes below at appropriate locations in the plans.)

- 8.1** Solid rock excavation will be required to reach required footing elevations.
- 8.2** Temporary sheeting or shoring/cofferdams and/or a dewatering method will be required for installation of the footings.
- 8.3** 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.
- 8.4** 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 at 502-564-2374 for further recommendations or if any questions arise pertaining to this project.

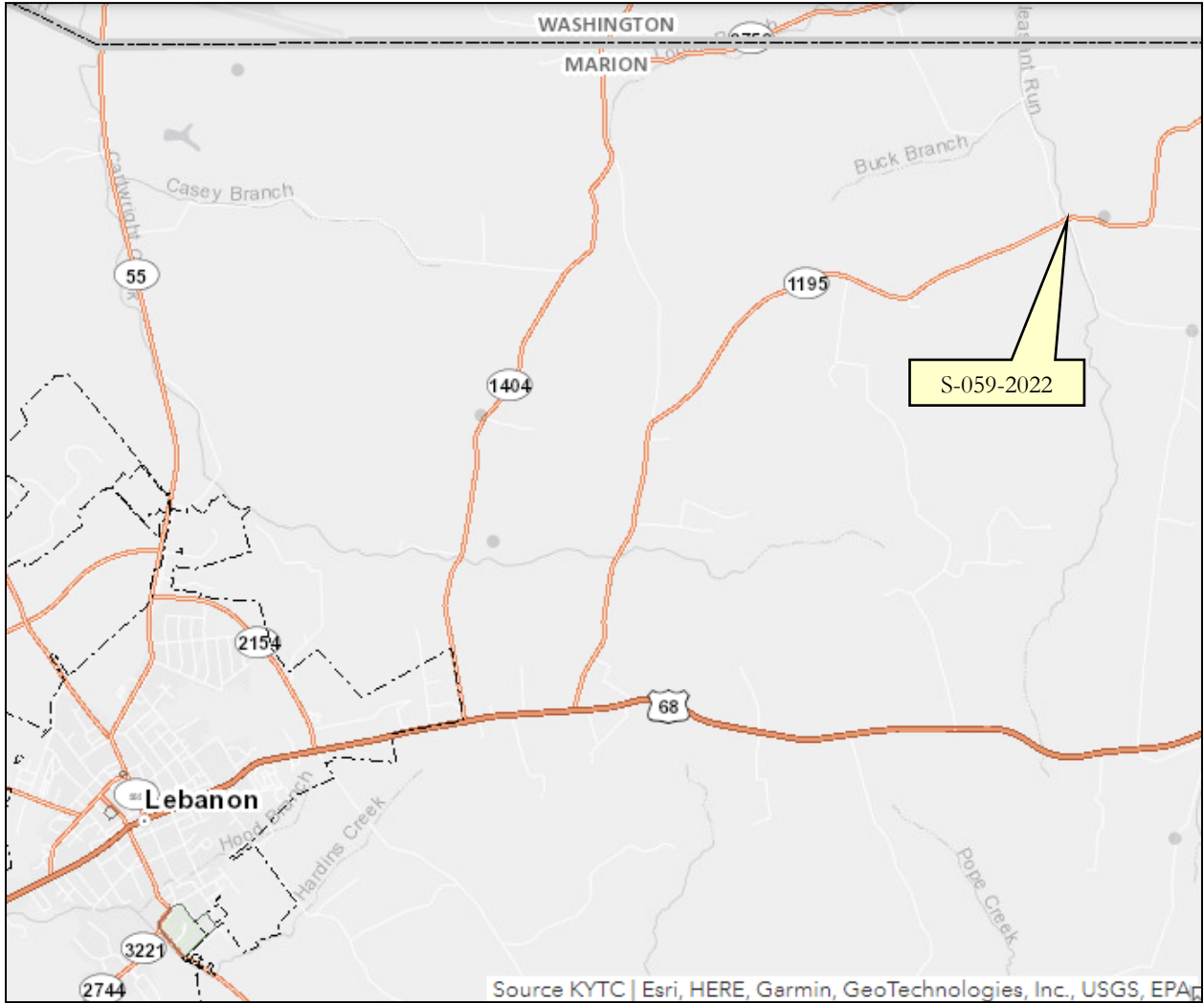
Attachments:

- **Project Location Map**
- **Project Site Assessment & Photos**

S-059-2022
Marion Co., KY 1195
078B00053N
June 15, 2022

Project Location Map:

