Final Summary Report on Truck Route Access Evaluation

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FINAL SUMMARY REPORT ON TRUCK ROUTE ACCESS EVALUATION

"Freight Movement and Intermodal Access in Kentucky"
SPR 98-189

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with
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| 16. Abstract           | This report summarizes the evaluation of truck route access between the National Highway System and 46 truck generating sites, including intermodal sites, throughout Kentucky (includes 81 routes and 800 miles of highway). Routes were evaluated quantitatively for nine highway features, assigned an overall route rating and recommendations for routine maintenance and re-construction were made. The level and quality of truck access to the NHS varies dramatically throughout the state. Some facilities are between 25 and 50 miles from the NHS. No significant difference in route ratings or other measures was found by geographic location. The different typography throughout the state contributed to differences in grade and curvature quality. Very few non-NHS truck routes have 12-foot lanes along their whole length. The intermodal facility routes in general were found to be of better quality than routes leading to truck only sites. Trucks are not always using the routes they should. Ten of the routes were considered the “best” and required no improvements at this time. Improvements on other routes varied from routine maintenance to the need for complete reconstruction. Routes were prioritized by length and amount of truck traffic to recommend the most critical routes for improvement. |
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1.0 Introduction

This study entitled “Freight Movement and Intermodal Access in Kentucky” was initiated in July 1997 for a two-year period funded by the Kentucky Transportation Cabinet (KYTC) and undertaken by the Kentucky Transportation Center (KYTC) with the University of Kentucky’s (UK) Department of Civil Engineering. The study was undertaken on the recommendation of KYTC’s Intermodal Advisory Panel. This report summarizes the results of the evaluation of highway access for trucks to intermodal facilities and other truck generating sites throughout Kentucky. In all, 81 routes used to access 46 facility sites or clustered sites were evaluated. These routes represented approximately 800 miles of highway. Another portion of this study considered freight commodity flows in Kentucky and those results are reported in a separate document.

The truck access evaluation involved the following stages of work.

- The existing intermodal and truck facility databases were updated. The intermodal facility directory had been originally created by the Kentucky Transportation Center as part of an ongoing project (see Figure 1). The database of sites generating more than 25 trucks per day had been compiled in 1994 by the KYTC Division of Transportation Planning along with the Area Development Districts (ADD) (see Figure 2). The geo-coding of these sites for Geographic Information System (GIS) use was not accurate enough for site selection in this project. Therefore, researchers with this project phoned all intermodal facilities and the highest truck trip generators in each area development district in the truck site database. While contacting the facilities to clarify location, other information such as commodity handled and number of transportation modes at the facility was also updated.

- In order to select approximately 50 sites for study throughout Kentucky, a GIS program was used to determine which sites were located in clusters and to determine their distance from the National Highway System (NHS). Clusters of facilities were then chosen for study based on total trucks per day and distance to the NHS, while ensuring that a variety of modes, commodities and geographic areas throughout the state were included. Transportation planners from Highway Districts and ADD offices were asked to recommend sites with truck access problems. The sites selected and studied are shown in Figure 3 and listed in Appendix A. This list contains the names of only the facilities which were in the original databases. In many cases, other facilities are also located at these sites as noted in the individual truck access reports.

- At the same time site databases were being updated and site selection was undertaken, researchers were also developing a procedure to evaluate the highway access between the NHS and the sites. This approach of evaluating the truck route between a site and the NHS was recommended by the state Intermodal Advisory Panel which is sponsored by and provides direction to the KYTC on intermodal issues. In this way, the study could focus on the actual route segments in use and the actual problems being experienced by the truck traffic using the route even when different highway sections fall under the responsibility of different jurisdictions. This type of approach is also applicable to economic development-related access studies where the routes leading to prime development sites may cross several
jurisdictions and include both state and local roads. Objective measures that allowed for prioritization of route problems were needed. This report summarizes the methodology that was developed but a more complete description is contained in Kentucky Transportation Center Report 98-14 "A Methodology for Evaluating Large Truck Access to Intermodal and Other Facilities".

- Once a site or cluster of sites was identified for potential route evaluation, the managers of the facilities were contacted (by fax and subsequently by phone). The nature and purpose of the study was described to the managers to solicit their cooperation. Those interested in participating were then asked to provide details regarding truck traffic, to identify the routes used to travel to the NHS and to identify the location and time of day of traffic problems affecting their trucks. Information on the largest typical truck using the route was collected to calculate many of the geometric adequacy measures described below. Finally, information regarding the origin, destination, quantity, and mode of freight flowing through the facility was collected for use in other freight commodity flow modeling studies. The cooperation of the site managers was very good. All managers but one have requested a copy of the final report, which was offered in the initial phone contact. Survey responses are contained within the reports on each individual site.

- Between May 1998 and January 1999, engineers conducted the evaluation of the highway routes leading to the sites from the NHS. The evaluation involved route video taping, site visits, field measurements, compilation of HIS data and use of traffic counts conducted by KYTC specifically for this project. A separate report was prepared for the routes leading to each site.

- Finally, in May 1999 the route characteristics and quantitative measures of truck access were compiled into a joint database for preparation of this report and delivery to KYTC. This database is in Appendix A.

2.0 Summary of Evaluation Methodology

The methodology involves tabulation of the following four types of information or measures: 1) problem truck miles and problem truck points, 2) subjective or unstructured evaluations, 3) overall route rating and 4) maintenance improvement locations. Problem truck miles and problem truck points were used for both point and continuous quantitatively evaluated route features: lane width, shoulders, bridges, railway crossings, grade, safe speed on horizontal curves, offtracking on horizontal curves, intersection turning radii, and stopping sight distance. Using criteria developed in brainstorming sessions and from reference sources, each of the above features along route sections or at points along the routes were graded as "preferred", "adequate" or "less than adequate" for truck access. In order to obtain the weighted sum of problem truck points along a route with respect to a particular feature, the number of less than "preferred" points were weighted by the number of trucks per day that passed that point. The "less than adequate" points were weighted twice that of "adequate" points. For continuous features, such as lane width, the problem truck miles were obtained by weighting the summation by the length of the sections with less than "preferred" features. Sections or points that are graded "preferred"
with respect to a particular route feature do not contribute to the sum of problem truck points or miles for that particular feature. In this way, the problem route features reported in section 5.0 are weighted by the number of trucks as well as the length of truck route as a measure of relative urgency.

Several truck route features that are important to an evaluation of truck access could not be graded as “preferred”, “adequate” or “less than adequate”. Some of these features were still rated quantitatively using other methods. These features included traffic level of service which was only studied when facility managers indicated a problem existed. Accident history was considered by plotting accident locations over a three-year period and referencing route sections that had been determined to have critically high truck accident rates in a previous KTC study. Clear zone inadequacies, pavement problems, parking issues, traffic control device problems, signage and other problems were noted when observed in the field. Some notes regarding these features are contained in the summary of route evaluation database that is provided in Appendix A. Information on most of these features must be obtained from the individual route reports.

