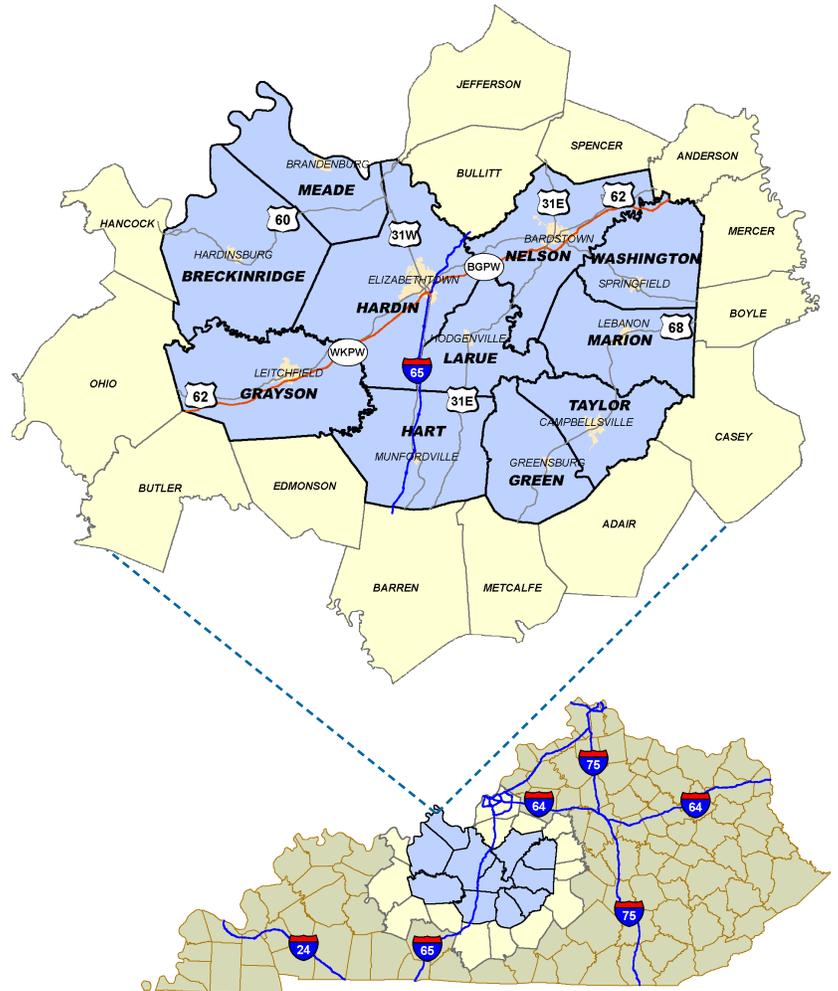


District 4 Accessibility and Connectivity Study Final Report

March 2021



Executive Summary

The Kentucky Transportation Cabinet (KYTC) initiated a pilot study to analyze accessibility and connectivity between and among the county seats for the 11 counties in District 4. Maintenance data as recorded in the KYTC Operations Management System (OMS) also was included in study analyses.

As part of the accessibility and connectivity study, meetings were held with local officials in each of the 11 counties within District 4 and focused on the local perspective of the officials to identify changes in population and jobs within each county. These two parameters – population and employment – were primary data considerations for the Kentucky Statewide Travel Demand Model (KYSTM). The updated model was used to project housing and non-retail employment opportunities as a result of improvements in the district, including improvement to seven regionally impactful corridors within District 4, as shown Table ES-1 and Figure ES-1.

Table ES-1: Regionally Impactful Corridors

District 4 Regionally Impactful Corridors							
Corridor	Route	D4 Counties Directly Served	Begin	End	Approximate Length	Anticipated Improvement Type	Cost Estimate
1	US 150	Nelson Washington	Bardstown (BG Parkway)	Springfield (US 150x)	18 miles	2+1 Initial; 4-lane divided ultimate	\$54,607,000
2	KY 245	Nelson	Bardstown (US 31E)	Clermont (I-65)	12 miles	2+1	\$10,470,000
3	KY 3005	Hardin	US 31W	WK PKWY	2 miles	Extension of Ring Road from US 31W to WK PKWY	\$6,067,444
4	KY 210	LaRue Green Taylor	Campbellsville (US 68)	Hodgenville (Lincoln Parkway)	29 miles	Widening – 2+1	\$25,302,500
5	US 68	Green	Edmonton (Cumberland Parkway)	Greensburg (US 68 MP 12.0, western intersection of KY 61 and US 68)	12 miles	Spot improvements – Minor widening for increased shoulder widths, spot improvements, and adding truck climbing lane at Russell Creek Hill.	\$5,350,000
6	Heartland Parkway	Marion Taylor Washington	Taylor/Adair County Line south of Campbellsville (KY 55)	Springfield	40 miles	Widening – 2+1	\$34,900,000
7	KY 61	Green LaRue	Adair/Green County Line south of Greensburg	US 31E	35 miles	Spot improvements – Minor widening for increased shoulder widths, spot improvements for poor roadway geometry.	\$15,604,155

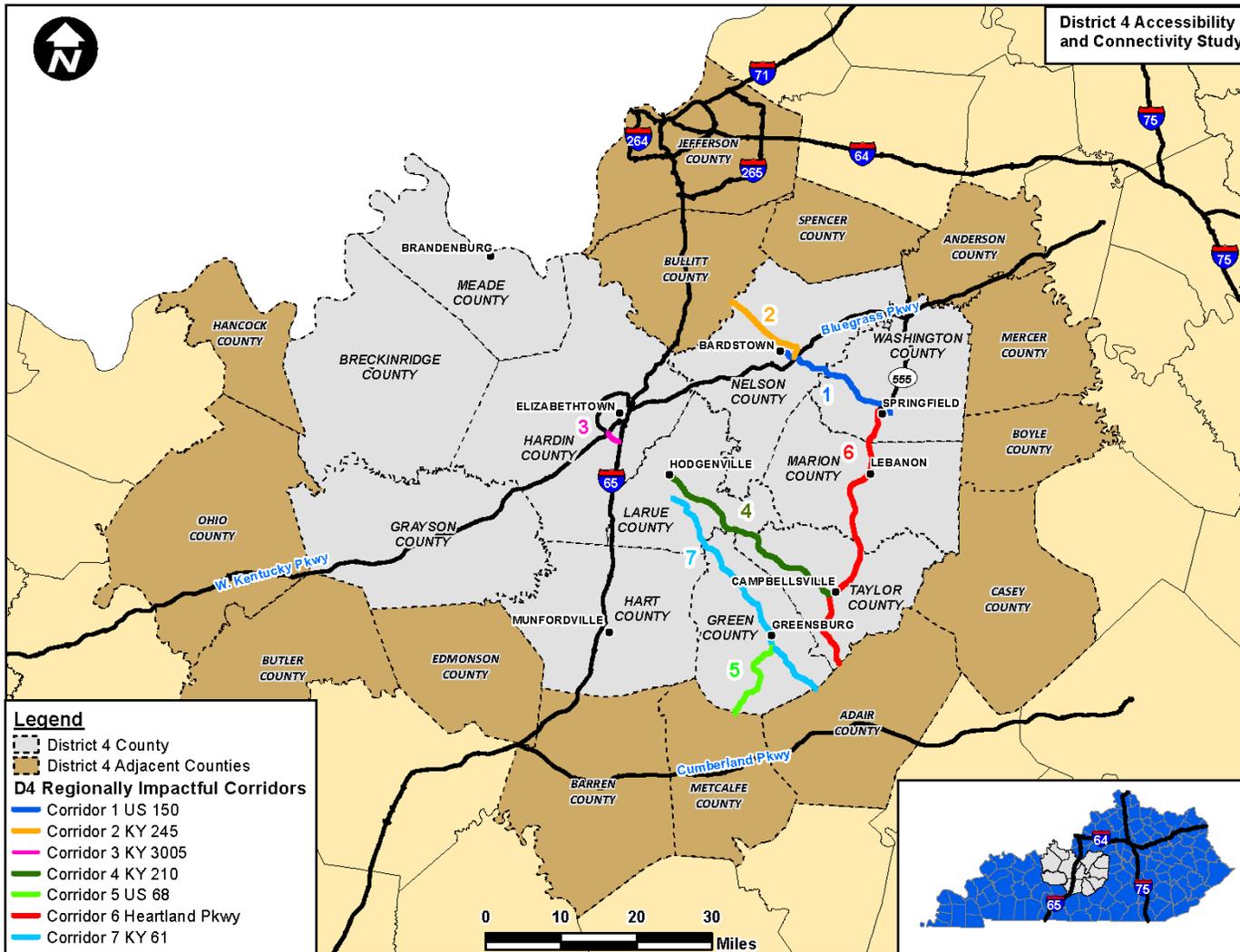


Figure ES-1: Map of Regionally Impactful Corridors

As part of the accessibility and connectivity study, meetings were held with local officials in each of the 11 counties within District 4 and focused on the local perspective of the officials to identify changes in population and jobs within each county. These two parameters – population and employment – were primary data considerations for the Kentucky Statewide Travel Demand Model (KYSTM).

Meetings with local officials (county judge executives, magistrates, city superintendents, etc.) were helpful to confirm or refine perspectives regarding transportation improvement needs for each county. However, these meetings did not yield significant data for updating the KYSTM to the extent anticipated. These meetings with local officials did prove useful to ensure updates to the KYSTM were consistent with observed patterns for population and employment growth/decline in their respective counties. The task of gathering this data may have been improved, had transportation professionals at the Area Development Districts and the Hardin/Meade Metropolitan Planning Organization been included in these discussions.

An analysis of the OMS data was developed to determine the extent to which this data corresponds with and could be used to identify persistent maintenance issues on major corridors. The focus of the study was accessibility and connectivity between county seats. However, maintenance data from the OMS was used to supplement the information gathered from meetings with county local officials concerning population growth, job growth, and the accessibility and connectivity between the District 4 counties and the surrounding region.

The OMS database was determined to be a possible source of data for identifying potential pavement resurfacing and rehabilitation needs and for identifying spot improvement needs relating to drainage, slide corrections, etc. Results from this study were inconclusive regarding whether this data can directly inform KYTC planning efforts. It was noted that while the OMS data and related analyses did yield potential resurfacing, rehabilitation, drainage, and slide correction projects, these were not the type of projects that were typical KYTC Six-Year Plan projects that would create the need for a planning study.

Based on the results of this pilot study, the project team offers the following comments and recommendations:

1. While the meetings with local officials to identify their accessibility and connectivity concerns did confirm District Planning staffs' perspectives on high-maintenance locations, it also was noted that inclusion of meetings with local economic development staffs and prominent industry representatives may have been useful.
2. To increase the potential usefulness of OMS data for future analyses, maintenance items should be input with specific milepoints to the greatest extent possible.
3. A methodology for calculating high-cost segments in District 4 was developed and could be used in future studies. This methodology, described below, involves engineering judgment to identify high-cost segments and yielded representative data for this study. During meetings

with Project Development and Preservation section staff, the project team was able to confirm specific problem conditions at the majority of high-cost maintenance segments.

This methodology identifies areas with high maintenance costs in District 4. The maintenance activity data was organized by county in Microsoft Excel and the length of each segment was calculated according to the milepoints identified in the OMS database.

Segments were then refined by identifying contiguous and consistent high-cost repairs; therefore, the segments were of varying length. The total cost for the segment, the cost per mile within the segment, and the percentage that segment's cost represents of the total corridor cost, were then calculated. Segment data was then imported into ArcGIS and further refined if warranted (e.g., segments may have been combined or separated based on visual relationship).

Future studies such as this one may prove useful to KYTC transportation planning, particularly if meetings occur with the above-mentioned transportation professionals and include OMS data that is consistently identified by specific milepoints.

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Appendix A	County Meeting Summaries
Appendix B	Critical Rate Factor (CRF) Summary Table
Appendix C	Operations Management System (OMS) Data Analysis

1.0 Introduction

The KYTC Division of Planning identified the need to include a district-specific look into its Statewide Planning process. In an effort to address this need, two pilot studies were performed focusing on District 4 and District 10. The District 4 and District 10 Accessibility and Connectivity Studies were undertaken to assess the current state of each pilot District, with an emphasis on strategies to improve safety, connectivity, and mobility within the District and surrounding areas.

As a part of the existing data review process, meetings were scheduled with local officials in each of the 11 counties within District 4. Meetings with Hardin and Meade Counties were held with the Hardin-Meade County MPO, in lieu of holding meetings with local officials for each respective county. Two parameters – population and employment – were the focus of these meetings because they were primary data considerations for the Kentucky Statewide Travel Demand Model. Another aspect of the study was an effort to integrate roadway maintenance considerations into the statewide planning process. In an effort to synthesize maintenance costs with the planning process, a subset of Operations Management System (OMS) data was provided by KYTC for the 11 counties within District 4 with an overarching objective of identifying persistent maintenance issues on major corridors.

1.1 Study Area

The study area for the District 4 pilot study included the 11 counties that comprise the District: Breckinridge, Grayson, Green, Hardin, Hart, Larue, Marion, Meade, Nelson, Taylor, and Washington. The study area is shown in Figure 1. In addition, travel patterns to and from the 14 surrounding Kentucky counties and three Indiana counties were considered for inclusion in the initial study area. Jefferson County is one of the 14 Kentucky counties but only touches District 4 for a very limited area between US 31W and the Ohio River. US 31W provides the most direct route between Jefferson County and District 4. In addition, the only connection between the three Indiana counties and District 4 is via KY 313, which becomes KY 79 and then IN 135 as it travels from Brandenburg, Kentucky, to Corydon, Indiana. With such limited connectivity between Jefferson County in Kentucky and the three Indiana counties, those locations were assumed not to have a significant impact on the travel patterns affecting District 4 for this study; however, since a small tip of Jefferson County touches District 4, it was decided to show Jefferson County on all mapping.

