Appendix C:

Abbreviated Geotechnical Overview

Frankfort Small Urban Area Study (SUA)
Abbreviated Geotechnical Overview
Franklin County

This study is located in Franklin County, including the urban limits of Frankfort and its surroundings as shown in **Figure 1**. The study will focus on short and long-term improvements that the Kentucky Transportation Cabinet, the City of Frankfort, or Franklin County can use for further project development and implementation. Due to the large area, this overview was not a normal abbreviated overview – just a map of geotechnical conditions (**Figure 2**). The center coordinates of Frankfort are approximately 38°12′N, 84°52′W. Franklin County, in central Kentucky, occupies both the Inner and Outer Bluegrass Physiographic Regions.

- The Inner Bluegrass is characterized by gently rolling hills and rich, fertile soils, which are perfect for raising horses. The gently rolling hills are caused by the weathering of relatively thick-bedded limestone that characterize the Ordovician strata of central Kentucky that has been pushed up along the crest of the Cincinnati Arch.
- The Outer Bluegrass is characterized by deeper valleys, with little flat land, because the bedrock in this area is mostly composed of interbedded Ordovician limestones and shales that are more easily eroded than the limestones of the Inner Bluegrass.

The county is primarily an upland limestone area, dissected by streams. The topography is rolling to hilly. The most conspicuous topographic features are valleys associated with the Kentucky River and major creeks: Benson and Elkhorn. The Kentucky River bisects the county north-south and lies 350 to 400 feet below the adjacent uplands. Elevations of the higher ridges are commonly between 850 and 900 feet; the lowest elevation in the county is 455 feet, the normal pool level of the Kentucky River below Lock and Dam #4. City Hall is at an elevation of approximately 510 feet; the State Capitol is at 595 feet; and the hills around Frankfort are generally 800 to 820 feet.

The city itself is mostly underlain with limestone with a high karst potential (**Figure 3**); the surrounding county is a combination of limestone and shale with a high to medium karst potential. Karst is a topography characterized by underground drainage systems which form as soluble rocks dissolve; caves, sinkholes, and sinking streams are common features associated with karst topography. While limestone is a staple for highway construction, mitigation of some type is typically needed when shale is present as it is prone to slumping and slope stability problems. There are sinkholes present scattered throughout the study area, also shown in **Figure 3**.

Limestone beds in the region are nearly horizontal, though the regional dip is slightly to the northwest. Very small local dips may be found, dipping in most any direction. Available mapping indicates some faults in the northeastern portion of the county but beyond the study area. Faults represent breaks in the Earth's crust. Several landslides are noted on the geologic overview map, primarily along the ridges associated with the Kentucky River.

Prior KYTC geotechnical projects within the study area can be accessed through the KYTC Geotechnical Branch Database through the KYTC Division of Structural Designs home page.[1] Locations of each study are shown in **Figure 4**.

[1] http://kgs.uky.edu/kgsmap/kytcLinks.asp

Landslide Reports

- L-001-2006
- L-003-1997
- L-005-2012
- L-009-2008
- L-009-2008
- L-010-1996
- L-012-2011
- L-013-2011
- L-017-1996
- L-029-1996
- L-030-1999

Roadway Reports

- R-001-1973
- R-001-2011
- R-001-2014
- R-002-1977
- R-002-1978
- R-003-2009
- R-008-1976
- R-014-1976
- R-019-1971
- R-020-1985
- R-022-1985
- R-023-2016
- R-025-1987
- R-026-1974
- R-026-1989
- R-035-1997
- R-050-2001
- R-065-2013
- R-070-2013
- RA-010-2014

Structure Reports

- S-002-1998
- S-003-1973
- S-003-1985
- S-003-1998
- S-007-1988
- S-009-1985
- S-011-1978
- S-017-1980
- S-019-1985
- S-020-1977
- S-021-1976
- S-025-1985
- S-027-1976
- S-029-1990
- S-039-1976
- S-039-1990
- S-042-1990
- S-042-2007
- S-043-2007
- S-048-1975
- S-059-1976
- S-059-2016
- S-061-1976
- S-066-1997
- S-067-1980
- S-073-1979
- S-074-1997
- S-075-1977
- S-075-2005
- S-076-2005
- S-077-2005
- S-078-2005
- S-089-1979
- S-133-2013
- S-150-1998
- S-151-1998
- S-152-1998
- S-153-1998
- S-154-1998
- S-199-2014
- S-200-2014
- S-201-2014
- SA-002-2015
- SA-010-2016
- SA-015-2016