Through use of the problem trucks per day and problem truck miles per day, specific sections or routes can be compared on a feature by feature basis to determine the urgency of needed improvements. However, there is also a need for a measure of the overall route quality, considering all route features, including those subjectively evaluated. Some consideration was given to weighting each of the features such that a composite quantitative measure could be determined. It was concluded that such a measure would be inaccurate due to the relative weighting of different features and the inability to include subjective features or elements such as traffic operations which are evaluated at only selected points. Therefore, the decision was made that the researcher who inspected the route, together with the research team, would consider the data collected and then grade the overall route on a scale of 1 through 10. In this case, 10 would represent a route that currently accommodates trucks with reasonably good standards of geometry, safety and operating conditions and therefore needs no improvements. The guidelines for this rating are shown in Table 1.

<table>
<thead>
<tr>
<th>Overall Route Rating</th>
<th>Qualitative Interpretation of Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Trucks should not be using this route</td>
</tr>
<tr>
<td>2</td>
<td>Major construction is required to improve this route</td>
</tr>
<tr>
<td>3-5</td>
<td>Minor improvements are required on this route</td>
</tr>
<tr>
<td>6-8</td>
<td>Minor improvements could improve this route</td>
</tr>
<tr>
<td>9</td>
<td>Minor problems exist that do not seriously impede truck access</td>
</tr>
<tr>
<td>10</td>
<td>Trucks are served with reasonable access</td>
</tr>
</tbody>
</table>
The final type of result that is provided for each site or cluster of sites is a list of maintenance improvement locations along the routes. These locations might result from subjective or point features that have been evaluated. The maintenance improvements list includes locations where a feature might be improved simply by routine work or maintenance already performed by some agency. As an example of a problem that could be rectified through maintenance improvement is an intersection sight distance problem that can be improved by simply removing overgrown vegetation or trees along the roadway. Recommendations for these types of improvements can be found in individual reports. The most common recommendations made in this category related to signage, pavement surface condition, brush removal, and parking.

3.0 Site and Route Descriptions

In all, the routes to 46 sites of individual or clustered facilities were evaluated. This number was reduced from the initial 57 sites because some facilities were combined as they used the same route(s). Others were not evaluated because the phone surveys found very few trucks. Two others were removed because newly open highway facilities connected the facility to the NHS. While many sites had only one facility, others had as many as 20. Riverport areas and industrial parks, in particular, had a large number of facilities in a cluster. In many cases, more than one route led from the facility to the National Highway System. On average there were 1.8 routes evaluated per site. The sites were located in 37 different counties with no more than 4 in any single county. In many cases, the routes crossed county boundaries. The number of sites evaluated in each Area Development District (ADD) is shown in Table 2. The sites and routes are illustrated in Figures 3 through 6. These figures illustrate that facilities in the west and south of Kentucky were located further from the NHS than in the central and northern areas of the state. A brief description of the routes is contained with the other summary information in Appendix A. A total of 13 of the sites had at least one intermodal facility, while the others involved only truck freight movements. A total of 4 riverports and one airport were evaluated.

The route lengths ranged from 0.4 miles to 54.3 miles with a mean length of 10.0 miles. Twenty five percent of the routes were less than 2.0 miles from the NHS while another quarter were above 14.2 miles. The site truck traffic on a route ranged from 15 to 600 trucks per day with a mean of 143. However, the maximum truck volume on the routes ranged from 20 to 2283 with a mean of 739. The Average Daily Traffic (ADT) varied along the length of each truck route (from a minimum of 348 to a maximum of 38,589). In order to consider the range of ADTs over all the routes studied, the maximum (ADT) for each route section was considered. The mean maximum ADT was 11,243 vehicles with a standard deviation of 8,635. These statistics further illustrate the variability of route characteristics.

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Note that in several cases the route evaluated was not to the National Highway System but to the state line or the actual destination for the freight.
Table 2: Sites by Area Development District

<table>
<thead>
<tr>
<th>ADD</th>
<th>Number of Sites</th>
<th>Mean Overall Route Rating (/10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green River</td>
<td>4</td>
<td>6.5</td>
</tr>
<tr>
<td>KIPDA</td>
<td>6</td>
<td>6.4</td>
</tr>
<tr>
<td>Purchase</td>
<td>4</td>
<td>4.6</td>
</tr>
<tr>
<td>Cumberland Valley</td>
<td>2</td>
<td>4.3</td>
</tr>
<tr>
<td>Gateway</td>
<td>2</td>
<td>7.5</td>
</tr>
<tr>
<td>Bluegrass</td>
<td>5</td>
<td>6.8</td>
</tr>
<tr>
<td>Buffalo Trace</td>
<td>2</td>
<td>5.0</td>
</tr>
<tr>
<td>Northern Kentucky</td>
<td>3</td>
<td>6.3</td>
</tr>
<tr>
<td>Pennyrile</td>
<td>3</td>
<td>7.3</td>
</tr>
<tr>
<td>Lincoln Trail</td>
<td>2</td>
<td>8.0</td>
</tr>
<tr>
<td>Big Sandy</td>
<td>3</td>
<td>5.3</td>
</tr>
<tr>
<td>Kentucky River</td>
<td>1</td>
<td>2.7</td>
</tr>
<tr>
<td>Barren River</td>
<td>5</td>
<td>5.4</td>
</tr>
<tr>
<td>FIVCO</td>
<td>3</td>
<td>4.7</td>
</tr>
<tr>
<td>Lake Cumberland</td>
<td>1</td>
<td>2.0</td>
</tr>
</tbody>
</table>

4.0 Overall Route Ratings

The overall route rating (see section 2.0), while subjective, is the most convenient measure to consider for route comparison and prioritization because it considers all factors studied. The distribution of ratings is shown in Figure 7. While the most frequent rating was 2 out of 10, the mean rating was 5.6, and 25 percent of the routes had a rating of 8 or higher. Again this illustrates the variety and range of route conditions with respect to truck access.

Table 2 indicates the average route ratings by ADD. The two lowest average ratings were for eastern Kentucky area development districts where topography is a significant limiting factor for highway development. Note also that these ADDs only had one site evaluated in each district. Figure 8 illustrates the lowest overall route rating by site. This figure further demonstrates that good and bad routes are found throughout the state.

Using linear regression, no relationship was found between route length and overall route rating. The mean overall rating for intermodal facility routes was 5.1 while the mean for truck site routes was 5.8. This difference was not statistically significant when tested using a Student’s t
Locations where offtracking may occur were estimated using wheel base lengths, horizontal curvature information from the HIS database and lane widths measured in the field. A total of 37 of the 81 routes had no curves with offtracking problems. The total problem truck points for offtracking ranged up to 78,278. However, four routes in particular stand out as unusually problematic when weighted by truck volume and the number of problematic curves. The following routes have problem truck miles greater than 25,000: the Sapphire Tipple in Letcher County; Willamette Industries in Hancock County; and both routes leading to Nally and Hayden in Harlan County.

Safe speed on horizontal curves was evaluated using a ball bank indicator. Two of the above sites also have routes that are in the most critical six with respect to safe speed (both routes to Nally and Hayden, and 3 routes to the Sapphire Tipple). The Estill County Industrial Park was the other site with problem truck points for safe speed exceeding 12,000. All other routes had less than 7,800 points including 46 routes with no safe speed problems on curves.

Grade was considered problematic when length and steepness combined to cause trucks to slow excessively. In some cases, downgrades were also problematic. Only 30 of the 81 routes had any grade problems noted. For the non-zero grade problem truck miles, the median was only 683 truck miles. However, three routes stand out with problem truck miles for grade exceeding 5,000 truck miles: Nally and Hayden in Harlan County, the Greensburg Manufacturing Company in Green County, and Willamette Industries in Hancock County.

