

TRUCK ROUTE ACCESS EVALUATION

Tyson Foods
Henderson County
Site # 2684

Report No. KTC-99-19

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

by

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1.0 Introduction

The Freight Movement and Intermodal Access in Kentucky Study (SPR 98-189) is being conducted by the Kentucky Transportation Center on behalf of the Kentucky Transportation Cabinet (KYTC). There are two major objectives of the study: evaluation of the access for trucks between intermodal or other truck generating sites and the National Highway System (NHS); and furthering the understanding of freight commodity flows throughout the state. This report summarizes the access evaluation for several facilities located in Henderson County in the Green River Area Development District (ADD) and KYTC Highway District # 2. The location of the site is shown in Figure 1. Work on other specific sites as well as the freight commodity flow task is on-going and is 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 Highway District planner recommendations, geographic location, distance to the National Highway System, and the number of trucks accessing the site. Consideration was also made for the freight type handled and transportation modes used. The Henderson County Tyson Foods site was recommended by KYTC District 2.

The Tyson Foods site was originally visited on February 27, 1998 for the initial site visit, facility identification, photographs, and videotaping. Field data collection was taken on three additional dates (July 9, September 29, and November 5, 1998). The site is located in a rural area of Henderson County south of Henderson and north of Sebree.

A phone survey of the facility manager was conducted early in the study process. The phone survey indicated at least 120 trucks per day entering and leaving the facility. Traffic counts for a 24-hour period taken in 1998 by KYTC found 538 trucks (7.2 percent of all vehicles) on US 41 at a location several miles north of the facility and 1,276 trucks (21.9 percent of all vehicles) on US 41 at a location within two miles south of the facility. A count on KY 56, near US 41, found 780 trucks (20.4 percent of all vehicles). These truck volumes would include trucks using other facilities. Truck volume counts were not available for some of the other routes used. The site trucks are generally semi tractor trailers five axle trucks with a maximum 48-foot trailer. The phone survey information can be found in Appendix A.

2.0 Trucks Routes in Use

There are several routes used to reach the National Highway System which is the Pennyriple Parkway. The industrial park is located south of Henderson off of US 41 (Figure 2). The closest interchanges on the Pennyriple Parkway north of the facility are Exit 68 (KY 416) and Exit 76 (KY 425). The closest interchanges south of the facility are Exit 63 (KY 56) and Exit 54 (KY 138). The indication during the phone survey was that Exits 63 and 68 were not used, and that Exit 54 was used for southbound and westbound trucks while Exit 76 was used for northbound and eastbound trucks. However, the site visits revealed that Exit 68, which is a partial diamond

with a southbound exit ramp and northbound entrance ramp, was used for inbound trucks from the north and outbound trucks to the north. Trucks use KY 2097 (Figure 3) and KY 2096 (Figure 4) to access Exit 68. The site visits also revealed that Exit 63, which is a cloverleaf, is used by inbound trucks from the south and outbound trucks to the south. While there was use of Exits 54 and 76, a larger volume of trucks was observed using Exits 63 and 68. Four routes were identified as shown in Figure 1. The county, highway number, and milepoints on the various highways are as follows:

<u>Route</u>	<u>County</u>	<u>Highway</u>	<u>Milepoint Range</u>
1	Henderson	US 41	0.406 - 0.8
		KY 2097	0.0 - 0.812
		KY 2096	0.0 - 3.069
		KY 416	7.8 - 8.0
2	Henderson	US 41	0.0 - 0.8
	Webster	US 41	9.676 - 12.076
		KY 56	12.470 - 14.184
3	Henderson	US 41	0.8 - 10.871
		KY 425	4.729 - 5.510
4	Henderson	US 41	0.0 - 0.4
	Webster	US 41	0.0 - 12.076
	Hopkins	US 41	27.638 - 27.705
	Hopkins	KY 138	0.0 - 1.158

The length of these routes are: 4.5 miles for Route 1, 4.9 miles for Route 2, 10.9 miles for Route 3, and 13.8 miles for Route 4.