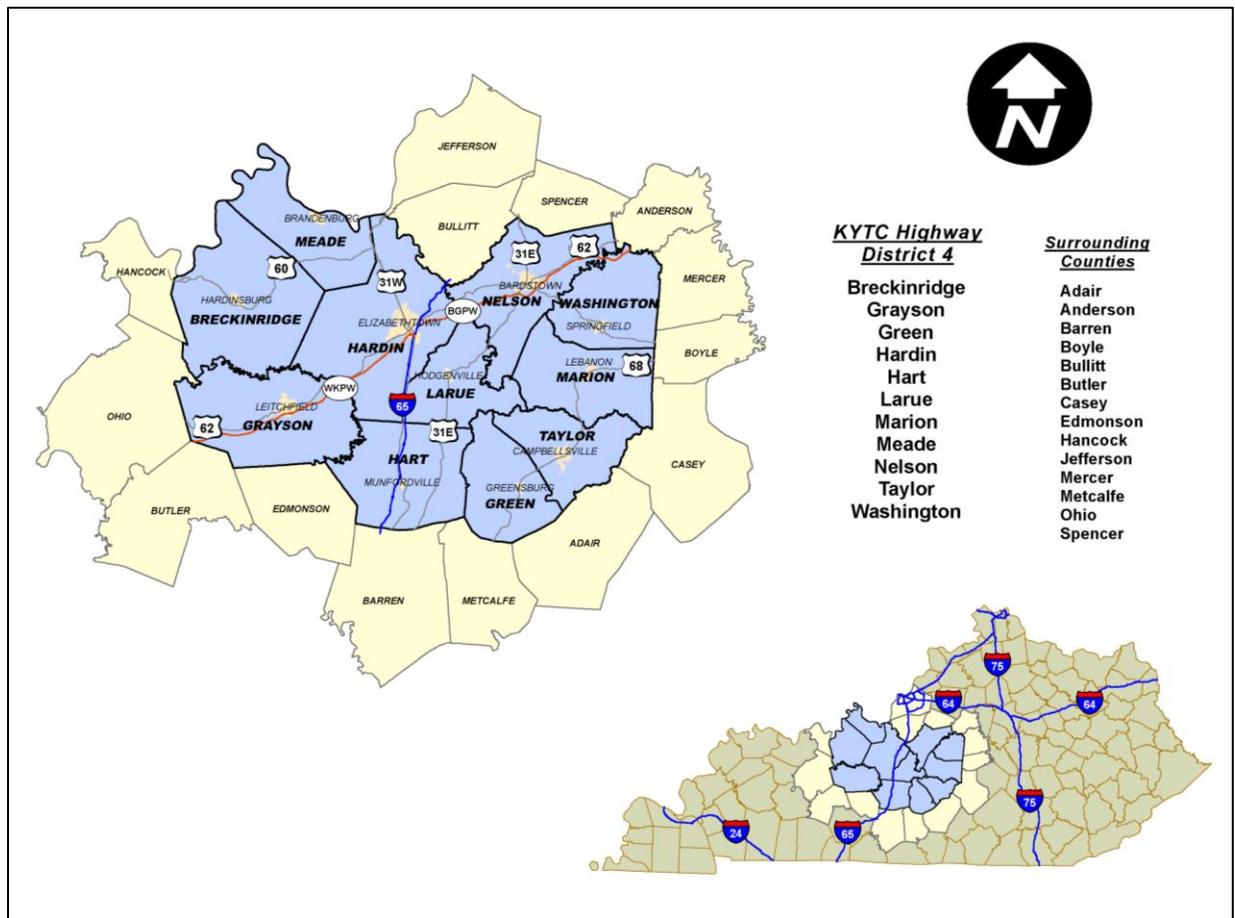


Figure 1: Study Area – District 4 Accessibility and Connectivity Study

1.2 Study Overview

The goal of the District 4 Accessibility and Connectivity Study is to assess the current state of the District, with a focus on determining those corridor improvements that would most improve accessibility and connectivity for District 4 and the surrounding counties. Accessibility reflects residents’ ability to reach employment opportunities and essential services such as groceries, household items, hospitals, and post-secondary education within a reasonable commuting time. Expectations for reasonable commuting time varied depending upon the specific local officials and their county locations relative to employment opportunities and essential services. Residents within some counties travel to another county to access these resources, whereas residents in other counties live within a relatively short distance of employers, retailers, healthcare providers, etc.

Connectivity reflects the scope, reliability, and safety of the transportation system used by residents to access those locations.

To accomplish this goal, several tasks were completed:

- Existing conditions analysis;

- Discussion with local officials to determine where District 4 residents are going for jobs, healthcare, shopping, etc. These discussions also helped refine land use and growth assumptions in the Kentucky Statewide Travel Demand Model (KYSTMv17);
- Identification of regionally impactful corridors;
- Identification of recurring maintenance issues based on a review of KYTC's Operations Management Systems (OMS) maintenance activity;
- Identification of potential improvement projects for the regionally impactful corridors; and
- County-level travel time analyses to evaluate accessibility.

2.0 County Meetings

In order to gather information for the Accessibility and Connectivity Study within KYTC District 4, meetings were held with local elected officials, as well as KYTC district personnel and consultant staff, within each county over the course of August – September 2017. The purpose of these meetings was to determine existing transportation patterns and concerns, as well as anticipated needs. The discussions were structured with the following questions:

- Where are the county residents going for jobs, healthcare, recreation, etc.?
- What issues prevent residents from getting where they want to go?
- Where is the county growing?
- What issues prevent the county from growing?
- Are there regions of the county where population and/or jobs are increasing, as well as regions where populations and/or jobs are declining?

A summary of the county local officials meetings follows; detailed minutes for the individual meetings are included in Appendix A. Washington County was identified as a pilot county for District 4. While the detailed summary for Washington County is included in Appendix A, this meeting served as a guide for the structure and format for future meetings with local officials. As anticipated, local officials were interested in how this study could ultimately lead to transportation improvements in their county. However, perhaps the most significant aspect of the Washington County meeting was the County Judge Executive's insistence that all meetings should include participation of local economic development staff so as to facilitate an informed discussion of job growth and development within the county. It also was noted that the shifting of population from one Traffic Analysis Zone (TAZ) to another was related as much to available infrastructure (water, sewer, gas) as it was to related population moving to job locations. The need for high-speed internet access also was discussed as increasingly essential. These discussions guided the presentations to subsequent counties, the listing of invitees, and formulation of questions. Throughout the course of the study, participants identified transportation-related strengths and weaknesses within each county,

as described below. **Table 1** summarizes the transportation needs and problems in each county, as well as perceived factors limiting county growth.

Table 1: Transportation Information Provided at Local Officials Meetings

Transportation Needs and Problems Factors Limiting Growth		
County	Transportation Needs/Problems	Factors Limiting Growth
Breckinridge	Additional facilities to improve connectivity	Utility infrastructure Bicycle/pedestrian, public transportation, and other transit facilities Population trends
Grayson	Complete bypass project	Utility infrastructure Access to industries/manufacturing Population trends Workforce development
Green	Corridor spot improvements Interstate access Maintenance funding	Utility infrastructure Lack of housing Lack of rail access Workforce capability
Hardin	Corridor spot improvements Additional facilities to improve connectivity	Internet access Bicycle/pedestrian, public transportation, and other transit facilities Workforce capability
Hart	Bypass to Horse Cave Corridor spot improvements	Utility infrastructure Population trends
Larue	Additional facilities to improve connectivity Improvements to KY 84 and South Lincoln Blvd.	Utility infrastructure Access to national parks Bicycle/pedestrian, public transportation, and other transit facilities
Marion	Campbellsville Bypass would benefit truck traffic going to factories Southside bypass would benefit Lebanon Corridor spot improvements Maintenance funding	Lack of housing Internet access Access to industries/manufacturing Workforce capability
Meade	Corridor spot improvements Additional facilities to improve connectivity	Internet access Bicycle/pedestrian, public transportation, and other transit facilities Workforce capability
Nelson	Additional facilities to improve connectivity Improvements to US 150	Utility infrastructure Lack of housing
Taylor	Complete Campbellsville Bypass and related access to Technology Park Interstate access Improvements to KY 555, KY 210, KY 55	Utility infrastructure Internet access Lack of rail access High healthcare costs among workforce Shortage of workers
Washington	Corridor spot improvements Interstate access Improvements to US 150 and KY 152 New four-lane roadway	Internet access Access to industries/manufacturing Lack of amenities

2.1 Transportation Needs and Problems

While each county had unique circumstances, some common needs, desires, and problems were identified as a result of the data gathered from the 11 counties. See Appendix A for meeting minutes and detailed summaries.

- **Bypass:** Several counties identified a need for constructing or completing a bypass to alleviate congestion associated with industries and schools. Some of these counties specifically identified the need to remove industry-related traffic from their downtown areas and help reduce conflicts with industrial traffic.
- **Corridor Spot Improvements:** Multiple counties cited specific corridor spot improvements that could alleviate specific safety and congestion concerns. These corridor improvements include widening existing lanes; adding turn lanes; widening shoulders; truck lanes; passing lanes; and other safety/spot improvements. Green County also indicated a need to make improvements that would allow raising the legal weight limits on KY 88.
- **Additional Facilities:** Several counties indicated a need for additional transportation facilities; some were specifically to provide connectivity to other counties. Some facilities are needed to improve connectivity within the counties.
- **Interstate Access:** Multiple counties indicated a need for improved interstate access, particularly to I-65, stating that their current access discourages industries and businesses from locating to their counties.
- **Specific Roadways:** Specific roads were identified as having areas of congestion that cause safety problems, having poor geometry, or as barriers to development. Some counties stated that a four-lane roadway is needed for industries to locate or expand.
- **Maintenance Issues:** Funding constraints for maintenance of the existing roadways was also noted.

2.2 Factors Limiting County Growth

Many counties expressed common factors that limit their growth, some of which were intertwined with the transportation network.

- **Lack of Infrastructure:** The need for expanded sewer, natural gas, and/or water, most often outside of the city limits, was cited as a hindrance to both housing development and industrial growth. In some cases, low housing density in the county make it difficult to financially justify the expense, but it also limited the amount of residential development (such as subdivisions) outside the city limits.
- **Lack of Housing:** Some local officials correlated the lack of infrastructure with the lack of affordable housing, or a general housing shortage overall.
- **Internet Availability:** Limited internet access was cited by several counties as an obstacle to businesses and industries locating in their area. Both Taylor and Washington Counties mentioned projects that are expected to improve internet access.

- **Roadway Access:** Several counties cited a need for improved access to industries/manufacturing. A need for improved access to national parks, state parks, and similar recreational areas was also noted by some counties.
- **Other Transportation Access:** Two counties stated that they lost potential industries due to a lack of rail access. Others stated that they needed improved bicycle/pedestrian, public transportation, and other transit facilities.
- **Workforce:** Several counties stated that they need to improve the quality of their workforce to attract employers. One cited high healthcare costs among the workforce as a detriment to attracting new businesses. A shortage of workers due to the low pay scale was also noted. One county noted that their lack of amenities, such as a mall, hospital, and recreation opportunities, discouraged people from moving to the area. Other counties talked about workforce development and the need to develop a workforce that could compete for the higher paying, higher skilled jobs. Breckinridge County also discussed the welding program that is supplying welders throughout Central Kentucky, which is an illustration of successful workforce development.
- **Population Trends:** Several counties identified population trends as a hindrance to growth, including an aging population/lower birth rate, stagnant population growth, and movement from the urban to rural communities.

2.3 Findings

The 11 counties within KYTC District 4 have a range of accessibility and connectivity concerns, which emerge into patterns based on the existing industry and transportation networks.

For those counties that already have well-established industries, the primary need appears to be to better accommodate industry traffic and move it away from residential and high-density areas, potentially with the addition of a bypass or spot improvement. Some of these counties need wider roads, turn lanes, and other improvements to provide safer travel conditions for the vehicle type mix on their roads. Economic and population growth might also improve with improved access to public transportation facilities and/or other modes of transportation.

Counties with poor prospects for industry and business growth noted a lack of access to a nearby interstate; their roadway network is often comprised of two-lane facilities with poor geometrics.

Counties with good prospects for industry and those with poor prospects have overlapping needs for improved utility infrastructure outside of the city limits, including internet access. Workforce readiness is a common concern as well. Many counties cited a need to improve or construct a specific roadway in response to improved connectivity and development opportunities.

The lack of public transportation could limit mobility for some segments of county populations (elderly, low-income, etc.). Improvements in access and connectivity to other modes of transportation also could contribute to growth. For example, growth could improve with access to rail, water, and air transport. Rail access for some counties in District 4 has diminished over the years. With the loss of rail access, shipping to and from these counties now is by truck/roadway.

Three counties in District 4 (Breckinridge, Meade, and Hardin) have frontage along the Ohio River; thus, development of river ports and improved access to river ports also could increase opportunities for growth. Several counties in District 4 have access to general aviation airports. While general aviation airports typically do not involve commercial shipping, general aviation airports do contribute to regional accessibility and connectivity.

In summary, the meetings with local officials for each county served as an opportunity for each county to describe issues and concerns as related to accessibility and connectivity within their county and with other counties and communities within the district. While it was important to allow the local officials to present their views, it was just as important that this served as a confirmation for District Planning staff that they did have a reasonable understanding of the key concerns within each county.

Data also was collected for the shifting population and employment demographics within each county. These data were used to update information in the KYSTM.

3.0 Regionally Impactful Corridors

The project team identified seven regionally impactful corridors within the district. These corridors are roadways which, when improved, would provide regional benefits to residents and commuters seeking health care, employment, recreational resources, etc. **Table 2** provides a list and description of regionally impactful corridors identified within District 4, including proposed improvement concepts and cost estimates, which are based on construction costs of programmed projects.

Corridor 1

In the northeast portion of the district, US 150, Corridor 1, provides an east-west connection that stretches approximately 120 miles between Louisville and Mount Vernon. Many drivers, including trucking companies, use this route to travel through the region, and this highway impacts the safety and efficiency of that travel. Improving US 150 is currently one of the District's highest priorities. This regionally significant corridor begins in Bardstown (Nelson County) at the Bluegrass Parkway and ends at Springfield in Washington County. This project has been advanced through the *US 150 Scoping Study* (Item No. 4-396.0), completed in December 2015, and preliminary engineering per Item No. 4-396.1. The segment in Nelson County has been advanced through the preliminary engineering phase up to the point of holding a public hearing and completion of the environmental documentation. Completion of the public hearing and environmental documentation in Nelson County has been delayed because of the



Substandard Shoulder along Corridor 1

COVID-19 pandemic and is anticipated for completion in 2021. It is anticipated that the segment in Nelson County will be advanced to final design once the environmental documentation is completed. The segment in Washington County (Item No. 4-396.3) has been advanced to the final design phase and is anticipated to be advanced to the right-of-way phase in 2022.