5.2 Lane Width and Shoulders

Lane width is a critical highway feature for many aspects of truck access. Only 11 of the 81 routes had 12-foot lanes along their entire length. Further, 21 of the routes had no sections of 12-foot lanes. A total of 54 routes had all sections with at least 11-foot lanes. Only 10 routes were completely comprised of 10-foot or narrower lanes. For problem truck miles for lane width, each route had on average 4486 truck miles (5201 with the zero observations removed). Four sites had routes with total problem truck miles greater than 20,000. Nally and Hayden and Willamette Industries, previously mentioned for curvature problems, make this list as well as Westvaco in Ballard County and Logan Aluminum in Logan County. The routes to these four sites can be considered the routes where the most trucks travel the longest sections on narrow lanes from among the routes studied.

No relationship was found between route length and the percent of the route that had 12-foot lanes or was less than or equal to 10-foot lanes. The percent of the route in different lane width
categories also did not vary for intermodal versus non-intermodal sites. However, the total number of problem truck miles for lane width was significantly greater for non-intermodal routes (5,261) versus intermodal routes (2,161). This finding suggests intermodal facility routes may be less of a concern than routes to truck only sites. The number of problem truck miles for lane width did not vary significantly by ADD.

Shoulders are not only part of the clear zone but also provide emergency stopping opportunities for trucks. Shoulders were evaluated based on their width and surface type. All but 2 routes were assigned problem truck miles for shoulders. Two routes stand out with greater than 30,000 problem truck miles for shoulders: Willamette Industries in Hancock County and one route to Westvaco in Ballard County. There is a high correlation between problem truck miles for shoulders and for lane width (Pearson’s Correlation Coefficient = 0.84).

5.3 Intersection Turning Radii

The majority of the routes (49) did not have any intersection turning radius problems for the largest truck using the route. All but one of the others had total problem truck points for turning radii below 1,500. Smith Brothers and Intertec Systems in Nelson County had a problem truck total of 9,394. Willamette Industries in Hancock County and Citgo Petroleum/Marathon Petroleum in Jefferson County each had problem truck points for turning radii between 1,400 and 1,500.

5.4 Bridges

Bridges were evaluated using the bridge sufficiency rating from the KYTC Division of Operations. A total of 49 routes contained bridges that were rated less than “preferred”. When weighed by truck volume on the route sections, seven routes are high outliers that should be considered for bridge improvements. These seven routes have problem truck points for bridges ranging from 3,865 to 8,712 while all others are below 3,000. A description of these routes is shown in Table 3.

5.5 Railway Crossings

Only 14 of the routes had railway crossings that were rated less than “preferred”. These problem truck points ranged from 40 to 2576. Six of these are considered particularly problematic. Three of these are in Eastern Kentucky (Millard Processing and Praise Loadout in Pike County and Sapphire Tipple in Letcher County). The other three are in Jefferson County at the two sites on the Ohio River off I-264. Before improvements are recommended at these crossings, investigation of the train traffic and speed should be undertaken.

5.6 Sight Distances

Only two routes were assigned problem truck points for inadequate stopping sight distances: Kenmor Stone in Carter County and Praise Loadout in Pike County. Each route is approximately 2 miles long and also has other problems associated with it.
Table 3: Routes with Problematic Bridges

<table>
<thead>
<tr>
<th>Site</th>
<th>County</th>
<th>Problem Truck Points (Bridges)</th>
<th>Maximum Truck Volume on Route (/day)</th>
<th>Route Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Westvaco</td>
<td>Ballard</td>
<td>8712</td>
<td>702</td>
<td>KY 121 to KY 286 to US 62 to I-24</td>
</tr>
<tr>
<td>Logan Aluminum</td>
<td>Logan</td>
<td>7920</td>
<td>720</td>
<td>US 431 North to the Western KY Pkwy</td>
</tr>
<tr>
<td>Westvaco</td>
<td>Ballard</td>
<td>6368</td>
<td>730</td>
<td>US 51 South to Pennyrile Pkwy</td>
</tr>
<tr>
<td>Bowling Green Concrete</td>
<td>Warren</td>
<td>5447</td>
<td>2283</td>
<td>Plum Springs Loop Rd to US 31W to KY 446 to I-65</td>
</tr>
<tr>
<td>Nally &amp; Hayden</td>
<td>Harlan</td>
<td>4400</td>
<td>400</td>
<td>North on US 421, Then KY 118 to the Daniel Boone Pkwy</td>
</tr>
<tr>
<td>Willamette Industries</td>
<td>Hancock</td>
<td>4283</td>
<td>986</td>
<td>South Route to Western Kentucky Pkwy at Leitchfield</td>
</tr>
<tr>
<td>Medusa Aggregates</td>
<td>Warren</td>
<td>3865</td>
<td>2283</td>
<td>McGinnis Quarry Rd to US 31W to KY 446 to I-65</td>
</tr>
</tbody>
</table>

5.7 Traffic Level of Service

Many sites had intersections or route sections identified by the facility managers as congested or problematic that were evaluated using the Highway Capacity Manual level of service procedures or traffic signal evaluations. Field traffic counts were collected on the days and at the times indicated by facility managers. All routes but one had acceptable levels of service given the surrounding land use and road type. The intersection of Grade Lane and the Preston Highway near I-65 on the UPS access route in Jefferson County has delay problems in the PM peak. This route is otherwise rated very high.

The discrepancy between the facility managers’ perceptions and the actual levels of service is a matter of concern. It seems that traffic delay expectations may not be able to be met along many truck routes.

5.8 Truck Accidents

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). A total of the 28 routes studied had sections that were identified in the KTC study as having critically high truck accident rates for the particular road classification. Average differences for
routes with and without high truck accident sections with respect to average route rating and total problem truck miles for several variables was tested using the Student's t test. No statistically significant difference (0.10 level) was found for lane width, overall route rating, offtracking, grade, intersection turning radius or safe speed on curves. This confirms that accident rates and their causes are not easily understood.

6.0 Findings and Recommendations for Individual Routes

This section of the report summaries the deficiencies and recommendations for the routes to each site or area studied. Sites are presented in alphabetical order by county and the overall route rating (see Table 1 on page 3) is shown in parentheses after the subsection title. When more than one overall route rating is specified, this indicates the number of routes to this facility that were evaluated. The conclusions as to the most critical routes for improvement are found in section 7.0, while the data indices for different features of each route are contained in Appendix A.

6.1 Dollar General (Site #2655) Allen County (Overall Route Rating: 6, 8)

The following problems were identified along the truck access routes to the Dollar General Corporation Site:

- 10-foot lane widths on KY 100 in Allen County;
- 9-foot lane widths on KY 3499
- narrow shoulder widths on KY 100 in Allen County;
- narrow shoulder widths on US 31E in Barren County;
- curbed shoulders on US 31E near Glasgow;
- less than “preferred” bridge sufficiency ratings on all routes; and
- accident histories along sections of KY 100, US 31E and KY 90.

In order to correct the surface width problems along these routes, complete reconstruction would be necessary. However, the problems associated with lane and shoulder widths are not believed to be severe enough at this time to warrant such action. If truck volumes were to increase, the need to correct the less than “preferred” features present on some route would become more of a priority. Curbed shoulders are located in an urban area along a section of US 31E with four lanes and 45 mph speed limits. Any corrective action would not be warranted other than to insure a two- to three-meter clear zone is maintained from the edge of the traveled roadway.

