

TRUCK ROUTE ACCESS EVALUATION

Central Kentucky Asphalt
Off of KY 1723
Site #2634

Report No. KTC-98-34

“Freight Movement and Intermodal Access in Kentucky”
SPR 98-189

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1.0 Introduction

The Freight Movement and Intermodal Access in Kentucky Study (SPR 98-189), undertaken by the Kentucky Transportation Center (KTC) on behalf of the Kentucky Transportation Cabinet (KYTC), has two main objectives. These objectives include 1) the evaluation of access for trucks between intermodal or other truck generating sites and the National Highway System (NHS) and 2) furthering the understanding of freight commodity flows throughout the state. This report summarizes the access evaluation for one facility located in Fayette County in the Bluegrass Area Development District (ADD) and KYTC Highway District #7. The location of the site is shown in Figure 1. Work on other specific sites as well as the freight commodity flow task are on-going and are documented elsewhere.

The sites to be evaluated were selected from two existing databases (a truck facility survey from 1994 and the intermodal facility inventory) based on ADD and KYTC planner recommendations, geographic location, distance to the NHS, and the number of trucks accessing the site. Consideration was also made for the freight type handled and transportation modes used.

The site was visited several times for data collection and video recordings as listed in Appendix A. The facility for study was Central Kentucky Asphalt, and the initial trip to the site revealed that there were no other significant sources of truck traffic in the vicinity. Early into the study process, phone surveys were conducted so that facility managers could provide insight into potential access-limiting issues. The phone survey completed on the facility, which is located in Appendix B, found that approximately 60 trucks per day (120 one-way trips) are accessing the facility.

2.0 Truck Routes in Use

There are two routes used for access onto the NHS. The facility has three entrances available: one onto KY 1681 (Old Frankfort Pike) and two onto KY 1723 (Forbes Road). The entrance onto Old Frankfort Pike is approximately 0.1 miles from the intersection of KY 1723 and KY 1681. The remaining two entrances lie on Forbes Road, approximately 0.1 miles and 0.15 miles from the intersection of KY 1723 and KY 1681, respectively. The entrance farther from the intersection of KY 1681 on KY 1723 is the most commonly used, as the remaining entrance lies along a grade and is not as accessible for trucks. The entrance onto KY 1681 is rarely used; thus, the small section of KY 1681 is not evaluated in this report.

The first route (KY 1723 south) that is used for access onto the NHS runs from the main truck exit on KY 1723 (indicated on Figure 2) and runs south on Forbes Road to US 60, which is on the National Highway System. KY 1723 is in the AA weight class, indicating that it is intended for a maximum gross weight of 62,000 pounds. This route is approximately 0.4 miles in length. Traffic signal control along this route is found at the intersection of US 60 and KY 1723. KY 1723 is best characterized as a low-density

Figure 1: Location of Truck-Generating Site (Fayette County)