Corridor 2

Also in the northeast portion of the district, KY 245, Corridor 2, begins in Nelson County at US 150 in Bardstown and travels northward to Bullitt County. This route serves as a northern bypass of Bardstown, intersecting US 62 and US 150 in an overlap with US 31E, and as a route to northern I-65 and Louisville.

Corridor 3

Corridor 3, KY 3005, is also known as Ring Road. This corridor provides a bypass around Elizabethtown in Hardin County, beginning at the Western Kentucky Parkway and ending at I-65. KY 3005 begins as a four-lane divided roadway and becomes a five-lane road with a center left-turn lane near the intersection with US 62.

Corridor 4

Corridor 4, KY 210, begins in Campbellsville at US 68 and ends in Hodgenville at the Lincoln Parkway. Located in the central part of the district, the corridor travels through LaRue, Green, and Taylor Counties; it also travels through Hardin County, but that section is not considered part of the regionally impactful corridor. South of Hodgenville in LaRue County, KY 210 becomes the primary route to Campbellsville in Taylor County.

Corridor 5

Corridor 5, US 68, is located in the southeast portion of District 4 beginning at the Cumberland Parkway in Edmonton, in Metcalfe County, and ending at the US 68/KY 61 intersection in Greensburg (MP 12.0). The intersection of US 68 at KY 61, southwest of Greensburg, has been recently improved, and improvements have been made for the curve known locally as “Vaughn Curve” (MP 10.8 to MP 11.6) just south of the Russell Creek Hill in Green County.

Corridor 6

The Heartland Parkway, Regionally Impactful Corridor 6, begins at the Adair/Taylor County line and ends in Springfield (Washington County), traveling through Marion, Taylor, and Washington Counties. The Heartland Parkway was identified in the initial *Hartland Parkway Alternatives Planning Study*, which extended from the Columbia Bypass in Adair County with KY 55 in Adair, Taylor, Marion, and Washington Counties to Springfield at US 150 before following KY 555 in Washington County to the Bluegrass Parkway. The *Heartland Parkway Alternatives Planning Study* identified a four-lane roadway as the recommended improvement strategy. During the preliminary engineering and environmental studies for Taylor and Adair Counties, it was ultimately determined that traffic growth was not as great as initially projected. While an environmental document was completed for

construction of a four-lane roadway, updated traffic data did not justify the need for four lanes and a four-lane roadway was determined not to be cost-efficient. Thus, the concept of a shared-four-lane or 2+1 concept now is proposed. Simply stated, a 2+1 roadway is a three-lane roadway with alternative passing lanes per each direction. A 2+1 roadway improves passing opportunities and travel times but at a lesser initial cost than for a four-lane roadway.

Corridor 7

Corridor 7, KY 61, begins at the Adair/Green County line, traveling through Green and Larue Counties, and ends in Hodgenville at US 31E. KY 61 is concurrent with several significant roadways, including US 68 through downtown Greensburg. The regional significance of KY 61 is that it provides access to the Cumberland Parkway in Adair County via KY 61 and the Columbia Bypass. Improving KY 61 through Green County and Larue County also is regionally significant by providing access to US 31 E and the Lincoln Parkway to I-65.

Table 2: District 4 Regionally Impactful Corridors

District 4 Regionally Impactful Corridors							
Corridor	Route	D4 Counties Directly Served	Begin	End	Approximate Length	Anticipated Improvement Type	Cost Estimate
1	US 150	Nelson Washington	Bardstown (BG Parkway)	Springfield (US 150x)	18 miles	2+1 Initial; 4-lane divided ultimate	\$54,607,000
2	KY 245	Nelson	Bardstown (US 31E)	Clermont (I-65)	12 miles	2+1	\$10,470,000
3	KY 3005	Hardin	US 31W	WK PKWY	2 miles	Extension of Ring Road from US 31W to WK PKWY	\$6,067,444
4	KY 210	LaRue Green Taylor	Campbellsville (US 68)	Hodgenville (Lincoln Parkway)	29 miles	Widening – 2+1	\$25,302,500
5	US 68	Green	Edmonton (Cumberland Parkway)	Greensburg (US 68 MP 12.0, western intersection of KY 61 and US 68)	12 miles	Spot improvements – Minor widening for increased shoulder widths, spot improvements, and adding truck climbing lane at Russell Creek Hill.	\$5,350,000
6	Heartland Parkway	Marion Taylor Washington	Taylor/Adair County Line south of Campbellsville (KY 55)	Springfield	40 miles	Widening – 2+1	\$34,900,000
7	KY 61	Green LaRue	Adair/Green County Line south of Greensburg	US 31E	35 miles	Spot improvements – Minor widening for increased shoulder widths, spot improvements for poor roadway geometry.	\$15,604,155

3.1 Existing Conditions

Existing conditions for the regionally impactful corridors are presented below. This information includes current roadway classifications and geometrics, crash history, and traffic volumes within the study area. Data for this section were collected from KYTC's Highway Information System (HIS) database, KYTC's Traffic Count Reporting System, aerial photography, and from field inspection.

3.1.1 Functional Classification

Functional classification is the grouping of roads, streets, and highways into integrated systems ranked by the level of mobility for through movements and access to adjoining land. This grouping acknowledges that roads serve multiple separate functions and it provides a basis for comparing roads. Functional classification can be used for, but is not limited to, the following purposes:

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

Figure 3 shows the functional classification of the District 4 regionally impactful corridors. Interstates (shown in red) are controlled-access highways that comprise the Dwight D. Eisenhower National System of Interstate and Defense Highways. These routes are the highest classification of arterials and were developed to connect major metropolitan areas. Principal arterials (shown in orange) serve major centers of metropolitan areas and are intended to provide a high level of mobility for substantial statewide travel. Minor arterials (shown in blue) serve trips of moderate length to smaller geographic areas and provide connections between principal arterials. Major collectors (shown in green) facilitate trips between local roads and the arterial network.¹

Figure 4 depicts the truck weight classifications of the regionally impactful corridors. US 150, KY 245, KY 3005, KY 210, and US 68 are classified as AAA and allow gross vehicle weight up to 80,000 pounds. KY 61 is listed as a AA route with maximum weights of 62,000 pounds. In compliance with the Surface Transportation Assistance Act of 1982 (STAA), Kentucky has established a network of highways on which commercial vehicles with increased dimensions may operate. These STAA vehicles include semi-tractor trailers with 53-foot-long trailers and single-unit trucks with a total

¹ Highway Functional Classification Concepts, Criteria and Procedures. U.S. Department of Transportation/Federal Highway Administration.
https://www.fhwa.dot.gov/planning/processes/statewide/related/highway_functional_classifications/section03.cfm#Toc336872985

length of 45 feet. These designated truck routes are shown on **Figure 5**. US 150 and a section of KY 55 in Taylor County, are federally-designated truck routes. KY 210, KY 245, and a section of US 68 in Green County, are state-designated routes.

