Kentucky Transportation Cabinet

Kenton County - Turkeyfoot Road (KY 1303) Planning Study – Final Report




Prepared for: Kentucky Transportation Cabinet
District 6 - Covington
Central Office Planning

Prepared by:

Palmer ENGINEERING

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EXECUTIVE SUMMARY

The Kentucky Transportation Cabinet (KYTC) initiated the Turkeyfoot Road (KY 1303) Planning Study to examine opportunities to improve safety and reduce congestion along Turkeyfoot Road (KY 1303) from Barnwood Drive (mile point [MP] 5.085) to the middle of the I-275 bridge (MP 5.685) in Crestview Hills in Kenton County, Kentucky. The KYTC established a Project Team and contracted with Palmer Engineering to assist in this effort to assess safety and congestion needs and to evaluate possible improvement concepts. Potential improvement concepts included spot improvements and consolidation of the adjacent Thomas More Parkway (MP 5.396) and Town Center Boulevard (MP 5.493) intersections, with consideration for pedestrians, bicycles, and transit.

Purpose and Need

The purpose of this study was to assess options to improve safety and reduce congestion along Turkeyfoot Road (KY 1303) from Barnwood Drive to the middle of the I-275 bridge (MP 5.685) with particular focus on the intersections with Thomas More Parkway and Town Center Boulevard. The primary goals of the study were to develop improvement strategies to reduce the potential for crashes and to reduce travel delays.

Turkeyfoot Road (KY 1303) is an urban minor arterial that stretches 6.3 miles between Mt. Zion Road (KY 536) to the south and Dixie Highway (US 25/42/127) to the north. The segment under study is 0.6 miles in length, from Barnwood Drive (MP 5.085) to the middle of the I-275 bridge (MP 5.685). It carries between 26,011 (MP 5.085 to MP 5.396) and 43,112 (MP 5.396 to MP 5.685) vehicles per day, with 2.5% trucks. A total of 290 crashes was reported within the project corridor between January 2014 and December 2016. The total includes crashes on Turkeyfoot Road (KY 1303) (221) and approaches at intersections (69). Of the mainline roadway crashes, approximately two-thirds were classified as rear-end. Long lines of traffic (queues), limited turn-lane capacity, and travel delays are frequently encountered by users.

Project Development

Local Officials and Stakeholder outreach helped guide the process, particularly in identifying potential issues and developing alternatives. KYTC District 6 and Central Office Planning co-hosted two Local Officials / Stakeholders Meetings. Project Team members also held separate information gathering meetings with the representatives of the St. Elizabeth Hospital and Thomas More College. The primary purpose of the first Local Officials / Stakeholders Meeting, held December 13, 2017, at the Crestview Hills City Building, was to present existing conditions within the project corridor and seek input in regard to the accuracy and validity of the existing conditions as described. The primary purpose of the second Local Officials / Stakeholders

Meeting, held on July 11, 2018 at the Crestview Hills City Building, was to present the results of the crash and traffic analyses and to solicit input on the conceptual alternatives.

Improvement Strategies

Three Project Team Meetings were held at the KYTC District 6 Office in Covington, Kentucky, during the development of this study. The crash locations presented in **Figure ES-1** were a primary focus in the development of alternatives. The Project Team discussed typical sections, which evolved to those shown in **Figures ES-2** and **ES-3**, as possible templates for the improvement of Turkeyfoot Road (KY 1303) and the consolidation of the Thomas More Parkway and Town Center Boulevard intersections. Those typical sections were incorporated into the following alternatives:

Alternative A: Spot Improvements / Lower Cost Options (see **Figure ES-4**)

1. Add a right-turn lane from northbound Turkeyfoot Road (KY 1303) to exit ramp – I-275 eastbound;
2. Eliminate the right-in entrance to TGI Fridays from southbound Turkeyfoot Road (KY 1303);
3. Add right-turn lane on Turkeyfoot Road (KY 1303) from I-275 eastbound ramp to existing Town Center Boulevard;
4. Eliminate access from Fraternity Court to Turkeyfoot Road (KY 1303);
5. Restrict left turns from Villa Madonna Drive to southbound Turkeyfoot Road (KY 1303);
6. Add a right-turn lane on northbound Turkeyfoot Road (KY 1303) approach at Thomas More Parkway intersection.

Alternative A is estimated to cost $3,250,000 with minor right-of-way impacts to approximately 2 residences and 5 commercial businesses, and no utility impacts. The cost of the spot improvements with Alternative A may increase if the KYTC chooses to implement the improvements as separate maintenance and/or highway plan projects.

Alternative B: Consolidate Town Center Boulevard and Thomas More Parkway Intersections (see **Figure ES-5**)

1. Include all Spot Improvements from Alternative A;
2. Consolidate the Town Center Boulevard and Thomas More Parkway Intersections to a single intersection by realigning both roads;
3. Add lane to southbound Turkeyfoot Road (KY 1303) from the I-275 eastbound ramp to just beyond relocated Town Center Boulevard;
4. Convert access to existing Town Center Boulevard to right-in / right-out only;

5. Convert frontage road from Turkeyfoot Road (KY 1303) to Thomas More Parkway to a right-in / right-out at Turkeyfoot Road (KY 1303);
6. Extend frontage road / backage road to reconnect with Thomas More Parkway.

Alternative B, which consolidates the Town Center Boulevard and Thomas More Parkway intersections and includes the Spot Improvements / Lower Cost Solutions, is estimated to cost $17,534,550. The construction of Alternative B would potentially impact up to 9 residential and 18 commercial properties and require the relocation of utilities, including a 24" gas line, sanitary sewer line, and overhead poles paralleling Town Center Boulevard between the College Park neighborhood and commercial development towards the Crestview Hills Town Center.

Traffic Operational Analysis

A traffic microsimulation model was developed to more accurately quantify and analyze traffic operations. A summary of the microsimulation results for Turkeyfoot Road (KY 1303) is presented in **Table ES-1** (page **ES-12**). The microsimulation indicated that each proposed alternative would reduce travel times and queue lengths compared to the existing condition. Travel times and queue lengths for segments of Turkeyfoot Road (KY 1303) between the critical nodes fluctuated between Alternatives A and B, primarily due to the changes in signal timing in the microsimulations and resulting congestion that occurs in critical movements within each alternative. The level of service (LOS) for the intersections in the study corridor improves significantly as the amount of delay for each vehicle is reduced along the corridor. While the LOS letter designation does not indicate a significant change due to the levels of service being significantly below the LOS E threshold, the delays are reduced by 50% for both alternatives. The spot improvements with Alternative A address the immediate needs for improving travel, but the improvements fail as the traffic increases in the future. Alternative B best addresses the congestion in the long term by reducing the overall total travel time for all vehicles in the model by over 2,000 minutes during the peak hour in comparison to Alternative A (see **Table ES-1**). Further improvements to level of service may also occur with the optimization of signal timing.

The queue lengths provided in **Table ES-1** were determined using the averages of ten separate runs in the traffic microsimulation program, VISSIM. Unlike HCS, VISSIM considers the entire roadway network when determining queue lengths as opposed to only considering a single intersection with volumes. Many of the queue lengths are better in Alternative A because the roadway network is causing vehicles to queue at intersections upstream of the movement; therefore, fewer vehicles are able to arrive at the intersection being summarized in that particular time window. With fewer vehicles arriving at the intersection, then fewer cars are able to queue because they are still being queued at an intersection upstream. Specific to this condition, Alternative A has less queue at some centralized intersections in the network

because Alternative B is more efficient up to that point and has allowed its vehicles to make it to the central intersections more quickly, where they are then forced to queue.

The improvements proposed in Alternative A result in a significant reduction in queue length on the ramps and Turkeyfoot Road (KY 1303), along with a reduction in travel time for the various routes in the study corridor. Travel times are reduced as a result of the improvements to the I-275 eastbound off-ramp and by providing an additional through lane for vehicles to travel southbound on Turkeyfoot Road (KY 1303). Alternative A reduces the conflict points along Turkeyfoot Road (KY 1303) by eliminating the left-exiting turns from Villa Madonna Drive and the Fraternity Court approach at Thomas More Parkway. Alternative A is estimated to reduce the annual number of crashes by 8% and reduce the travel time for all of the vehicles in the system by 14.8% (4,329 minutes) in the AM and 29% (15,328 minutes) in the PM relative to the No-Build Alternative in 2040. The combination of these improvements reduces congestion, provides capacity for the traffic demand, and results in the 2040 travel times being similar to existing conditions.

Alternative B improvements expand on the Alternative A lower-cost options by eliminating the signalized intersection at Town Center Boulevard, which keeps traffic continuously flowing, to provide for additional gaps in traffic for the I-275 eastbound right turns. The consolidation of the intersections reduces weaving on northbound Turkeyfoot Road (KY 1303) between Thomas More Parkway and Town Center Boulevard and increases left-turn storage capacity on northbound and southbound Turkeyfoot Road (KY 1303). This alternative improves the southbound Turkeyfoot Road (KY 1303) queue at Thomas More Parkway by providing an additional through lane and adequate storage for the left-turn lanes to Thomas More Parkway. The southbound right-turn lane that is proposed for Alternative A ends at the College Park intersection and is tapered out past the Town Center Boulevard intersection in Alternative B. The termination of the turn lane as shown in Alternative B is preferred to avoid right-of-way impacts associated with the proposed urban typical section.

The alternative also significantly improves the southbound through movement at the I-275 ramp, which is attributed to the elimination of a signal that impacts the flow of traffic due to the queue from downstream signals. Alternative B also reduces the conflict points along Turkeyfoot Road (KY 1303) by eliminating the left-exiting turns from Villa Madonna Drive, eliminating the Fraternity Court approach, and realigning Thomas More Parkway and Town Center Boulevard to provide a single intersection. A two-way-left-turn lane from Thomas More Parkway will be required to provide access to Villa Madonna Drive and the frontage/backage road, with a right-turn-lane-only entrance to replace the existing full access to the second building fronting Thomas More Parkway.

Alternative B is estimated to reduce the annual number of crashes by 19% and reduce the travel time for all of the vehicles in the system by 23.6% (6,976 minutes) in the AM and 32.5% (17,110 minutes) in the PM relative to the No-Build Alternative in 2040. It is estimated that the traveling public would also experience a significant and immediate reduction in travel time of 19% in the PM with Alternative B relative to the existing 2017 traffic due to the consolidation of the Town Center Boulevard and Thomas More Parkway intersections. The combination of these improvements reduces congestion, provides capacity for the traffic demand, and results in a significant reduction in the peak periods for the 2040 travel times. While the travel times fluctuate in the segments due to the signal timing in the microsimulations and resulting congestion, Alternative B best addresses the congestion in the long term by reducing the overall total travel time for all vehicles in the model.

The movements throughout Alternatives A and B that operate at LOS F can be improved to become LOS E or better by improving signal optimization and the addition of more lanes, through and turning, along the major and minor roadways. The addition of lanes would result in significant right-of-way and utility impacts along the study corridor and could require widening the existing bridge over I-275. These improvements were deemed to be beyond the scope of this study.

A comparison matrix of the improvement strategies, which includes the factors of costs, percent crash reduction per year, and travel time reduction, is presented in **Table ES-2** (page **ES-13**).

Conclusions

The conclusions for the Turkeyfoot Road (KY 1303) Planning Study are predicated on the project purpose and need, Project Team input, Local Officials/ Stakeholders feedback, and technical analysis. The Project Team preferred Alternative B as the alternative to improve the safety and mobility along Turkeyfoot Road (KY 1303) as a long-term solution with the following improvements:

1. Implement all Spot Improvements from Alternative A
    a. Add a right-turn lane to exit ramp – I-275 eastbound
    b. Eliminate the right-in entrance to TGI Fridays
    c. Add a right-turn lane on Turkeyfoot Road (KY 1303) from I-275 eastbound ramp to existing Town Center Boulevard
    d. Eliminate the access from Fraternity Court to Turkeyfoot Road (KY 1303)
    e. Restrict left turns from Villa Madonna to Turkeyfoot Road (KY 1303) southbound

   f. Add a right-turn lane on Turkeyfoot Road (KY 1303) northbound to Thomas More Parkway
2. Consolidate the Town Center Boulevard and Thomas More Parkway intersections to a single intersection by realigning both roads
3. Add a lane to Turkeyfoot Road (KY 1303) southbound from the I-275 eastbound ramp to just beyond relocated Town Center Boulevard
4. Convert access to the existing Town Center Boulevard to right-in / right-out
5. Convert frontage road from Turkeyfoot Road (KY 1303) to Thomas More Parkway to right-in / right-out at Turkeyfoot Road (KY 1303)
6. Extend the frontage road / backage road to reconnect with Thomas More Parkway

In discussions with KYTC project management, it was later decided that Alternative B include a shared-use path along the east side of Turkeyfoot Road (KY 1303) through the study corridor and on the south side of Thomas More Parkway.Although the Intersection at Dudley Road was outside the limits of the study, the microsimulation model revealed that the intersection of Turkeyfoot Road (KY 1303) and Dudley Road experiences significant queues along the major road (Turkeyfoot Road (KY 1303) in both the northbound and southbound through movements in 2040. Queues along the minor road (Dudley Road) occur in both the eastbound and westbound through movements as well as the westbound left-turn movement. These queues are a result of the increase in demand or traffic volumes along both roadways for the future build scenario.

An Interchange Modification Report (IMR) for the system-to-system interchange at I-75 and I-275 is currently being developed, which could result in modifications to the I-275/KY 1303 interchange. Additional lanes on the ramps and KY 1303 bridge over I-275 would provide capacity that was not evaluated in this study and which could greatly improve the congestion in the area. Alternative B does not propose changes to the KY 1303 bridge and generally uses the ramps in their current locations; therefore, any improvements evolving from the IMR should be compatible with Alternative B.

During the course of this study's undertaking, the Kentucky General Assembly enacted Project Item Number 6-450. The project is for Turkeyfoot Road (KY 1303) with termini beginning at Dudley Road and going northward to US 25, encompassing the entirety of the subject study area. Independent of Item Number 6-450, the Conclusions herein would recommend Alternative A as an immediate improvement and with Alternative B as the ultimate improvement. With Item Number 6-450 established and funds provided, said project will proceed and include the improvements identified as Alternative B.

TURKEYFOOT RD (KY 1303)
CRASH MAP

KENTUCKY TRANSPORTATION CABINET

Palmer ENGINEERING

SCALE: 1"=200'

0' 100' 200' 400'

BARNWOOD DR INTERSECTION

MANNER OF COLLISION

REAR END	SIDESWIPE-SAME DIRECTION	ANGLE	OPPOSING LEFT TURN	TOTALS
12	1	3	2	18

FROM BARNWOOD DR TO THOMAS MORE PARKWAY

MANNER OF COLLISION

REAR END	ANGLE	OPPOSING LEFT TURN	SINGLE VEHICLE	HEAD ON	TOTALS
8	6	7	3	1	25

THOMAS MORE PARKWAY INTERSECTION

MANNER OF COLLISION

REAR END	SIDESWIPE-SAME DIRECTION	ANGLE	OPPOSING LEFT TURN	HEAD ON	TOTALS
41	19	5	2	1	68

TOWN CENTER BOULEVARD INTERSECTION

MANNER OF COLLISION

REAR END	SIDESWIPE-SAME DIRECTION	ANGLE	OPPOSING LEFT TURN	BACKING	TOTALS
38	20	12	6	2	78

I-275 RAMPS INTERSECTION

MANNER OF COLLISION

REAR END	SIDESWIPE-SAME DIRECTION	ANGLE	OPPOSING LEFT TURN	SINGLE VEHICLE	BACKING	REAR TO REAR	TOTALS
85	5	4	1	3	2	1	101

CRASHES: JAN 1, 2014 - DEC 31, 2016

LEGEND

MANNER OF COLLISION	TOTALS
REAR END	184
SIDESWIPE-SAME DIRECTION	45
ANGLE	30
OPPOSING LEFT TURN	18
SINGLE VEHICLE	6
BACKING	4
HEAD ON	2
REAR TO REAR	1

BARNWOOD DR

COLLEGE PARK DR

FATALITY

COLLEGE PARK DR

VILLA MADONNA DR

FRATERNITY CT

TOWN CENTER BLVD

THOMAS MORE PARKWAY

BUSINESS PARK ENTRANCE

I-275 EB EXIT RAMP

I-275 EB ENTRANCE RAMP

INTERSTATE 275

BEGIN MP	END MP	LENGTH (MILES)	ADT	CRITICAL CRASH RATE FACTOR
5.085	5.226	0.141	30,300	0.50

BARNWOOD DR - COLLEGE PARK DR

BEGIN MP	END MP	LENGTH (MILES)	ADT	CRITICAL CRASH RATE FACTOR
5.226	5.285	0.059	30,300	0.25

COLLEGE PARK DR - VILLA MADONNA DR

BEGIN MP	END MP	LENGTH (MILES)	ADT	CRITICAL CRASH RATE FACTOR
5.285	5.396	0.111	30,900	1.08

VILLA MADONNA DR - THOMAS MORE PKWY/ FRATERNITY CT

BEGIN MP	END MP	LENGTH (MILES)	ADT	CRITICAL CRASH RATE FACTOR
5.396	5.493	0.097	44,700	1.55

THOMAS MORE PKWY/ FRATERNITY CT - TOWN CENTER BLVD

BEGIN MP	END MP	LENGTH (MILES)	ADT	CRITICAL CRASH RATE FACTOR
5.493	5.637	0.144	44,500	1.69

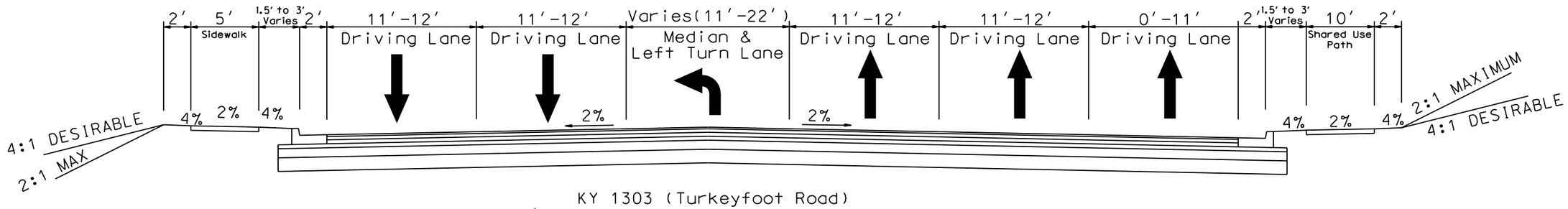
TOWN CENTER BLVD - I-275 RAMPS

BEGIN MP	END MP	LENGTH (MILES)	ADT	CRITICAL CRASH RATE FACTOR
5.637	5.685	0.048	26,800	1.09

I-275 RAMPS - I-275 OVERPASS

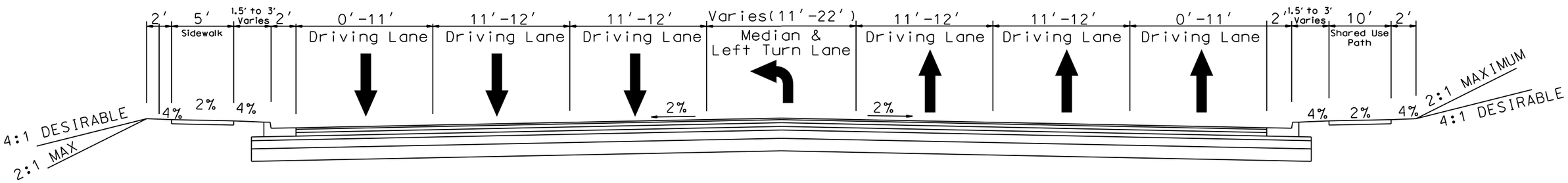
Figure ES-1: Crash Map

TYPICAL SECTIONS



KY 1303 (Turkeyfoot Road)
5-11′ Lanes From College Park Dr. to I-275
4-12′ Lanes from Barnwood Dr. to College Park Dr.