The functional classification of most of the roads is rural, major collector. The exceptions are KY 2097 and KY 2096 which are rural local, KY 416 which is rural, minor collector and KY 425 which is urban, principal arterial. The weight classification for most of the roads are AAA which carries a maximum gross weight of 80,000 pounds. The exceptions are KY 2096 which has a AA classification with a weight limit of 62,000 pounds and KY 138 which with an A classification and weight limit of 44,000 pounds.

Estimates of average daily traffic (ADT) was obtained from the Highway Information System. Volume estimates on the sections of various highways ranged from: 1,200 on KY 138; 1,700 on KY 416; 2,100 on KY 2096 and 2097; 3,600 on KY 56; 2,200 to 7,000 on various portions of US 41; and 7,000 on KY 425.

Figure 1: Location of Truck Generating Site

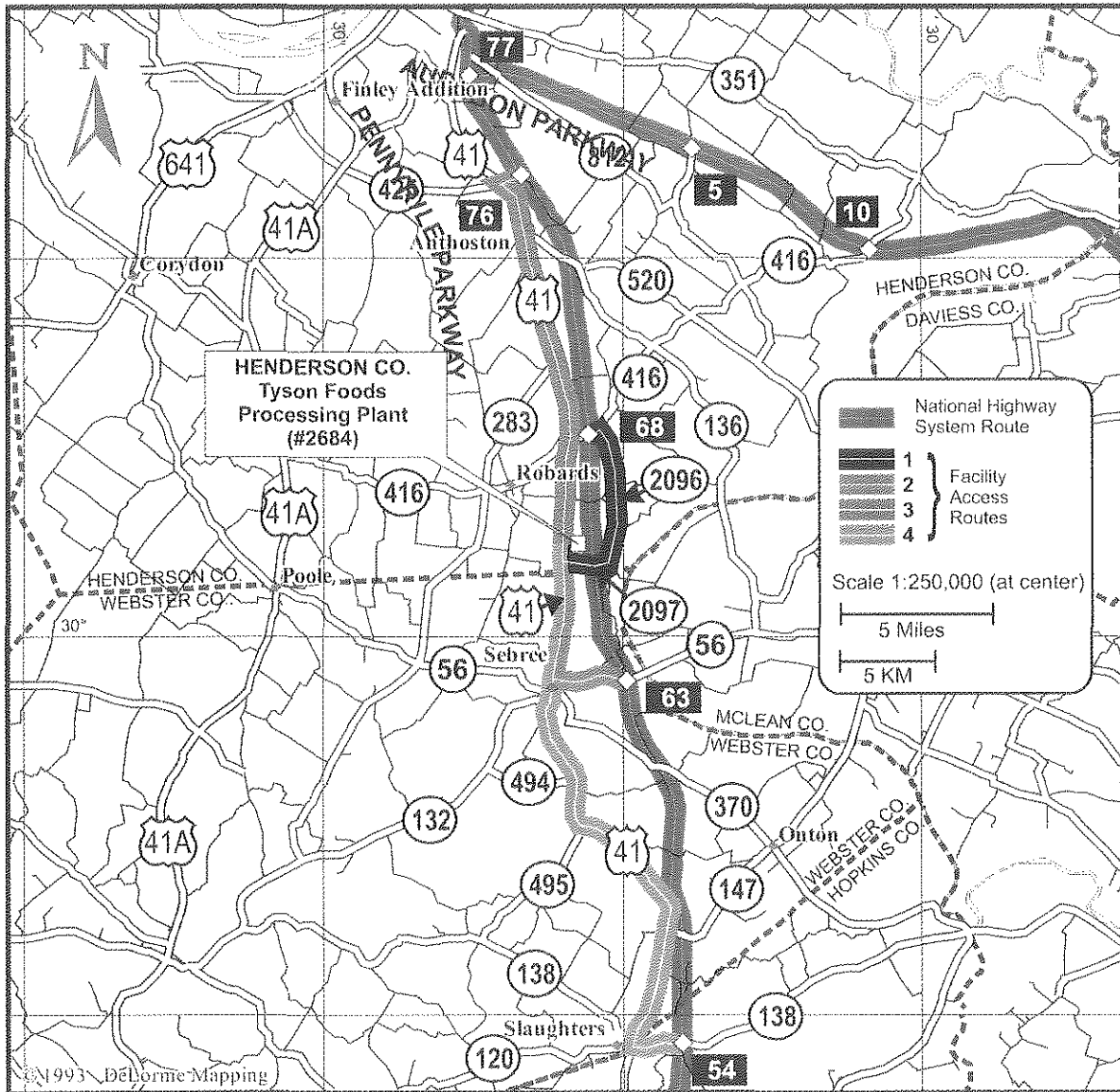


Figure 2: US 41 (between KY 425 and KY 416)



