



# **COMPREHENSIVE REVIEW/EVALUATION OF MAJOR REGIONAL TRANSPORTATION ROUTES**

**Prepared for**

**Kentucky Transportation Cabinet – Division of Planning**



**Prepared by**

**Purchase Area Development District**



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**FY10 KYTC/ADD WORK PROGRAM - WORK ELEMENT 8e  
COMPREHENSIVE REVIEW/EVALUATION OF MAJOR  
REGIONAL TRANSPORTATION ROUTES**

**PROJECT**

During Fiscal Year 2011, the Kentucky Transportation Cabinet (KYTC) required each Area Development District to undertake a comprehensive effort to review the major highway network, major traffic generator routes and access routes to such networks from the major traffic generators and freight sites within the region. This effort focused on evaluating the condition of these roadways using available data and planning tools to identify if needs should be addressed through either the creation of a new Project Identification Form (PIF) or revision of an existing PIF.

The Purchase Area Development District (PADD) reviewed the major roadways, National Highway System, National Truck Network, STRAHNET (not applicable in the Purchase), Kentucky Freight Focus Network, and the primary access routes to the major facilities in the region. KYTC adequacy ratings and other data was referenced to evaluate the condition of such routes. This process began by identifying primary access routes to all major industries, multimodal and/or modal facilities (airports, riverports, rail facilities and major trucking terminals) and major traffic generators within the region. The PADD identified 193 facilities within the Purchase Region to be evaluated for this report. The primary access route to each of the facilities was evaluated to identify any problem areas for which potential project identification may be required.

Kentucky Transportation Cabinet District 1 planning staff and the PADD Regional Transportation Committee were consulted for input into this report. PADD staff referenced the current KYTC Highway Plan and State Highway Unscheduled Projects List (UPL) to see if projects have already been identified that would relate to any potential access issues with the major facilities. The December 2010 KYTC Adequacy Ratings report was referenced in gathering information for the access routes.

**GIS / GPS (MAPPING)**

A Geographical Information System (GIS) was created to aid in the identification of facility location and primary access routes, view adequacy ratings of primary access routes and view any previously identified UPL projects located in the facility area. A Global Positioning System (GPS) was used to obtain coordinates for the location of the facilities. Once all identified locations were recorded, PADD staff used the KYTC GPS Road Centerline File in ArcView to create event themes and shape files using the adequacy rating and UPL files. These themes were used to identify the primary access routes. Using data from the adequacy rating file and the KYTC Highway Information System (HIS) each of the following were identified for the access routes: beginning and ending mile points, length, lane number, lane width, shoulder width, adequacy rating, percentile and percentile range.

## **MAPS / FIELD REVIEW**

Maps were produced showing the major roadway network, location of the facilities, their access routes and the corresponding adequacy rating percentile range for the highway segments. Maps were also produced to show the relationship between the facility locations and areas where projects have been previously identified on the UPL. Maps were prepared on a county level and when needed a city level and community level. Based on the available adequacy rating data, color coding was used to reflect the highway section percentile ranges. Highway segments rated in the 25<sup>th</sup> or lower percentile are coded yellow. These segments are also highlighted yellow in the adequacy ratings spreadsheet and the map index spreadsheet. This process allowed the planner to quickly identify areas located in the 25<sup>th</sup> or lower percentile. These areas were given priority in the review/evaluation process. If an adequacy rating on an access route to a facility did not indicate a need, then the route was only identified and the adequacy rating noted.

Field reviews may be necessary in priority areas and when/if needed information was gathered to be included as a new PIF or to aid in PIF revisions.

## **FUNCTIONAL CLASSIFICATION SYSTEM**

Functional classification is the process in which streets and highways are ranked according to the character of service they provide. Basic to the development of any logical highway system is the recognition that a road does not by itself serve traffic needs. Travel involves the movement through a network of inter-related roads and streets. The movement must be channeled through an efficient hierarchical system that progresses from a lower classification handling short, locally oriented trips to higher classifications that connect regional and inter-regional traffic generators, handling longer trips. The KYTC recognizes four levels of service and two localities, rural and urban.

The Rural Principal Arterial System is comprised of the Interstates, Other Principal Arterials, Minor Arterials, Major Collector Roads, Minor Collector Roads and Local Roads. The Urban Principal Arterial System is comprised of Interstates, Other Principal Arterials, Minor Arterial Streets, Collector Streets, and Local Streets. Currently KYTC does not have available adequacy ratings on the rural minor collectors, local roads and urban local streets.