EXISTING / ALTERNATIVE A



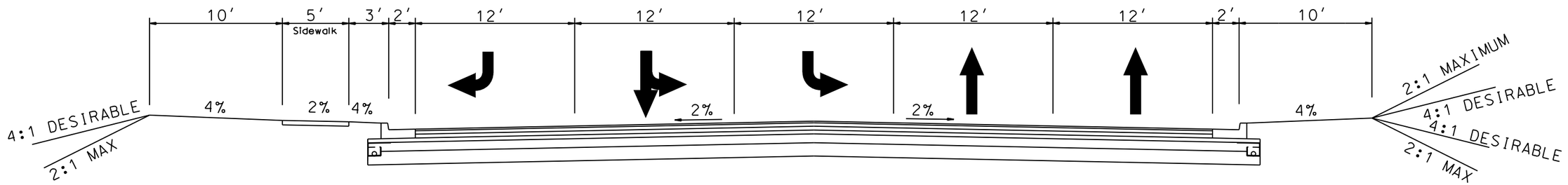
KY 1303 (Turkeyfoot Road)
6-11′ Lanes from Town Center Boulevard to I-275 EB Exit Ramp
5-11′ Lanes From College Park Dr. to Town Center Boulevard
4-12′ Lanes from Barnwood Dr. to College Park Dr.

PROPOSED ALTERNATIVE B

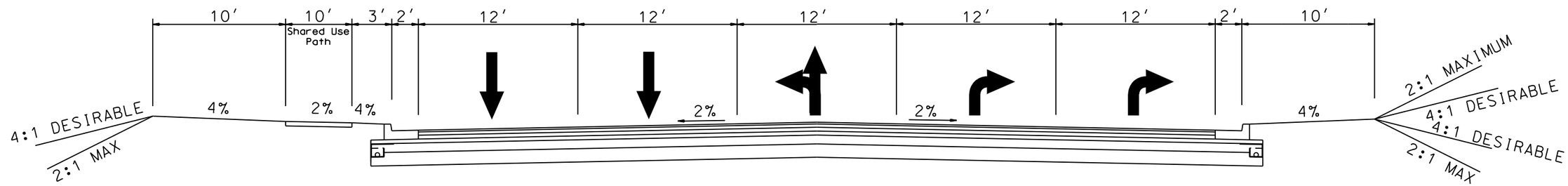
NOT TO SCALE

Figure ES-2: Existing and Proposed Typical Sections for Turkeyfoot Road

TYPICAL SECTIONS



RELOCATED TOWN CENTER BOULEVARD
NORMAL SECTION



RELOCATED THOMAS MORE PARKWAY
NORMAL SECTION

NOT TO SCALE

Figure ES-3: Typical Sections for Town Center Boulevard & Thomas More Parkway

Figure ES-4: Turkeyfoot Road (KY 1303) Alternative A

Figure ES-5: Turkeyfoot Road (KY 1303) Alternative B

Table ES-1: Traffic Measures of Effectiveness

Travel Times			Existing		No Build		Alternative A				Alternative B			
			2017 AM	2017 PM	2040 AM	2040 PM	2017 AM	2017 PM	2040 AM	2040 PM	2017 AM	2017 PM	2040 AM	2040 PM
Map Nodes	From	To	Time (min:sec)	Time (min:sec)	Time (min:sec)	Time (min:sec)	Time (min:sec)	Time (min:sec)	Time (min:sec)	Time (min:sec)	Time (min:sec)	Time (min:sec)	Time (min:sec)	Time (min:sec)
1 to 5	I-275 EB	Thomas More Pkwy	4:43	3:31	9:36	8:48	3:23	2:33	2:58	2:25	2:39	2:57	5:01	4:40
1 to 6	I-275 EB	Dudley Road	4:25	5:01	9:15	11:00	2:35	3:26	2:51	4:26	2:30	3:20	3:32	4:54
3 to 5	I-275 WB	Thomas More Pkwy	6:00	4:43	8:40	7:42	4:13	3:36	4:07	5:49	3:35	2:43	5:14	5:46
3 to 6	I-275 WB	Dudley Road	5:16	6:01	8:07	9:51	4:00	4:42	4:16	7:46	2:10	2:23	5:46	6:04
6 to 2	Dudley Road	I-275 EB	2:25	4:04	6:27	13:02	2:20	5:29	4:18	4:52	3:02	2:55	2:52	3:46
6 to 4	Dudley Road	I-275 WB	3:06	5:05	6:40	15:47	2:22	7:27	5:22	6:23	4:05	4:10	2:58	4:07
TOTAL TRAVEL TIME ALL VEHICLES (MIN)			**15,100**	**23,183**	**29,527**	**52,695**	**14,248**	**22,529**	**25,135**	**37,367**	**13,850**	**18,769**	**22,551**	**35,585**

Maximum Queue Lengths	Existing		No Build		Alternative A				Alternative B			
Location	2017 AM (ft)	2017 PM (ft)	2040 AM	2040 PM	2017 AM (ft)	2017 PM (ft)	2040 AM (ft)	2040 PM (ft)	2017 AM (ft)	2017 PM (ft)	2040 AM (ft)	2040 PM (ft)
NB Turkeyfoot at Thomas More Pkwy (Thru Movement)	908	2293	1644	3921	708	2809	3755	3191	954	724	916	1063
SB Turkeyfoot at Thomas More Pkwy (Left Turn)	675	301	551	613	618	263	631	414	373	412	1045	1144
NB Turkeyfoot at Town Center Blvd (Thru Movement)	557	783	442	812	597	1037	614	1647				
SB Turkeyfoot at Town Center Blvd (Thru Movement)	809	1206	811	2091	716	493	812	531				
SB Turkeyfoot at I-275 EB Ramps (Thru Movement)	873	981	1977	2324	519	1026	1475	1310	557	647	1272	685
EB I-275 Off-Ramp (Right Turn)	1078	1322	1820	1701	380	718	552	455	211	223	726	970

Level of Service/Delay	NO Build				Alternative A				Alternative B			
	2040 AM		2040 PM		2040 AM		2040 PM		2040 AM		2040 PM	
Signalized Intersection	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
Barnwood Drive	C	33	C	20	C	33	C	20	C	33	C	20
Thomas More Parkway	F	330	F	250	E	75	D	54	F	97	F	125
Town Center Blvd	E	74	F	182	D	52	F	120	NA	NA	NA	NA
I-275 EB Ramps	F	256	F	314	F	129	F	172	F	129	F	172
I-275 WB Ramps	D	41	F	82	D	41	F	82	D	41	F	82

Table ES-2: Comparison Matrix

	Existing	Alternative A	Alternative B
	Current Conditions As - Is	Spot Improvements Lower Cost Solutions	Relocate Town Center and Thomas More Pkwy
Corridor Length (ft.)	3,390	3,390	3,390
Design Speed (mph)	45	45	45
Minimum SSD 360 FT Criteria	350 FT	350 FT	350 FT
Number of Signalized Intersections	5	5	4
Earthwork Fill (cu yd.)	0	7,199	48,437
Right of Way			
Number of Parcels	0	2 Res + 5 Com	9 Res + 18 Com
Residential Relocations	0	0	Potential
Right-of-Way Acquisition (Acre)	0	0.2	11.00
Utility Impacts	NONE	LOW	HIGH
Costs			
Construction (with 30% Contingency)	$0	$2,648,000	$9,897,000
Design (15% Construction)	$0	$397,000	$1,484,550
Right of Way	$0	$205,000	$5,450,000
Utilities	$0	$0	$703,000
Total	**$0**	**$3,250,000***	**$17,534,550**
Percent Crash Reduction Per Year		8%	19%
Travel Time Reduction			
Relative to Existing 2017 AM		852 min (5.6%)	1,250 min (8.3%)
Relative to Existing 2017 PM		654 min (2.8%)	4,414 min (19%)
Relative to No-Build 2040 AM		4,392 min (14.8%)	6,976 min (23.6%)
Relative to No-Build 2040 PM		15,328 min (29%)	17,110 min (32.5%)

*The cost of the spot improvements with Alternative A may increase if the KYTC chooses to implement the improvements as separate maintenance and/or highway plan projects.

INTRODUCTION

1.1 PROJECT CORRIDOR

The Kentucky Transportation Cabinet (KYTC) initiated the Turkeyfoot Road (KY 1303) Planning Study to assess options to improve safety and reduce congestion along Turkeyfoot Road (KY 1303) from Barnwood Drive to the middle of the I-275 bridge (mile point [MP] 5.685). The KYTC established a Project Team and contracted with Palmer Engineering to assist in this effort by conducting a planning study to evaluate possible improvement concepts for Turkeyfoot Road (KY 1303) throughout the project corridor, including spot improvements and consolidating the Thomas More Parkway and Town Center Boulevard intersections. Multimodal traffic in Edgewood and Crestview Hills will also be considered in the study. The project corridor shown in **Figure 1** extends along Turkeyfoot Road (KY 1303) from Barnwood Drive to the middle of the I-275 bridge (MP 5.085 to MP 5.685). The project corridor is located in Kenton County, in Northern Kentucky.

1.2 PURPOSE AND NEED

The purpose of this study was to assess options to improve safety and reduce congestion along Turkeyfoot Road (KY 1303) from Barnwood Drive to the middle of the I-275 bridge (MP 5.685) with particular focus on the intersections with Thomas More Parkway and Town Center Boulevard. The primary goals of this planning study were to develop improvement strategies to reduce the potential for crashes and to reduce travel delays.

Turkeyfoot Road (KY 1303) is an urban minor arterial that stretches 6.3 miles between Mt. Zion Road (KY 536) to the south and Dixie Highway (US 25/42/127) to the north. The segment under study is 0.6 miles in length, from Barnwood Drive to the middle of the I-275 bridge (mile point (MP) 5.085 to MP 5.685). It carries between 26,011 (MP 5.085 to MP 5.396) and 43,112 (MP 5.396 to MP 5.685) vehicles per day, with 2.5% trucks. A total of 290 crashes was reported within the project corridor between January 2014 and December 2016. The total includes crashes on Turkeyfoot Road (KY 1303) (221) and approaches at intersections (69). Of the mainline roadway crashes, approximately two-thirds were classified as rear-end. Long lines of traffic (queues), limited turn-lane capacity, and travel delays are frequently encountered by users.

Figure 1: Project Corridor

The main trip generators in the project corridor are St. Elizabeth Hospital, a medical office park, Thomas More College, and the Crestview Hills Town Center. In addition, the area has seen a large amount of residential growth south of the interstate. The issues along the corridor are:

- Turkeyfoot Road (KY 1303) leads to the City of Independence, which generates significant traffic along the corridor
- Traffic queues on the I-275 eastbound off-ramp to mainline I-275
- Difficulty getting in and out of Town Center Boulevard and Thomas More Parkway during peak hours
- Considerable weaving along Turkeyfoot Road (KY 1303) between Thomas More Parkway and I-275
- Insufficient storage for left turns along Turkeyfoot Road (KY 1303)
- Queue along Turkeyfoot Road (KY 1303) for Thomas More Parkway intersection extends beyond Barnwood Drive
- PM peak hour vehicles at Villa Madonna Drive cannot pass through the Thomas More Parkway traffic signal in one cycle
- Right-most lane along northbound Turkeyfoot Road (KY 1303) is overloaded with cars accessing I-275 eastbound

1.3 PROJECT HISTORY

In 2005, the Ohio-Kentucky-Indiana Regional Council of Governments (OKI) completed the Turkeyfoot Road (KY 1303) Corridor Traffic Operations Analysis (http://www.oki.org/studies-plans/turkey-foot-road-corridor/) at the request of the KYTC. The project limits of that study began at Dixie Highway (US 25/42/127) and terminated at Dudley Road. The OKI study included the project limits of the current planning corridor study. The purpose of the OKI study was to examine, in general terms, the physical and operational characteristics of this roadway corridor. Due to the projects constructed after that report and changes in traffic, the OKI study is no longer current; but was used as a resource for this study.

Funds from the Congestion Mitigation and Air Quality (CMAQ) Improvement Program were used to improve the Turkeyfoot Road (KY 1303) and I-275 interchange in the mid-2000s, which included adding a northbound right-turn lane along Turkeyfoot Road (KY 1303) onto the I-275 eastbound ramp and a second westbound left-turn lane.

The 2014 Kenton County Transportation Plan (http://www.oki.org/studies-plans/kenton-county-transportation-plan/) identified multiple projects within the project corridor. This Turkeyfoot Road (KY 1303) study was originally a component of a larger project but was extracted as a separate study for funding purposes.

A project along Thomas More Parkway was completed in 2017 using funding from the Surface Transportation Program for Northern Kentucky (SNK) to extend the two lanes along Thomas More Parkway eastbound past Centerview Boulevard.

Over the course of the study, KYTC developed a new database for projects that are in the Strategic Highway Investment Formula for Tomorrow (SHIFT), called the Continuous Highway Analysis Framework (CHAF) for tracking projects with SHIFT. Three completed projects in the area are outcomes from the Kenton County Transportation Plan.

- CHAF IP20160009 (PIF 06 059 D1303 5.30): Increase safety and reduce congestion for northbound KY 1303 at Thomas More Parkway.
- CHAF IP20130051 (PIF 06 059 D1303 6.00): Improve safety and reduce congestion along KY 1303 from Dudley Road to US 25, including multi-modal needs.
- CHAF IP20080361 (PIF 06 059 D1303 9.00): Improve safety and reduce congestion along KY 1303 (Turkeyfoot Rd) from Dudley Rd to US 25 (Dixie Hwy); include multi-modal needs. This project represents the current planning study.

1.4 COMMITTED PROJECTS

The numerous projects listed in the KYTC 2018 Highway Plan in Kenton County near Covington are shown in **Figure 2**.

KYTC Item No. 6-450 is a new project in the 2018 Highway Plan for improving safety and reducing congestion along Turkeyfoot Road (KY 1303) from Dudley Road to US-25. The 6-450 project includes the segment of Turkeyfoot Road (KY 1303) from Barnwood Drive to the middle of the I-275 bridge evaluated in this planning study.

Three notable projects are proposed near the project corridor:

- Dudley Road (CS-4128) is proposed to be resurfaced and stabilized in several phases of construction from Winding Trails to US 25 - Dixie Highway with federal SNK funding (KYTC Item No. 6-428.10, 6-428.20, 6-428.30, and 6-428.40).
- A realignment project is proposed to improve the existing alignment of Buttermilk Pike, Orphanage Road, and US 25 in Fort Mitchell with state SPP funding (KYTC Item No. 6-8951).
- A congestion mitigation project to improve the safety and reduce congestion is proposed on KY 17 at the I-275 interchange with federal STP funding (KYTC Item No. 6-449).

The following pavement rehabilitation projects are also proposed with federal maintenance funding for I-275 from:

- I-75 to the Boone County line (KYTC Item No. 6-20035), and
- US 25 - Dixie Highway to I-75 KYTC Item No. 6-20039).

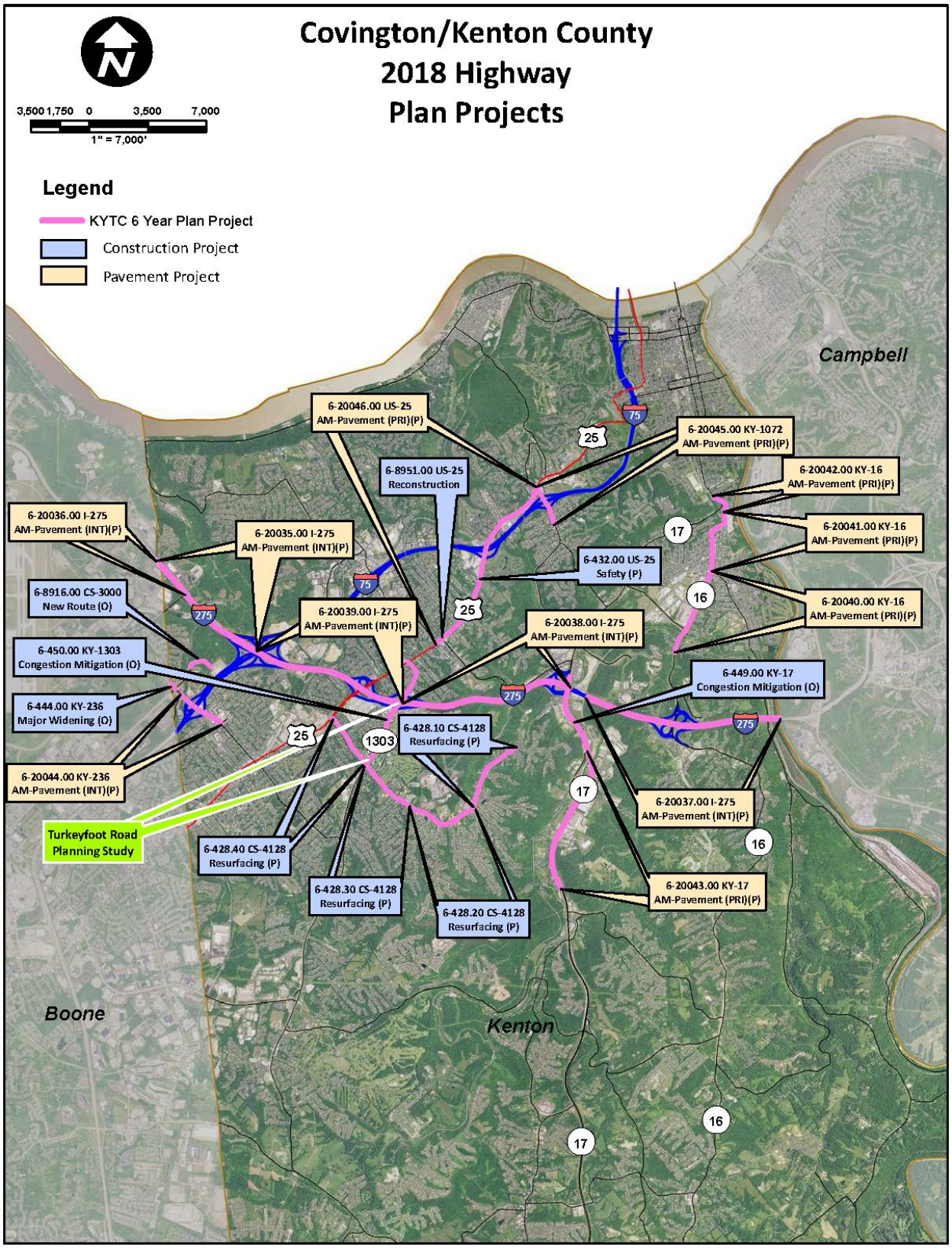


Figure 2: Covington/Kenton County 2018 Highway Plan Projects

2.0 EXISTING CONDITIONS

Conditions of the existing transportation network within the project corridor are examined in this section. This information includes roadway facilities and geometrics, crash history, and traffic volumes within the project corridor. Data for this section was collected from the KYTC's Highway Information System (HIS) database, aerial photography, as-built plans, the Kentucky State Police, and field review. A summary of the information contained within the KYTC HIS database is included in **Table 1**.

Table 1: Existing Conditions Summary

SEGMENT	BEGIN MP	END MP	LENGTH (miles)	Annual Average Daily Traffic (AADT)	Number of Lanes	Divided/Undivided	Curb, Gutter & Sidewalk
TURKEYFOOT TOTAL	**5.085**	**5.685**	**0.600**	**36,090**	**4**	**Divided**	**5' Sidewalk**
BARNWOOD DR TO COLLEGE PARK DR	5.085	5.226	0.141	30,303	4-12'	Divided (20')	5' Sidewalk
COLLEGE PARK DR TO VILLA MADONNA DR	5.226	5.285	0.059	30,234	4-11'	Divided (22')	5' Sidewalk
VILLA MADONNA DR TO THOMAS MORE PKWY/ FRATERNITY CT	5.285	5.396	0.111	30,864	4-11'	Divided (22')	5' Sidewalk
THOMAS MORE PKWY/FRATERNITY CT TO TOWN CENTER BLVD	5.396	5.493	0.097	44,637	4-11'	Divided (22-16')	5' Sidewalk
TOWN CENTER BLVD I-275 RAMPS	5.493	5.637	0.144	44,414	4-11'	Divided (11-14')	5' Sidewalk
I-275 RAMPS I-275 OVERPASS	5.637	5.685	0.048	26,778	4-12'	Divided (19')	5' Sidewalk

2.1 ROADWAY SYSTEMS

Functional classification is the grouping of roads, streets, and highways into systems or classes according to the character of service they are intended to serve. This grouping acknowledges that roads serve multiple functions and provides a basis for comparing roads. Functional classifications can be used for, but are not limited to, the following purposes:

- Provide a framework for highways serving mobility and connecting regions and cities within a state
- Provide a basis for assigning jurisdictional responsibility according to the roadway's importance
- Provide a basis for development of minimum design standards according to function
- Provide a basis for evaluating present and future needs
- Provide a basis for allocation of limited financial resources

Figure 3 presents the functional classification of roadways within the project corridor.