Construction Reports

- C-005-2009

According to Natural Resources Conservation Web Soil Survey data, the study area encompasses nearly 32,000 acres and is predominantly silt loam (nearly 85%), followed by rock outcrop complexes (10%) and silty clay/silty clay loam (4%) with the remaining area water. The soil report for the study area is shown in **Figure 5** and **Table 1**.

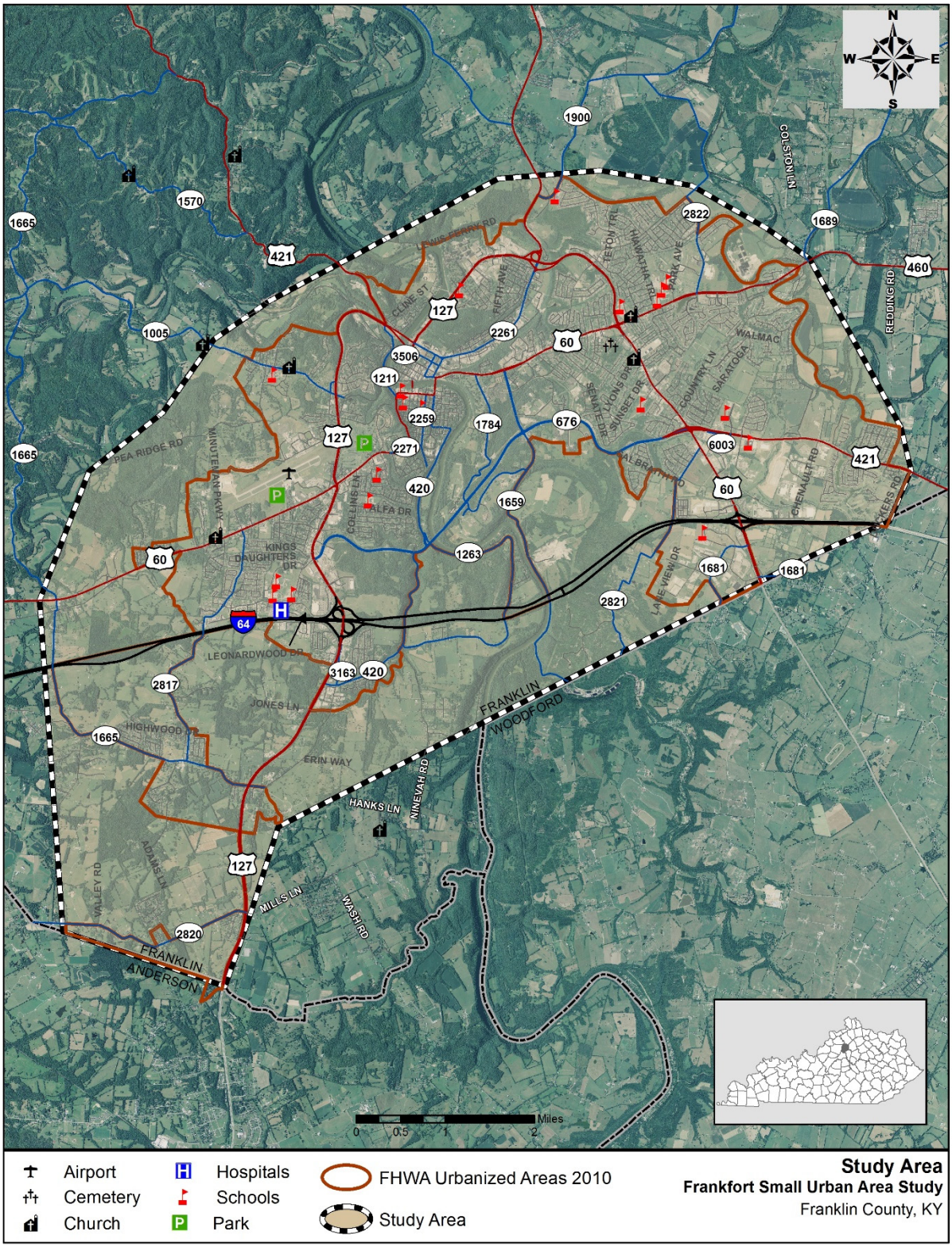


Figure 1 Study Area

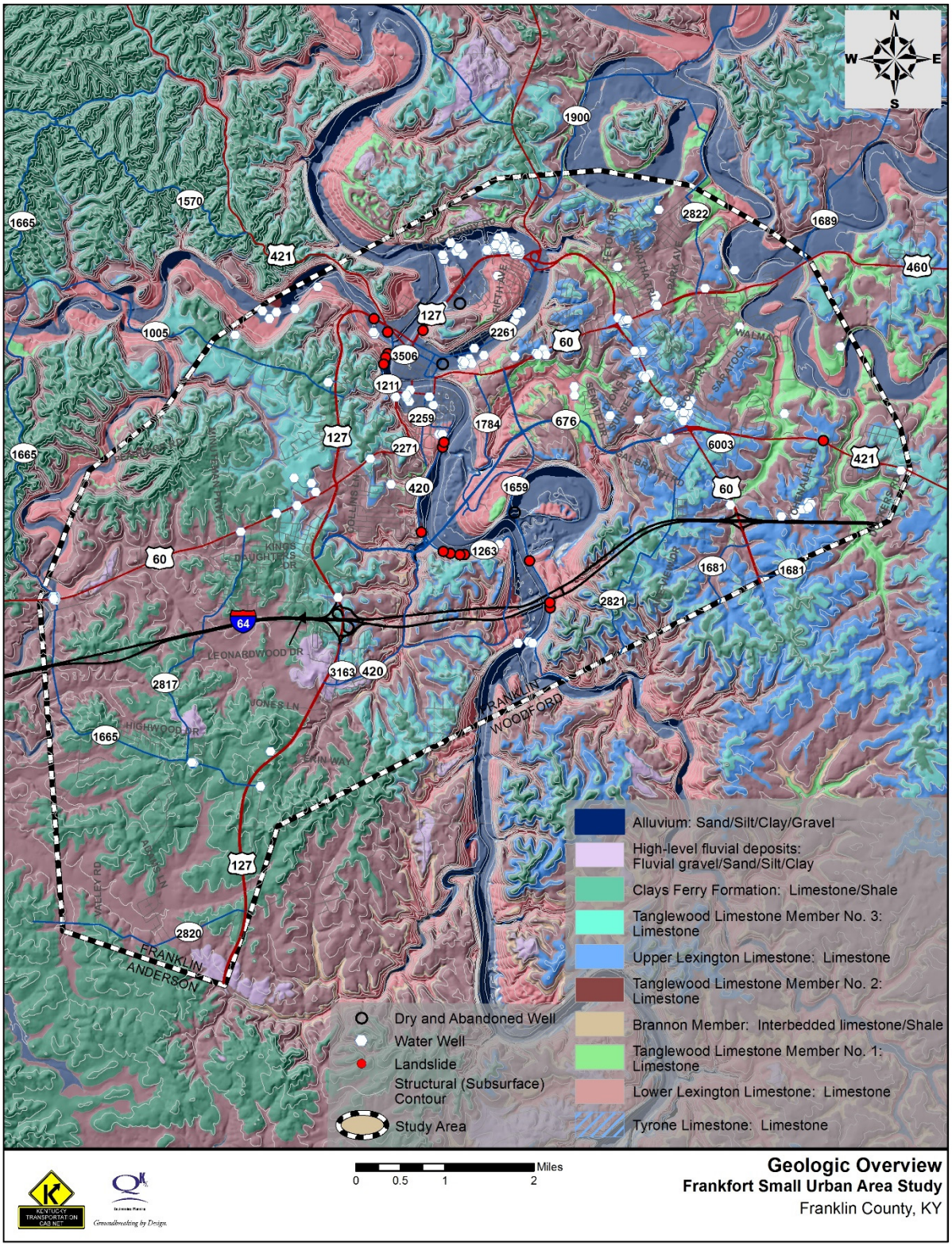
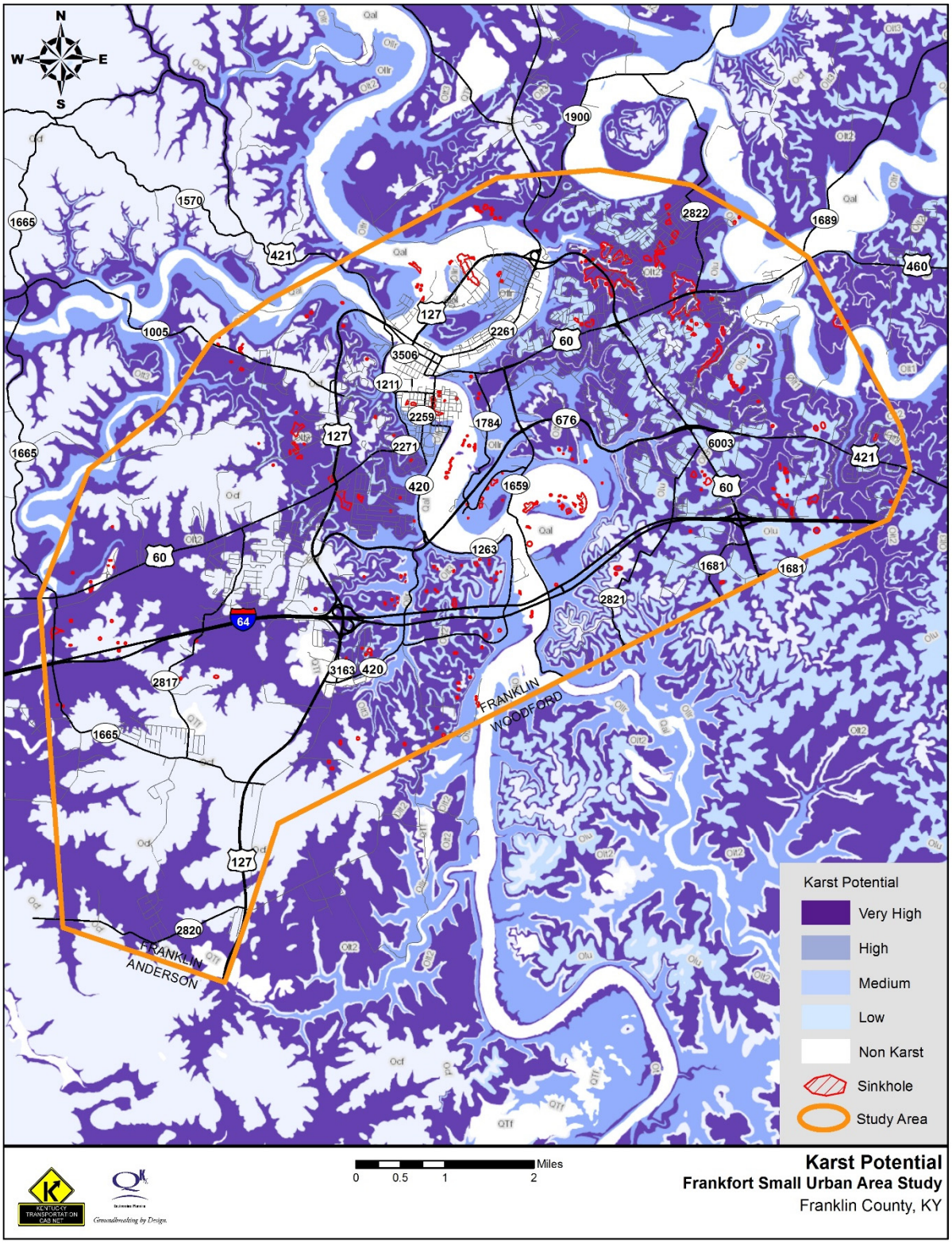