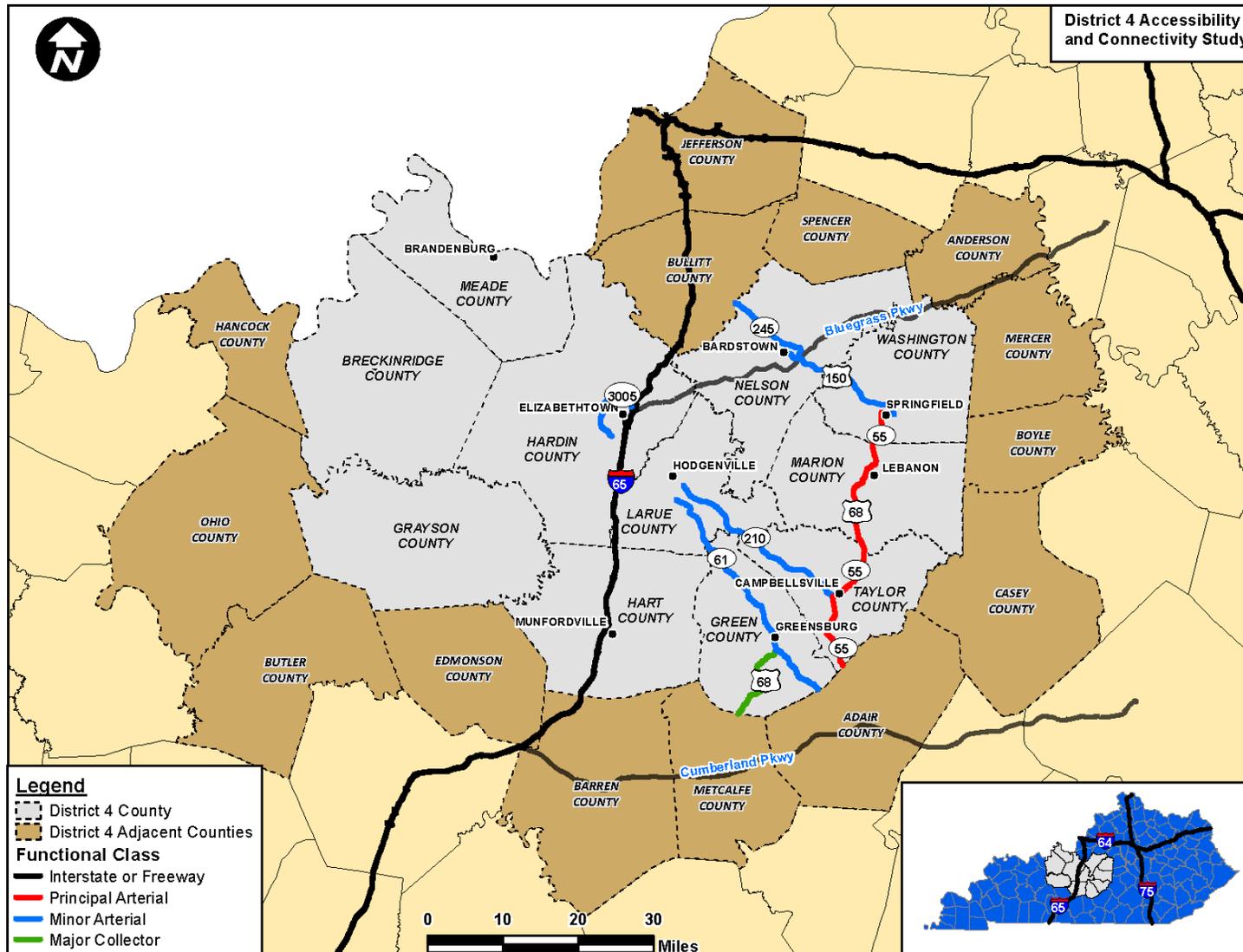


Figure 3: Functional Classification

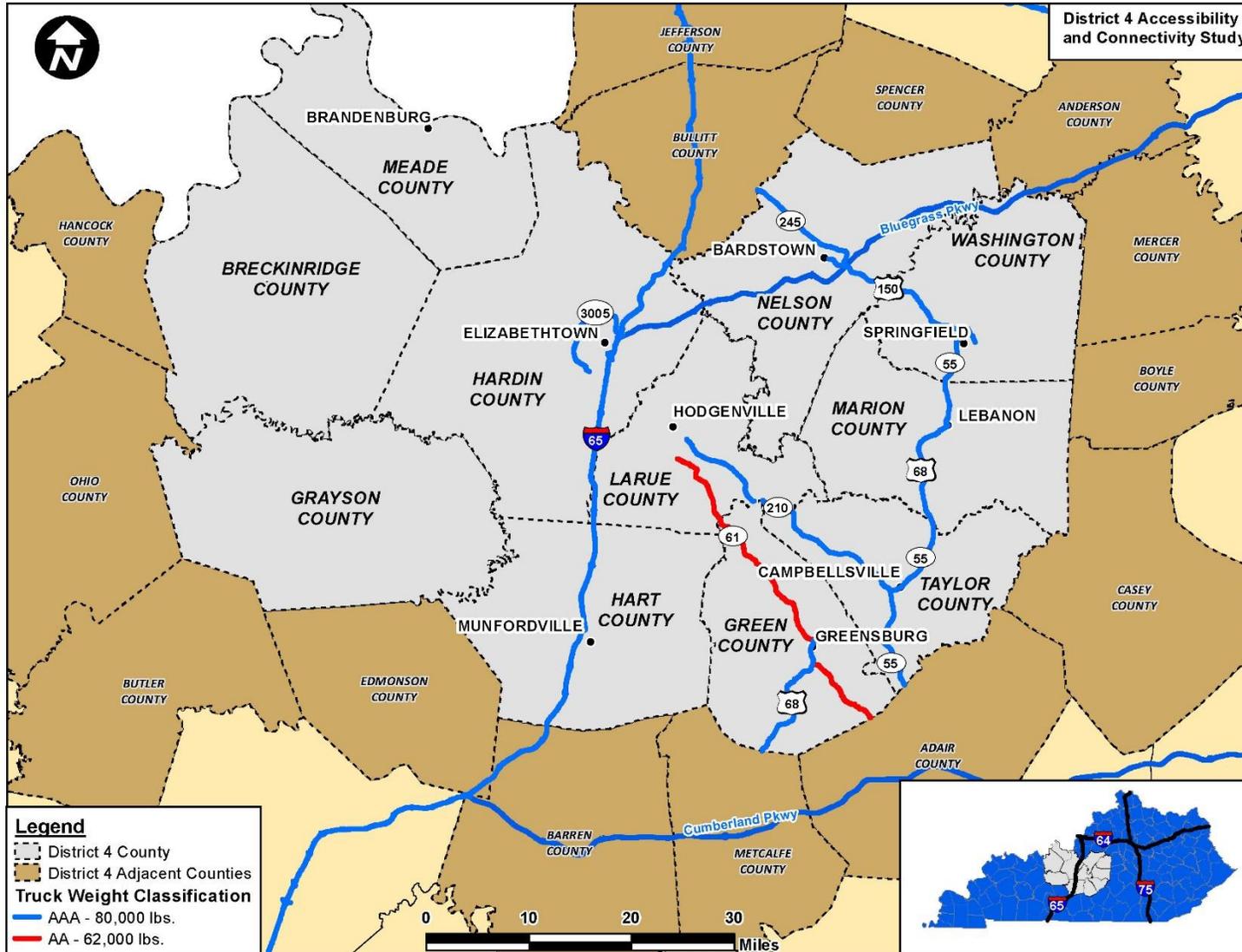


Figure 4: Truck Weight Classification

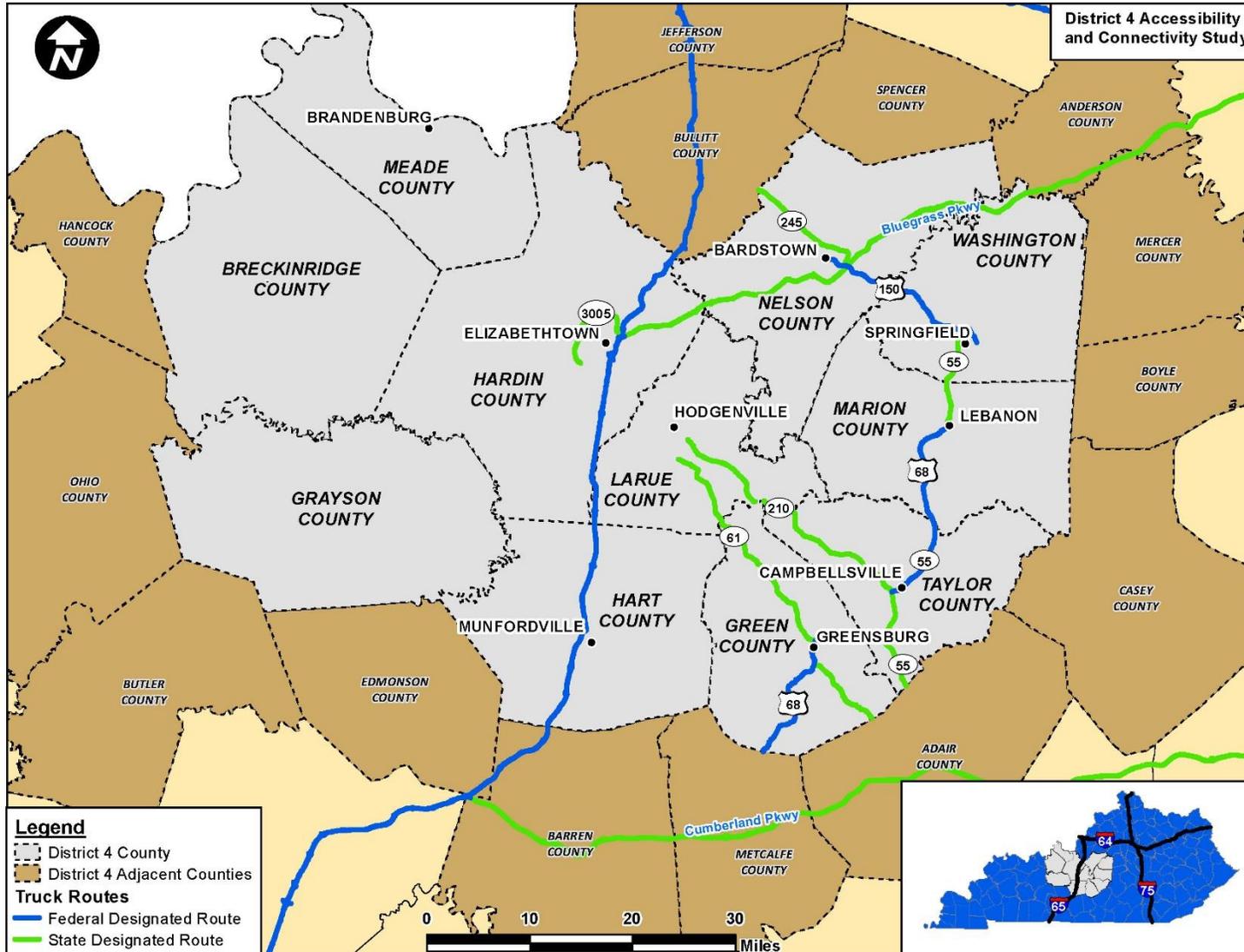


Figure 5: Designated Truck Routes

3.1.2 Roadway Geometrics

The current number of lanes and lane widths along the regionally impactful corridors in District 4 are shown on **Figure 6**. Multi-lane highways in District 4 include portions of KY 245 and KY 3005, and small segments of KY 210, the Heartland Parkway (KY 55), and KY 61. Current KYTC design guidelines suggest a minimum of 11-foot-wide lanes for arterials and collector roadways. Several arterials, including portions of US 150, KY 210, US 68, the Heartland Parkway, and KY 61, have lane widths less than 11 feet.

Shoulder widths for the regionally impactful corridors are shown on **Figure 7**. All of the arterial routes have sections with shoulders less than four feet wide, while the recommended shoulder width for such roadways is eight feet.

3.1.3 Traffic Analysis

The most recent average daily traffic (ADT) volumes from KYTC's traffic count stations are shown on **Figure 8**. ADT volumes on the regionally impactful corridors in District 4 range from 1,000 vehicles per day (VPD) to over 10,000 VPD.

To evaluate the adequacy of roadway segments, existing ADT volumes were compared to the road's theoretical capacity. This is the preferred KYTC methodology for evaluating the adequacy of roadway segments. A volume-to-capacity ratio (V/C) represents the proportion of traffic demand using the roadway for the designated time-period in relation to its capacity to serve the demand.

Estimated 2017 daily traffic volumes developed from the updated KYSTM were used along with Highway Capacity Manual (HCM) 6th edition procedures to develop V/C ratios, as shown on **Figure 9**. The desired V/C threshold is 0.9 for rural areas and 1.0 for urban areas. A V/C greater than this indicates the road is congested. For this study, V/C thresholds over 0.7 are also shown as an indicator of the progression of V/C in addition to the V/C \geq 0.9 for rural areas and V/C \geq 1.0 for urban areas. The V/C threshold of 0.7 is shown as an indicator that V/C was trending toward increased congestion. This threshold value was identified for reporting purposes to show the overall range of V/C values in addition to the more traditional values of V/C of 0.9 for rural areas and V/C $>$ 1.0 for urban areas.

Portions of KY 245, KY 3005 (Ring Road), and US 150 in Nelson County have a V/C ratio greater than 0.9, which indicates that mitigation measures (including additional lanes) may be warranted based on current traffic demand. Segments with a V/C ratio greater than 0.7 are shown in **Table 3** and **Figure 9**. All other regionally impactful corridor segments in District 4 operate under their intended design capacity with a V/C less than 0.7.