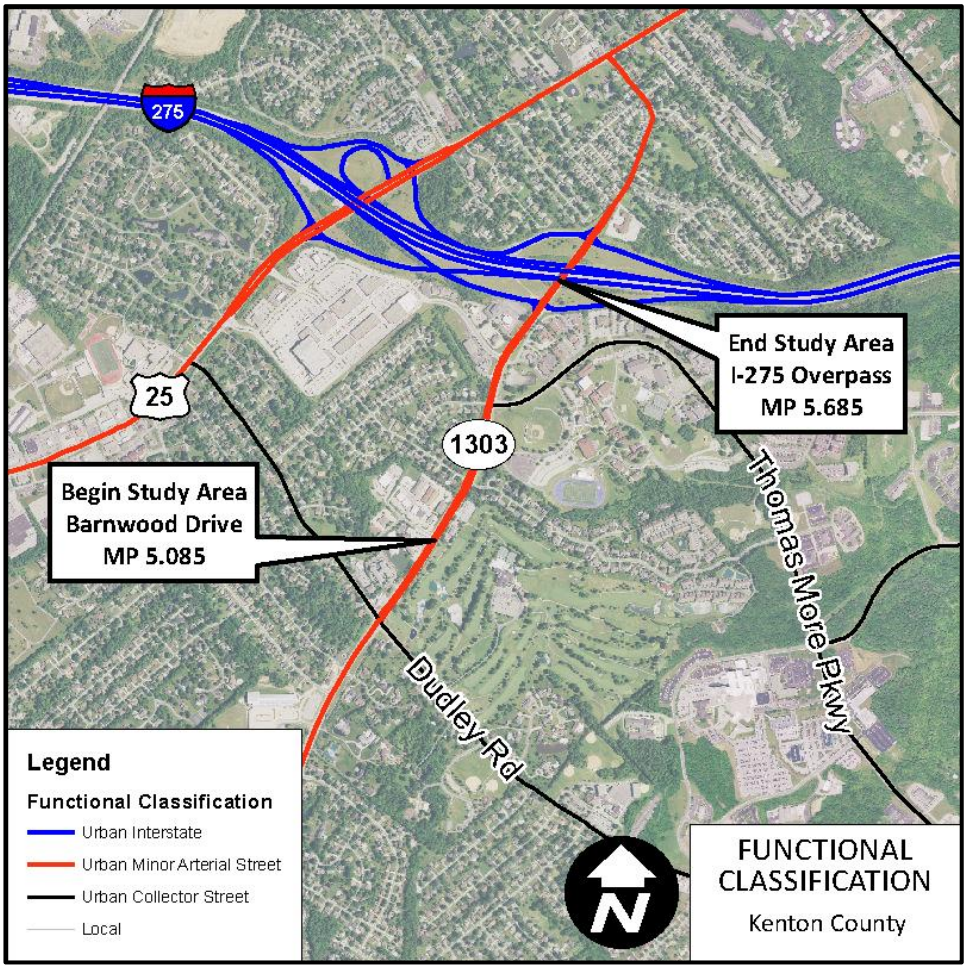


Figure 3: Functional Classification of Roadways in Study Area

Turkeyfoot Road (KY 1303) is an urban minor arterial between the interstate and southern Kenton County and serves as the primary access to St. Elizabeth Hospital, a medical office park, Thomas More College, and the Crestview Hills Town Center. Thomas More Parkway is a major collector, and the remaining roadways in the project corridor are local roads.

2.2 ROADWAY GEOMETRIC CHARACTERISTICS

Existing conditions related to mobility and the physical characteristics of the corridor were identified throughout the Turkeyfoot Road (KY 1303) corridor. These findings are illustrated in **Figure 4**.

Turkeyfoot Road (KY 1303) has a posted speed limit of 45 mph and has four 12-ft travel lanes from Barnwood Drive to College Park Drive. The four lanes become 11-ft travel lanes from College Park Drive to the I-275 eastbound ramps. The median width varies from 11-ft to 22-ft to accommodate left-turn lanes. Curb and gutter exist on both sides of Turkeyfoot Road (KY 1303) through the project corridor. Between Barnwood Drive and the I-275 ramps are 14 access points, including a right-turn-in-only for TGI Fridays and a locked gate entrance to the Duke Energy substation. Traffic signals are located at the Turkeyfoot Road (KY 1303) intersections with Barnwood Drive, Thomas More Parkway / Fraternity Court, Town Center Boulevard, and the I-275 eastbound ramps.

Barnwood Drive is a 24-ft wide street with curb on each side and left- and right-turn lanes at the Turkeyfoot Road (KY 1303) intersection. Barnwood Drive provides access to a mixture of office, institutional, restaurant, and retail land uses.

College Park Drive, located on both sides of Turkeyfoot Road (KY 1303), is a 24-ft wide street with concrete lip-curb and no shoulders providing residential access.

Villa Madonna Drive is a 20-ft wide street with concrete lip-curb and gutter providing alternate access to Thomas More College.

Fraternity Court, located across Turkeyfoot Road (KY 1303) at the intersection with Thomas More Parkway, is a 22-ft wide residential street with concrete lip-curb and gutter.

Thomas More Parkway is a five-lane, 59-ft wide urban connector street at the Turkeyfoot Road (KY 1303) intersection, with two eastbound lanes and three westbound lanes (two right-turn lanes and one left-turn lane that also crosses Turkeyfoot Road (KY 1303) to Fraternity Court). Thomas More Parkway provides access to Thomas More College, a number of medical and office buildings, St. Elizabeth South Medical Center, and residential neighborhoods toward its east terminus.

Town Center Boulevard is a four-lane, 46-ft wide local street with curb and gutter. Town Center Boulevard has one westbound lane and three eastbound lanes (one right-turn lane, one left-turn lane, and one left / through lane to the Business Park Entrance on the east side of Turkeyfoot Road (KY 1303) at the intersection with Turkeyfoot Road (KY 1303). Town Center Boulevard provides access to numerous office buildings, restaurants, and retail establishments

including the Crestview Hills Municipal Building and Crestview Hills Town Center. The street narrows to two lanes with a left-turn lane at the rear of the Crestview Hills Town Center.

The vertical grade along Turkeyfoot Road (KY 1303) transitions from a crest vertical curve near College Park Drive to a sag vertical curve south of the Thomas More Parkway (from +3% to -5% to +3%). The sag vertical curve is 600 feet in length, providing headlight sight distance of 350 feet. AASHTO guidelines suggest 360 feet of headlight sight distance for a 45 mph design speed. While the sag vertical curve does not meet the required headlight sight distance, it does not appear that the sag vertical curve contributes to a crash history at this location. The correction of this vertical curve was determined to be unnecessary by the project team. The grade from Thomas More Parkway to the I-275 bridge is generally flat with a -1% grade. The horizontal alignment curves to the left with a radius of 1432.39' near College Park Drive, curves back to the right with a 954.93' radius near Thomas More Parkway, and then continues across the I-275 bridge in a tangent section.

2.2.1 PEDESTRIAN, BICYCLE, AND TRANSIT ACCOMMODATIONS

Pedestrian accommodations are present along both sides of Turkeyfoot Road (KY 1303) with 5-ft sidewalks throughout the project corridor. Sidewalks are provided along Turkeyfoot Road (KY 1303) on both sides from Barnwood Drive to the south side of Town Center Boulevard. Sidewalks continue northward only on the east side of Turkeyfoot Road (KY 1303) through the I-275 interchange. A short section of the Turkeyfoot Road (KY 1303) sidewalk also wraps around the south side of Barnwood Drive before it terminates at the first entrance. College Park Drive and Villa Madonna Drive do not have sidewalks. A sidewalk extends along the south side of Thomas More Parkway to Thomas More College and the St. Elizabeth South Medical Center. Town Center Boulevard has a sidewalk along the south side. Pedestrian crossings for Turkeyfoot Road (KY 1303) are provided south of the intersections with Barnwood Drive, Thomas More Parkway and Fraternity Court, and Town Center Boulevard and Business Park Entrance. An existing bike lane is on Turkeyfoot Road (KY 1303) south of the Barnwood Drive intersection, but no bike lanes are present in the project corridor.

The Transit Authority of North Kentucky (TANK) serves the Turkeyfoot Road (KY 1303) area via 18X Edgewood Express with stops at the Crestview Hills Town Center and Thomas More College. No transit stops are in the project corridor, but Turkeyfoot Road (KY 1303) is a highly utilized bus route for TANK.

TURKEYFOOT RD (KY 1303)
TRAFFIC AND ROADWAY CHARACTERISTICS

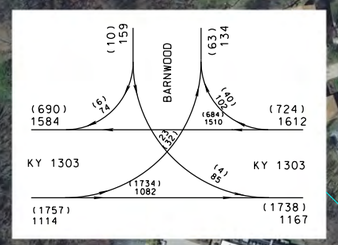
KENTUCKY TRANSPORTATION CABINET

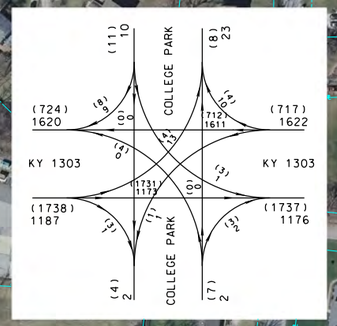
Palmer ENGINEERING

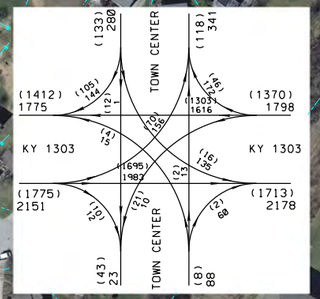
SCALE: 1"=200'

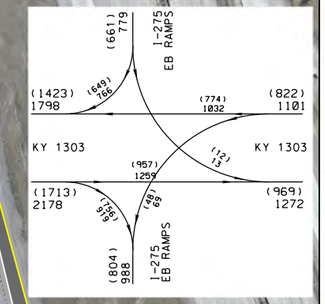
0' 100' 200' 400'

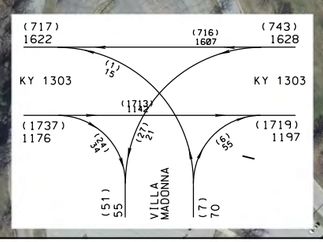
LOCATION		AM TRAVEL TIME (MIN:SEC)	AM VOLUME (VEH)	PM TRAVEL TIME (MIN:SEC)	PM VOLUME (VEH)
1-5	I-275 EB TO THOMAS MORE	6:50	414	5:41	236
1-6	I-275 EB TO TURKEYFOOT AT DUDLEY	6:22	165	6:39	473
3-5	I-275 WB TO THOMAS MORE	7:15	194	4:49	106
3-6	I-275 WB TO TURKEYFOOT AT DUDLEY	5:58	386	5:47	647
6-2	NB TURKEYFOOT AT DUDLEY TO I-275 EB	2:46	364	3:49	195
6-4	NB TURKEYFOOT AT DUDLEY TO I-275 WB	2:19	695	3:20	534

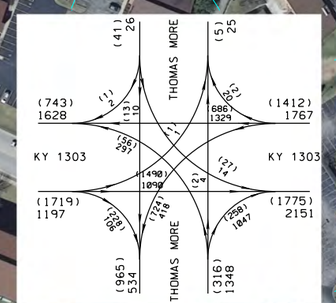












VERTICAL LENGTH OF CURVE		STOPPING SIGHT DISTANCE	
MINIMUM CRITERIA (FT)	ACTUAL (FT)	MINIMUM CRITERIA (FT)	ACTUAL (FT)
625	600	360	350

6 AT DUDLEY

1 I-275 EB EXIT RAMP

2 I-275

5

BARNWOOD DR

COLLEGE PARK DR

FRATERNITY CT

TOWN CENTER BLVD

VILLA MADONNA DR

COLLEGE PARK DR

THOMAS MORE PARKWAY

BUSINESS PARK ENTRANCE

I-275 EB ENTRANCE RAMP

MP 5.1 MP 5.2 MP 5.3 MP 5.4 MP 5.5 MP 5.6

STOP

Figure 4: Traffic and Roadway Characteristics

2.3 CRASH HISTORY

Crash records and reports for the Turkeyfoot Road (KY 1303) corridor were obtained from Kentucky State Police, Kentucky Open Portal Solutions (KYOPS) Database through the KYTC Highway Information System (HIS) database extract. Crashes occurring in parking lots and on the I-275 ramps were not included in the scope of this study. Between January 1, 2010, and December 31, 2015, a total of 177 all-vehicle-type crashes occurred along the project corridor. The crashes are geospatially located and presented in **Figure 5** and in **Figure 6**.

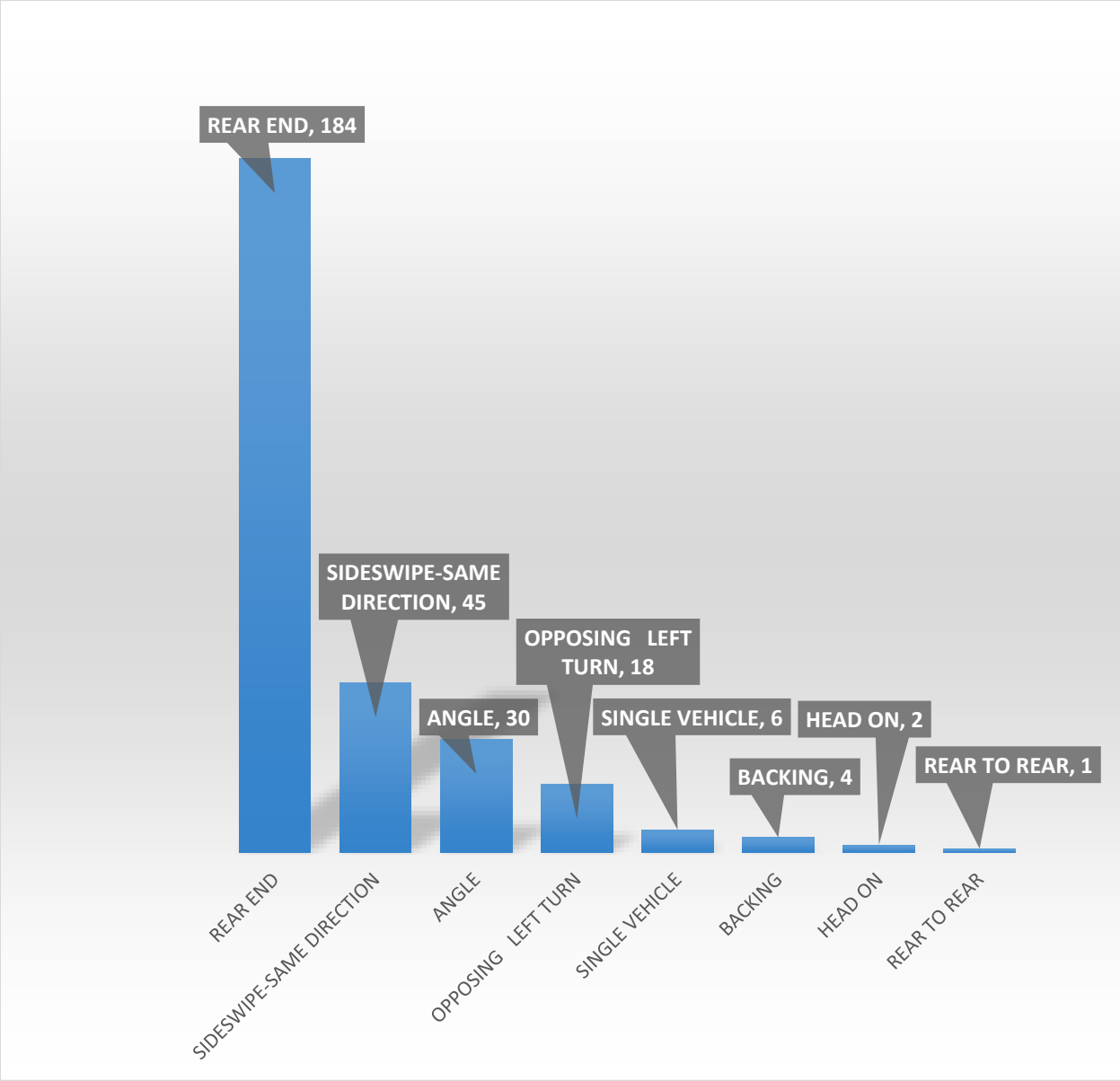


Figure 5: Crash History – Turkeyfoot Road (KY 1303) and Approaches (2014 - 2016)

TURKEYFOOT RD (KY 1303)
CRASH MAP

SCALE: 1"=200'

0' 100' 200' 400'

KENTUCKY TRANSPORTATION CABINET

Palmer ENGINEERING

CRASHES: JAN 1, 2014 - DEC 31, 2016

LEGEND

MANNER OF COLLISION	TOTALS
REAR END	184
SIDESWIPE-SAME DIRECTION	45
ANGLE	30
OPPOSING LEFT TURN	18
SINGLE VEHICLE	6
BACKING	4
HEAD ON	2
REAR TO REAR	1

BARNWOOD DR INTERSECTION

MANNER OF COLLISION

REAR END	SIDESWIPE-SAME DIRECTION	ANGLE	OPPOSING LEFT TURN	TOTALS
12	1	3	2	18

FROM BARNWOOD DR TO THOMAS MORE PARKWAY

MANNER OF COLLISION

REAR END	ANGLE	OPPOSING LEFT TURN	SINGLE VEHICLE	HEAD ON	TOTALS
8	6	7	3	1	25

THOMAS MORE PARKWAY INTERSECTION

MANNER OF COLLISION

REAR END	SIDESWIPE-SAME DIRECTION	ANGLE	OPPOSING LEFT TURN	HEAD ON	TOTALS
41	19	5	2	1	68

TOWN CENTER BOULEVARD INTERSECTION

MANNER OF COLLISION

REAR END	SIDESWIPE-SAME DIRECTION	ANGLE	OPPOSING LEFT TURN	BACKING	TOTALS
38	20	12	6	2	78

I-275 RAMPS INTERSECTION

MANNER OF COLLISION

REAR END	SIDESWIPE-SAME DIRECTION	ANGLE	OPPOSING LEFT TURN	SINGLE VEHICLE	BACKING	REAR TO REAR	TOTALS
85	5	4	1	3	2	1	101

BARNWOOD DR

COLLEGE PARK DR

FATALITY

VILLA MADONNA DR

FRATERNITY CT

TOWN CENTER BLVD

THOMAS MORE PARKWAY

BUSINESS PARK ENTRANCE

I-275 EB EXIT RAMP

I-275 EB ENTRANCE RAMP

INTERSTATE 275

BEGIN MP	END MP	LENGTH (MILES)	ADT	CRITICAL CRASH RATE FACTOR
5.085	5.226	0.141	30,300	0.50

BARNWOOD DR - COLLEGE PARK DR

BEGIN MP	END MP	LENGTH (MILES)	ADT	CRITICAL CRASH RATE FACTOR
5.226	5.285	0.059	30,300	0.25

COLLEGE PARK DR - VILLA MADONNA DR

BEGIN MP	END MP	LENGTH (MILES)	ADT	CRITICAL CRASH RATE FACTOR
5.285	5.396	0.111	30,900	1.08

VILLA MADONNA DR - THOMAS MORE PKWY/ FRATERNITY CT

BEGIN MP	END MP	LENGTH (MILES)	ADT	CRITICAL CRASH RATE FACTOR
5.396	5.493	0.097	44,700	1.55

THOMAS MORE PKWY/ FRATERNITY CT - TOWN CENTER BLVD

BEGIN MP	END MP	LENGTH (MILES)	ADT	CRITICAL CRASH RATE FACTOR
5.493	5.637	0.144	44,500	1.69

TOWN CENTER BLVD - I-275 RAMPS

BEGIN MP	END MP	LENGTH (MILES)	ADT	CRITICAL CRASH RATE FACTOR
5.637	5.685	0.048	26,800	1.09

I-275 RAMPS - I-275 OVERPASS

Figure 6: Crash Map

Table 2 presents a summary of all crashes reported within the project corridor over the time period. A total of 290 crashes was reported on Turkeyfoot Road (KY 1303) and approaches. Of these 290 crashes, 184 crashes were rear-end crashes, 45 crashes were sideswipe same direction crashes, and 48 crashes were angle crashes.