Figure 2 Overview


N
W
E
S
Karst Potential
Very High
High
Medium
Low
Non Karst
Sinkhole
Study Area
FRANKLIN
WOODFORD
FRANKLIN
ANDERSON
64
60
127
421
420
1665
1570
1005
1900
2822
1689
460
2261
3506
1211
2259
1784
676
6003
2271
1659
1263
1681
2821
3163
2817
2820
Miles
0
0.5
1
2
Karst Potential
Frankfort Small Urban Area Study
Franklin County, KY

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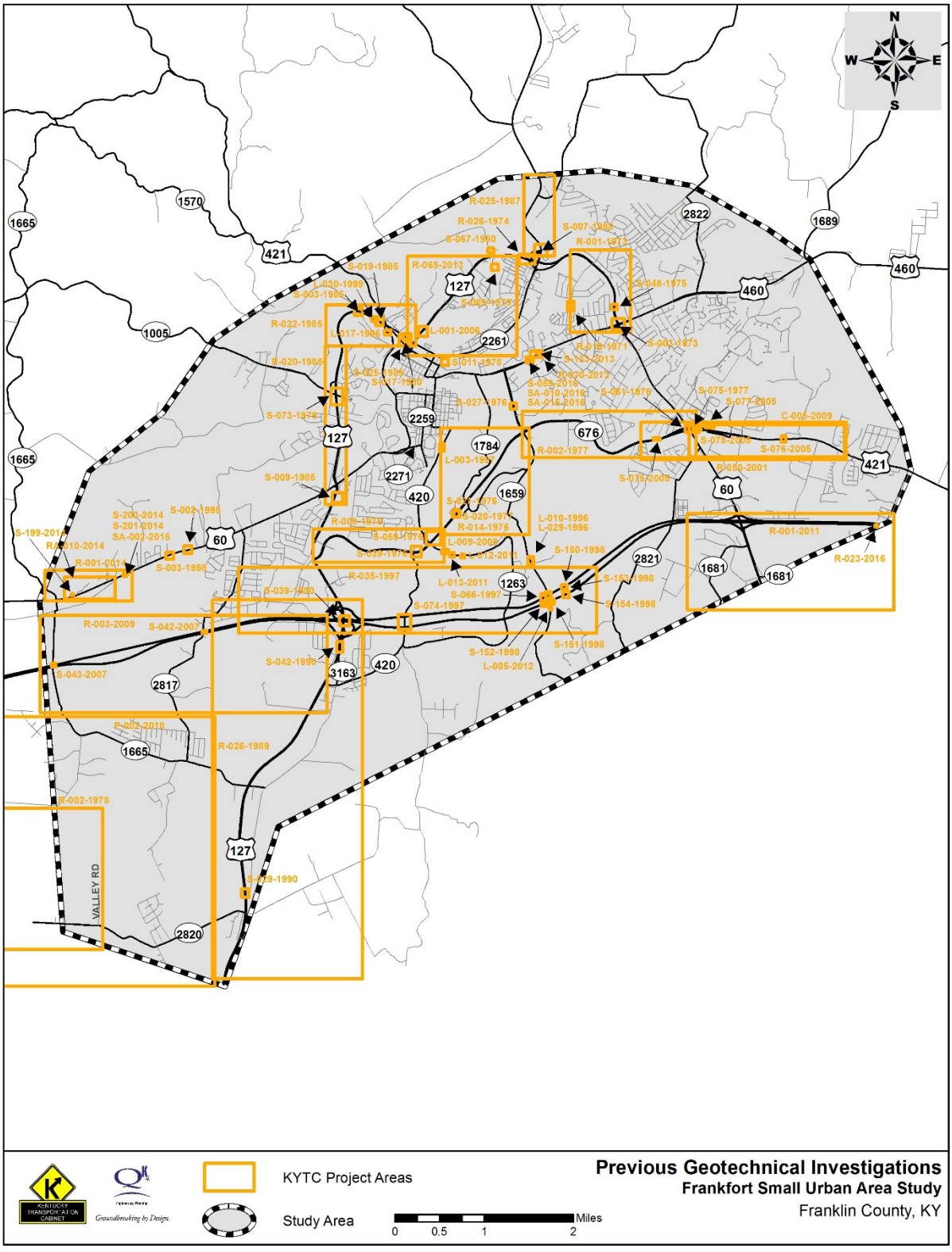