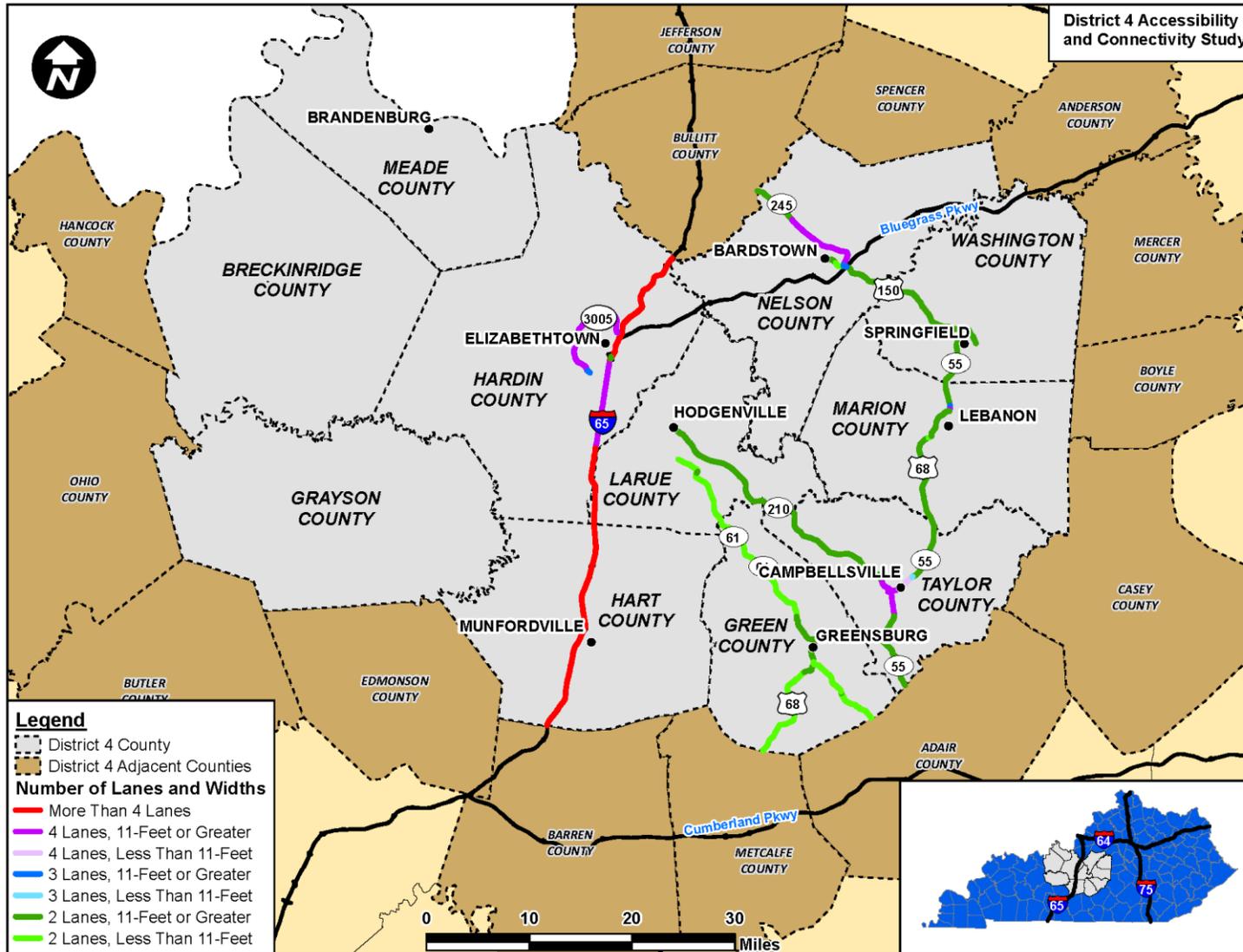


Figure 6: Number of Lanes and Lane Widths

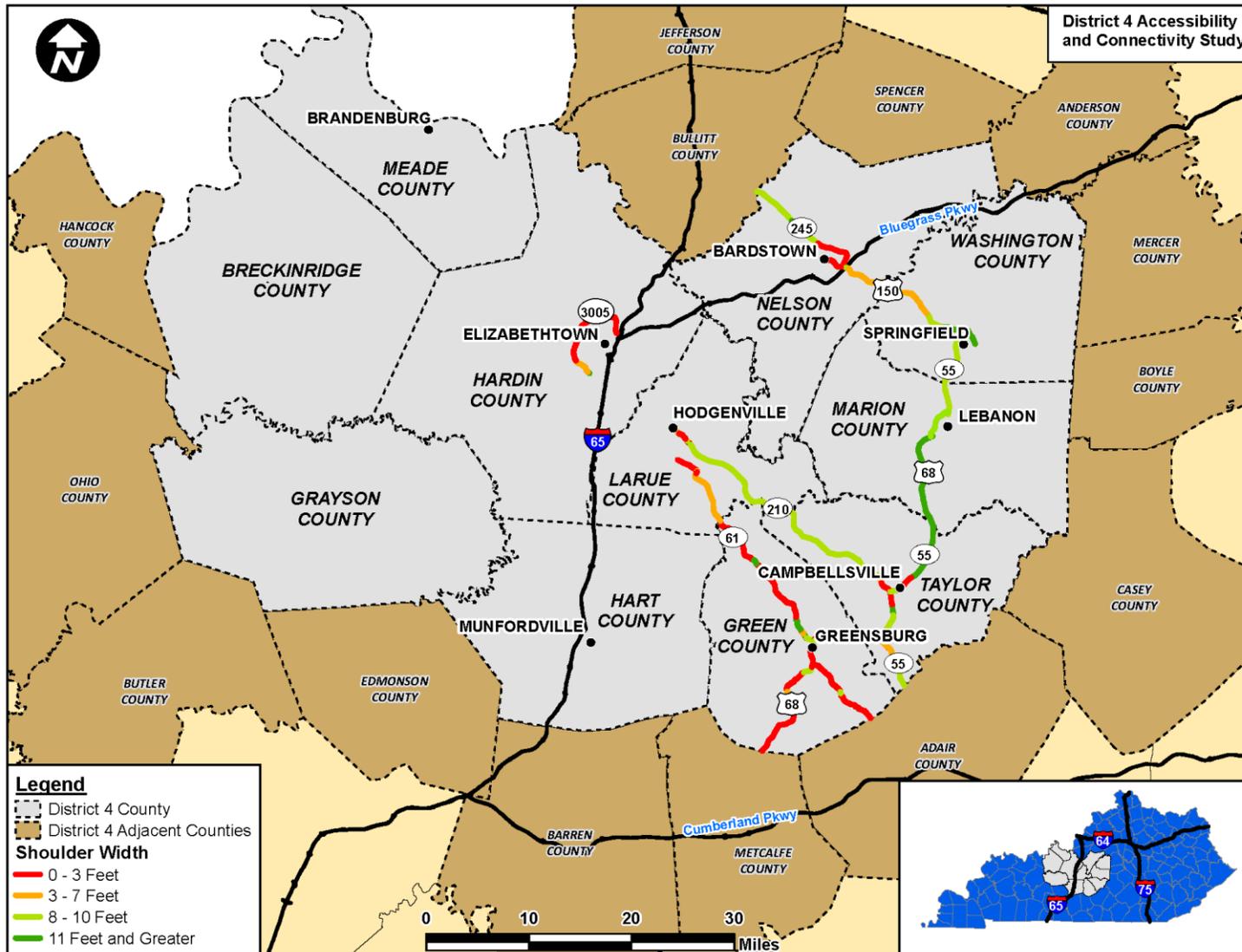


Figure 7: Shoulder Width

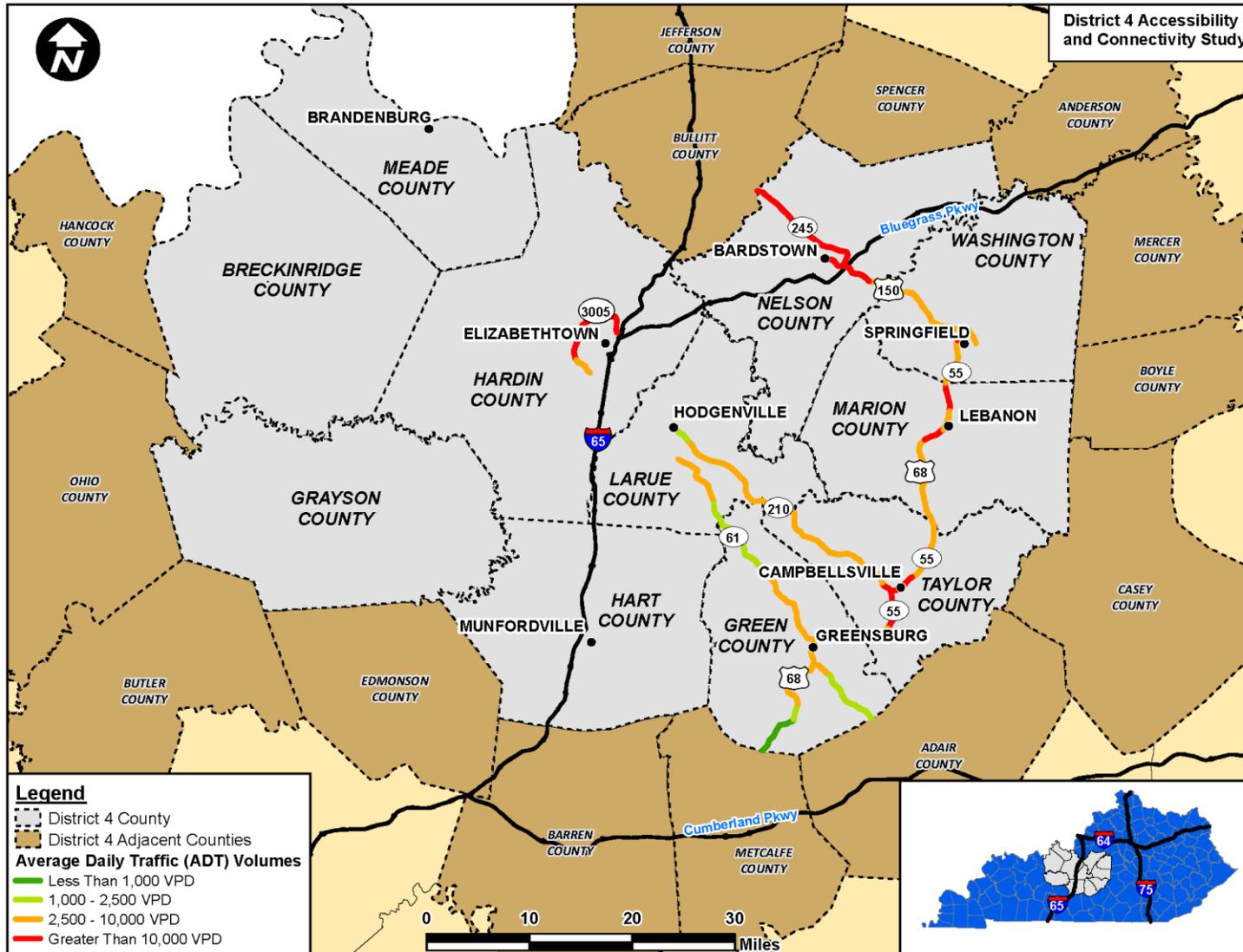


Figure 8: Average Daily Traffic (ADT) Volumes

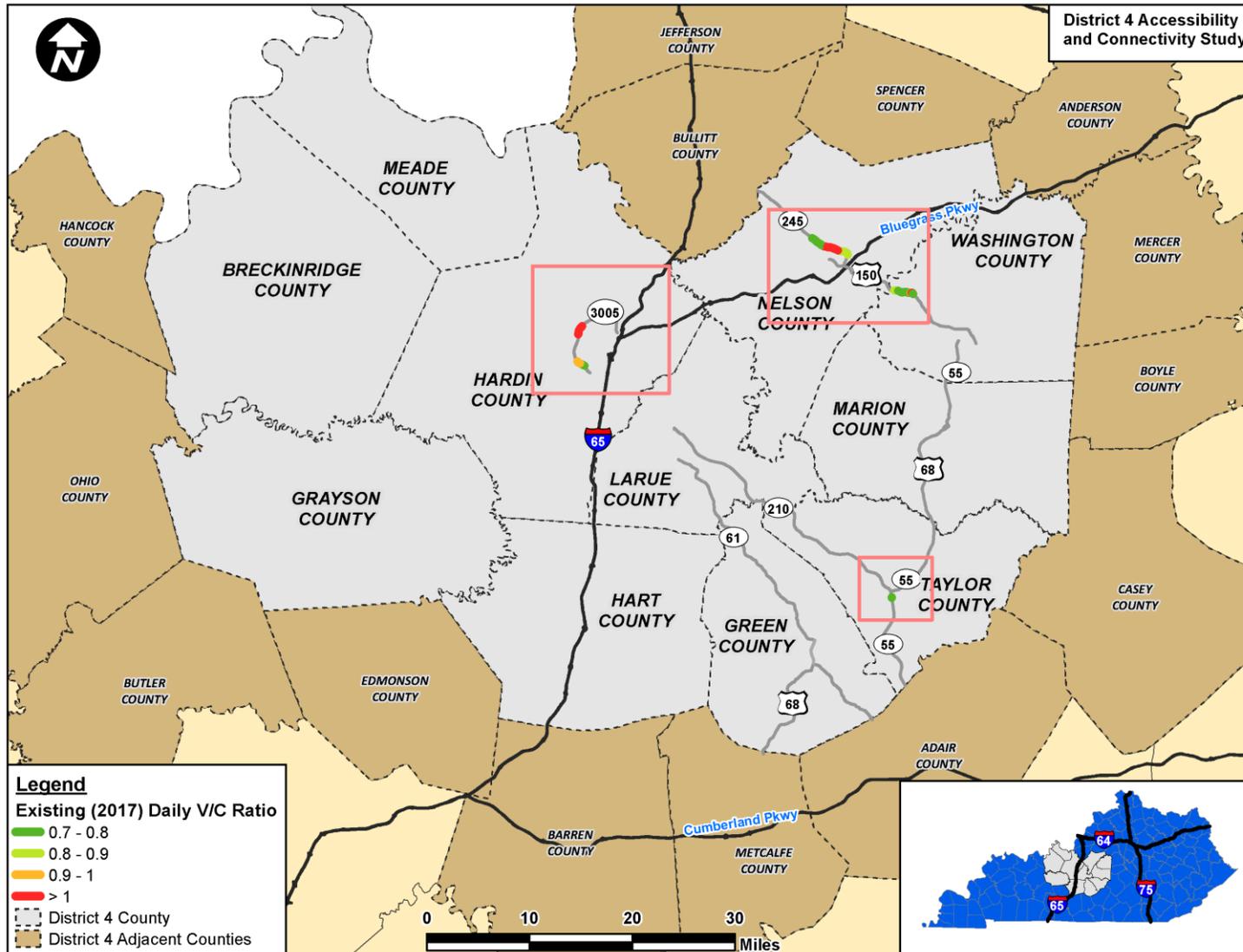


Figure 9: KYSTM Existing (2017) Daily Volume-to-Capacity Ratios

Table 3: KYSTM Existing (2017) Daily V/C Ratios > 0.7 in District 4

Route	County	Start MP	End MP	V/C Ratio	ADT
KY 3005	Hardin	0.892	1.393	0.80	8,454
KY 3005	Hardin	1.393	1.748	0.92	10,187
KY 3005	Hardin	4.51	4.642	1.04	12,173
KY 3005	Hardin	4.642	5.422	1.23	28,970
KY 245	Nelson	1.201	2.334	0.87	17,932
KY 245	Nelson	2.334	2.649	1.17	25,193
KY 245	Nelson	2.649	2.864	1.35	29,640
KY 245	Nelson	2.864	3.151	1.42	30,841
KY 245	Nelson	3.151	3.342	1.47	30,917
KY 245	Nelson	3.342	3.96	1.27	26,240
KY 245	Nelson	4	5.15	0.80	14,426
KY 245	Nelson	5.15	5.198	0.82	8,855
US 150	Nelson	0	0.32	0.90	11,006
US 150	Nelson	0.32	0.44	0.87	10,217
US 150	Nelson	0.44	1.697	0.76	8,823
US 150	Nelson	1.697	1.794	1.47	15,953
US 150	Nelson	1.794	1.854	1.47	15,270
US 150	Nelson	1.854	1.864	1.28	13,534
US 150	Nelson	1.864	1.874	1.30	13,664
US 150	Nelson	1.874	1.934	1.30	14,336
US 150	Nelson	1.934	1.994	0.72	14,336
Heartland Parkway (KY 55)	Taylor	9.676	9.682	0.80	9,104

3.1.4 Crash Analysis

To quantify safety concerns, a crash analysis was performed for the time period of 2012 to 2016 for the regionally impactful corridors within District 4. Crashes were geospatially referenced and compared to statewide data to identify locations experiencing above-average crash rates. The methodology is defined in the Kentucky Transportation Center research report Analysis of Traffic Crash Data in Kentucky (2012-2016). As defined in the methodology report, segments vary in length and are divided along roadways where geometry or traffic volumes change. For each segment, analysts examined the number of crashes, traffic volume, rural/urban, number of lanes, and segment length to determine the critical rate factor (CRF). The CRF is one measure of the safety of a road, expressed as a ratio of the crash rate at the location compared to the critical crash rate for similar roadways throughout the state. A CRF of 1.00 or greater indicates that crashes may be occurring more often than can be attributed to random occurrence.

Segment locations with CRF values are shown in **Figure 10** and **Table 4**. CRF values greater than 2.0 shown in red on **Figure 10**. A detailed CRF summary table is included in Appendix B.

Table 4: Regionally Impactful Corridor Segments with CRF above 1.0 (2012 – 2016)

County	Route	Begin	End	Crashes	CRF
Washington	US 150	6.557	11.1	106	5.21
Green	US 68	13.615	14.388	48	2.86
Taylor	Heartland Parkway (KY 55)	0	6.546	116	2.68
Green	KY 61	8.194	9.796	38	2.50
Taylor	KY 210	14.436	16.626	219	2.38
LaRue	KY 210	5.18	6.994	25	2.21
Green	KY 61	0	8.194	65	1.95
Nelson	US 150	1.954	2.15	41	1.92
Green	US 68	11.954	13.615	78	1.87
LaRue	KY 61	0	8.031	86	1.82
LaRue	KY 210	4.446	4.82	27	1.79
Green	KY 61	11.344	24.344	83	1.57
LaRue	KY 210	4.82	5.18	11	1.50
Washington	Heartland Parkway (KY 55)	4.551	16.169	60	1.49
Nelson	US 150	0.44	1.697	131	1.25
Nelson	US 150	1.697	1.954	43	1.16
Nelson	KY 245	2.334	3.342	303	1.03
Taylor	KY 210	0	11.775	105	1.00

3.1.5 KYTC Operational Management System (OMS) Meetings

A parallel data collection effort for the study involved using Operational Management System (OMS) data to synthesize maintenance costs for primary routes within the district. The focus of this effort was to determine if there was a maintenance-driven impact for existing routes that could be integrated into the district planning effort. The summary of OMS meetings and data is included in Appendix C.

The KYTC provided a subset of the OMS data via an Excel document for analysis. The District 4 spreadsheet from KYTC contained 19,150 individual maintenance activities (rows of data) for District 4 between January 2012 and July 2017. Specific data provided by the KYTC included:

- Pavement repair (pothole patching)
- Shoulder repair
- General roadside repair (rock falls & landslides)
- Bridge maintenance
- Roadway drainage repair (culvert & pipe repair)
- Emergency repairs

An analytical methodology was developed to determine problematic segments within the district.

To identify areas with high maintenance costs in District 4, the 19,150 maintenance activities were grouped by county in Microsoft Excel and each route within that county was then copied to an individual sheet. The route sheets were then sorted by “From Point,” and then “To Point” (the corridor milepoints). A calculated column, “Length,” was added to each sheet to determine the length of the segment, based upon the milepoints.

Segments were then determined based upon contiguous and consistent high-cost repairs; therefore, the segments were of varying length. Once each segment was identified, the total cost for the segment, the cost per mile within the segment, and the percentage that segment’s cost represents of the total corridor cost, were calculated.

Segment data was then imported into ArcGIS and further refined if warranted (e.g., segments may have been combined or separated based on visual relationship). Mapping was created for each county, with segments categorized according to the following cost-per-mile thresholds: Less than \$10,000; \$10,000 - \$25,000; \$25,000 - \$50,000; \$50,000 - \$75,000; and Greater than \$75,000. Within each map, the segments with a cost per mile of \$10,000 or greater were placed on the map with an accompanying flag or tabulation to identify the following information for each segment:

- Route number
- Milepoints of the high-cost segment
- Cost per mile within the segment
- Percentage of the corridor’s total maintenance cost represented by the segment

After completing the OMS data analysis, individual meetings with Section Engineers and maintenance staff from each of the District 4 counties were organized to discuss the identified roadway segments and any other corridors with potential recurring maintenance issues. The goal of the meetings was to solicit input from the maintenance staff for comparison with the results of the data-driven OMS analysis. The meetings were organized by construction and maintenance offices within the district. Counties associated with the specific section offices were represented in each meeting, and the meetings were held according to the following format:

- The meeting attendees addressed each county in their Section, one county at a time.
- They were first given a blank page and asked to describe the high-cost maintenance areas within each county. Specific high-maintenance sites were identified by district staff for each county.
- Next, the district staff were given an 11”x17” map for each county, with each high-cost segment identified as described above. After district staff had time to review the results of the OMS data analysis, a discussion ensued comparing the district comments from the blank maps with the results of the OMS data analysis.