## **ADEQUACY RATINGS**

*This work element product utilizes the KYTC December 2010 adequacy rating report. The following information is from the Kentucky Transportation Center Research Report KTC-02-30/SPR-256-01-1F Kentucky Highway Rating System. For more information on KYTC Adequacy Ratings, please refer to that report.*

The KYTC uses roadway adequacy ratings as one tool in its effort to prioritize proposed highway improvements. Without an accurate method for measuring roadway adequacy, it is difficult to efficiently allocate the Commonwealth's limited resources to the most needed projects. The adequacy rating is comprised of three elements or indices: condition, safety, and service. The score of these components provide an overall quantitative measure of adequacy. The composite index (adequacy rating) is the sum of the three component indices with a maximum of 100 points.

The condition component includes the pavement condition as measured by the International Roughness Index (IRI); the higher the IRI number, the rougher the pavement and the lower the adequacy score. The safety component includes: accident critical rate factors (CRF), lane widths, shoulder widths, median widths and alignment adequacy for rural segments. The CRF for a roadway segment is the rate above which crashes cannot be said to be occurring randomly. A CRF greater than 1.0 indicates a statistically significant crash problem and may warrant further investigation.

The following are the codes for the other safety factors involved in scoring the safety index.

- Access Control

1	Full
2	Partial
3	None

- Median Type

1	Curbed
2	Positive Barrier
3	Unprotected
4	None

- Horizontal Alignment Adequacy

0	Curve data are not reported or this item is not required for the section.
1	All curves meet appropriate design standards for the type of roadway. Reduction of curvature would be unnecessary even if reconstruction were required to meet other deficiencies (i.e. capacity, vertical alignment, etc.)
2	Although some curves are below appropriate design standards for new construction, all curves can be safely and comfortably negotiated at the prevailing speed limit on the section. The speed limit was not established by the design speed of curves.
3	Infrequent curves with design speeds less than the prevailing speed limit on the section. Infrequent curves may have reduced speed limits for safety purposes.
4	Several curves uncomfortable or unsafe when traveled at the prevailing speed limit on the section, or the speed limit on the section is severely restricted due to the design speed of curves.

- Vertical Alignment Adequacy – Note this is ***not a factor*** included in the Adequacy calculations, but the data for each segment is included herein for information purposes. Here is a list of the definitions:

- 0 Grade data are reported or this item is not required for the section.

- 1 All grades (rate and length) and vertical curves meet minimum design standards appropriate for the terrain. Reduction in rate or length of grade would be unnecessary even if reconstruction were required to meet other deficiencies (i.e., capacity, horizontal alignment, etc.).
- 2 Although some grades (rate and/or length) and vertical curves are below appropriate design standards for new construction, all grades and vertical curves provide sufficient sight distance for safe travel and do not substantially affect the speed of trucks.
- 3 Infrequent grades and vertical curves that impair sight distance or affect the speed of trucks (when truck climbing lanes are not provided).
- 4 Frequent grades and vertical curves that impair sight distance or severely affect the speed of trucks; truck climbing lanes are not provided.

The service component includes volume/service flow ratio (measures a segments congestion) and access control. As the V/SF ratio approaches the value 1.00, the congestion level of the roadway segment increases. Theoretically, a value of 1.00 means 100% congested, but V/SF values in excess of 1.00 can exist and indicate extreme congestion conditions. Peak Capacity is the peak hour capacity of the roadway segment.

Before a road section can be given a score it is necessary to give each category in each of the three component indices a score. The three component indices are then added together to generate the composite index, which is the section’s total score. A road in perfect condition is scored 100, with actual scores ranging from 0 to 100. While a perfect score for any type of road – rural or urban, interstate, arterial, or collector – is always a 100, the various categories can carry different weights depending on the functional class and rural or urban location.

Table 1 presents the rural road components and category weight factors for the four functional classifications.