Figure 3: KY 2097 (between US 41 and KY 2096)



Figure 4. KY 2096 (between KY 416 and KY 2096)

3.0 Route Data Collection and Evaluation

The route features that were evaluated in this study are shown in Table 1 along with a brief description of the evaluation method. While some of these features required 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.

3.1 Traffic Operations and Level of Service

The phone survey of the facility indicated that there were no operational problems or concerns related to traffic congestion or delay along the routes. The only comment was that there were occasional delays along US 41 but this was not a major concern. Observations during the site visits confirmed this opinion. Thus, there was no need for any detailed traffic counts or travel time surveys.

3.2 Accident History

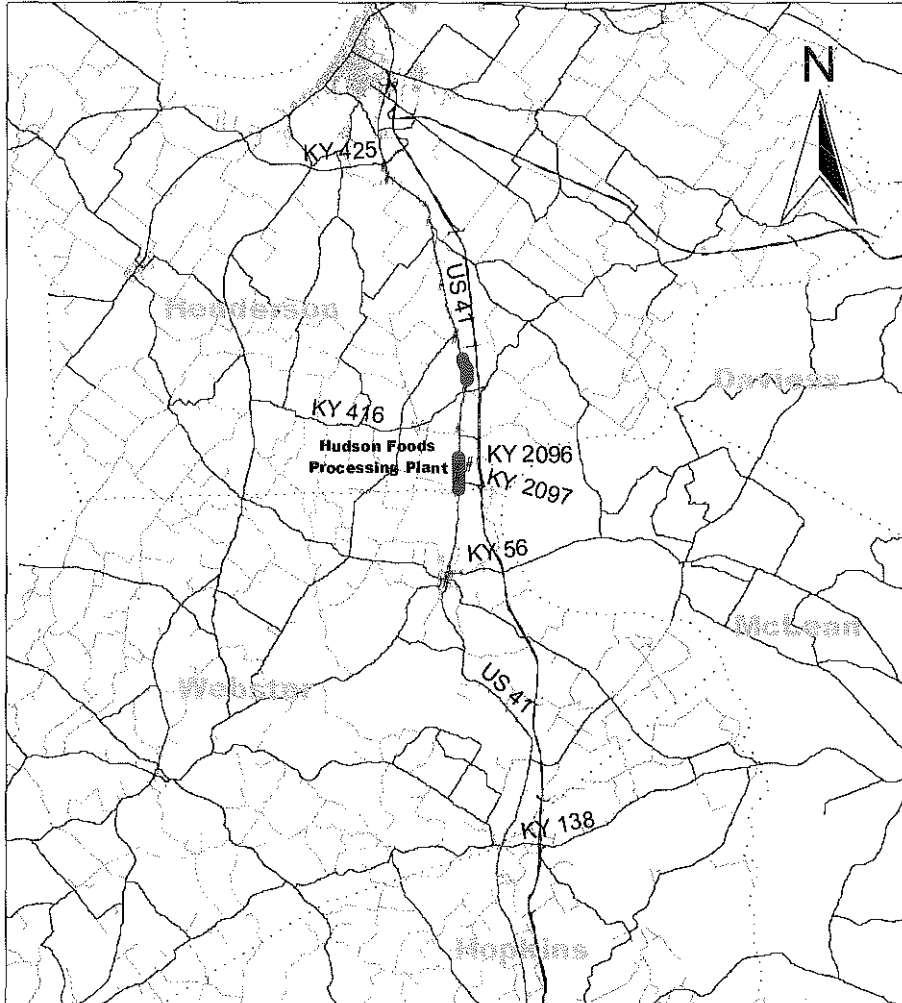
In 1997 the Kentucky Transportation Center studied all state-maintained roads throughout Kentucky and determined average truck accident rates for different types of road sections. A critical accident rate was then calculated using the average accident rate for a specific highway type along with an assumed level of statistical significance and exposure (vehicle miles traveled). Two sections along US 41 were identified as having a truck accident rate higher than the critical rate for that particular highway type. No sections were identified on any of the remaining routes. Both of the US 41 sections were in Henderson County. One was between milepoints 0.0 (Webster County line) and 1.0. The entrance to Tyson Foods is at milepoint 0.8 which is within this section. There were five truck accidents in the three-year period with a critical rate factor of 1.53. Two involved an opposite direction sideswipe, one was a same direction sideswipe, and two involved a parked vehicle. The other section was between milepoints 3.3 and 4.0. The intersection with KY 416 is at milepoint 3.2. There were four accidents with a critical rate factor of 1.72. Two involved a same direction sideswipe with one an opposite direction sideswipe, and one was a collision with an animal. There were two accidents on KY 416 at the US 41 intersection.