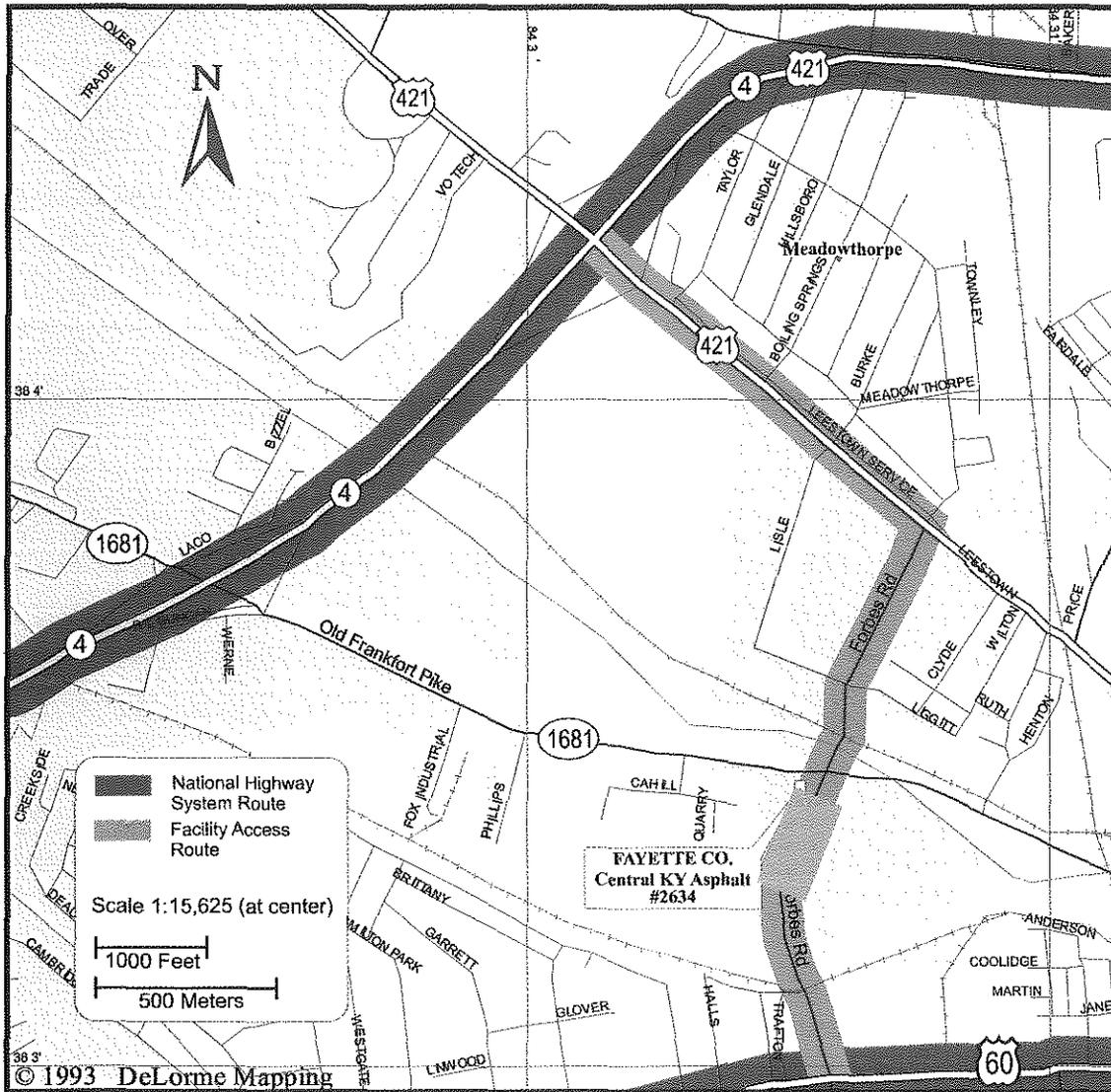


Figure 2: Aerial photograph of the Fayette County site (1993 picture)

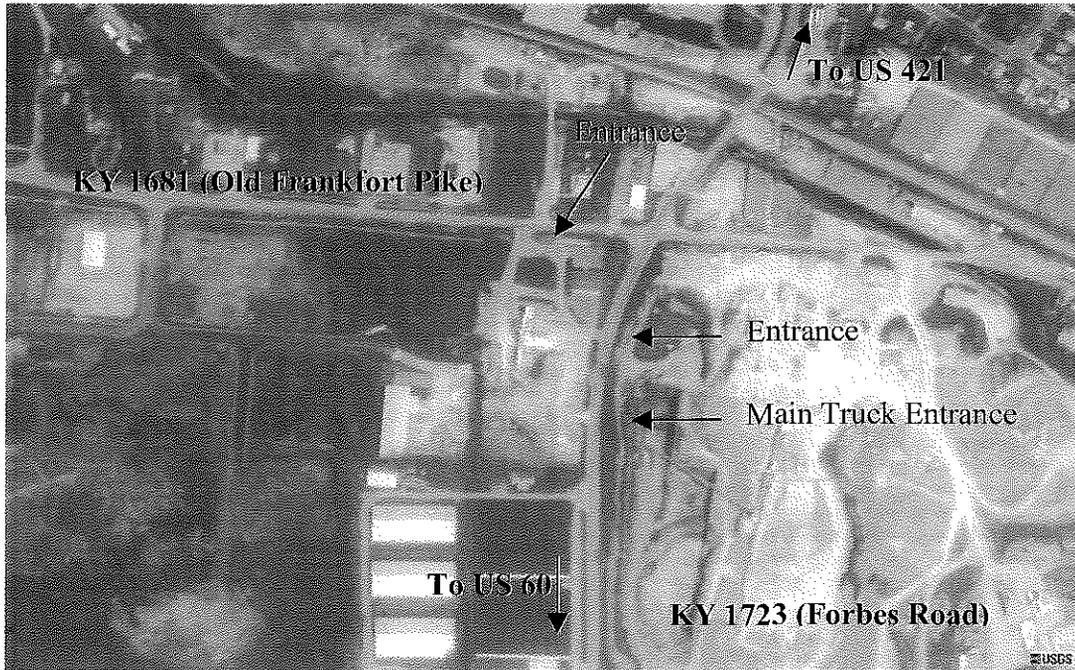
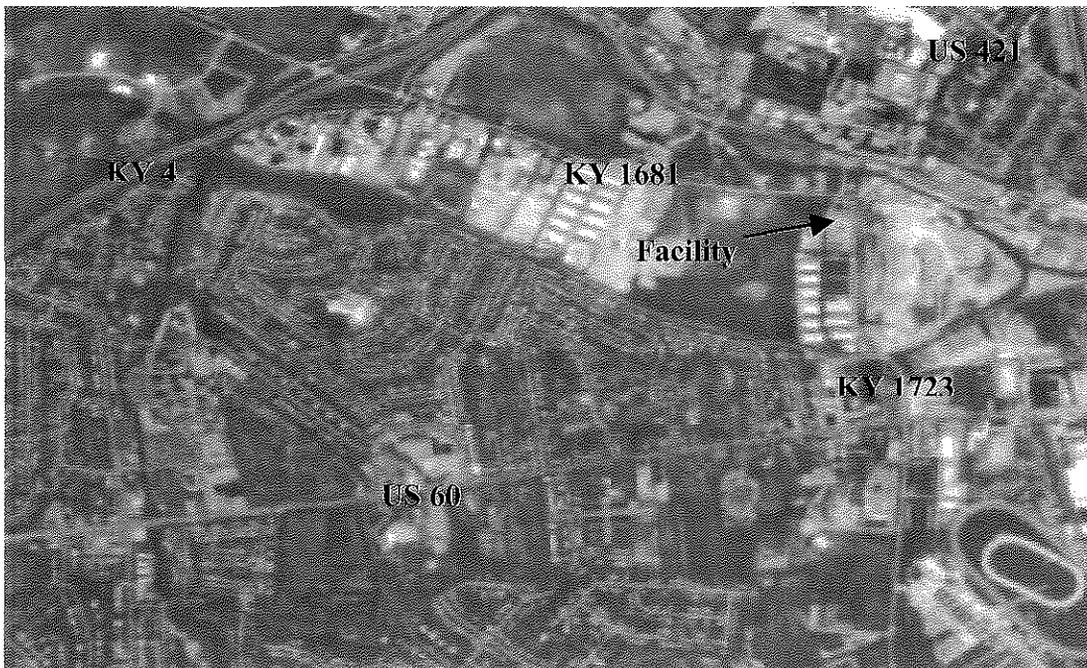