Approximately one-third of the 290 crashes occurred at the eastbound I-275 ramp terminal and Turkeyfoot Road (KY 1303) intersection, including 85 rear-end crashes. Approximately half of the crashes (146) occurred between the closely spaced intersections of Thomas More Parkway and Town Center Boulevard, including 79 rear-end, 30 sideswipe - same direction, and 16 angle crashes.

Fourteen sideswipe - same direction crashes occurred along northbound Turkeyfoot Road (KY 1303) between the closely spaced, signalized Thomas More Parkway and Town Center Boulevard intersections.

Table 2: Turkeyfoot Road (KY 1303) Crash Summary

MANNER OF COLLISION	BARNWOOD INTERSECTION	FROM BARNWOOD TO THOMAS MORE PKWY	THOMAS MORE PKWY INTERSECTION	TOWN CENTER BLVD INTERSECTION	I-275 RAMPS INTERSECTION	TOTALS
	MP 5 TO MP 5.1	MP 5.1 TO MP 5.3	MP 5.3 TO MP 5.4	MP 5.4 TO MP 5.6	MP 5.6 TO MP 5.7	
REAR END	12	8	41	38	85	**184**
SIDESWIPE-SAME DIRECTION	1	0	19	20	5	**45**
ANGLE	3	6	5	12	4	**30**
OPPOSING LEFT TURN	2	7	2	6	1	**18**
SINGLE VEHICLE	0	3	0	0	3	**6**
BACKING	0	0	0	2	2	**4**
HEAD ON	0	1	1	0	0	**2**
REAR TO REAR	0	0	0	0	1	**1**
TOTALS	**18**	**25**	**68**	**78**	**101**	**290**

Ten crashes were reported as angle or opposing left at the Villa Madonna Drive intersection. Of the 10 crashes, 3 were injury crashes. Traffic along northbound Turkeyfoot Road (KY 1303) queues from the Thomas More Parkway intersection past the Villa Madonna Drive intersection. For all of the crashes at the Villa Madonna Drive intersection, the drivers were attempting to make left turns through the queued traffic on Turkeyfoot and were hit by moving traffic.

A total of 58 crashes occurred on the eastbound I-275 exit ramp approaching Turkeyfoot Road (KY 1303). Of the 58 crashes, 54 were rear-end crashes with 9 injury crashes. The eastbound I-275 exit ramp carries a heavy volume, and the signal is timed to minimize the traffic queue onto mainline I-275. Almost all (98%) of the ramp traffic turns right, onto Turkeyfoot Road (KY 1303).

KYTC uses a systematic procedure to identify locations having high crash rates. The actual number of crashes, as obtained from the KYOPS database, occurring within a roadway segment is used to calculate the Actual Crash Rate using the number of crashes, roadway length, AADT, and the number of years for which crash data is being examined. Using an analysis procedure from the Kentucky Transportation Center and referenced in The Analysis of Traffic Crash Data in Kentucky (2010-2014), Actual Crash Rates are compared to the Critical Crash Rate for similar types of Kentucky roadways. The Critical Crash Rate is the rate which is greater, statistically, than the average crash rate for similar roadways and represents a rate above which crashes may be occurring in a non-random fashion. This ratio of Actual Crash Rate to the Critical Crash Rate is the Critical Crash Rate Factor (CCRF). Thus, a CCRF greater than 1.0 indicates crashes may be occurring more often than can be attributed to random occurrence. This procedure is used as a screening technique indicating locations where further analysis may be needed. It is not a definitive statement of a crash problem nor a measurement of a crash problem. The CCRF analysis for Turkeyfoot Road (KY 1303) is provided in **Table 3**.

Table 3: Turkeyfoot Road (KY 1303) Critical Crash Rate Factor Analysis

SEGMENT	BEGIN MP	END MP	ADT	Crashes				HMVM	Rates per HMVM				Critical Crash Rate Factor	Critical Fatality Rate Factor
				Fatal	Injury	PDO	Total		Fatal	Injury	PDO	Total		
BARNWOOD DR TO COLLEGE PARK DR	5.085	5.226	30,303	1	1	14	16	0.05	21.37	21.37	299.23	341.98	0.50	0.82
COLLEGE PARK DR TO VILLA MADONNA DR	5.226	5.285	30,234	0	2	2	4	0.02	0.00	102.39	102.39	204.79	0.25	0.00
VILLA MADONNA DR TO THOMAS MORE PKWY/FRATERNITY CT	5.285	5.396	30,864	0	3	26	29	0.04	0.00	79.97	693.08	773.05	1.08	0.00
THOMAS MORE PKWY/FRATERNITY CT TO TOWN CENTER BLVD	5.396	5.493	44,637	0	2	48	50	0.05	0.00	42.18	1012.42	1054.60	1.55	0.00
TOWN CENTER BLVD TO I-275 EASTBOUND RAMPS	5.493	5.637	44,414	0	9	66	75	0.07	0.00	128.51	942.43	1070.94	1.69	0.00
I-275 EASTBOUND RAMPS TO I-275 OVERPASS	5.637	5.685	26,778	0	1	13	14	0.01	0.00	71.05	923.66	994.71	1.09	0.00
TURKEYFOOT TOTAL	5.085	5.685	36,090	1	18	169	188	0.24	4.22	75.91	712.75	792.88	1.47	0.43

*HMVM: Hundred million vehicle miles

Within the project corridor, a total of 188 crashes was reported on Turkeyfoot Road (KY 1303) between Barnwood Drive and I-275. During this period, one fatality, 18 injury crashes, and 169 property damage only (PDO) crashes were reported. Most of the crashes (168) occurred between Villa Madonna Drive and the I-275 eastbound ramp terminals, and the CCRF was greater than 1.0 for this portion of project corridor. The CCRF was 1.55 between Thomas More Parkway and Town Center Boulevard intersections and 1.69 between Town Center Boulevard and eastbound I-275 ramp terminal intersections.

2.4 EXISTING PROPERTY AND UTILITIES

PVA records were used to identify property boundaries along the corridor (see **Figure 7**). South of the I-275 interchange along the west side of Turkeyfoot Road (KY 1303) are two restaurants before the intersection with Town Center Boulevard, which extends to the west past an office building, a restaurant, a retail building, and the Crestview Hills Municipal Building to the Crestview Hills Town Center and to Dixie Highway (US 25). South of Town Center Boulevard is a residential subdivision which accesses Turkeyfoot Road (KY 1303) at Fraternity Court and College Park Drive. From College Park Drive to Barnwood Drive, a mixture of office, institutional, and retail land uses has access to Turkeyfoot Road (KY 1303). Along the east side of Turkeyfoot Road (KY 1303), south of I-275, an office park is accessed by an unnamed private street (labeled as Business Park Entrance in the accompanying maps) intersecting Turkeyfoot Road (KY 1303) opposite Town Center Boulevard. South of this intersection, Thomas More Parkway provides primary access to Thomas More College, a number of medical office buildings, and numerous office buildings. Thomas More Parkway also serves as the primary access to the St. Elizabeth South Medical Center. Villa Madonna Drive provides alternate access to the Thomas More College. College Park Drive serves a small residential cul-de-sac. The Summit Hills Country Club abuts the east side of Turkeyfoot Road (KY 1303) but does not have direct access to Turkeyfoot Road (KY 1303).

Numerous utility facilities occur along the project corridor including overhead and underground utilities. Utility companies were contacted to identify these facilities along the corridor to assist in alternative development. Some utility companies were identified through KY 811, and other utility companies were individually contacted for location. The locations of utilities along Turkeyfoot Road (KY 1303) are shown in **Figure 7.** The following utility companies were identified:

- Cincinnati Bell Telephone Company (Communications)
- Duke Energy Kentucky Inc. (Gas Distribution, Electric, Gas Transmission)
- Level 3 Communications (Fiber Optic)
- St. Elizabeth Medical Center (Fiber Optic)

- Charter/Spectrum (Telephone, Cable TV, Fiber Optic)
- Northern KY Water (Water)
- Sanitary District 1 (Sewer)

A sanitary sewer line crosses Turkeyfoot Road (KY 1303) north of Thomas More Parkway and south of Town Center Boulevard. The sanitary sewer line continues west paralleling Town Center Boulevard between the College Park neighborhood and commercial development along Town Center Boulevard toward Crestview Hills Town Center. Another sanitary sewer line crossing is on Turkeyfoot Road (KY 1303) at College Park Drive.

A water main runs along the east side of Turkeyfoot Road (KY 1303) south of Thomas More Parkway and along the west side of Turkeyfoot Road (KY 1303) north of Thomas More Parkway. Additional water main crossings occur at Barnwood Drive, College Park Drive, Fraternity Court, Thomas More Parkway, and north of Town Center Boulevard. A water main is located along the I-275 eastbound exit ramp crossing I-275 west of the interchange.

A 24-inch gas main transmission line crosses Turkeyfoot Road (KY 1303) north of Thomas More Parkway and south of Town Center Boulevard. The gas main continues west paralleling Town Center Boulevard between the College Park neighborhood and commercial development along Town Center Boulevard toward Crestview Hills Town Center. Another gas main crosses north of Town Center Boulevard on Turkeyfoot. Various gas service lines are north of the Thomas More Parkway on the west side of Turkeyfoot Road (KY 1303) and along Town Center Boulevard.

A utility substation is located north of Barnwood Drive on the east side of Turkeyfoot Road (KY 1303). The majority of overhead electric is located on the west side of Turkeyfoot Road (KY 1303) south of Business Park entrance. The overhead electric is located on the east side of Turkeyfoot Road (KY 1303) north of Business Park entrance and continues on the east side to the I-275 overpass.

Underground and overhead fiber optic lines run along the corridor. The overhead fiber is located on the overhead electric poles. The underground fiber is located at the Thomas More Parkway and Turkeyfoot Road (KY 1303) intersection and near Barnwood Drive. The majority of communication utilities are located on the electric poles. Underground telephone runs along the east side of Turkeyfoot Road (KY 1303) from College Park to Business Park Entrance.

TURKEYFOOT RD (KY 1303)
PROPERTY AND UTILITIES MAP

KENTUCKY TRANSPORTATION CABINET

Palmer ENGINEERING

SCALE: 1"=200'

0' 100' 200' 400'

UTILITY OWNERS

COMMUNICATIONS:	CINCINNATI BELL
GAS / ELECTRIC:	DUKE ENERGY KENTUCKY INC
COMMUNICATIONS:	LEVEL 3 COMMUNICATIONS
WATER:	NORTHERN KENTUCKY WATER DISTRICT
SANITATION:	SD1
COMMUNICATIONS:	TIME WARNER CABLE / SPECTRUM

- WATER
- GAS
- OVERHEAD
- UNDERGROUND ELECTRIC
- COMMUNICATIONS - FIBER, TV, TELEPHONE, ETC.
- STORM SEWER
- SANITARY SEWER
- RIGHT-OF-WAY / PROPERTY
- ENVIRONMENTAL CONCERNS

TOWN CENTER BLVD
I-275 EB EXIT RAMP
INTERSTATE 275
FRATERNITY CT
COLLEGE PARK DR
BARNWOOD DR
MP 5.1
MP 5.2
MP 5.3
MP 5.4
MP 5.5
MP 5.6
BUSINESS PARK ENTRANCE
EXISTING CHAPEL
I-275 EB ENTRANCE RAMP
VILLA MADONNA DR
THOMAS MORE PARKWAY

Figure 7: Existing Property and Utilities

3.0 TRAFFIC ANALYSIS – EXISTING (2017) AND FUTURE/NO-BUILD (2040)

3.1 TRAFFIC COUNTS AND ORIGIN-DESTINATION STUDY

Current traffic volumes on Turkeyfoot Road (KY 1303) range from 26,721 vehicles per day (vpd) at the Villa Madonna Drive to 42,388 vpd between Town Center Boulevard and I-275.

Traffic counts were conducted using Miovision, a portable video data collection device, at the following locations along Turkeyfoot Road (KY 1303) on Tuesday, October 3, 2017:

- Dudley Road
- Barnwood Drive
- Thomas More Parkway
- Town Center Boulevard
- I-275 EB Ramps
- I-275 WB Ramps

An Origin-Destination Study was performed to identify the existing traffic patterns for the project corridor. By gathering the origin-destination data, the traffic modeling could more accurately replicate the weaving maneuvers that vehicles are making in the congested conditions and aid with developing solutions. The weaves from the I-275 Ramps to Thomas More Parkway were critical paths; so determining where vehicles were originating from was a necessity. The origin-destination data was collected for vehicles traveling on I-275, Thomas More Parkway, Town Center Drive, and Turkeyfoot Road (KY 1303). To collect the origin-destination data, BlueTOAD, a Bluetooth technology that gathers the unique Bluetooth addresses as vehicles pass the nodes, was used at six origination-destination nodes from October 1-7, 2017, to create a matrix of routes.

The OKI traffic model and historic traffic growth along the corridor were used to evaluate a growth rate for the project. Thomas More College and St. Elizabeth Healthcare also provided information concerning their future growth plans that was considered in the development of the traffic forecast. Palmer coordinated this information with the KYTC Division of Planning to establish the 1.5% growth rate for the corridor.

3.2 2017 EXISTING TRAFFIC OPERATIONS

A microsimulation model was developed for the AM and PM peak hours to evaluate Travel Times, Maximum Queue Lengths, and Level of Service (LOS) / Delay for Turkeyfoot Road (KY 1303) from I-275 to the Dudley Road intersection. The model is a computer software package that replicates the flow of traffic through intersections and allows for the interaction of

multiple intersections to be determined. The model also provides the public with a visual graphic of how traffic flows in the project corridor. The origin-destination data was used to route vehicles within the microsimulation model. The results of the traffic analysis for existing conditions are presented in **Table 4**. The Map Nodes referenced in this table are visually depicted in **Figure 8**.The traffic forecast for the project, which uses existing traffic counts and growth rates to predict future traffic volumes, is presented in **Appendix A.**

Table 4: Traffic Analysis for Existing Conditions

Travel Times

Map Nodes	From	To	2017 AM		2017 PM	
			Time (min:sec)	Volume (vph)	Time (min:sec)	Volume (vph)
1 to 5	I-275 EB	Thomas More Pkwy	4:43	414	3:31	236
1 to 6	I-275 EB	Dudley Road	4:25	165	5:01	473
3 to 5	I-275 WB	Thomas More Pkwy	6:00	194	4:43	106
3 to 6	I-275 WB	Dudley Road	5:16	386	6:01	647
6 to 2	Dudley Road	I-275 EB	3:06	364	5:05	195
6 to 4	Dudley Road	I-275 WB	2:25	695	4:04	534

Maximum Queue Lengths

Location	2017 AM (ft)	2017 PM (ft)
NB Turkeyfoot at Thomas More Pkwy (Thru Movement)	908	2293
SB Turkeyfoot at Thomas More Pkwy (Left Turn)	675	301
NB Turkeyfoot at Town Center Blvd (Thru Movement)	557	783
SB Turkeyfoot at Town Center Blvd (Thru Movement)	809	1206
SB Turkeyfoot at I-275 EB Ramps (Thru Movement)	873	981
EB I-275 Off-Ramp (Right Turn)	1078	1322

Level of Service/Delay

Signalized Intersection	2017 AM		2017 PM	
	LOS	Delay (sec)	LOS	Delay (sec)
Barnwood Drive	B	14	B	14
Thomas More Parkway	F	166	F	103
Town Center Blvd	D	40	E	78
I-275 EB Ramps	F	105	F	142
I-275 WB Ramps	D	46	D	45

Figure 8: Traffic Analysis Nodes

Level of service (LOS) is a qualitative measure describing operational conditions within a traffic stream, based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience. Six levels of service range from A through F. LOS A is associated with free-flow conditions, high freedom to maneuver, and little or no delay. Conditions at or near capacity typically are associated with LOS E. At LOS F, traffic conditions are oversaturated and beyond capacity, with low travel speeds, little or no freedom to maneuver, and high delays. LOS D is desirable in an urban area with LOS E being accepted during short intervals. **Figure 9** graphically depicts the traffic conditions associated with each LOS designation.

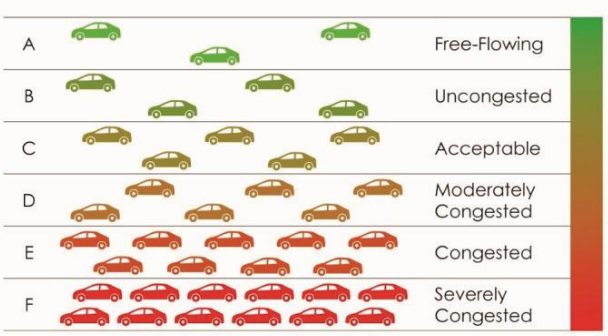


Figure 9 : Level of Service

The existing travel times along Turkeyfoot Road (KY 1303) are summarized in **Table 5** for the 2017 base year conditions. Travel time data was physically measured by driving each critical route five times; this data was used to calibrate the VISSIM traffic microsimulation model, which was simulated 10 times for each route. The AM peak hour experiences a high volume of vehicles turning left onto Thomas More Parkway as well as a high volume traveling northbound on Turkeyfoot Road (KY 1303). The PM Peak has more traffic overall and a heavy southbound Turkeyfoot Road (KY 1303) movement that is congested due to commuter traffic along the corridor. The northbound Turkeyfoot Road (KY 1303) travel time from Dudley Road to the I-275 westbound on-ramp is approximately three minutes in the AM Peak and five minutes in the PM Peak. The southbound Turkeyfoot Road (KY 1303) travel time from the I-275 off-ramp to Dudley Road is five minutes in the AM Peak and six minutes in the PM Peak. With the congestion along the corridor, vehicles experience a significant number of stops, which increase the likely exposure to crashes. The microsimulation reveals that that all of the vehicles within the system travel a combined 23,000 minutes in the PM peak hour to their destination through the project corridor.

Table 5: Existing and No-Build Travel Times (minutes:seconds)

		Travel Direction	2017 – Existing (min:sec)	2040 – No-Build (min:sec)	Change in Time (min:sec)
AM	275 EB Ramp to Thomas More Parkway	SB	4:43	9:36	4:53
	275 EB Ramp to Dudley Road	SB	4:25	9:15	4:50
	275 WB Ramp to Thomas More Parkway	SB	6:00	8:40	2:40
	275 WB Ramp to Dudley Road	SB	5:16	8:07	2:51
	Dudley to 275 EB	NB	2:25	6:27	4:02
	Dudley to 275 WB	NB	3:06	6:40	3:34
PM	275 EB Ramp to Thomas More Parkway	SB	3:31	8:48	5:17
	275 EB Ramp to Dudley Road	SB	5:01	11:00	5:59
	275 WB Ramp to Thomas More Parkway	SB	4:43	7:42	2:59
	275 WB Ramp to Dudley Road	SB	6:01	9:51	3:50
	Dudley to 275 EB	NB	4:04	13:02	8:58
	Dudley to 275 WB	NB	5:05	15:47	10:42

The existing delay times and level of service along Turkeyfoot Road (KY 1303) are summarized in **Table 6** for the 2017 base year conditions. The volume-to-capacity ratio (V/C) ratio is a conventional level-of-service measure for roadways, comparing roadway demand (vehicle volumes) with roadway supply (carrying capacity). V/C is often associated with determining how well a roadway is performing, also called level of service. The volume-to-capacity (V/C) ratios during the AM and PM Peaks are above the 1.0 threshold (as high as 1.5), revealing that the corridor is handling more traffic than its theoretical capacity and resulting in long queues and delays for motorists.