Figure 5 shows the locations of accidents during the years 1995, 1996, and 1997. Summaries of the accidents along each of the four truck routes are shown in Table 2 for the same three-year period. Each route is considered separately so there is some overlap of roads and some accidents could be counted on more than one route.

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

Figure 5: Accident Locations (1995-1997)



LEGEND

- # Facility
- Accidents: 1-3
- # Accidents: 3-5
- # Accidents: 6-8
- Critical Accident Rate Section

Scale - 1:250000

2 0 2 4 6 Miles

4 0 4 8 Kilometers

Table 2: Accident Types along Tyson Foods Truck Routes

Route 1. US 41/KY 2097/KY 2096/KY 416

	<i>Non-Truck Accidents</i>	<i>Truck Accidents</i>	<i>Percent Trucks</i>
Total Accidents	14	0	0
Fatal	0	0	NA
Injury	1	0	0
Intersection	1	0	0

Route 2. US 41/KY 56

	<i>Non-Truck Accidents</i>	<i>Truck Accidents</i>	<i>Percent Trucks</i>
Total Accidents	25	4	14
Fatal	0	1	100
Injury	8	1	11
Intersection	3	0	0

Route 3. US 41/KY 425

	<i>Non-Truck Accidents</i>	<i>Truck Accidents</i>	<i>Percent Trucks</i>
Total Accidents	95	19	17
Fatal	1	0	0
Injury	25	9	26
Intersection	30	5	14

Route 4. US 41/KY 138

	<i>Non-Truck Accidents</i>	<i>Truck Accidents</i>	<i>Percent Trucks</i>
Total Accidents	49	8	14
Fatal	0	2	100
Injury	21	1	5
Intersection	15	1	6

3.3 Cross Section Features

Figures 6 and 7 illustrate the sections of the routes having different widths of lanes and shoulders, respectively. The majority of the lane widths (86 percent) are 11 feet which is considered “adequate.” Almost all of the roads had shoulder widths which were considered “less than adequate” (93 percent).

Although some of the roads did not have a wide shoulder, there were no substantial problems related to clear zones.

3.4 Curvature Features

There were no curves on these routes which would result in offtracking into the opposing lane.

Grades are considered problematic if they cause trucks to slow excessively. Observations showed there was only one grade on any of the routes which could cause trucks to slow. This grade was on KY 2096 between milepoints 0.0 and 0.4. The grade could cause minor slowing (5 to 10 mph) for a truck traveling on the route from Tyson Foods to northbound on the Pennyrile Parkway (Route 1).

3.5 Railroad Crossings

The only at-grade railroad crossing was on US 41 in Henderson County at milepoint 0.242. This crossing had signs, pavement markings, and lights as an active warning device so it would be considered as having a “preferred” rating.

3.6 Bridges

The locations of the bridges are shown on Figure 9. There were 16 bridges on all the routes. No bridges had a “less than adequate” rating with five having an “adequate” and 11 with a “preferred” rating.