6.2 Westvaco (Site #2683) Ballard County (Overall Route Rating: 4, 7, 5)

The following problems were identified along the truck access routes to Westvaco in Wickliffe:

- significant lengths of each route with less than "preferred" lane widths and shoulders;
- numerous less than “preferred” bridge sufficiency ratings;
- numerous less than “preferred” grades;
- numerous curves where offtracking may occur;
- one curve with safe speed problems (south route); and
• one problematic intersection (US 51 and US 60 in Wickliffe on the north route) with problems for left turning trucks.

The intersection of US 51 and US 60 could be improved by widening the lanes on US 51 so that trucks have more space available to turn into. In order to correct the lane width, shoulder, and curve deficiencies along these routes, complete reconstruction would be necessary. If growth in the area were to increase truck volumes, such action may be considered.

6.3 Bath County Industrial Site (Site #26) Bath County (Overall Route Rating: 7)

The following problems were identified along the truck access routes to the Bath County Industrial Site in Bath County:

• significant length of route with less than "preferred" lane widths and shoulders;
• two less than “preferred” grades; and
• one curve with offtracking and safe-speed problems.

The only problem with the state-maintained portion of this route is the grade on KY 36. The section of Kendall Springs Road with no clear zone or usable shoulder is in need of drainage improvements, shoulder construction, and speed advisory signs. The remaining problems associated with lane widths and shoulders can only be alleviated by reconstructing the non state-maintained portion of the route. If truck volumes along this portion of the route were to increase, then such action might be considered.

6.4 JRB Incorporated and the Paul Coffey Industrial Park (Site # 2561 & 2682) Boyd County (Overall Route Rating: 5, 5, 5)

In conclusion, the following problems were identified along the truck route:

• sections of US 60 with narrow lanes and shoulders;
• several curves on US 60 where offtracking could occur;
• missing and incorrect traffic signs on US 60;
• “less than adequate” bridges; and
• accident history along sections of US 60.

A recommended improvement is the replacement or correction of traffic signs along US 60. Given the truck volume and accident history some improvements to the route, particularly in Ashland, are recommended.

6.5 Bullitt County Stone (Site # 2031) Bullitt County (Overall Route Rating: 7)

The following problems were identified along the truck route:

• narrow lanes and shoulders on KY 61;
• problematic horizontal curves on KY 61;
• inadequate turning radius at the intersection of KY 44 and KY 61;
a humped railroad crossing on KY 44; and
an intersection in the merge area of a lane drop on KY 44.

The recommended improvements are:

- the intersection of KY 44 and KY 61 could be rebuilt;
- the humped railroad crossing could be improved; and
- the merge area on KY 44 could be moved away from the intersection.

6.6 Dow Corning, Varty Dayton Walther and Ghent Generating Station (Site # 33 & 51)
Carroll County (Overall Route Rating: 8, 2)

The following problems were identified along the truck routes:

- sections with narrow lanes and shoulders,
- problematic horizontal curves on the Gallatin County route;
- sections of grade on KY 35;
- inadequate turning radii at two intersections;
- a lack of directional signing at the intersection of KY 36 and US 42; and
- a railroad crossing that is not perpendicular to the roadway.

The recommended improvements are:

- remove sign and widen pavement at the intersection of KY 36 and US 42 and
- add directional signing at the intersection of KY 35 and US 42.

6.7 Kenmore Stone and Ruth Brothers Quarry (Site #2620) Carter County (Overall Route Rating: 2, 3)

The following problems were identified along the truck route:

- narrow lanes and shoulders;
- problematic grades;
- problematic horizontal curves;
- poor turning radius from US 60 onto KY 2;
- a narrow bridge on US 60;
- problematic site distance on US 60; and
- accident history.

The following improvements are recommended on these routes: elimination of sections of on-street parking on US 60 in Olive Hill, and pavement widening at the intersection of US 60 and KY 2. The narrow cross section problem can only be addressed through reconstruction which is most critical at this time in the town of Olive Hill.
6.8 Cook Family Foods (Site #2663) Carter County (Overall Route Rating: 8)

The following problems were observed along the truck route:

- narrow lanes and shoulders; and
- limited turning radius at the intersection of KY 1/KY 7 and CW Stevens Road.

It is recommended that pavement be widened at the intersection of CW Stevens Road and KY 1/KY 7. Given the short length of this route road widening is only recommended if further land use that attracts trucks is developed.

6.9 Hopkinsville Industrial Park (Site #41) Christian County (Overall Route Rating: 10)

The conclusion was that trucks were served with reasonable access to this facility. The only feature which was not given a "preferred" rating was the shoulders. The shoulder on US 41 could be changed from gravel to paved and shoulders could be added to the roads inside the industrial park.

6.10 Owensboro Riverport Authority / Miles Farm Supply Dock (Site #24) Daviess County (Overall Route Rating: 9, 8)

The following problems were identified along the truck access routes to the Owensboro Riverport Authority and Miles Farm Supply outside Owensboro:

- significant lengths of route with less than "preferred" lane widths and shoulders;
- significant lengths of roadway with insufficient clear zone;
- one horizontal curve with offtracking and safe speed problems;
- one less than “preferred” turning radius with problems for right turning trucks; and
- one less than “preferred” turning radius with problems for both left and right turning trucks.

In order to correct the less than “preferred” lane and shoulder widths found along the routes, complete reconstruction of both the east and west route would be necessary. Given the current volume of trucks found along both routes, such action may not be feasible. Should the area see an increase in truck volumes in the future, such reconstruction might be reconsidered. Both intersections with turning radius problems could be improved through lane widening in the vicinity of the intersection.

6.11 Edmonson County (No Site Number) Edmonson, Grayson, and Warren Counties (Overall Route Rating: 2)

The following problems were identified along this route:

- insufficient sight distance at the intersection of KY 226 and KY 259;
- a level railway crossing that is currently inappropriate for trucks;
- four less than “preferred” bridges;
- clear zone problems along some sections of the route;
• narrow lanes and shoulders along entire route;
• one grade that would be inappropriate for large or heavy trucks; and
• numerous horizontal curves where offtracking and safe speed would be a problem.

Providing large truck access to Edmonson county would require major construction. The northern route to the Western Kentucky Parkway would require re-construction to address curvature problems. The southern section of this route along KY 101 through the town of Smith’s Grove cannot be made adequate for larger trucks due to the railway crossing and the proximity of residential and commercial land uses to the highway. Both the sections of US 31W to the east and west of KY 101 could provide access to I-65. However, the sections of KY 259 and KY 101 to the north of US 31W would still require re-construction. A decision on whether to proceed with re-construction should consider possible stimuli for economic development and the extent of truck size violations on the route.

At this time, the inadequate sight distance problem at the intersection of KY 259 and KY 226 could be addressed with traffic control (i.e., an all way stop).

6.12 Estill County Industrial Park (Site # 2679) Estill County (Overall Route Rating: 6)

The following problems were observed along the truck route.

• narrow lanes and shoulders,
• problematic horizontal curves;
• problematic grades (especially on KY 1840); and
• narrow bridges.

The problems with lane width and curvature could be addressed by rebuilding KY 82 and KY 89. The only recommended improvement for this route is the addition of edge lines on KY 1840.