The signalized intersections at Thomas More Parkway, Town Center Drive, and the I-275 eastbound ramp operate at LOS E or below in the existing conditions during both the AM and PM peak hours. The poor level of service at each of the other intersections results in long queues and through lanes being blocked by vehicles spilling out of the turn bays. The Barnwood Drive intersection has a low approach volume, resulting in LOS B during the AM and PM peak hours with the majority of green time dedicated to Turkeyfoot Road (KY 1303). The I-275 westbound ramp has LOS D during the AM and PM peak hours, which is acceptable for urban areas.

Table 6: Existing and No-Build Delay Times at Signalized Intersections (seconds/LOS)

		2017 – Existing (sec/LOS)	2040 – No-Build (sec/LOS)
AM	275 WB Ramp	46/D	41/D
	275 EB Ramp	105/F	256/F
	Town Center Dr	40/D	74/E
	Thomas More Parkway	166/F	330/F
	Barnwood Dr	14/B	33/C
PM	275 WB Ramp	45/D	82/F
	275 EB Ramp	142/F	314/F
	Town Center Dr	78/E	182/F
	Thomas More Parkway	103/F	250/F
	Barnwood Dr	14/B	20/C

3.3 2040 NO-BUILD TRAFFIC OPERATIONS

The 2040 future year No-Build condition has an increase in traffic of 26% in the daily volumes, compared to the existing conditions. The corridor has continued to increase in volume over the previous 10 years, and the OKI Travel Demand Model, which forecasts traffic based on land use, transportation networks, and travel patterns for areas in Ohio, Indiana, and Kentucky, predicts that the area will continue to increase with commuter traffic even with the surrounding area mostly developed. The No-Build network has the same configuration as the existing network and will continue to decline in level of service with the increase in traffic volumes.

Travel time data for the 2040 No-Build condition was averaged over 10 microsimulation runs for the same routes as the existing conditions (see **Table 5**). The northbound Turkeyfoot Road (KY 1303) travel time from Dudley to the I-275 westbound on-ramp is over six minutes in the AM Peak and over 15 minutes in the PM Peak, indicating near-complete gridlock conditions. The southbound Turkeyfoot Road (KY 1303) travel time from eastbound I-275 off-ramp to Dudley Road is nine minutes in the AM Peak and 11 minutes in the PM Peak. The microsimulation for the 2040 PM peak hour reveals that the total travel time for all of the vehicles combined in the system doubles to over 52,000 minutes within the project corridor.

The V/C ratio along the corridor is over the 1.0 threshold in the 2040 No-Build condition, resulting in capacity-related issues (see **Table 6**). The signalized intersections at Thomas More Parkway, Town Center Drive, and the I-275 eastbound ramp continue to operate at LOS E or below in the AM and PM Peaks in the No-Build condition, and delays are twice as long as the existing condition. The intersection at the I-275 westbound ramp drops to LOS E during the AM peak hour.

4.0 ENVIRONMENTAL AND GEOTECHNICAL OVERVIEWS

4.1 ENVIRONMENTAL OVERVIEW

4.1.1 INTRODUCTION

An Environmental Overview was performed to determine potential impacts of the proposed study and is included in **Appendix C**. These natural and human environmental resources were identified from literature and database reviews, as well as field visits. The environmental points of interest from the overview are presented in **Figure 10**. The following sections discuss both natural and human environment resources present within the project corridor. This information was assembled from readily available data sources and correspondence with resource agencies; additional, detailed investigations should be undertaken as part of any future project development phases.

4.1.2 ENVIRONMENTAL CHARACTERISTICS OF THE PROJECT CORRIDOR

4.1.2.1 AIR QUALITY AND NOISE IMPACTS

The northern portion of Kenton County, including the project corridor, is a non-attainment area for 8-hour ozone (O_3) for National Ambient Air Quality Standards (NAAQS). Coordination with the appropriate officials and air quality analysis will be required to ensure that the proposed project does not exceed air quality standards.

Projects proposed by this study receiving Federal funding would require a noise study to determine noise impacts from the proposed project. See **Appendix C** for a description of the policies and procedures associated with the type of noise study that would be performed. Various types of noise receptors are in the project corridor, including college buildings and residences.

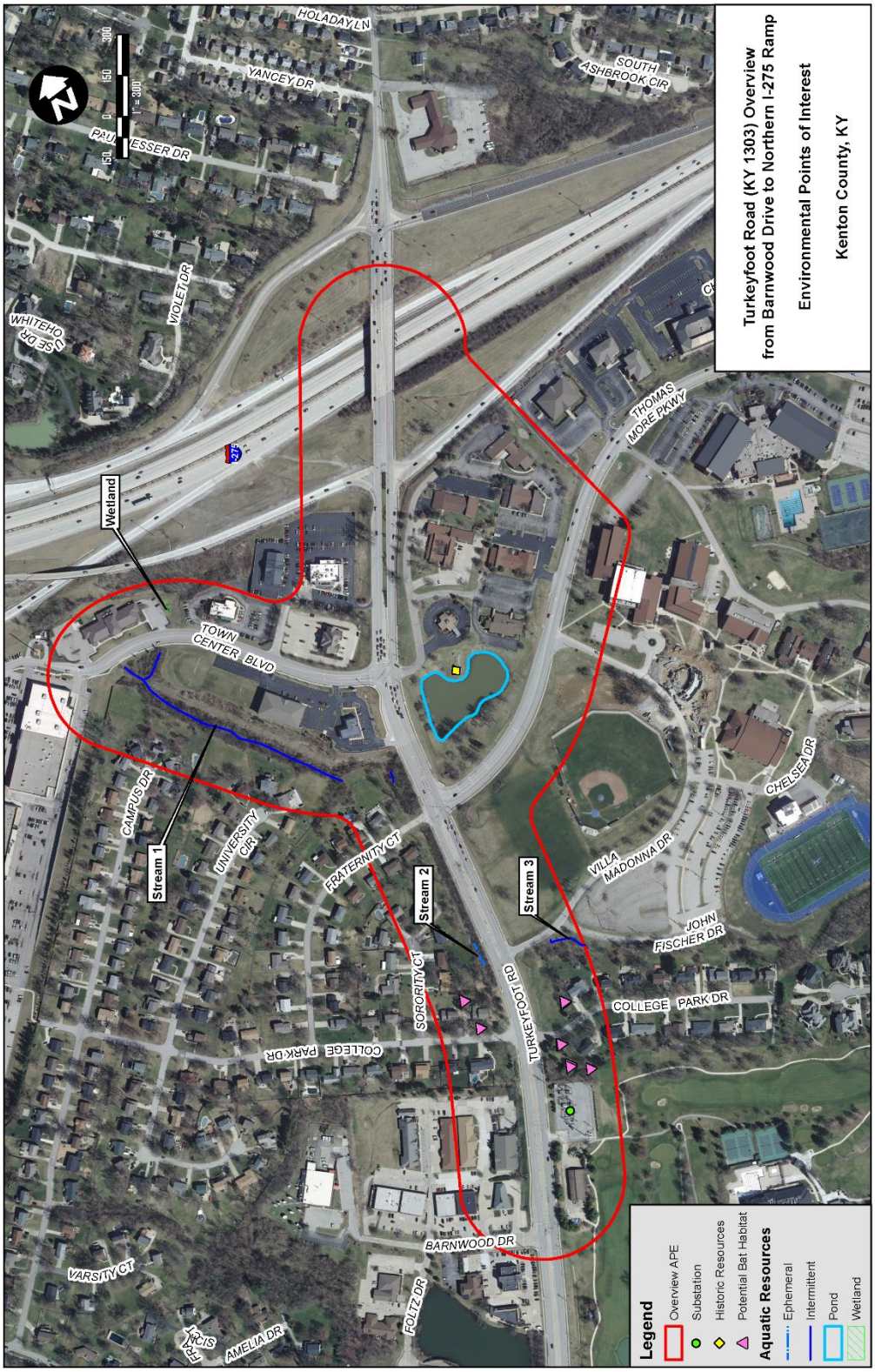


Figure 10: Environmental Points of Interest

4.1.2.2 AQUATIC RESOURCES

Floodplains

Floodplain information was obtained from the Federal Emergency Management Agency's (FEMA) FIRMette digital flood data, as appended by the state of Kentucky. This project corridor is located on Flood Insurance Rate Maps (FIRM) 21117C0015F. No flooding hazards are in the project corridor. The project corridor is within the Ohio River watershed, which comprises 29.52 square miles.

Waters and Wetlands

One small detention area wetland is present north of Crestview Hill Mall Road. This wetland contained narrow-leaf cattails (obligate wetland plant, OBL) and black willow (facultative wet plant, FACW). This wetland may or may not be jurisdictional because of no direct surface connection to other water features; the only possible connection is via underground culverts.

Three intermittent streams are present in the project corridor (see **Figure 10**). Stream 1 originates from a culvert under Crestview Hill Mall Road and joins Stream 2. Stream 2 flows along the west side of Turkeyfoot Road (KY 1303) through various culverts, one under Fraternity Court and another between Fraternity Court and Central Bank. Stream 2 turns northwest along the 24-inch gas line and eventually flows into a large culvert under Crestview Hills Mall Road. A portion of this stream along Turkeyfoot Road (KY 1303) has already been impacted by the placement of concrete. Stream 3 is an intermittent stream that originates at a culvert under Villa Madonna Drive and flows southeast off the project corridor. No clear origin was evident for this stream. One pond is located in the project corridor. This pond has no connection to the streams in the project corridor since its outlet flows east through a large culvert with an unknown outlet location and away from the current streams present.

Each of the streams, the pond, and the wetland will have to be delineated and have official jurisdictional status applied.

Permits

A field survey of the area indicated 404/401 permitting will be required for construction within the project corridor. Permit requirements will be determined during the study's design phase. Streams and jurisdictional drainage ditches were not formally assessed for this overview.

4.1.2.3 THREATENED AND ENDANGERED SPECIES

The majority of the project corridor is comprised of urban development and transportation right of way. However, the project corridor contains large and small trees that could be considered as potential Indiana and/or northern long-eared bat roosting/maternity habitat, particularly within residential neighborhoods. Therefore, any tree removal will have to be coordinated with USFWS under the Endangered Species Act 1973.

Federally threatened and endangered species for Kenton County include the gray bat; Indiana bat; northern long-eared bat; running buffalo clover; and the following mussels: sheepnose, clubshell, fanshell, northern riffleshell, orangefoot pimpleback, pink mucket, spectaclecase, purple cat's paw, rabbitsfoot, ring pink, and rough pig toe.

No critical habitat, trout streams/fish spawning areas, sensitive areas, management areas, or protected natural areas are known to occur near the project corridor. Mussel species should not be subject to impacts since the streams within the project corridor do not support those species.

4.1.2.4 CULTURAL HISTORIC RESOURCES

4.1.2.4.1 HISTORIC RESOURCES

A cultural historic reconnaissance survey of the project corridor was performed in November 2017. Based upon this survey and preliminary research, only one building, the Monte Cassino Chapel, has sufficient age and significance to be listed in the National Register of Historic Places (NRHP). This site is included on the Environmental Points of Interest Map (**Figure 10**). The historic overview is provided in **Attachment B** to the Environmental Overview.

The Monte Cassino fieldstone chapel (see **Figure 11**) was constructed in Covington's Peaselburg neighborhood in 1878 by Benedictine monks on the grounds of the Monte Cassino Benedictine Monastery. The chapel was relocated to its current site on the proposed Thomas More campus in Spring 1965. The chapel is likely eligible under Criterion Consideration B, as important both for its architectural value and its association with the non-religious commercial work of the Benedictine Monks of Monte Cassino Monastery. This building appears to have retained its architectural integrity and may well be the only building associated with the monks' tenure in Kenton County, Kentucky. In addition, the chapel could potentially be listed for its association with the development of Thomas More College in the mid-1960s,

Figure 11: Monte Cassino Chapel

given that the move occurred over 50 years ago. Further research will need to be conducted to assess the historic significance of this resource.

4.1.2.4.2 ARCHAEOLOGICAL RESOURCES

An Archaeological Overview was conducted in November 2017 for the proposed project (see **Attachment C** of the Environmental Overview). The Archaeological Overview consisted of in-office research, review of the Kentucky Office of State Archaeology (OSA) records, and a site visit; no shovel testing was performed.

No archaeological sites were identified by the reports on file at OSA or any other type of survey within the project corridor. One archaeological site was identified by those surveys as being within the 2-kilometer archaeological buffer. In spite of the development throughout the corridor, isolated locations were identified that could contain intact soils. Major infrastructure projects have occurred within the corridor, which include construction of I-275, the archaeological survey of which was completed in 1968, and the widening of Turkeyfoot Road (KY 1303), for which an archaeological survey was completed in 1994 (Rodeffer 1968; Stallings and Ross-Stallings 1994). One other survey within the project corridor was completed in 2001 for a cellular tower location (Stillwell 2001). The I-275 survey through Kenton County, however, was hampered by landowner access and vegetation, and no map of survey strategies or accessed properties was included in the report.

The surveyed corridor prior to the widening of Turkeyfoot Road (KY 1303) is assumed to be within the current limits of the now-widened Turkeyfoot Road (KY 1303) itself. Therefore, the current project corridor extends beyond those limits and portions outside of the current right of way still need to be surveyed. It is recommended that these areas be subjected to subsurface survey using shovel testing. Areas that were identified as possibly intact were generally located near corners of intersections, as these were free from residential development, and areas that have mature trees. In addition to those areas noted for shovel test survey, the northwestern corner of the area is a steep ravine and should be walked over and examined for rockshelters or other cultural features.

4.1.2.5 SECTION 4(F)/SECTION 6(F) RESOURCES

If federal funds are used for the project, Section 4(f) of the Department of Transportation (DOT) Act of 1966 will also apply to public recreational resources. Section 4(f) stipulates that the Federal Highway Administration (FHWA) and other DOT agencies cannot approve the use of land from publicly-owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites unless there is no feasible and prudent alternative to the use of the land, and the action includes all possible planning to minimize harm to the property resulting from use.

Section 6(f)(3) of the Land and Water Conservation Fund Act of 1965 requires all property acquired or developed with Land and Water Conservation Fund (LWCF) assistance be maintained in perpetuity for public outdoor recreation use.

No public recreational resources are within or adjacent to the project corridor. Two private recreational facilities, the Summit Hills Country Club and Thomas More College's baseball field, are located adjacent to Turkeyfoot Road (KY 1303). These facilities do not appear to be subject to the provisions of Section 4(f).

The LWCF database was not available to consult during the development of the Environmental Overview; however, it should be confirmed at a later date that Section 6(f) resources are not present within the project corridor.

4.1.2.6 HAZARDOUS MATERIAL/UNDERGROUND STORAGE TANK (UST)

Hazardous materials within the project corridor include the Duke Energy substation immediately adjacent to Turkeyfoot Road (KY 1303), potential chemicals in the medical facilities, and the potential for asbestos in structures. At the time of the environmental field visits, no polychlorinated biphenyl (PCBS) containers were identified; but no access to the property or the buildings was allowed. It would be best to avoid the substation (see **Figure 10**) and utilities (i.e., the gas line between Turkeyfoot Road (KY 1303) and Town Center Boulevard) to the extent possible.

Potential exists for medical and dental facilities in the project corridor to house chemicals that could have been accidentally released in floor drains. If drains are found in these facilities, it would be best to sample water/soils near or in them.

Asbestos-containing materials (ACMs) can be found in building structures. Prior to demolition, ACM samples will need to be taken.

No gas stations or other petroleum-containing facilities were identified within the project corridor. No burn or dump sites, nor any other hazardous waste sites are immediately adjacent to the area of potential effect.

4.1.2.7 SOCIOECONOMIC CHARACTERISTICS

Socioeconomic data for the state, Kenton County, and Census Tract Block Groups within the project corridor were obtained to determine potential Environmental Justice (EJ) issues. **Figure 12** shows the location of all Census Tract Block Groups. A socioeconomic study was performed for this overview by the Northern Kentucky Area Development District in a report entitled KY 1303 – Turkeyfoot Road (KY 1303) Socioeconomic Study, which is included in the

Environmental Overview as **Attachment D** (see **Appendix C**); summaries of those findings are included below.

4.1.2.7.1 HUMAN POPULATION SUMMARY

The percentages of protected populations in the project corridor, as defined by the KYTC's 2014 Guidance for Environmental Justice Analysis, are summarized in **Table 7**. Shaded cells denote population percentages within a Census Tract Block Group that exceed the county's percentage for that category. These populations are discussed further in Section 4.1.2.7.2, below.

Table 7: Human Population Summary

	United States	Kentucky	Kenton County	BG 1 CT 645	BG 1 CT 654	BG 3 CT 646
Minority Populations	38.7%	15.1%	11.3%	2.3%	7.4%	26.3%
Low-Income Populations	15.5%	18.9%	14.6%	13.2%	2.7%	21.3%
Elderly Populations	14.9%	14.4%	12.3%	20.7%	20.3%	14.7%
Disabled Populations	12.4%	17.0%	14.2%	21.6%	15.4%	16.1%
Limited English Populations	8.6%	2.1%	1.7%	1.2%	1.4%	7.3%

4.1.2.7.2 ENVIRONMENTAL JUSTICE

The purpose of Executive Order (EO) 12898, "Federal Actions to Address Environmental Justice in Minority and Low-Income Populations," is to focus federal attention on the environmental and human health condition of minority and low-income communities, to promote non-discrimination in federal programs affecting human health and the environment, and to provide minority and low-income communities access to public information and an opportunity to participate in matters relating to the environment and human health.

Additionally, the KYTC works to identify potential populations of the Elderly, Disabled, Limited English Proficiency, and Limited Transportation Options that may be impacted in or near the affected community, should highway improvements take place in the future.

Census Tract 646 Block Group 3 is located north of I-275; while a portion of the project corridor extends into this Block Group, the project corridor does not encroach upon any residences or

other structures within the Block Group. Within the project corridor, this Block Group only includes transportation right of way and would not be included in an EJ analysis for the project.

Higher percentages of Elderly and Disabled populations are present in both Block Groups within the project corridor, when compared to the rates within Kenton County. Further analysis and coordination will need to occur to determine whether any EJ impacts will occur to these populations.

4.1.2.8 AGRICULTURE

The immediate project corridor is predominantly urban; therefore, the provisions of the Farmland Protection Policy Act (7 CFR 658) do not appear to apply to this project. No farmland is within or adjacent to the project corridor, and it is not expected that this project will result in any impacts to farmland in Kenton County; further investigation should occur during project development to confirm that coordination with the Natural Resources Conservation Service (NRCS) is not required.