Figure 3: Aerial photograph of the Fayette County site (1993 picture)



industrial sector. The second route (US 421 west) calls for the trucks to travel north along KY 1723 for approximately 0.6 miles to its intersection with US 421 (Leestown Road). Trucks then turn left and proceed west on US 421 for roughly 0.65 miles to New Circle Road. US 421 is in the AAA weight class, indicating that its maximum allowable gross weight is 80,000 pounds. Traffic signal control is found at the intersection of US 421 and KY 1723.

3.0 Route Data Collection and Evaluation

The route features that are to be evaluated in this study are shown in Table 1 along with a brief description of the evaluation method. While some of these features require only subjective evaluation by the engineer during site inspection, others required quantitative measurement in order to label the particular point or section as “preferred”, “adequate”, or “less than adequate” for truck access. The guidelines for labeling a point or section into one of these three descriptive categories are provided in both the interim and final report for this project. In several cases measurements were only taken where subjective evaluation indicated a problem might exist as preferred type sections and points do not contribute to an increase in the problem truck points or miles that are assumed for the route (see Chapter 4).

3.1 Traffic Operations and Level of Service

The survey of this site indicated that there were no operational problems or concerns for this site. The only problems identified were the construction along Richmond Rd--a temporary problem area which is not on the facility’s access routes. Thus, the routes are assumed to operate at an acceptable level.

Table 1: Route Features and Method of Evaluation

Feature	Methodology	Team Consensus based on Committee Meeting and Draft Report Feedback	Feature Type
Offtracking	Lane Width with formula based on wheel and axle spacing	Evaluate where observation of trucks indicates possible offtracking - use HIS data and collect in field	Point
Max. Safe Speed on a Curve	Ball Bank Indicator Reading	Evaluate complete route due to ease of data collection	Point
Grade	Speed Reduction Tables with Percent Grade and Direct Observation	Evaluate where observation of trucks indicates speed reduction occurs using HIS data and collect in field as needed	Continuous
Lane Width	HIS data and field measurement	Review complete route due to ease of data collection	Continuous
Clear Zone	Observation	Subjective evaluation	Subjective
Shoulders	HIS data and field measurement	Evaluate where HIS data is available and estimate based on observation elsewhere	Continuous
Pavement Condition	Observation	Subjective evaluation	Subjective
Truck Stopping Sight Distance	Field measurements	Measure only when observation indicates possible problem	Point
Turning Radii	Field measurements and observations of trucks	Measure only when observation indicates possible problem	Point
Accident History	Accident data files and KTC High Truck Accident Report	Do for entire route	Subjective
Intersection LOS	Traffic counts	Only where problems are indicated by facility managers	Point
Route LOS	Traffic counts and travel time studies	Only where problems are indicated by managers	Continuous
RR Crossings	Field Observation	Evaluate all level crossings	Point
Bridges	KYTC Sufficiency Rating	Evaluate all bridges	Point

3.2 Accidents

In 1997 the Kentucky Transportation Center studied all the state-maintained roads throughout Kentucky and determined average truck accident rates for different types of road sections. A critical accident rate was then calculated using the average accident rate for a specific highway type along with an assumed level of statistical significance and exposure (vehicle miles traveled). One section of this truck route had an accident rate higher than the critical rate for that highway type. US 421 between milepoints 0.337 and 1.300 had a critical rate factor of 1.301, where the critical rate factor is the ratio of the actual accident rate to the critical accident rate. This value indicates that the number of accidents involving trucks is 1.3 times the average rate and thus is a problem.

Figure 4 shows the locations of accidents during the years 1994, 1995, and 1996. A summary of the accidents along the first (KY 1723 south) and second (US 421 west) truck routes (for all roads, not just state-maintained roads) is shown in Tables 2 and 3 for the same three-year period. The number of accidents along the KY 1723 south route is insignificant and only two included trucks. The 9.0% of accidents involving trucks along the US 421 west route is somewhat higher than either the percent trucks along KY 1723 (6.4%) or US 421 (4.9%). This suggests that there are some safety concerns from an accident history point of view that must be addressed along this route.