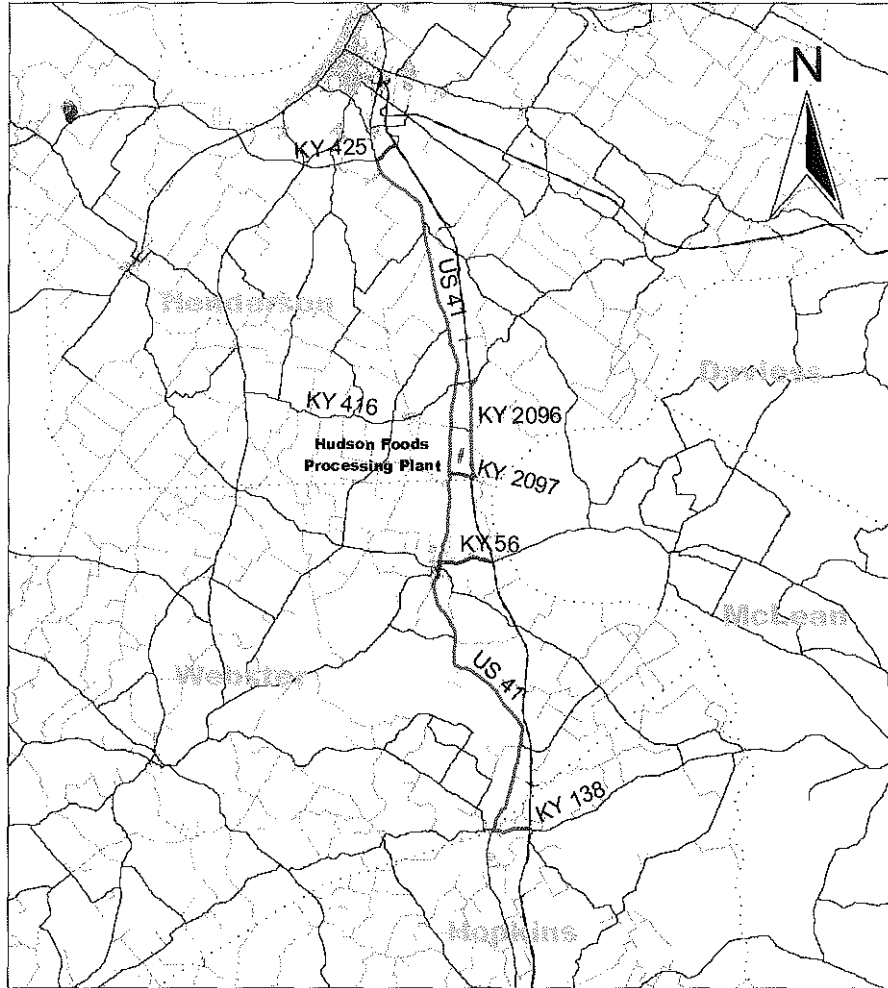
3.7 Sight Distance

No significant sight distance problems were noted.

3.8 Other Route Features

The pavement condition on the routes was good.