37.6171354740, -85.1611716010



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Geotechnical Survey

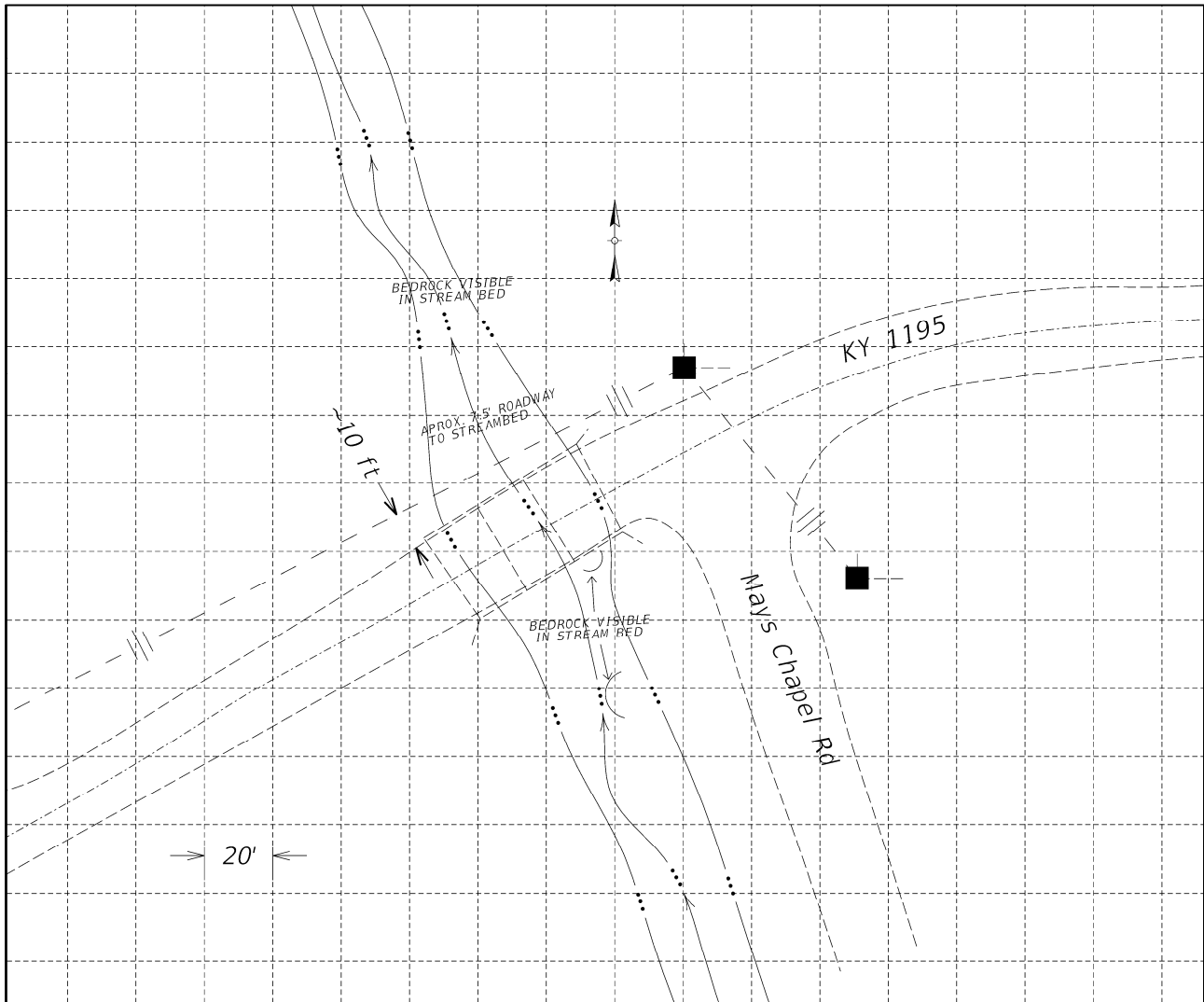
SURVEY REQUEST CHECKLIST

Geotech Survey field work needed:	<input type="checkbox"/> Ground line Profile at Bridge (Upstream and Downstream) <input type="checkbox"/> Channel Bottom Rock <input type="checkbox"/> Rock Out-Cropping <input type="checkbox"/> Sink Holes <input type="checkbox"/> Other (see Geotechnical site conditions Notes) <input type="checkbox"/> None
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Geotechnical

Geotechnical site conditions:	<input type="checkbox"/> Visual rock outcroppings at site <input checked="" type="checkbox"/> Visual observation of rock in stream bed, crossing or railroad <input type="checkbox"/> Rock Probe (Depth) <input type="checkbox"/> Other (see Geotechnical site conditions Notes) <input type="checkbox"/> None	Geotechnical site conditions Notes from Geotech Engineer:	
Anticipated level of geotechnical work for project advancement:	Additional Geotechnical investigation needed? <input type="radio"/> Yes <input checked="" type="radio"/> No		

Sketch:





Looking north from culvert



Utility poles about 40' north of culvert



Looking south from culvert



Looking upstream



Looking upstream



Looking downstream



Upstream face of culvert



Upstream face of culvert



Footing on bedrock



Downstream face of culvert



Looking upstream through middle barrel



Downstream of culvert with bedrock in streambed