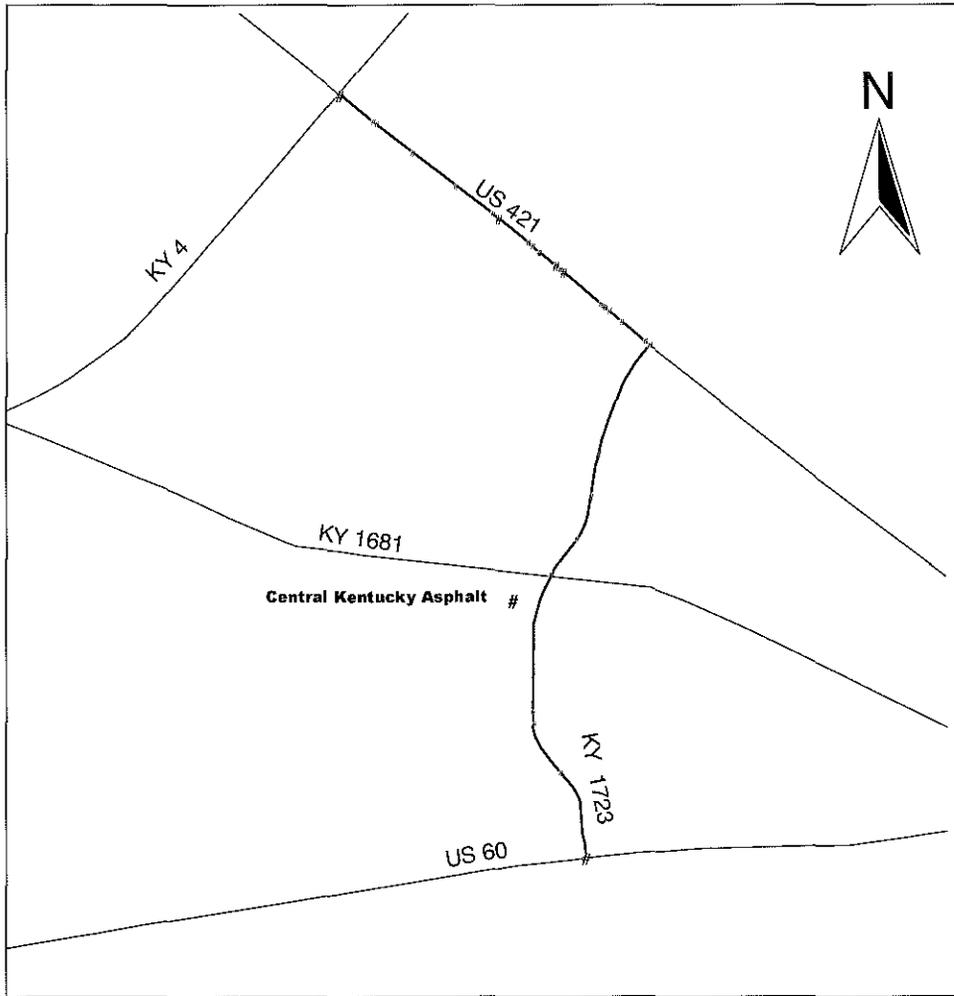
Table 2: Accident Types Along KY 1723 South (Fayette County) Truck Route

	<i>Non-Truck Accidents</i>	<i>Truck Accidents</i>	<i>Percent Trucks</i>
Total	14	2	12.5
Fatal Accidents	0	0	0.0
Injury	4	0	0.0
Intersection	7	1	12.5

Table 3: Accident Types Along US 421 West (Fayette County) Truck Route

	<i>Non-Truck Accidents</i>	<i>Truck Accidents</i>	<i>Percent Trucks</i>
Total	131	13	9.0
Fatal Accidents	0	0	0.0
Injury	31	1	3.1
Intersection	71	4	5.3

Figure 4: Accident Locations (1994-1996)



LEGEND

- # Facility
- Accidents: 1 - 2
- # Accidents: 3 - 4
- # Accidents: 5 - 6
- Freight Access Route
- State Highway System

Scale - 1:16000

0.3 0 0.3 Miles

500 0 500 Meters

3.3 Cross Section Features

Figures 5 and 6 illustrate the sections of the route with different lane widths and shoulder types, respectively. KY 1723 and US 421 are both comprised of 12 foot lanes which is considered to be “preferred”. The section of US 421 on this route (mileposts 1.042 – 1.254) begins with 10 foot stabilized shoulders which are considered “adequate”. The remainder of the route consists of “less than adequate” shoulders. KY 1723 begins at US 60 with a curbed shoulder for roughly 0.1 miles and continues with a 6 foot stabilized shoulder until the areas adjacent to the intersection of KY 1723 and US 421, where the shoulder is composed of a one-foot curb. All pavement along US 421 was in good condition, while some along KY 1723 was fair, especially in the area of the railroad crossing north of the intersection of KY 1723 and KY 1681 discussed in section 3.5.

