

Appendix D - GEOTECHINICAL OVERVIEW

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MEMORANDUM

TO: Keith Dotson
Division of Planning

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DATE: October 4, 2013

SUBJECT: **Laurel/Knox County**
STUDY OPTIONS FOR A NEW CORRIDOR WHICH WILL EXTEND
THE CORBIN BYPASS TO I-75 NEAR KY 552
Item # 11-190.00
MARS # 8670201P
Preliminary Geotechnical Assessment

The Division of Planning is conducting a study for options for a new corridor which will extend the Corbin bypass to I-75 near KY 552. This project is located in Laurel and Knox Counties, Kentucky as depicted on the site map. This abbreviated review will discuss some general geotechnical concerns with the area.

The study area is located in the Eastern Kentucky Coal Field Physiographic Region. The Kentucky Geological Survey web site states that:

The Eastern Kentucky Coal Field is part of a larger physiographic region called the Cumberland Plateau (which extends from Pennsylvania to Alabama). The interior of the Eastern Kentucky Coal Field is dominated by forested hills and highly dissected by V-shaped valleys. In general, the elevations of the hills are highest in southeastern Kentucky.

The approximate coordinates for the center of this site are: 36.988842 degrees North and -84.052158 degrees West. The site is located in the Lily (218) and Corbin (231) Geologic Quadrangles.

Available geologic mapping indicates that the project is underlain by bedrock of the Breathitt, Lee Formations and alluvium deposits. The regional dip of the bedrock is east-southeast, although bedrock contours indicate that the bedrock strata is relatively flat. The Breathitt formation consists of shale, limestone, siltstone, sandstone, coal and clay. The sandstones can be friable and the shales can be highly weatherable. The Corbin Sandstone Member of the Lee Formation underlies the Breathitt Formation. The sandstone of the Lee Formation can be poorly cemented and friable. For estimation of right of way for rock cuts in this area it is typical to assume from a 1.5V:1H to 2V:1H for cut slopes. No faults or other significant natural geologic features are indicated on the mapping in this area.

The Lily and Blue Gem coal seams have been mined in this area. According to available information the Lily seam ranges from 0-48" thick and the Blue Gem ranges from 0-29" thick. Numerous mines appear to be located throughout the study area. It appears that strip mining, auger mining and deep mining have taken place in the area. It is also likely that there are numerous locations where small scale "house coal" mining operations have taken place. Some

deep mine maps are available for in-depth study of future alignments. Additional mines not noted on the attached map will likely be encountered during design and construction. Deep mines encountered during construction likely will contain water. Mitigation of the mining areas may be required. It is likely that areas of uncompacted or loosely compacted mine spoil exist in the area. These areas can be problematic for road construction.

Foundations for bridges in this area would typically be founded on shallow foundations (spread footings on bedrock) or deep foundations (steel H-piles driven to bedrock or drilled shafts socketed into bedrock). Culverts and walls are typically supported on shallow (either yielding or non-yielding) foundations on soil or bedrock.

Soil strata in this area tends to be relatively thin. The soils encountered in the area are generally suitable for embankment construction. Generally, embankments built from the native soils and durable bedrock can be constructed to a height of 60 feet with 2H:1V side slopes if the foundation is suitable and proper compaction methods are used. Building embankments with non-durable shales may require special methods to obtain acceptable long term results. Soil cuts over approximately 10 feet often require analyses to design proper side slopes. In no case should soil cuts be steeper than 2H:1V. Suitable rock for embankment construction and rock roadbed is readily available in this area of the state. Soils in the area are considered erodible.

California Bearing Ratio (CBR) values used in pavement design generally range from 2-4 for soils subgrades in the area and 9-11 for a 2 foot durable rock road bed. Chemical modification of soil subgrades are sometimes used in this area. Wet areas could require undercutting and replacement of soils.

Previously completed Geotechnical Investigations within the study area are:

<u>Report No.</u>	<u>Route</u>	<u>Structure Over</u>	<u>Report Type</u>	<u>Description</u>
R-009-1999	I-75		Roadway	From Sta 40+300 NB & SB, End NorthBound at Sta 45+865 NB, End SouthBound at Sta 47+020 SB (EA Partners and HMB's Section I)
S-323-2007	US-25		Roadway	I-75 Median-Cable Guardrail
R-009-2010	I-75		Roadway	From Station 93+00 to Station 163+00
R-088-2007	US-25		Roadway	From Sta. 1090+02.05 to 1569+41.16
R-018-2003	I-75	Robinson Creek	Roadway	INCREASE CAPACITY OF THE ROBINSON CREEK BRIDGE ON US-25 AT MILEPOST 3.28. (06CCN)
S-080-1996	CR-1217	Robinson Creek	Structure	Bridge is located approximately 1.0 miles from CR-1217 junction with US-25
S-197-1998	I-75	Robinson Creek	Structure	INCREASE CAPACITY OF THE ROBINSON CREEK BRIDGE ON US-25 AT MILEPOST 3.28. (06CCN)at STA 327+50