6.13 Transport Court Cluster (Site # 28) Fayette County (Overall Route Rating: 9, 2, 9)

The following problems were identified along the truck routes:

• narrow lanes on Mercer Road and KY 1978;
• narrow shoulders along most of the route;
• problematic horizontal curves on Nandino Boulevard; and
• brush blocking signs on KY 1978.

A recommended improvement is clearing the brush along KY 1978. No other improvements are necessary at this time.
6.14 Central Kentucky Asphalt (Site # 2634) Fayette County (Overall Route Rating: 7, 6)

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.

6.15 Ivel Prep Plant (Site #1353) Floyd County (Overall Route Rating: 6)

The following problems were identified along the truck access route to the Ivel Prep Plant in Floyd County:

- significant length of route with less than "preferred" lane widths and shoulders;
- one curve with less than “preferred” safe speed and offtracking;
- one less than “preferred” grade; and
- one short section of roadway with poor pavement conditions.

Complete reconstruction of the route (specifically Ivy Creek Road) would be required to remedy the majority of the access-limiting problems. The facility manager indicated that there is an expected increase in production of up to 100%. With such an increase possible in the near future, such action might be considered. However, reconstruction of the state-maintained portion of this route (US 23) is not required. In addition, the Stratton Branch Road portion of the route, with the relatively new bridge over the Levisa Fork of the Big Sandy River, does not require reconstruction.

6.16 Topy Corporation (Site #53) Franklin County (Overall Route Rating: 8)

The following problems were identified along the truck access route to the Topy Corporation in Frankfort:

- significant lengths of route with less than "preferred" lane widths and shoulders;
- one intersection (Industrial Road with Chenault Road) with problems for right-turning trucks; and
- one less than “preferred” bridge sufficiency rating.

Lane widening near the intersection of Chenault and Industrial Roads might alleviate the turning radius problem for right turning trucks. The problems associated with lane and shoulder widths could only be corrected through reconstruction of both Chenault and Industrial Roads, which is
currently unnecessary. However, should traffic volumes increase, such reconstruction might be reconsidered.

6.17 Hickman Riverport Area (Site # 16) Fulton County (Overall Route Rating: 2, 2, 2, 2)

The following problems were identified along the truck access routes to the Hickman Riverport Area:

- minor offtracking and horizontal curve safe speed problems;
- significant lengths of highway with less than “preferred” lane widths and shoulders;
- two problematic intersections (KY 1099 with KY 309 and KY 125) with turning radii problems for both left and right turning trucks;
- one problematic railway crossing on KY94 west of Hickman;
- traffic backups at the riverport between July and October due to delays in processing trucks; and
- minor truck accident problems.

Possible minor improvements, and even complete reconstruction, should be considered for the two intersections on the Hickman By-pass (KY 1099). Routing traffic such that KY 309 is avoided might be possible if improvements west of Hickman, particularly the KY 94 and KY 1099 intersection, were implemented.

6.18 Grant County Industrial Park (Site # 2677) Grant County (Overall Route Rating: 8)

The following problems were identified along the truck route:

- narrow lanes on KY 22;
- inadequate turning radius at park entrance; and
- accident history on KY 22.

A recommended improvement is pavement widening to improve the turning radius from the industrial park onto US 25. As the industrial park develops widening of the lanes on KY 22 will be necessary.

6.19 Seaboard Farms (Site #2623) Graves County (Overall Route Rating: 8)

The following problems were identified along the truck access route to the Seaboard Farms mill in Mayfield:

- less than "preferred" lane widths and shoulders;
- turning bay deficiencies (southern intersection of US 45B and US 45);
- one less than “preferred” bridge sufficiency rating; and
- one problematic intersection (Macedonia Road with US 45) with problems for left turning trucks.
The intersection of US 45 and Macedonia Road could be improved by widening the lanes on Macedonia so that trucks have more space available to turn into. However, with the railroad crossing so close to the intersection, this may not be feasible. Consideration should be made for placing warning signs on US 45B so that drivers are aware of the turning bay deficiencies. In order to correct the lane width and shoulder problems along this route, complete reconstruction would be necessary. However, the problems associated with lane and shoulder widths are not severe enough to warrant such action.

6.20 Campbell-Hausfeld (Site # 2637) Grayson County (Overall Route Rating: 7, 8)

The following problems were identified along the truck route:

- narrow lanes and shoulders;
- low truck weight class ("A") on KY 224;
- poor turning radius from KY 920 onto Embry Drive; and
- two bridges with "adequate" rating.

The recommended improvement is the reconstruction of the intersection of KY 920 and Embry Drive to eliminate the turning radius problem. Other roadways with lane and shoulder width problems could be addressed by rebuilding those sections of highways.

6.21 Greensburg Manufacturing (Site # 2666) Green County (Overall Route Rating: 2, 2, 2)

The following problems were identified along these truck routes:

- narrow lanes and shoulders;
- frequent grades;
- curves with offtracking and curve speed problems; and
- turning radii at two intersections.

The solution to these problems is the construction of new roads or realignment of the current roads. Improvement of one of these routes may be warranted at this time.

6.22 Willamette Industries (Site #2659) Hancock County (Overall Route Rating: 3, 8, 6)

The following problems were identified along the truck access routes to Willamette Industries in Hawesville:

- accident-related concerns along the west and south routes;
- significant lengths of each route with less than "preferred" lane widths and shoulders;
- numerous less than "preferred" bridge sufficiency ratings;
- numerous less than "preferred" grades (predominately along south route);
- numerous curves where offtracking may occur (predominately along south route);
- two curves with safe speed problems (south route); and
• two problematic intersections (KY 69 and KY 334 on the north route, KY 54 and KY 69 on the south route) with problems for right turning trucks.

The intersection of KY 54 and KY 69 could be improved by widening the lanes on both roads in the vicinity of the intersection so that trucks have more space available to turn into. Preventing vehicles from parking near the intersection of KY 69 and KY 334 in Hawesville might alleviate that turning radius problem. In order to correct the lane width, shoulder, and curve deficiencies along these routes, complete reconstruction would be necessary. If growth in the respective areas were to increase truck volumes, such action may be considered.

6.23 Nally & Hayden (Site # 15) Harlan County (Overall Route Rating: 2, 2)

The following problems were observed along the truck routes:

• narrow lanes and shoulders;
• steep grades;
• problematic horizontal curves;
• clear zone problems;
• two “less than adequate” bridges;
• accident history; and
• limited turning radius at the intersection of US 421 and KY 257 in Hayden.

A recommended improvement is the enforcement of a no-parking zone to improve the turning radius at the intersection of US 421 and KY 257. The problems with lane width, grade and curvature along KY 421 could be addressed by rebuilding sections of that highway.

6.24 Henderson Riverport Area (Site #2) Henderson County (Overall Route Rating: 7)

The conclusion was that the roadways provided adequate access with possible minor improvements which could improve the route. The only substantial potential improvement on a state-maintained road was to widen the lanes and shoulders on a section of KY 136 east of US 60 in the area of the side roads. Improvements on the side roads would involve adding shoulders and placing standard signs and pavement markings and performing some surface maintenance. There was also one sharp curve on Industrial Park Road which resulted in offtacking into the opposing lane.

6.25 Tyson Foods (Site #2684) Henderson County (Overall Route Rating: 5, 5, 7, 7)

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 widths.
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.