**Table 1: Rural Component Indices and Category Weight Factors**

	Interstate	Other Principal Arterial	Minor Arterial	Major Collector
<b>Pavement Condition Index</b>	<b>40</b>	<b>35</b>	<b>30</b>	<b>30</b>
Condition	40	35	30	30
<b>Safety Index</b>	<b>25</b>	<b>35</b>	<b>45</b>	<b>55</b>
Lane Width	4	6	10	12
Shoulder Width	2	3	4	5
Median Type	2	0	0	0
Alignment	4	9	10	10
Critical Rate	13	17	21	28
<b>Service Index</b>	<b>35</b>	<b>30</b>	<b>25</b>	<b>15</b>
V/C Ratio	35	25	20	15
Access Control	0	5	5	0
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Table 2 presents the urban road component index and category weight factors for the four functional classifications.

**Table 2: Urban Component Indices and Category Weight Factors**

	<b>Interstate</b>	<b>Other Principal Arterial</b>	<b>Minor Arterial</b>	<b>Major Collector</b>
<b>Pavement Condition Index</b>	<b>30</b>	<b>30</b>	<b>30</b>	<b>30</b>
Condition	30	30	30	30
<b>Safety Index</b>	<b>30</b>	<b>35</b>	<b>45</b>	<b>55</b>
Lane Width	8	12	16	12
Shoulder Width	4	0	0	0
Median Type	2	5	6	5
Critical Rate	16	18	23	30
<b>Service Index</b>	<b>40</b>	<b>35</b>	<b>25</b>	<b>15</b>
V/C Ratio	40	25	20	15
Access Control	0	5	5	0
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Each section of highway that is rated will have a total score, which is the sum of the scores for each category. That is, the sum of the score for pavement condition, lane width, shoulder width, median type, horizontal alignment (rural only), critical rate, volume capacity ratio, and access control. A road in perfect condition will receive all points in the category, while a road in the worst condition will get none. A road of intermediate quality will receive some points but not all. To help measure roadway conditions, a percentile is used for adequacy rating composite scores in each of the rated highway functional classifications. The percentile can be used as a measure of a particular roadway section’s condition compared to other roadway sections of the same classification statewide.

**PERCENTILE RANGE**

The percentile value is calculated as the percentage of the section mileage (for the same functional class) that has a composite rating lower than or equal to the current section. For example, a percentile rating of 23 means that 77% of the roadway segments within the same functional classification rate better than this segment.

The KYTC December 2010 adequacy rating report has adequacy rating scores and percentile ratings for 327 highway sections in the Purchase Area Development District. In order to evaluate/review the region’s transportation network the percentiles were divided into 4 ranges; 0-25.00, 25.01-50.00, 50.01-75.00, 75.01-100.

Table 3 lists the number and percentage of highway sections in each range.

**Table 3: Percentage of Highway Sections in each Percentile Range**

<b>Percentile Range</b>	<b>Number of Sections</b>	<b>Percentage</b>
0.00 – 25.00	77	24%
25.01 – 50.00	83	25%
50.01 – 75.00	72	22%
75.01 – 100	95	29%
	327	100%

To get a better understanding of the current transportation network, the access routes were also separated into the percentile ranges. There were 193 facilities identified along with their primary access route. Those facilities and routes are grouped into the respective percentile range based on the adequacy rating of the primary access route.

Table 4 lists the number and percentage of facilities in each range.

**Table 4: Percentage of Facilities in each Percentile Range**

<b>Percentile Range</b>	<b>Number of Facilities</b>	<b>Percentage</b>
0.00 – 25.00	33	17%
25.01 – 50.00	44	23%
50.01 – 75.00	35	18%
75.01 – 100	58	30%
Not Rated	23	12%
	193	100%

## **EVALUATION**

The identification of access routes to all major traffic generators and major trucking facilities within the region was a task originally in the FY04 KYTC Annual Work Program and included in the PADD Regional Concept Plan in FY05. Major revisions to the report were completed during the FY06 Annual Work Program. This information is to be updated and enhanced as needed to maintain a current document. Specific data as noted in this report should be collected and documented thoroughly. If the data indicates a need, then notations will be made identifying if the need has been addressed by an existing KYTC Highway Plan or UPL project, or if a new PIF needs to be prepared to address the need.

PADD Regional Transportation Committee members were asked to review this report and given time to provide input and comments on any issues related to the identified access management facilities and adequacy ratings. Staff explained to the committee that this report is to be used as a tool to identify problems or potential problem areas when evaluating the regional transportation system. Committee members are also asked to review the identified access facilities to ensure the report includes the most accurate data.

The PADD will continue to monitor and evaluate access route issues and identify problem areas. When projects are identified the proper information will be collected and a PIF will be submitted to the KYTC District 1 for cost estimates.