- Specific comments included temporary repairs that resulted in high expenditures and permanent repairs that resolved the issue leading to high costs, from the staff's perspective. Not every area flagged as a high-maintenance cost was discussed. In some instances, the discussion served to describe a recurring problem that, while it may not have the type of issue that would lead to a KYTC Six-Year Plan type project, it did point out the need for some type of rehabilitation or mitigation projects that were needed to preserve the existing infrastructure. In other instances, the discussion described some initial preliminary repairs in advance of a more substantial improvement such as a rehabilitation or resurfacing project.
- A large-scale road map for each county was provided as well, and Section staff were requested to mark their high-priority areas on that map. Comments and concerns associated with each area marked and described were noted. Those areas were added to the summary tables and mapping and identified as not being reflected in the OMS data when applicable.

After the meetings with maintenance staff, mapping of the high-cost maintenance areas in each county was updated to reflect feedback from the District. The mapping identified segments that were confirmed as problem areas; segments which had issues that have been resolved; segments which had issues that were not reflected in the OMS data; and high-cost segments that were not discussed by the District staff. See Appendix C for a summary of the meetings with section staff and the updated mapping.

Table 5 presents a summary of the four locations on District 4 regionally impactful corridors that were identified as having recurring maintenance issues and having five-year maintenance costs greater than \$25,000 per mile. **Figure 11** shows segments with recurring maintenance costs greater than \$10,000 per mile that have not been resolved and do not have a planned project. A complete review of District 4 locations with recurring maintenance issues can be found in Appendix C.

Table 5: District 4 Locations with Recurring Maintenance Issues

Location	County	Route	Begin	End	Maintenance Issues	Notes	Total Cost
1	Green	KY 210	0.0	0.75	Guardrail	Identified through data-driven process	\$107,465
2	Nelson	KY 55	0.0	1.0	Pavement/ Geometry	Identified through data-driven process	\$42,018
3*	Larue	KY 210	6.0	8.0	Patching/Milling	Identified through data-driven process	\$113,661
4	Taylor	KY 55	1.9	3.0	Bridge Shoulders/Guardrail	Identified through data-driven process; Project planned	\$34,068

* This maintenance issue was identified as having been resolved during the meetings with Section staff and is not included in the mapping below.

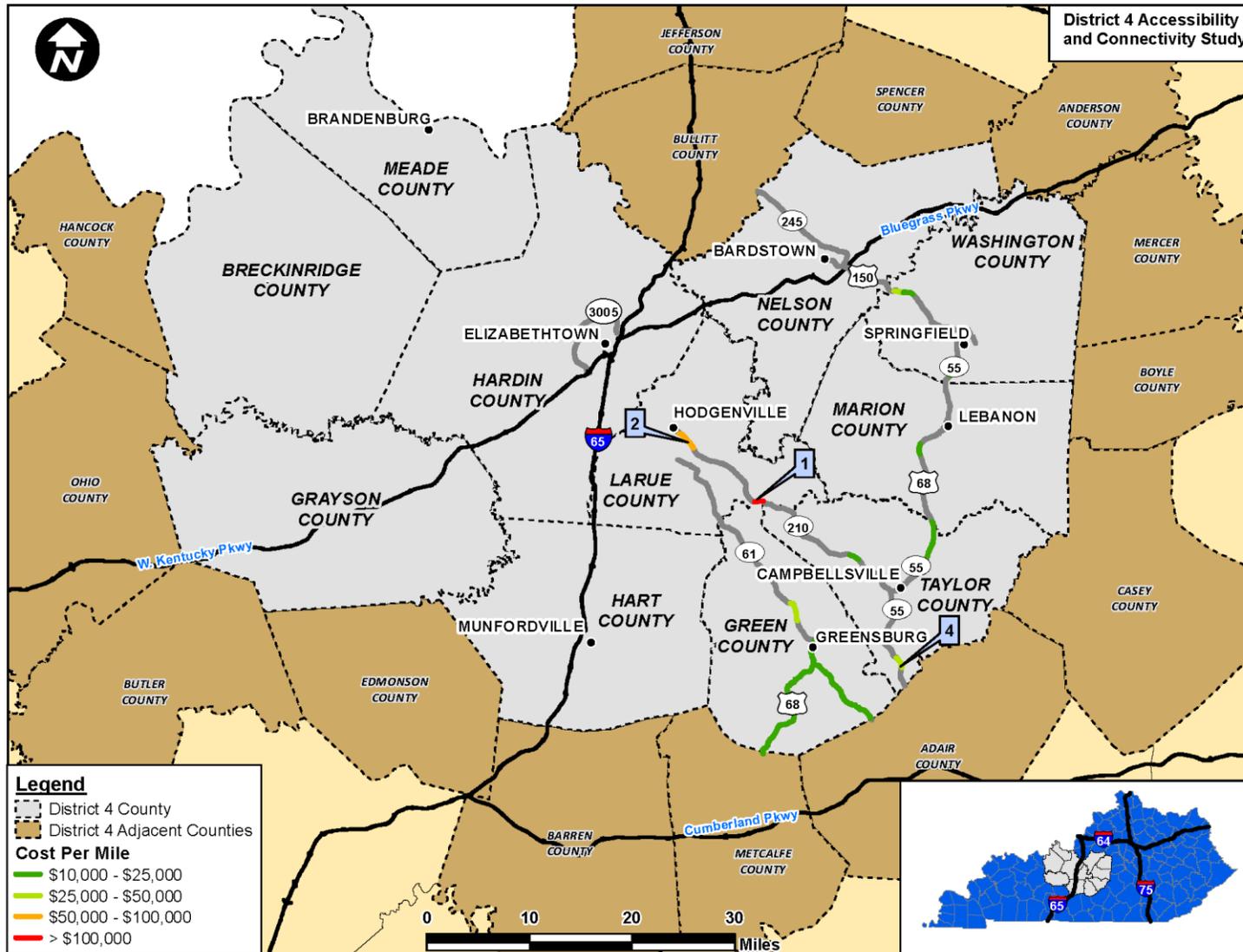


Figure 11: District 4 Recurring Maintenance Locations

3.2 Existing Highway Plan Projects

The Continuous Highways Analysis Framework (CHAF) is a KYTC application that collects, tracks, and analyzes transportation needs across the state. It provides a means to sponsor, score, and rank projects as a part of the Strategic Highway Investment Formula for Tomorrow (SHIFT) process.

Figure 12 presents the CHAF projects on the District 4 regionally impactful corridors along with all projects that were included in Kentucky's FY 2018 – FY 2024 Highway Plan. **Figure 12a** presents the existing CHAF projects on the District 4 regionally impactful corridors along with all projects currently included in Kentucky's FY 2020 – FY 2026 Highway Plan. Only widening and/or reconstruction projects are shown.

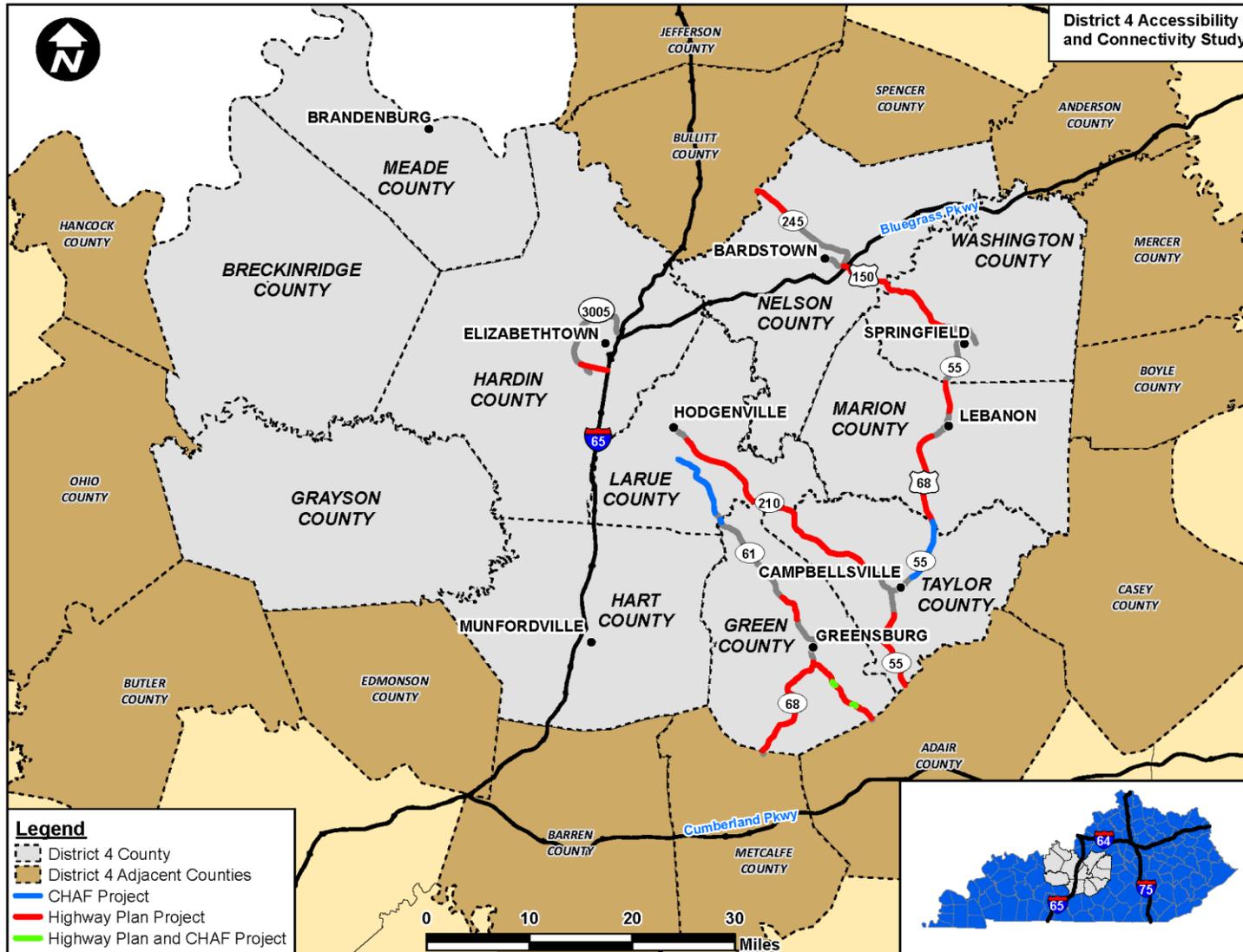


Figure 12: Regionally Impactful Corridor Highway Plan Projects and CHAFs (2018 – 2024)

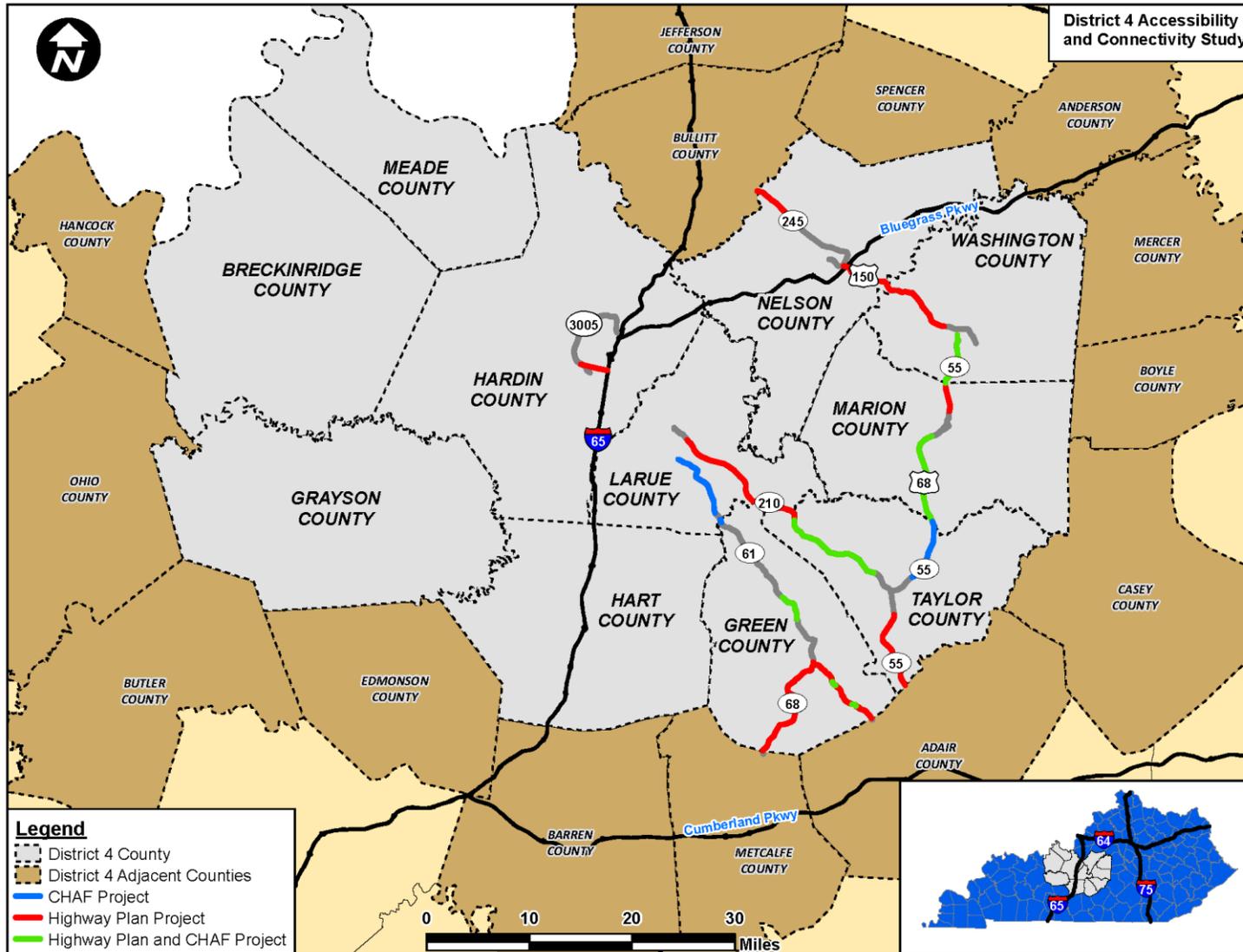


Figure 13a: Regionally Impactful Corridor Highway Plan Projects and CHAFs (2020 – 2026)

4.0 Travel Time Analysis

The primary analytical tool used to evaluate potential improvements and strategies is the 17th version of the Kentucky Statewide Travel Demand Model (KYSTMv17). An initial task of the analysis was a review of the KYSTM's road network and socioeconomic data for the counties within the study area.