Figure 6: Lane Widths



LEGEND

#	Facility
—	Lane Width: 9-10 Feet
—	Lane Width: 11 Feet
—	Lane Width: 12-14 Feet

Scale - 1:250000

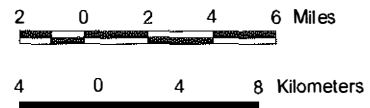
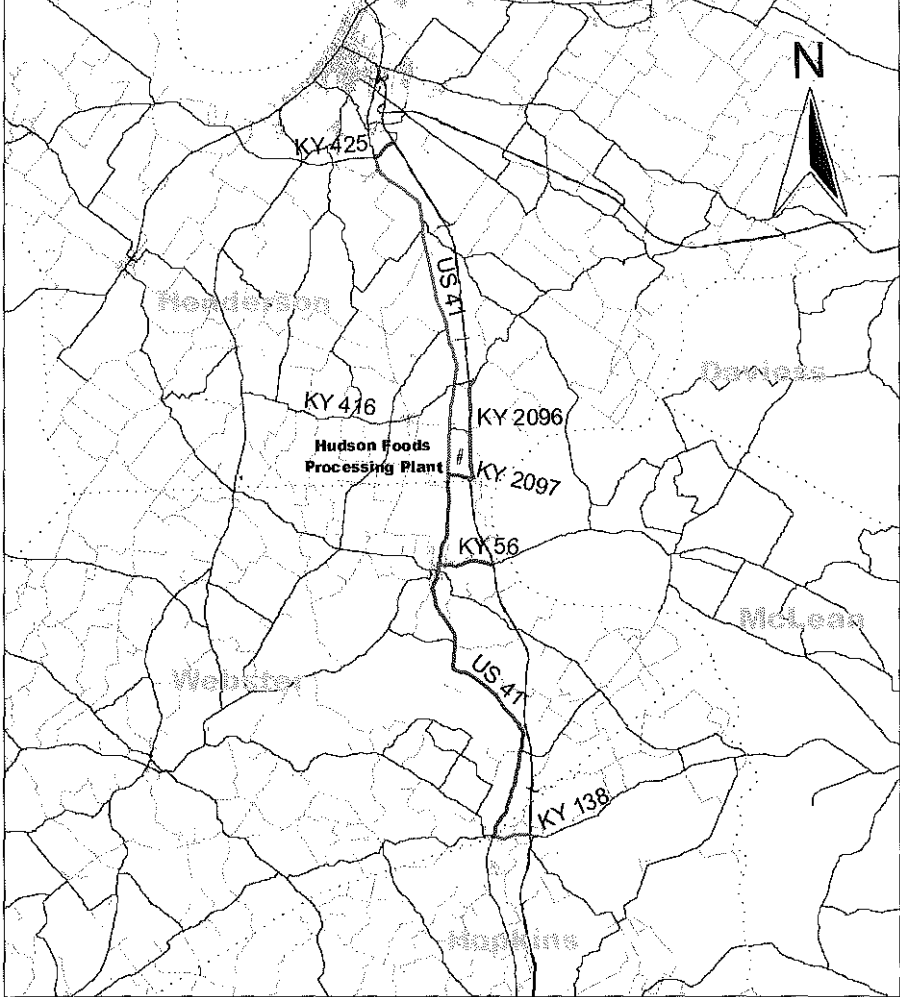
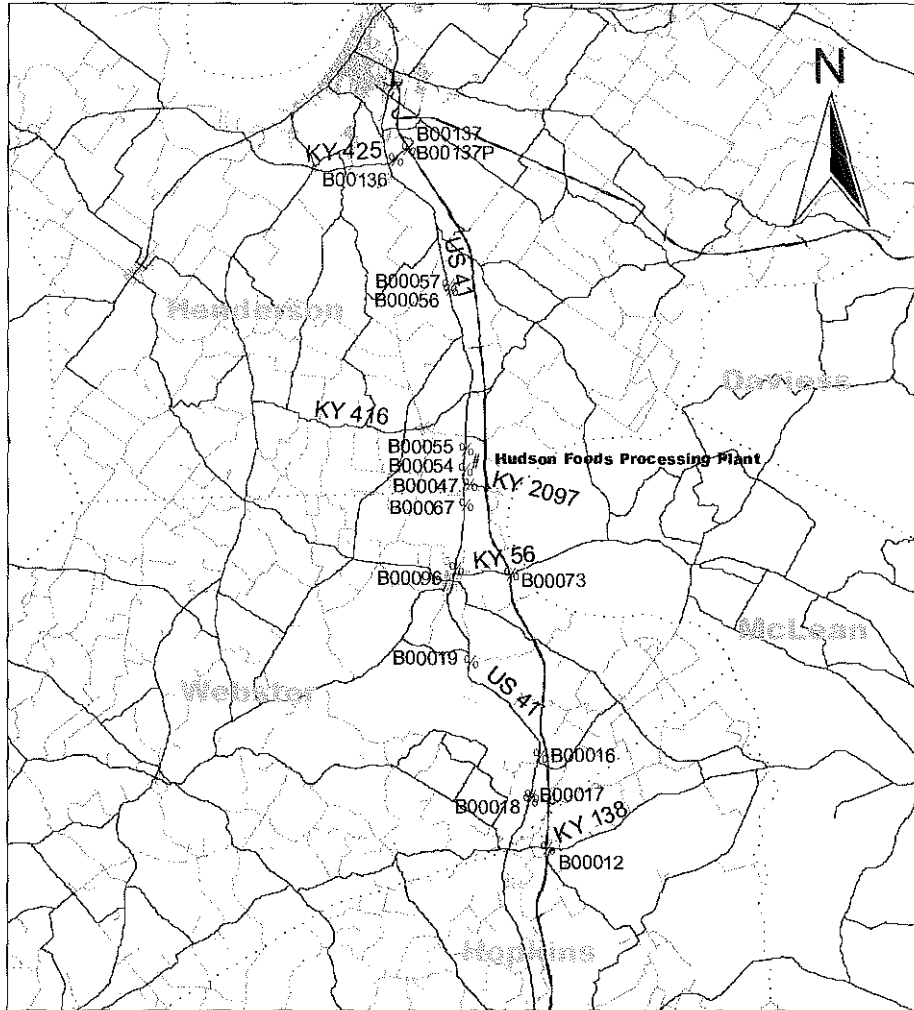