6.26 Safety Kleen (Site #2145) Henry County (Overall Route Rating: 5)

The following problems were identified along the truck access route to Safety Kleen in Smithfield:

- significant lengths of route with less than "preferred" lane widths and shoulders;
- four curves with offtracking problems;
- two curves with less than "preferred" ball-bank indicator readings;
- one less than "preferred" grade;
- two less than "preferred" bridge sufficiency ratings;
- accidents on KY 146; and
- short lengths of highway with no clear zone.

The section of KY 146 with no shoulder or clear zone could be improved by installing guardrails, which has already been done on portions of the route in the vicinity. The remaining problems could only be remedied through reconstruction of the route, which is deemed unnecessary at the current time. If further development increases the truck volumes in the area, such reconstruction might be reconsidered.

6.27 Centennial Resources, Inc./B.Four, Inc. (Site #2685) Hopkins County (Overall Route Rating: 6)

The conclusion was that the facility provided adequate, although less than ideal, access. The access can be improved with minor improvements to the route. While no accident problem has been found to be associated with the roadway width, the 10-foot lanes and two-foot shoulders are considered "less than adequate" and should be widened. This also applies to the bridges along the route.

6.28 Louisville Airport, UPS, Ford Motor Company (Site # 6) Louisville, Jefferson County (Overall Route Rating: 10, 10)

The following problems were identified along the truck route:

- minor shoulder deficiencies; and
- one section with a critically high truck accident rate.

Trucks are served with good access at this site. A minor improvement for the right turning bay at Fern Valley Road and Grade Lane might be considered. Further investigation as to the reasons for the high truck accident rates on Fern Valley Road might also be considered.
6.29 Bells Lane Cluster (Site #7) Jefferson County (Overall Route Rating: 3, 5)

The following problems were observed along the truck route:

- narrow lanes and shoulders;
- rough railroad crossings; and
- problematic horizontal curves.

Pavement repair at railroad crossings is required. It is recommended that sections of Bells Lane be widened.

6.30 Campground Road Cluster (Site #8) Jefferson County (Overall Route Rating: 5, 5)

The following problems were observed along the truck route:

- narrow lanes and shoulders;
- turning radii at two intersections;
- rough railroad crossings; and
- problems from a truck accident history perspective.

The following minor improvements are recommended on this route: repainting the pedestrian crosswalk on Campground Road, and pavement widening at the intersection of Kramers Lane and Campground Road. This is a heavy truck traffic area and some sections of this route are identified as National Highway System intermodal connections. Therefore, serious consideration to reconstruction of some segments of these route to have wider cross sections should be made.

6.31 Norfolk Southern Rail Intermodal Terminal (Site # 1767) Louisville, Jefferson County (Overall Route Rating: 8)

The following problems were identified along the truck route:

- minor pavement problems;
- traffic signal needs a left arrow;
- narrow shoulders;
- limited turning radius from I-264 ramp on Newburg Road; and
- a critically high truck accident rate on Newburg Road at I-264

Although the first two improvements should be undertaken, urban development limits the ability of the state to correct the third and fourth problems. Further investigation of the accident hazard should be seriously considered.
6.32 Sapphire Tipple (Site #1499) Letcher County (Overall Route Rating: 4, 2, 2)

The following problems were identified along these truck routes:
- narrow lanes and shoulders;
- steep grades;
- curves with offtracking and curve speed problems;
- turning radii at two intersections;
- rough railroad crossings;
- poor pavement; and
- incorrect road signs.

Some of these problems can only be eliminated by rebuilding the roads. Many of the pavement problems were caused by trucks hauling coal on roads not part of the coal haul system and could be alleviated by enforcing the existing weight limits. The following improvements are recommended on these routes:
- pavement widening at the intersection of KY 15 and KY 7;
- complete resurfacing of KY 931;
- pavement repair at railroad crossings and other problem areas on KY 7;
- bridge work on KY 931 at bridge 99; and
- removing incorrect road signs.

6.33 Logan Aluminum (Site #2657) Logan County (Overall Route Rating: 6, 7, 5)

The following problems were identified along the truck access routes to the Logan Aluminum Site:
- 11-foot lane widths on US 431;
- less than “preferred” shoulder widths on US 431;
- 10-foot lane widths on US 79;
- less than “preferred” shoulder widths on US 79;
- less than “preferred” bridge sufficiency ratings on all routes; and
- turning radius at US 431 and US 79.

The turning radius problem should be addressed. Major construction to correct other problems should be considered depending on future traffic and truck projections. Continuation of the bypass south of Russellville would correct many problems.

The Six Year Highway Plan project to widen US 431 from north of the intersection with US 68/KY 80 to the Logan Aluminum entrances will correct deficiencies associated with this section of roadway.
6.34 Madison County Industrial Park (Site # 2678) Richmond, Madison County
(Overall Route Rating: 7)

The following problems were found on this route:
- some sections with 11-foot lanes;
- most of the route has less than “preferred” shoulders;
- minor traffic congestion on KY 876;
- pavement in fair condition on US 25; and
- three problematic intersection turning radii.

While minor problems exist on this route, no improvements are indicated unless traffic levels increase.

6.35 Dravo Lime Company (Site # 30) Mason County (Overall Route Rating: 5, 3)

The following problems were identified along the truck route:
- narrow lanes and shoulders;
- problematic grades;
- problematic horizontal curves;
- poor turning radius from US 68 onto KY 10;
- a narrow bridge on KY 1237; and
- faded pavement markings on Springdale Road.

The recommended improvements are repainting the center line of Springdale Road and improving the intersection of US 68 and KY 10 to eliminate turning radius problems. Rebuilding sections of KY 10 to address lane width and curvature problems could be considered if traffic volumes increase.

6.36 Inland Container Corporation (Site # 2632) Mason County (Overall Route Rating: 6, 9, 2)

The following problems were identified along these truck routes:
- narrow lanes and shoulders;
- sections with problematic horizontal curves;
- problematic grade (especially on KY 19);
- minor turning radii problems; and
- a non-standard “Bump” sign on KY 8.

Major improvements are not recommended because the most direct route to the NHS (KY 3017) has few problems. The “Bump” sign on KY 8 should be removed or replaced. Limiting the parking to one side of the street on westbound KY 8 in Maysville would improve the lane width problem in that area.
6.37 Paducah-McCracken County Riverport Area (Site #14) McCracken County (Overall Route Rating: 9)

The following problems were identified along the truck access routes to the Paducah US 60 Business Route and Locust Drive area.

- clear zone problem on Wayne Sullivan Drive (US 60X) at the ITAPCO facility;
- rough railroad crossing on Locust Street near TBI Steel;

Only minor problems were noted along this truck route. No improvements are required at this time.

6.38 Midland Trail Industrial Park / Heilig-Meyers (Site # 32) Montgomery County (Overall Route Rating: 8)

The following problems were identified along the truck route:

- sections with narrow lanes and shoulders;
- one problematic horizontal curve;
- a misplaced stop sign; and
- a minor lack of signing for the industrial park.

Recommended improvements are:

- move the stop sign to the correct position and
- add a sign along US 60 indicating the park entrance.

6.39 Paradise Power Plant (Site #1113) Muhlenberg County (Overall Route Rating: 6)

The conclusion was that the facility was provided with adequate, although less than ideal, access. The access can be improved with minor improvements to the route. A wider shoulder could be provided on KY 176 and a portion of US 431. Some bridge improvements could be made. There are also limitations in the clear zone provided on US 431.

