



Geotechnical and Coring Services

for

# Old Cranston Road EMS Facility

## Morehead, Kentucky

April 24, 2020

Prepared for

Rowan County Judge Executive  
Morehead, Kentucky

CSI Project Number LX200044





## Consulting Services Incorporated

Lexington 859.309.6021 | Cincinnati 513.252.2059

Geotechnical & Materials Engineering | IBC Special Inspection | Material Testing

April 24, 2020

Rowan County Judge Executive's Office  
600 West Main Street  
Morehead, Kentucky 40351

ATTN: Judge Harry T. Clark

Subject: **Geotechnical and Coring Service**  
Old Cranston Road EMS Facility  
Morehead, Kentucky  
CSI Project No. LX200044

Dear Judge Clark:

**Consulting Services Incorporated of Kentucky (CSI)** is pleased to present our findings for the geotechnical and coring services completed for the proposed new EMS Facility in Morehead, Kentucky. We provided our services in general accordance with CSI's revised proposal number 6639, dated April 17, 2020.

### **BACKGROUND**

Project information was provided via email correspondence from you and from Mr. Marty Friedman of MSE of Kentucky. The project site is located along the east site of Old Cranston Road in Morehead, Kentucky. We understand this new EMS facility is planned to be constructed inside the existing site building.

We were contracted by your office and coordinated our scope with MSE. Our scope included coring through the existing slab at several locations to assess the following:

- General slab concrete conditions and attempt to assess what type of slab reinforcement was in-place
- Measure the approximate width of up to 3 common footing locations in warehouse area (wall and column pole)
- Assess near surface soil conditions for possible new foundation design and construction

If any of this information is incorrect or if it changes, please let us know so we can review and reassess our scope of services needed and provide best fit recommendations for the project.



## AREA/SITE INFORMATION

A review of the *USGS Map of the Morehead Quadrangle, Rowan County, Kentucky (dated 1972)* indicates that the project site is underlain by Mississippian aged rock of the Farmers Formation. The siltstone or very fine grained sandstone are described as light gray to tan and very evenly bedded.

We have reviewed several available aerial photographs, dated as far back as February 1995. The February 1995 photograph indicates the project site was occupied by the existing site building and pavement areas. Between February 1995 and June 2004, additional pavement areas were constructed on the southern side of the building. Between June 2008 and June 2010, a small addition was constructed on the northwestern corner of the building. No other changes have been noted in the vicinity.

## SITE SURFACE OBSERVATIONS AND SUBSURFACE CONDITIONS

Mrs. Carole Gibbs and Mr. Barry Bishop, EIT of CSI conducted a site visit, performed a field reconnaissance and coring and hand augering operations within the proposed project area on April 21, 2020. Please reference the following sections for details of the site surface and subsurface conditions in the new tank area and the building addition area.

### Site Surface Conditions

As previously mentioned, the proposed new EMS Facility will be located inside the existing site building. In general, the existing concrete floor slab appeared to be in good condition. Some minor cracking was observed around several of the existing interior columns. Additionally, a crack was observed in the slab along the eastern portion of the existing building.

The following photos depict the project site at the time of our exploration:



Photo 1. View of project area



Photo 2. View of concrete coring



Photo 3. View of cracking around interior column



Photo 4. View of building addition area (facing west)

Subsurface Conditions

We cored through the concrete slab in 6 locations within the footprint of the new EMS Facility (as shown in Figure 1). Hand augering and Dynamic Cone Penetrometer tests (DCPs) were performed (where applicable).