The reports are located on the KYTC Geotechnical Branch Database which can be accessed through the KYTC Division of Structural Designs home page (Click on Geotech and Search KYTC Completed Projects).

P-009-2013
Laurel/Knox County
Corbin Bypass Extension Planning Study

Site specific Geotechnical investigations are critical in this region for design.

Please feel free to contact this office for additional information.

Attachments:

Site Map

GQ Site Map

Known Mined Areas and Coal seams



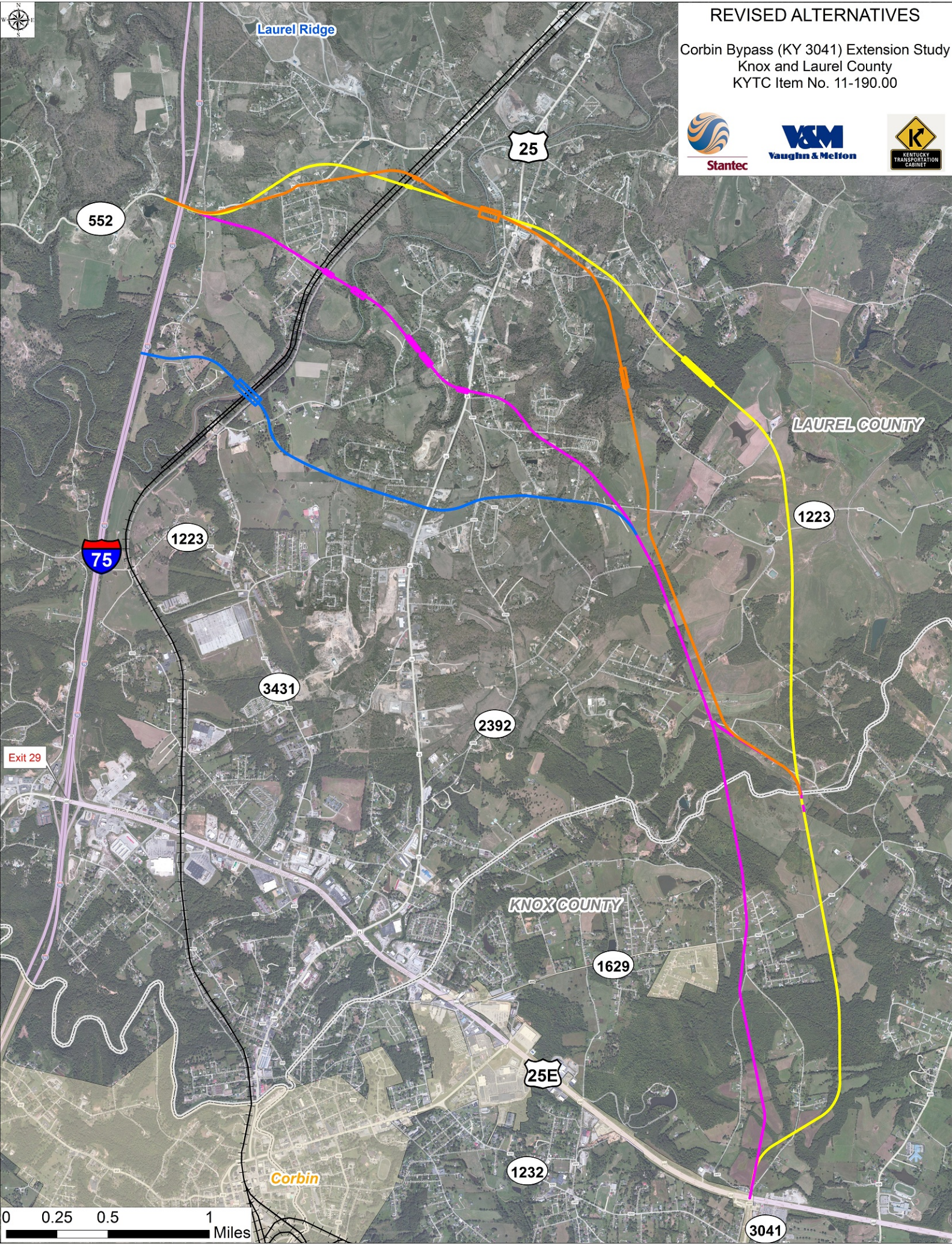
Laurel Ridge

REVISED ALTERNATIVES

Corbin Bypass (KY 3041) Extension Study
Knox and Laurel County
KYTC Item No. 11-190.00



