

Appendix G: Preliminary Geotechnical Assessment

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MEMORANDUM

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DATE: April 14, 2014

SUBJECT: Warren County
US 231 Scottsville Road from KY 880 to KY 884
1100 C35 D625 03 FD04 1550 C114 E143
Mars # 8767401D
Item # 3-8702.00
Preliminary Geotechnical Assessment

The Division of Planning is conducting a scoping and traffic operations study for US 231 (Scottsville Road) in Bowling Green Kentucky. This project is located in Warren County, KY from KY 880 to KY 884 on US 231. The study area is located in the Mississippian Plateau or Pennyrile Physiographic Region. This abbreviated review will discuss some general geotechnical concerns with the area.

The approximate coordinates for the center of this site is site are: 36.947355 degrees North and -86.423733 degrees West. The site is located in the Bowling Green South (235) Geologic Quadrangle as depicted on the attached map.

The study area is well known for its rolling terrain, red clay soils (residual material remaining after the soluble elements of the bedrock have dissolved) and the Karst behavior of the underlying bedrock (Karst features may include sinkholes, caves and solution features in the bedrock).

The Kentucky Geological Survey states that the physiographic region encompassing the area:

consists of a limestone plain characterized by tens of thousands of sink holes, sinking streams, streamless valleys, springs, and caverns. The term "karst" is used to define this type of terrain. The Karst terrain of the Mississippian Plateau occurs because the bedrock in the eastern and southern parts of the region is dominated by thick deposits of Mississippian-age limestones. These limestones are soluble (i.e. will dissolve) under the right conditions, which means they can easily be eroded by waters moving through the ground. These groundwaters can form miles of passages beneath the surface, from tiny paths only inches wide, to large caverns and rooms more than 100 feet wide

The available mapping that this area has numerous karst features (sinkholes).

The predominant bedrock formation at or near the surface of this location is the Ste. Genevieve Limestone. The Ste. Genevieve Limestone is underlain by the St. Louis Limestone. Both limestone formations are highly susceptible to karst related issues. Mapped contours indicate that the bedrock is relatively flat in this area however large local variations in the bedrock surface should be anticipated due to the karst nature of the site. The limestone formations weather to

moderately and highly plastic clay soils. Both formations also tend to leave small to large pieces of chert in the weathered soil residue. Artificial fill should be anticipated due to the amount of development in the area.

A field review of the site was made. This included the area as shown on the supplied map in addition to the potential for a connector road from Ken Bale Boulevard to Wall Street. Numerous Karst features are present in the corridor.



Karst Basin across from Advance Auto Parts



Open throat in the area of the Ken Dale Boulevard to Wall Street connector

Foundations for bridges in the study area are generally rock bearing (end bearing piles, drilled shafts or spread foundations). Smaller structures such as retaining walls and box culverts are commonly founded on soil.

P-002-2014
Warren County
US 231 Scottsville Road from KY 880 to KY 884

Soils in the area are generally suitable for embankment construction. Generally embankments built from the native soils can be constructed to a height of 60 feet with 2H:1V sideslopes if the foundation is suitable and proper compaction methods are used. Soil cuts in the native soils have been historically problematic. Soil cuts over approximately 10 feet often require analyses to design proper sideslopes. In no case should soil cuts be steeper than 2H:1V.

California Bearing Ratio (CBR) values used in pavement design generally range from 2-5 for soils subgrades in the area. The use of rock roadbed is a common practice in the area. Chemical modification of subgrade is sometimes used in the area, however past projects have indicated large cobbles and boulders (chert) in the soils which could make chemical modification problematic. Wet areas could require undercutting and/or rock stabilization for embankment construction. It is likely that subgrade under existing pavements could be very wet and might require some type of stabilization if pavements are removed.

Rock cuts in the area can be problematic due to the Karst nature of the bedrock. Solution features can cause the bedrock surface to be erratic.