Figure 7: Shoulder Widths



LEGEND		Scale - 1:250000	
#	Facility	2 0 2 4 6 Miles	
—	Shoulder Width: 0-1 Foot		
—	Shoulder Width: 2 Feet	4 0 4 8 Kilometers	
—	Shoulder Width: 4 Feet		
—	Shoulder Width: 5-10 Feet		

Figure 8: Bridge Locations



LEGEND

#	Facility
% B00000	Bridge Number

Scale - 1:250000

2 0 2 4 6 Miles



4 0 4 8 Kilometers



4.0 Route Evaluation and Recommendations

4.1 Problem Truck Miles and Truck Points

In order to compare different routes to consider relative urgency of needed route improvements the features rated “preferred”, “adequate”, and “less than adequate” along a route were normalized for the number of miles, number of points, and number of trucks using the route section. In the case of the various Tyson Foods routes, four features (lane width, shoulders, grade, and bridges) that were evaluated quantitatively 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. Sections which are not rated as “preferred” are weighted by length as well as the number of trucks on the section.

Table 3 contains the total problem truck miles and total problem points for lane width, shoulders, grades, and bridges along these routes. Truck volumes were estimated using a truck volume counts on US 41 and KY 56 and information obtained from the facility. The truck volumes on some of the routes were high and obviously included trucks using other facilities. The rating of these routes relative to others evaluated for other facilities will be reported in the final report.

4.2 Maintenance Improvement Locations

This type of improvement could be addressed during routine maintenance programs by either the state or county and therefore could improve truck access without requiring major construction or expense. The pavement markings on KY 2097 and KY 2096 consist of only a painted centerline but the pavement widths would allow edge lines to be placed.

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 UK engineers who studied the route and its features either during a site visit or by viewing a video of trucks using the routes rated the overall access on a scale of 1 through 10. The interpretation for these ratings is shown in Table 4. A separate rating was given for each of the four routes. Routes 3 and 4 would have the highest rating of 7 but also have the longest length. Routes 1 and 2 would have a rating of 5 because improvements are needed on these routes. The phone survey found that concerns relating to the Pennyryle Parkway interchanges on KY 416 and KY 56 limited their use. However, observations show that Routes 1 and 2 are used frequently. This would probably be related to their shorter length.

Table 3: Summary of Problem Truck Miles and Truck Points for Various Routes

Feature	Road	Location	Points*	Length (miles)	Trucks (/day)	Truck- points	Truck- miles
Route 1 - Henderson County							
Lane Width	US 41	MP 0.4-0.8	1	0.4	1,000		600
	KY 416	MP 7.8-8.0	2	0.2	200		80
	KY 2096	MP 0.0-3.1	1	3.1	200		620
Shoulders	US 41	MP 0.4-0.8	2	0.4	1,000		800
	KY 416	MP 7.8-8.0	2	0.2	200		80
	KY 2096	MP 0.0-3.1	2	3.1	200		1,240
	KY 2097	MP 0.0-0.8	2	0.8	300		480
Grade	KY 2096	MP 0.0-0.4	1	0.4	200		80
Bridges	US 41	MP 0.653	1		1,000	1,000	
TOTAL						1,000	3,980
Route 2 - Henderson (051)/Webster (117) Counties							
Lane Width	US 41/051	MP 0.0-0.8	1	0.8	1,000		800
	US 41/117	MP 9.7-12.1	1	2.4	1,250		3,000
Shoulders	US 41/051	MP 0.0-0.8	2	0.8	1,000		1,600
	US 41/117	MP 9.7-12.1	2	2.4	1,250		6,000
	KY 56/117	MP 12.5-14.2	1	1.7	780		1,326
Bridges	US 41/051	MP 0.653	1		1,000	1,000	
	US 41/117	MP 11.681	1		1,250	1,250	
TOTAL						2,250	12,726