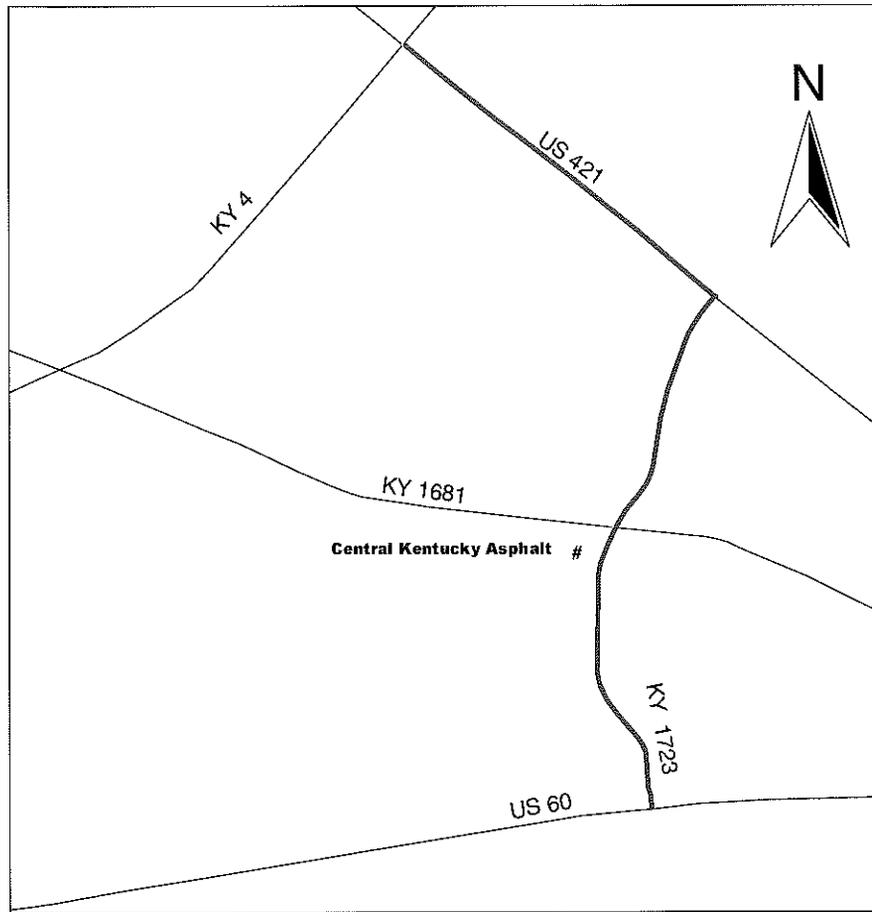
3.4 Curvature Features

Curvature can cause problems for all drivers, but the effects on trucks can be more severe. If a truck is incapable of traveling the posted speed limit while remaining in its own travel lane, then the roadway segment is inadequate. Curvature along this route was tested for problematic curves by the use of the ball-bank indicator. By maintaining the posted speed limits and advisory speeds through curves, the ball-bank indicator allows for the determination of whether or not the curve should be driven at indicated speeds. The ball-bank did not indicate any problems along KY 1723 at the posted 35 miles per hour, and US 421 does not have any significant curvature.

One turning radius was approximated with field measurements as observation demonstrated that offtracking was likely among larger trucks. Figure 7 demonstrates that trucks making a right turn at the intersection of US 421 and KY 1723 must negotiate a 50 foot turning radius which is bound by a curb on the inside. While site visits did not allow for the observation of the 53 foot trailers that the survey suggested as being the largest vehicles accessing the facility, markings on the curb indicated that trucks are running onto the curb in order to minimize encroachment into the opposing lanes of traffic. Some single unit trucks were observed making the turn with little or no encroachment; however, the roadway should be able to accommodate the largest truck travelling it. For this reason, this turning radius is rated “less than adequate”.

There is no significant vertical curvature along the route, with the exception of the areas adjacent to the intersection of KY 1723 and KY 1681. This grade, stretching approximately 0.2 miles west of the intersection, is approximately 3 to 5 percent and occurs close enough to the intersection that no serious speed reduction would be encountered. Since the main entrance used off of KY 1723 into Central Kentucky Asphalt lies at the top of the grade, trucks would normally be slowing down in order to make the turn safely, regardless of the grade.

Figure 5: Lane Widths



LEGEND

- # Facility
-  Lane Width: 12 Feet
-  Freight Access Route
-  State Highways System