Figure 4 Existing Geotechnical Studies from KYTC

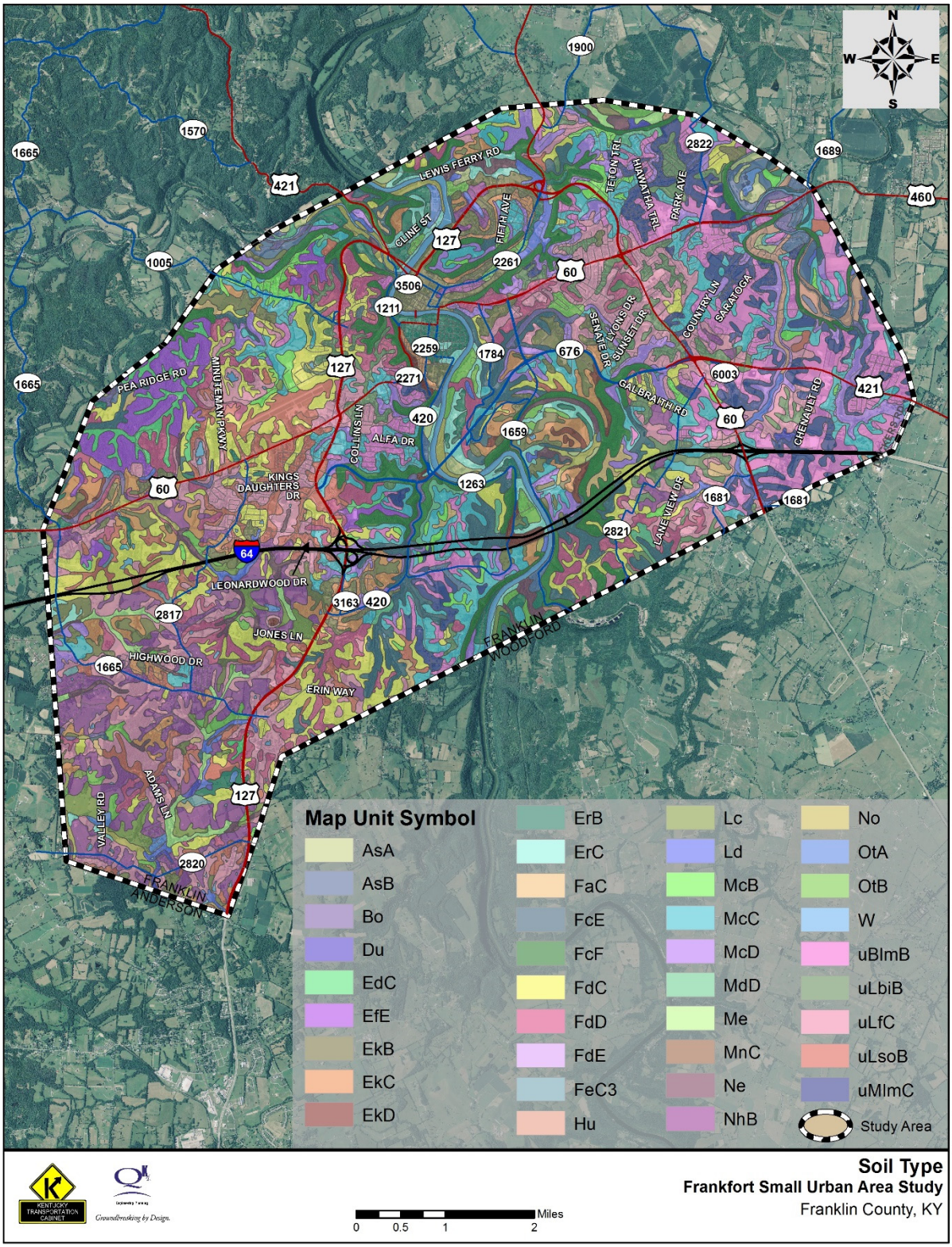

Figure 5 Soil Types

Table 1 Web Soil Survey

Map Unit Symbol	Map Unit Name	Acres in AOI
	Silt Loam Type	
uLfC	Lowell-Faywood silt loams, 6 to 12 percent slopes	3,333.60
FdC	Faywood silt loam, 6 to 12 percent slopes	2,597.60
McC	McAfee silt loam, 6 to 12 percent slopes	2,544.20
uBlmB	Bluegrass-Maury silt loams, 2 to 6 percent slopes	2,220.70
NhB	Nicholson silt loam, 2 to 6 percent slopes	1,987.20
FdD	Faywood silt loam, 12 to 30 percent slopes	1,773.20
EkB	Elk silt loam, 2 to 6 percent slopes	1,513.50
uLsoB	Lowell-Sandview silt loams, 2 to 6 percent slopes	1,402.30
McD	McAfee silt loam, 12 to 20 percent slopes	1,394.50
uMlmC	Maury-Bluegrass silt loams, 6 to 12 percent slopes	1,273.50
uLbiB	Lowell-Bluegrass silt loams, 2 to 6 percent slopes	1,063.70
EkC	Elk silt loam, 6 to 12 percent slopes	1,037.10
ErB	Elk silt loam, 2 to 6 percent slopes, rarely flooded	662.1
ErC	Elk silt loam, 6 to 12 percent slopes, rarely flooded	478.5
McB	McAfee silt loam, 2 to 6 percent slopes	477.2
OtB	Otwood silt loam, 2 to 6 percent slopes, rarely flooded	449
Ne	Newark silt loam, 0 to 2 percent slopes, occasionally flooded	381.7
AsB	Ashton silt loam, rarely flooded, 2 to 6 percent slopes	363.2
Ld	Lindside silt loam, 0 to 2 percent slopes, occasionally flooded	355.4