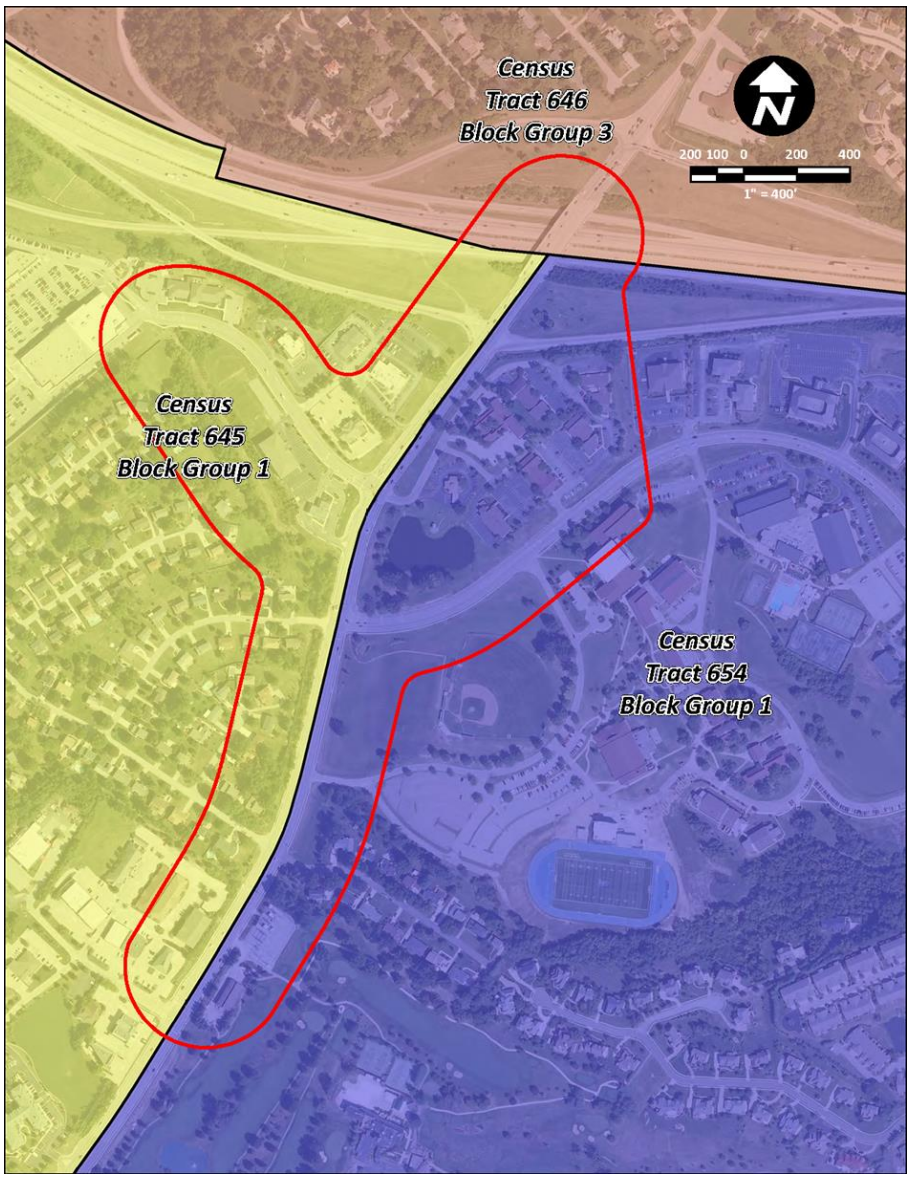


Figure 12: Census Tract Block Groups within the Project Corridor

4.2 GEOTECHNICAL OVERVIEW

American Engineers, Inc. provided a Geotechnical Overview for the project corridor, a copy of which is provided in **Appendix D**. The geotechnical overview was conducted in relative accordance with Section 801 of the *KYTC Geotechnical Manual*. The purpose of this overview was to identify potential geotechnical concerns and provide anticipated typical parameters for design throughout the defined project corridor as a precursor to a more thorough geotechnical field investigation. The study was conducted during November and December 2017 and included geologic research of available geologic and topographic quadrangle maps, Soil Survey of Kenton County, Kentucky, as well as multiple resources available from the Kentucky

Geological Survey and the United States Geological Survey. Past reports from geotechnical investigations for roadways and structures in and near the area of the Geotechnical Overview were also reviewed.

Much of the project corridor is developed with residential and commercial properties, a bridge, and intersections with high traffic counts. Numerous utilities, including both overhead and underground, were observed along the existing roadway, and much of the existing alignment is bound by Thomas More College on the east side of the existing roadway. It is likely that any new construction will be constrained by these existing features. A means of soil stabilization will likely be required to provide a suitable platform for any additional fill placement and to support any new construction, whether by utilization of granular embankment or chemical stabilization. Chemical stabilization can be difficult; however, KYTC District 6 prefers to use chemical or cement stabilization. Manipulation and drying of subgrade soils will likely be required during construction to provide adequate compaction.

4.2.1 SITE GEOLOGY

Available geologic mapping (Geologic map of the Covington quadrangle, northern Kentucky, USGS, 1971 and the Kentucky Geological Survey Geologic Map Information Service online) indicates bedrock, which underlies the project corridor, is comprised primarily of the Upper Ordovicianaged Bull Fork Formation. The Bull Fork Formation is predominantly comprised of interbedded limestone and shale.

Highway fill containing appreciable quantities of shale and argillaceous limestone from Upper Ordovician formations is subject to failure by sliding.

Mapping did not indicate any potential for karst development, and no known coal zones or oil or gas fields exist in the project corridor. Two monitoring wells were noted from the KY Geologic Map Information Service north and south of the intersection of Dudley Road and Turkeyfoot Road (KY 1303).

4.2.2 TOPOGRAPHY AND DRAINAGE

The project corridor lies within the Outer Bluegrass Physiographic Region in Kenton County.

Topography of the project corridor is characterized by broad, gently sloping ridgetops, moderately sloping side slopes, and moderately wide to narrow flood plains. Topographic relief throughout the project corridor ranges from a low of about 860 feet at the north end of the bridge over I-275 to a high of about 895 feet near Dudley Road.

Surface drainage within the project corridor trends toward several small localized creeks and ditches and ultimately drains to the Ohio River. Along the existing roadway, surface drainage appears to drain into a curb and gutter along the west side of the roadway.

4.2.3 GEOTECHNICAL CONSIDERATIONS

Subgrade soils which lie within the project corridor are anticipated to have a design CBR value near 2. It is anticipated that subgrade stabilization will likely be required for any new construction. Chemical treatment, such as lime or cement stabilization, may be desired to effectively stabilize road subgrades. Chemical stabilization can be difficult; however, KYTC District 6 prefers to use chemical or cement stabilization. Stabilization utilizing processed crushed stone and geotextile fabric may prove to be a more viable alternative for this project.

Soils which underlie the project corridor are anticipated to largely consist of clayey silts with excessive moisture contents, which are highly sensitive to moisture content. Closer tolerances to the optimum moisture content are often required when utilizing soils containing high percentages of silt and sand-sized particles.

Wet areas could require stabilization for embankment construction. Likewise, subgrade soils under existing pavements could be very wet and might require stabilization if pavements are removed. It should be anticipated that shale may have been utilized for pavement subgrade stabilization during prior roadway construction in the area. Any new bridges, culverts, or culvert extensions will likely be designed for a non-yielding foundation.

Adequate drainage will be of primary concern with any new design or new construction since the soils in the area are anticipated to be silty in nature. Positive drainage should be promoted at all times during construction. Mitigation of surface runoff should be performed by silt checks, silt traps, sediment basins, and lined ditches, where appropriate, and directed toward permanent drainage structures as soon as possible.

Any new roadway embankments or cut slopes for new construction will likely be minimal. Any embankments constructed at 2H:1V or flatter will likely provide an acceptable factor of safety for embankments less than 20 feet in height. Soil cuts in the residual soils and plastic shales of the Bull Fork Formation can be problematic due to softening of the clays upon exposure in the cuts. Soil cut slopes should not be steeper than 2H:1V. While not anticipated, previous reports in the area indicate that embankments and cut slopes greater than 20 feet in height may require flatter configurations. Review of previous roadway reports indicates that embankments greater than approximately 25 feet in height should be constructed at 2.5H:1V, and embankments greater than approximately 35 feet in height should be constructed at 3H:1V. Previous roadway reports also indicate that cuts over 25 feet in depth should be constructed at

2.5H:1V. Further investigation and analyses will dictate the slope design; however, these slope ratios should be considered until such work has been performed.

No oil or gas wells were identified through review of online mapping or during field review of the project corridor. Any oil or gas wells identified prior to or during construction should be closed in accordance with Section 708 of the current edition of the Standard Specifications for Road and Bridge Construction.

Several monitoring wells or other water wells were indicated to lie within the project corridor upon review of online mapping near the intersection with Dudley Road. Any water wells, cisterns, manholes, or catch basins not incorporated into any new design and identified prior to or during construction should be closed in accordance with Section 708 of the current edition of the Standard Specifications for Road and Bridge Construction.

A working platform for subgrade stabilization may be required for select areas where soft, saturated soils are encountered. The working platform will typically consist of quarry material such as KYTC No. 2 stone or similar. Previous geotechnical reports in the area have listed select areas where working platforms were required beneath the roadway template. The crushed stone will likely be wrapped in Geotextile Fabric, Type I. Based on previous projects in areas containing similar materials, the thickness of the working platform may exceed one foot. Alternatively, *in lieu of* a working platform the use of geogrid and/ or high-strength fabric may be an option to improve subgrade performance when used in conjunction with an additional six to eight inches of processed stone such as DGA or crushed stone base. The actual thickness, type of stabilization, and locations will be determined by the engineer during construction and may depend on seasonal fluctuations of the water table.

5.0 INITIAL PROJECT TEAM MEETINGS AND PUBLIC INVOLVEMENT

Project Team meetings were held throughout the development of the study to present findings, solicit feedback, and coordinate with KYTC staff. Summaries of the Project Team meetings are provided in **Appendix E**.

The Project Team also held two Local Officials / Stakeholders Meetings and met with key stakeholders in separate meetings during the development of the study. The meeting summaries for the Local Officials / Stakeholders Coordination are provided in **Appendix F** in chronological order and include a list of the attendees.

5.1 FIRST PROJECT TEAM MEETING

The first Project Team meeting was held on December 13, 2017, at the KYTC District 6 Office in Covington, Kentucky. The Project Team was presented display maps of the existing Traffic and Roadway Characteristics (**Figure 4**), Crash History **(Figure 6)**, and Existing Property and Utilities **(Figure 7)** that would also be shared during the Local Officials / Stakeholders Meeting later that day. The meeting then proceeded to a discussion of the PowerPoint Presentation that was to be presented at the Local Officials / Stakeholders Meeting. The PowerPoint presentation included a summary of peak hour travel times, which were derived from the microsimulations. The Project Team discussed various opportunities for refining the microsimulation based on reaction times, field measurement of acceleration times, and observed queues along the corridor, and agreed to collaborate on these changes following the meeting. Modifications to the PowerPoint presentation were made for improved clarification of the information presented. The meeting concluded with a reminder that the primary goal for the Local Officials / Stakeholders Meeting was to confirm that the safety and congestion issues had been accurately identified.

5.2 FIRST LOCAL OFFICIALS AND STAKEHOLDERS MEETINGS

The first Local Officials and Stakeholders meeting was held on December 13, 2017, at the Crestview Hills City Building in Crestview Hills, Kentucky. The primary purpose of the first meeting was to present existing conditions within the project corridor and confirm that the safety and congestion issues had been accurately identified. These conditions and data were presented through a PowerPoint presentation and displays. Of 31 attendees to the meeting, 18 were Local Officials and Stakeholders, and the remaining 13 were from the Transportation Cabinet, the NKADD, or the Consultant Team.

Questionnaires were distributed for the attendees to provide written feedback regarding the existing conditions, perceived problem areas, and additional comments. Written comments were received from 13 attendees. A brief summary of comments follow:

- Existing conditions are accurately represented
- Problem is volume of traffic at peak times and the proximity of access roads connecting to Turkeyfoot Road (KY 1303)
- Long queues along Turkeyfoot between I-275 and Thomas More Parkway
- Congestion and travel times are a primary concern
- Safety of pedestrians (students at Thomas More College) is a concern
- Realignment of Thomas More Parkway and Town Center Boulevard was noted as a possible solution

5.3 STAKEHOLDER INFORMATION GATHERING MEETINGS

5.3.1 ST. ELIZABETH HEALTHCARE – APRIL 2018/JUNE 2018

A meeting was held at the KYTC District 6 Office in Covington, Kentucky on April 19, 2018, with St. Elizabeth Hospital representatives to discuss future campus development. During the meeting, St. Elizabeth Hospital provided a detailed discussion on the future hospital expansion. At the time of the meeting, CT Consultants was performing a traffic impact study of the expansion. The study was expected to be completed by June 2018. The team agreed the selected annual growth rate would adequately cover the anticipated growth.

An additional meeting was held at the KYTC District 6 Office on June 25, 2018, with St. Elizabeth Hospital representatives to review the Traffic Impact Study Report for the Edgewood Campus prepared by CT Consultants. A copy of selected portions of the report was presented to the group. The discussion focused on the intersections of Turkeyfoot Road (KY 1303) at Thomas More Parkway / Fraternity Court. The results of the analysis presented in the report indicated that the intersection currently operates at Level of Service (LOS) D in both the AM and PM peak hours. They further noted that the proposed site traffic added minimum delay to the intersection as compared to the No-Build scenario.

5.3.2 THOMAS MORE COLLEGE MEETING – MAY 2018

A meeting was held at the KYTC District 6 Office in Covington, Kentucky on May 2, 2018, with representatives of the Thomas More College. Thomas More College gave a brief overview of the

potential options presented in the Thomas More College Long-Range Plan. At the time of this meeting, the Long-Range Plan was in draft form.

Aspects of the plan include improvements to the existing campus roadway network and land use changes along Turkeyfoot Road (KY 1303) and Thomas More Parkway. As part of the plan, Villa Madonna Drive would become the main campus entrance and provide continuity to Thomas More Parkway along Renaissance Drive. Thomas More College is also looking at mix-used properties on campus and is currently constructing additional residence housing on campus.

Thomas More College inquired about converting the one-way stop-controlled Villa Madonna Drive and Turkeyfoot Road (KY 1303) intersection to a signalized intersection based on Long-Range Plan options being studied. Due to the limits of the Turkeyfoot Road (KY 1303) Corridor Planning Study, the Project Team could not provide information on whether or not the change in traffic patterns would warrant a traffic signal for the mentioned option.

Thomas More College has expanded its campus to a building across Turkeyfoot Road (KY 1303) near Barnwood Drive. Currently, the students need to cross Turkeyfoot Road (KY 1303) at the Thomas More Parkway intersection or at the Barnwood Drive intersection. The College inquired about constructing a crosswalk mid-block between the intersections to provide additional access across Turkeyfoot Road (KY 1303). The team explained that the state policy is to avoid mid-block crossings due to the pedestrian risks as compared to the expectation of drivers.

6.0 ALTERNATIVES DEVELOPMENT

6.1 IMPROVEMENT STRATEGIES

Improvement strategies were developed after considering the existing conditions, including environmental concerns, geotechnical data, utilities, and residential relocations; traffic and crash analyses; and input from Local Officials / Stakeholders. This information was presented through Project Team meetings and Local Officials / Stakeholders meetings.

After existing conditions were verified at the first round of meetings, traffic and crash analyses were performed. As a result of the analyses, alternatives were developed to address safety and mobility utilizing a series of improvements that included addressing the offset intersection of Town Center Boulevard and Thomas More Parkway and low-cost spot improvements that would provide an immediate benefit.

6.2 SECOND PROJECT TEAM MEETING – MAY 2018

A second Project Team meeting was held on May 2, 2018. The primary purpose of the meeting was to review the conceptual improvement strategies developed to improve safety and reduce congestion along Turkeyfoot Road (KY 1303) between Barnwood Drive and the eastbound ramps of I-275. The crash data was presented to show how the crash locations were a primary focus in the development of alternatives for the study. The team was presented two alternatives for discussion:

- **Alternative 1 –** An ultimate solution that consolidates the intersections of Town Center Boulevard with Thomas More Parkway to a single intersection. It also includes the series of low-cost improvements developed for Alternative 2.
- **Alternative 2 -** A series of low-cost spot improvements that would provide an immediate benefit.

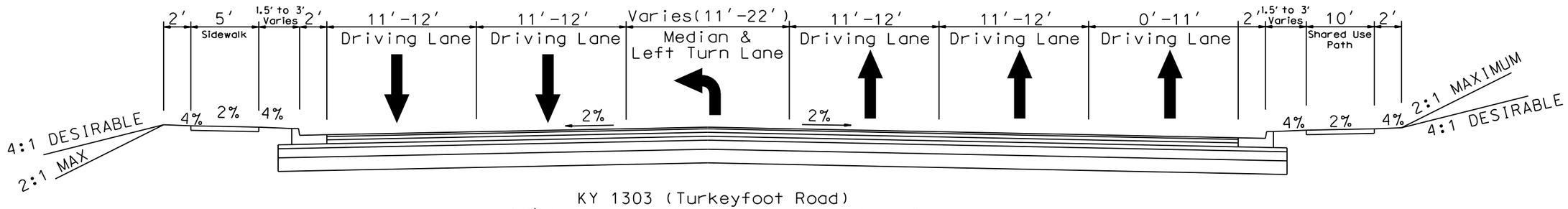
The Project Team offered numerous suggestions for refining the alternatives, including changes to access points and the potential for a new traffic signal at College Park Drive. The team agreed to use 12-feet lane width for the study. The Project Team endorsed the concepts but requested that that the alternative numbering be reversed so that the low-cost improvements are presented first and the ultimate solution is presented second, as follows:

- **Alternative A –** A series of low-cost spot improvements that would provide immediate benefit.
- **Alternative B –** An ultimate solution that consolidates the intersections of Town Center Boulevard with Thomas More Parkway to a single intersection, with a series of improvements, including the low-cost improvements developed for Alternative A.

6.3 TYPICAL SECTIONS

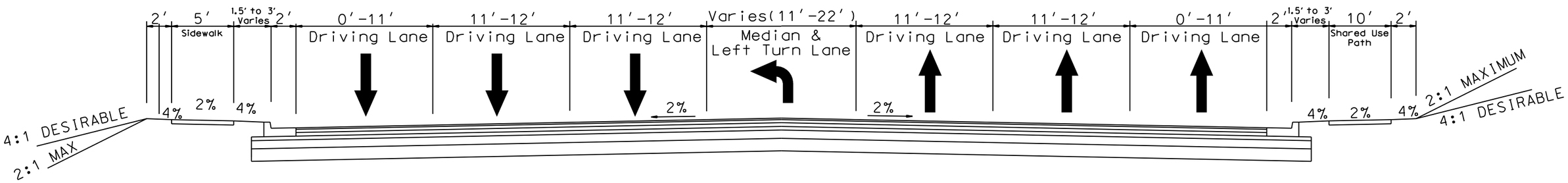
The Project Team utilized the typical sections shown in **Figure 13** and **Figure 14** to evaluate the improvement alternatives for this study.

TYPICAL SECTIONS



KY 1303 (Turkeyfoot Road)
5-11′ Lanes From College Park Dr. to I-275
4-12′ Lanes from Barnwood Dr. to College Park Dr.

EXISTING / ALTERNATIVE A



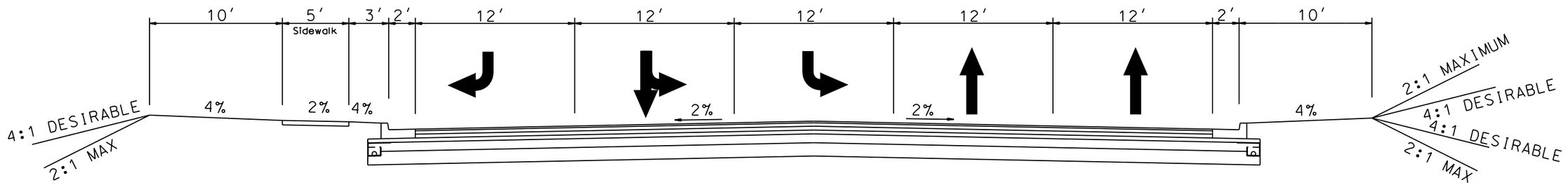
KY 1303 (Turkeyfoot Road)
6-11′ Lanes from Town Center Boulevard to I-275 EB Exit Ramp
5-11′ Lanes From College Park Dr. to Town Center Boulevard
4-12′ Lanes from Barnwood Dr. to College Park Dr.