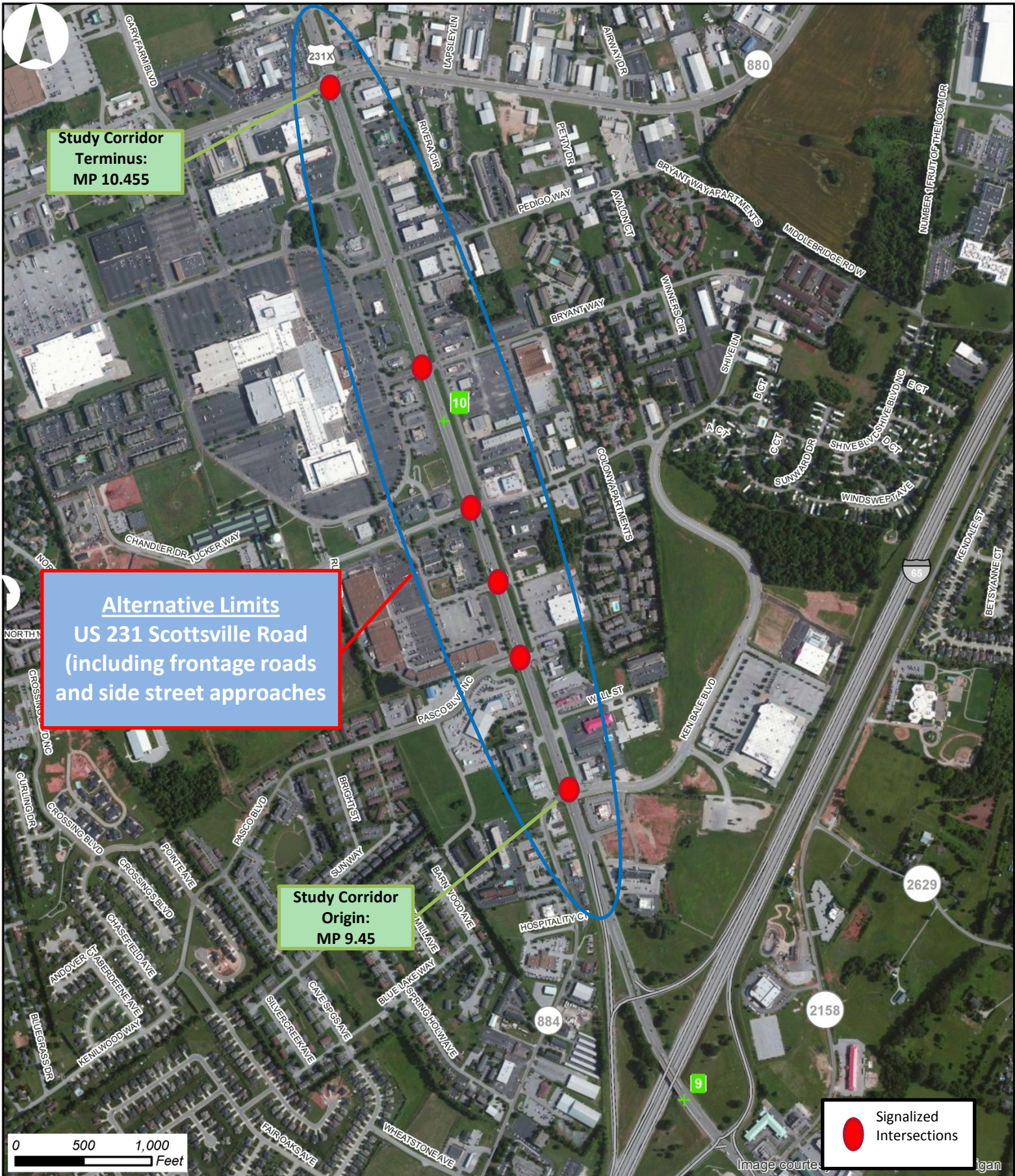
A list of previously completed Geotechnical Investigations close to the study area is listed below. The reports can be accessed through the KYTC Geotechnical Branch Database which can be accessed through the KYTC Division of Structural Designs home page.

Project ID	Project Type	Route	Description
R-003-2000	Roadway	KY 2158	From Station 450+35.45 to 632+21.78
R-011-1997	Roadway	US 231	From Station 0+942.74 to 3+650
R-016-2011	Roadway	KY 884	Improve Three Springs Road Section 1
R-019-2010	Roadway	KY 884	Widen Three Springs Road from Flealand to Scottsville
R-022-2000	Roadway	KY 880	From Station 10+00 to 154+98.32
R-041-2008	Roadway	I-65	Reconstruct I65/US 231 Interchange
R-051-1998	Roadway	I-65	From Station 8+624.59 to 20+400.93
S-030-2008	Structure	KY 884	Wall on Three Springs Road
S-123-2011	Structure	US 231	Reconstruct I65/US 231 Interchange