No	Nolin silt loam, 0 to 2 percent slopes, occasionally flooded	322.5
Lc	Lawrence silt loam, 0 to 2 percent slopes, rarely flooded	306.4
Bo	Boonesboro silt loam, occasionally flooded	220.1
Me	Melvin silt loam, 0 to 2 percent slopes, occasionally flooded	214.8
Hu	Huntington silt loam, 0 to 4 percent slopes, occasionally flooded	213.9
EkD	Elk silt loam, 12 to 20 percent slopes	191
AsA	Ashton silt loam, rarely flooded, 0 to 2 percent slopes	178.1
OtA	Otwood silt loam, 0 to 2 percent slopes, rarely flooded	94.9
uBlmB	Bluegrass-Maury silt loams, 2 to 6 percent slopes	2.9
Hu	Huntington silt loam, 0 to 4 percent slopes, occasionally flooded	0.6
MnC	McAfee silt loam, 6 to 12 percent slopes	0.6
FdE	Faywood silt loam, 12 to 30 percent slopes	0.1
	Rock Outcrop Complex Type	
FcF	Fairmount-Rock outcrop complex, 30 to 60 percent slopes	1,848.90
FcE	Fairmount-Rock outcrop complex, 12 to 30 percent slopes	1,174.40
MdD	McAfee-Rock outcrop complex, 6 to 20 percent slopes	150.8
	Silt Clay & Silty Clay Loam Type	
EfE	Eden flaggy silty clay, 15 to 35 percent slopes	656.1

Map Unit Symbol	Map Unit Name	Acres in AOI
EdC	Eden silty clay loam, 6 to 15 percent slopes	253.1
FaC	Fairmount flaggy silty clay, 6 to 12 percent slopes	173.5
Du	Dunning silty clay loam, 0 to 2 percent slopes, occasionally flooded	58.3
FeC3	Faywood silty clay, 6 to 12 percent slopes, severely eroded	44
	Other	
W	Water	459.4
Total Area		**31,872.80**