Scale - 1:16000

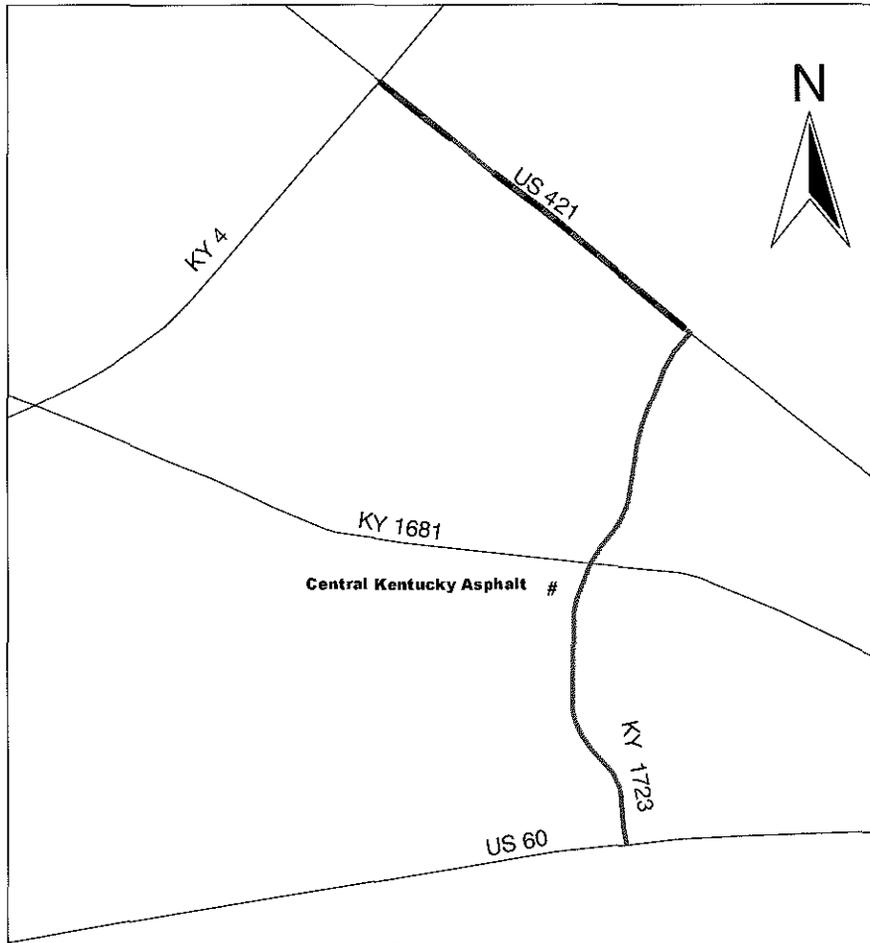
0.3 0 0.3 Miles



500 0 500 Meters



Figure 6: Shoulder Widths



LEGEND

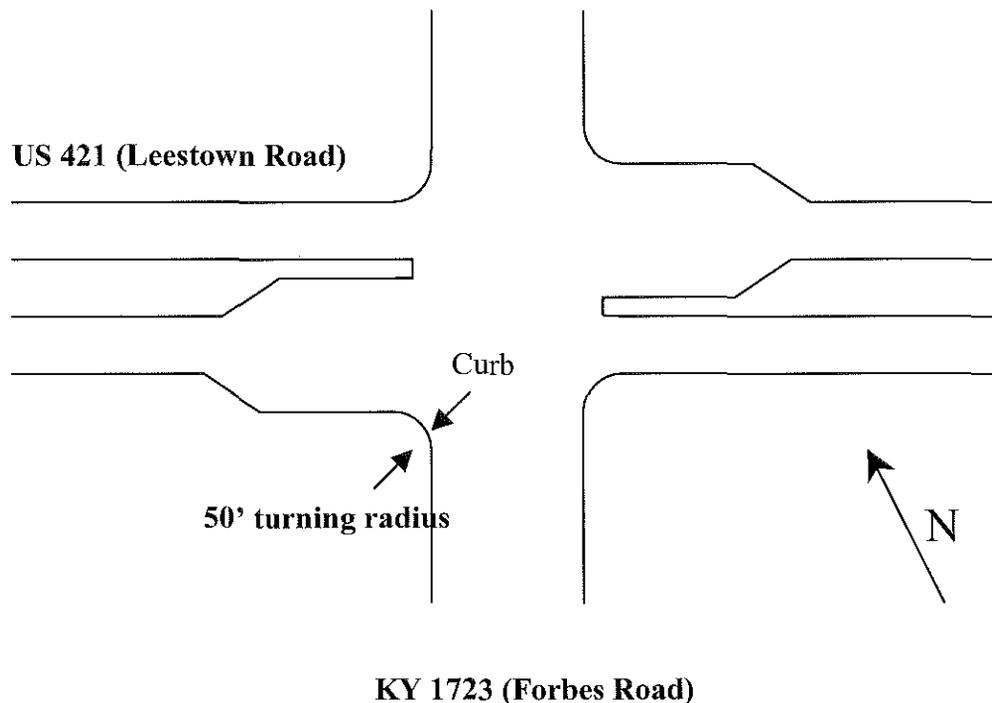
- # Facility
- Shoulder Width: Curbed
- Shoulder Width: 2 Feet
- Shoulder Width: 6 Feet
- Shoulder Width: 10 Feet
- State Highway System