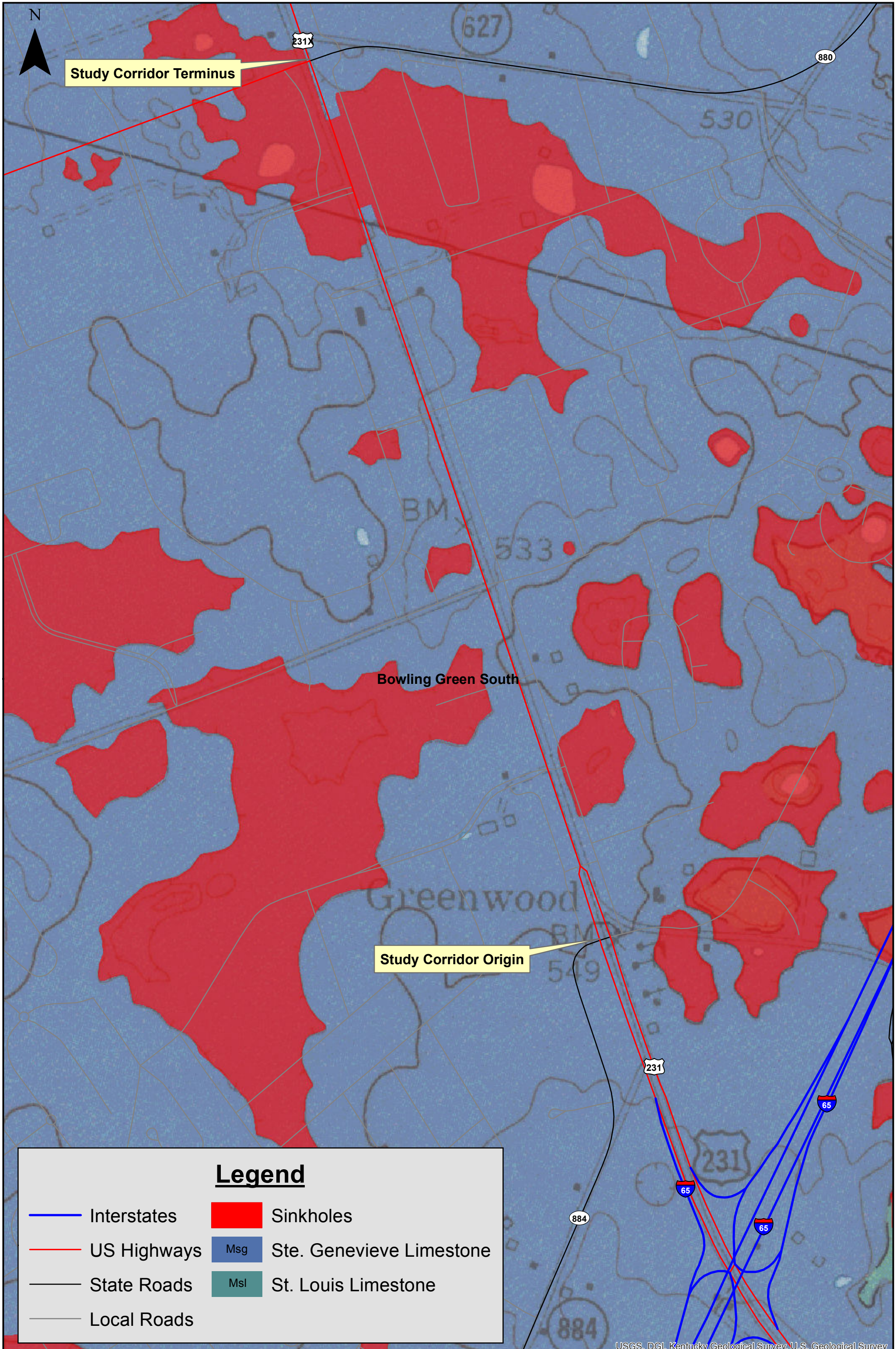
Site specific Geotechnical investigations are extremely critical in this region for design due to the karst potential of the area and the potential for problematic soils.

Attachments:

Project Site Map
Geologic Quadrangle Site Map



**US 231 – Scottsville Rd
 From Three Springs Road to
 Lovers Lane
 KYTC Item No 3-8702
 Warren County**



Study Corridor Terminus

Bowling Green South

Study Corridor Origin

Greenwood

Legend

- Interstates
- US Highways
- State Roads
- Local Roads
- Sinkholes
- Msg Ste. Genevieve Limestone
- Msl St. Louis Limestone

0 500 1,000 2,000 Feet