Congestion Management Process for the KYOVA/Huntington, WV-KY-OH Urbanized Area

Final Report (Draft)

Prepared for:
KYOVA Interstate Planning Commission, Huntington, WV
and
Regional Intergovernmental Council, Charleston, WV

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Executive Summary

The 2010 Census results had a significant impact on the Huntington urbanized area which led its new designation as a Transportation Management Areas or TMA (see July 18, 2012 Federal Register). A TMA is an urbanized area with a population over 200,000. The new designation identified the Huntington, WV-KY-OH TMA with an urbanized population of 202,637. The Huntington, WV-KY-OH TMA boundary includes the West Virginia counties of Cabell and Wayne, Lawrence County, Ohio (all previously served by KYOVA Interstate Planning Commission); the Kentucky Counties of Boyd and Greenup (previously known as the Ashland Area MPO and served by FIVCO Area Development District) and a portion of Putnam County, WV (which will continue to be served by Regional Intergovernmental Council-RIC). After the designation, the three states met and determined that the Huntington, WV-KY-OH TMA would fall under the jurisdiction of the KYOVA Interstate Planning Commission, which would oversee the transportation planning functions.

As the Metropolitan Planning Organization (MPO) for the region, the KYOVA Interstate Planning Commission ("KYOVA") is required to develop a Congestion Management Process (CMP) for this TMA. In early February, 2013, KYOVA placed an advertisement for consultant professional services to develop the CMP and a contract was executed with Stantec Consulting Services Inc. on May 22, 2013.

As a process, the CMP is cyclical. The study upon which this report is based represents the establishment of the process and execution of its initial cycle. As would be expected, a data-intensive process such as this requires; 1) identifying the data needed to develop performance measures that meet established CMP objectives; 2) obtaining the data that currently exist and developing effective means for dealing with data that do not exist or cannot be obtained; and 3) applying the evaluation methods that produce the performance measures.

The process follows the recommended model consisting of eight actions or steps. Those are:

1. Develop Regional Objectives for Congestion Management
2. Define CMP Network
3. Develop Multimodal Performance Measures
4. Collect Data/Monitor System Performance
5. Analyze Congestion Problems and Needs
6. Identify and Assess Strategies
7. Program and Implement Strategies
8. Evaluate Strategy Effectiveness

The KYOVA CMP and its documentation through this report follow those eight actions.

Development and selection of congestion management objectives was done in conjunction with CMP stakeholders. The CMP network was established in consultation with the stakeholders. An assessment was made of desired performance measures, analytical methods needed to produce those performance

measures, and available data to support the analytical methods. Ultimately, the performance measures selected were based on the availability of existing data and available resources for the study.

A two-tiered approach was taken to identifying congested locations. Analytical methods and resulting performance measures like volume-to-capacity (V/C) ratio, Level of Service (LOS), and Travel Time Index (TTI) were used, based on available data and corresponding methods. These methods are sufficient and appropriate for locating and quantifying congestion at the macroscopic level (for example, the entire section of Interstate 64 from Hal Greer Boulevard to US 60), but it was acknowledged that the budget and schedule were not sufficient for identification and evaluation of smaller or isolated locations such as signalized intersections. Those locations were identified through workshops with stakeholders; though subjective in nature, it was believed that local stakeholders more than anyone else would know where those congested locations are and to what factors the congestion could be attributed.

The CMP provides an objective, data driven process that planners, engineers and elected officials will use in selecting and prioritizing congestion mitigation solutions. Recommendations for congestion mitigation strategies and projects were developed for the identified congested locations, as well as initial estimates of probable cost. A matrix of congested locations, recommended strategies and projects, estimates of probable cost, and comparison with the CMP objectives was created to provide assistance with project prioritization and programming. Implementation of congestion mitigation strategies and projects ultimately will occur through the West Virginia Department of Transportation, Kentucky Transportation Cabinet and Ohio Department of Transportation; initially, they must be added to the respective Transportation Improvement Programs (TIPs) and Metropolitan Transportation Plans (MTPs).

Abstract

Title:	Congestion Management Process for the KYOVA/Huntington, WV-KY-OH Urbanized Area
Authors:	KYOVA Interstate Planning Commission Regional Intergovernmental Council Stantec Consulting Services Inc. (lead consultant)
Subject:	Development of the KYOVA/Greater Huntington WV-KY-OH Congestion Management Process was accomplished in accordance to 23 CFR 450.320 parts (a) and (b) and is intended to serve as a systematic process that provides for a safe and effective integrated management and operation of the multimodal transportation system.
Date:	January 17, 2014
Source:	**KYOVA Interstate Planning Commission** 400 Third Avenue Huntington, West Virginia 25701 www.wvs.state.wv.us/kyova **Regional Intergovernmental Council** 315 D Street South Charleston, WV 25303 http://www.wvregion3.org
Authorized Officer:	Michele Craig, Executive Director mcraig@ntelos.net
Abstract:	The 2010 Census results had a significant impact on the Huntington urbanized area which lead to the July 18, 2012 Federal Register publication of newly designated Transportation Management Areas (TMAs). The new designation identified the Huntington, WV-KY-OH TMA with an urbanized population of 202,637. The Huntington, WV-KY-OH TMA boundary includes the West Virginia counties of Cabell and Wayne, Lawrence County, Ohio (all previously served by KYOVA Interstate Planning Commission); the Kentucky Counties of Boyd and Greenup (previously known as the Ashland Area MPO and served by FIVCO Area Development District) and a portion of Putnam County, WV (which will continue to be served by Regional Intergovernmental Council-RIC). After the designation, the three states met and determined that the Huntington, WV-KY-OH TMA would fall under the jurisdiction of the KYOVA Interstate Planning Commission, which would oversee the transportation planning functions. As the Metropolitan Planning Organization (MPO) for the region, the KYOVA Interstate Planning Commission ("KYOVA") is required to develop a Congestion Management Process (CMP) for this TMA. This report documents the execution of the initial cycle of the CMP. In addition to the identification of congested locations and recommendations for improvements to be incorporated into the metropolitan planning process, the report also provides recommendations for enhancement of the CMP through the execution of future cycles.

Introduction

The MPO now has a planning tool specifically focused on locating, quantifying and mitigating congestion.

As the Metropolitan Planning Organization (MPO) for the Huntington, West Virginia region, the KYOVA Interstate Planning Commission ("KYOVA") is responsible for implementing the metropolitan transportation planning process in accordance with federal requirements. With the release of the 2010 Census results, the Huntington, WV-KY-OH Urbanized Area had reached a population of 202,637. On July 18, 2012, the Federal Register published a list of designated Transportation Management Areas (urban areas with a population of 200,000 or greater), which included the Huntington, WV-KY-OH Urbanized Area. As a newly designated TMA, KYOVA must meet several additional requirements because of its TMA status. One of those requirements is the development of a regional Congestion Management Process (CMP).

The Huntington Urbanized Area boundary changed as a result of the 2010 Census; the area was expanded to include the I-64/Hurricane/Teays Valley corridor in Putnam County. KYOVA already served Wayne and Cabell counties in West Virginia and Lawrence County in Ohio. Now, Greenup and Boyd counties in Kentucky also have been added, truly making this a regional, multi-state MPO.

The CMP represents one component of an integrated metropolitan planning process; other aspects include the long-range Metropolitan Transportation Plan (MTP), the Transportation Improvement Program (TIP), and the Unified Planning Work Program (UPWP). As a process, the CMP is cyclical and ongoing. This report serves to document the creation of the KYOVA/Huntington, WV-KY-OH Urbanized Area CMP and establishment of its initial cycle.

As defined in federal regulation (23 CFR 450.320 parts (a) and (b)), the CMP is intended to serve as a systematic process that provides for a safe and effective integrated management and operation of the multimodal transportation system. The process consists of several actions, including:

- Development of regional congestion management objectives
- Establishment of multimodal transportation system performance measures
- Collection of data and monitoring of system performance to define the extent (both spatially and magnitude) and duration of congestion and to determine the causes of congestion
- Identification of congestion management strategies
- Implementation activities, including the identification of a schedule for implementation and possible funding sources
- Evaluation of the effectiveness of implemented strategies.

Federal guidance recommends a process model that is built upon activities or actions that are common to successful CMPs and at a basic level must be implemented in order to comply with federal regulations.

Those eight actions are the framework for the KYOVA/Huntington, WV-KY-OH Urbanized Area CMP and are illustrated in the graphic in **Figure 1**.

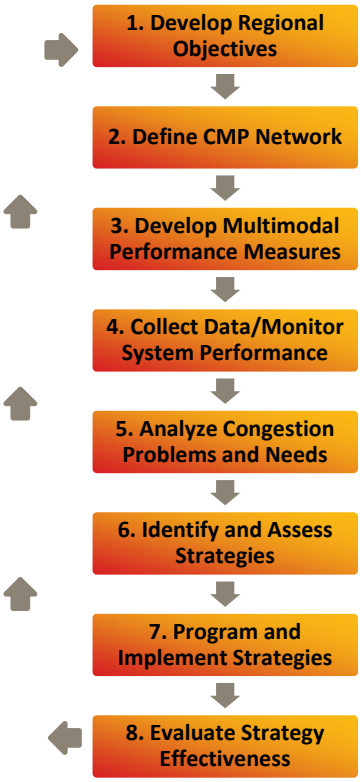


Figure 1. Eight Actions of the CMP

The CMP is a cyclical process; the completion of this initial cycle will mark the transition point for the beginning of the subsequent cycle. The CMP also is an evolutionary process. While the intent of the initial version is to meet federal requirements and become an integral part of the metropolitan planning process, it is recognized even at this point that opportunities exist to improve and enhance the CMP through the execution of future cycles, as needed data and/or financial resources become available. As an example, while travel time reliability is addressed within this initial CMP cycle through the computation of a travel time index (TTI), this computation represents average conditions; the data and financial resources were not available to address travel time *variability*, or how travel time varies from one day to the next. Thus, this report also includes recommended enhancements and additions over future cycles that will make the CMP more complete, more comprehensive, and more able to serve the citizens of the region.

The CMP is data driven; in order to identify, quantify and evaluate congested streets and roads, it takes data. The data must be available already or collected as part of the CMP. When data are not available, trade-offs must be made.

There is a relationship between CMP objectives, data and evaluation methods, as illustrated in **Figure 2**. Reverting back to the travel time reliability example, it may be an objective of the CMP to address travel time reliability, including travel time variability from day to day and as affected by factors such as

weather, incidents, construction, etc. With the completion of several SHRP 2 research projects, there are now computational methods that address travel time reliability as a function of congestion, including travel time variability. These methods require additional data, though, which in turn require additional time and resources. In developing the CMP objectives, therefore, there should be an understanding of what is required to support the objectives, time involved, and cost. For this initial version of the CMP, it is recognized that some of the objectives, or at least the metrics by which the objectives can be measured, will serve as placeholders for future cycles of the CMP when additional data and resources become available.

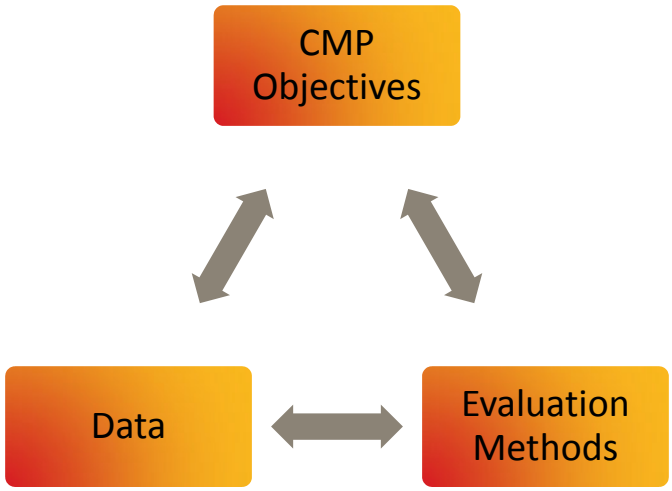


Figure 2. Relationship between CMP Objectives, Data and Evaluation Methods

With respect to the variability of congestion and reliability, recurring congestion is generally predictable, it occurs regularly, and is typically caused by demand in excess of capacity of the system or the system element. While not necessarily desirable, that fact that it is predictable makes it much easier to accept. Non-recurring congestion causes unreliable travel times and is caused by events such as traffic incidents, work zones, weather and special events. Non-recurring congestion and resulting unreliable travel times are most frustrating to travelers and the FHWA estimates that non-recurring congestion sources account for over half of all delay experienced by travelers.

Available data and evaluation methods utilized in this initial version of the KYOVA/Huntington, WV-KY-OH Urbanized Area CMP are fairly sufficient at addressing recurring congestion at the big-picture level. Non-recurring congestion, which is believed to be the most significant type of congestion in the region, is addressed only modestly at best. It is recognized that the greatest opportunity for improving the CMP beyond this initial cycle will be to enhance its capability to address non-recurring congestion.

1.0 Development of Regional Congestion Management Objectives

The federal Congestion Management Process (CMP) is an objectives-driven, performance-based approach to planning for congestion management. The development of regional objectives for the CMP responds to the goals and vision for the region established early in the transportation planning process. As the first

step in the CMP, the objectives provide direction and guidance for development of the CMP. Within the CMP, roles of the selected objectives are to:

- Define what the region wants to achieve regarding congestion management
- Serve as the primary point of connection between the CMP and the Metropolitan Transportation Plan
- Serve as the basis for defining direction of CMP and its performance measures
- Reflect the priorities of the Metropolitan Planning Organization
- Serve as a tool for the MPO to assess how well actions and policies are helping to achieve goals

For the KYOVA/Huntington, WV-KY-OH Urbanized Area CMP, objectives should help to answer the following questions:

1) What do we want to achieve with the CMP?
2) What is considered unacceptable congestion for the KYOVA/Huntington Urbanized Area?
3) Where are the congested locations?
4) How will the CMP be used to make transportation decisions within the region?

Selection of objectives for the CMP also should be based upon understanding what the public wants:

- What does the public really care about with regard to congestion?
- How high of a priority is minimizing traffic congestion?
- What type of congestion is most problematic? For the public? For freight shippers?
- What aspects of congestion most adversely affect livability, safety and economic vitality?

1.1 IDENTIFICATION OF CANDIDATE OBJECTIVES

Selection of objectives for the KYOVA/Huntington, WV-KY-OH Urbanized Area CMP was done through the stakeholder participation process. At the stakeholder kickoff meeting held on August 29, 2013, stakeholders scored each of the candidate objectives on the basis of its importance to the CMP, from '1' (Not Important) to '5' (Very Important). The questionnaire used for scoring is included in the Appendix. Stakeholders initially were presented the candidate objectives, grouped by functional area (Preserve/Expand Capacity, Enhance System Connectivity, Improve Arterial Operations, Congestion Types, and Enhance System Efficiency/Safety). The candidate objectives, by functional group, are listed as follows:

Capacity Preservation/Expansion

- I-64 through capacity
- I-64 interchanges
- Other major regional routes

System Connectivity Enhancement

- Ohio River bridges
- Connectivity among major routes

Arterial Operation Improvement

- Traffic signals/signal systems
- Access management

Identification of Congestion Types

- Recurring
- Non-recurring

Enhancement of System Efficiency/Safety

- Incident response
- Traveler information
- Work zone activity
- Transportation Systems Management
- Travel Demand Management
- Alternative transportation modes (bus transit, bicycle, pedestrian)
- Accommodation of freight movement

1.2 SCORING RESULTS

A total of 21 stakeholders participated in the scoring. The results, including the average score and standard deviation, are shown in **Table 1**.

Table 1. CMP Objectives and Scoring

Objective	Avg. Score	Std. Dev.
1. Preserving/expanding the I-64 through capacity?	3.70	0.979
2. Preserving/expanding the I-64 Interchanges?	3.95	0.826
3. Preserving/expanding other regional routes?	3.90	0.995
4. Enhancement of bridges?	2.95	1.117
5. Connectivity among major routes?	4.05	1.071
6. Improving traffic signals and signal systems?	4.29	0.717
7. Access management?	3.86	1.108
8. Recurring congestion?	3.90	1.091
9. Non-recurring congestion?	3.57	1.326
10. Incident management?	3.81	0.981
11. Traveler information?	3.05	1.024
12. Work zone activity?	3.00	0.949
13. Transportation systems management?	3.38	1.117
14. Travel demand management?	2.71	1.102
15. Alternative transportation modes	2.86	1.315
16. Accommodation of freight movement?	4.10	0.852

The standard deviation is an indicator of the spread of the "votes" about the average score; the higher the standard deviation, the more spread out the votes.

The objectives were ranked by average score and the resulting rankings are shown in **Table 2**. It was acknowledged that the initially proposed candidate objectives were fairly comprehensive, but as a practical matter, the final list for inclusion in the CMP would need to be shortened. A statistical Analysis of Variance was used to identify a logical breakpoint, considering the ranking of the average scores and the standard deviations for each of the objectives. The breakpoint, from a statistical perspective, is highlighted in Table 2.

Table 2. Ranking of CMP Objectives

Objective	Avg. Score
6. Improving traffic signals and signal systems?	4.29
16. Accommodation of freight movement?	4.10
5. Connectivity among major routes?	4.05
2. Preserving/expanding the I-64 Interchanges?	3.95
3. Preserving/expanding other regional routes?	3.90
8. Recurring congestion?	3.90
7. Access management?	3.86
10. Incident management?	3.81
1. Preserving/expanding the I-64 through capacity?	3.70
9. Non-recurring congestion?	3.57
13. Transportation systems management?	3.38
11. Traveler information?	3.05
12. Work zone activity?	3.00
4. Enhancement of bridges?	2.95
15. Alternative transportation modes	2.86
14. Travel demand management?	2.71

1.3 CMP OBJECTIVES

The stakeholders, through the balloting process, determined that both recurring and non-recurring congestion were important and should be addressed through the CMP. The results indicate that a higher emphasis should be placed on recurring congestion than non-recurring congestion. This is important when considering performance measures, available data, and evaluation methods within the constraints of the CMP budget.

Although Objective 15, Increase the Use of Alternative Transportation Modes, did not rank highly from a statistical perspective, it was decided to include it in the list of CMP objectives because of its importance in the downtown Huntington area and particularly in and around the Marshall University campus.

Based on stakeholder input, the following objectives are recommended for incorporation into the KYOVA/Huntington, WV-KY-OH Urbanized Area Congestion Management Process:

Capacity Preservation/Expansion

- Preserving/expanding the I-64 through capacity
- Preserving/expanding the I-64 Interchanges
- Preserving/expanding other regional routes

System Connectivity Enhancement

- Improve/enhance connectivity among major routes

Arterial Operation Improvement

- Improve traffic signals and signal systems

- Implement access management strategies and principles

Enhancement of System Efficiency/Safety

- Improve incident management and response
- Improve truck freight movement
- Increase the use of alternative transportation modes

2.0 CMP Network

In determining the CMP network, two aspects were considered:

1. The geographic boundaries of the MPO; and
2. The transportation system components.

Geographically, the KYOVA TMA boundary includes Greenup and Boyd counties in Kentucky; Lawrence County, Ohio; and Wayne and Cabell counties in their entirety in West Virginia. The TMA also includes the Hurricane and Teays Valley communities in Putnam County that are included in the Greater Huntington, WV-KY-OH Urbanized Area, as defined from the 2010 Census. The TMA Planning Boundary was used to define the extent of the CMP network and this boundary is shown in **Figure 3**.

For those streets and roads within the TMA Planning Boundary, the following criteria were used in defining the CMP network:

- Interstate 64 and other routes listed on the National Highway System (NHS)
- Additional "Enhanced NHS" routes (as expanded through the MAP-21 legislation) functionally classified as Principal Arterial or identified as Intermodal Connectors
- Other state or local routes integral to regional connectivity and/or mobility on which recurring congestion is observed.

A proposed CMP network was submitted initially to the CMP stakeholders using the criteria listed above. After review, some minor changes were made, primarily in the form of additional local routes deemed to be important by the stakeholders.

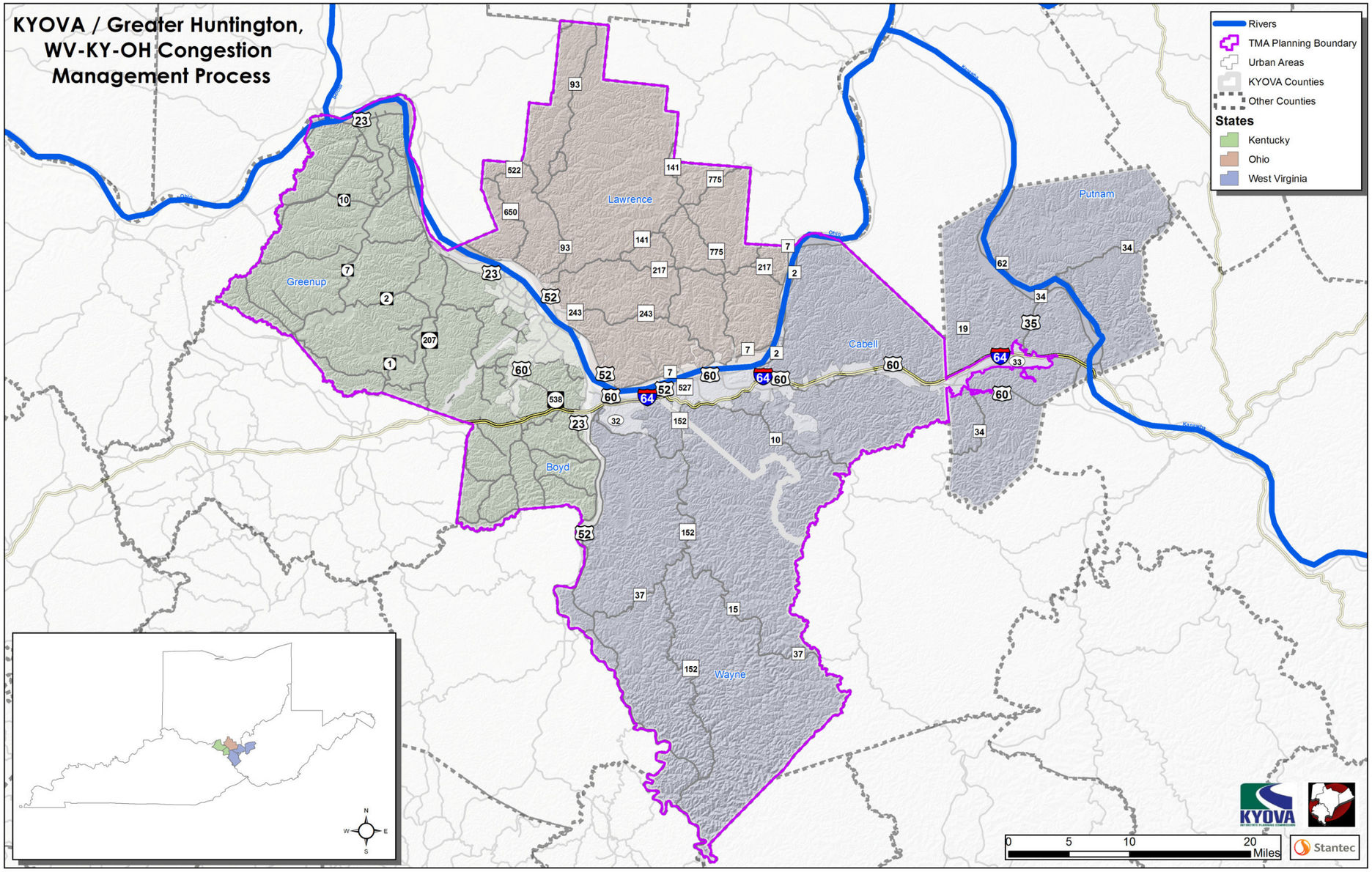


Figure 3. KYOVA/Greater Huntington, WV-KY-OH Transportation Management Area Boundary

Source: KYOVA Interstate Planning Commission

The CMP network is shown in **Figure 4**. A list of CMP network routes and their functional classifications is provided in **Table 3.**

Interstate 64 is the major traffic-carrying facility through the region and serves as the "spine" of the regional transportation network. It connects Lexington, Louisville, St. Louis and other points west with Richmond, Virginia and the Washington, D.C. area. In the middle part of the United States, I-64 provides a critical connection among major north-south interstates – I-65, I-75, and I-95. Locally, it is the primary connection between Ashland/Huntington and Charleston.

US 23 and US 52 are major north-south routes in the region. US 23 connects the coalfields of southeastern Kentucky and western Virginia with I-64. Indeed, much of the coal freight tonnage in the region is moved along US 23. US 52 also serves as a major north-south route, connecting western Virginia and southwestern West Virginia with southwest Ohio.

US 60 parallels I-64 and serves as a primary commuter route through the region. It serves multiple functions – providing downtown area accessibility and mobility, providing access to Marshall University and other activity centers, providing access to major retail areas, and a as detour route for I-64. Because it serves multiple functions and is a heavily traveled commuter route in the region, US 60 is more subject to recurring congestion than most routes in the CMP network.

Three of the CMP network routes serve as intermodal connectors. CR 32 provides a linkage for the Huntington Tri-State Airport to US 52 and I-64. KY 757 provides a connection from US 23 to the Marathon Oil Refinery that is located along the banks of the Big Sandy River in Boyd County. In Greenup, KY 67, also referred to as the Industrial Parkway, provides a vital freight connection between I-64, US 23 and the industries located along the Ohio River.

In Ohio, in addition to US 52, State Route 7 provides access and mobility along the north side of the Ohio River. A portion of the Chesapeake Bypass has been constructed, from its connection with US 52 to State Route 527 and the 6th Street bridge. The remaining section, from SR 527 to Proctorville, is planned but has not been constructed. Completion of this missing link will improve mobility in Ohio along the north side of the river.

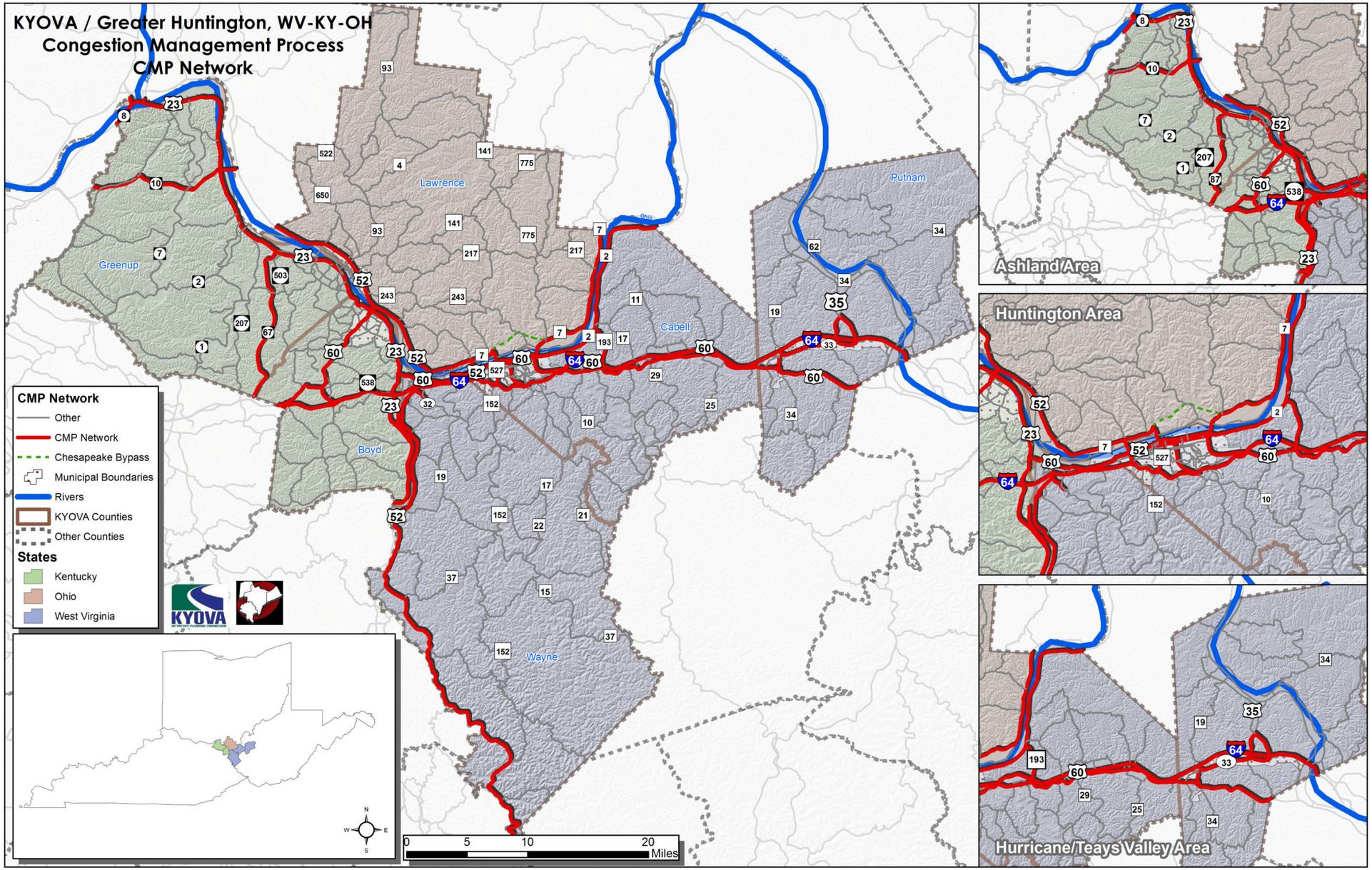


Figure 4. CMP Network

Table 3. CMP Network Routes by Functional Class

Route	County	State	Street/Road Name	From	To	Functional Classification
I-64	Boyd	KY		Boyd/Grayson Co. Line	KY/WV State Line	Rural Interstate
	Wayne	WV		KY/WV State Line	Wayne/Cabell County Line	Urban Interstate
	Cabell	WV		Wayne/Cabell County Line	Cabell/Putnam County Line	Urban Interstate
	Putnam	WV		Cabell/Putnam County Line	Putnam/Kanawha County Line	Urban Interstate
US 23	Greenup	KY	Seaton Ave./Russell Rd.	US Grant Bridge	Greenup/Boyd County Line	Rural Principal Arterial
	Boyd	KY	Greenup Ave./Winchester Ave./Louisa St.	Greenup/Boyd County Line	I-64	Urban Principal Arterial
	Boyd	KY	Louisa Rd.	I-64	Boyd/Lawrence County Line	Rural Principal Arterial
US 23B	Boyd	KY	Greenup Ave.	US 23 split	US 23/US 60 split	Urban Minor Arterial
US 35	Putnam	WV		CR 33 Teays Valley Road	I-64	Rural Minor Arterial
	Putnam	WV		I-64	WV 34	Rural Principal Arterial
US 60	Boyd	KY		I-64	KY 180	Urban Principal Arterial
	Boyd	KY	Purple Heart Highway/13th St.	KY 180	12th St./13th. St. split	Urban Principal Arterial
	Boyd	KY	12th St./13th. St. (one-way couplet)	12th St./13th. St. split	Greenup Ave.	Urban Principal Arterial
	Boyd	KY	Winchester Ave./Louisa St.	Greenup Ave.	US 23/US 60 split	Urban Principal Arterial
	Wayne	WV	Chestnut St./Oak St./Waverly Rd./Adams Ave.	US 23/US 60 split	1st St.	Urban Principal Arterial
	Cabell	WV	Adams Ave./3rd St.-5th St. (one-way couplet)	1st St.	31st St.	Urban Principal Arterial
	Cabell	WV	Midland Trail	31st St.	I-64	Urban Principal Arterial
	Cabell	WV	Midland Trail	I-64	Cabell/Putnam County Line	Urban Minor Arterial
	Putnam	WV	Midland Trail/Main St./1st St.	Cabell/Putnam County Line	Putnam/Kanawha County Line	Urban Minor Arterial
KY 8	Boyd	KY		Lewis/Greenup County Line	US 23	Rural Principal Arterial
KY 180	Boyd	KY		I-64	US 60	Urban Principal Arterial
KY 10	Greenup	KY		Lewis/Greenup County Line	Ohio River/Jesse Stuart Bridge	Rural Principal Arterial
KY 67*	Greenup	KY	Industrial Parkway	I-64	US 23	Rural Minor Arterial
KY 757*	Boyd	KY		US 23	Marathon Refinery	Rural Minor Collector
US 52	Wayne	WV	Big Sandy River Rd.	Wayne/Mingo County Line	WV 75	Rural Principal Arterial
	Wayne	WV		WV 75	I-64	Urban Principal Arterial
	Wayne	WV		I-64	OH SR 7	Urban Expressway
	Lawrence	OH		OH SR 7	Ironton City Limits	Urban Expressway
	Lawrence	OH		Ironton City Limits	Lawrence/Scioto County Line	Rural Principal Arterial
CR 32*	Wayne	WV		US 23	Huntington Tr-State Airport	Urban Principal Arterial
CR 33	Putnam	WV	Teays Valley Road	WV 34	US 35	Urban Minor Arterial
WV 527	Cabell	WV	5th St./8th Ave./8th St.	I-64	US 60	Urban Principal Arterial
WV 10	Cabell	WV	16th St./Hal Greer Blvd.	I-64	US 60	Urban Principal Arterial
WV 2	Cabell	WV	Ohio River Rd.	Cabell/Mason County Line	Huntinton Urbanized Area Limit	Rural Principal Arterial
	Cabell	WV	Ohio River Rd./3rd Ave,/Bridge St.	Huntinton Urbanized Area Limit	US 60/31st St.	Urban Principal Arterial
WV 34	Putnam	WV	Teays Valley Road	US 60	CR 33	Urban Minor Arterial
	Putnam	WV		CR 33	Putnam Village Road	Urban Minor Arterial
	Putnam	WV		Putnam Village Road	US 35	
WV 193	Cabell	WV	Big Ben Bowen Hwy.	WV 2	Barboursville City Limit	Rural Principal Arterial
	Cabell	WV	Big Ben Bowen Hwy.	Barboursville City Limit	I-64	Urban Principal Arterial
	Cabell	WV	Big Ben Bowen Hwy.	I-64	US 61	Urban Minor Arterial
SR 7	Lawrence	OH	Chesapeake Bypass	US 52	SR 527	Urban Expressway
	Lawrence	OH	Rookwood Ave.	SR 527	SR 106	Urban Minor Arterial
	Lawrence	OH		SR 106	Market St./Rte. 107	Urban Principal Arterial
	Lawrence	OH	Market St.	Market St./Rte. 107	Proctorville City Limit	Urban Principal Arterial
	Lawrence	OH		Proctorville City Limit	Lawrence/Gallia County Line	Rural Principal Arterial

* Intermodal connector

Bridge crossings represent a significant component of the regional transportation system, providing connectivity and mobility among the numerous communities. While recurring congestion on bridges is not a current issue, the major river crossings represent critical transportation infrastructure elements, particularly in the event of those situations resulting in non-recurring congestion; i.e. an incident or maintenance/construction. For that reason, those bridges crossing the Ohio River and its major tributaries in the region – the Big Sandy River and the Guyandotte River – are noted specifically and accounted for as part of the CMP network. These bridges are shown in **Figure 5** and are listed in **Table 4**.

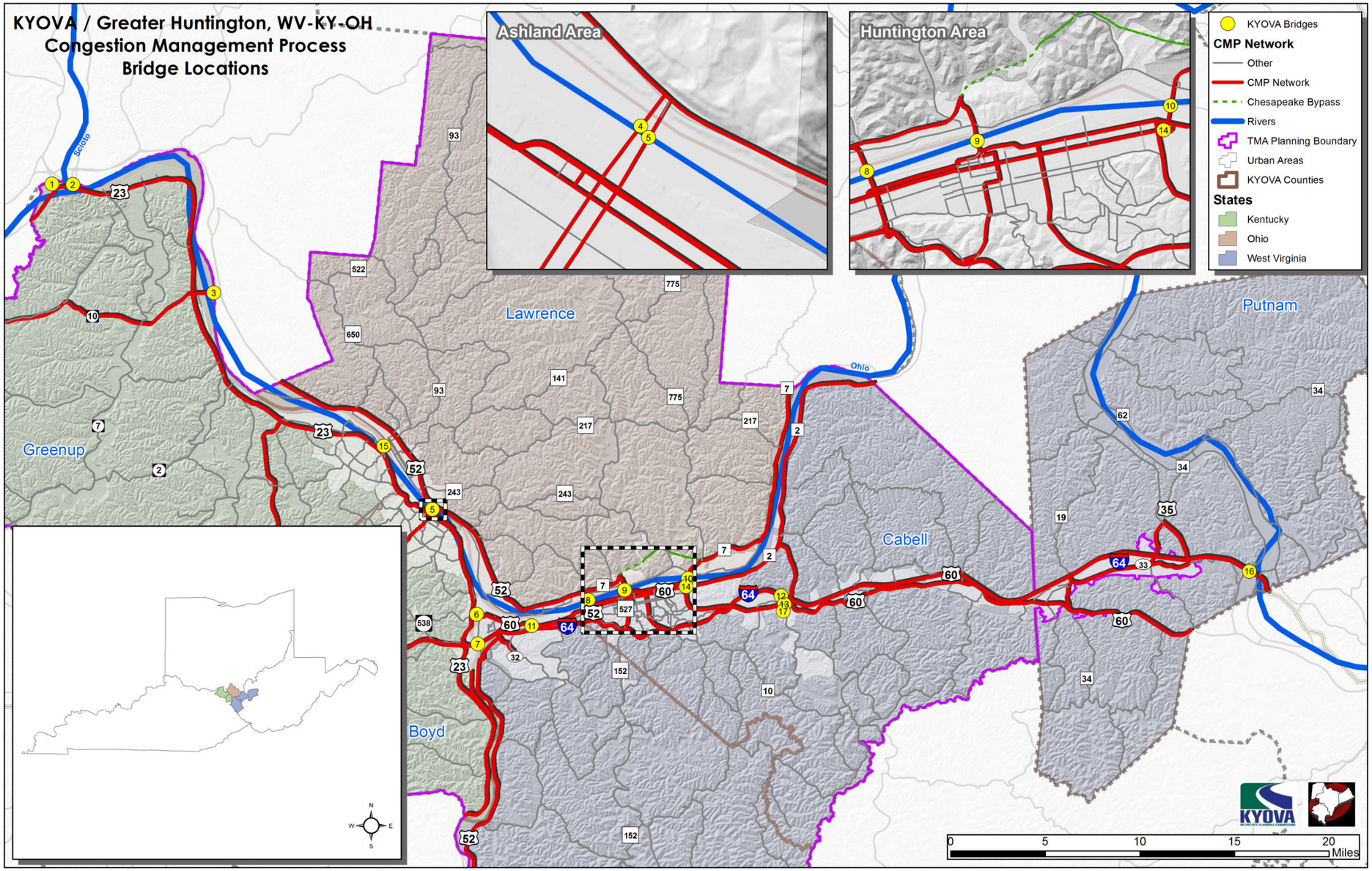


Figure 5. Major River Crossing Locations

Table 4. Listing of Major River Crossings

Map ID	Route Prefix	Route No.	State Jurisdiction	Dir. of Flow	No. of Lanes	Crossing	Local Name
1	KY	852	KY	2 - Way	2	Ohio River	Carl D. Perkins Bridge
2	US	23	OH	2 - Way	2	Ohio River	US Grant Bridge
3	OH	253	Corps of Engrs.	2 - Way	2	Ohio River	Greenup Locks and Dam
4	US	23 S	KY	1 - Way	2	Ohio River	12th Street Bridge
5	US	23 S	KY	1 - Way	3	Ohio River	13th Street Bridge
6	US	60	KY	2 - Way	2	Big Sandy River	Billy C. Clark Bridge
7	I	64	WV	2 - Way	4	Big Sandy River	Interstate 64 Big Sandy River Bridge
8	US	52	WV	2 - Way	2	Ohio River	West 17th Street Bridge/West Huntington Bridge
9	WV	527	WV	2 - Way	4	Ohio River	6th Street Bridge
10	WV	106	WV	2 - Way	2	Ohio River	31st Street Bridge/East Huntington Bridge
11	US	60	WV	2 - Way	2	Twelvepole Creek	Mose Napier Bridge
12	WV	2	WV	2 - Way	2	Guyandotte River	Bridge Street/3rd Avenue
13	WV	2 (Truck)	WV	1 - Way	1	Guyandotte River	Guyandotte River Overpass Bridge/5th Avenue
14	WV	2 (Truck)	WV	1 - Way	1	Guyandotte River	31st Street ramp onto the 31st Street Bridge
15			OH	2 - Way	2	Ohio River	Ironton-Russell Bridge

The Ironton-Russell Bridge is not considered to be a major bridge. It is a two-lane bridge and has weight restrictions. A new bridge, located just southeast of the existing structure, is currently under construction.

3.0 Performance Measures

At the core of the CMP are its performance measures – metrics used to tell how well (or how poorly) the system is performing. Performance measures must be:

- Quantifiable (or at least categorical) – They must be comparable to some standard of acceptability, over time.
- Easily understood – They must be explicable in simplified terms to both technical and non-technical people.
- Practical – They should be developed in a cost-effective manner, relying as much as possible on existing, readily-available data sources. If new data sources are needed, these should be cost-effective as well.
- Effective – They should be effective in identifying congested locations and quantifying the intensity, duration, extent, and variability of congestion.

Referring back to Figure 2, performance measures are the products of evaluation methods. Knowing the desired performance measures that will be most effective for the CMP, evaluation methods are selected that: 1) will produce the desired performance measures; and 2) can be implemented using available data (and sometimes in the absence of actual data, representative or average default values that serve as surrogates for the actual data). Thus, the availability and quality of data is crucial to the development of effective performance measures and selection of associated evaluation methods.

Table 5 presents the four major dimensions of congestion, auto-related performance measures that can be used to quantify and qualify those dimensions, and the ability to incorporate them into the KYOVA/Greater Huntington, WV-KY-OH CMP.

Auto travel is the predominant travel mode in the region. However, the CMP is a multimodal process and efforts to manage congestion should incorporate other modes, particularly bus transit, bicycle and pedestrian modes. Existing operational data for these other modes are limited, but at a minimum, network coverage for fixed route transit service and pedestrian/bike routes and trails is available. As performance measures, the proportion of the CMP network supplemented by fixed-route transit and pedestrian/bike routes or trails can be quantified.

Selection of performance measures to be used in this initial cycle of the CMP was based on the following key factors:

1. Determination of congestion management objectives
2. Evaluation methods needed to produce performance measures that will meet these objectives
3. Availability of existing data to support selected evaluation methods

Table 5. CMP Performance Measures

Congestion Dimension	*Related Performance Measures*	*Suitability for KYOVA/Greater Huntington CMP*
Intensity (The relative severity of congestion)	• Volume-to-Capacity ("V/C") ratio • Level of Service (LOS) • Average travel speed • Average delay time • Travel time index (TTI)	Actual data or suitable defaults exist for the computation of segment-based V/C ratios and LOS. A single regional travel demand model does not exist; the three individual models that cover the region are not suitable for producing comparable estimates of average travel time and average delay time. The accuracy of computed V/C ratios from the individual travel demand models is questionable. A limited amount of travel time data are available and have been obtained, from which travel time indices (TTIs) can be computed. The travel time data are from different sources and, more importantly, do not cover all of the routes in the CMP network.
Duration	• Hours of travel per day at V/C ratio over 1.0 • Hours of travel per day at LOS E or F • Number or share of roadway miles experiencing more than three hours of congestion per day on average	As no peak period regional travel demand model exists currently, there is no tool for accurately estimating the number of hours of travel per day at V/C ratio over 1.0 or at LOS E/F. As recurring congestion is characteristically constrained to the traditional weekday A.M. and P.M. peak *hour* in the region, the three-hour threshold would not be reached on a typical day.
Extent	• Number or share of vehicle miles traveled at LOS E or F • Total delay	Vehicle-miles traveled at LOS E/F can be computed from previous performance measures. Total delay estimates can be computed from travel time data.
Variability/Reliability	• Crash rate • Planning time index (ratio of 95th percentile travel time to free flow travel time) • Buffer time index (ratio of difference between 95th percentile travel time and average travel time, divided by average travel time	Crash rate has been considered as a surrogate for congestion variability and reliability; it can be used as a performance measure for the CMP. Planning time and buffer time indices can be computed from the travel time data.

Based on these, the following performance measures were selected:

Congestion Intensity

- Volume-to-Capacity (V/C) ratio (from travel demand models)
- Level of Service
- Travel Time Index (TTI)

Duration

None selected, as recurring congestion in the region is confined to the traditional weekday A.M. and P.M. peak hours.

Extent

- Number/share of vehicle-miles traveled at LOS E/F
- Total delay

Reliability/Variability

- Crash rate
- Planning Time Index (PTI)

Multimodal

- Transit
  - Fixed-route transit coverage
  - Proportion of CMP network that includes fixed-route transit
- Bicycle/Pedestrian
  - Bicycle/pedestrian routes/facilities
  - Proportion of CMP network that includes bicycle/pedestrian routes/facilities

This initial cycle of the CMP will focus primarily on recurring congestion, given the availability (or lack thereof) of existing data and project resources. Non-recurring congestion is addressed tangentially through crash rate and Planning Time Index performance measures, but these do not address causative factors of non-recurring congestion – incidents, weather, work zones, and special events. ***Several stakeholders to the process have stated that non-recurring congestion is a bigger problem than recurring congestion in this region.*** Future versions of the CMP will need to address non-recurring congestion more sufficiently.

4.0 Data Collection/System Performance Monitoring

Establishing the initial CMP has required the collection and assimilation of a considerable amount of data – data that defines the system itself, in addition to data that describes system performance. Project resources did not permit the collection of new data specifically for use in the CMP; thus, the primary objective of this task was to obtain all of the existing data currently available from the CMP stakeholder partners and use that data to the fullest extent possible within the CMP. It is recognize that some gaps in the data exist. Those are noted in this report and recommendations for enhancements to the CMP will include addressing these gaps.

The following is a description of the primary data types and their sources that were obtained for use in the establishment of the CMP.

4.1 TRAVEL DEMAND MODELS

Three regional travel demand models were obtained to support this initial version of the CMP. The models were used to produce V/C ratios that were used as a screening tool to identify congested roadway segments. All three models were developed in TransCAD®, a GIS-based modeling platform from Caliper® Corporation. A summary of the individual models is shown below:

Travel Demand Model	*CMP Area Counties*	*Model Years*	*Model Periods*	*Owning Agency*
KYOVA	Wayne, Cabell, Lawrence	2010 Base Year 2040 Forecast Year	• AM Peak • Mid-Day • PM Peak • Off-Peak • Daily	KYOVA Interstate Planning Commission
Ashland Area	Boyd, Greenup	2010 Base Year 2040 Forecast Year	• Daily	Kentucky Transportation Cabinet
RIC	Putnam	2010 Base Year 2040 Forecast Year	• AM Peak • Mid-Day • PM Peak • Off-Peak • Daily	Regional Intergovernmental Council

4.2 GIS DATA

Geographic information system (GIS) data of several types were obtained from multiple stakeholders. Roadway network attribute data – facility type, functional classification, number of lanes, posted speed limit, etc. – were obtained from the state transportation agency stakeholders. Reference data in GIS format – jurisdictional boundaries, rivers, National Highway System routes, etc. – were obtained from KYOVA and from state transportation agency stakeholders. Additionally, data on existing bicycle and pedestrian facilities, along with transit routes, were obtained from KYOVA from its recent development of the 2040 Metropolitan Transportation Plan. Some of the crash data (but not all) were available and were obtained in GIS format (see the subsequent discussion on crash data).

4.3 TRAVEL TIME DATA

Travel time data were obtained from several sources. From these data sets, performance measures – average travel speed, travel time index (TTI) and planning time index (PTI) were computed for incorporation into the CMP.

The following travel time data sets were obtained:

- FHWA National Performance Management Research Data Set (NPMRDS). These data recently have been made available to state and local transportation agencies by the Federal Highway Administration. A September 2013 sample was obtained for National Highway System facilities in corresponding counties in West Virginia (Wayne, Cabell and Putnam), Kentucky (Greenup and Boyd), and Ohio (Lawrence). The data set did not include travel time information for non-NHS facilities contained in the CMP network.
- NAVTEQ 2011 data for Boyd and Greenup counties was acquired from the Kentucky Transportation Cabinet. These data were used to compliment the NPMRDS data that were obtained from the study area; in particular, non-NHS CMP network facilities in Greenup and Boyd counties.
- INRIX data were obtained from the Ohio Department of Transportation. These data included:
  - Travel time data for the section of I-64 between Milton (Exit 28) and Hurricane (Exit 34); and
  - Identification of ranked bottleneck locations. These data were used as supplemental data to the NPMRDS and NAVTEQ data sets.
- TomTom Data travel time data were obtained from the Regional Intergovernmental Council. They included travel time indices for I-64 and US 60 in Hurricane and Teays Valley areas.

No single data set provided comprehensive coverage for the CMP network. Even with the combination of travel time data, some gaps in coverage remained. The most glaring exception was the lack of travel time data for US 60 (Midland Trail) in Cabell and Putnam counties; while US 60 is included in the CMP network, this section is not included in the National Highway System. A further discussion of the travel time data and derivation of performance measures is contained in Section 5 of this report.

4.4 TRAFFIC COUNTS

Traffic count data were obtained from the individual state transportation agency stakeholders. These included:

- Average Daily Traffic (ADT) volumes for individual facilities within the CMP network;
- Hourly directional traffic volume data for a limited number of locations (used to quantify traffic peaking and directional distribution characteristics); and
- Vehicle classification data for a limited number of locations (used to determine heavy vehicle percentages within the traffic stream for various facility groups – interstates and freeways, multilane highways, two-lane highways, and urban streets).

Peak hour intersection turning movement volume data were not obtained for this initial cycle of the CMP. Future cycles may include intersection-level analyses that include the need for this type of information, but analyses at this level of detail were not contained within this version.

4.5 VEHICLE CRASH DATA

Vehicle crash data for CMP network facilities were obtained from state transportation agency stakeholder partners. In Ohio and West Virginia, data for the years 2009 through 2011 were obtained. From Kentucky, data for these three years were obtained, plus crash data for the year 2012. The data were analyzed and average crash rates by roadway segment were computed. These results were coded into a GIS format for graphic display.

4.6 INTELLIGENT TRANSPORTATION SYSTEMS DATA

To the extent possible, data collection within the CMP should be coordinated with existing data sources, including Intelligent Transportation Systems (ITS) data[1]. Traffic management centers within the West Virginia, Kentucky and Ohio departments of transportation were contacted to determine the extent to which ITS data could be used to support the CMP. A summary is provided in the following sections:

West Virginia Department of Transportation (WVDOT)

Several permanent Automated Traffic Recorder (ATR) stations are located within the CMP network in West Virginia. Regarding incidents (crashes, disabled vehicles, road debris, etc.), the WVDOT is developing a program to be integrated with the West Virginia State Police that will track all incidents. Information to be obtained will include incident type, time of occurrence, duration and location. The WVDOT also is in the process of developing a program to implement Road Weather Information Systems (RWIS) instrumentation.

Kentucky Transportation Cabinet (KYTC)

There is no ITS architecture in Boyd and Greenup counties at this time. There are several ATR stations located within the CMP network from which directional hourly volumes and classification data can be obtained.

The Kentucky Transportation Cabinet Division of Traffic is in the process of installing bluetooth devices into traffic signal systems across the state. These devices will capture and report travel time information, from which travel speeds can be computed. The signal systems in the Ashland area do not contain this capability yet, but the Cabinet intends to implement this in the Ashland area in the future. No time frame has been identified.

Ohio Department of Transportation (ODOT)

The ODOT does not have any ITS architecture in this region. Only traffic volume and vehicle classification data are available, and the only ATR station is located on US 52 in Scioto County, just across the Lawrence County line.

[1] 23 CFR 450.320 (c) 3

4.7 TRANSIT

Ashland Bus System

The City of Ashland, Kentucky offers fixed route bus service over four routes throughout Ashland and adjoining areas of Catlettsburg, Summit and Kenova, West Virginia. Buses run hourly from the downtown transit center and bus stops are located at all major areas of interest. The Ashland Bus System also offers paratransit services.

Tri-State Transit Authority

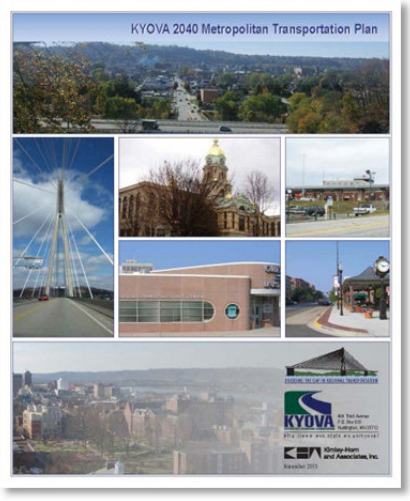
The Tri-State Transit Authority (TTA) provides fixed route bus service in the Greater Huntington area. The service includes connections to Proctorville, Chesapeake and Ironton, Ohio and Ashland, Kentucky. Five of TTA's bus routes provide direct service to and from the Marshall University campus. Additionally, the Pullman Shuttle provides free service to Marshall University, downtown Huntington and Pullman Square. All bus routes serve the TTA Center, located between downtown Huntington and the Marshall University campus. The TTA also offers paratransit services to complement its fixed route service.

Lawrence County Public Transit

Lawrence County Public Transit operates four fixed routes in the area. Two of these four are commuter express routes connecting the transit terminals in Ironton, Ashland and Huntington. The agency also offers paratransit service.

A map of the Ashland Bus System, Lawrence County and TTA coverage is shown in **Figure 6**. Based on route maps provided, the total fixed route mileage for the three systems is approximately 94 miles. Approximately 25 percent of the 100-mile CMP network is covered by fixed route bus service.

4.8 STUDIES/PLANNING DOCUMENTS



Copies of planning documents were obtained to provide supplemental information for the CMP. These documents included:

- KYOVA 2040 Metropolitan Transportation Plan
- Regional Intergovernmental Council (Charleston Are MPO) 2040 Metropolitan Transportation Plan
- Ashland Area 2040 Metropolitan Transportation Plan
- Downtown Huntington Access Study
- KYOVA Coordinated Public Transit Human Services Transportation Plan

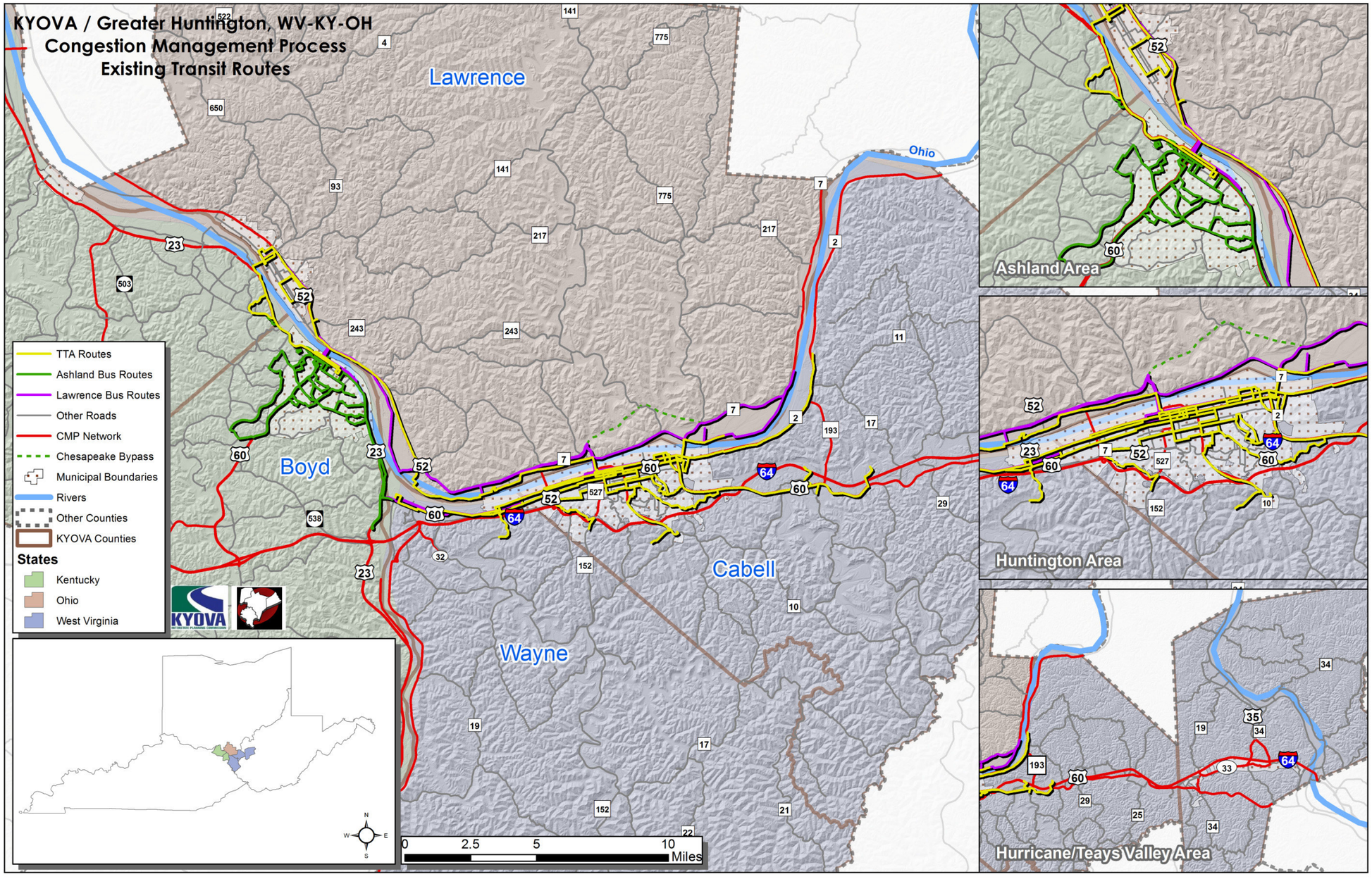


Figure 6. Fixed Route Transit Coverage

5.0 Analysis of Congestion Problems and Needs

This step consists of three components:

1. Identification of congested locations – both those where recurring congestion is observed and those locations where non-recurring congestion has been observed to occur or where it is likely to occur.
2. Quantification of congestion – intensity, extent and duration – for those congested locations identified in the previous task; and
3. Identification of the causes of this congestion and determination of facility and/or system needs to address the congestion.

Several analysis methods and tools were used to identify congested locations and to quantify the congestion. These were:

- Volume-to-capacity (V/C) ratios using the three travel demand models for the area
- Level-of-service analysis using methods prescribed in the Highway Capacity Manual (HCM)
- Analysis of travel time data
- Crash analysis
- Stakeholder input

5.1 VOLUME-TO-CAPACITY (V/C) RATIOS USING TRAVEL DEMAND MODELS

Traffic assignments from the three travel demand models and corresponding roadway segment (i.e. link) capacities were used to compute V/C ratios. Roadway segments considered to be congested or likely to be congested if:

- The V/C ratio was between 0.9 (90% of capacity) and 1.1 (110% of capacity) – these were considered to be near or at capacity; and
- The V/C ratio was greater than 1.1 (110% of capacity) – these were considered to be over capacity.

This step was used as an initial screening step. Volume-to-capacity ratios were computed for the following scenarios:

- Weekday A.M. peak period
- Weekday P.M. peak period
- Weekday 24-hour period

As the Ashland Area travel demand model only produces 24-hour assignments, no V/C computations were available for A.M. and P.M. peak periods. The travel demand models were used to compute V/C ratios for the existing or base year.

V/C ratios were computed using direct model assignments and capacities. It should be noted that link capacities are established differently in the various travel models. Due to limited project resources, no effort was made to revisit this issue in the models and establish a consistent method for determining capacity that could be applied across all three models.

V/C ratios for the A.M. and P.M. peak periods are shown in **Figures 7** and **8**, respectively. As stated previously, the Ashland Area travel demand model is a 24-hour model only, so no peak hour V/C ratios are provided. **Figure 9** presents V/C ratios based on 24-hour traffic assignments from all three models.

The V/C analyses flagged the following locations as potentially congested, according to the model output:

- Hal Greer Boulevard (WV 10) from Washington Boulevard to 3rd Avenue in Huntington
- US 60 from Interstate 64 to US 23 in Ashland
- US 23 from KY 5 in Ashland to US 60 in Catlettsburg

Because there are three separate travel demand models that cover the Greater Huntington area and because of the inconsistencies in how these models compute roadway capacity (and the resulting V/C ratios), it was decided that the V/C results would be used for informational purposes only during this initial cycle of the CMP. Section 9 of this document provides recommendations for enhancing travel demand model functionality to be applied in future cycles.

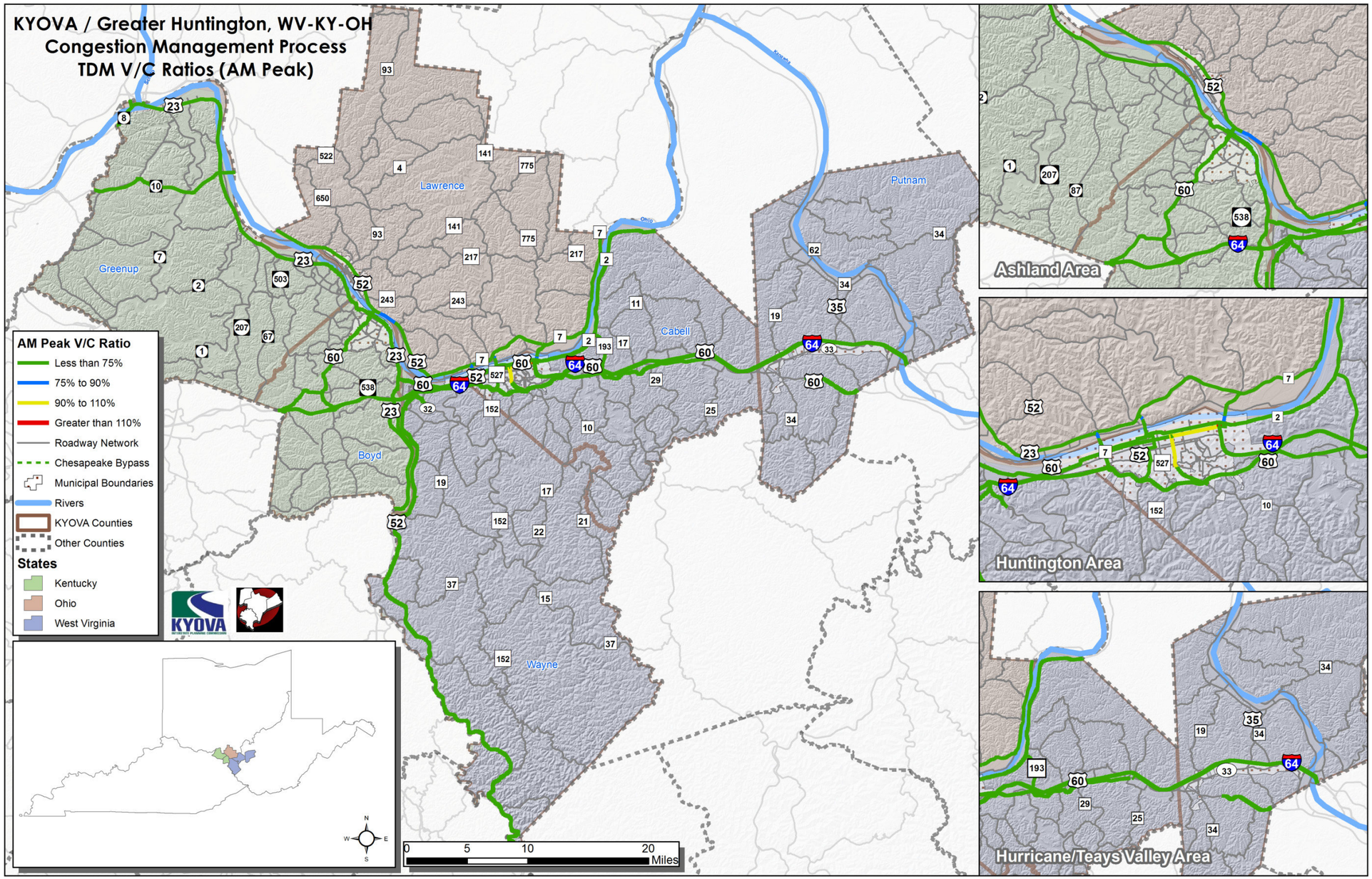


Figure 7. V/C Ratios from Existing AM Peak Traffic Model Assignments

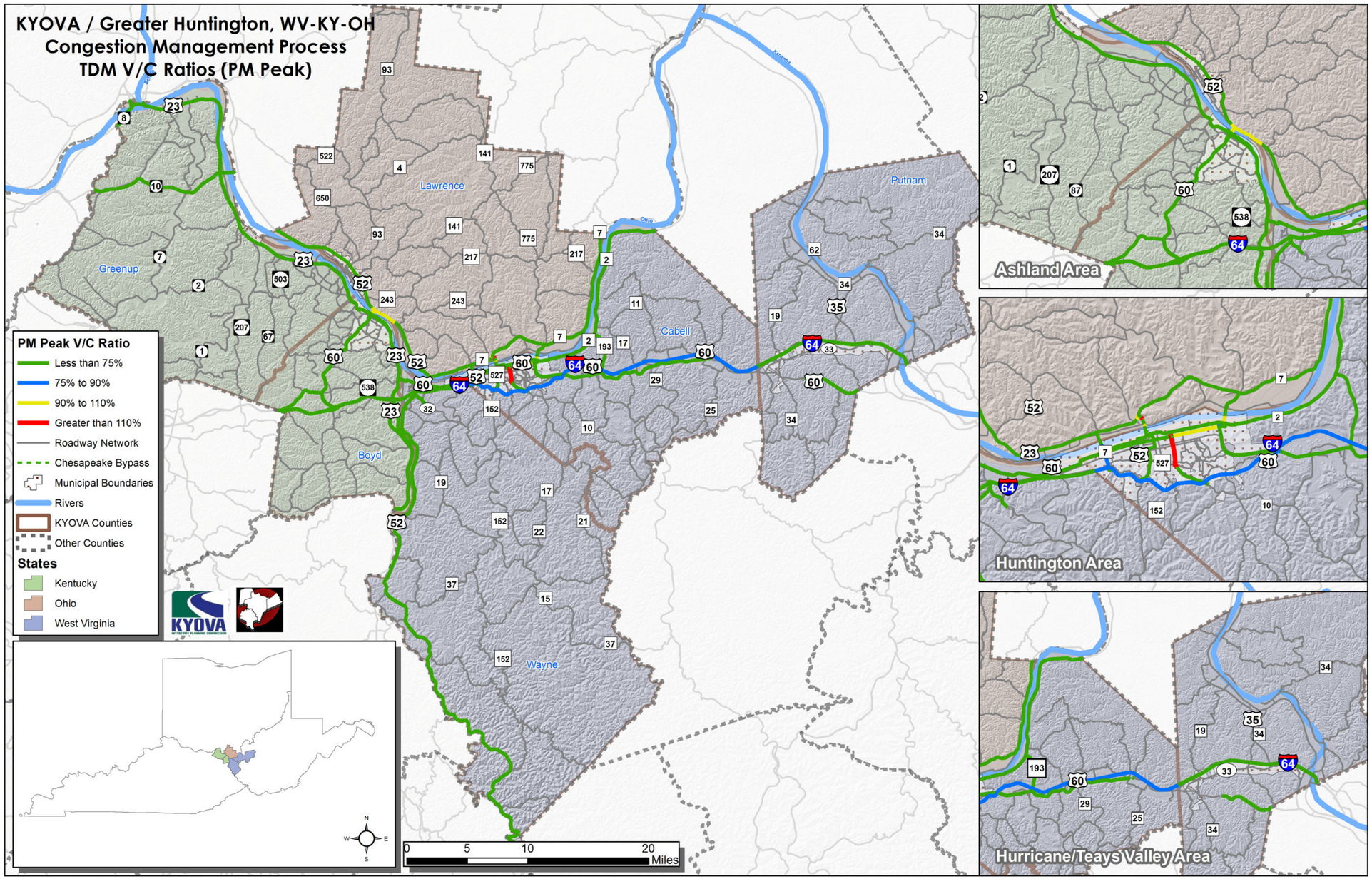


Figure 8. V/C Ratios from Existing PM Peak Traffic Model Assignments

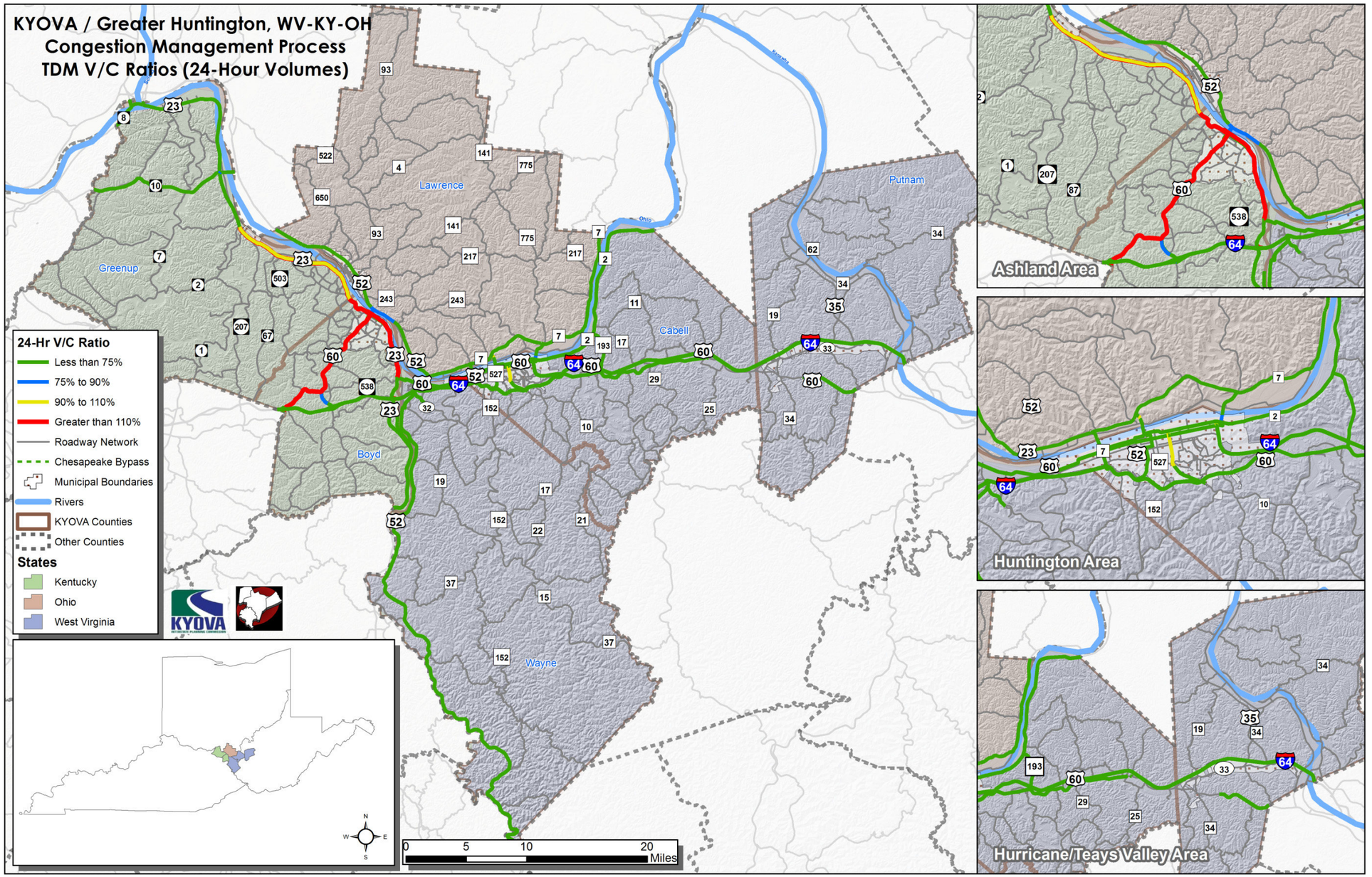


Figure 9. V/C Ratios from Existing Average Daily Traffic Model Assignments

5.2 LEVEL-OF-SERVICE (LOS) ANALYSES

Levels of service were computed for roadway sections using methods prescribed in the 2010 Highway Capacity Manual (HCM). Level of service (LOS) is used to translate complex numerical computations into a simple A-F system that is representative of the travelers' perception of the quality of service provided by various facilities or services within the transportation system. Using the A-F scale, LOS A represents the best operating conditions from a traveler perspective and LOS F represents the worst. Undesirable traffic congestion generally occurs at LOS E and F.

Planning applications of the HCM are appropriate and typical when directed toward broad issues such as problem identification, long-range analysis and performance monitoring. For the CMP, service volume tables were constructed for individual facilities or facility groups. Service volume tables are a frequently-used planning application of the HCM; using computational methods for the different facility types, average daily traffic volume lookup tables are constructed which provide an estimate of the peak period LOS as a function of the daily traffic volume. Representative default input values derived from the analysis of peak period traffic count data are used in the construction of the service volume tables based on the following HCM methods 1) Basic Freeway Segments (i.e. Interstate 64); 2) Multilane Highways; 3) Two-Lane Highways; and 4) Urban Streets.

An area-wide map showing predicted base year (i.e. existing) peak period levels of service for individual roadway segments is shown in **Figure 10**. Projected future year 2040 levels of service are shown in **Figure 11**. The year 2040 levels of service are based on projected average daily traffic volumes obtained from the three regional travel demand models. The LOS analysis indicates that the following roadway sections are congested during peak periods:

- 3rd Avenue from Hal Greer Boulevard to 31st Street in Huntington
- 31st Street Bridge
- WV 34 from CR 33 to US 35 in Hurricane

Additional sections anticipated to become congested by 2040 include:

- WV 527 (5th Street) from I-64 to North Boulevard
- 6th Street Bridge (WV 527) in Huntington
- US 60/12th Street Bridge/13th Street Bridge in Ashland to US 52
- WV 34/CR 33 (Teays Valley Road) in Hurricane
- US 60 (Midland Trail) through the I-64 interchange
- I-64 east of Hurricane Creek Road (Exit 34)

The LOS results and GIS network data were used to compute the number of CMP network miles and the share of the total network at LOS E/F. It is estimated that currently about 1.4 CMP network miles (roughly 1 percent) operate at LOS E or F during peak periods. In 2040, it is estimated that approximately 9.5 CMP network miles (about 6.6 percent) will operate at LOS E or F during peak periods. The LOS analysis supports the general belief that recurring congestion in the region is less of a problem than non-recurring congestion.

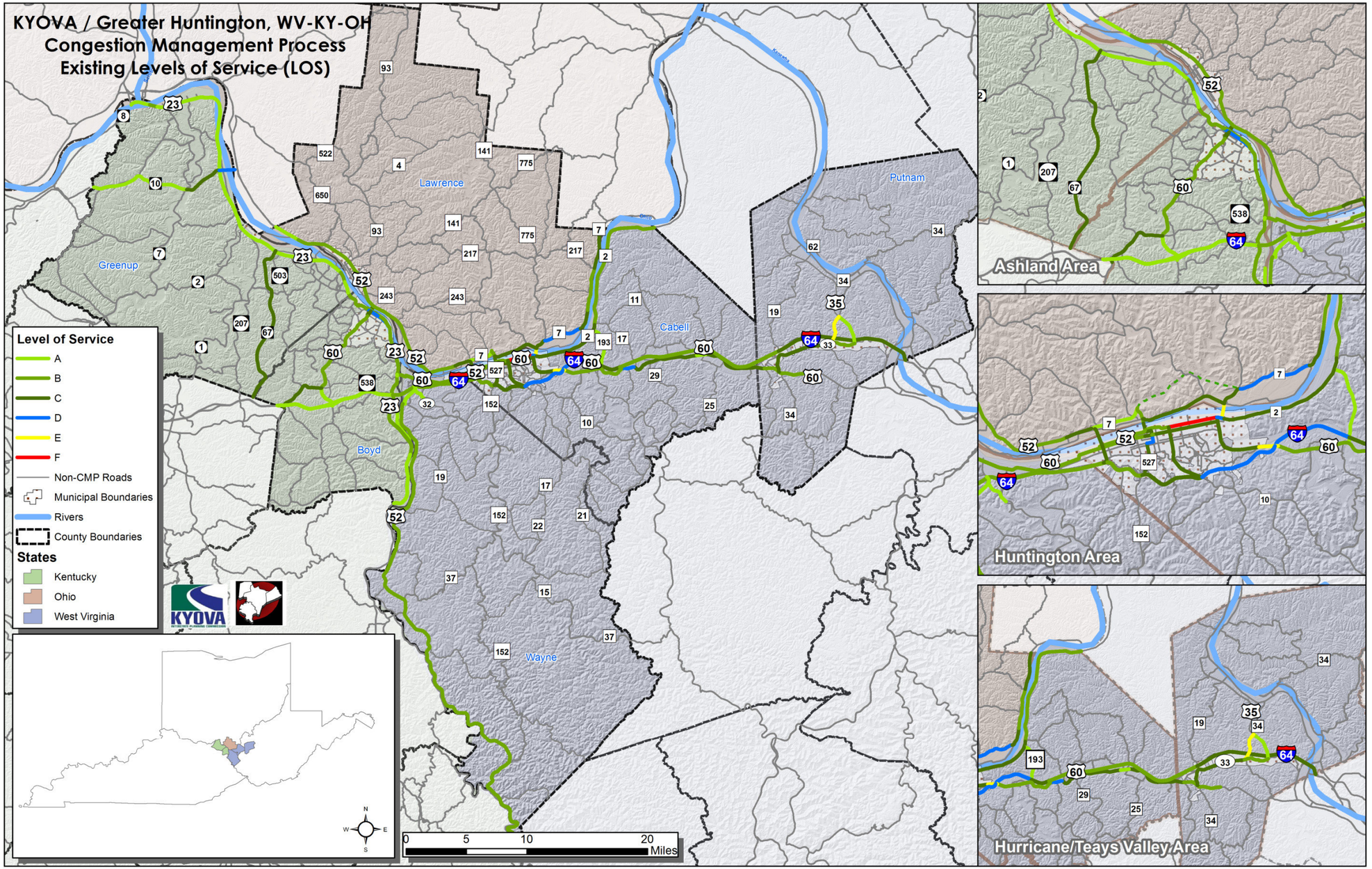


Figure 10. Existing Levels of Service

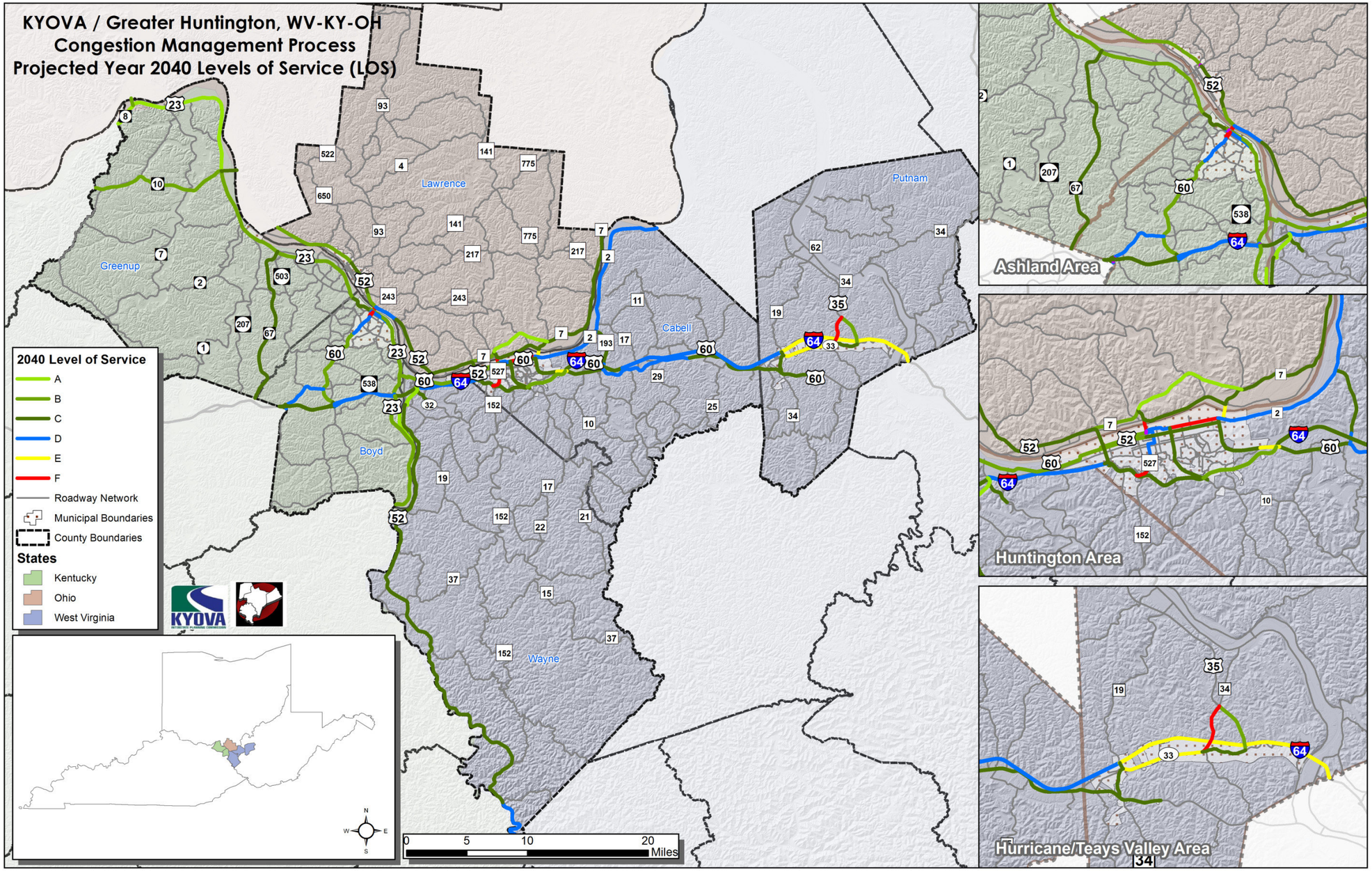


Figure 11. Projected Year 2040 Levels of Service

5.3 TRAVEL TIME ANALYSES

Non-recurring congestion is as much of a problem in the region as recurring congestion, if not more so.

The travel time data were analyzed to compute the Travel Time Index (TTI) and Planning Time Index (PTI) for each roadway segment, where:

- TTI is computed as the ratio of the peak period travel time for a roadway segment to the non-peak travel time for the same segment.
- PTI is computed as the ratio of the 95th percentile travel time to free flow travel time

Within the CMP, the TTI is used as a performance measure to quantify the intensity of congestion. A TTI of 1.2, for example, indicates that the trip along the segment in question takes 0.2 times or 20 percent longer than the same trip during non-peak conditions. The PTI is used as an indicator of travel time reliability. For example, a PTI of 1.9 means that there is a 95 percent probability (i.e. one day in 20) that the peak period travel time on the subject link will take 90 percent longer or less than the non-peak travel time.

From the NPMRDS data, average or mean travel times were computed for the following periods:

- Weekday A.M. peak period (from 7:00 A.M. to 9:00 A.M.)
- Weekday P.M. peak period (from 5:00 P.M. to 7:00 P.M.)
- Weekday Off-Peak period (9:00 A.M. to 10:30 A.M.; 1:30 P.M. to 3:00 P.M.; and 10:00 P.M. to 2:00 A.M.)

For each period, the average or mean travel time was computed and these were used in the computation of TTI and PTI values.

For the 2011 NAVTEQ data obtained from the KYTC for non-NHS routes in Kentucky, TTIs and PTIs were computed already. The reference (i.e. non-congested speed) was computed by the KYTC as the 60th-percentile speed (instead of the average speed). While this method produces slightly different TTI/PTI values than those using average speeds, for the purpose of the initial cycle of this CMP, the difference was considered to be insignificant and those values were deemed acceptable for the purpose of identifying and quantifying congested roadway segments.

Segment-based TTI's for weekday A.M. and P.M. peak periods are shown in **Figures 12** and **13**, respectively. Segment-based PTI's for weekday A.M. and P.M. peak periods are shown in **Figures 14** and **15**, respectively.

From the travel time data, total delay due to congestion for individual roadway segments and for the CMP network as a whole were computed. Based on the two-month sample, congestion resulted in approximately 2.8 total hours of vehicular delay for the average weekday A.M. peak. For the P.M. peak, there was no discernable overall increase in travel time and resulting delay due to congestion. Likely the A.M. peak period is more condensed than the P.M. peak, for which the delay due to congestion is therefore more noticeable.

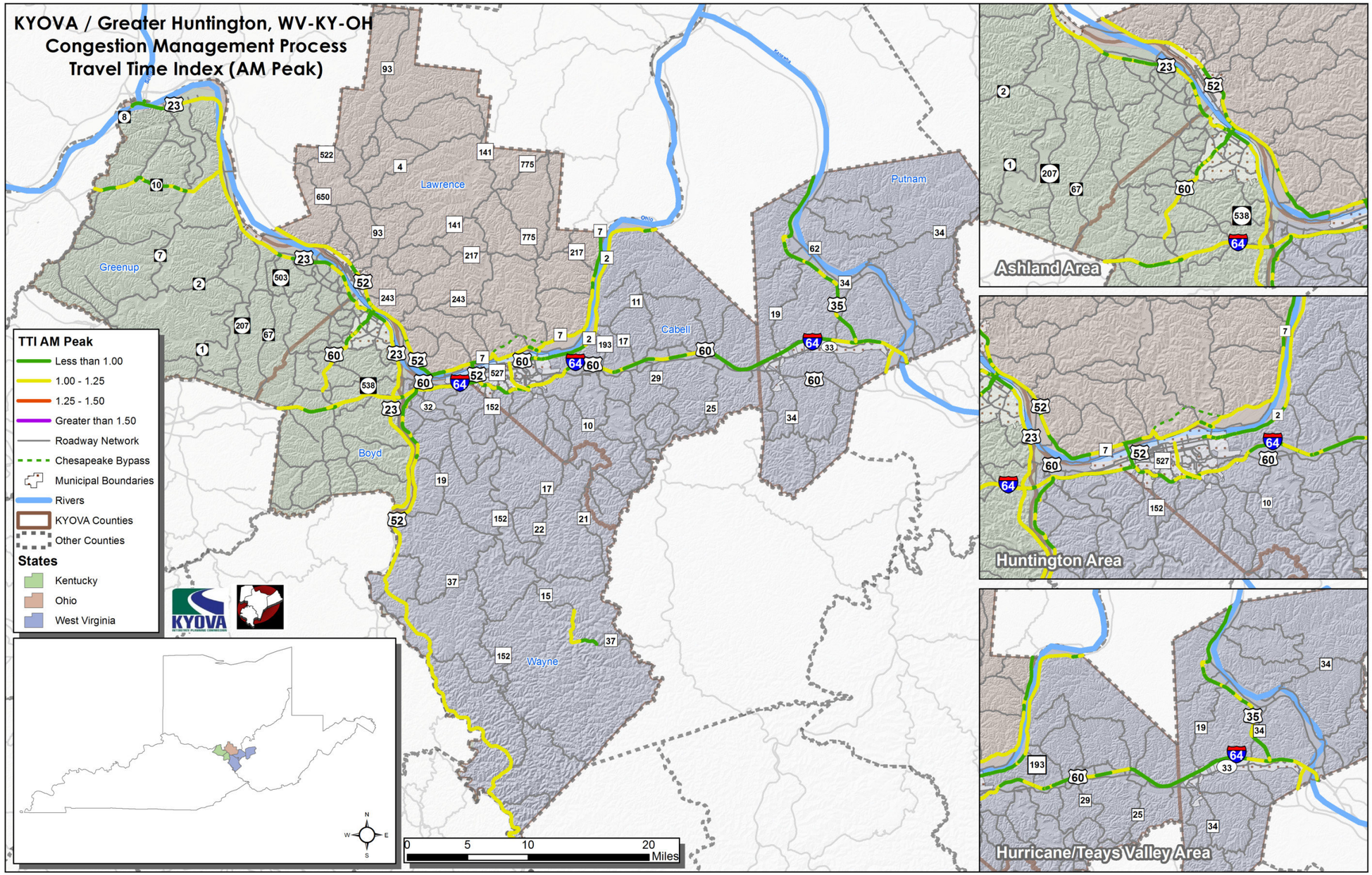


Figure 12. Travel Time Indices (TTI) - A.M. Peak

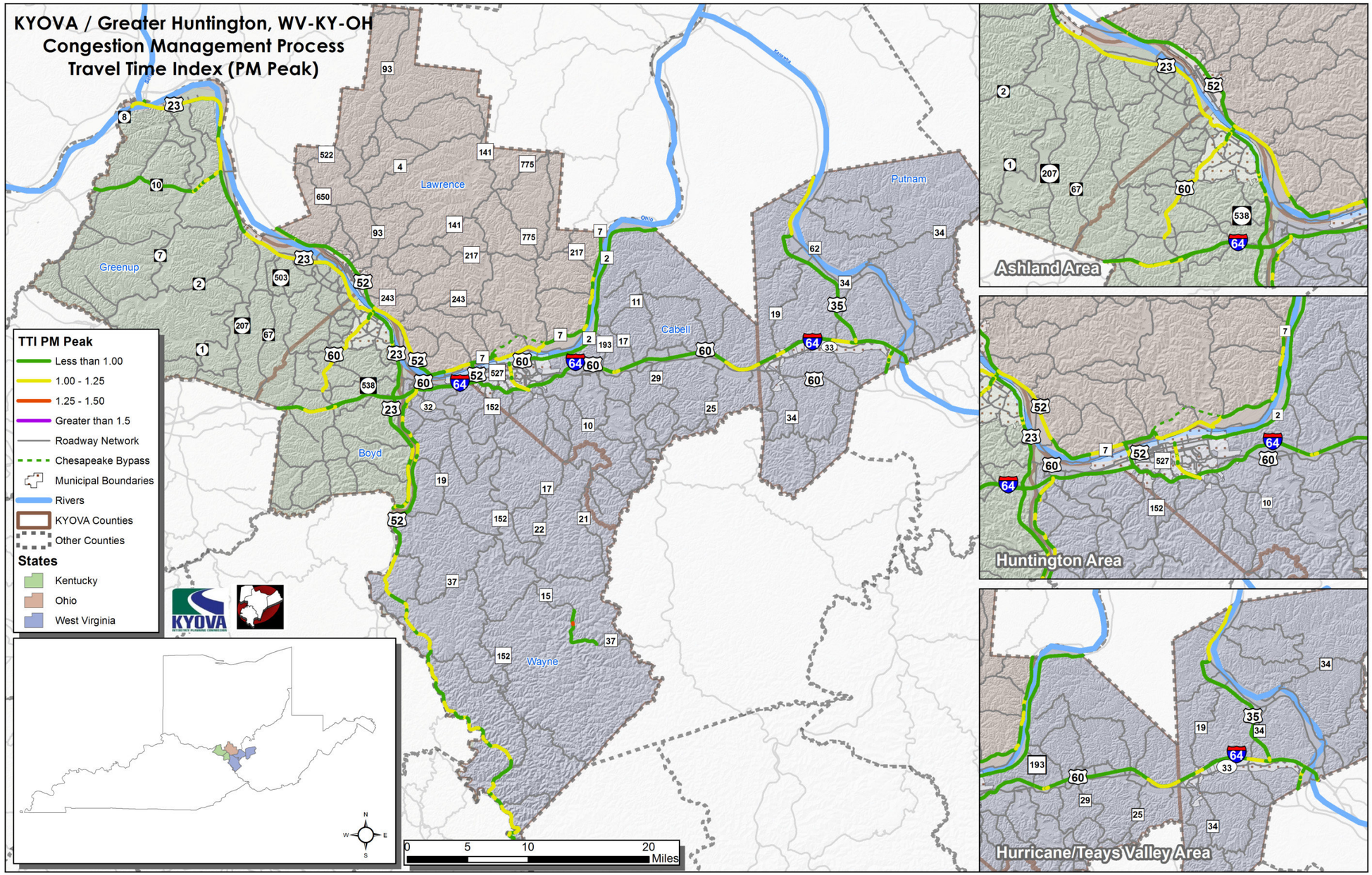


Figure 13. Travel Time Indices (TTI) - P.M. Peak

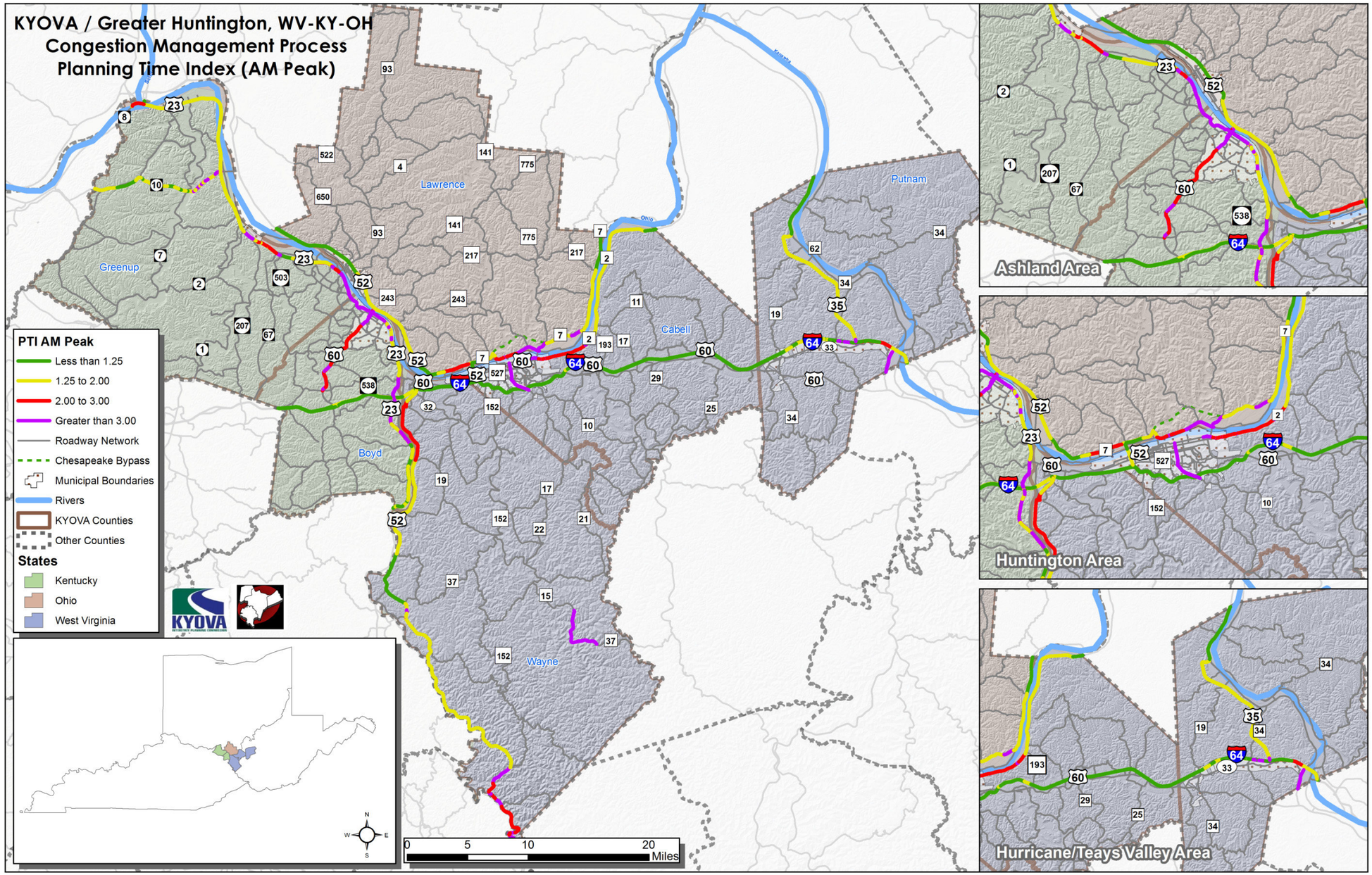


Figure 14. Planning Time Indices (PTI) - AM Peak

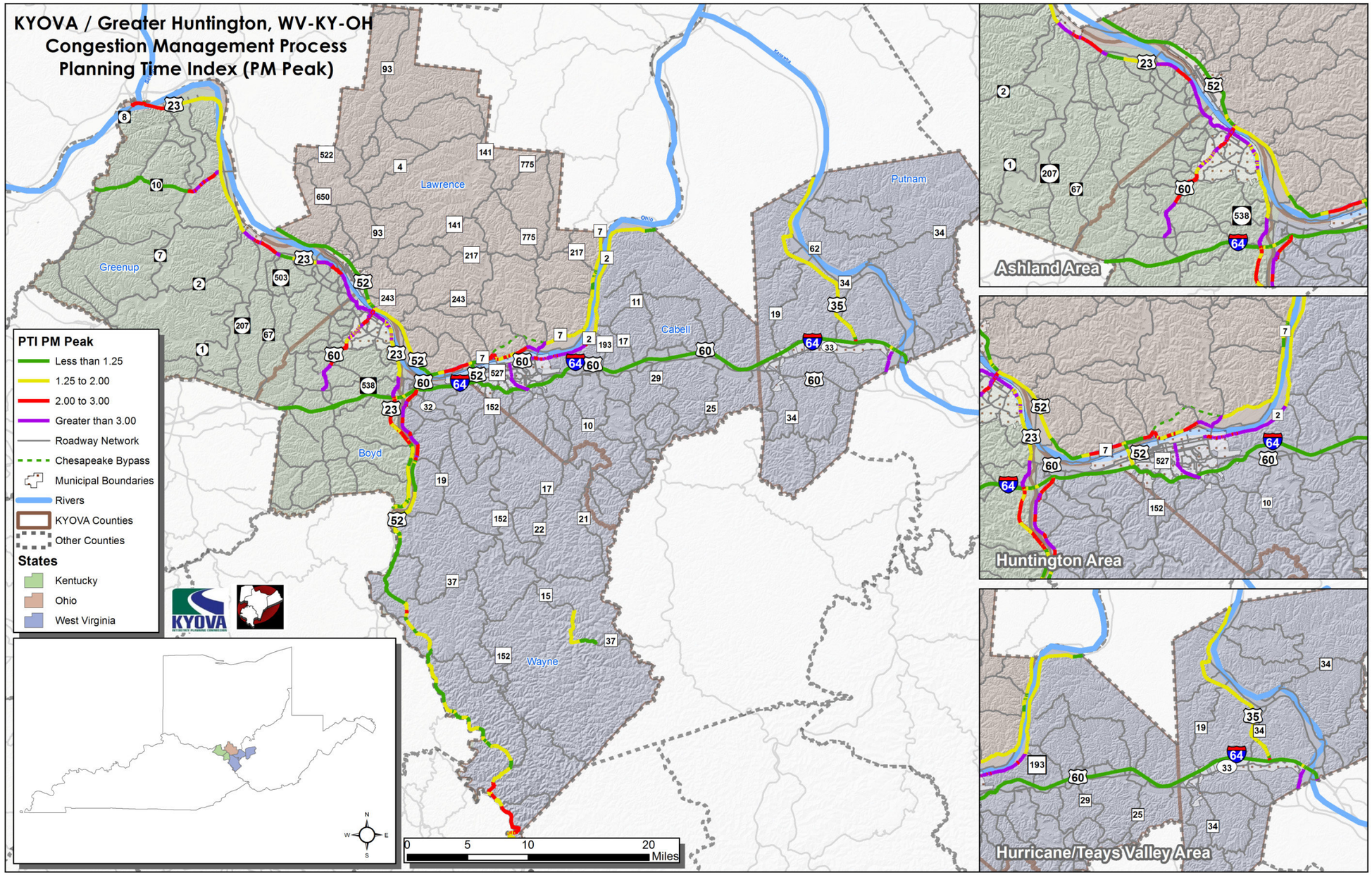


Figure 15. Planning Time Indices (PTI) - PM Peak

5.4 CRASH ANALYSES

5.4.1 Summary of Crash Data Available

Using the crash data tables provided by KYOVA, crash rates were calculated for the arterials, collectors and interstates. The range of data was 2009-2011 for Ohio and West Virginia, and 2009-2012 for Kentucky. The data included several attributes such as severity, crash type, injuries and fatalities, but the scope of this task was to quantify the crashes. Locating the crashes based on report data alone was a difficult task due to inconsistent and incomplete descriptions. However, a GIS layer was available in Kentucky and Ohio which helped to count the crashes graphically. There was no GIS information provided for the West Virginia crashes. As a result, the crash locations were confirmed using Google Maps and straight line diagrams obtained from the West Virginia Division of Highways. Any crashes found to be outside of the network or along a different route were not used.

5.4.2 Average Daily Traffic (ADT) Data

Average daily traffic (ADT) information was provided by KYOVA. Using this information, the crash rates were calculated for each segment. When more than one ADT was provided for a segment, the ADTs were averaged. It should be noted that the traffic counts were performed over the span of a few years and there was a large degree of variance within the count data. Averaging the data provided stronger data points to use for calculation.

5.4.3 Determination of Roadway Segments

In Ohio and Kentucky, each route was divided into segments and the number of crashes within that segment was quantified using the GIS points provided. Using the ADT information, the crash rates were calculated for each segment. Segments in Ohio and Kentucky were established based on crash cluster locations and natural roadway "breaks" such as classification changes, etc. In the absence of natural breaks, segments were defined based on major intersections.

For West Virginia, each route was divided up into segments based on significant intersection locations. Interstate 64 was segmented by interchange locations. Care was taken to ensure that the segments were not too short in length, which could lead to an artificially high crash rate.

5.4.4 Roadway Classifications and Statewide Averages

Roadway classifications were provided by KYOVA via GIS. However, adjustments were made in West Virginia roads to match their classifications, for the sake of comparison. Statewide averages for the various classifications were obtained from the state DOTs. For Kentucky, the statewide averages were reported for the period 2007-2011. For Ohio, the reporting period was 2010-2012; for West Virginia, 2003.

Calculation of crash rates for roadway sections is summarized in **Table 6**. The calculated rates are compared to statewide average rates for similar roadway types and the results are shown in the "% of Average" column at the right of the table. Those sections with crash rates up to 120 percent of the statewide average are highlighted in yellow; those sections with crash rates more than 120 percent of the statewide average are highlighted in red. A map of the computed crash rate in comparison to the statewide average for individual roadway segments is shown in **Figure 16.** Those segments colored yellow (110 percent to 150 percent of the statewide average for similar roads), red (150 percent to 200 percent of the statewide average for similar roads) or purple (more than 200 percent of the statewide average) should be considered as candidates for safety improvements that also could help reduce resulting non-recurring congestion.

5.4.5 High-Crash Intersections

A listing of the intersections in the network with the highest number of crashes is shown in **Table 7**. Intersection crash rates were not calculated due to the absence of intersection-level ADT data, but the table still provides a snapshot of potentially problematic locations that could result in non-recurring congestion. Several of these locations also were identified in the stakeholder workshops.

Table 6. Crash Rates by Roadway Section

Greenup County, KY

Segment ID	Route	From	To	Length (mi.)	Crashes	Ave. ADT (2010-12)	Crash Rate*	Roadway Classification	Statewide Average*	% of Average
10	SR 10	County Line	County Line	12.5	27	2,951	50	Rural Principal Arterial - 2 lane	203	25%
20	SR 8	County Line	County Line	3.2	22	6,158	76	Rural Principal Arterial - 2 lane	203	38%
30	US 23	SR 8	SR 10	13.4	115	9,493	62	Rural Principal Arterial	196	32%
40	US 23	SR 10	SR 67	8.8	149	15,027	77	Rural Principal Arterial	196	39%
50	US 23	SR 67	County Line	8.0	463	19,093	208	Rural Principal Arterial	196	106%
60	SR 67	US 23	County Line	14.0	53	5,192	50	Rural Minor Arterial - 2 lane	203	25%

Boyd County, KY

Segment ID	Route	From	To	Length (mi.)	Crashes	Ave. ADT (2010-12)	Crash Rate*	Roadway Classification	Statewide Average*	% of Average
70	US60	County Line	SR 180	4.1	132	18,771	117	Urban Principal Arterial - 2 lane	451	26%
80	US60	SR 180	SR 538	2.6	356	18,771	500	Urban Principal Arterial - 4 lane	451	111%
90	US60	SR 538	Bi-Directional Split	5.3	571	14,935	494	Urban Principal Arterial	451	110%
100	US60	Bi-Directional Split	County Line	1.0	195	14,935	894	Urban Principal Arterial - CBD	451	198%
110	SR 180	I-64	US60	1.8	59	8,790	255	Urban Principal Arterial	451	57%
120	US 23	County Line	US 23B	2.0	466	31,719	503	Urban Principal Arterial	451	112%
130	US 23 - Business	US 23	US 23	1.9	416	16,213	925	Urban Principal Arterial	451	205%
140	US 23	US 23B	I-64	8.5	278	16,504	136	Urban Principal Arterial	451	30%
150	US 23	I-64	County Line	10.8	104	10,968	60	Urban Principal Arterial	451	13%
160	I-64	County Line	County Line	10.7	201	19,436	66	Rural Interstate	51	130%
170	SR 752 - Durbin Rd.	US23	SR 1937 - Bear Creek Rd.	----- No Data Available -----						

Lawrence County, OH

Segment ID	Route	From	To	Length (mi.)	Crashes	Ave. ADT (2010-12)	Crash Rate*	Roadway Classification	Statewide Average*	% of Average
180	US52	County Line	Bend West of Burlington	18.9	148	19,476	0.37	Urban Freeway	0.92	40%
190	US52	Bend West of Burlington	County Line (Bridge)	3.5	43	22,881	0.49	Urban Freeway	0.92	53%
200	SR 7	US52	SR 106 / 107 (W. Junction)	6.3	22	12,828	0.25	Urban Freeway	0.92	27%
210	SR 7	SR 107 (E. Junction)	County Line	8.6	75	4,393	1.81	Urban / Rural Principal Arterial	1.45	125%

West Virginia Counties

Segment ID	Route	From	To	Length (mi.)	Crashes	Ave. ADT (2010-12)	Crash Rate*	Roadway Classification	Statewide Average*	% of Average
220	WV 2	0 (WV 2 and 31st Street I/S)	2	2.0	87	8,303	478	US and WV Route (Non-Expressway) Municipal	543	88%
230	WV 2	2	4	2.0	19	10,114	86	US and WV Route (Non-Expressway) Non-Municipal	225	38%
240	WV 2	4	6	2.0	11	10,114	50	US and WV Route (Non-Expressway) Non-Municipal	225	22%
250	WV 2	6	8	2.0	14	10,090	64	US and WV Route (Non-Expressway) Non-Municipal	225	28%
260	WV 2	8	10	2.0	31	10,090	141	US and WV Route (Non-Expressway) Non-Municipal	225	63%
270	WV 2	10	12	2.0	4	10,090	18	US and WV Route (Non-Expressway) Non-Municipal	225	8%
280	WV 2	12	15.5	3.5	12	10,090	31	US and WV Route (Non-Expressway) Non-Municipal	225	14%
290	WV 2	15.5	17	1.5	0	10,090	0	US and WV Route (Non-Expressway) Non-Municipal	225	0%
300	WV 2	17	18 (Mason Co Line)	1.0	4	10,090	37	US and WV Route (Non-Expressway) Non-Municipal	225	16%

Table 6 (cont.)

Segment ID	Route	From	To	Length (mi.)	Crashes	Ave. ADT (2010-12)	Crash Rate*	Roadway Classification	Statewide Average*	% of Average
310	WV 10	3rd Street	I-64	3.0	320	14,710	662	US and WV Route (Non-Expressway) Municipal	543	122%
Segment ID	**Route**	**From**	**To**	**Length (mi.)**	**Crashes**	**Ave. ADT (2010-12)**	**Crash Rate***	**Roadway Classification**	**Statewide Average***	**% of Average**
320	CR 32	WV 75	Huntington Tri-State Airport	1.0	1	3,273	28	County Route	380	7%
Segment ID	**Route**	**From**	**To**	**Length (mi.)**	**Crashes**	**Ave. ADT (2010-12)**	**Crash Rate***	**Roadway Classification**	**Statewide Average***	**% of Average**
330	US 52	0.25	4.67	3.9	31	6,289	115	US and WV Route (Non-Expressway) Municipal	543	21%
340	US 52	4.68	14.52	9.8	23	5,109	42	US and WV Route (Non-Expressway) Non-Municipal	225	19%
350	US 52	14.53	24.31	9.8	35	5,301	62	US and WV Route (Non-Expressway) Non-Municipal	225	27%
360	US 52	24.32	36.40	12.1	56	5,493	77	US and WV Route (Non-Expressway) Non-Municipal	225	34%
370	US 52	36.41	49.07	12.7	34	4,079	60	US and WV Route (Non-Expressway) Non-Municipal	225	27%
380	US 52	49.08	54.22	5.1	21	4,400	85	US and WV Route (Non-Expressway) Non-Municipal	225	38%
Segment ID	**Route**	**From**	**To**	**Length (mi.)**	**Crashes**	**Ave. ADT (2010-12)**	**Crash Rate***	**Roadway Classification**	**Statewide Average***	**% of Average**
390	WV 193	WV 2	I-64	3.6	8	7,520	27	US and WV Route (Non-Expressway) Non-Municipal	225	12%
Segment ID	**Route**	**From**	**To**	**Length (mi.)**	**Crashes**	**Ave. ADT (2010-12)**	**Crash Rate***	**Roadway Classification**	**Statewide Average***	**% of Average**
400	WV 527	3rd Avenue	I-64	2.8	527	13,838	1242	US and WV Route (Non-Expressway) Municipal	543	229%
Segment ID	**Route**	**From**	**To**	**Length (mi.)**	**Crashes**	**Ave. ADT (2010-12)**	**Crash Rate***	**Roadway Classification**	**Statewide Average***	**% of Average**
410	US 60	23rd Street and Chestnut Inters	Camden Avenue	5.4	111	3,875	485	US and WV Route (Non-Expressway) Municipal	543	89%
420	US 60	Camden Road	1st Street	2.9	250	10,298	764	US and WV Route (Non-Expressway) Municipal	543	141%
430	US 60	1st Street	15th Street	1.6	262	12,593	1188	US and WV Route (Non-Expressway) Municipal	543	219%
440	US 60	1st Street	31st Street	3.5	561	12,798	1144	US and WV Route (Non-Expressway) Municipal	543	211%
450	US 60	1st Street	31st Street	3.6	311	12,593	627	US and WV Route (Non-Expressway) Municipal	543	115%
455	US 60	3rd Avenue	WV 193	6.5	949	20,391	654	US and WV Route (Non-Expressway) Municipal	543	120%
460	US 60	WV 193	Teays Vally	10.8	339	20,391	141	US and WV Route (Non-Expressway) Non-Municipal	225	62%
Segment ID	**Route**	**From**	**To**	**Length (mi.)**	**Crashes**	**Ave. ADT (2010-12)**	**Crash Rate***	**Roadway Classification**	**Statewide Average***	**% of Average**
470	I-64	KY SL	Exit 6	6.0	147	27,500	81	Interstate	135	60%
480	I-64	Exit 6	Exit 20	14.0	601	37,028	106	Interstate	135	78%
490	I-64	Exit 20	MP 31 (Cabell/Putnum CL)	11.0	213	33,500	53	Interstate	135	39%

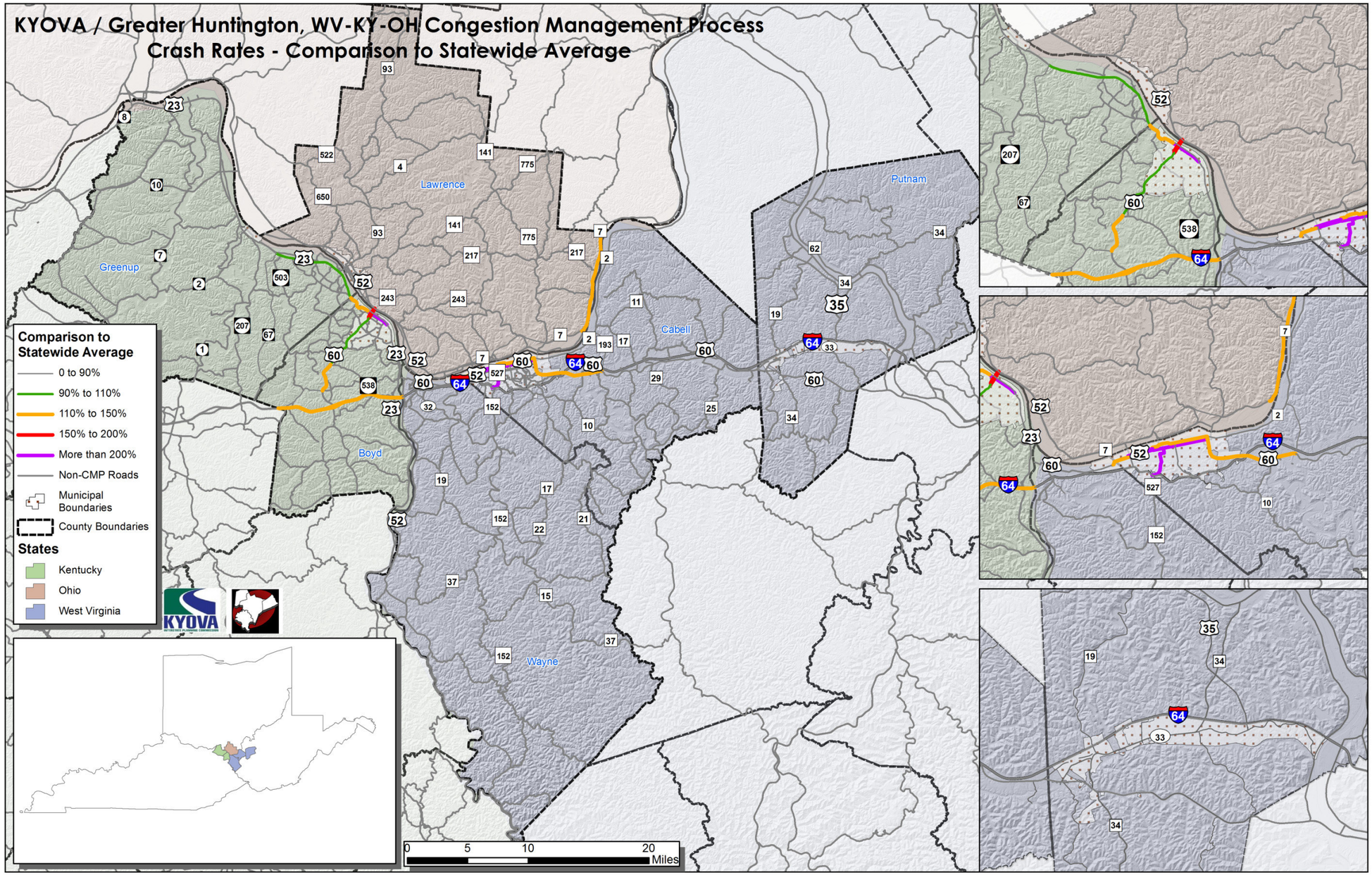


Figure 16. Computed Crash Rates in Comparison to Statewide Average Crash Rates for Similar Roadways

Table 7. Intersection Crashes

County	*Segment*	*Route*	*Intersection*	*Avg. Yearly Crashes**
Boyd, KY	130	US23B	US 60 NB (13th Street)	38
Boyd, KY	120	US 23	Ashland Center Mall	27
Cabell, WV	460	US 60 (5th Ave)	31st Street	22
Greenup, KY	50	US 23	KY 693 (Diederich Blvd.)	21
Boyd, KY	130	US23B	US 60 SB (12th Street)	16
Cabell, WV	310/440	US 60 (5th Ave)	Hal Greer (CR 10)	14
Boyd, KY	90	US 60	SR 168 (Blackburn Ave.)	13
Boyd, KY	120	US 23	US 23B (Northwest I/S)	13
Cabell, WV	420	Adams Avenue	W 19th Street	13
Boyd, KY	90	US 60	KY 716 (E. Little Garner Rd.)	12
Boyd, KY	140	US 23	I-64 Interchange	11
Cabell, WV	460	31st Street	4th Avenue	10
Boyd, KY	90	US 60	Oakview Rd.	10
Boyd, KY	90	US 60	KY 766	9
Boyd, KY	120	US 23	River Hill Rd.	9
Boyd, KY	70	US 60	KY 180	8
Boyd, KY	80	US 60	KY 538	8
Boyd, KY	140	US 23	CS-1007	8
Boyd, KY	120	US 23	KY 168 (Hoods Creek Pike)	8
Boyd, KY	90	US 60	Ramey St.	7
Boyd, KY	140	US 23	CS-1027 (Chestnut Street)	7
Boyd, KY	100	US 60 SB	Central Ave.	6
Greenup, KY	50	US 23	CR 1725 (Ashland Dr.)	6
Greenup, KY	30	US 23	KY 10	5
Boyd, KY	100	US 60 NB	Central Ave.	4
Boyd, KY	130	US23B	US 23 (Southwest I/S)	4
Greenup, KY	30	US 23	KY 8	3
Greenup, KY	30	US 23		3
Greenup, KY	50	US 23	KY 67	2
Cabell, WV	390	WV 2	CR 193	

** Ohio & West Virginia crash period = 2009-2011; Kentucky crash period = 2009-2012*

5.5 STAKEHOLDER IDENTIFICATION OF CONGESTED LOCATIONS

The evaluation methods discussed previously are tools for identifying and quantifying potentially congested roadway segments. While these systematic tools are valuable, it is recognized that stakeholder input is equally valuable for 1) confirming potentially congested locations identified using the tools are indeed congested; and 2) identifying additional locations of congestion – both recurring and non-recurring – that may not be identified using these tools.

Two stakeholder workshops were held on March 26, 2014. The first workshop was held in Hurricane with representatives from Putnam County, the Regional Intergovernmental Council (RIC), KYOVA and the West Virginia Department of Transportation Division of Highways. The objective was to identify congested locations for the Putnam County portion of the CMP network.

Stakeholder input is an integral part of the Congestion Management Process.

The second workshop was also held on March 26, 2014 at the KYOVA offices. The objective of the second workshop was to identify congested locations for the remainder of the CMP network – Greenup and Boyd counties in Kentucky, Lawrence County in Ohio, and Wayne and Cabell counties in West Virginia. A list of participants in the two workshops in presented in the Appendix.

In the workshops, breakout groups were created and the groups were asked to identify and mark on a map those locations where they deemed congestion to be problematic. Participants were asked to determine whether the congestion occurred regularly (i.e. recurring) or whether it occurred irregularly (i.e. non-recurring), typically as a result of an incident, weather, construction, a special event, etc.). They also were asked for input on potential causative factors and suggested solutions.

At the KYOVA workshop in Huntington, a comprehensive list of congested locations was compiled. Using an automated polling system, participants were asked to rank each of the congested locations from '1' (Most Important) to '5' (Least Important) as a means of prioritizing those locations and recommended improvements. A map of congested locations from the two workshops is shown in **Figure 17**. Prioritization of the congested locations is shown in **Table 8**. The locations are prioritized according to state, as congestion mitigation will be the responsibility of individual states. Priorities are reflected in the "Average Score" column of Table 8; the closer the number is to 1, the higher the priority of the location, according to the stakeholders who participated in the workshop.

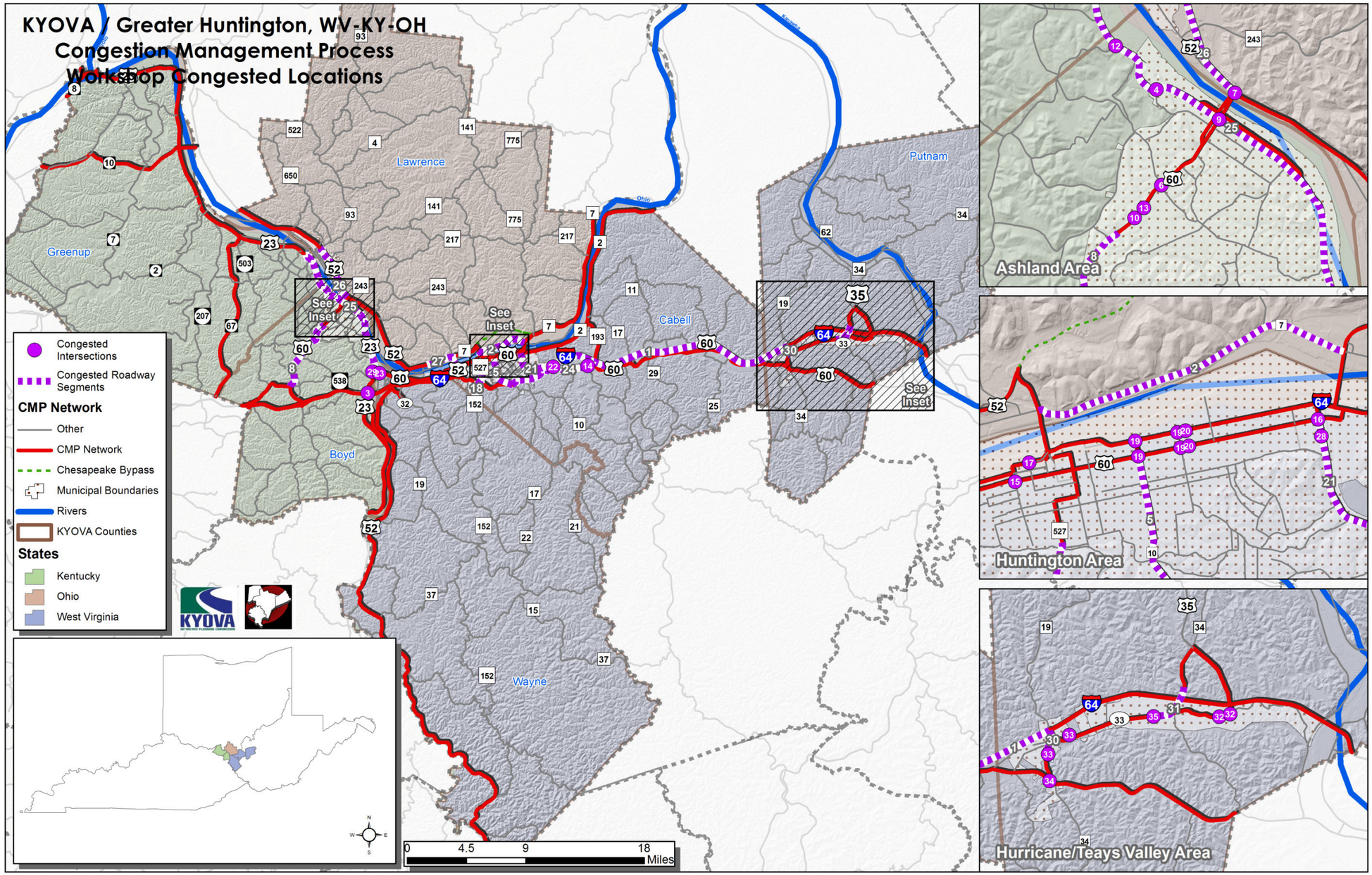


Figure 17. Map of Congested Locations from Stakeholder Workshops

Table 8. Stakeholder Identification and Prioritization of Congested Locations

Map ID	Name	Location Type	Score/# of Votes					Average Score	Rank	State
			1	2	3	4	5			
5	WV 10/Hal Greer Boulevard from I-64 to 5th Avenue, Huntington	Segment	7	5	2	0	0	1.643	1	WV
21	US 60 (Midland Trail) from Third Avenue to I-64 interchange	Segment	5	6	2	0	0	1.769	2	WV
14	US 60 at East Pea Ridge Road-Farmdale Road, Barboursville	Intersection	4	6	2	0	0	1.833	3	WV
28	8th Avenue at 31st Street (US 60), Huntington	Intersection	4	4	3	0	0	1.909	4	WV
24	US 60 from I-64 (29th Street interchange) to Merritts Creek/WV 193 (Barboursville exit)	Segment	2	4	2	0	0	2.000	5	WV
19	3rd Avenue/5th Avenue intersections with Hal Greer Boulevard and 20th Street	Intersection	4	7	3	1	0	2.067	6	WV
16	US 60 at 5th Avenue (near 31st Street bridge), Huntington	Intersection	3	6	3	1	0	2.154	7	WV
22	I-64/US 60 (29th Street) interchange	Intersection	2	6	2	1	0	2.182	8	WV
1	I-64 from WV 10/Hal Greer Blvd. to WV 34 in Teays Valley	Segment	1	10	0	1	1	2.308	9	WV
15	5th Avenue at 1st Street, Huntington	Intersection	2	5	4	1	1	2.538	10	WV
18	WV 527 (5th Street) from I-64 to 13th Avenue	Segment	3	2	4	3	0	2.583	11	WV
17	US 60 (3rd Avenue) at 3rd Street at-grade railroad crossing	Intersection	1	0	6	4	2	3.462	12	WV
20	3rd Avenue and 5th Avenue railroad crossings between 22nd and 23rd streets	Intersection	1	0	5	4	2	3.500	13	WV
2	SR 7 (Rockwood Avenue) through Chesapeake from WV 527 to SR 106 in Proctorville	Segment	3	5	0	0	0	1.625	1	OH
7	US 52 in Ohio at 12th Street/13th Street bridge approaches	Intersection	4	5	2	1	0	2.000	2	OH
27	US 52 from 17th Street bridge to Walmart entrance	Segment	3	5	2	1	0	2.091	3	OH
26	US 52 from 12th Street/13th Street bridges at Ashland to SR 93 in Ironton, Ohio	Segment	3	3	3	1	0	2.200	4	OH
25	US 23 from US 60 in Catlettsburg to KY 207 in Russell	Segment	6	2	2	0	0	1.600	1	KY
9	US 60 at US 23, Ashland	Intersection	4	3	2	0	0	1.778	2	KY
6	US 60 at Blackburn Avenue and Algonquin Avenue, Ashland	Intersection	3	4	2	0	0	1.889	3	KY
8	US 60 from KY 180 to Rose Hill Cemetery, Ashland	Segment	2	3	3	0	0	2.125	4	KY
4	US 23 at River Hill Drive/Walmart entrance, Ashland	Intersection	1	5	1	1	0	2.250	5	KY
12	US 23 at KY 5, Ashland	Intersection	2	3	2	1	0	2.250	6	KY
3	I-64/US 23 interchange south of Catlettsburg	Intersection	1	3	4	0	0	2.375	7	KY
29	US 23/US 60, Catlettsburg	Intersection	2	3	2	0	1	2.375	8	KY
10	US 60 Berry Street (Paul Blazer High School)	Intersection	1	3	2	1	0	2.429	9	KY
13	US 60 at Highland Avenue, Ashland	Intersection	1	2	2	1	0	2.500	10	KY
23	US 60/23rd Street railroad crossing	Intersection	1	3	4	2	1	2.909	11	KY

5.6 OTHER CONGESTED LOCATIONS

There is one other non-recurring congestion issue this is not addressed by any of the analytical methods in the CMP and was not mentioned in the stakeholder workshops, but has been mentioned by KYOVA and WVDOT officials. Huntington is bisected by the CSX railroad tracks that run east-west through the downtown area. Between US 52 and 31st Street, there are five railroad underpasses that facilitate north-south travel into and out of downtown:

1. 1st Street
2. 8th Street
3. 10th Street
4. Hal Greer Boulevard (16th Street)
5. 20th Street

These locations are shown in **Figure 18**. During very heavy rain events, the underpasses often flood, making them impassable and severely constricting north-south mobility. There is an immediate need to replace pumps and make other storm sewer system improvements. Mitigation of non-recurring congestion associated with underpass flooding would be one of many benefits realized.

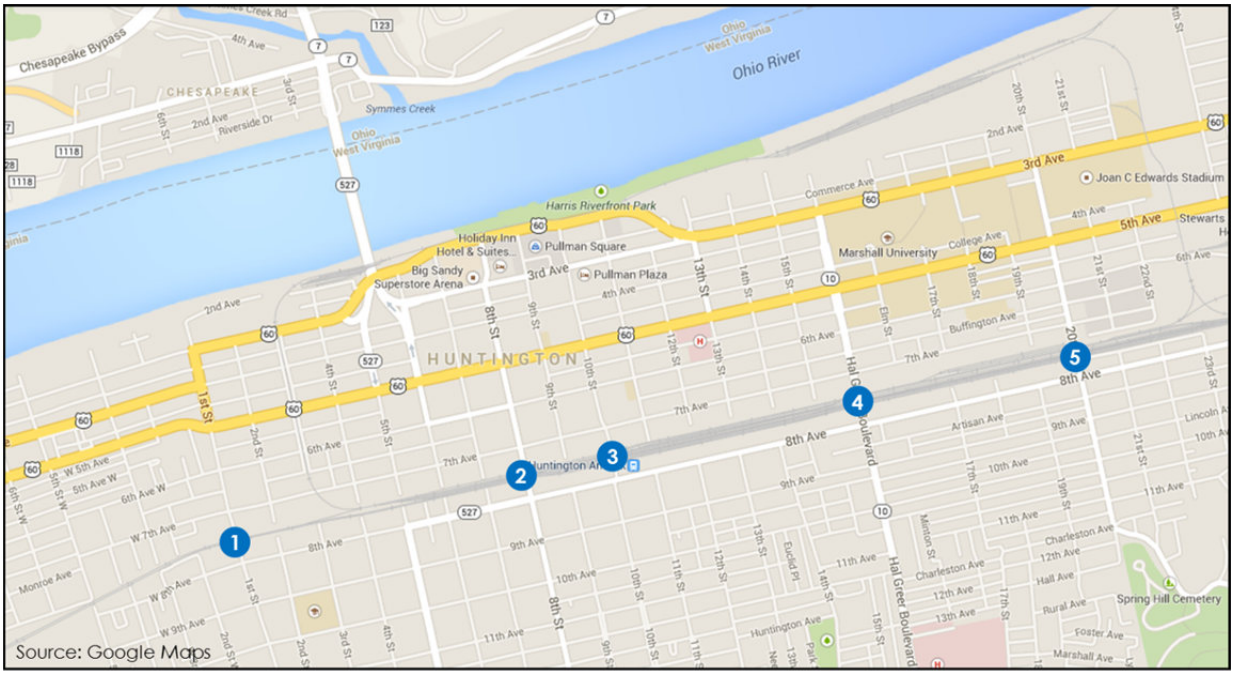


Figure 18. Downtown Railroad Underpass/Viaduct Locations

5.7 DETERMINATION OF UNACCEPTABLE CONGESTION

The term "unacceptable congestion" is relative. What is unacceptable to one urbanized area may be acceptable to another, especially if the other is a large metropolitan area where congestion lasts several hours. Within the Greater Huntington Area, stakeholders have indicated that periods of recurring congestion are confined to the traditional weekday A.M. and P.M. peak hours.

With respect to what level of congestion is unacceptable, because the Huntington area is not a large metropolitan area, the traditional performance measure thresholds for identifying congested flow would be appropriate for determining unacceptable congestion:

- Level-of-service (LOS) F, which has been used historically to delineate the traffic flow regime characterized by stop-and-go waves, poor travel times, low comfort and convenience, and increased accident exposure.

- Demand greater than capacity (i.e., V/C greater than 1.0). Due to the inconsistencies among the three travel demand models used in this analysis (from which V/C was computed), it was determined that a V/C ratio of 1.10 (ten percent higher than capacity) was a more reasonable threshold than 1.0 for determining unacceptable congestion.

With regard to TTI, there doesn't appear to be a universally accepted threshold for what constitutes unacceptable congestion. Travelers expect a trip to take longer during peak flow periods than off-peak periods, so a TTI greater than 1.00 is anticipated. But how much longer should an acceptable trip be and at what point does it become unacceptable?

As travel time data for this initial version of the CMP were very limited – both spatially and temporally – a TTI of 1.25 (i.e. the trip takes 25 percent longer during the peak period compared to off-peak) was arbitrarily set as the threshold for unacceptable congestion. With future cycles of the CMP and as travel time data become more robust, this threshold should be revisited and established in conjunction with CMP stakeholders.

Because of limited resources and data, it was difficult to paint a full picture of the state of congestion – both recurring and non-recurring congestion – using performance measures generated by analytical procedures. To supplement the analyses, a determination of what levels of congestion were deemed unacceptable was manifested in the subjective identification of congested locations (Section 5.5) and suggested solutions through the stakeholder workshops.

6.0 Identification and Assessment of CMP Strategies

A total of 35 congested locations were identified through the two stakeholder workshops. These were identified in Figure 17 in Section 5. For Boyd and Greenup counties in Kentucky, Lawrence County in Ohio, and Wayne and Cabell counties in West Virginia, the location, description of congestion issues, and recommended solutions are presented in **Table 9**. For one of the locations identified – the US 23/KY 10 intersection at the Jesse Stuart Locks and Dam in Greenup, Kentucky (Map ID #11) – a project to add eastbound turn lanes has been programmed already and this location can be omitted.

The congested locations in Putnam County are listed in **Table 10**. These are presented separately, as congestion mitigation projects and strategies will be implemented through the metropolitan planning process of the RIC MPO. Priorities were assigned subjectively by the stakeholder group, according to three relative groups – High, Medium and Low.

Table 9. KYOVA Area Congested Locations

Map ID	Location	Type of Congestion	Description	Recommended Solution(s)
1	I-64 from WV 10/Hal Greer Blvd. to WV 34 in Teays Valley	Recurring	Peak period congestion that becomes exacerbated in the event of an incident, construction activity or weather event.	Widening to 6 lanes is planned or underway for the section from WV 10/Hal Greer Blvd. (Exit 11) to US 60 (Exit 15).
2	SR 7 (Rockwood Avenue) through Chesapeake from WV 527 to SR 106 in Proctorville	Recurring	Peak period congestion	Advance construction of the remainder of the Chesapeake Bypass
3	I-64/US 23 interchange south of Catlettsburg	Recurring	Peak period congestion associated with traffic volumes and truck turning activity	1. Optimize traffic signal timing 2. Interchange alternatives study
4	US 23 at River Hill Drive/Walmart entrance, Ashland	Recurring	Heavy congestion associated with Walmart ingress/egress	1. Signal timing optimization 2. Add second left-turn lane on northbound River Hill Drive approach
5	WV 10/Hal Greer Boulevard from I-64 to 5th Avenue, Huntington	Recurring	1. Heavy peak period volumes along Hal Greer Boulevard 2. Medical center ingress/egress 3. Offset signals at 10th Avenue and Charleston Avenue 4. Pedestrian activity near Marshall University campus 5. Lack of access management	See *Downtown Huntington Access Study*
6	US 60 at Blackburn Avenue and Algonquin Avenue, Ashland	Recurring	Congestion associated with a 5-legged intersection	1. Conduct study to eliminate Algonquin Avenue approach leg 2. Signal timing optimization
7	US 52 in Ohio at 12th Street/13th Street bridge approaches	Recurring	Two separate bridge approaches intersecting with US 52; treated as a single intersection	Intersection/interchange alternatives study

Map ID	Location	Type of Congestion	Description	Recommended Solution(s)
8	US 60 from KY 180 to Rose Hill Cemetery, Ashland	Recurring	1. Transition from 5-lane to 4-lane cross-section 2. Safety issues 3. Access management issues	US 60 corridor scoping study
9	US 60 at US 23, Ashland	Recurring	Traffic congestion associated with intersection capacity issues	Operations analysis of 12th Street/Winchester Ave., 13th Street/Winchester Ave., 12th Street/Carter Ave. and 13th Street/Carter Ave. intersections
10	US 60 at Berry Street (Paul Blazer High School), Ashland	Recurring	Congestion associated with Paul Blazer High School traffic	1. Widen Berry Street approach 2. Add southbound left turn lane from US 60 3. Add northbound right turn lane from US 60
11	US 23/KY 10 at Jesse Stuart Locks and Dam, Greenup	Recurring	Intersection congestion	Eliminated; project to add eastbound KY 10 turn lanes has been let
12	US 23 at KY 5, Ashland	Recurring	Intersection congestion	1. Add turn lane to northbound KY 5 approach (if feasible) 2. Signal timing optimization
13	US 60 at Highland Avenue, Ashland	Recurring	Intersection congestion	1. Add turn lane to eastbound Highland Avenue approach 2. Signal timing optimization
14	US 60 at East Pea Ridge Road-Farmdale Road, Barboursville	Recurring	Congestion and safety issues associated with a skewed intersection	1. Add left-turn lane to southbound East Pea Ridge Road approach 2. Signal timing optimization
15	5th Avenue at 1st Street, Huntington	Non-recurring	Safety issues associated with alignment and intersection geometry	Add pavement markings along northbound 1st Street between 6th Avenue and 5th Avenue to help drivers with lane assignment
16	US 60 at 5th Avenue (near 31st Street bridge), Huntington	Recurring	Congestion issues associated with peak period traffic volumes and pedestrian activity	1. New pavement markings on eastbound 5th Avenue approach 2. Traffic signal timing optimization

Map ID	Location	Type of Congestion	Description	Recommended Solution(s)
17	US 60 (3rd Avenue) at 3rd Street at-grade railroad crossing, Huntington	Non-recurring	Traffic interruption associated with train crossings	Advance flashing lights/warning signs on 3rd Avenue
18	WV 527 (5th Street) from I-64 to 13th Avenue, Huntington	Non-recurring	Congestion associated with slick pavement due to snow and ice	1. Pavement treatment 2. Drainage improvements 3. Signal optimization at North Boulevard intersection
19	3rd Avenue/5th Avenue intersections with Hal Greer Boulevard and 20th Street, Huntington	Recurring	Major intersections bordering the main campus of Marshall University. High peak period auto volumes combined with pedestrian and bicycle movements.	Optimize traffic signal timing based on auto, pedestrian and bicycle volumes. Work in conjunction with Marshall University
20	3rd Avenue and 5th Avenue railroad crossings between 22nd and 23rd streets, Huntington	Non-recurring	Traffic interruption associated with train crossings	Advance flashing lights/warning signs on 3rd Avenue and 5th Avenue
21	US 60 (Midland Trail) from Third Avenue to I-64 interchange, Huntington	Recurring	Congestion associated with heavy peak period traffic volumes	1. Access management 2. Signal timing optimization
22	I-64/US 60 (29th Street) interchange, Huntington	Recurring	Congestion and safety associated with heavy peak period traffic volumes (including trucks), weaving across US 60, and turning movements	Conduct study to examine impacts of I-64 eastbound exit ramp modification. Proposed improvement is to eliminate "free" right turn movement from I-64 eastbound to US 60 eastbound, move it to the west, and make it a signal-controlled right-turn lane. This would increase queuing on the I-64 EB exit ramp but would eliminate the left-hand weave across US 60 to the McDonald's.
23	US 60/23rd Street railroad crossing, Huntington	Non-recurring	Traffic interruption associated with train crossings	Advance flashing lights/warning signs on US 60

Map ID	Location	Type of Congestion	Description	Recommended Solution(s)
24	US 60 from I-64 (29th Street interchange) to Merritts Creek/WV 193 (Barboursville exit)	Recurring	Congestion associated with heavy peak period traffic volumes	Access management
25	US 23 from US 60 in Catlettsburg to KY 207, Russell	Recurring	Congestion associated with heavy peak period traffic volumes	US 23 corridor study, to include: 1. Intersection improvements 2. Signal timing optimization (see *Downtown Ashland Signal Timing Report, KYTC*) 3. Access management
26	US 52 from 12th Street/13th Street bridges at Ashland to SR 93 in Ironton, Ohio	Recurring	Congestion associated with peak period traffic volumes	See #7
27	US 52 from 17th Street bridge to Walmart entrance	Recurring	Congestion associated with peak period traffic volumes	Intersection operations analyses at Walmart entrance, Sandusky Road, and Charley Creek Road
28	8th Avenue at 31st Street (US 60), Huntington	Recurring	Peak period congestion associated with high traffic volumes/turning activity	Intersection analysis – operations, safety and design
29	US 23/US 60, Catlettsburg	Recurring	Peak period congestion associated with high traffic volumes. Also non-recurring congestion associated with train crossing on east leg (US 60)	1. Access management (eastbound 35th Street approach) 2. Signal timing/operations analysis (including pre-emption for train crossing)

Table 10. Putnam County Congested Locations

Map ID	Location	Type of Congestion	Description	Recommended Solution	Priority
30	CR 19 from I-64 to WV 34	Recurring	1. Lack of signal coordination 2. Numerous driveways	1. Signal optimization 2. Develop access management plan 3. Scoping study to build bypass from SR 34/CR 19 intersection south to US 60	High
31	WV 34 from CR 33 to north of I-64	Recurring	1. Numerous driveways 2. Lack of access management 3. High crash experience 4. Heavy truck turning volumes	1. Develop access management plan 2. Signal coordination, to incorporate heavy truck turning activity	High
32	CR 33 Teays Valley Road from WV 34 to US 35	Non-recurring	Detour route that becomes congested with incidents on I-64	1. Develop "I-64" bypass timing plan(s) for signals at US 35 South and Great Teays Boulevard	Medium
33	Teays Valley Road – WV 34 and CR 33	Recurring	Congestion, especially during the A.M. peak, related to school traffic along the subject roadway sections	1. Develop detailed site access and circulation plans for each school 2. Improve bicycle, pedestrian and school bus access at these locations	Medium
34	US 60 at WV 34	Recurring	Congestion and safety problems attributable to high peak period traffic volumes combined with skewed alignment approach on WV 34 approach	1. Re-align WV 34 approach to form a 90-degree T-intersection 2. Conduct signal warrant study	Low
35	WV 34 at Hospital Drive	Recurring	P.M. peak period congestion and back-ups	1. Signal timing optimization 2. Intersection improvements (will require further study)	Low

Most of the congested locations in the area were identified through the stakeholder workshops; i.e., those others identified through the V/C and LOS analyses in Sections 5.1 and 5.2 are listed in Tables 9 and 10. For the underpass locations discussed in Section 5.6 and shown in Figure 18, an application for a Federal TIGER Discretionary Grant of $175,000 to develop a street flooding mitigation plan for the City of Huntington has been submitted by the KYOVA Interstate Commission. This plan would be the first step in mitigation of non-recurring congestion at these locations.

The 2040 Metropolitan Transportation Plan includes a number of recommended roadway improvements that would serve to improve congestion. Among these is the recommendation to widen I-64 from US 52 (Exit 6) to the Cabell/Putnam county line. The CMP has demonstrated the need to extend the widening eastward through the Teays Valley area. The West Virginia Department of Transportation already has programmed widening projects from Hal Greer Boulevard to US 60. Though widening of the remaining sections would be considered to be a long-term capital project, the need for congestion mitigation through widening is mentioned as part of the CMP.

Another project programmed for implementation by the Kentucky Transportation Cabinet is the widening of US 60 from two to three lanes from I-64 to KY 180 in Boyd County. The project is intended to provide both congestion mitigation and safety improvements.

A traffic signal retiming study[2] recently was completed for the Kentucky Transportation for three of the signal systems in downtown Ashland. New timing plans were developed for the following systems:

Ashland Downtown-2 Signal System

- Greenup Avenue @ 29th Street
- Greenup Avenue @ 17th Street
- Greenup Avenue @ 16th Street
- Greenup Avenue @ 15th Street
- Winchester Avenue @ Greenup Avenue

Ashland Downtown-99 Signal System

- Greenup Avenue @ 7th Street
- Winchester Avenue @ 10th Street
- Winchester Avenue @ 12th Street
- Winchester Avenue @ 13th Street
- Carter Avenue @ 13th Street
- Carter Avenue @ 12th Street
- Winchester Avenue @ Town Mall Center
- Winchester Avenue @ 9th Street

Ashland Downtown-3 Signal System

- Central Avenue @ 12th Street
- Central Avenue @ 13th Street
- Montgomery Avenue @ 12th Street
- Lexington Avenue @ 13th Street
- Lexington Avenue @ 12th Street
- Oakview Road @ 13th Street

[2] *Statewide Traffic Engineering – Ashland, Kentucky*, by BTM Engineering, Inc., March 6, 2014

Implementation of new, optimized signal timing plans by the Kentucky Transportation Cabinet is anticipated to improve traffic congestion along US 23 (Greenup Avenue), US23 Business (Winchester Avenue), 12th Street (US 60 westbound) and 13th Street (US 60 eastbound) in downtown Ashland.

The CMP also has demonstrated the need for a US 23 corridor study through the Ashland area, from KY 5 in Bellefonte to I-64 south of Catlettsburg. This is a heavily traveled corridor that facilities both through travel and access to businesses and neighborhoods. In addition to evaluation of traffic signal timing plans for those intersections not addressed in the previously mentioned study, there is the need to consider intersection improvements and access management along the entire section.

7.0 Programming and Implementation of CMP Strategies

The identified congested locations and recommended mitigation strategies/capital projects are listed in **Table 11**. Some of these capital projects also appear in the individual metropolitan transportation plans for the region – the KYOVA 2040 MTP, the Ashland Area MPO 2040 MTP, and the Kanawha-Putnam MTP ("Metro Mobility 2040"). Regarding the Ashland area, it must be pointed out that the FIVCO Area Development District (FIVCO ADD) has served as the staff agency for the Ashland Area MPO since 1988. Beginning July 1, 2013, the KYOVA Interstate Planning Commission has assumed transportation planning activities for Boyd and Greenup counties in Kentucky, based on the 2010 Census and the Secretary of Transportation's designation of the Greater Huntington area as a Transportation Management Area. Future versions of the Ashland area MTP will be incorporated into the KYOVA MTP.

Where applicable, the recommended strategies and projects listed in Table 11 include an estimate of probable cost. For capital projects, these estimates include design, construction, and minimal right-of-way acquisition, in current dollars. Table 11 also includes the CMP objectives developed by stakeholders early in the congestion management process. Objectives met by each of the recommended solutions are noted with a black dot in the corresponding table cell.

Several of the recommended strategies involve studies. The reason is that cost effective solutions – capital projects and other congestion mitigation strategies – cannot be developed without further evaluation. Financial resources available for establishment of this CMP were not sufficient to include studies at these congested locations. The studies will serve as placeholders until specific strategies and capital projects can be identified.

Implementation of congestion mitigation strategies and projects ultimately will be the responsibility of individual states - West Virginia, Kentucky and Ohio. A variety of funding mechanisms and sources exist –the key will be in the programming of these projects for implementation. Because of the variability and flexibility of potential funding sources, specific recommendations on prioritization (beyond what was determined by stakeholders) and funding were not made in order to take advantage of this flexibility.

It is envisioned that many of the recommended capital projects will be funded through traditional federal and state highway funding by the respective agencies. Safety funds should be considered for mitigation strategies to address non-recurring congestion associated with high-crash locations. Similarly,

maintenance funds can be used for restriping/pavement marking projects (e.g. #15, #16) that will improve driver guidance and therefore operations.

It is recommended and encouraged that applicable federal funding categories be pursued where they would apply and where congestion mitigation can be demonstrated as a benefit. These include Congestion Mitigation and Air Quality (CMAQ), Transportation Enhancement (TE), Safe Routes to School (SRTS), and Planning funds (which could be applied to recommended corridor and access management studies). Some of the strategies and projects would be candidates for Local Public Agency (LPA) implementation of federal transportation funding through locally-administered projects. Each state will have specific guidelines for LPA projects.

Table 11. Implementation of Recommended Congestion Mitigation Solutions

Congested Location	MAP ID	Recommended Strategies	Est. of Probable Cost[1] (in $1,000's)	CMP Objectives									Implementation	Anticipated Benefit
				Capacity Preservation/Expansion			System Connectivity Enhancement	Arterial Operation		System Efficiency/Safety				
				Preserve/Expand I-64 Through Capacity	Preserve/ Expand I-64 Interchanges	Preserve/ Expand Other Regional Routes		Improve Traffic Signals/ Systems	Access Management	Incident Management/ Response	Truck Freight Movement	Alternative Transportation Modes		
I-64 from WV 10/Hal Greer Blvd. to WV 34 in Teays Valley	1	Widening to 6 lanes is planned or underway for the section from WV 10/Hal Greer Blvd. (Exit 11) to US 60 (Exit 15).	40,000	●							●		KYOVA MTP WVDOT	Reduce congestion
SR 7 (Rockwood Avenue) through Chesapeake from WV 527 to SR 106 in Proctorville	2	Advance construction of the remainder of the Chesapeake Bypass	71,000			●	●				●		KYOVA MTP ODOT	• Reduce congestion • Enhance system connectivity
I-64/US 23 interchange south of Catlettsburg	3	1. Optimize traffic signal timing 2. Interchange alternatives study	125		●	●		●			●		Ashland TIP Ashland MTP KYTC	Reduce congestion
US 23 at River Hill Drive/Walmart entrance, Ashland	4	1. Signal timing optimization 2. Add second left-turn lane on northbound River Hill Drive approach	300			●		●					Ashland TIP Ashland MTP KYTC	Reduce congestion
WV 10/Hal Greer Boulevard from I-64 to 5th Avenue, Huntington	5	See *Downtown Huntington Access Study*	---					●	●			●	KYOVA TIP KYOVA MTP WVDOT	Reduce congestion Improve safety
US 60 at Blackburn Avenue and Algonquin Avenue, Ashland	6	1. Conduct study to eliminate Algonquin Avenue approach leg 2. Signal timing optimization	50			●		●	●				Ashland TIP Ashland MTP KYTC	Reduce congestion
US 52 in Ohio at 12th Street/13th Street bridge approaches	7	Intersection/interchange alternatives study	50			●		●					KYOVA TIP KYOVA MTP ODOT	Reduce congestion
US 60 from KY 180 to Rose Hill Cemetery, Ashland	8	US 60 corridor scoping study	200			●	●	●	●			●	Ashland TIP KYTC	Reduce congestion Improve safety Enhance mobility
US 60 at US 23, Ashland	9	Operations analysis of 12th Street/Winchester Ave., 13th Street/Winchester Ave., 12th Street/Carter Ave. and 13th Street/Carter Ave. intersections	50			●		●					Ashland TIP Ashland MTP KYTC	Reduce congestion

Congested Location	MAP ID	Recommended Strategies	Est. of Probable Cost[1] (in $1,000's)	CMP Objectives									Implementation	Anticipated Benefit
				Capacity Preservation/Expansion			System Connectivity Enhancement	Arterial Operation		System Efficiency/Safety				
				Preserve/Expand I-64 Through Capacity	Preserve/ Expand I-64 Interchanges	Preserve/ Expand Other Regional Routes		Improve Traffic Signals/ Systems	Access Management	Incident Management/ Response	Truck Freight Movement	Alternative Transportation Modes		
US 60 Berry Street (Paul Blazer High School)	10	1. Widen Berry Street approach 2. Add southbound left turn lane from US60 3. Add northbound right turn lane from US 60	700			●		●	●			●	Ashland TIP Ashland MTP KYTC	Reduce congestion
US 23/KY 10 at Jesse Stuart Locks and Dam, Greenup	11	Eliminated; project to add eastbound KY 10 turn lanes has been let	N/A			●		●					KYTC	Reduce congestion
US 23 at KY 5, Ashland	12	1. Add turn lane to northbound KY 5 approach (if feasible) 2. Signal timing optimization	250			●		●					Ashland TIP Ashland MTP KYTC	Reduce congestion
US 60 at Highland Avenue, Ashland	13	1. Add turn lane to eastbound Highland Avenue approach 2. Signal timing optimization	420			●		●					Ashland TIP Ashland MTP KYTC	Reduce congestion
US 60 at East Pea Ridge Road-Farmdale Road, Barboursville	14	1. Add left-turn lane to southbound East Pea Ridge Road approach 2. Signal timing optimization	300			●		●					KYOVA TIP KYOVA MTP WVDOT	Reduce congestion
5th Avenue at 1st Street, Huntington	15	Add pavement markings along northbound 1st Street between 6th Avenue and 5th Avenue to help drivers with lane assignment	15					●					KYOVA TIP City of Huntington	Reduce congestion Improve driver guidance
US 60 at 5th Avenue (near 31st Street bridge), Huntington	16	1. New pavement markings on eastbound 5th Avenue approach 2. Traffic signal modifications	50			●		●					KYOVA TIP WVDOT	Reduce congestion Improve driver guidance
US 60 (3rd Avenue) at 3rd Street at-grade railroad crossing	17	Advance flashing lights/warning signs on 3rd Avenue	50			●		●					KYOVA TIP WVDOT	Improve driver information
WV 527 (5th Street) from I-64 to 13th Avenue	18	1. Drainage improvements 2. Signal optimization at North Boulevard intersection	425[3]					●					KYOVA TIP KYOVA MTP WVDOT	Reduce congestion Improve safety

Congested Location	MAP ID	Recommended Strategies	Est. of Probable Cost[1] (in $1,000's)	CMP Objectives									Implementation	Anticipated Benefit
				Capacity Preservation/Expansion			System Connectivity Enhancement	Arterial Operation		System Efficiency/Safety				
				Preserve/Expand I-64 Through Capacity	Preserve/ Expand I-64 Interchanges	Preserve/ Expand Other Regional Routes		Improve Traffic Signals/ Systems	Access Management	Incident Management/ Response	Truck Freight Movement	Alternative Transportation Modes		
3rd Avenue/5th Avenue intersections with Hal Greer Boulevard and 20th Street	19	Optimize traffic signal timing based on auto, pedestrian and bicycle volumes. Work in conjunction with Marshall University.	30					●				●	KYOVA TIP KYOVA MTP City of Huntington WVDOT	Reduce congestion Improve mobility
3rd Avenue and 5th Avenue railroad crossings between 22nd and 23rd streets	20	Advance flashing lights/warning signs on 3rd Avenue and 5th Avenue	50									●	KYOVA TIP KYOVA MTP WVDOT	Improve driver information
US 60 (Midland Trail) from Third Avenue to I-64 interchange	21	1. Access management 2. Signal timing optimization	75		●	●		●	●				KYOVA TIP KYOVA MTP WVDOT	Reduce congestion Improve safety
I-64/US 60 (29th Street) interchange	22	Conduct study to examine impacts of I-64 eastbound exit ramp modification. Proposed improvement is to eliminate "free" right turn movement from I-64 eastbound to US 60 eastbound, move it to the west, and make it a signal-controlled right-turn lane. This would increase queuing on the I-64 EB exit ramp but would eliminate the left-hand weave across US 60 to the McDonald's.	60		●			●					KYOVA TIP KYOVA MTP WVDOT	Reduce congestion Improve safety
US 60/23rd Street railroad crossing	23	Advance flashing lights/warning signs on US 60	50			●					●		Ashland TIP Ashland MTP KYTC	Improve driver information
US 60 from I-64 (29th Street interchange) to Merritts Creek/WV 193 (Barboursville exit)	24	Access management	60			●		●	●				KYOVA TIP KYOVA MTP WVDOT	Reduce congestion Improve safety Improve mobility

Congested Location	MAP ID	Recommended Strategies	Est. of Probable Cost[1] (in $1,000's)	CMP Objectives									Implementation	Anticipated Benefit
				Capacity Preservation/Expansion			System Connectivity Enhancement	Arterial Operation		System Efficiency/Safety				
				Preserve/Expand I-64 Through Capacity	Preserve/ Expand I-64 Interchanges	Preserve/ Expand Other Regional Routes		Improve Traffic Signals/ Systems	Access Management	Incident Management/ Response	Truck Freight Movement	Alternative Transportation Modes		
US 23 from US 60 in Catlettsburg to KY 207 in Russell	25	US 23 corridor study, to include: 1. Intersection improvements 2. Signal timing optimization (see *Downtown Ashland Signal Timing Report, KYTC*) 3. Access management	200[4]			●	●	●	●				Ashland TIP Ashland MTP KYTC	Reduce congestion
US 52 from 12th Street/13th Street bridges at Ashland to SR 93 in Ironton, Ohio	26	See #7	---			●		●					KYOVA TIP KYOVA MTP ODOT	Reduce congestion
US 52 from 17th Street bridge to Walmart entrance	27	Intersection operations analyses at Walmart entrance, Sandusky Road, and Charley Creek Road	50			●		●	●				KYOVA TIP KYOVA MTP ODOT	Reduce congestion
8th Avenue at 31st Street (US 60), Huntington	28	Intersection analysis – operations, safety and design	25			●		●	●				KYOVA TIP KYOVA MTP City of Huntington WVDOT	Reduce congestion Improve safety
US 23/US 60, Catlettsburg	29	1. Access management (eastbound 35th Street approach) 2. Signal timing/operations analysis (including pre-emption for train crossing)	50			●		●	●		●	●	Ashland TIP Ashland MTP KYTC	Reduce congestion Improve safety Improve mobility
CR 19 from I-64 to WV 34	30	1. Signal optimization 2. Develop access management plan 3. Scoping study to build bypass from SR 34/CR 19 intersection south to US 60	150		●		●	●	●				RIC TIP RIC MTP WVDOT	Reduce congestion Enhance system connectivity
WV 34 from CR 33 to north of I-64	31	1. Develop access management plan 2. Signal coordination, to incorporate heavy truck turning activity	75					●	●		●		RIC TIP RIC MTP WVDOT	Reduce congestion Improve mobility

Congested Location	MAP ID	Recommended Strategies	Est. of Probable Cost[1] (in $1,000's)	CMP Objectives									Implementation	Anticipated Benefit
				Capacity Preservation/Expansion			System Connectivity Enhancement	Arterial Operation		System Efficiency/Safety				
				Preserve/Expand I-64 Through Capacity	Preserve/ Expand I-64 Interchanges	Preserve/ Expand Other Regional Routes		Improve Traffic Signals/ Systems	Access Management	Incident Management/ Response	Truck Freight Movement	Alternative Transportation Modes		
CR 33 Teays Valley Road from WV 34 to US 35	32	Develop "I-64" bypass timing plan(s) for signals at US 35 South and Great Teays Boulevard	25	●	●			●			●		RIC TIP WVDOT	Reduce congestion Improve mobility
Teays Valley Road – WV 34 and CR 33	33	1. Develop detailed site access and circulation plans for each school 2. Improve bicycle, pedestrian and school bus access at these locations	100					●	●			●	RIC TIP RIC MTP WVDOT	Reduce congestion Improve safety Improve mobility
US 60 at WV 34	34	1. Re-align WV 34 approach to form a 90-degree T-intersection 2. Conduct signal warrant study	750			●		●					RIC TIP RIC MTP WVDOT	Reduce congestion Improve safety
WV 34 at Hospital Drive	35	1. Signal timing optimization 2. Intersection improvements (will require further study)	50					●	●				RIC TIP RIC MTP WVDOT	Reduce congestion
Downtown Railroad Underpasses	N/A	Develop street flooding mitigation plan	175				●			●			TIGER Grant City of Huntington	Reduce congestion Improve mobility
US 23 Corridor Study	N/A	Corridor study of US 23 from KY 5 in Bellefonte to I-64 south of Catlettsburg	150			●		●	●		●	●	Ashland TIP Ashland MTP KYTC	Reduce congestion Improve safety Improve mobility

Footnotes:

● - Meets CMP objective
[1] Estimated design and construction cost in 2014 dollars
[2] Access management study to examine alternatives, develop recommended solutions, and facilitate public/stakeholder involvement. Capital project and right-of-way costs will vary depending on implemented recommendations and are not included.
[3] Drainage improvements only; does not include utility relocation or pavement replacement
[4] Corridor study; cost of capital improvements will depend on implemented recommendations
KYOVA 2040 MTP – KYOVA 2040 Metropolitan Transportation Plan
KYOVA TIP – KYOVA Transportation Improvement Plan
Ashland 2040 MTP – Ashland MPO 2040 Metropolitan Transportation Plan
Ashland MPO TIP – Ashland MPO Transportation Improvement Plan
KYTC – Kentucky Transportation Cabinet
ODOT – Ohio Department of Transportation
WVDOT – West Virginia Department of Transportation

As the CMP is part of the metropolitan planning process, most of the recommended solutions (especially capital projects) will be implemented as amendments to the existing Transportation Improvement Program for KYOVA, RIC (Putnam County projects) and Ashland. Projects also would be added to the Metropolitan Transportation Plan for these agencies, either as an amendment to the 2040 MTPs that currently exist or through inclusion in the next update of those plans. Amendments to the respective TIPs and MTPs must go through public involvement process.

The 'Implementation' column in Table 11 references the respective TIP and MTP for Ashland, KYOVA and RIC projects/strategies. As mentioned previously, the Ashland MPO is being integrated into the KYOVA MPO. Congestion mitigation solutions in Boyd and Greenup counties that are not implemented through amendments to the Ashland MPO TIP and MTP would be included in future versions of the KYOVA TIP and MTP after this integration is complete. The anticipated implementing agency is also listed – WVDOT, KYTC, ODOT and the City of Huntington.

8.0 Evaluation of Strategy Effectiveness

The anticipated effectiveness of the recommended congestion mitigation solution is provided in the 'Anticipated Benefit' column of Table 11. Through the development of this initial CMP cycle, it will be possible only to develop an expectation of strategy effectiveness – reduced congestion, improved safety, improved mobility, improved driver information, etc. As an initial step in the next cycle of the CMP, an evaluation of the effectiveness of implemented solutions – including performance measures - should be undertaken to provide feedback.

9.0 Recommendations for CMP Enhancements

Establishment of the KYOVA/Huntington, WV-KY-OH Urbanized Area Congestion Management Process has identified a number of needed enhancements, both for the purpose of more fully serving the region's congestion management needs and for the purpose of meeting federal requirements. As of this final report, the following recommendations for enhancing the CMP are made:

Though the Congestion Management Process has been established, there are opportunities for enhancement.

Travel Demand Model Integration

A travel demand model (TDM) is a primary analysis tool used in regional planning and this includes the congestion management process. As stated in a previous section of this interim report, there are currently three separate TDMs that cover the CMP region. These models don't all work the same way and have been calibrated to different base years. Furthermore, the Ashland Area TDM is not a time-of-day model. There is a need to integrate these into a single TDM for the KYOVA region. This can be done by using the KYOVA TDM as a basis and merging the Ashland Area model into it. The KYOVA model can be expanded eastward to include the Hurricane and Teays Valley areas; it would not be necessary at this point to merge the entire RIC model into it. The merged model should be a time-of-day model that can be used as a high-

level tool to produce regional performance measures, to identify congested locations, and to provide an estimation of the operational impacts of congestion management strategies. Further enhancement to the model through the inclusion of node (i.e. intersection) delay will produce a tool that can be used at a more detailed project level of analysis.

Decision Support System Development

The CMP development has highlighted the need to collect, evaluate, display and manage a multitude of data. It is recommended that a Decision Support System (DSS) be developed to provide a foundation for the CMP. A DSS is a GIS-based system of relational databases, computational tools and information sources used to: 1) store transportation system attribute and performance data; 2) perform technical analyses that identify/quantify congestion and assess the effectiveness of congestion reduction/mitigation strategies; and 3) provide themed maps and system performance reports for stakeholders and decision makers. It is recommended that a Web-based portal to the DSS be created to enhance the utility and effectiveness of the DSS. Several of the DSS components exist already. The state departments of transportation maintain their highway network data in relational GIS databases. KYOVA and some of its local stakeholder partners maintain data that are being used in the CMP. The DSS provides a platform to bring all of that information together.

More Comprehensive Travel Time Data Coverage

Travel time data, and particularly travel time-related metrics like the Travel Time Index and Planning Time Index, and particularly effective performance measures within the congestion management process, especially because they are easily related to stakeholders and the public. Until recently, travel time data were collected on an ad hoc basis for specific projects/studies or were purchased at the area-wide level from private, third-party vendors. Recently, area-wide travel time data have been made available to public agencies through the FHWA National Performance Management Research Data Set (NPMRDS). These data were particularly useful, but did not adequately cover the CMP region both in time and space. The data provided were for one month – September 2013 – and for National Highway System routes only. Additional sources were used to "fill in the gaps" – 2011 NAVTEQ data purchased by the Kentucky Transportation Cabinet, INRIX travel time data for I-64 provided by the Ohio Department of Transportation, and TomTom travel time data for Putnam County segments provided by RIC. Travel time data coverage of the CMP should be enhanced to include the entire CMP network for at least one year (or a representative sample of one year).

Travel Time Reliability

The Federal Notice of Proposed Rule Making for the MAP-21 legislation is expected to be published in May 2014. It is anticipated that the notice will direct states to include travel time reliability as a performance measure. The second Strategic Highway Research Program ("SHRP 2") included methods to quantify and evaluate travel time reliability. Of particular interest, SHRP 2 Project L08 developed a travel time reliability methodology that can be incorporated into a CMP. It is strongly advised that this CMP be enhanced to more directly address travel time reliability, particularly as it relates to non-recurring congestion caused by incidents, weather, construction activities and special events.

Truck Level of Service

Similar to the SHRP 2 program, there is recent research (through National Cooperative Freight Research Program Project 41) that has resulted in a methodology to evaluate the effects of congestion on truck level of service. Up to now, trucks have been evaluated with respect to highway capacity only as a portion of total vehicles (and related passenger-car equivalents) in the traffic stream. This new methodology will enable the CMP to address trucks and levels of service separately.

10.0 CMP Stakeholders

The following is a list of stakeholders that have participated in the establishment and development of the KYOVA/Huntington, WV-KY-OH Urbanized Area CMP:

- KYOVA Interstate Planning Commission
- Regional Intergovernmental Council (Charleston, WV MPO)
- West Virginia Department of Transportation, Division of Highways
- Kentucky Transportation Cabinet
- Ohio Department of Transportation
- Federal Highway Administration
- Tri-State Transit Authority
- Marshall University
- FIVCO Area Development District, Kentucky
- City of Huntington, WV
- Putnam County, WV
- Lawrence County, OH
- City of Ashland, KY

Appendix

CMP OBJECTIVES SURVEY

KYOVA Congestion Management Process Objectives Scoring

Please rate ("X") each of the following by importance with a value of 1 representing not important and 5 equaling very important.

1. Preserving/expanding the I-64 through capacity?

1	2	3	4	5
○	○	○	○	○

2. Preserving/expanding the I-64 Interchanges?

1	2	3	4	5
○	○	○	○	○

3. Preserving/expanding other regional routes?

1	2	3	4	5
○	○	○	○	○

4. Enhancement of bridges?

1	2	3	4	5
○	○	○	○	○

5. Connectivity among major routes?

1	2	3	4	5
○	○	○	○	○

6. Improving traffic signals and signal systems?

1	2	3	4	5
○	○	○	○	○

7. Access management?

1	2	3	4	5
○	○	○	○	○

8. Recurring congestion?

1	2	3	4	5
○	○	○	○	○

9. Non-recurring congestion?

1	2	3	4	5
○	○	○	○	○

11. Incident management?

1 2 3 4 5

12. Traveler information?

1 2 3 4 5

13. Work zone activity?

1 2 3 4 5

14. Transportation systems management?

1 2 3 4 5

15. Travel demand management?

1 2 3 4 5

16. Alternative transportation modes (Bus, Bicycle, Pedestrian)?

1 2 3 4 5

17. Accommodation of freight movement?

1 2 3 4 5

18. Other objective?

1 2 3 4 5

19. Other objective?

1 2 3 4 5

20. Other objective?

1 2 3 4 5

Optional

Name:	
Agency:	

WORKSHOP PARTICIPANTS

Participants of the March 26, 2014 workshops to identify congested locations at KYOVA in Huntington and at Hurricane City Hall in Putnam County:

Marion Russell	City of Ashland
Patrick Leighty	E.L. Robinson Engineering Company
Terri Sicking	FIVCO/KYOVA
Thomas Witt	Kentucky Transportation Cabinet – Central Office
Beth Jones	Kentucky Transportation Cabinet – Central Office
Joe Callahan	Kentucky Transportation Cabinet – District 9
Bethany Wild	KYOVA
Jody Sigmon	KYOVA
Saleem Salameh	KYOVA
Jesse Mullins	Marshall University
Paul Cyrus	Marshall University
Adam Petrie	Marshall University
Gerald Rowe II	Marshall University
Zayyad M. Yakubu	Marshall University
Andrew Nichols	Marshall University
Sandy Mellert	Putnam County Planning
Brian Donat	Putnam County Planning
Scott Ferry	Regional Intergovernmental Council (RIC)
Kara Greathouse	Regional Intergovernmental Council (RIC)
Tom Creasey	Stantec
Mike Rutkowski	Stantec
Max Bushell	Stantec
Kevin Sullivan	West Virginia DOT, Division of Highways
Brian Carr	West Virginia DOT, Division of Highways
Randy Spradling	West Virginia DOT, Division of Highways

ABBREVIATIONS

ADT	Average Daily Traffic
ATR	Automated Traffic Recorder
CFR	Code of Federal Regulations
CMAQ	Congestion Mitigation and Air Quality
CMP	Congestion Management Process
DSS	Decision Support System
FHWA	Federal Highway Administration
GIS	Geographic Information System
HCM	Highway Capacity Manual
ITS	Intelligent Transportation Systems
KYOVA	Kentucky-Ohio-West Virginia Interstate Planning Commission
KYTC	Kentucky Transportation Cabinet
LOS	Level of Service
MPO	Metropolitan Planning Organization
MTP	Metropolitan Transportation Plan
NHS	National Highway System
NPMRDS	National Performance Management Research Data Set
ODOT	Ohio Department of Transportation
PTI	Planning Time Index
RIC	Regional Intergovernmental Council
SHRP	Strategic Highway Research Program
TDM	Travel Demand Model
TMA	Transportation Management Area
TTA	Tri-State Transit Authority
TTI	Travel Time Index
UPWP	Unified Planning Work Program
V/C	Volume-to-Capacity
WVDOT	West Virginia Department of Transportation

GLOSSARY

Average Daily Traffic (ADT) – The average total volume of traffic passing a point or segment of a highway facility in both directions over one year.

Capacity – The maximum sustainable hourly flow rate at which persons or vehicles reasonably can be expected to traverse a point or uniform section of a lane or roadway during a given time period under prevailing roadway, environmental, traffic and control conditions.

Congestion Management Process (CMP) – A systematic process for managing congestion. The CMP provides information on transportation system performance and finds alternative ways to alleviate congestion and enhance the mobility of people and goods, to levels that meet state and local needs.

Crash Rate – An expression of the relative safety of a roadway segment or intersection, taking into account exposure data. A crash rate is calculated to determine relative safety compared to other similar roadways, segments, or intersections. Crash rates typically use exposure data in the form of traffic volumes or roadway mileage and are often expressed in the form of annual crashes per 100 million vehicles or per 100 million vehicle-miles.

Delay – Additional time experienced by a driver, passenger, bicyclist, or pedestrian beyond that required to travel at a desired speed

Functional Classification - The process by which streets and highways are grouped into classes, or systems, according to the character of service they are intended to provide.

Intelligent Transportation Systems (ITS) - The application of advanced information and communications technology to surface transportation in order to achieve enhanced safety and mobility while reducing the environmental impact of transportation.

Intermodal Connector – A public road leading to a major intermodal terminal that has a critical bearing on the efficient operation of that facility.

Level of Service (LOS) – A quantitative stratification of a performance measure or measures that represent quality of service, measured on an A – F scale, with LOS A representing the best operating conditions from the traveler's perspective and LOS F the worst.

Metropolitan Planning Organization (MPO) – A regional policy body, required in urbanized areas with populations over 50,000, and designated by local officials and the governor of the state. The MPO is responsible in cooperation with the state and other transportation providers for carrying out the metropolitan transportation planning requirements of federal highway and transit legislation.

Metropolitan Transportation Plan (MTP) - The official intermodal transportation plan that is developed and adopted through the metropolitan transportation planning process for the metropolitan planning area, in accordance with 23 U.S.C. 134, 23 USC 135 and 49 U.S.C. 5303.

Mobility – The ability of people and goods to move from place to place.

Paratransit - A variety of smaller, often flexibly scheduled-and-routed transportation services using low-capacity vehicles, such as vans, to operate within normal urban transit corridors or rural areas. These services usually serve the needs of persons that standard mass-transit services would serve with difficulty, or not at all. Often, the patrons include the elderly and persons with disabilities.

Performance Measure – A quantitative or qualitative characterization of some aspect of the service provided to a specific road user group.

Planning Time Index (PTI) - A ratio of the total time needed to ensure 95% on-time arrival as compared to a free-flow travel time.

Transportation Improvement Program (TIP) - A document prepared by a metropolitan planning organization that lists projects to be funded with FHWA/FTA funds for the next one- to three-year period.

Transportation Management Area (TMA) - An urbanized area with a population over 200,000 (as determined by the latest decennial census) or other area when TMA designation is requested by the Governor and the MPO (or affect local officials), and officially designated by the Administrators of the FHWA and the FTA. The TMA designation applies to the entire metropolitan planning area(s). (23CFR500)

Travel Demand Model – A software package and associated data sets used to replicate existing traffic conditions and to predict future traffic demands, travel patterns and conditions.

Travel Time Reliability - Consistency or dependability in travel times, as measured from day to day or across different times of day.

Travel Time Index (TTI) – The ratio of the average peak period travel time as compared to a free-flow travel time.

Volume-to-Capacity (V/C) Ratio – The ratio of traffic flow rate to capacity for a roadway system element.

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