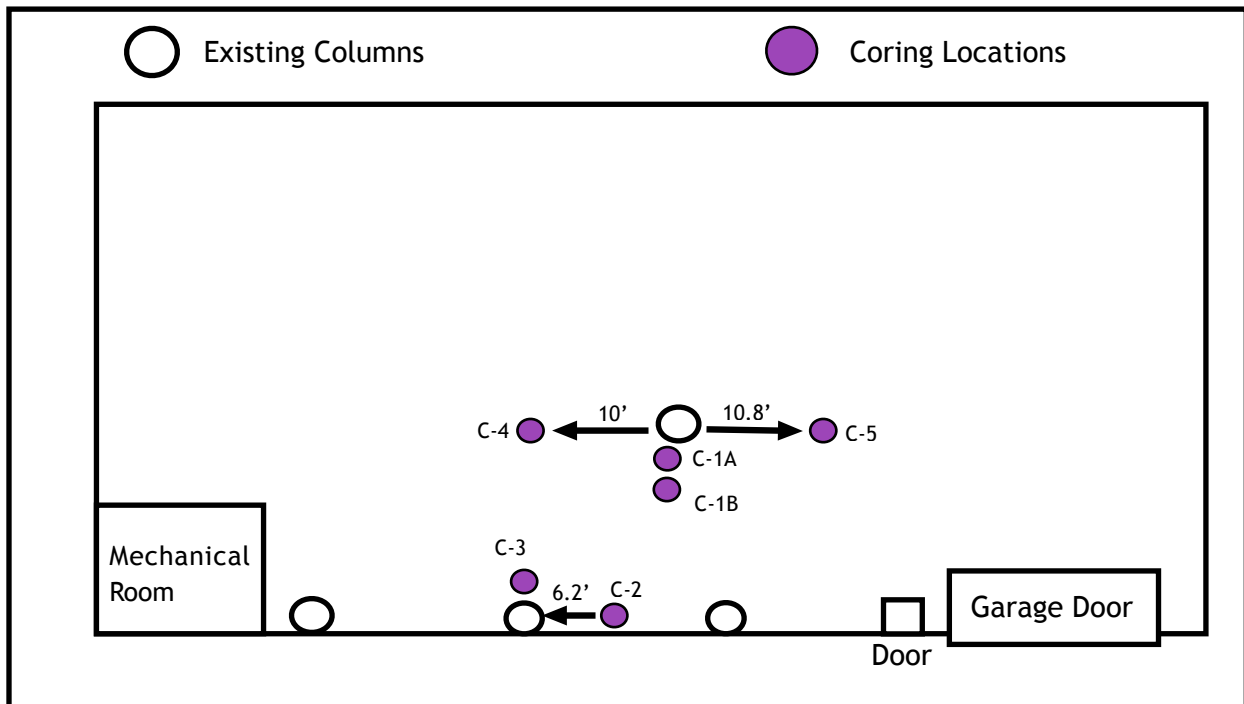


Figure 1. Approximate Boring Locations



In general, we encountered concrete, overlying gravel, overlying previously placed fill (where encountered). The overburden subsurface conditions are summarized in Table 1.

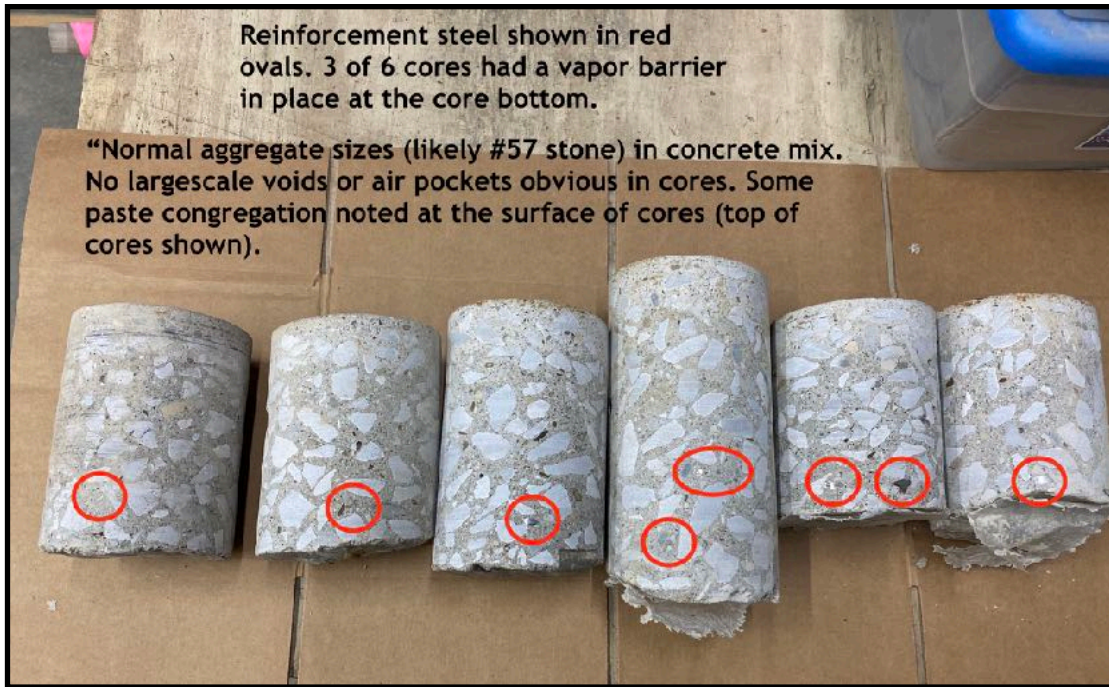
Boring C-1A was located 6 inches from an existing interior column. Hand auger refusal was encountered at a depth of 8 inches on a smooth continuous surface. An offset boring (C-1B) was performed 18 inches from the same existing column. Hand auger refusal was encountered at a depth of 8 inches on a rock fragment. A probe rod was then pushed on the side of the rock fragment and encountered refusal at a depth of 2 feet.

Strata	Thickness	Notes
Surface Cover: Concrete	4 to 7 inches	Present in all borings
Gravel	1 inch to 6 inches	Present in all borings
Fill - orange, tan and gray clay with silt, rock fragments and trace wood fragments	Approximately 0.1 foot to 2 feet	Present in 5 of 6 borings

Hand auger refusal was encountered in the remaining 4 borings at depths ranging from 1.3 feet to 2.7 feet. Based on the cuttings and probing each boring, we believe refusal was encountered on large rock fragments in these 4 borings.

### **CONCRETE SLAB NOTES**

The slab thickness was generally about 5 inches. At core location C-3, the slab was significantly thicker and was possibly part of a “thickened slab” footing. All core locations had slab reinforcement, generally located within 1 inch of the slab bottom and appeared to be WWF reinforcement of about 0.15 to 0.24 inches in diameter (corresponding to about 1.4 to 4.5 wire size range for WWF). The slab concrete mix appeared to be somewhat normal in appearance compared to similar light duty warehouse slabs. No obvious large-scale air pockets were observed in the cores and the concrete mix contained #57 sized coarse aggregate. The top of the slab appeared to have some paste “congregation”, which is sometimes indicative a overfinishing (too much trowel or floating) the surface. See the photo on the following page for the recovered cores including highlighting the steel reinforcement.



**EXISTING FOUNDATION WIDTHS**

At three locations, we cored through the slab at potential existing footing locations to attempt to ascertain existing footing widths. See Figure 1, specifically C-1A, C-1B, C-2 and C-3.

C-1A and C-1B were at an interior column and C-1A was drilled approximately 6 inches from the steel column. That boring encountered what we believe to be the top of a column footing at 8 inches deep. C-1B was drilled 12 inches further away from the column and did not encounter the footing top. Therefore, the column footing is likely to be a 2' x 2' (or similar sized) column footing.

At C-2 and C-3 locations (mid-span exterior columns and at a column, respectively), no footing was observed down to at least 2.6 and 2.7 feet. These were drilled approximately 6 inches from the existing wall, leading us to believe that either an 18-inch wide or narrower footing is in place or only a grade beam is below the wall (or combinations of both). Also, at C-3, the slab was almost 2 inches thicker than at other locations. This may indicate a “thickened slab” footing along the perimeter.



## FOUNDATIONS

Based on the existing foundations and the encountered subsurface conditions, this new facility can utilize shallow spread foundations bearing on soil, as needed. If there are any changes in the project criteria, CSI should be allowed to review the recommendations to determine if any modifications are required.

Shallow spread footings may be sized using a maximum allowable bearing pressure of 2,000 pounds per square foot (psf). Foundations should bear on the firm or better soil.

Additional design considerations for spread foundations bearing on soil are outlined as follows:

- Design all footings with a minimum 24 inches width;
- Interior footings (those not exposed to freezing) may be placed at nominal depths.

Construction notes:

- We encountered rocky material in our borings. Difficult soil excavation is possible due to the potential of larger rocks present.
- We did not encounter wet conditions in our borings, but the Morehead area is known for potential shallow water conditions.

## CLOSURE

We appreciate the opportunity to provide our geotechnical services to you and the design team. Please do not hesitate to contact us for questions or comments about the information contained herein.