Scale - 1:16000

0.3 0 0.3 Miles

500 0 500 Meters

Figure 7: Intersection Diagram of KY 1723 and US 421 with turning radius problem



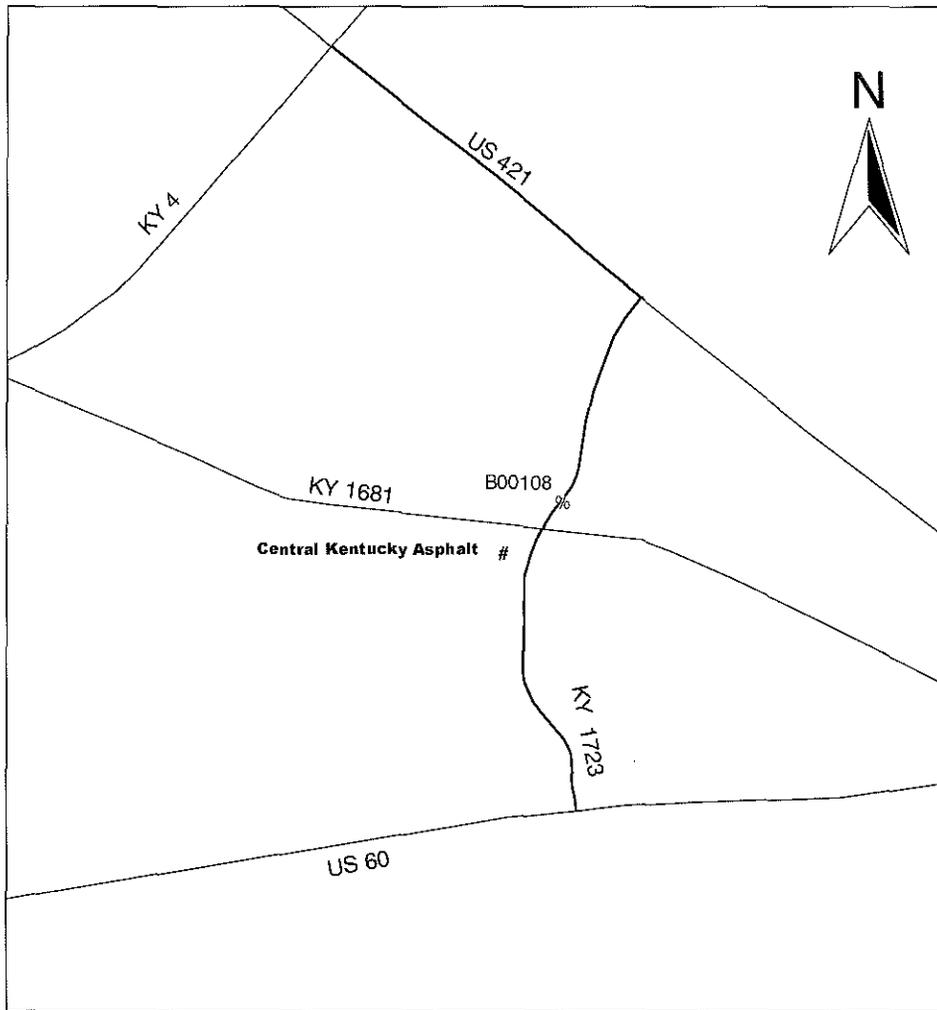
3.5 Railroad Crossings

There is one at-grade railroad crossing along each route. The first crossing is at milepost 0.16, just north of US 60 (NHS) on the KY 1723 south route. Pavement over this crossing is in good condition and warning lights without gates are used to inform vehicle operators of oncoming trains. There are no significant problems associated with this crossing. Therefore, this crossing is considered to be “preferred”. The second crossing occurs approximately 0.1 miles from the intersection of KY 1723 and KY 1681 (milepost 0.64) on the US 421 west route. This crossing is composed of pavement that is in poor condition and the crossing is not level, requiring vehicles to reduce travel speed in order to traverse the crossing in a safe manner. Drivers are made aware of oncoming trains by flashing warning lights at this crossing, but there are no gates to stop vehicles while trains are in the vicinity. This combination of factors gives the crossing a rating of “adequate”.

3.6 Bridges

The only bridge along this route is a roadway culvert located at approximately milepost 0.6 on KY 1723 (US 421 west route) and can be seen in Figure 8. The Kentucky Transportation Cabinet’s Division of Operations maintains a database of bridge

Figure 8: Bridge Location



LEGEND

- # Facility
- % B00000 Bridges
- Freight Access Route
- State Highway System

Scale - 1:16000

0.3 0 0.3 Miles

500 0 500 Meters

sufficiency ratings that are based on the serviceability (as well as other characteristics) of the structure. Roadway culverts such as the one found on KY 1723 are included in this database as they are considered to be a type of bridge. This structure received a sufficiency rating of 81.2, which is considered to be “preferred”.

3.7 Sight Distance

There is only one potential problem associated with sight distance along this route. The entrance into Central Kentucky Asphalt on KY 1723 that is closest to the intersection of KY 1681 and KY 1723, although not used extensively for truck purposes, has potential to be problematic. If trucks try to turn left out of the facility, oncoming traffic from the direction of US 60 may not have adequate stopping distance to avoid a collision. However, no trucks were witnessed using this entrance during site visits while the entrance nearest US 60 was used extensively. In addition, the only tire markings at this entrance were from vehicles turning right out of the facility and did not appear to be from large trucks. Thus, this issue was not considered for the purpose of this evaluation.

4.0 Complete Route Evaluation and Recommendations

4.1 Problem Truck Miles and Truck Points

In order to compare different routes to consider the relative urgency of needed route improvements, the features rated “preferred”, “adequate”, and “less than adequate” along a route are to be normalized for the number of miles, number of points, and number of trucks using the section. In the case of this Fayette County truck route, three features (shoulders, turning radius, and railroad crossing) that were evaluated have sections or points that are considered only “adequate” or “less than adequate”. A section or point that is considered “less than adequate” is weighted two times that of an “adequate” point or section. Less than preferred sections are weighed by length as well as the number of trucks passing that point.

Tables 4 and 5 contain the total problem truck miles and total problem points for lane width, shoulders, turning radii, and bridges along both routes. The rating of these routes relative to others evaluated will be reported in the final report. The number of trucks on both routes came from 1998 traffic counts conducted by the KYTC Division of Planning. The only exception is for the portion of KY 1723 included in the second route. Since the traffic count numbers are only for the portion of KY 1723 included in the KY 1723 south route (counts were taken at milepost 0.05, just north of US 60), an exterior source of truck volumes had to be used. Therefore, only the number of trucks indicated in the phone survey was included. This resulted in 60 trucks accessing the facility and 120 two-way trips.