Table 3: Summary of Problem Truck Miles and Points for Various Routes (continued)

Feature	Road	Location	Points*	Length (miles)	Trucks (/day)	Truck-points	Truck-miles
Route 3 - Henderson County							
Lane Width	US 41	MP 0.8-10.9	1	10.1	500		5,050
Shoulders	US 41	MP 0.8-10.9	2	10.1	500		10,100
Bridges	US 41	MP 6.200	1		500	500	
	US 41	MP 6.320	1		500	500	
TOTAL						1,000	15,150

Route 4 - Henderson (051)/Webster (117)/Hopkins (054) Counties

Lane Width	US 41(051)	MP 0.0-0.4	1	0.4	1,250		500
	US 41(117)	MP 0.0-9.2	1	9.2	750		6,900
		MP 9.8-12.1	1	2.3	1,250		2,875
	US 41(054)	MP 27.6-27.7	1	0.1	750		75
	KY138(054)	MP 0.0-1.2	1	1.2	300		360
Shoulders	US 41(051)	MP 0.0-0.4	2	0.4	1,250		1,000
	US 41(117)	MP 0.0-12.1	2	12.1	1,000		24,200
	US 41(054)	MP 27.6-27.7	2	0.1	750		150
	KY138(054)	MP 0.0-1.2	2	1.2	300		720
Bridges	US 41(117)	MP 6.855	1		750	750	
		MP 11.681	1		1,250	1,250	
TOTAL						2,000	36,780

*1 point for “adequate” features and 2 points for “less than adequate” features (0 points for “preferred” features not shown)

Table 4: 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
3-5	Minor improvements are <u>required</u> on this route
6-8	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

Trucks use several routes to access the Pennyrile Parkway. The routes using US 41 and KY 425 to Exit 76 (Route 3) and using US 41 and KY 138 to Exit 54 (Route 4) currently provide the best access relative to roadway conditions but are substantially longer than the alternate routes. The only potential improvements on these routes would be increasing the shoulder and lane width.

The shortest route uses US 41, KY 2097, KY 2096, and KY 416 to Exit 68 which is a partial interchange (southbound exit ramp and northbound entrance ramp). A recommendation would be upgrading Exit 68 to a full interchange and reconstructing the section of KY 416 between KY 2096 and US 41.

Appendix A: Phone Survey Conducted with Facility

PHONE SURVEY RESULTS

<u>Facility ID</u>	<u>Facility Name</u>	<u>Location / City</u>	<u>County</u>	<u>ADD</u>
2684	Hudson Foods	Robards	Henderson	Green River
<u>Contact Name</u>	<u>Title</u>	<u>Phone</u>	<u>Fax</u>	
Vickie Angeloff	Transportation	502-521-4000	502-521-3064	

1. Is the location of your facility on the map correct? Yes
2. Our information shows about 120 trucks per day access your facility. Is that correct?
If not, fill in correct volume. Yes
3. Is the truck traffic to and from your facility seasonal or mostly constant?
Constant
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? 48' semitrailer
6. What is the largest truck operating at your facility?
7. What type of freight or commodity is shipped, and is incoming and outgoing freight different?
(one may be an empty truck) In - chicken (live haul) grainery
Out - processed chicken
8. Does the truck traffic peak at specific times of the day? (e.g., out in the morning and return in the afternoon) Steady all day
9. What traffic congestion and delay problems along the routes are you aware of, or feel need improvement?
Location (route segment, intersection, etc.) Time and Day of Week
Occasional delays along US 41 - not a major concern
10. Where do trucks at your facility go to and come from? (This may be an interstate, cities, general direction-N,S,E,W) Half US 41 north to KY 425 to Pennyryle Parkway (Exit 76) north and east with other half south to Pennyryle Parkway at Exit 54 south and west
11. Do you have any other problems or concerns along the route you would like us to consider?
On/off Pennyryle Parkway at Exit 68
12. Would you like a copy of the final report (roadway/route evaluation ???)