Cordially,



Carole A. Gibbs  
Staff Engineer

Attachments: Hand Auger Logs

Joseph S. Cooke, PE  
Principal  
Licensed KY 21,244



**BORING: C-1A**  
Elevation (ft): 100.0

Elev. (ft)	Depth (ft)	Description	Symbol	Sample	DCP Blow Counts	Remarks
		CONCRETE - 5 inches				Dry upon completion of hand augering Vapor barrier observed beneath the concrete
		GRAVEL - 3 inches				Note: Hand Auger Refusal encountered on smooth, continuous surface
		Hand Auger Refusal at 0.7 feet				
98	2					

\*Assumed elevation of top of slab at 100.0 feet



CSI KY HAND AUGER LX200044 MOREHEAD EMS.GPJ LOG A NWNL01.GDT 4/24/20



Consulting Services Incorporated  
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Lexington, KY 40505  
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Fax: 888.792.3121

**CLIENT:** Morehead Judge Executive's Office  
**PROJECT:** Morehead EMS Facility  
**LOCATION:** Morehead, Kentucky  
**JOB NUMBER:** LX200044  
**LOGGED BY:** C. Gibbs  
**APPROVED BY:** J. Cooke, PE

**CONTRACTOR:** CSI Personnel  
**EQUIPMENT:** 3" Hand Auger  
**DATE STARTED:** 4/21/2020  
**DATE COMPLETED:** 4/21/2020  
**WEATHER:** Sunny, 50's



**BORING: C-1B**  
Elevation (ft): 100.0

Elev. (ft)	Depth (ft)	Description	Symbol	Sample	DCP Blow Counts	Remarks



\*Assumed elevation of top of slab at 100.0 feet

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**DATE COMPLETED:** 4/21/2020  
**WEATHER:** Sunny, 50's

**BORING: C-2**  
Elevation (ft): 100.0

Elev. (ft)	Depth (ft)	Description	Symbol	Sample	DCP Blow Counts	Remarks

\*Assumed elevation of top of slab at 100.0 feet



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**BORING: C-3**  
Elevation (ft): 100.0

Elev. (ft)	Depth (ft)	Description	Symbol	Sample	DCP Blow Counts	Remarks
		GRAVEL - 4 inches				Vapor barrier observed beneath the concrete
		FILL - sampled as FIRM, orange clay, with some silt, with some rock fragments, moist				
		FILL - sampled as FIRM, gray silty clay, moist				
		Hand Auger Refusal at 2.6 feet				Note: A probe rod was advanced to a depth of 2.6 feet and encountered the same hard surface.



\*Assumed elevation of top of slab at 100.0 feet

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
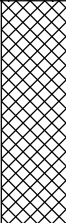
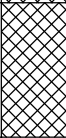


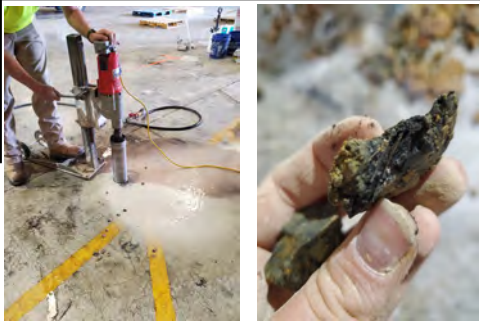
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**WEATHER:** Sunny, 50's

**BORING: C-4**  
Elevation (ft): 100.0

Elev. (ft)	Depth (ft)	Description	Symbol	Sample	DCP Blow Counts	Remarks
		GRAVEL - 1 inch				Vapor barrier observed beneath the concrete
		FILL - sampled as STIFF, orange clay, with some silt, with trace rock fragments, moist				
		FILL - sampled as STIFF, gray silty clay, with wood framgents, with rock fragments, moist			2-15-20+	
		Hand Auger Refusal at 1.3 feet				



**SAMPLE LEGEND:**

 Grab Sample

\*Assumed elevation of top of slab at 100.0 feet

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**WEATHER:** Sunny, 50's

**BORING: C-5**  
Elevation (ft): 100.0

Elev. (ft)	Depth (ft)	Description	Symbol	Sample	DCP Blow Counts	Remarks
		CONCRETE - 5 inches				Dry upon completion of hand augering
		GRAVEL - 5 inches				Vapor barrier observed beneath the concrete
		FILL - sampled as STIFF, orange to tan clay, with silt, with some rock fragments, moist				
					15-14-15	
98	2	Hand Auger Refusal at 1.9 feet				



**SAMPLE LEGEND:**

Grab Sample

\*Assumed elevation of top of slab at 100.0 feet

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