To analyze and prioritize potential improvement projects along the regionally impactful corridors, the TransCAD travel time analysis tool was used with the KYSTM to create 40- and 90-minute travel time contours centered on each county seat. The contours were used to estimate the number of 2040 retail opportunities and jobs accessible within each travel shed for the No-Build scenario, the Existing + Committed Tier 1 and Tier 2 Projects scenario (as explained in Section 4.1.2), and for improvements on regionally impactful corridors. The number of households within a 40-minute drive or a 90-minute drive estimates the workforce for existing and prospective employers/businesses. The number of jobs estimates the economic opportunity available to county residents within a 40-minute drive and a 90-minute drive.

4.1 Regionally Impactful Corridor Improvements

4.1.1 No-Build

The No-Build scenario includes no additional transportation improvements. This scenario was carried forward as a basis of comparison.

4.1.2 Tier 1 & Tier 2 Projects

The Existing + Committed scenario included District 4 Tier 1 and Tier 2 projects from Kentucky's Enacted FY 2018 – FY 2024 Highway Plan (**Table 6**) and from Kentucky's Enacted FY 2020 – FY 2026 Highway Plan (**Table 7**). The tiers were determined as follows:

- Tier 1: Project is in the 1st Biennium in Kentucky's Enacted Highway Plan and KYTC's Recommended Highway Plan.
- Tier 2: Project is in the 1st Biennium in Kentucky's Enacted Highway Plan but was outside the 1st Biennium in KYTC's Recommended Highway Plan.

Table 6: Tier 1 and Tier 2 Projects in Kentucky's FY 2018 - FY 2024 Highway Plan

District	County	Item No.	Overall Tier	Route	Begin MP	End MP	Description	Funding Year	Cost*
4	Taylor	142.21	2	KY-555			Construct Campbellsville Bypass	2020	\$7,600,000
4	Taylor	142.3	1	KY-555			Construct Campbellsville Bypass	2019	\$1,000,000
4	Hardin	153.01	1	KY-251	2.681	6.288	Improvements from KY 3005 to KY 434	2019 & 2021	\$8,700,000
4	Hardin	170	1	KY-313	10.598	14.534	Widen to 4 lanes	2019 & 2020	\$12,750,000
4	Nelson	396.1	2	US-150	1.952	7.426	Improve safety, mobility and geometrics	2022 & 2024	\$3,650,000
4	Hart	441	2	KY-335	1.2	2.545	Improve mobility, connectivity and safety	2020 & 2021	\$2,500,000
4	Hardin	7020	1	KY-361	0	0.5	Relocate intersection	2020	\$2,500,000
4	Nelson	8309.1	1	US-150	1.697	2.285	Improve US-150	2019 & 2020	\$5,000,000
4	Grayson	8502.1	1	US-62	23	24.3	Improve US 62	2020	\$2,000,000
4	Hardin	8801	1	KY-1357	14.614	16.292	Improve safety, geometrics, drainage and maintenance issues	2020, 2021, & 2024	\$14,500,000
4	Marion	8803	2	KY-49	23.35	24.98	Improve safety, mobility and geometrics	2020	\$3,300,000

District	County	Item No.	Overall Tier	Route	Begin MP	End MP	Description	Funding Year	Cost*
4	Marion Washington	8916	1	KY-55	1.866 0	4.669 3.485	Improve mobility	2019 & 2022	\$5,700,000
4	Taylor	8920	1	KY-55	0	8.003	Improve mobility	2019 & 2020	\$2,500,000
4	Taylor	8920.01	2	KY-55	0	8.003	Improve mobility	2020	\$7,000,000

*Funding years as shown in the enacted Kentucky's FY 2018 - FY 2024 Highway Plan

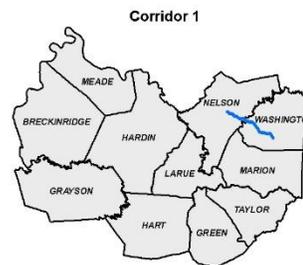
Table 7: Tier 1 and Tier 2 Projects in Kentucky's FY 2020 - FY 2026 Highway Plan

District	County	Item No.	Overall Tier	Route	Begin MP	End MP	Description	Funding Year	Cost*
4	Taylor	142.3	2	KY-55			Construct Campbellsville Bypass	2021	\$12,100,000
4	Hardin	153.01	2	KY-251	2.681	6.288	Improvements from KY 3005 to KY 434	2022	8,550,000
4	Nelson	396.1	1	US-150	1.952	7.653	Improve safety, mobility and geometrics	2021, 2023, & 2025	\$42,800,000
4	Green	397.12	1	US-68	9.682	10.775	Russell Creek Hill	2021 & 2022	\$5,350,000
4	Hart	441	1	KY-335	1.2	2.545	Improve mobility, connectivity and safety	2021 & 2023	\$11,000,000
4	Nelson	8309.1	2	US-150	1.697	2.285	Improve US-150	2021, 2022, & 2023	\$11,807,000
4	Grayson	8502.1	1	US-62	23	24.3	Improve US 62	2021	\$4,000,000
4	Hardin	8801	1	KY-1357	14.614	16.292	Improve safety, geometrics, drainage and maintenance issues	2021 & 2023	11,500,000

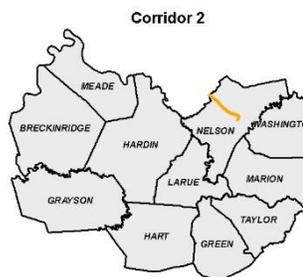
*Funding years as shown in the enacted Kentucky's FY 2020 - FY 2026 Highway Plan

4.1.3 Proposed Corridor Improvements

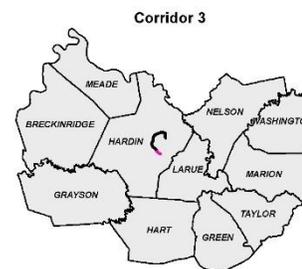
Corridor 1 (US 150): US 150 is a two- to three-lane minor arterial with 12-foot lanes, shoulder widths ranging from 2 – 12 feet, and speed limits ranging from 35 – 55 mph. In Kentucky, US 150 begins at the Indiana state line and ends in Mount Vernon (Rockcastle County). It travels through Nelson and Washington Counties in District 4 and the regionally impactful corridor begins at the Bluegrass Parkway and ends in Springfield at US 150X. Corridor 1 improvements include constructing a 2+1 initial, four-lane divided ultimate roadway in Nelson County and a 2+1 roadway in Washington County, which is included in Kentucky's FY 2020 - FY 2026 Highway Plan under multiple KYTC item numbers, with design funds programmed for the entire corridor; construction funds are programmed in the year 2025. The improvements are expected to enhance local and regional mobility; increase capacity where necessary; and to provide a safer, more efficient connection between the Bluegrass Parkway and Interstate 75 (I-75) in Rockcastle County. Currently, US 150 provides the only regional east/west connection for areas between the Bluegrass Parkway in Bardstown and I-75 in Mount Vernon.



Corridor 2 (KY 245): KY 245 is a two- to four-lane minor arterial with 12-foot lanes, shoulder widths ranging from 2 - 12 feet, and speed limits ranging from 45 - 55 mph. KY 245 begins at the intersection of KY 61 (Preston Hwy) in Bullitt County and ends at the US 150 intersection in Bardstown (Nelson County) and Corridor 1. This road provides the quickest connection between Bardstown, I-65 North, and Louisville. The regionally impactful corridor begins at the Nelson County line and ends at the US 150 intersection in Bardstown. Projects listed in Kentucky's FY 2020 - FY 2026 Highway Plan within the corridor are major widening projects: from KY 332 north of Bardstown to the Flaget Hospital site (4-133.00) and from KY 1430 to KY 332 west of Bardstown (4-295.10). KY 245 provides an important connection for District 4 between Bardstown at the Bluegrass Parkway and I-65. Proposed Corridor 2 improvements consist of constructing a 2+1 roadway from US 31E in Bardstown to I-65 in Clermont. There are currently no projects along this regionally impactful corridor in Kentucky's FY 2020 - FY 2026 Highway Plan.

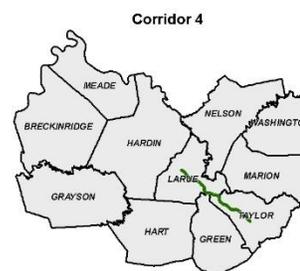


Corridor 3 (KY 3005): KY 3005 is a three- to four-lane minor arterial with 12-foot lanes, shoulder widths ranging from 0 - 10 feet, and speed limits ranging from 35 – 55 mph. Locally, it is known as Ring Road. It originates outside the western limits of Elizabethtown at an interchange with Western Kentucky Parkway. The road then takes a wide circuit to the north of the city, eventually entering the city limits. Its eastern terminus is at US 62, here known as Mulberry Street, within the city

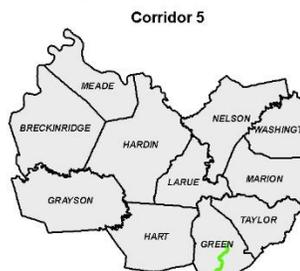


limits and approximately 1 mile west of Interstate 65. Kentucky Route 3005 (Ring Road) serves as a northern bypass of Elizabethtown. The KY 3005 (Ring Road) corridor provides a connection from the Western Kentucky Parkway to I-65 south of Elizabethtown and onto US 31W near the southern end of Hardin County. Proposed improvements to KY 3005 would extend this roadway, potentially as a four-lane divided highway. There are no projects for KY 3005 currently listed in Kentucky's FY 2020 - FY 2026 Highway Plan.

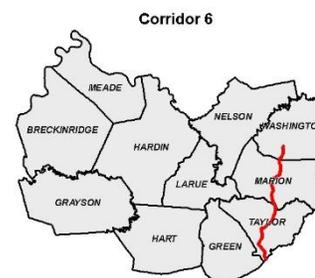
Corridor 4 (KY 210): KY 210 is a two- to four-lane minor arterial throughout Green and Taylor Counties. In LaRue County, it is a minor collector from MP 0.0 to MP 6.994 and a minor arterial from MP 6.994 to MP 16.613. Lane widths range from 11 to 12 feet, while shoulder widths range from two to eight feet. Posted speed limits vary between 25 and 55 mph. KY 210 begins at an intersection with 31W southeast of Elizabethtown and travels alongside KY 61 to Hodgenville. South of Hodgenville, KY 210 becomes the primary route to Campbellsville. This route serves as a major corridor for traffic to both Lake Cumberland and Green River Lake as well as facilitates connectivity from KY 55 in Campbellsville to I-65 and the Western Kentucky Parkway in Hardin County. The regionally impactful corridor includes the portions of KY 210 traveling through LaRue, Green, and Taylor Counties, and proposed improvements to this corridor include widening to a 2+1 roadway from Campbellsville to Hodgenville. A scoping study is programmed for KY 210 in LaRue, Green, and Taylor Counties in Kentucky's FY 2020 - FY 2026 Highway Plan.



Corridor 5 (US 68): US 68 is a two- to four-lane route in Green County that serves as a major collector from MP 0.0 to MP 11.968, and a minor arterial from MP 11.968 to MP 18.425. It is a two- to four-lane road with 9- to 13-foot lanes and two- to four-foot shoulders. The speed limit ranges from 35 to 55 mph. US 68 runs from US 62 in Reidland, Kentucky, to I-75 in northwest Ohio. US 68 is designated as a Scenic Highway throughout Kentucky. US 68 travels eastward through Green County and passes through the town of Greensburg. The regionally impactful corridor begins just south of Greensburg and terminates in Edmonton at the Cumberland Parkway. It provides a route between KY 55 in Campbellsville and the Cumberland Parkway in Edmonton (Metcalf County), effectively providing a route from Campbellsville to Bowling Green. Proposed spot improvements for this regionally impactful corridor include minor widening for increased shoulder widths, adding a truck climbing lane at Russell Creek Hill, and other potential improvements. Three spot improvement projects, one of which is adding the truck climbing lane at Russell Creek Hill, are included in Kentucky's FY 2020 - FY 2026 Highway Plan under KYTC Item No. 4-397.12. Improvements to Vaughn Curve on US 68 just west of Greensburg were recently completed under KYTC Item No. 4-396.10.

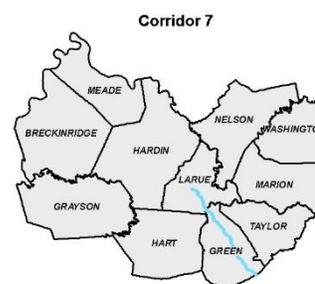


Corridor 6 (Heartland Parkway): The entire Parkway runs from the intersection of KY 55/Columbia Bypass in Adair County to the Bluegrass Parkway in Washington County via KY 55 and KY 555. The regionally impactful corridor begins at the Adair/Taylor county line and travels north through Taylor, Marion, and Washington Counties, and ends at the intersection of KY 55 and US 150X in Washington County. This includes a segment of the to-be-constructed Campbellsville Bypass. The segment of the Campbellsville Bypass from KY 70 to US 68 E (Kentucky's FY 2020 - FY 2026 Highway Plan) is programmed for construction in 2021. The segment of the Campbellsville Bypass from KY 55 to KY 70 is currently under construction. Corridor 6 continues with KY 55/US 68 to the Lebanon Bypass and onto US 150X in Washington County.