Stantec



552

25

1223

1223

3431

2392

Exit 29

75

KNOX COUNTY

LAUREL COUNTY

1629

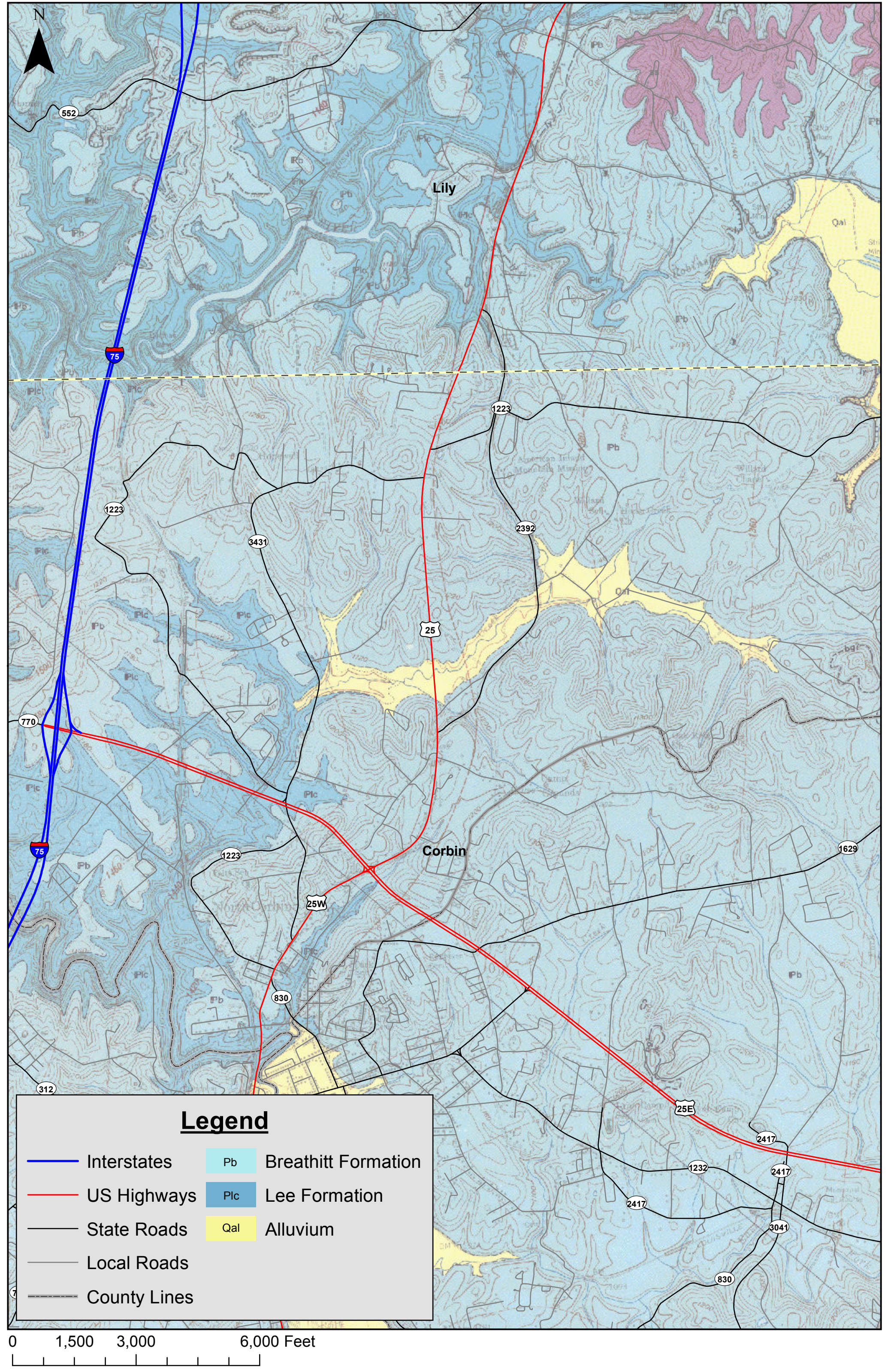
25E

1232

Corbin

3041

0 0.25 0.5 1 Miles



Legend

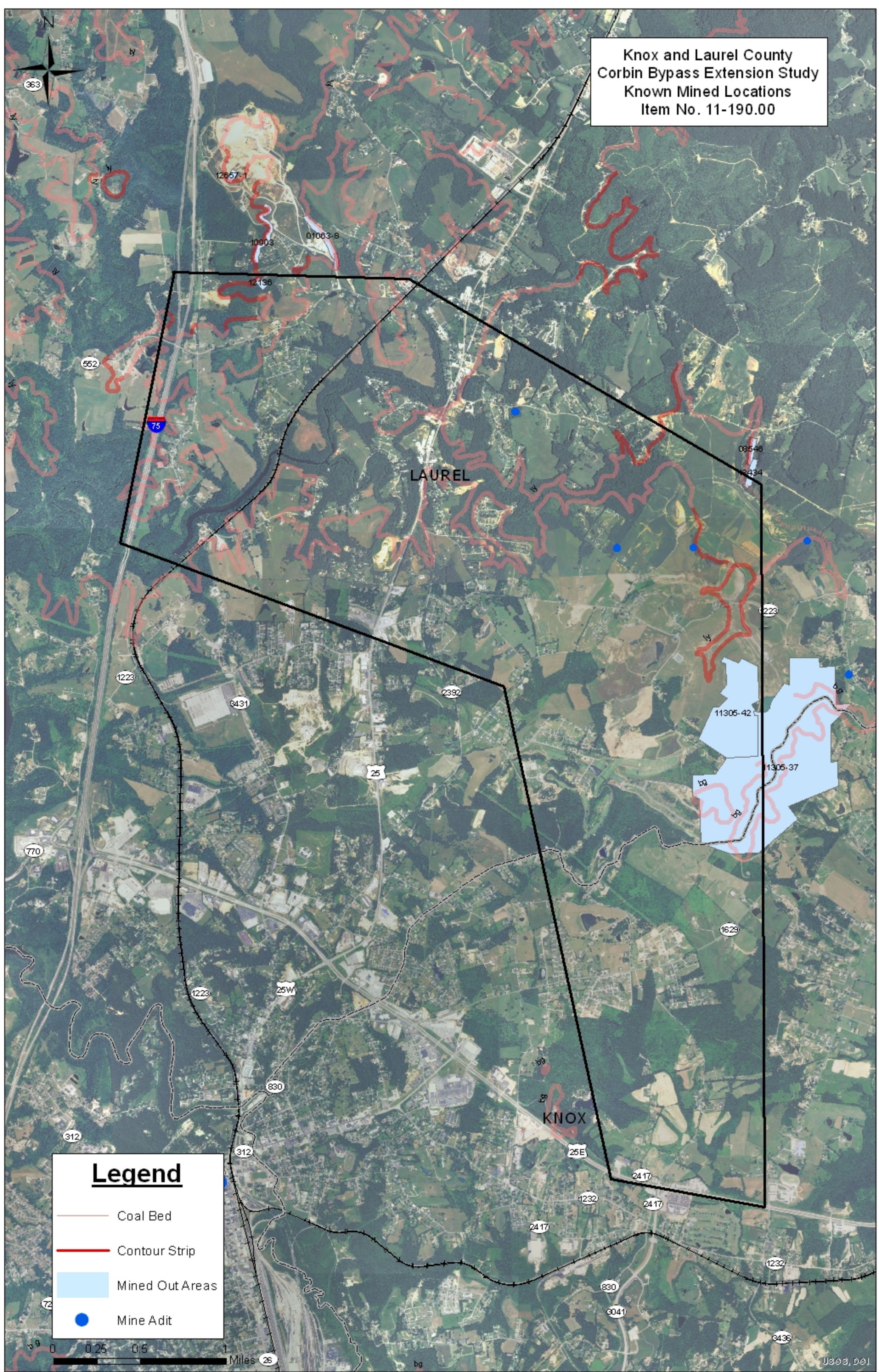
- | | |
|---|--|
|  Interstates |  Pb Breathitt Formation |
|  US Highways |  Plc Lee Formation |
|  State Roads |  Qal Alluvium |
|  Local Roads | |
|  County Lines | |

0 1,500 3,000 6,000 Feet

Knox and Laurel County
Corbin Bypass Extension Study
Known Mined Locations
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Legend

- Coal Bed
- Contour Strip
- Mined Out Areas
- Mine Adit