PROPOSED ALTERNATIVE B

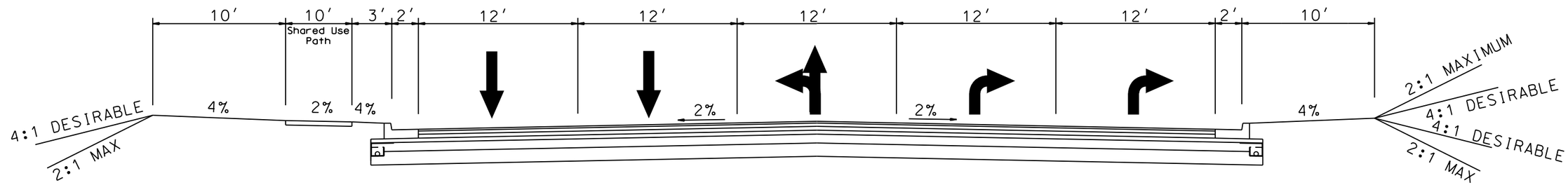
NOT TO SCALE

Figure 13:
Existing and Proposed
Typical Sections
for Turkeyfoot Road

TYPICAL SECTIONS



RELOCATED TOWN CENTER BOULEVARD
NORMAL SECTION



RELOCATED THOMAS MORE PARKWAY
NORMAL SECTION

NOT TO SCALE

Figure 14:
Conceptual Typical Sections
for Town Center Boulevard
and Thomas More Parkway

6.4 ALTERNATIVES

6.4.1 ALTERNATIVE A

Alternative A was developed as lower-cost options to address the immediate deficiencies that are occurring along the corridor. The following improvements were developed so that they could be constructed independently of each other; but, if all are constructed, the corridor would provide a greater improvement:

Alternative A: Spot Improvements / Lower Cost Options (see **Figure 15**)

1. Add a right-turn lane to exit ramp – I-275 eastbound
2. Eliminate the right-in entrance to TGI Fridays
3. Add a right-turn lane on Turkeyfoot Road (KY 1303) from I-275 eastbound ramp to existing Town Center Boulevard
4. Eliminate the access from Fraternity Court to Turkeyfoot Road (KY 1303)
5. Restrict left turns from Villa Madonna to Turkeyfoot Road (KY 1303) southbound
6. Add a right-turn lane on Turkeyfoot Road (KY 1303) northbound to Thomas More Parkway

The addition of an extra lane on the I-275 eastbound off-ramp provides for stacking of the right-turning vehicles. As part of Alternative A, an additional lane will be added along southbound Turkeyfoot Road (KY 1303) and dropped at College Park Drive. The additional through lane on Turkeyfoot Road (KY 1303) will provide improved capacity if unmet demand for Thomas More Parkway vehicles queue back into the southbound lanes. The alternatives also closes several access points along Turkeyfoot Road (KY 1303) and converts Villa Madonna Drive to a J-turn intersection. The addition of right-turn lanes at Thomas More Parkway and Town Center Drive will improve capacity.

6.4.2 ALTERNATIVE B

Alternative B was developed as an ultimate fix to address the long-term operations along the corridor. As part of the alternative development, the team developed the following solutions that could be integrated to include Alternative A improvements if those are constructed before Alternative B.

Alternative B: Consolidate Town Center Boulevard and Thomas More Parkway Intersections (see **Figure 16**)

1. Include all Spot Improvements from Alternative A

2. Consolidate the Town Center Boulevard and Thomas More Parkway intersections to a single intersection by realigning both roads
3. Add a lane to Turkeyfoot Road (KY 1303) southbound from the I-275 eastbound ramp to just beyond relocated Town Center Boulevard
4. Convert access to the existing Town Center Boulevard to right-in / right-out
5. Convert frontage road from Turkeyfoot Road (KY 1303) to Thomas More Parkway to right-in / right-out at Turkeyfoot Road (KY 1303)
6. Extend the frontage road / backage road to reconnect with Thomas More Parkway

Alternative B relocates Thomas More Parkway and Town Center Boulevard to be situated further south of the existing Town Center Boulevard intersection, based on the traffic analyses and the proximity to the existing I-275 ramp location. This location improves the intersection spacing from the I-275 ramps. By relocating and unifying these intersections, a signal can be eliminated, thereby reducing potential travel time delays and the number of conflict points; and additional storage can be provided for the Thomas More Parkway dual left turn.

The southbound right-turn lane that is proposed for Alternative A is dropped at the College Park intersection and is tapered out past the Town Center Boulevard intersection in Alternative B. The termination of the turn lane as shown in Alternative B is preferred to avoid right-of-way impacts associated with the proposed urban typical section.

The consolidation of the intersections reduces weaving on northbound Turkeyfoot Road (KY 1303) between Thomas More Parkway and Town Center Boulevard and increases left-turn storage capacity on northbound and southbound Turkeyfoot Road (KY 1303). The existing Town Center Drive access point would be converted to right-in/right-out access and serve as an access road to the commercial businesses along the route. The additional southbound lane would be dropped after the relocated Thomas More Parkway intersection, resulting in three through lanes. A two-way left-turn lane from Thomas More Parkway will be required to provide access to Villa Madonna Drive and the frontage/backage road, with a right-turn lane only entrance to replace the existing full access to the second building fronting Thomas More Parkway.

In discussions with KYTC project management, it was later decided that Alternative B would include a shared-use path along the east side of Turkeyfoot Road (KY 1303) through the study corridor and on the south side of Thomas More Parkway. The shared-use path was preferred by the Project Team and local officials to accommodate students who currently walk to various parts of the Thomas More College campus and to provide a protected path for the users along and across Turkeyfoot Road (KY 1303). As part of the project, a connection would be provided to the adjacent business park and shopping center.

Figure 15: Alternative A

Figure 16: Alternative B

6.5 2040 TRAFFIC ANALYSIS OF BUILD ALTERNATIVES

A microsimulation model was used to compare existing and proposed improvements and to evaluate the benefits of the alternatives to the entire corridor. The team selected travel times for specific routes and number of stops as evaluation criteria for the system. A summary of the traffic microsimulation results for the Turkeyfoot Road (KY 1303) traffic measures of effectiveness is presented in **Table 8**. The results of the microsimulation revealed reductions in travel time and maximum queue lengths for each alternative when compared to existing conditions. Although the level of service designation does not indicate a significant change in grade level, the level of service for the intersections along Turkeyfoot Road (KY 1303) improves significantly in the amount of delay each vehicle will experience along the corridor.

Travel times and queue lengths for segments of Turkeyfoot Road (KY 1303) between the critical nodes fluctuated between Alternatives A and B, primarily due to the changes in signal timing in the microsimulations and resulting congestion that occurs in critical movements within each alternative. The spot improvements with Alternative A address the immediate needs for improving travel, but the improvements fail as the traffic increases in the future. Alternative B best addresses the congestion in the long term by significantly reducing the overall travel time for the vehicles in the model in comparison to Alternative A.

The travel times for the improvements are shown in **Table 9** and indicate a significant reduction in the peak periods for 2040 volumes. By implementing these improvements, the 2040 travel times are similar to existing conditions. The total number of stops in the network was also reduced significantly with the improvements, which will improve safety and traffic flow.

Table 8: Traffic Measures of Effectiveness

Travel Times			Existing		No Build		Alternative A				Alternative B			
			2017 AM	2017 PM	2040 AM	2040 PM	2017 AM	2017 PM	2040 AM	2040 PM	2017 AM	2017 PM	2040 AM	2040 PM
Map Nodes	From	To	Time (min:sec)	Time (min:sec)	Time (min:sec)	Time (min:sec)	Time (min:sec)	Time (min:sec)	Time (min:sec)	Time (min:sec)	Time (min:sec)	Time (min:sec)	Time (min:sec)	Time (min:sec)
1 to 5	I-275 EB	Thomas More Pkwy	4:43	3:31	9:36	8:48	3:23	2:33	2:58	2:25	2:39	2:57	5:01	4:40
1 to 6	I-275 EB	Dudley Road	4:25	5:01	9:15	11:00	2:35	3:26	2:51	4:26	2:30	3:20	3:32	4:54
3 to 5	I-275 WB	Thomas More Pkwy	6:00	4:43	8:40	7:42	4:13	3:36	4:07	5:49	3:35	2:43	5:14	5:46
3 to 6	I-275 WB	Dudley Road	5:16	6:01	8:07	9:51	4:00	4:42	4:16	7:46	2:10	2:23	5:46	6:04
6 to 2	Dudley Road	I-275 EB	2:25	4:04	6:27	13:02	2:20	5:29	4:18	4:52	3:02	2:55	2:52	3:46
6 to 4	Dudley Road	I-275 WB	3:06	5:05	6:40	15:47	2:22	7:27	5:22	6:23	4:05	4:10	2:58	4:07
TOTAL TRAVEL TIME ALL VEHICLES (MIN)			**15,100**	**23,183**	**29,527**	**52,695**	**14,248**	**22,529**	**25,135**	**37,367**	**13,850**	**18,769**	**22,551**	**35,585**

Maximum Queue Lengths	Existing		No Build		Alternative A				Alternative B			
Location	2017 AM (ft)	2017 PM (ft)	2040 AM	2040 PM	2017 AM (ft)	2017 PM (ft)	2040 AM (ft)	2040 PM (ft)	2017 AM (ft)	2017 PM (ft)	2040 AM (ft)	2040 PM (ft)
NB Turkeyfoot at Thomas More Pkwy (Thru Movement)	908	2293	1644	3921	708	2809	3755	3191	954	724	916	1063
SB Turkeyfoot at Thomas More Pkwy (Left Turn)	675	301	551	613	618	263	631	414	373	412	1045	1144
NB Turkeyfoot at Town Center Blvd (Thru Movement)	557	783	442	812	597	1037	614	1647				
SB Turkeyfoot at Town Center Blvd (Thru Movement)	809	1206	811	2091	716	493	812	531				
SB Turkeyfoot at I-275 EB Ramps (Thru Movement)	873	981	1977	2324	519	1026	1475	1310	557	647	1272	685
EB I-275 Off-Ramp (Right Turn)	1078	1322	1820	1701	380	718	552	455	211	223	726	970

Level of Service/Delay	NO Build				Alternative A				Alternative B			
	2040 AM		2040 PM		2040 AM		2040 PM		2040 AM		2040 PM	
Signalized Intersection	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
Barnwood Drive	C	33	C	20	C	33	C	20	C	33	C	20
Thomas More Parkway	F	330	F	250	E	75	D	54	F	97	F	125
Town Center Blvd	E	74	F	182	D	52	F	120	NA	NA	NA	NA
I-275 EB Ramps	F	256	F	314	F	129	F	172	F	129	F	172
I-275 WB Ramps	D	41	F	82	D	41	F	82	D	41	F	82

6.5.1 ALTERNATIVE A

The benefits of Alternative A to the entire corridor were evaluated through the microsimulation model to compare the proposed improvements to the No-Build existing conditions in 2040. The improvements proposed in Alternative A result in a significant reduction in queue length on the ramps and Turkeyfoot Road (KY 1303), along with a reduction in travel time for the various routes. The northbound Turkeyfoot Road (KY 1303) travel times experience significant reduction with the proposed improvements. Travel times are reduced due to the improvements to the I-275 eastbound off-ramp eliminating vehicles queueing onto I-275 and by providing an additional through lane for vehicles to travel southbound on Turkeyfoot Road (KY 1303). The combination of these improvements reduces congestion and provides capacity for the traffic demand.

The travel times for the improvements are shown in **Table 9** and indicate a significant reduction in the peak periods for 2040 volumes. By implementing these improvements, the 2040 travel times are similar to existing conditions. The total delay at each signal was reduced significantly and the total number of stops was reduced by 20% with Alternative A, in comparison to the no-build, resulting in improved safety and traffic flow.

Table 9: 2040 Travel Times (minutes:seconds)

		2017 Existing (min:sec)	2040 No-Build (min:sec)	2040 Alternative A (min:sec)	2040 Alternative B (min:sec)
AM	275 EB Ramp to Thomas More Parkway	4:43	9:36	2:58	5:01
	275 EB Ramp to Dudley Road	4:25	9:15	2:51	3:32
	275 WB Ramp to Thomas More Parkway	6:00	8:40	4:07	5:14
	275 WB Ramp to Dudley Road	5:16	8:07	4:16	5:46
	Dudley to 275 EB	2:25	6:27	4:18	2:52
	Dudley to 275 WB	3:06	6:40	5:22	2:58
PM	275 EB Ramp to Thomas More Parkway	3:31	8:48	2:25	4:40
	275 EB Ramp to Dudley Road	5:01	11:00	4:26	4:54
	275 WB Ramp to Thomas More Parkway	4:43	7:42	5:49	5:46
	275 WB Ramp to Dudley Road	6:01	9:51	7:46	6:04
	Dudley to 275 EB	4:04	13:02	4:52	3:46
	Dudley to 275 WB	5:05	15:47	6:23	4:07

The delay times and level of service for the improvements are shown in **Table 10** and reveal that the level of service for the intersections along Turkeyfoot Road (KY 1303) improves significantly as the amount of delay for each vehicle is reduced along the corridor. While the level of service letter designation does not indicate a significant change due to the levels of service being significantly below the LOS E threshold and with the improvements, the delays are reduced by 50% or more but do not reach the desirable LOS D. The V/C ratio of the intersections within the project corridor improve slightly from the No-Build with the highest being 1.35. Alternative A reduces the conflict points along Turkeyfoot Road (KY 1303) by eliminating the left-exiting turns from Villa Madonna Drive and also eliminating the Fraternity Court approach at Thomas More Parkway.

Table 10: 2040 Delay Times (seconds/LOS)

	Turkeyfoot Drive Intersections	2040 No-Build (sec/LOS)	2040 Alternative A (sec/LOS)	2040 Alternative B (sec/LOS)
AM	275 WB Ramp	41/D	41/D	41/D
	275 EB Ramp	256/F	129/F	129/F
	Town Center Blvd	74/E	52/D	-
	Thomas More Parkway	330/F	75/E	97/F
	Barnwood Dr.	33/C	33/C	33/C
PM	275 WB Ramp	82/F	82/F	82/F
	275 EB Ramp	314/F	172/F	172/F
	Town Center Blvd	182/F	120/F	-
	Thomas More Parkway	250/F	54/D	125/F
	Barnwood Dr.	20/C	20/C	20/C

6.5.2 ALTERNATIVE B

The benefits of Alternative B to the entire corridor were also evaluated through the microsimulation model to compare the proposed improvements to the No-Build existing conditions in 2040. Alternative B improvements expand on the Alternative A lower-cost options by eliminating a signalized intersection, which keeps traffic continuously flowing, to provide for additional gaps in traffic for the I-275 eastbound right turns. This alternative also improves the southbound Turkeyfoot Road (KY 1303) queue at Thomas More Parkway by providing an additional through lane and adequate storage for the left-turn lanes to Thomas More Parkway. The alternative also significantly improves the southbound through movement at the I-275

ramp, which is attributed to the elimination of a signal that impacts the flow of traffic due to the queue from downstream signals.

Table 9 presents the savings in travel time and **Table 10** provides the delay and level of service comparison for the alternatives. The travel time for the improvements indicates a significant reduction in the peak periods for 2040 volumes. While the travel times fluctuate in the segments due to the signal timing in the microsimulations and resulting congestion, Alternative B best addresses the congestion in the long term by reducing the overall total travel time for all vehicles in the model by over 2,000 minutes during the peak hour in comparison to Alternative A (see **Table 8**). The PM peak hour provides the greatest benefit within Alternative B due to the higher volume of vehicles entering the project corridor at multiple locations and not just a single point, as occurs during the AM peak hour. The total delay at each signal was reduced significantly, and the total number of stops was reduced by 32% with Alternative B, in comparison to the no-build, resulting in improved safety and traffic flow.

The levels of service for the intersections along Turkeyfoot Road (KY 1303) improve significantly in the reduction of delay each vehicle will experience along the corridor, although the level of service designation does not indicate a significant change in grade level. While the level of service letter designation does not indicate a significant change due to the levels of service being significantly below the LOS E threshold, the delays are reduced by 50% or more just as with Alternative A. The V/C ratio of the intersections within the project corridor improves from the No-Build and Alternative A with the highest being 1.10. Alternative B reduces the conflict points along Turkeyfoot Road (KY 1303) by eliminating the left-exiting turns from Villa Madonna Drive, eliminating the Fraternity Court approach, and realigning Thomas More Parkway and Town Center Drive to provide a single intersection.

According to the HCS software used to analyze the existing and build conditions, some movements within the study area continue to operate at LOS F in the design year. For Alternative A, Alternative B, and the No-Build alternative, each LOS F movement has been identified in **Appendix G**. Each movement meeting LOS F has been evaluated, and countermeasures identified that will improve the movement to LOS E. The countermeasures that would result in LOS E or better at each movement are included in Appendix G. However, it should be noted that any improvement that results in a higher level of service at one movement results in a trade-off of level of service in other movements.

Some movements identified as LOS F by the HCS software may be attributed to software limitations. For example, the I-275 eastbound ramps are currently signalized, but right turns onto the ramp are permitted, allowing for better traffic flow than what the HCS software can model. However, the turning movement can only be modeled as either a signalized or free-flow

condition. In addition, the HCS software does not account for aggressive driving, which may be more typical in urban conditions such as at this intersection. Thus, it could also be hypothesized that conditions may be improved at several locations, even though the software default modeling may not indicate an improvement.

The scope of this study did not include improvements to the bridge over I-275, which limits the overall corridor improvements that are possible. Such improvements would require extensive utility and right-of-way impacts. In addition to widening the bridge (adding lanes) to improve several movements, countermeasures that would improve the level of service at failing movements include: signal optimization, additional through or turn lanes, and adjusting maximum green times. In many cases, multiple countermeasures would be required to achieve LOS E or better.

The College Park intersection was determined not to meet the signal warrants based on the volumes that are currently using the intersection. With the modifications to the intersections in the project corridor, additional study should be completed during final design. With signals located on each side of the intersection, it is anticipated that adequate gaps will be provided for vehicles to enter and exit the roadway.

Although the Intersection at Dudley Road was outside the limits of the study, the microsimulation model revealed that the intersection of Turkeyfoot Road (KY 1303) and Dudley Road experiences significant queues along the major road (Turkeyfoot Road (KY 1303) in both the northbound and southbound through movements in 2040. Queues along the minor road (Dudley Road) occur in both the eastbound and westbound through movements as well as the westbound left-turn movement. These queues are a result of the increase in demand or traffic volumes along both roadways for the future build scenario.

6.6 OPPORTUNITIES FOR REDUCING CRASHES

An analysis was performed on the alternatives to evaluate the opportunities for reducing crashes based on the proposed improvement and elimination of conflict points. A summary of the results is presented in **Table 11**. The analysis for Alternative A estimates that prohibiting the left turns out of Villa Madonna Drive would prevent two crashes, and adding the right-turn lane to the I-275 eastbound exit ramp would prevent six crashes each year. The analysis for Alternative B estimates that consolidating the Thomas More Parkway and Town Center Boulevard intersections would reduce 10 crashes each year, for a total reduction of 18 crashes per year when combined with the low-cost improvements of Alternative A.

Table 11: Summary of Opportunities for Reducing Turkeyfoot Road (KY 1303) Crashes

Villa Madonna Drive Improvements		
Improvement	Crash Reduction Benefit for 5 years **Alternative A (1)**	Crash Reduction Per Year **Alternative A (1)**
	Dollars ($)	Crashes
Left Turn Out Prohibited	$352,217	2
Thomas More Parkway and Town Center Blvd Intersection Realignment		
Improvement	Crash Reduction Benefit for 5 years **Alternative B (2)**	Crash Reduction Per Year **Alternative B (2)**
	Dollars ($)	Crashes
Realign Thomas More Pkwy and Town Center Blvd	$779,343	10
I-275 EB Exit Ramp		
Improvement	Crash Reduction Benefit for 5 years **Alternative A (1)**	Crash Reduction Per Year **Alternative A (1)**
	Dollars ($)	Crashes
Add Right-Turn Lane to Ramp	$679,281	6
Alternative	**Crash Reduction Per Year**	**Percent Crash Reduction Per Year**
Alternative A	8	8%
Alternative B	18	19%

6.7 COMPARISON MATRIX VS. POTENTIAL IMPACTS

A comparison matrix of the improvement strategies, which includes the factors of costs, percent crash reduction per year, and travel time reduction, is presented in **Table 12**.