6.40 Bardstown Industrial Park & Smith Brothers Distributing (Site #52) Nelson County (Overall Route Rating: 9, 8)

The following problems were identified along the truck access routes to the Bardstown Industrial Park and Smith Brothers Distributing in Bardstown:

- turning radii on Nutter Drive at intersection with KY 245;
- turning radii on Kelly Drive at intersection with KY 245;
- turning radii on Withrow Court at intersection with US 31E; and
- shoulder width on US 31E less than “preferred”.

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Several sections of KY 245 and US 31E along the access routes are targeted for reconstruction as part of the Six Year Highway Plan. This reconstruction should address the problems along these routes.

6.41 Dravo Lime Company (Site # 44) Pendleton County (Overall Route Rating: 7)

The following problems were identified along the truck route.

- narrow lanes and shoulders;
- minor curvature problems;
- limited turning radius at the intersection of KY 8 and KY 2828; and
- dust at the facility entrance.

The recommended improvements are:

- pavement widening to increase the turning radius from KY 2828 onto KY 8;
- signs or other warning devices on KY 8 where dust causes visibility problems at the facility entrance;
- add route markers and directional signing at the intersection of KY 8 and KY 2828; and
- lane widening could be considered on KY 8 if traffic volumes increase significantly.

6.42 Millard Processing (Site # 1677) Pike County (Overall Route Rating: 2)

The following problems were identified along the truck route:

- two-way traffic on a one-lane road (Nelse Hill Road);
- lack of usable shoulders;
- problematic horizontal curves on KY 1789;
- inadequate turning radius from Nelse Hill Road onto KY 1789;
- rough railroad crossings;
- sight distance around bridge pier; and
- narrow bridge on Nelse Hill Road.

The low traffic volumes on Nelse Hill Road may not justify major improvements along that road. The intersection of Nelse Hill Road, KY 1441 and KY 1789 could be improved to eliminate the problems with turning radius and rough railroad crossings. These problems could also be addressed through enforcement of existing weight limits on KY 1789. Enforcing the weight limit would encourage trucks to use KY 1441 (the official coal haul route) rather than KY 1789.
6.43 Praise Loadout (Site # 1700) Pike County (Overall Route Rating: 8)

The following problems were identified along the truck route:

- narrow shoulders;
- offtracking of several curves;
- rough railroad crossing;
- sight distance at intersection of KY 80 and US 460; and
- accident history.

The improvements recommended for this site are:

- resurface the railroad crossing and
- install a warning light on US 460 at the intersection with KY 80.

6.44 Plum Springs Industrial Site (Site #2575) Warren County (Overall Route Rating: 2)

The following problems were identified along the truck access routes to the Plums Springs industrial site:

- significant offtracking and clear zone problems in the vicinity of the railroad underpass on Plum Springs Loop;
- minor lengths of highway with less than "preferred" lane widths and shoulders;
- one problematic intersection (Plum Spring Loop with Commerce Street) with turning radius problems for right turning trucks;
- three less than “preferred” bridge sufficiency ratings; and
- truck accident problems at the intersection of US 31W and Plum Springs Loop.

Complete reconstruction should be considered for the railroad underpass on Plum Springs Loop. While an alternate route does exist (Plum Springs to US 31W / US 68 / KY 80), the predominately-used route has trucks traveling through the underpass. Lane widening at the end of Commerce Street near its confluence with Plum Springs Loop could improve the turning radius problems of the intersection.

6.45 Medusa Aggregates (Site #2628) Warren County (Overall Route Rating: 7)

The following problems were identified along the truck access route to Medusa Aggregates:

- Minor lengths of highway with less than "preferred" lane widths and shoulders;
- One problematic intersection (McGinnis Quarry Road with US 31W) with turning radius problems for right turning trucks;
- Two bridges with less than “preferred” sufficiency ratings; and
- Minor truck accident problems.
Minor improvements (such as lane widening) to the intersection of US 31W and McGinnis Quarry Road could alleviate the turning radius problem. The remaining access-limiting issues could only be corrected with major construction. Should future growth in the area create higher volumes of truck traffic on the route, such construction might become feasible.

6.46 American Greeting Corporation (Site # 2569) Whitley County (Overall Route Rating: 9)

The following problems were identified along the truck route:

- narrow shoulders; and
- minor clear zone problems.

Some of the clear zone problems could be eliminated by adding guardrails.

7.0 Conclusions

The primary objectives of this study were to develop a methodology to evaluate truck access along truck routes and to apply this methodology to a set of facilities throughout the state. The methodology involved tabulation of four types of information or measures: 1) problem truck miles and problem truck points, 2) subjective or unstructured evaluations 3) overall route rating and 4) maintenance improvement locations. The methodology is deemed relatively easy to use, time efficient and comprehensive. Although data requirements were high, data collection in the field and use of HIS data proved time efficient. However, the method relied significantly on truck and traffic counts which were difficult to obtain for all sections of all routes. If further use of the methodology is considered, a more comprehensive plan to obtain traffic and truck count information should be developed.

In all, 81 routes used to access 46 facility sites or clustered sites were evaluated. These routes represented approximately 800 miles of highway. A total of 13 of the sites had at least one intermodal facility while the others involved only truck freight movements. The level and quality of truck access to the NHS varies dramatically throughout the state. Some facilities are between 25 and 50 miles from the NHS. No significant difference in route ratings or other measures was found by ADD. The different topography throughout the state contributed to differences in grade and curvature quality. Very few non-NHS truck routes have 12-foot lanes along their whole length. The intermodal facility routes in general were found to be of better quality than routes leading to truck only sites.

Trucks are not always using the routes they should. In several cases, trucks were observed using routes not on the designated truck network, the coal haul system or the route indicated by the facility manager. These observations confirm that enforcement issues still exist. The routes indicated in Table 4 were considered the best routes and were assigned overall route ratings of 9 or 10. Most of these routes are in larger urban areas. They do not at this time require consideration for improvements based on this evaluation.
Table 4: Best Truck Access Routes

<table>
<thead>
<tr>
<th>Facility</th>
<th>County</th>
<th>Route Description</th>
<th>Length (miles)</th>
<th>Overall Route Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inland Container Corporation</td>
<td>Mason</td>
<td>KY 3071 to KY 9</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>American Greeting Corporation</td>
<td>Whitley</td>
<td>KY 3431 South to US 25 E</td>
<td>1.4</td>
<td>9</td>
</tr>
<tr>
<td>CF Motor Freight, USF Holland Inc.</td>
<td>Fayette</td>
<td>Mercer Rd to KY 1978 to US 421 to KY 4</td>
<td>1.2</td>
<td>9</td>
</tr>
<tr>
<td>CF Motor Freight, USF Holland Inc.</td>
<td>Fayette</td>
<td>Mercer Rd to KY 1978 to US 421 to I-64</td>
<td>10.6</td>
<td>9</td>
</tr>
<tr>
<td>Owensboro Riverport Authority</td>
<td>Daviess</td>
<td>Harbor Dr to KY 331, Southwest on KY 331</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>to US 60.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smith Brothers, Intertec Systems</td>
<td>Nelson</td>
<td>KY 245 North to I-65</td>
<td>14.6</td>
<td>9</td>
</tr>
<tr>
<td>Paducah-McCracken Co. Riverport Authority</td>
<td>McCracken</td>
<td>Wayne Sullivan Dr to KY 1954 to I-24</td>
<td>4.2</td>
<td>9</td>
</tr>
<tr>
<td>Regional Airport Authority, UPS</td>
<td>Jefferson</td>
<td>Grade Ln/KY 1631 to I-65</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>White Hydraulics</td>
<td>Christian</td>
<td>US 41 to Pennyrile Pkwy</td>
<td>1.7</td>
<td>10</td>
</tr>
<tr>
<td>Regional Airport Authority, UPS</td>
<td>Jefferson</td>
<td>Crittendon Ave to I-264</td>
<td>1.4</td>
<td>10</td>
</tr>
</tbody>
</table>

The routes indicated in Table 5 received the lowest overall route ratings and had a route length of greater than 10 miles. In total, 18 and 4 routes were assigned overall route ratings of 2 or 3 respectively; however, the longer routes were considered more critical.