A segment of 2+1 roadway was initially constructed in Adair County from the Columbia Bypass to the Adair/Taylor county line. Continuation of the 2+1 roadway from the Adair/Taylor county line to the Campbellsville Bypass is currently being constructed. Another section of 2+1 roadway has been built in Marion County and is funded from MP 0.0 to 9.364 under KYTC Item No. 4-8917.00. A section of the corridor in Taylor County is also programmed under this item number. A total of \$9,350,000 is allocated in federal funds for both segments; construction funding is programmed for the year 2022. Completion of the 2+1 roadway in Washington County between the Lebanon Bypass and KY 555/US 150X in Springfield is under construction and will be completed in the fall of 2021.

Corridor 7 (KY 61): KY 61 is a two- to four-lane minor arterial with lane widths ranging from 9 to 12 feet with one- to eight-foot shoulders. The posted speed limit varies from 35 to 65 mph. KY 61 begins at the Tennessee state line and travels through several counties in District 4 before terminating at the intersection with US 31E in Louisville, Jefferson County. It provides connectivity between the Cumberland Parkway in Adair County, through Greensburg and Hodgenville to Elizabethtown, I-65, and the Western Kentucky Parkway. The regionally impactful corridor begins at the Adair/Green county line and extends through Green, LaRue, Hardin, and Nelson Counties, terminating in Hodgenville at US 31E. Proposed spot improvements for this corridor include minor widening to increase shoulder widths and other spot improvements to improve poor roadway geometry. Kentucky's FY 2020 - FY 2026 Highway Plan includes multiple projects to improve KY 61 in Green County (Item No. 4-8712.00).



4.1.4 County-Level Travel Time Summary

After the KYSTM Model was updated, the project team focused on an analysis of the Build Travel Time Analysis on a county-by-county basis when all improvements to the regionally impactful corridors are combined. Results are summarized in **Table 8** for both the 40-minute and 90-minute travel time thresholds when the recommended improvements are made to the regionally impactful

corridors. As opposed to analyses for individual regionally impactful corridors, the project team decided to complete the analysis based on combining the effects of improvements to all regionally impactful corridors for each county within District 4. A basis for doing this is that the preponderance of improvements in the District 4 area were mostly improving passing opportunities (2+1 configurations) and other geometric modifications/corrections and did not show a lot of difference individually, but did show a benefit when grouped together.

Table 8: 2040 County-Level Travel Time Summary

County	Scenario		Existing + Committed	Improved Corridors	Increase (X) from Existing + Committed	Percent Change	Scenario		Existing + Committed	Improved Corridors	Increase (X) from Existing + Committed	Percent Change
Breckinridge County	40 Min	Households	35,687	43,951	8,264	+18.8%	90	Households	676,150	811,580	135,430	+16.7%
		Non-Retail Jobs	8,690	13,558	4,868	+35.9%	Min	Non-Retail Jobs	262,027	341,348	79,320	+23.2%
Grayson County	40 Min	Households	52,972	63,729	10,757	+16.9%	90	Households	800,469	965,937	165,468	+17.1%
		Non-Retail Jobs	14,507	23,841	9,333	+39.1%	Min	Non-Retail Jobs	322,551	422,913	100,362	+23.7%
Green County	40 Min	Households	51,242	54,808	3,566	+6.5%	90	Households	677,945	817,709	139,763	+17.1%
		Non-Retail Jobs	22,100	30,572	8,473	+27.7%	Min	Non-Retail Jobs	277,041	367,486	90,445	+24.6%
Hardin County	40 Min	Households	163,866	216,877	53,011	+24.4%	90	Households	947,563	1,169,341	221,778	+19.0%
		Non-Retail Jobs	58,999	71,493	12,494	+17.5%	Min	Non-Retail Jobs	378,419	495,419	116,999	+23.6%
Hart County	40 Min	Households	74,242	90,783	16,541	+18.2%	90	Households	783,386	962,714	179,328	+18.6%
		Non-Retail Jobs	30,384	44,313	13,929	+31.4%	Min	Non-Retail Jobs	318,315	420,606	102,291	+24.3%
Larue County	40 Min	Households	98,124	127,487	29,363	+23.0%	90	Households	923,296	1,137,768	214,473	+18.9%
		Non-Retail Jobs	30,325	43,635	13,310	+30.5%	Min	Non-Retail Jobs	372,547	486,022	113,475	+23.3%
Marion County	40 Min	Households	64,962	74,835	9,873	+13.2%	90	Households	961,578	1,194,630	233,052	+19.5%
		Non-Retail Jobs	29,025	43,315	14,290	+33.0%	Min	Non-Retail Jobs	382,809	503,595	120,786	+24.0%
Meade County	40 Min	Households	99,143	124,141	24,998	+20.1%	90	Households	675,239	820,461	145,222	+17.7%
		Non-Retail Jobs	25,017	28,168	3,151	+11.2%	Min	Non-Retail Jobs	264,857	348,434	83,576	+24.0%
Nelson County	40 Min	Households	187,067	252,776	65,709	+26.0%	90	Households	974,884	1,222,596	247,712	+20.3%
		Non-Retail Jobs	65,254	77,980	12,726	+16.3%	Min	Non-Retail Jobs	383,347	509,165	125,818	+24.7%
Taylor County	40 Min	Households	50,230	53,575	3,345	+6.2%	90	Households	743,586	912,396	168,810	+18.5%
		Non-Retail Jobs	21,653	29,353	7,700	+26.2%	Min	Non-Retail Jobs	318,657	416,885	98,228	+23.6%
Washington County	40 Min	Households	71,288	89,666	18,378	+20.5%	90	Households	978,125	1,216,132	238,007	+19.6%
		Non-Retail Jobs	30,693	44,073	13,380	+30.4%	Min	Non-Retail Jobs	388,642	510,534	121,892	+23.9%

On average, in District 4, improvements to the regionally impactful corridors will lead to an increase for access to households of 17.6% within a 40-minute travel shed, with a standard deviation of 6.3%. Conversely, improvements to the regionally impactful corridors will lead to an increase for access to households of 18.4% within a 90-minute travel shed, with a standard deviation of 1.1%. The individual percentages change are shown in Table 8 by county.

On average, in District 4, improvements to the regionally impactful corridors will lead to an increase for access to non-retail jobs of 26.9% within a 40-minute travel shed, with a standard deviation of 8.7%. Conversely, improvements to the regionally impactful corridors will lead to an increase for access to non-retail jobs of 23.9% within a 90-minute travel shed, with a standard deviation of 0.5%. The individual percentages change are shown in Table 8 by county.

For the 40-minute threshold for households, Nelson County showed the greatest increase (26.0%), and for non-retail jobs, Grayson County showed the highest increase in access (39.1%). For the 90-minute travel shed, Nelson County is anticipated to experience the greatest increases for both access to households (20.3%) and non-retail jobs (24.7%).

From another perspective, Green County and Taylor County showed the lowest increase in access to households within a 40-minute travel shed. Green County was at 6.5% increased access to households within 40 minutes, and Taylor County was lowest at 6.2%. From a geographical perspective, Green County and Taylor County are the two southernmost counties in District 4 (see Figure 14). Taylor County had the lowest increase in access to non-retail jobs within a 40-minute travel shed, at 16.3%. Access to non-retail jobs within 40 minutes was highly variable across the 11 counties, with a range of 22.8% from high to low.

For households, at 90 minutes, the lowest increase is in Breckinridge County (16.7%), with Grayson and Green Counties very close at 17.1%. From a geographical perspective, Breckinridge and Grayson Counties are the westernmost counties in District 4. Access to non-retail jobs within 90 minutes was very close for all counties in District 4, as evidenced by the 0.5% standard deviation for the average and an overall range from high to low of 1.5%.

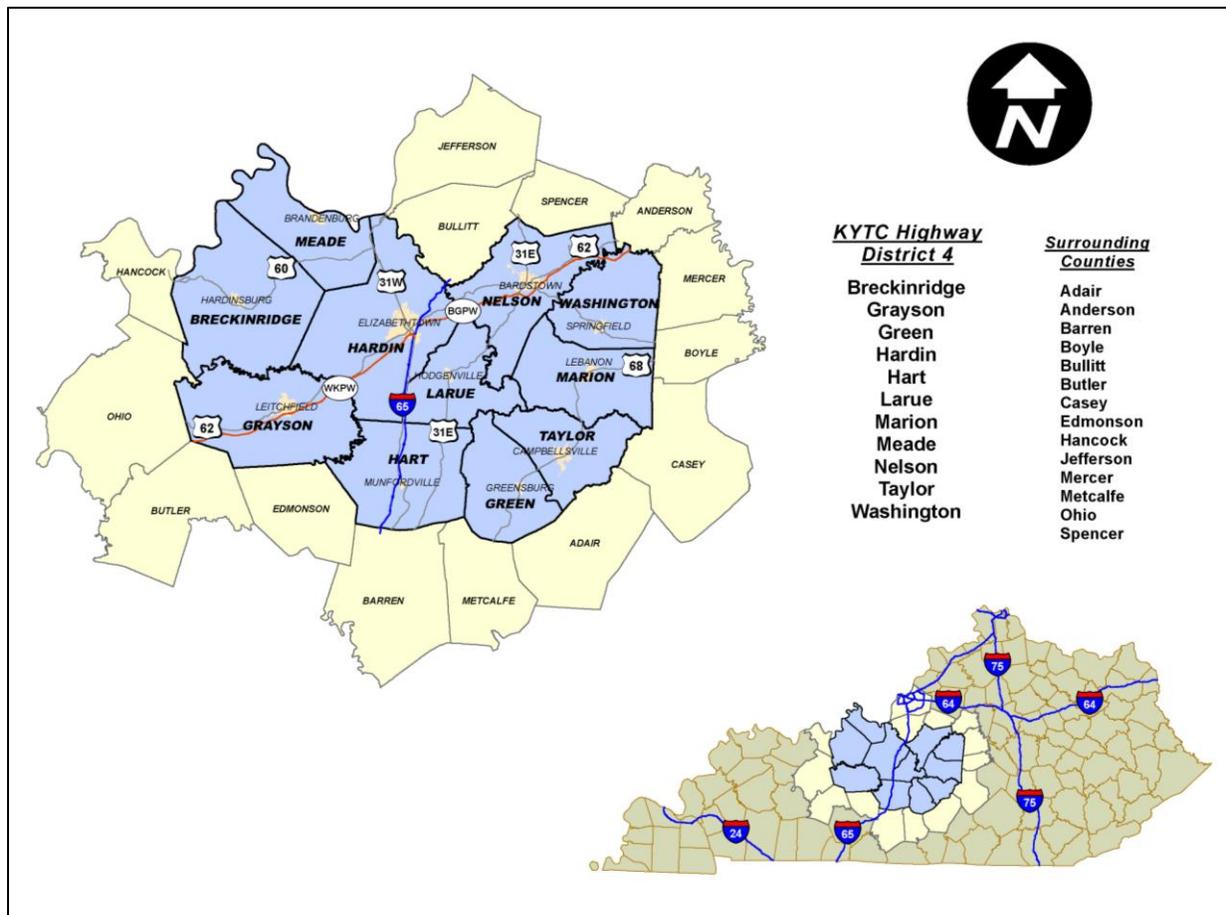


Figure 14: District 4 County Locations

4.2 Cost Estimates

Cost estimates as obtained from Kentucky’s Enacted FY 2018 – FY 2024 Highway Plan and Kentucky’s Enacted FY 2020 – FY 2026 Highway Plan for improvements on the regionally impactful corridors, are shown in **Table 6** and **Table 7**. For those regionally impactful corridors not shown in **Table 6** and **Table 7**, planning-level estimates were developed and have already been shown in **Table 2**.

Future efforts should examine broader types of improvements considering such items as the following:

- Safety improvements
- Congestion relief
- Economic development
- Freight movement
- Other multimodal considerations

Within any of the categories noted above, a more narrow scope of study may be applicable. In future efforts, categorizing improvement strategies could help with evaluating improvement impacts and benefits and ultimately result in better information for inclusion in CHAFs.

5.0 Conclusions

Improvements to the seven regionally impactful corridors will improve the accessibility and connectivity in District 4. These corridor improvements will result in some increased access to housing and non-retail employment, but increased safety and improved travel conditions will be the more significant benefits.

Improvement to Corridor 1, US 150 in Nelson and Washington Counties, is currently the District's top priority. A 5.7-mile section of the corridor is included in Kentucky's FY 2020 - FY 2026 Highway Plan (KYTC Item No. 4-396.1), with design funds programmed in 2021; right of way and utilities in 2023; and construction in 2025. An approximately 2-mile section of US 150 (Item No. 4-396.2), which connects with Item No. 4-396.1 through the Beech Fork Bridge, is also included in Kentucky's FY 2020 - FY 2026 Highway Plan. That project also includes federal funds for all project phases, beginning in 2021. The total cost for the scheduled improvements in Nelson County is \$42.8 million, while the total cost for the Washington County project is \$12.79 million.

Overall, the District 4 Pilot Study validated the KYTC staff's perceptions of transportation needs in counties in their district. The OMS data provided useful information regarding potential rehabilitation and maintenance projects, but not projects that would be included in KYTC's Six-Year Highway Plan.

6.0 Contacts/Additional Information

Written requests for additional information should be sent to the KYTC Division of Planning, 200 Mero Street, Frankfort, KY 40622. Additional information regarding this study can also be obtained from Bradley Bottoms at 270-766-5066 (email at Bradley.Bottoms@ky.gov).

Final Report

District 4 Accessibility and Connectivity Study Various Counties



Kentucky Transportation Cabinet
Central Office, Division of Planning
Highway District 4, Elizabethtown

In Partnership with:



March 2021