Table 12: Comparison Matrix

	Existing	Alternative A	Alternative B
	Current Conditions As - Is	Spot Improvements Lower Cost Solutions	Relocate Town Center and Thomas More Pkwy
Corridor Length (ft.)	3,390	3,390	3,390
Design Speed (mph)	45	45	45
Minimum SSD 360 FT Criteria	350 FT	350 FT	350 FT
Number of Signalized Intersections	5	5	4
Earthwork Fill (cu yd.)	0	7,199	48,437
Right of Way			
Number of Parcels	0	2 Res + 5 Com	9 Res + 18 Com
Residential Relocations	0	0	Potential
Right-of-Way Acquisition (Acre)	0	0.2	11.00
Utility Impacts	NONE	LOW	HIGH
Costs			
Construction (with 30% Contingency)	$0	$2,648,000	$9,897,000
Design (15% Construction)	$0	$397,000	$1,484,550
Right of Way	$0	$205,000	$5,450,000
Utilities	$0	$0	$703,000
Total	**$0**	**$3,250,000***	**$17,534,550**
Percent Crash Reduction Per Year		8%	19%
Travel Time Reduction			
Relative to Existing 2017 AM		852 min (5.6%)	1,250 min (8.3%)
Relative to Existing 2017 PM		654 min (2.8%)	4,414 min (19%)
Relative to No-Build 2040 AM		4,392 min (14.8%)	6,976 min (23.6%)
Relative to No-Build 2040 PM		15,328 min (29%)	17,110 min (32.5%)

*The cost of the spot improvements with Alternative A may increase if the KYTC chooses to implement the improvements as separate maintenance and/or highway plan projects.

6.8 BENEFIT-TO-COST ANALYSIS

In efforts to compare the studied alternatives, a cost-benefit analysis was performed. The cost-benefit analysis includes identifying the change in travel time savings and reduced crashes as a savings benefit. Benefits in the context of reduced travel time savings and reduced crashes were compared with estimated costs for the studied alternatives and summarized as a benefit/cost ratio.

The monetary value of travel time was calculated based on the procedure provided in the FHWA Work Zone Road User Cost: Concept and Application. The value of time (VOT) for business and personal travel were computed for passenger cars. Truck volumes were included in the passenger car volumes for the VOT computation. For this analysis, the monetary value of time is the sum of the dollar value of personal travel time and the dollar value of business travel time. Where applicable and available, regional unit cost data and project specific data was used in the computation. The computation resulted in a VOT of $19.05 per hour.

The travel times for existing (2017) and future year (2040) in the AM and PM peak hours were measured for the existing condition, Alternative A, and Alternative B using microsimulations and forecasted traffic. An average of these travel times was calculated and used to estimate the travel time for a 10-year period. Based on engineering judgment and data provided in NCHRP Report 365 Travel Estimation Techniques for Urban Planning, the analysis assumed that the AM and PM peak hours accounted for 40% of the delay that would occur on a single day. The travel time benefit for Alternative A and Alternative B were calculated using the VOT of $19.05 per hour.

The computation of the crash reduction benefit for the studied alternatives used the comprehensive crash unit costs associated with the scale developed by the National Safety Council for defining levels of injury severity (see **Table 13**). For the purpose of alternatives comparison, KYTC assigns dollar values to crash severities based on 2017 dollars for the following:

- “PDO” No fatality or injury; property damage only
- “C” Minor injuries include hysteria, nausea, momentary unconsciousness, and complaint of pain without visible signs of injury
- “B” Moderate injuries include visible injuries such as a “lump” on the head, abrasions, and minor lacerations
- “A” Severe injuries include skull fractures, internal injuries, broken or distorted limbs, unconsciousness, severe lacerations, severe burns, and unable to leave the scene without assistance

- "K" Fatal injuries include deaths which occur within thirty days following injury in a motor vehicle crash

Table 13: Comprehensive Crash Unit Costs

Severity	Comprehensive Crash Unit Cost (2017 dollars) - State Adjusted
PDO	$9,689
C	$102,957
B	$162,885
A	$537,913
K	$9,281,571

The crash reduction benefit was calculated for each improvement and compiled for an alternative total. The crash histories were analyzed and evaluated with respect to the improvements. Crash reductions were estimated according to the improvements and based on the crash history and severity associated with the existing condition. For example, the elimination of a left turn at specific locations would theoretically result in zero left-turn opposing direction crashes. The average of the crash reduction benefit was calculated and applied to a 5-year period. **Table 14** provides the benefit/cost summary of Alternative A and Alternative B.

Table 14: Benefit-Cost Summary (in Millions of 2017 Dollars)

Benefit Cost Summary		
	Alternative A	**Alternative B**
Benefit (Millions of 2017 Dollars)		
Crash Reduction (5 years)	*$1.0*	*$1.8*
Travel Time Reduction (10 years)	*$21.9*	*$30.7*
Total Benefit	$22.9	$32.5
Total Cost (2017 Dollars)	$2.7	$17.4
Benefit/Cost Ratio	8.5	2.3

7.0 FINAL PROJECT TEAM MEETING AND LOCAL OFFICIAL AND STAKEHOLDER COORDINATION

A third Project Team meeting and second Local Officials and Stakeholders' meeting was also held on July 11, 2018. The primary purpose of these meetings was to present and discuss feasible improvement alternatives and related costs. The meeting included a PowerPoint presentation and displays of the improvement strategies proposed with Alternative A (see **Figure 15**) and Alternative B (see **Figure 16**).

The second meeting of Local Officials and Stakeholders was held on Wednesday, July 11, 2018, at the Crestview Hills City Building, Crestview Hills, Kentucky. A total of 34 persons signed in for the meeting. Of these attendees, 20 were Local Officials and Stakeholders. The remaining 14 attendees were from the Transportation Cabinet, the OKI, NKADD, or the Consultant Team.

The group was provided a brief overview on the progress of the study and informed that the project had been funded for preliminary engineering and environmental assessment for the next biennium of the Highway Plan (Item No. 6-450). It was further noted that the project in the Highway Plan would extend from Dudley Road to US 25, beyond the limits of this study.

The presentation focused on possible alternative improvement options that have evolved from the study. The improvement scenarios described in Alternative A could be implemented individually or in combination. Alternative B is a more extensive improvement scenario that included relocating Town Center Boulevard and Thomas More Parkway as well as other improvements proposed in Alternative A. A summary of traffic operational analyses in the context of the alternative improvement strategies was also presented (see **Table 8**), including an analysis associated with estimating the potential for reducing crashes (see **Table 11**) and a cost-comparison matrix (see **Table 12**).

A questionnaire was provided to the Local Officials and Stakeholders attending the meeting to obtain their input on the proposed improvements. Written comments were received from 13 persons. A summary of responses to questions included in the questionnaire is provided in **Table 15**. Responding Stakeholders were generally supportive of the proposed improvements but did express concerns as to how changing access along the corridor would affect businesses, land development opportunities, and especially residences.

Table 15: Summary of Local Officials and Stakeholders Questionnaire Responses

Turkeyfoot Road - KY 1303, Kenton County - Scoping Study Local Officials / Stakeholders Meeting - July 11, 2018 Questionaire Responses				
Alternative A: Spot Improvements / Lower Cost Options	Yes	No	Did Not Respond	Overall Concurence
(1) Add right-turn lane to exit ramp – I-275 eastbound	12	0	1	92%
(2) Eliminate right-in entrance to Fridays	7	5	1	54%
(3) Add right-turn lane on Turkeyfoot Road from I-275 eastbound ramp to existing Town Center Boulevard	11	1	1	85%
(4) Eliminate access from Fraternity Court to Turkeyfoot Road (KY 1303)	12	1	0	92%
(5) Restrict left turns to Turkeyfoot Road northbound to Thomas More Parkway	8	2	3	62%
(6) Add right-turn lane on Turkeyfoot Road northbound to Thomas More Parkway	11	1	1	85%
Alternative B: Realign Town Center Boulevard and Thomas More Parkway	Yes	No	Did Not Respond	
(1) Realign Town Center Boulevard and Thomas More Parkway	11	0	2	85%
(2) Add lane to Turkeyfoot southbound from I-275 eastbound ramp to just beyond relocated Town Center Boulevard	12	0	1	92%
(3) Make access to existing Town Center Boulevard right-in / right-out	11	1	1	85%
(4) Make frontage road from Turkeyfoot Road to Thomas More Parkway right-in / right-out at Turkeyfoot Road	7	5	1	54%
(5) Extend frontage road / backage road to reconnect with Thomas More Parkway	8	3	2	62%
All Spot Improvements from Alternative A are proposed to be included with Alternative B.				

8.0 RESOURCE AGENCY COORDINATION – AUGUST 2018

During the development of this study, comments were solicited from federal, state, and local resource agencies, as well as other stakeholders, in accordance with principles set forth in the National Environmental Policy Act (NEPA) of 1969. The purpose of this resource agency coordination is to identify potential alternatives, environmental issues, and impacts related to the study early in the process to minimize negative impacts.

The KYTC Division of Planning mailed packets of information regarding the project-related existing conditions and proposed short-term and long-term alternatives to the various resource agencies. Each agency was asked to provide the following information:

- Comments on the draft purpose and need for the project

- Significant issues or concerns in the project corridor that may need to be addressed so that the project can be adequately scoped
- Any ongoing conservation or development plans the agency or organization has or is aware of in the project corridor
- Locations of any known areas, issues, or resources within the project corridor that should be considered when developing alternatives so that the impacts can be minimized, mitigated, or avoided early in the process
- Any mitigation strategies that should be considered during project development

A summary of the comments received during resource agency coordination is presented in **Table 16**. Refer to **Appendix H** for more details regarding the responses received from the following resource agencies.

Table 16: Summary of Resource Agency Responses

Kenton County - Turkeyfoot Road (KY 1303) Summary of Resource Agency Responses	
Craig Potts, Executive Director and State Historic Preservation Officer Tourism, Arts, and Heritage Cabinet Kentucky Heritage Council 410 High Street Frankfort, KY 40601	Noted the one (1) historic resource identified within the project corridor. The Kentucky Heritage Council has no known concerns or issues with the proposed project at this time. Any issues or concerns pertaining to Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C Sec 470f) and regulations at 36 C.F.R. Part 800 that may arise as the project progresses will be addressed through our continuing programmatic agreement with KYTC's Division of Environmental Analysis. Refer to the letter from Mr. Potts for additional information.
Eva Land USEPA Region 4 - NEPA Program Office 61 Forsyth Street, SW; Mailcode 9T25 Atlanta, GA 30303	*Water Quality*: The proposed project is adjacent to an unnamed stream and waterbody. Based on a Geographic Information Systems (GIS) analysis of the National Wetlands Inventory there are 16 acres (57%) of freshwater pond wetlands and 12 acres (43 %) of riverine wetlands located within a half-mile project buffer area. *Air Quality:* This area is a marginal nonattainment area for the 8-hour 2008 ozone standard. Emissions of volatile organic carbon and nitrogen oxide contribute to the formation of ground-level ozone. An alternative that improves traffic flow and decreases idle time will also minimize ozone formation. *Social Impacts:* The proposed project has the potential to cause social impacts to the community. The project goes through Thomas Moore College and is adjacent to the college's recreation field. The roadway expansion could result in increased noise, roadway vibration, construction detours, travel pattern disruptions, and increased traffic volumes. Refer to the email from Ms. Land for additional information.

Kenton County - Turkeyfoot Road (KY 1303) Summary of Resource Agency Responses	
Kentucky Airport Zoning Commission (KAZC) John Houlihan, Administrator Department of Highways, District Six 421 Buttermilk Pike, Covington, KY 41017	The KAZC jurisdiction starts at 200 feet above ground level for the above subject. If any structure would exceed 200 feet above ground level (permanent or temporary), a permit is required from the KAZC.
Keith H. Talley, Sr., Director Louisville Metro Air Pollution Control District 701 W. Ormsby Ave., Suite 303	The location is not within our jurisdiction at APCD.
Larry C. Taylor, Environmental Scientist Consultant Office of the Commissioner Department of Environmental Protection Energy and Environmental Cabinet 300 Sower Boulevard, 2nd Floor Frankfort, KY 40601	The Energy and Environment Cabinet serves as the state clearinghouse for review of environmental documents generated pursuant to the National Environmental Policy Act (NEPA). Within the Cabinet, the Commissioner's Office in the Department for Environmental Protection (DEP) coordinates the review for Kentucky state agencies. Comments were included from the following divisions and branches within the DEP: Division of Water • Water Quality Branch • Watershed Management • Compliance & Technical Assistance Branch Division of Waste Management Division of Air Quality Refer to the letter from Mr. Taylor for specific comments and additional contact information.
Phil DeGarmo U.S. Fish and Wildlife Service KY Ecological Services Field Office 330 West Broadway, Rm 265 Frankfort, KY 40601	The Kentucky Field Office (KFO) is directing project proponents to obtain species lists from the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Conservation (IPaC) system located at: https://ecos.fws.gov/ipac/. IPac will immediately provide you with a current species list appropriate for your proposed project and an official letter on USFWS letterhead. This list will include species currently listed as threatened or endangered, species proposed for listing, critical habitat for listed species, and bird species of conservation concern. The official species list is not a concurrence letter; additional coordination with the KFO may be necessary to ensure ESA compliance. Refer to the letter from Mr. DeGarmo for additional information.

Kenton County - Turkeyfoot Road (KY 1303) Summary of Resource Agency Responses	
Paul W. Meier, Mayor City of Crestview Hills 50 Town Center Boulevard Crestview Hills, KY 41017-2561 (859) 341-7373	The City of Crestview Hills has strongly supported a plan to alleviate traffic congestion and safety concerns along Turkeyfoot (SR 1303) for a number of years. We agree that the purpose of the project should be for both safety of the traveling public and ease of mobility. The need for the project is clearly demonstrated by the high number of auto accidents and current level of service at the intersection and ramps. A project that improves the level of service on Turkeyfoot Road (KY 1303), while minimizing impacts on our residents is a high priority for our City Council. A project to improve Turkeyfoot Road (KY 1303) needs to account for access to the regional shopping center. The existing Thomas More College pond and adjacent stone chapel on Turkeyfoot Road (KY 1303) are landmarks for the community. The City, Thomas More College, and St. Elizabeth Hospital all have future development plans that need to be considered in the future improvements to Turkeyfoot Road (KY 1303). Refer to the letter from Mayor Meier for more specific details, including potential zoning changes. Refer to the letter from Mayo Meier for additional information.
Donnie J. Holland, Commissioner Kentucky Department of State Parks Tourism, Arts and Heritage Cabinet 2 Hudson Hollow, Unit 1, Frankfort, KY 40601-4311	Responded to letter with no specific input or comments.
Tresa Straw Chief of Staff, Office of the Secretary Cabinet for Health and Family Services Frankfort, KY 40601	Responded to letter with no specific input or comments.
Sharon L. Ricks, Regional Health Administrator, Region IV Office of the Assistant Secretary for Health U.S. Department of Health and Human Services 61 Forsyth Street, S.W, Suite 5B95 Atlanta, GA 30303	Responded to letter with no specific input or comments; recommended that we should reach out to the Kenton County Health Department to obtain their input on the public health impact of your plan.
Roger Recktenwald Director for Infrastructure Planning & IT KY Association of Counties 400 Englewood Drive, Frankfort, KY 40601	During a conversation with KYTC representative, Mr. Recktonwald stated that KACo supports the planning study and will be submitting a written response.

9.0 CONCLUSIONS

The conclusions of the Turkeyfoot Road (KY 1303) Planning Study are predicated on the project purpose and need, Project Team input, Local Officials / Stakeholders feedback, and technical analysis. The Project Team preferred Alternative B as the alternative to improve the safety and mobility along Turkeyfoot Road (KY 1303) as a long-term solution with the following improvements:

- Implement all Spot Improvements from Alternative A
    - Add a right-turn lane to exit ramp – I-275 eastbound
    - Eliminate the right-in entrance to TGI Fridays
    - Add a right-turn lane on Turkeyfoot Road (KY 1303) from I-275 eastbound ramp to existing Town Center Boulevard
    - Eliminate the access from Fraternity Court to Turkeyfoot Road (KY 1303)
    - Restrict left turns from Villa Madonna to Turkeyfoot Road (KY 1303) southbound
    - Add a right-turn lane on Turkeyfoot Road (KY 1303) northbound to Thomas More Parkway
- Consolidate the Town Center Boulevard and Thomas More Parkway Intersections to a single intersection by realigning both roads
- Add a lane to Turkeyfoot Road (KY 1303) southbound from the I-275 eastbound ramp to just beyond relocated Town Center Boulevard
- Convert access to the existing Town Center Boulevard to right-in / right-out
- Convert frontage road from Turkeyfoot Road (KY 1303) to Thomas More Parkway to right-in / right-out at Turkeyfoot Road (KY 1303)
- Extend the frontage road / backage road to reconnect with Thomas More Parkway

In addition, it was decided that Alternative B would include a shared-use path along the east side of Turkeyfoot Road (KY 1303) through the study corridor and on the south side of Thomas More Parkway.

The proposed improvements are estimated to reduce the annual number of crashes by 19% and reduce the travel time for all of the vehicles in the system by 23.6% (6,976 minutes) in the AM and 32.5% (17,110 minutes) in the PM relative to the No-Build Alternative in 2040. With the unification of the intersections of Town Center Boulevard with Thomas More Parkway, the traveling public will also experience a significant and immediate reduction in travel time of 19% in the PM as soon as the project is open to traffic. A comparison matrix of the improvement

strategies, which includes the factors of costs, percent crash reduction per year, and travel time reduction, is presented in **Table 12**.

The movements throughout Alternatives A and B that operate at level of service (LOS) F can be improved to become LOS E or better by improving signal optimization and the addition of more lanes, through and turning, along the major and minor roadways. The addition of lanes could require widening the existing bridge over I-275 and result in significant right-of-way and utility impacts. These were deemed to be beyond the scope of this study.

An Interchange Modification Report for the system-to-system interchange at I-75 and I-275 is currently being developed that could result in modifications to the I-275/KY 1303 interchange. Additional lanes on the ramps and KY 1303 bridge over I-275 would provide capacity that was not considered in this study and could greatly improve the congestion in the area. Alternative B does not propose changes to the KY 1303 bridge and generally uses the ramps in their current locations; therefore, any improvements evolving from the IMR should be compatible with Alternative B.

During the course of this study's undertaking, the Kentucky General Assembly enacted Project Item Number 6-450. The project is for Turkeyfoot Road (KY 1303) with termini beginning at Dudley Road and going northward to US 25, encompassing the entirety of the subject study area. Independent of Item Number 6-450, the Conclusions herein would recommend Alternative A as an immediate improvement and with Alternative B as the ultimate improvement. With Item Number 6-450 established and funds provided, said project will proceed with the improvements identified as Alternative B and shown in Figure 16, including the lane taper for southbound Turkeyfoot Road (KY 1303) west of Town Center Boulevard.

9.1 FUTURE STEPS

Unusual to most planning studies, the General Assembly included KYTC Item No. 6-450.00 in the *2018-2024 Enacted Highway Plan* with design funding for Turkeyfoot Road (KY 1303) between Dudley Road and Dixie Highway. This study falls within the larger project limits of the design project. KYTC has authorized the funding and is progressing with preliminary design.

10.0 CONTACTS / ADDITIONAL INFORMATION

Additional information regarding this study can also be obtained from the KYTC District 6 Project Manager, Carol Callan-Ramler (email at Carol.Callan-Ramler@ky.gov); or Branch Manager for Project Development, Mike Bezold (email at Mike.Bezold@ky.gov) at (859) 341-2700; or the Central Office Division of Planning Project Manager, Stephen DeWitte,

at (502) 544-7183 (email at Stephen.DeWitte@ky.gov); or Division Director, Amanda Spencer (email at Amanda.Spencer@ky.gov).