One method to prioritize routes for improvement is to weight the overall route rating by route length and number of trucks on the route in the same fashion as undertaken for individual route features. In order to calculate this weighted overall route rating, the maximum number of trucks per day at any point on the route was used. The number of trucks was multiplied by the length and divided by the overall route rating. The ranking of each route is shown in the far right column of Appendix A for all routes evaluated. Table 6 indicates the six high outliers using this weighted approach. All four of these sites have been mentioned in at least one section of this report as a critical route with respect to a particular route feature. All are relatively long routes and each has a maximum number of trucks per day of more than 400. However, the number of trucks destined for the particular facility or facilities under study is not necessarily high. Only Willamette Industries has a high number of site trucks per day (200). These routes are considered most critical for improvements.

From a truck volume point of view, the two routes leading to the Sapphire Tipple which has a daily site truck volume of 600 might also be considered critical as these routes received only a 2 for overall route quality. The most critical intermodal facilities are the Hickman-Fulton Riverport Authority in Fulton County, the Sapphire Tipple in Letcher County, Millard Processing in Pike County, and the BP Oil/Itapco Wharf in Jefferson County.
<table>
<thead>
<tr>
<th>Facility</th>
<th>County</th>
<th>Route Description</th>
<th>Length (miles)</th>
<th>Overall Route Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hickman-Fulton Co. Riverport Authority</td>
<td>Fulton</td>
<td>KY 94 to Tennessee State Line</td>
<td>12.2</td>
<td>2</td>
</tr>
<tr>
<td>Dow Coming and Ghent Generating Station</td>
<td>Carroll</td>
<td>US 42 East to KY 35 to I-71</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>Inland Container Corporation</td>
<td>Mason</td>
<td>KY 8 West to KY 19 to KY 9</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>Hickman-Fulton Co. Riverport Authority</td>
<td>Fulton</td>
<td>KY 125 to KY 166, East to Purchase Pkwy</td>
<td>18.6</td>
<td>2</td>
</tr>
<tr>
<td>Hickman-Fulton Co. Riverport Authority</td>
<td>Fulton</td>
<td>KY 94 East to Purchase Pkwy</td>
<td>20.9</td>
<td>2</td>
</tr>
<tr>
<td>Greensburg Manufacturing Company</td>
<td>Green</td>
<td>KY 61 South to the Cumberland Pkwy</td>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td>Greensburg Manufacturing Company</td>
<td>Green</td>
<td>KY 61 North to KY 88, West to I-65</td>
<td>28</td>
<td>2</td>
</tr>
<tr>
<td>Nally &amp; Hayden</td>
<td>Harlan</td>
<td>North on US 421, Then KY 118 to the Daniel Boone Pkwy</td>
<td>31</td>
<td>2</td>
</tr>
<tr>
<td>Greensburg Manufacturing Company</td>
<td>Green</td>
<td>KY 61 North to I-65</td>
<td>36</td>
<td>2</td>
</tr>
<tr>
<td>No Facility</td>
<td>Edmonson</td>
<td>KY 259 and KY 101 between Western KY Pkwy and I-65</td>
<td>40</td>
<td>2</td>
</tr>
<tr>
<td>Willamette Industries</td>
<td>Hancock</td>
<td>South Route to Western Kentucky Pkwy at Leitchfield</td>
<td>54.3</td>
<td>3</td>
</tr>
</tbody>
</table>
Table 6: Routes with the Lowest Overall Route Rating Weighted by Length and Truck Volume

<table>
<thead>
<tr>
<th>Facility</th>
<th>County</th>
<th>Route Description</th>
<th>Length (miles)</th>
<th>Overall Route Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greensburg Manufacturing Company</td>
<td>Green</td>
<td>KY 61 North to KY 88, West to I-65</td>
<td>28</td>
<td>2</td>
</tr>
<tr>
<td>Greensburg Manufacturing Company</td>
<td>Green</td>
<td>KY 61 South to the Cumberland Pkwy</td>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td>Westvaco</td>
<td>Ballard</td>
<td>US 51 South to Pennyrile Pkwy</td>
<td>33.7</td>
<td>4</td>
</tr>
<tr>
<td>Nally &amp; Hayden</td>
<td>Harlan</td>
<td>North on US 421, Then KY 118 to the Daniel Boone Pkwy</td>
<td>31</td>
<td>2</td>
</tr>
<tr>
<td>Greensburg Manufacturing Company</td>
<td>Green</td>
<td>KY 61 North to I-65</td>
<td>36</td>
<td>2</td>
</tr>
<tr>
<td>Willamette Industries</td>
<td>Hancock</td>
<td>South Route to Western Kentucky Pkwy at Leitchfield</td>
<td>54.3</td>
<td>3</td>
</tr>
</tbody>
</table>
Figure 1: Intermodal Facilities in Kentucky

- Facility

--- National Highway System
Figure 2: Truck Trip Generating Sites throughout Kentucky

- Truck Facility
- National Highway System
Figure 3: Sites and Clusters of Sites Selected for Study

LEGEND

Facility

National Highway System

County Boundary

1:3000000

50 0 50 100 Miles
Figure 4: Truck Access Routes in Western Kentucky
Figure 5: Truck Access Routes in North Eastern Kentucky

LEGEND

• Facility

- Freight Access Route

- National Highway System

- County Boundary

1:1500000

25 0 25 50 Miles
Figure 6: Truck Access Routes in South Eastern Kentucky

LEGEND

- Facility
- Freight Access Route
- National Highway System
- County Boundary

1:1500000

25 0 25 50 Miles
Figure 7: Frequency of Overall Route Ratings
Figure 8: Spatial Distribution of Overall Route Ratings
Appendix A: Truck Route Summary Information
Truck Route Summary Information Listed by County
Truck Route Summary Information Listed by Area Development District
Truck Route Summary Information Listed by Facility Name
<table>
<thead>
<tr>
<th>Site Name/Number</th>
<th>Facility Name</th>
<th>Authority/Agency</th>
<th>Route Capacity (miles)</th>
<th>Bridges (miles)</th>
<th>State Route (miles)</th>
<th>Speed Limits (miles)</th>
<th>Number of Intersections</th>
<th>Number of Unsignalized Intersections</th>
<th>Number of Trains and/or Buses</th>
<th>Number of Lane Blocks</th>
</tr>
</thead>
</table>
Truck Route Summary Information Listed by Site Number
Truck Route Summary Information Listed by Rank