4.2 Maintenance Improvement Locations

The only maintenance suggestion that could be considered for these routes is to reconstruct the railroad crossing on the second route and to provide crossing gates for both routes. The crossing found on the second route is in poor condition and its rehabilitation would allow for a higher system speed along the route as both trucks and cars alike would not be forced to decrease their speeds to the present extent. The addition of gates to both the crossings on the first and second routes would improve the overall safety of the system, but are not required as both warning lights and adequate sight distance currently exist.

Table 4: Summary of Problem Truck Miles and Points for KY 1723 South Route

Feature	Road	Segment/point	Points*	Length (miles)	Trucks (/day)	Truck-points	Truck-miles
Shoulders	KY 1723	MP 0 - 0.4	2	0.4	553		442.4
Total							442.4

* Note: 1 point for "adequate" features and 2 points for "less than adequate" features (0 points for "preferred" features not shown)

Table 5: Summary of Problem Truck Miles and Points for US 421 West Route

Feature	Road	Segment/point	Points*	Length (miles)	Trucks (/day)	Truck-points	Truck-miles
Shoulders	KY 1723	MP 0.4 - 1.03	2	0.63	120		151.2
	US 421	MP 1.042-1.254 & 1.615-1.789	1	0.39	480		187.2
	US 421	MP 1.254-1.615	2	0.36	480		345.6
Total							684.0
Turning Radius	US 421	KY 1723	2		120	240.0	
Total						240.0	
Railroad Crossing	KY 1723	MP 0.64	1		120	120.0	
Total						120.0	

* Note: 1 point for "adequate" features and 2 points for "less than adequate" features (0 points for "preferred" features not shown)

4.3 Overall Route Rating

In order to account for both the subjectively and objectively evaluated route features along truck routes throughout the state, a panel of Kentucky Transportation Center engineers who are responsible for studying the routes associated with this project devised a scale for quantitatively scoring the route from 1 to 10. The interpretation for this scale can be seen in Table 6. Based upon the findings from the various site visits and

information obtained from the HIS database, the KY 1723 south route running from Central Kentucky Asphalt to US 60 rates at an 7. The US 421 west route, extending from the facility to US 421 and then KY 4, merits a score of 6.

Table 6: Interpretation of the Overall Route Rating

Overall Route Rating	Qualitative Interpretation of Rating
1	Trucks should not be using this route
2	Major construction is required to improve this route
3 to 5	Minor improvements are <u>required</u> on this route
6 to 8	Minor improvements could <u>improve</u> this route
9	Minor problems exist that do not seriously impede truck access
10	Trucks are served with reasonable access

4.4 Conclusions and Recommendations

In conclusion, the following problems were identified along the truck access routes to Central Kentucky Asphalt in Fayette County:

- Significant length of route with less than "preferred" shoulders;
- One less than "preferred" turning radius for right-turning trucks (west route); and
- One less than "preferred" railroad crossing (west route).

The problematic turning radius at the intersection of US 421 and KY 1723 could be remedied by widening the lanes or removing the curbed shoulder on KY 1723. The railroad crossing on the US 421 west route could benefit from resurfacing. The problems associated with shoulders can only be alleviated by reconstructing the routes. If truck volumes along the routes were to increase, then such action might be considered.

Appendices

Appendix A: Field Site Visit Dates and Activities

January 8, 1998 – initial site visit and videotaping

May 13, 1998 – field data collection

May 29, 1998 - field data collection

Appendix B: Phone Surveys Conducted with Facilities

PHONE SURVEY RESULTS

<u>Facility ID</u>	<u>Facility Name</u>	<u>Location / City</u>	<u>County</u>	<u>ADD</u>
2634	CENTRAL KY. ASPHALT	LEXINGTON	FAYETTE	BLUEGRASS

<u>Contact Name</u>	<u>Title</u>	<u>Phone</u>	<u>Fax</u>
HAROLD BARGO		606-255-1140	606-299-2385

1. Is the location of your facility on the map correct? YES
2. Our information shows about 60 trucks per day access your facility. Is that correct? *If not, fill in correct volume.*

Is the truck traffic to and from your facility seasonal or mostly constant?
SEASONAL, 8 MONTHS PEAK CAN GO UP TO 75 WITH SUMMER

4. *(If truck traffic is seasonal)* Is the trucks/day for the peak season?
5. What is the most common size truck operating at your facility? TANDEM SINGLE UNIT

What is the largest truck operating at your facility? 53' SEMITRAILER

7. What type of freight or commodity is shipped, and is incoming and outgoing freight different? *(one may be an empty truck)*
ASPHALT , STONE, AND SAND IN

8. Does the truck traffic peak at specific times of the day? *(e.g., out in the morning and return in the afternoon)* MOSTLY CONSISTENT ON PEAK SEASONS, 7:30 - 8:30 TO 4:30 - 5:30

9. What traffic congestion and delay problems along the routes are you aware of, or feel need improvement?

<u>Location (route segment, intersection, etc.)</u>	<u>Time and Day of Week</u>
CURRENT WORK ON RICHMOND RD., NONE AROUND FORBES , 421	

10. Where do trucks at your facility go to and come from? *(This may be an interstate, cities, general direction-N,S,E,W)*
11. Do you have any other problems or concerns along the route you would like us to consider?
NONE - EXCEPT CURRENT HIGH TRAFFIC AREAS
12. Would you like a copy of the final report (roadway/route evaluation ???) YES

NOTES/COMMENTS: