



# CONGESTION MANAGEMENT PROCESS TECHNICAL REPORT

May 2015

mvrpc
MIAMI VALLEY
REGIONAL PLANNING COMMISSION

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# Chapter 1 — Executive Summary

## 1.1 Introduction

In response to the 1991 Intermodal Surface Transportation Equity Act (ISTEA), the Miami Valley Regional Planning Commission (MVRPC) produced its first Congestion Management System (CMS) Technical Report in 1998. The 1998 report, with recurring roadway congestion as its sole focus, used performance measures to uncover roadway congestion concerns, identify possible causes of congestion, and find potential corrective actions for congestion in the Dayton Region. These measures provided the basis for identifying the extent and severity of congestion over time. Subsequent updates (approximately every four years) expanded on the original content to incorporate transit performance, non-recurring congestion, travel time reliability, and accessibility measures.

MVRPC has produced the 2015 Congestion Management Process (CMP) Technical Report to update the progress of the Region's congestion management strategies and their integration into MVRPC's transportation planning processes. This report has been redesigned to include a description of transportation conditions in the Region at the corridor level, including data on safety, congestion, mobility (freight, transit, car and bike/pedestrian), and land use. The information in this report can be used as a tool to evaluate and monitor the performance of transportation investments.

The Ohio Department of Transportation (ODOT) has been at the forefront of congestion management for Ohio since 1993 with the development of the statewide Traffic Congestion Management System (TCMS). As stated in the Work Plan, the primary goal of the TCMS was "to provide a management tool for use in the identification and ultimate remediation of congestion through implementation strategies that provide for the most efficient use of the existing and future transportation system." Objectives of the TCMS included:

- Identifying locations of existing and future congestion;
- Specifying strategies to minimize or eliminate congestion;
- Evaluating effectiveness of implemented strategies; and
- Providing input to the MPO's Long Range Transportation Plans.

In addition to those outlined by the state TCMS, objectives of the 2015 CMP Technical Report include:

- Document the locations of traffic crashes;
- Identify locations where congestion may be impacting roadway safety;
- Document travel time reliability statistics for the Region; and
- Document congestion management strategies.

The results of the analysis indicate that recurring congestion on the Region's transportation network is on the rise. Recurring congestion is a traffic event that occurs at the same location and time, typically because traffic demand exceeds the capacity of the roadway system.

The peak morning and evening travel periods are becoming particularly prone to longer delays as a result of recurring congestion. In addition, many of the Region's freeways may be experiencing significant non-recurring congestion due to random and unpredictable events, such as traffic crashes, and an aggressive freeway re-construction and modernization program. Analyses indicate that implementation of the MVRPC Long Range Transportation Plan could significantly reduce roadway congestion on much of the regional transportation system. Other local strategies to manage congestion include integrating alternative forms of transportation (i.e. public transit, walking/bicycling, and carpooling), and operational management solutions, such as traffic incident management.

The 2015 CMP Technical Report will be made available to the public in electronic format on MVRPC's website. In addition, presentations will be made to a variety of public entities in preparation for the 2016 update of the Long Range Transportation Plan. These results will also be presented at various public participation meetings.

### 1.1.1 Regional Context

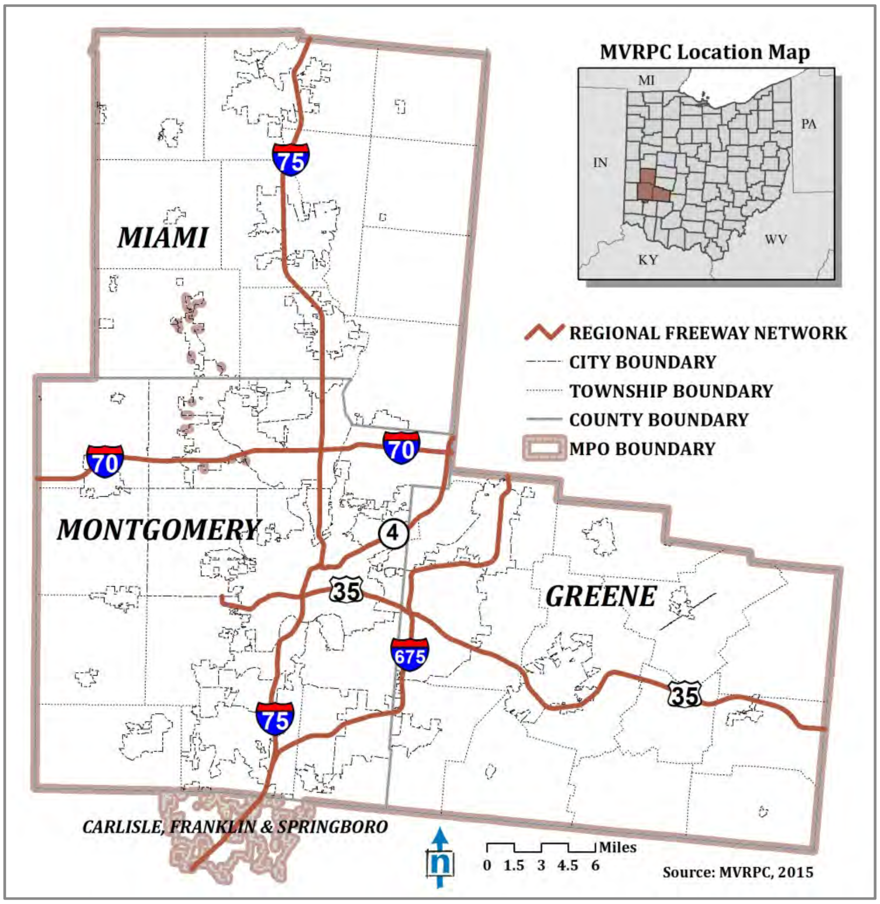
The Miami Valley Regional Planning Commission is the federally designated Metropolitan Planning Organization (MPO) for the counties of Miami, Montgomery, and Greene in western Ohio, plus the cities of Carlisle, Franklin, and Springboro in northern Warren County (See Figure 1.1). With Dayton as its largest city (pop. 143,907), approximately one million people reside within the 82 jurisdictions that comprise the MPO Region. The primary focus of this report is the regional freeway network (I-75, I-70, I-675, SR 4, and US 35) as it carries the highest traffic volumes relative to surface arterial and collector roadways. Hereafter, the MVRPC planning area will be referred to as the 'Dayton Region', or simply the 'Region'.

### 1.1.2 Introduction to Congestion

For roadway users, the best transportation system would move people and goods to where they need to be in a quick, safe, and cost effective manner. However, the traffic demand placed upon the current roadway system is increasing more quickly than can be accounted for by projects and programs to expand roadway capacity. Congestion continues to grow in both time and geographic extent on the Nation's most heavily traveled corridors, many of which are located in highly urbanized regions where roadway expansion may not be politically and/or economically feasible. Therefore, an increasing importance has been placed on maximizing roadway capacity through a combination of physical and operational roadway improvements, as well as alternative modes of transportation, and other livability initiatives.

"Congestion" is generally defined from the perspective of the roadway user. The public's perception of congestion relies primarily on their own experiences when traveling on the Nation's roadways. For example, roadway congestion experienced by a rush-hour commuter in

Dayton, Ohio will be much different than that experienced by a rush-hour commuter in a much larger city, such as Chicago or New York City. It is these differences in experiences that create difficulties when attempting to define congestion. However, an engineer would describe congestion as the condition where traffic demand approaches and/or exceeds the roadway's ability to facilitate travel at normal speeds. Typically, roadway congestion manifests itself as "stop-and-go" traffic conditions.




## Figure 1.1 — MVRPC Planning Boundary and Regional Freeway Network

According to the Federal Highway Administration (FHWA), roadway congestion is comprised of three key elements: severity, extent, and duration. The blending of these elements will determine the overall effect of congestion on roadway users. The severity of congestion refers to the magnitude of the problem at its peak. The extent of congestion describes the geographic area or number of affected motorists, while the duration describes the length in time that users experience congested conditions. Because these elements have a positive relationship, any increase in one will subsequently result in an increase in the others. Therefore, as roadway congestion continues to build (increased severity), more travel will occur under congested conditions (increased duration) affecting an increasing number of motorists and roadway facilities (increased extent).[1]

Roadway congestion occurs due to a number of planned and unplanned events either in isolation or in tandem. In some cases, the clockwork nature of recurring congestion can be the sole event. However, presented below, research by FHWA has identified several additional root causes for roadway congestion along with their percent contribution as a cause of national roadway congestion.

- Traffic Incidents (25%) — Random events occurring in the travel lanes that disrupt otherwise "normal" traffic flow, such as crashes, disabled vehicles, or roadway debris.
- Bad Weather (15%) — Environmental conditions can affect driver behavior, causing motorists to drive more slowly and/or allow for larger gaps between cars.
- Work Zones (10%) — Construction activities that alter traffic flow due to lane or shoulder restrictions, lane shifts, or temporary closures.
- Traffic Control Devices (5%) — Poorly timed or spaced signals and railroad crossings can cause intermittent disruptions in traffic flow.
- Special Events (5%) — Sudden increases in traffic demand due to planned events, particularly in rural areas, can temporarily overburden the roadway system.
- Physical Bottlenecks (40%) — Sections of the roadway system that have reached their operational capacity.
- Fluctuations in Normal Traffic Flow (Unknown) — Day-to-day changes in the traffic demand placed on the system due to random unknown causes.

Though these events typically result in traffic congestion, it is almost impossible to predict when they might occur. Other than bottlenecks resulting from maximized roadway capacity, the above listed events take place with irregularity throughout the day. According to FHWA, 60% of roadway congestion can be attributed to traffic incidents, inclement weather, work zones, poorly timed traffic control devices, or special events.[1] Therefore, accurately predicting travel times between two points becomes increasingly difficult as congestion caused by irregular events disrupts the transportation network over longer periods of time and larger sections of roadway, leading to frustration for commuters, commercial operators, and public officials.

## 1.2 Regional Report Card

MVRPC has undertaken the development of a performance measurement and reporting program to evaluate the impact and effectiveness of congestion in the Region. The performance measures help evaluate various congestion parameters including transportation system conditions, transportation system safety and incidence response as well as accessibility to alternative modes of transportation such as transit, bike and walk.

[1] "Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance", *FHWA* (2008)

## Table 1.1 — Regional Report Card

| Measure | | Description | Data[1] | | Goal | Actual | Trend |
|---|---|---|---|---|---|---|---|
| System Performance | Average Freeway Speed (mph) | *Source: INRIX* | NA | 60.2 (2013) | — | — | ■ |
| | Congested System | Congested Lane-Miles *Source: Texas Transportation Institute* | 29.0 % (2007) | 24.0% (2011) | ↓ | ↓ | -5% |
| | Annual Freeway Vehicle Hours of Delay | *In hours; Source: INRIX* | NA | 696,167 (2013) | ↓ | — | ■ |
| | Annual Cost of Vehicle Delay on Freeways | *In millions; Source: INRIX* | NA | $24.33 (2013) | ↓ | — | ■ |
| | Annual Cost of Truck Delay on Freeways | *In millions; Source: INRIX* | NA | $12.82 (2013) | ↓ | — | ■ |
| Safety | Incident Response | Average duration of major freeway incidents[2] *In minutes; Source: INRIX* | NA | 98 (2013) | ↓ | — | ■ |
| | Mean Distance Between Calls | Miles between service calls. *Source: GDRTA* | NA | 15,813 (2013) | ↓ | — | ■ |
| | Rate of Fatalities | Total fatalities per 100 million Daily Vehicle Miles Traveled *Source: ODPS* | 0.82 (2008-10) | 0.88 (2011-13) | ↓ | ↑ | 9% |
| | Rate of Serious Injuries | Total incapacitating injuries per 100 MDVMT[3] *Source: ODPS* | 8.39 (2008-10) | 7.88 (2011-13) | ↓ | ↓ | -65% |
| | Transit Incidents | Transit incidents per 100,000 trips *Source: NTD* | 0.28 (2008-10) | 0.27 (2011-13) | ↓ | — | ■ |
| Accessibility | Miles of Regional Bikeway | Additions to Regional Bikeway System *In miles; Source: MVRPC* | 165 (2010) | 198 (2014) | ↑ | ↑ | 20% |
| | Population Served by Bikeway | Population within ½ mile of a Regional Bikeway *Source: U.S. Census, MVRPC* | 28.3% (2000) | 28.8% (2010) | ↑ | — | ■ |
| | Employment Served by Bikeway | Employment within ½ mile of a Regional Bikeway *Source: QCEW, MVRPC* | 43.2% (2000) | 43.8% (2010) | ↑ | — | ■ |
| | Population Served by Transit | Population within ½ mile of a GDRTA Bus Route *Source: U.S. Census, MVRPC* | 79.8% (2000) | 79.5% (2010) | ↑ | — | ■ |
| | Employment Served by Transit | Employment within ½ mile of a GDRTA Bus Route *Source: QCEW, MVRPC* | 85.4% (2000) | 89.3% (2010) | ↑ | ↑ | 4.5% |
| | Work trips by bike and walking | Work trips in the Region by biking and walking *Source: U.S. Census, ACS 2006-2010* | 2.55% (2000) | 2.79% (2010) | ↑ | — | ■ |
| | Population living in mixed land use district | Population living in districts integrated with residential and employment land uses *Source: U.S. Census, QCEW, MVRPC* | NA | 36% (2010) | ↑ | — | ■ |

[1]For data cells marked "NA", comparable data is not available for an earlier period. 2013 data will be used to establish a baseline for future updates of the CMP Report. [2]Incidents are any major collision, occasional roadwork, obstruction, inclement weather, etc.. [3]Million Daily Vehicle Miles Traveled.

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# Chapter 2 — Recurring Congestion Trends

Roadway congestion occurs when travel demand is close to or exceeds the traffic carrying capacity of the roadway. It appears on a regular basis at expected locations along the roadway network, typically developing on commuter corridors during the morning and evening peak travel periods. Recurring congestion can also occur outside of these travel periods, most often as a result of holidays or planned special events. However, the time, location, and length of recurring roadway congestion can change from day-to-day, due to fluctuations in daily travel demand.

## 2.1 Peer Comparison of Congestion Performance Measures

Table 2.1 presents a comparison of safety, accessibility and system performance measures in the MVRPC Region with those in the State and the Nation. The Dayton Region has a greater rate of total fatalities as well as total incapacitating injuries as compared to the entire U.S., though less than the State of Ohio. The Region also has the lowest number of transit incidents per 100,000 trips as compared to Ohio or the Nation. However, only 1.8% of the Region's work trips occur on transit; 2.8% of the work trips are by bike and walking which is a higher share when compared to Ohio (2.6%).

Based on Texas Transportation Institute's 2012 Urban Mobility Report, Table 2.1 also presents a comparison of several congestion-related performance measures between the Dayton urban area, peer urban areas, and all 498 urban areas in the country analyzed in the report. The peer urban areas include 33 urban areas in the country (including the Dayton urban area) with a population size between 500,000 and one million people.

According to the report, nationally, the average commuter:

- Spent an extra 38 hours traveling in 2011,
- Wasted 19 gallons of fuel in 2011 — a week's worth of fuel for the average U.S. driver, and
- Had to plan for approximately three times as much travel time as in light traffic conditions in order to account for the effects of unexpected crashes, bad weather, special events and other irregular congestion causes.

The table shows that the Dayton urban area performs better than the Nation and peer urban areas in all of the examined congestion performance measures. However, overall, the report concludes that across the U.S., congestion is worsening in areas of every size with congestion costs rising as more commuters and freight shippers use the system.

## Table 2.1 — The Region Compared to Peer Cities, State, and Nation

| Measure | Description | Dayton Region[1] | Ohio | Nation |
|---|---|---|---|---|
| **Rate of Fatalities** | Total fatalities per 100 million Daily Vehicle Miles Traveled. *Source: ODPS, NHTSA* (2011-2013) | 0.89 | 0.99 | 0.80 |
| **Rate of Serious Injuries** | Total incapacitating injuries per 100 million Daily Vehicle Miles Traveled. *Source: ODPS, NHTSA* | 7.88 (2011-13) | 8.54 (2011-13) | 5.90 (2010-12) |
| **Transit Incidents** | Transit incidents per 100,000 trips. *Source: NTD* (2011-2013) | 0.27 | 0.31 | 0.21 |
| **Percent work trips by bike and walking** | Percent of work trips in the Region by biking and walking *Source: ACS* (2006-2010) | 2.8% | 2.6% | 3.3% |
| **Percent work trips by transit** | Percent of work trips in the Region by transit *Source: ACS* (2006-2010) | 1.8% | 1.8% | 4.9% |
| **Measure** | **Description** | **Dayton Urban Area** | **Average of Peer Urban Areas[2]** | **Average of all 498 Urban Areas** |
| **Percent Congested Lane Miles** | Percent of peak period lane miles with congested travel (2011) | 24% | 35% | 43% |
| **Yearly Delay per Auto Commuter** | The extra time spent traveling at congested speeds rather than free-flow speeds by private vehicle drivers and passengers who typically travel in the peak periods. (in hours – 2011). | 24 | 29 | 38 |
| **Excess Fuel Consumed per Auto Commuter** | Extra fuel consumed during congested travel per private vehicle drivers and passengers. (gallons – 2011) | 12 | 14 | 19 |
| **Planning Time Index (Freeway Only)** | The ratio of travel time on the worst day of the month to travel time at free-flow conditions. (2011) | 2.37 | 2.66 | 3.09 |
| **Truck Congestion Cost** | The yearly value of delay time and wasted fuel for trucks. (millions of 2011 dollars) | $52 | $62 | $54 |

[1]For the purposes of calculation, includes Greene, Miami and Montgomery counties only
[2]Peer Urban Areas: 33 Urban Areas of over 500,000 and less than 1 million population

## 2.2 Methodology

The following sections provide a brief overview of travel conditions in the Dayton Region and are based on the regional roadway networks resulting from projects in the 2012 update to the 2040 Long Range Transportation Plan.

MVRPC used its regional travel demand model to develop scenarios consistent with the LRTP list of projects. The complete list of LRTP projects is included in MVRPC's 2040 Long Range Transportation Plan which is available on the internet on MVRPC's website[1]. Three scenarios were developed: 2010 Base conditions, 2040 Existing plus Committed (E+C), and 2040 Plan. The 2040 Plan scenario includes all projects in the Long Range Transportation Plan (LRTP), while the E+C scenario includes only projects that are funded in the SFY 2012-2015 Transportation Improvement Program (TIP). Socioeconomic data from 2010 is used on the Base scenario, while 2040 forecasted socioeconomic data is used on the 2040 E+C and Plan scenarios. For more information on socioeconomic data assumptions, refer to the May 2012 update of the 2040 Long Range Transportation Plan.

Congestion statistics for the base and future year scenarios were generated for each roadway segment by using CMAQT software developed by the Ohio Department of Transportation (ODOT). Systemwide congestion was identified by location and quantified by severity using the level of service (LOS) performance measure. Ten freeway corridors were identified for detailed congestion analyses. A variety of congestion performance measures were utilized to study congestion on corridors including volume-to-capacity ratios, average speeds, cost of vehicle delay, travel time index, and crash rates.

## 2.3 Systemwide Congestion — Level of Service

Level of Service (LOS) is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists. Volume-to-capacity (V/C) ratio is a measure of the traffic volume on a road compared to the capacity of the road. The capacity of a road depends on its physical and operational characteristics and varies by functional class. A higher V/C ratio indicates that the traffic volume of the road is nearing its capacity and is becoming congested.

The analyses presented in this section are based on calculations by CMAQT software and its definition of LOS and V/C ratio. LOS is broken down into six levels (A through F), with significant traveler delay and recurring congestion occurring at LOS D, E, and F. LOS was used to identify specific locations of congestion in the Base (2010), Existing plus Committed (2040 E+C) and the Long Range Transportation Plan (2040 LRTP) networks. Figures 2.1, 2.2, and 2.3 identify roads having LOS D (V/C>0.751) or worse. In the Base (2010) network, roadway congestion is located mainly on I-75 and US-35 in Montgomery County, particularly in the downtown Dayton area. Roadway congestion is also present on surface roadways near local-access interchanges. Roadway congestion is increasingly present in the 2040 E+C network. The majority of freeway

[1] http://docs.mvrpc.org/lrtp/2012/Chapter5.pdf

sections in Montgomery County will operate at LOS D, E, or F, with significant roadway congestion along I-75 through downtown Dayton, in Miami County and near the Warren County border in Montgomery County. Congestion will also spread to I-70 and on surface roadways in rural sections of Greene County, particularly US 42 and US 68. Various projects, including interchange and freeway reconstruction, are included in the 2040 LRTP to improve the freeway performance; this is reflected in Figure 2.3 representing the 2040 Plan scenario. Under the 2040 LRTP scenario, only a few isolated freeway and surface roadways will operate at LOS E or F. This represents a significant improvement compared to the 2040 E+C scenario.

Since the publication of the 2011 CMP report, the most significant change in LOS was in the reduced levels of service (LOS) on the I-75 corridor. This increase in demand may be due to a number of regional factors, additional demand as a result of expanding the Plan horizon to 2040, more frequent non-recurring congestion, new residential and commercial development, or increased dispersal of employment centers. In addition, a number of construction projects initiated throughout the Region have further degraded roadway capacity, but can be expected to increase LOS on the regional freeway network over time. These capacity improvements on I-75 are reflected in both the 2040 E+C and Plan scenario analyses.

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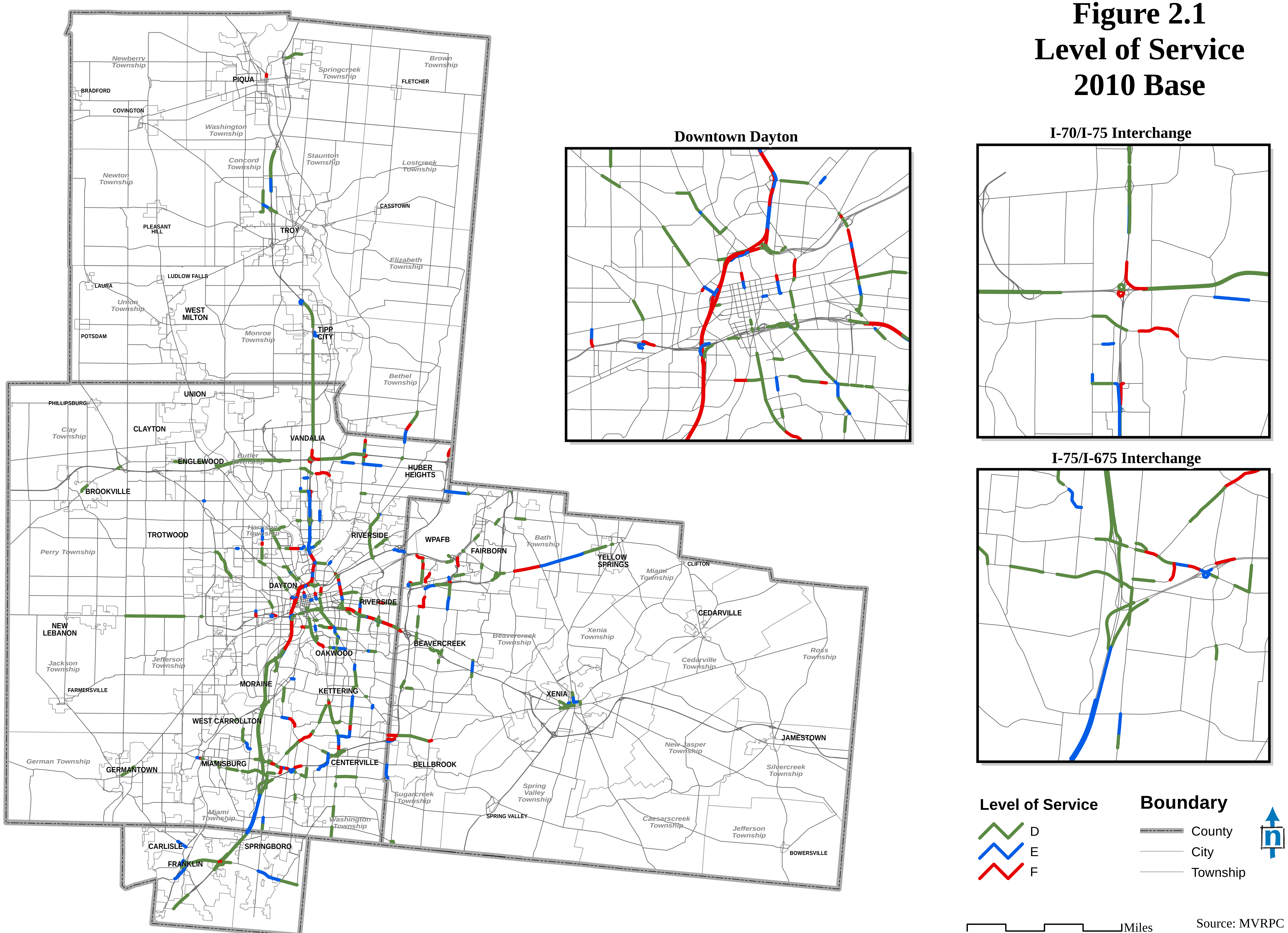
# Congestion Management Process

## Technical Report, May 2015

# Figure 2.1
# Level of Service
# 2010 Base




Source: MVRPC

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# Congestion Management Process

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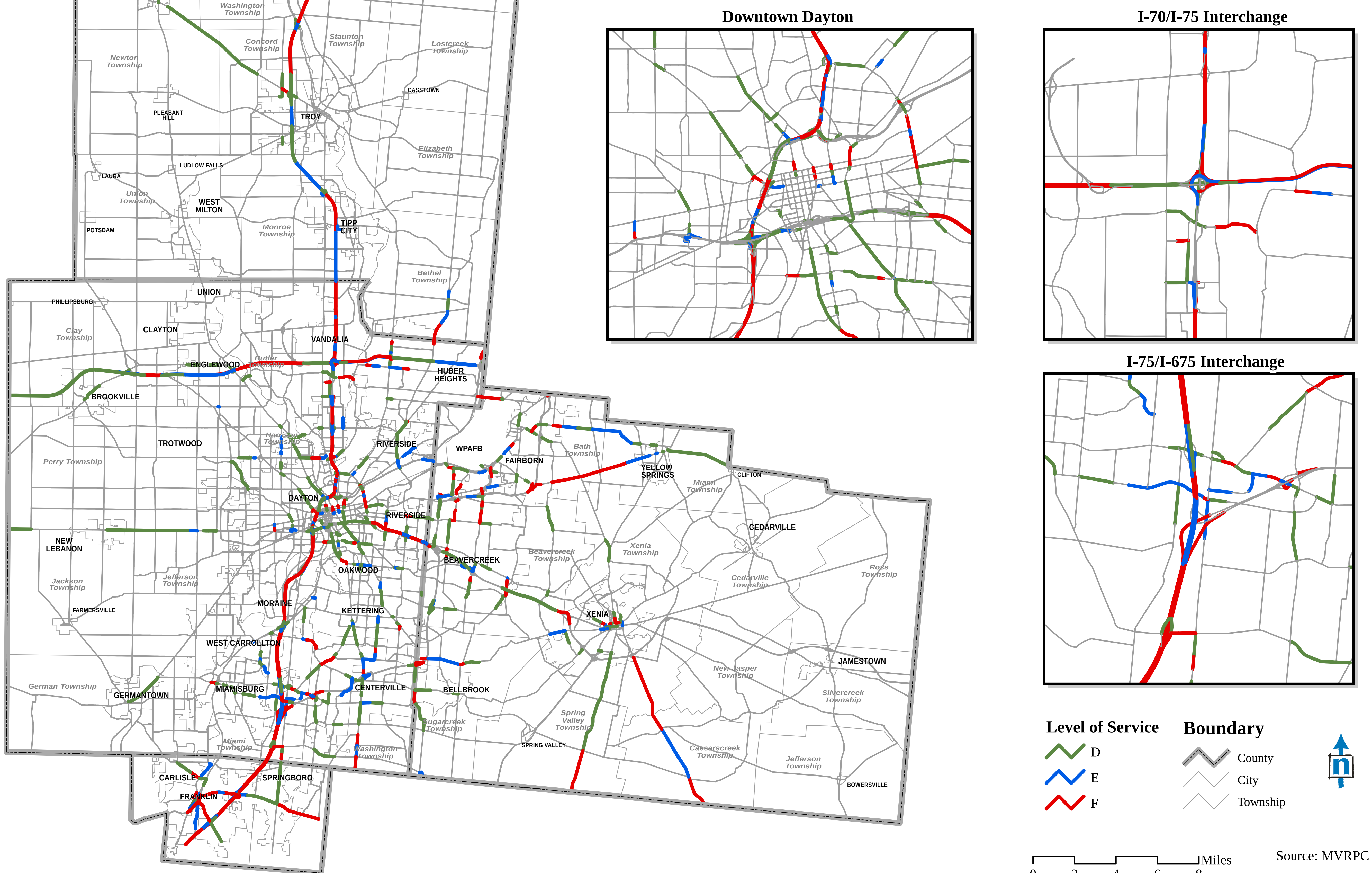
# Figure 2.2
# Level of Service
# 2040 Existing + Committed




Source: MVRPC
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# Congestion Management Process
## Technical Report, May 2015

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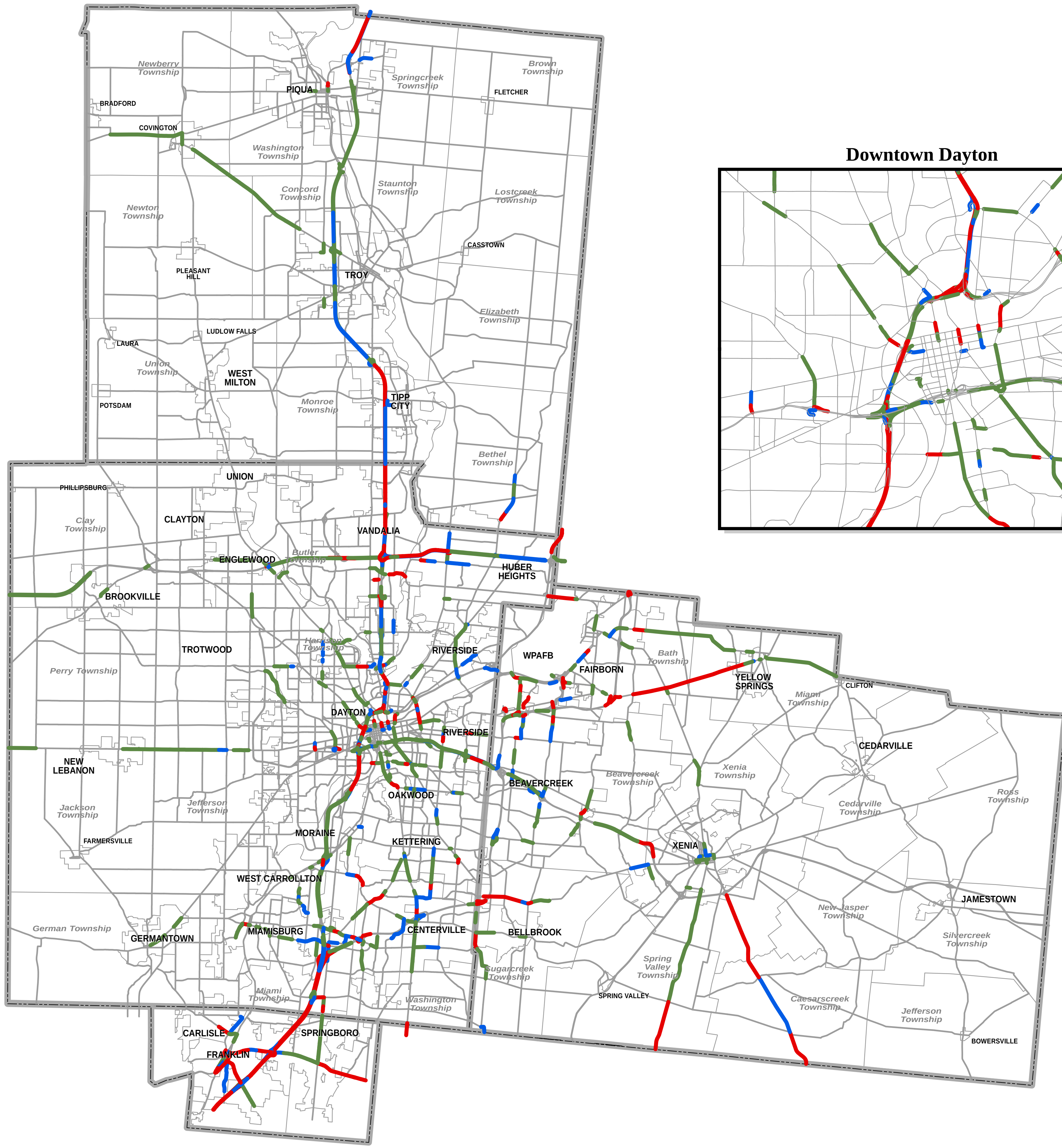
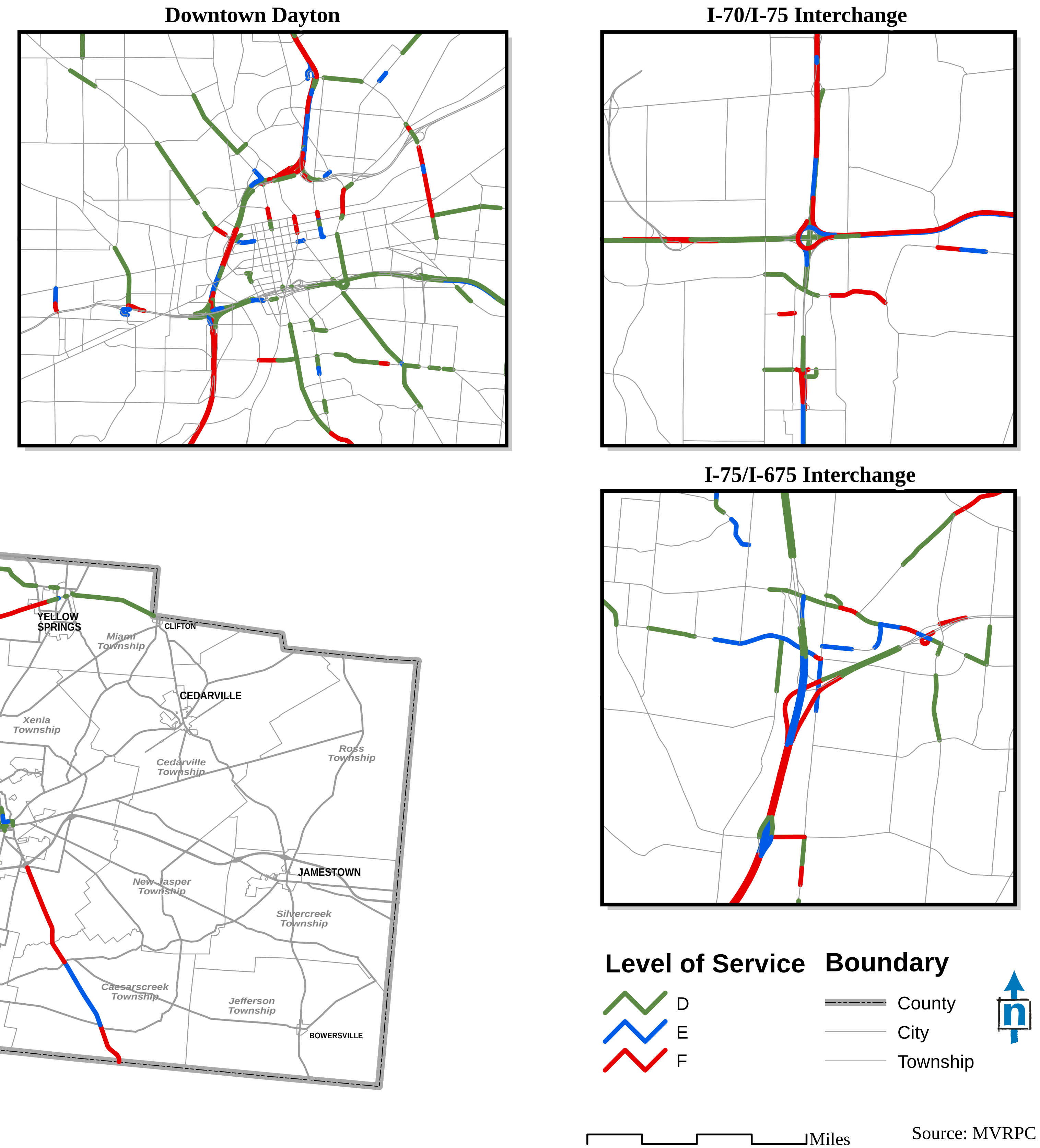
# Figure 2.3
# Level of Service
# 2040 Plan

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## 2.4 Freeway Corridor Analysis

In the Dayton Region, though freeways represent only 13 percent of the total roadway lane miles, they carry between 40 percent (2010 Base) and 44 percent (2040 LRTP Plan scenario) of the total vehicle miles of travel (VMT). As a result, freeway travelers experience some of the worst congestion levels in the Region.

As part of the congestion management process, ten freeway corridors in the Region were identified for detailed congestion study and analyses. Figures 2.4 to 2.13 present a corridor profile and summarize corridor performance data for each corridor while Table 2.2 compares the corridors to each other.

The congestion corridors listed in Table 2.2 are used to identify current and future deficiencies related to travel time and/or level of service for development of projects or programs that can be funded through various funding programs such as Congestion Mitigation/Air Quality (CMAQ), Surface Transportation Program (STP) or through the Federal Transit Administration (FTA). The following paragraphs describe the content of each corridor profile.

### 2.4.1 Corridor Location

Each corridor profile has a location map of the corridor that provides a close-up view of where the corridor is located in the Region and the surrounding land uses. The land uses are based on the existing land cover in the Region (as of 2007) and can be interpreted using the following legend.

- Commercial
- Industrial
- Institutional
- Residential
- Agricultural / Open Space

### 2.4.2 Corridor Congestion Scan

MVRPC utilized third-party vendor INRIX's[1] website to generate congestion scan charts that provided a robust visualization of congestion occurrences along a corridor and allowed for detailed exploration of each corridor. The congestion scan chart, based on average raw speeds along a corridor, provides a consolidated view of the extent of slow traffic specific to each location along a corridor, in each direction over a 24-hour period. The congestion scan charts were plotted as raw speeds on weekdays for the year 2013.

[1] INRIX is a commercially available database that provides a variety of travel reliability and congestion measures for an extensive roadway network based on cellphone, other vehicle probes, and traditional road sensors. INRIX can be accessed by the Ohio MPOs through an ODOT contract.

## Table 2.2 — Corridor Performance Comparison

| Congestion Performance | Corridor 1: I-70 — East of I-75 | Corridor 2: I-70 — West of I-75 | Corridor 3: I-75 — North of I-70 | Corridor 4: I-75 — US 35 to I-70 | Corridor 5: I-75 — South of US 35 | Corridor 6: I-675 — North of US 35 | Corridor 7: I-675 — South of US 35 | Corridor 8: US 35 — I-75 to I-675 | Corridor 9: US 35 — East of I-675 | Corridor 10: SR 4 — I-75 to I-70 |
|---|---|---|---|---|---|---|---|---|---|---|
| Daily Volume (2010) | 62,200 | 49,400 | 54,500 | 95,400 | 96,000 | 53,000 | 65,700 | 72,300 | 39,600 | 21,600 |
| Daily Volume (2040 Estimated) | 103,700 | 77,200 | 105,000 | 127,300 | 136,800 | 69,800 | 81,200 | 81,100 | 52,100 | 28,700 |
| Truck Volume (2010) | 14,800 | 17,200 | 12,100 | 14,000 | 15,400 | 7,900 | 4,500 | 4,600 | 4,100 | 1,700 |
| Truck Volume (2040 Estimated) | 28,300 | 26,200 | 21,100 | 25,200 | 27,500 | 11,200 | 7,000 | 5,600 | 6,600 | 4,700 |
| Posted Speed (in mph) | 65 | 65 – 70 | 65 – 70 | 55 – 65 | 55 – 65 | 65 | 65 | 55 | 50 – 55 | 50 – 60 |
| Average Speed (AM Peak Hour: 7 – 8 AM) | 66.8 | 65.9 | 67.2 | 62.3 | 65.8 | 67.1 | 67.1 | 58.6 | 58.6 | 61.5 |
| Average Speed (PM Peak Hour: 4 – 5 PM) | 66.9 | 66.1 | 67.2 | 61.3 | 62.8 | 67.1 | 67.3 | 58.5 | 53.4 | 61.6 |
| V/C Ratio (2010 – AM Peak) | 0.71 | 0.63 | 0.64 | 0.93 | 0.84 | 0.44 | 0.53 | 0.87 | 0.48 | 0.39 |
| V/C Ratio (2040 Est. – AM Peak) | 0.92 | 0.90 | 0.91 | 0.99 | 1.10 | 0.57 | 0.65 | 0.97 | 0.62 | 0.39 |
| V/C Ratio 2010 – PM Peak | 0.70 | 0.66 | 0.71 | 0.93 | 0.83 | 0.44 | 0.52 | 0.85 | 0.62 | 0.42 |
| V/C Ratio (2040 Est. – PM Peak) | 0.92 | 0.95 | 1.01 | 0.99 | 1.09 | 0.57 | 0.65 | 0.94 | 0.79 | 0.45 |
| Travel Time Index 2013 – Peak Hours | 0.96 | 0.98 | 0.96 | 1.00 | 1.06 | 0.97 | 0.97 | 1.01 | 1.07 | 0.99 |
| Cost of Vehicle Delay (In '000s of 2013 dollars) | $436 | $3,039 | $3,341 | $3,236 | $10,700 | $349 | $573 | $1,147 | $1,399 | $114 |
| Total Crashes (2011-2013) | 242 | 710 | 1,037 | 974 | 1,781 | 578 | 757 | 467 | 462 | 152 |
| Crash Rate (In MVMT; 2011-2013) | 0.55 | 0.77 | 0.75 | 0.93 | 1.01 | 0.90 | 0.82 | 0.94 | 1.61 | 0.58 |

### 2.4.3 Corridor Profile

Each corridor profile figure includes descriptive statistics such as the length, number of lanes, functional class, access control, presence of intelligent transportation systems and deployment, transit service and whether the corridor is part of the nationally-designated primary freight network. Some of these elements are described in further detail below.

FUNCTIONAL CLASSIFICATION is a system of categorizing roadways based on their use and general characteristics. The system is based on the premise that roadways are part of a network and the functional classification describes the role a particular roadway plays in the larger system. The urban arterial system should carry the majority of trips entering and leaving the urban area, as well as significant intra-area travel, such as between central business districts and outlying residential areas or travel between major communities. The urban principal arterial system should serve the major centers of activity of a metropolitan area, the highest traffic volume corridors, and facilitate the longest trips. All corridors analyzed in Figures 2.4 to 2.13 are functionally classified as Interstates, Freeways, or Other Principal Arterials.

ACCESS CONTROL is an important strategy in managing congestion; any segments subject to access limitations along CMP corridors are noted. All the analyzed corridors have been designated as limited access roadways which ensures the adequate flow of traffic along the roadway itself and allows movement of vehicles as efficiently as possible.

INTELLIGENT TRANSPORTATION SYSTEMS (ITS) refers to the use of technology to manage roadways and improve the efficiency of the overall transportation network. In-depth ITS analysis is beyond the scope of the CMP corridor profiles. However, it is important to recognize the role of ITS in congestion management. The corridor profiles contain two pieces of data: 1) whether or not the corridor is incorporated in the regional ITS architecture (Dayton Freeway Management System) and designated as an ITS corridor; 2) if there is currently ITS-related technology deployed along the corridor. Both pieces indicate the potential role that ITS can play in management of the corridor. The "Corridor Profile" table contains a number of designations that refer to the types of ITS deployment currently found along the corridor such as highway advisory radios, dynamic message signs and cameras.

TRANSIT CHARACTERISTICS The profile table indicates the type of service, including the transit routes, present along the corridor. The transit row of the profile table also classifies transit service into two types: regular routes and express routes.

PRIMARY FREIGHT NETWORK The new transportation federal legislation, Moving Ahead for Progress in the 21$^{st}$ Century (MAP-21), discussed in greater detail in Chapter 6, required a federal designation of a nationwide primary freight network. The corridor profiles identify whether a particular corridor is a part of this network and whether it serves intermodal connector facilities, such as major airports.

### 2.4.4 Corridor Summary Data

All corridor congestion performance statistics are summarized in this table on the profile page of each corridor.

DAILY VOLUME refers to the average weekday daily volume along the segments of a CMP corridor. Most corridors have large ranges in volume and often feature lower traffic levels on the periphery. High volume locations frequently experience high levels of delay or congestion, however the correlation is not perfect. The daily volume for the base year (2010) is obtained from ODOT traffic counts while the 2040 volumes are estimated based on MVRPC's travel demand model.

TRUCK VOLUME refers to the average weekday daily truck volume along the corridor. The daily truck volume for the base year (2010) is obtained from ODOT's truck counts while the 2040 truck volumes are estimated based on MVRPC's commercial traffic model.

AVERAGE SPEED refers to the average speeds observed along the corridor during peak periods. MVRPC utilized INRIX data to compute average speeds during peak hours for each corridor.

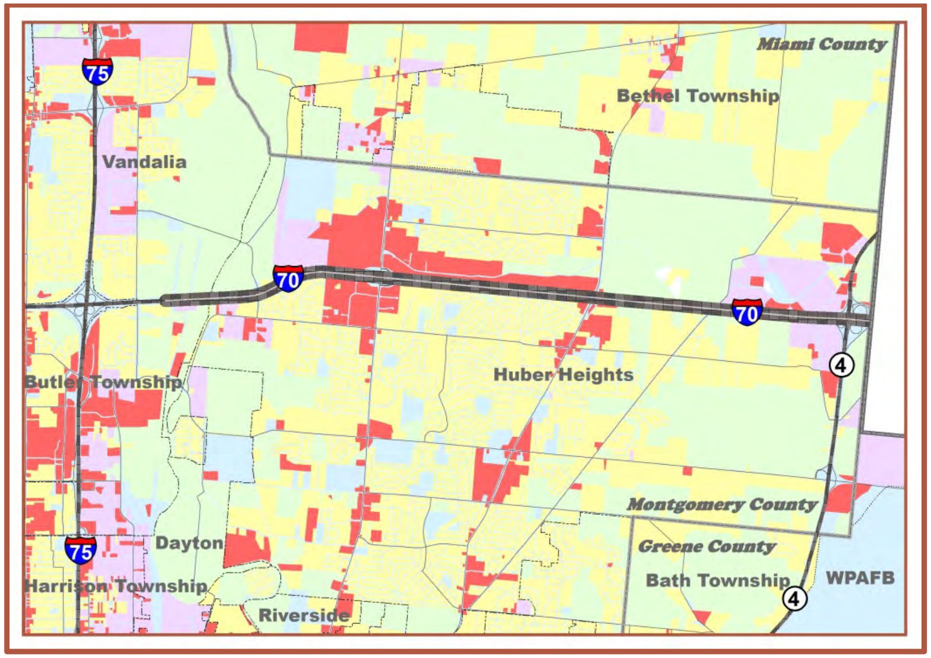
VOLUME-TO-CAPACITY (V/C) RATIO compares the observed traffic volume along a roadway compared to the capacity, or the number of vehicles that a roadway segment is intended to carry. V/C is estimated for each peak period for the base year 2010 and the Plan horizon year of 2040. The closer V/C ratio is to 1.0 the greater the level of congestion is considered to be. A V/C ratio of greater than 1.0 is considered to be "over capacity."

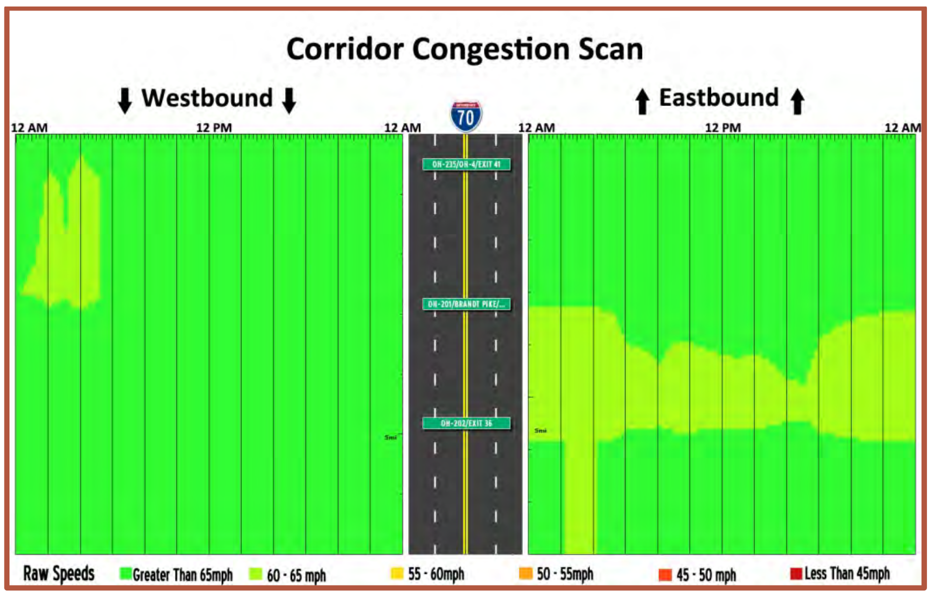
TRAVEL TIME INDEX is the ratio of the average peak period travel time as compared to free-flow travel time. For example, a value of 1.2 means that average peak travel times are 20% longer than free-flow travel times. In this analysis, the travel time index was calculated for 2013 weekdays. MVRPC utilized travel time data supplied by a private vendor, INRIX, to determine travel time reliability trends in the Miami Valley. Travel time reliability is measured through several mobility and reliability indicators that impact the individual traveler such as travel time index, buffer time index, and planning time index.

COST OF VEHICLE DELAY is the economic impact to drivers and businesses based on lost productive time, wasted fuel, and additional vehicle maintenance costs due to extra time spent in traffic. The cost of vehicle delay is calculated by applying monetary values to the estimated hours of total delay incurred by passenger and truck travel, plus additional vehicle operating costs. Total delay is defined as the difference between the amount of time it would take a vehicle to traverse a corridor from one end to the other traveling at the posted speed compared to the actual amount of time it takes a vehicle to drive the corridor.

TOTAL CRASHES AND CRASH RATES are tabulated for each corridor based on 2011-2013 data obtained from ODOT. The crash rates are reported per million vehicle miles traveled (MVMT). In general, safety is an important component in measuring congestion as congested conditions often result in a greater likelihood of crashes, and crashes can further increase congestion.

# Figure 2.4 — Corridor 1: I-70- East of I-75



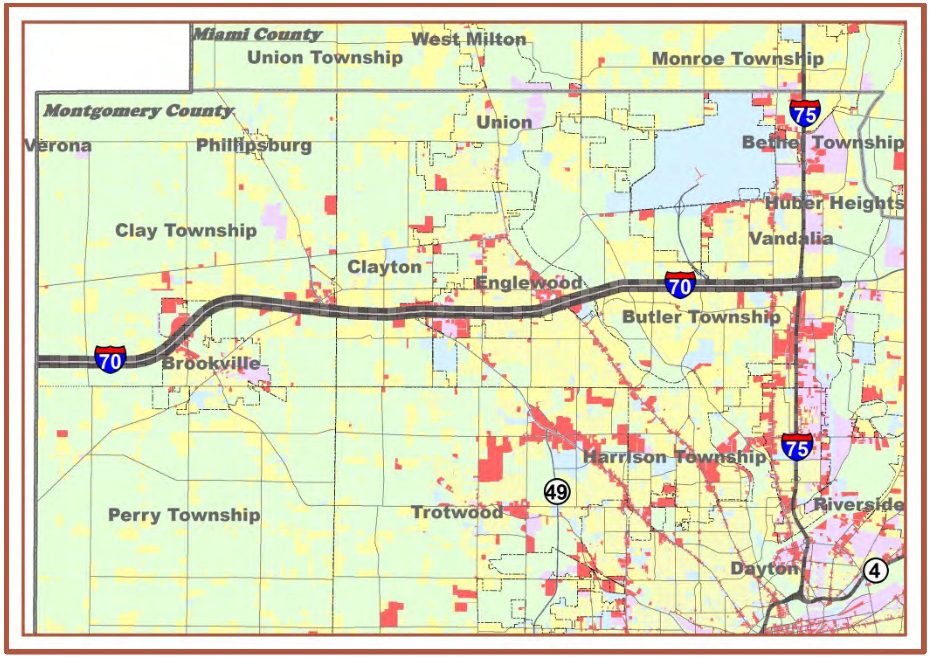

## Profile & Statistics

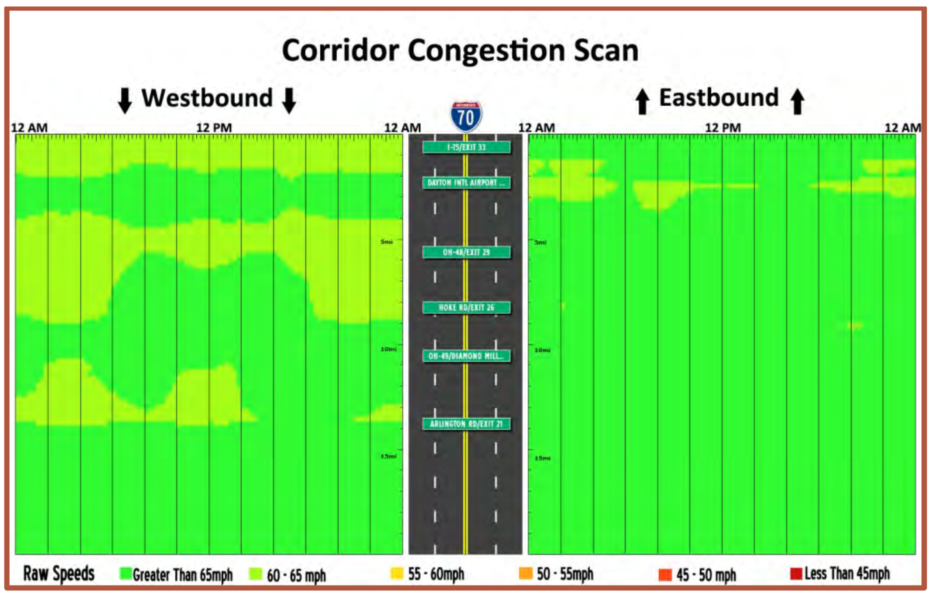
| Corridor Profile | | |
|---|---|---|
| **Length** | 6.59 miles | |
| **Functional Class** | Interstate | |
| **Access Control** | Limited | |
| **Lanes** | 6 | |
| **Intelligent Transportation Systems** | Designated Corridor? Yes | |
| | ITS Deployment: Cameras | |
| **Served by Transit?** | No | |
| **Part of National Freight Network?** | Yes | |
| **Intermodal Connector / Facility** | No | |
| **Corridor Summary Data** | | |
| **Daily Volume: 2010/2040 (est.)** | 62,200 | 103,700 |
| **Truck Volume: 2010/2040 (est.)** | 14,800 | 28,300 |
| **Posted Speed** | 65 mph | |
| **Average Speed (AM Peak Hour: 7-8AM)** | 66.8 mph | |
| **Average Speed (PM Peak Hour: 4-5PM)** | 66.9 mph | |
| **V/C Ratio: 2010/2040 (est.) – AM Peak** | 0.71 | 0.92 |
| **V/C Ratio: 2010/2040 (est.) – PM Peak** | 0.70 | 0.92 |
| **Travel Time Index (2013 – Peak Hours)** | 0.96 | |
| **Cost of Vehicle Delay (2013)** | $435,855 | |
| **Total Crashes / Crash Rate (2011-2013)** | 242 crashes | 0.55 per MVMT |

## Other Corridor Characteristics

- The I-70 Corridor, east of I-75, is primarily an urban corridor surrounded by heavy industrial, low intensity commercial and residential, and some open space/agricultural uses.
- This corridor carries one of the highest percentage of truck traffic in the Region and is a significant thoroughfare for freight movement.
- This corridor was studied to determine the feasibility of truck only lanes as part of a multi-state study in 2007-2009.

## Figure 2.5 — Corridor 2: I-70- West of I-75



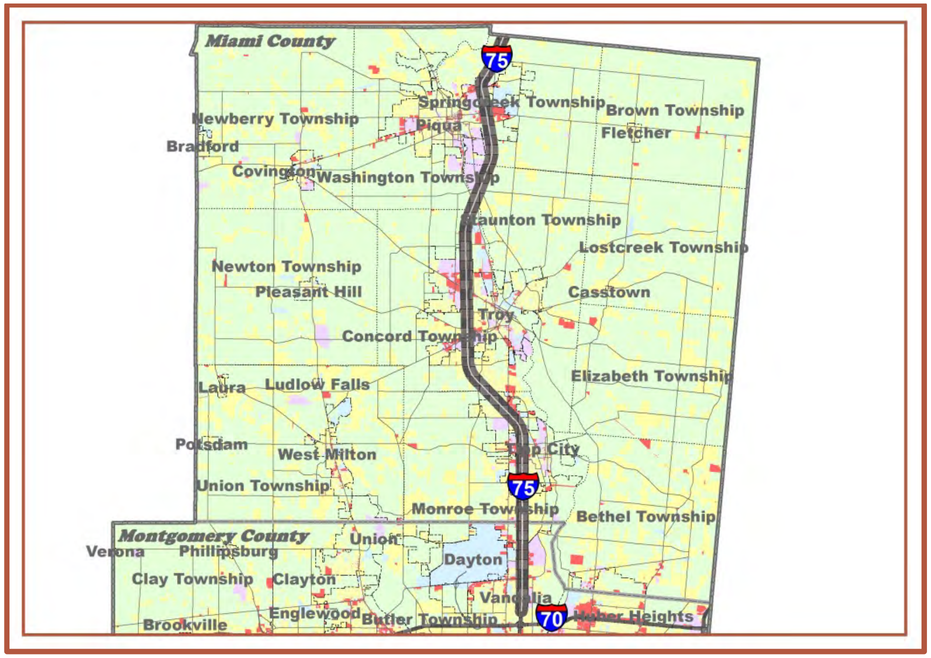

## Profile & Statistics

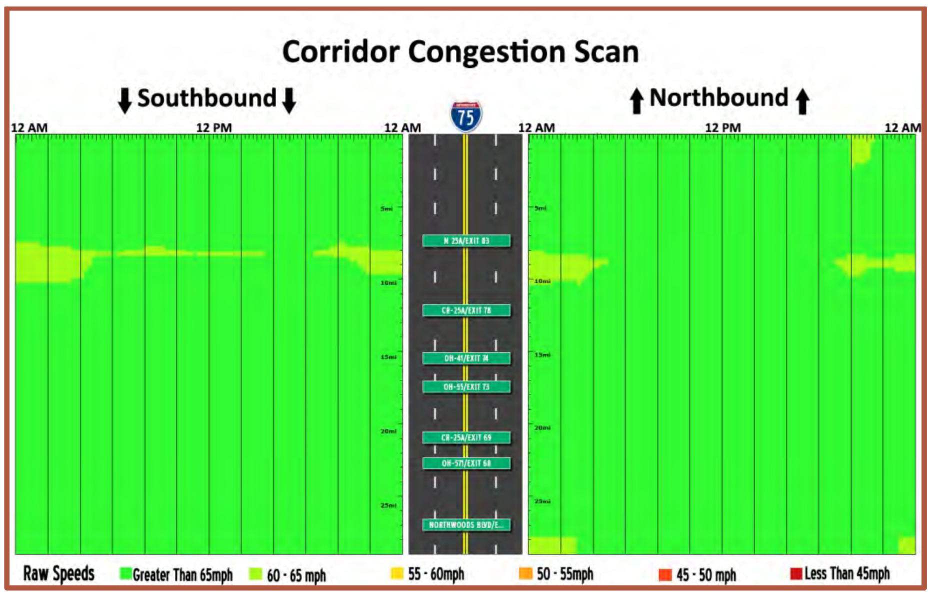
| Corridor Profile | | |
|---|---|---|
| **Length** | 16.98 miles | |
| **Functional Class** | Interstate | |
| **Access Control** | Limited | |
| **Lanes** | 4 | |
| **Intelligent Transportation Systems** | Designated Corridor? Yes, partial – East of SR 49 North<br>ITS Deployment: Highway Advisory Radio, Camera, Dynamic Message Sign | |
| **Served by Transit?** | Yes – GDRTA Route 40 (Partial) | |
| **Part of the National Freight Network?** | Yes | |
| **Intermodal Connector/Facility** | Yes; Dayton International Airport | |
| **Corridor Summary Data** | | |
| **Daily Volume: 2010/2040 (est.)** | 49,400 | 77,200 |
| **Truck Volume: 2010/2040 (est.)** | 17,200 | 26,200 |
| **Posted Speed** | 65 mph – 70 mph | |
| **Average Speed (AM Peak Hour: 7-8AM)** | 65.9 mph | |
| **Average Speed (PM Peak Hour: 4-5PM)** | 66.1 mph | |
| **V/C Ratio: 2010/2040 (est.) – AM Peak** | 0.63 | 0.90 |
| **V/C Ratio: 2010/2040 (est.) – PM Peak** | 0.66 | 0.95 |
| **Travel Time Index (2013 – Peak Hours)** | 0.98 | |
| **Cost of Vehicle Delay (2013)** | $3,038,931 | |
| **Total Crash / Crash Rate (2011-2013)** | 710 crashes | 0.77 per MVMT |

## Other Corridor Characteristics

- The I-70 Corridor, west of I-75, progresses from an urban to mostly a rural corridor surrounded by low intensity commercial, residential and open space/agriculture being the primary use.
- This corridor carries one of the highest percentage of truck traffic in the Region and is a significant thoroughfare for freight movement.
- Widening of the corridor between Airport Access Road and SR 48 is currently under construction.

# Figure 2.6 — Corridor 3: I-75- North of I-70



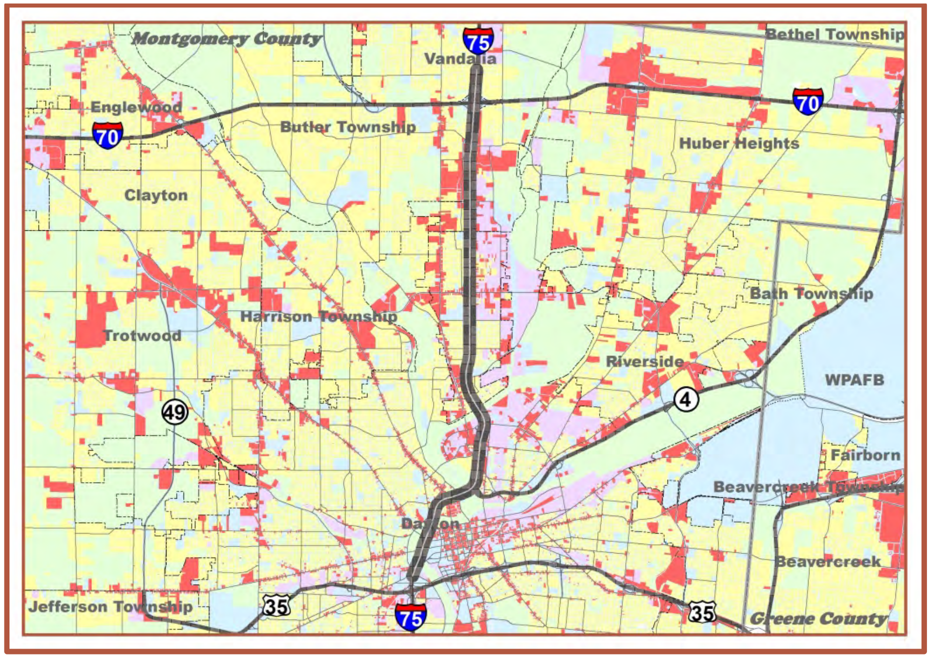

## Profile & Statistics

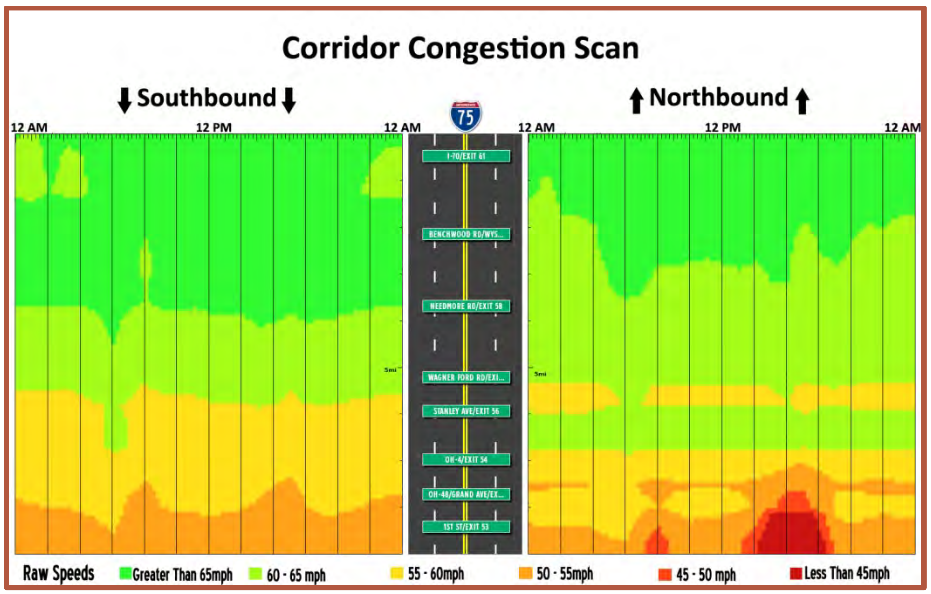
| Corridor Profile | | |
|---|---|---|
| **Length** | 23.38 miles | |
| **Functional Class** | Interstate | |
| **Access Control** | Limited | |
| **Lanes** | 4-6 | |
| **Intelligent Transportation Systems** | **Designated Corridor?** Yes, partial – South of Tipp City | |
| | **ITS Deployment:** Highway Advisory Radio, Cameras, Dynamic Message Sign | |
| **Served by Transit?** | No | |
| **Part of the National Freight Network?** | Yes | |
| **Intermodal Connector / Facility** | No | |
| **Corridor Summary Data** | | |
| **Daily Volume: 2010/2040 (est.)** | 54,500 | 105,000 |
| **Truck Volume: 2010/2040 (est.)** | 12,100 | 21,100 |
| **Posted Speed** | 65 mph – 70 mph | |
| **Average Speed (AM Peak Hour: 7-8AM)** | 67.2 mph | |
| **Average Speed (PM Peak Hour: 4-5PM)** | 67.2 mph | |
| **V/C Ratio: 2010/2040 (est.) – AM Peak** | 0.64 | 0.91 |
| **V/C Ratio: 2010/2040 (est.) – PM Peak** | 0.71 | 1.01 |
| **Travel Time Index (2013 – Peak Hours)** | 0.96 | |
| **Cost of Vehicle Delay (2013)** | $3,341,495 | |
| **Total Crash / Crash Rate (2011-2013)** | 1,037 crashes | 0.75 per MVMT |

## Other Corridor Characteristics

- The I-75 corridor, north of I-70, is a suburban/rural corridor that connects a number of significant industrial destinations along with low intensity residential and agricultural/open space uses.
- This corridor carries one of the highest percentage of truck traffic in the Region and is a significant thoroughfare for freight movement.
- Some of the recent highway projects completed along this stretch include modification and reconfiguration of the I-70/I-75 interchange.

# Figure 2.7 — Corridor 4: I-75- US 35 to I-70



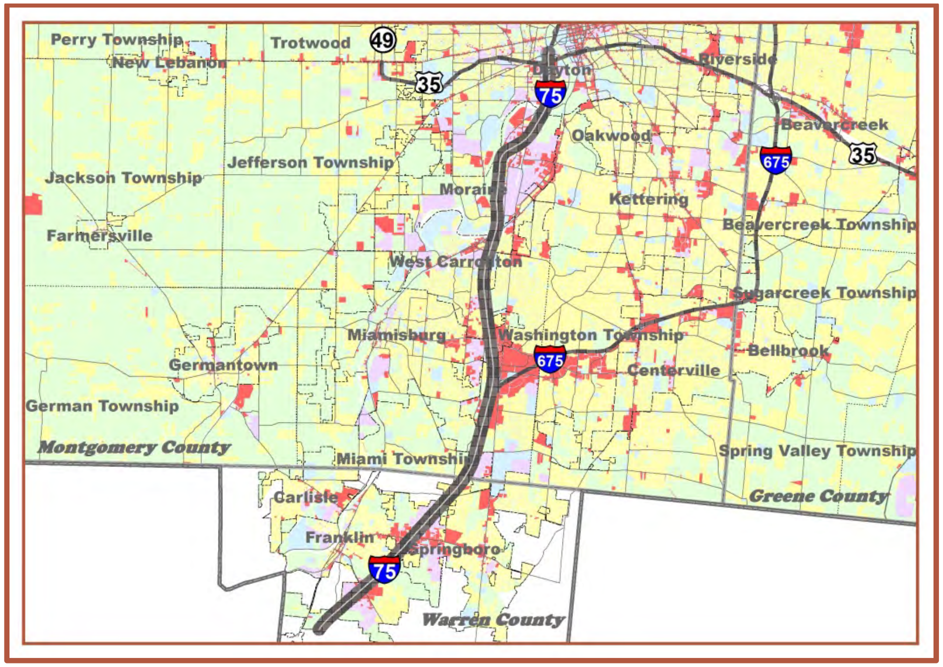

## Profile & Statistics

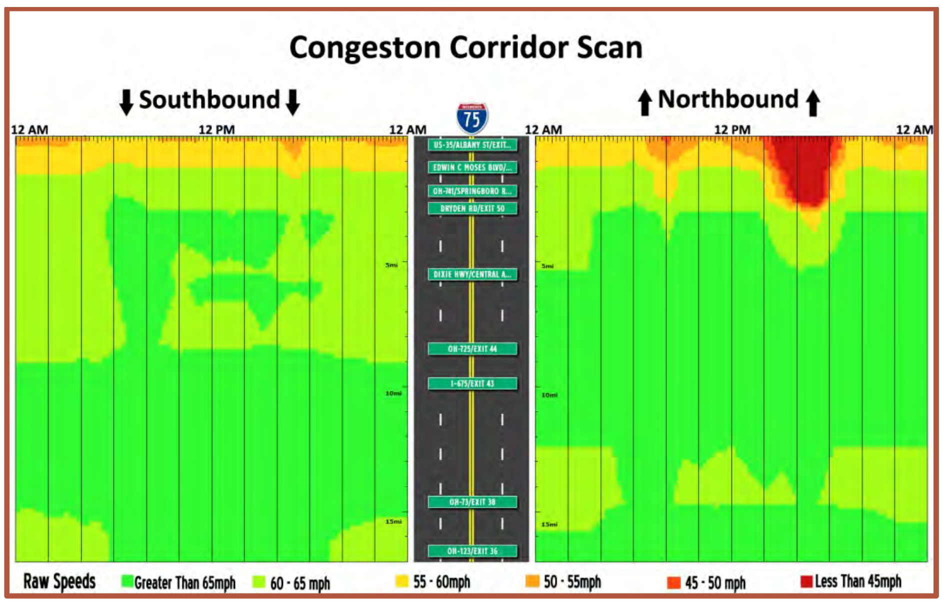
| Corridor Profile | | |
|---|---|---|
| **Length** | 8.96 miles | |
| **Functional Class** | Interstate | |
| **Access Control** | Limited | |
| **Lanes** | 6 - 8 | |
| **Intelligent Transportation Systems** | **Designated Corridor?** Yes<br>**ITS Deployment:** Radios, Cameras, Dynamic Message Sign | |
| **Served by Transit?** | Yes – Express Routes 1A and 5; GDRTA Route 42 | |
| **Part of National Freight Network?** | Yes | |
| **Intermodal Connector / Facility** | Yes – Wright Stop Plaza Transit Center | |
| **Corridor Summary Data** | | |
| **Daily Volume: 2010/2040 (est.)** | 95,400 | 127,300 |
| **Truck Volume: 2010/2040 (est.)** | 14,000 | 25,200 |
| **Posted Speed** | 55 mph – 65 mph | |
| **Average Speed (AM Peak Hour: 7-8AM)** | 62.3 mph | |
| **Average Speed (PM Peak Hour: 4-5PM)** | 61.3 mph | |
| **V/C Ratio: 2010/2040 (est.) – AM Peak** | 0.93 | 0.99 |
| **V/C Ratio: 2010/2040 (est.) – PM Peak** | 0.93 | 0.99 |
| **Travel Time Index (2013 – Peak Hours)** | 1.00 | |
| **Cost of Vehicle Delay (2013)** | $3,235,927 | |
| **Total Crash / Crash Rate (2011-2013)** | 974 crashes | 0.93 per MVMT |

## Other Corridor Characteristics

- This corridor is a densely populated urban corridor connecting high density residential areas in Dayton with its downtown and surrounded by significant industrial, retail and office commercial uses.
- This corridor carries one of the highest percentage of truck traffic in the Region and is a significant thoroughfare for freight movement.
- The southern portion of this corridor, south of SR 4, is currently undergoing widening and reconfiguration as part of Phase 2 of the downtown subcorridor reconstruction project.

# Figure 2.8 — Corridor 5: I-75- S of US 35



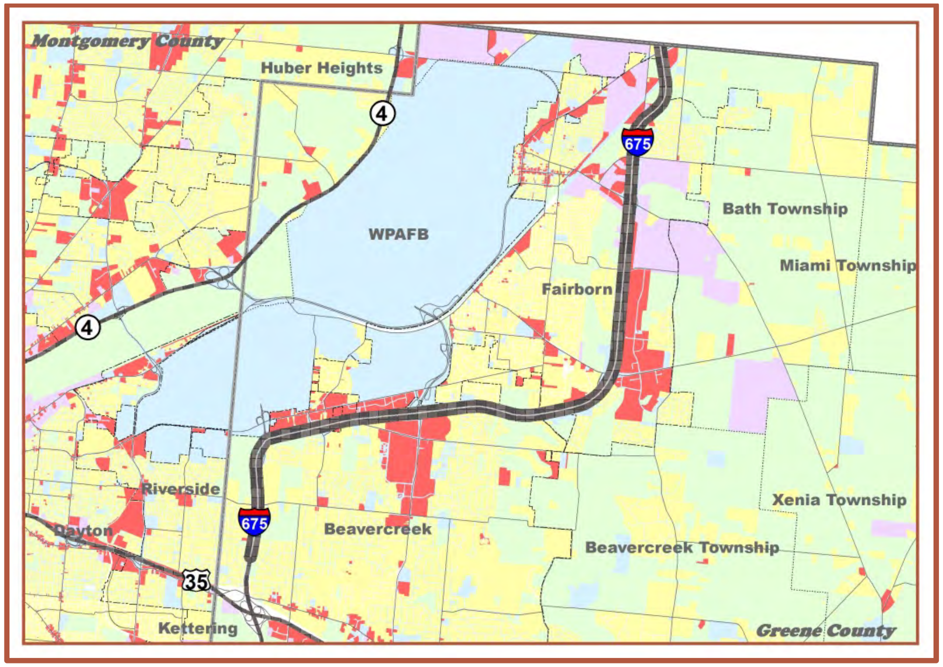

## Profile & Statistics

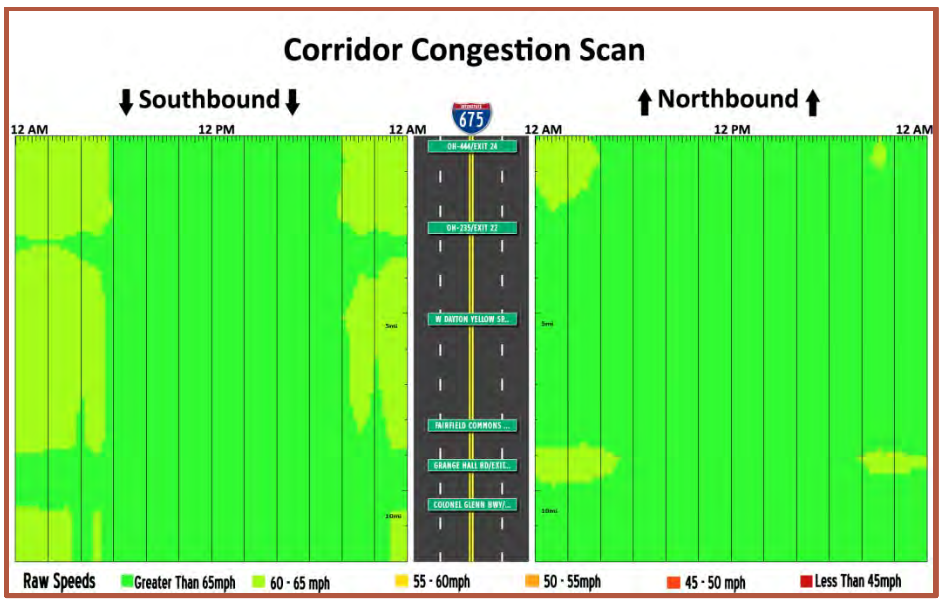
| Corridor Profile | | |
|---|---|---|
| **Length** | 17.65 miles | |
| **Functional Class** | Interstate | |
| **Access Control** | Limited | |
| **Lanes** | 6 - 8 | |
| **Intelligent Transportation Systems** | **Designated Corridor?** Yes<br>**ITS Deployment:** Highway Advisory Radio, Other Radios, Cameras, Dynamic Message Sign | |
| **Served by Transit?** | Yes – Express Route 5; Route 42 | |
| **Part of National Freight Network?** | Yes | |
| **Intermodal Connector / Facility** | No | |
| **Corridor Summary Data** | | |
| **Daily Volume: 2010/2040 (est.)** | 96,000 | 136,800 |
| **Truck Volume: 2010/2040 (est.)** | 15,400 | 27,500 |
| **Posted Speed** | 55 mph – 65 mph | |
| **Average Speed (AM Peak Hour: 7-8AM)** | 65.8 mph | |
| **Average Speed (PM Peak Hour: 4-5PM)** | 62.8 mph | |
| **V/C Ratio: 2010/2040 (est.) – AM Peak** | 0.84 | 1.10 |
| **V/C Ratio: 2010/2040 (est.) – PM Peak** | 0.83 | 1.09 |
| **Travel Time Index (2013 – Peak Hours)** | 1.06 | |
| **Cost of Vehicle Delay (2013)** | $10,700,074 | |
| **Total Crash / Crash Rate (2011-2013)** | 1,781 crashes | 1.01 per MVMT |

## Other Corridor Characteristics

- This urban corridor connects urban and suburban residential areas in Dayton and northern Warren County with downtown Dayton and is surrounded by significant industrial, retail and office commercial uses.
- This corridor carries one of the highest percentage of truck traffic in the Region and is a significant thoroughfare for freight movement.
- The southern portion of this corridor was widened to four lanes as a recommendation of the North South Transportation Initiative. More recently, a new interchange was built at Austin Pike along this corridor and a partial interchange was upgraded to a full interchange at Exit 47.

## Figure 2.9 — Corridor 6: I-675- N of US 35



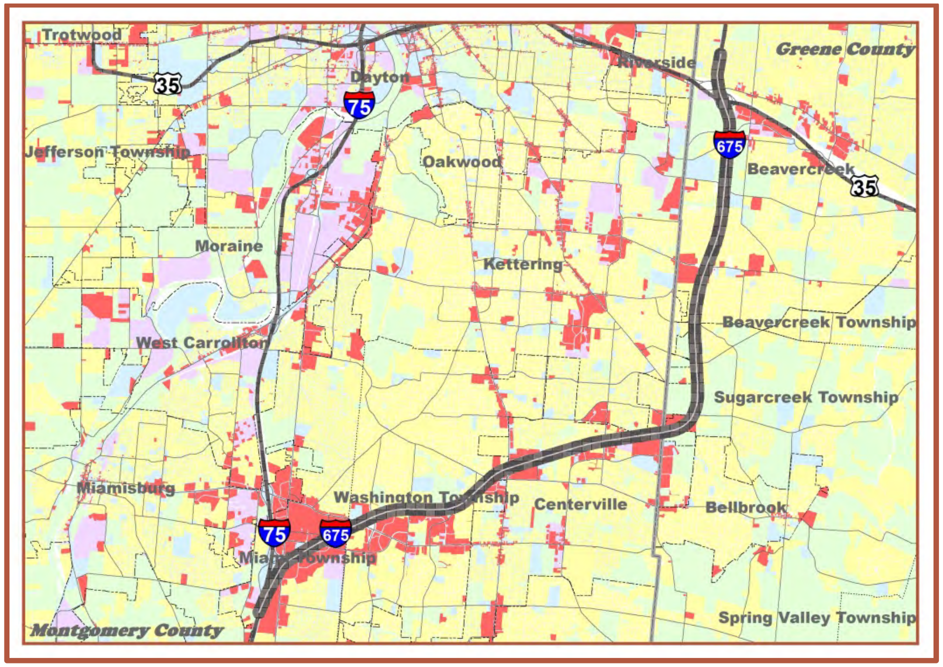

## Profile & Statistics

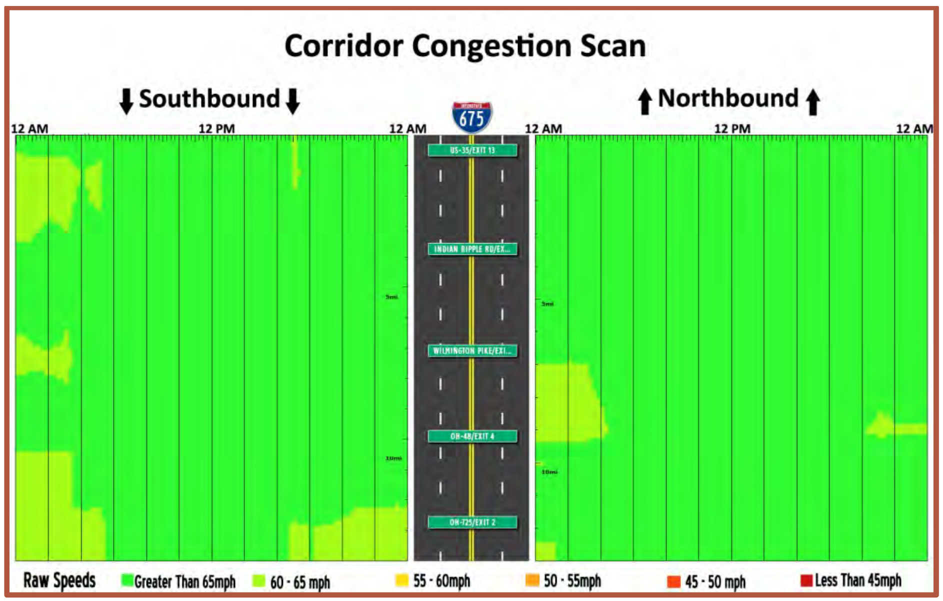
| Corridor Profile | | |
|---|---|---|
| **Length** | 10.99 miles | |
| **Functional Class** | Interstate | |
| **Access Control** | Limited | |
| **Lanes** | 4 - 6 | |
| **Intelligent Transportation Systems** | **Designated Corridor?** Yes | |
| | **ITS Deployment:** Cameras | |
| **Served by Transit?** | No | |
| **Part of National Freight Network?** | No | |
| **Intermodal Connector / Facility** | No | |
| **Corridor Summary Data** | | |
| **Daily Volume: 2010/2040 (est.)** | 53,000 | 69,800 |
| **Truck Volume: 2010/2040 (est.)** | 7,900 | 11,200 |
| **Posted Speed** | 65 mph | |
| **Average Speed (AM Peak Hour: 7-8AM)** | 67.1 mph | |
| **Average Speed (PM Peak Hour: 4-5PM)** | 67.1 mph | |
| **V/C Ratio: 2010/2040 (est.) – AM Peak** | 0.44 | 0.57 |
| **V/C Ratio: 2010/2040 (est.) – PM Peak** | 0.44 | 0.57 |
| **Travel Time Index (2013 – Peak Hours)** | 0.97 | |
| **Cost of Vehicle Delay (2013)** | $349,424 | |
| **Total Crash / Crash Rate (2011-2013)** | 578 crashes | 0.90 per MVMT |

## Other Corridor Characteristics

- The I-675 corridor, north of US 35, provides access to major retail facilities, Wright State University, and WPAFB. It is also a commuting corridor for medium density residential areas in Beavercreek and Fairborn in Greene County.
- Completed between 1975 and 1984, this auxiliary interstate highway serves as an eastern bypass of Dayton for traffic that doesn't need to go through downtown Dayton and would otherwise have added to the congestion in the downtown area.

# Figure 2.10 — Corridor 7: I-675- S of US 35



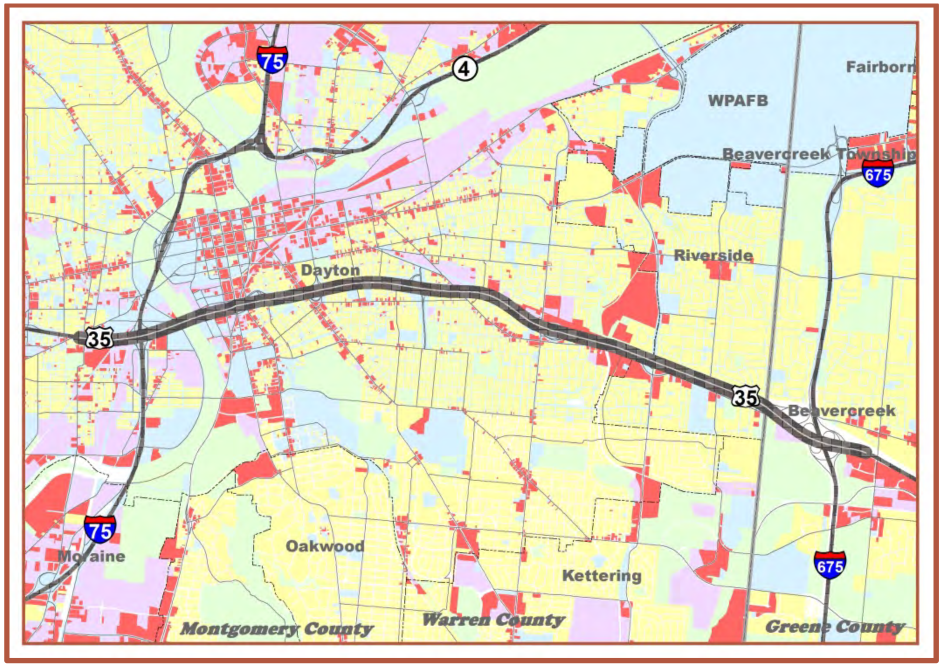

## Profile & Statistics

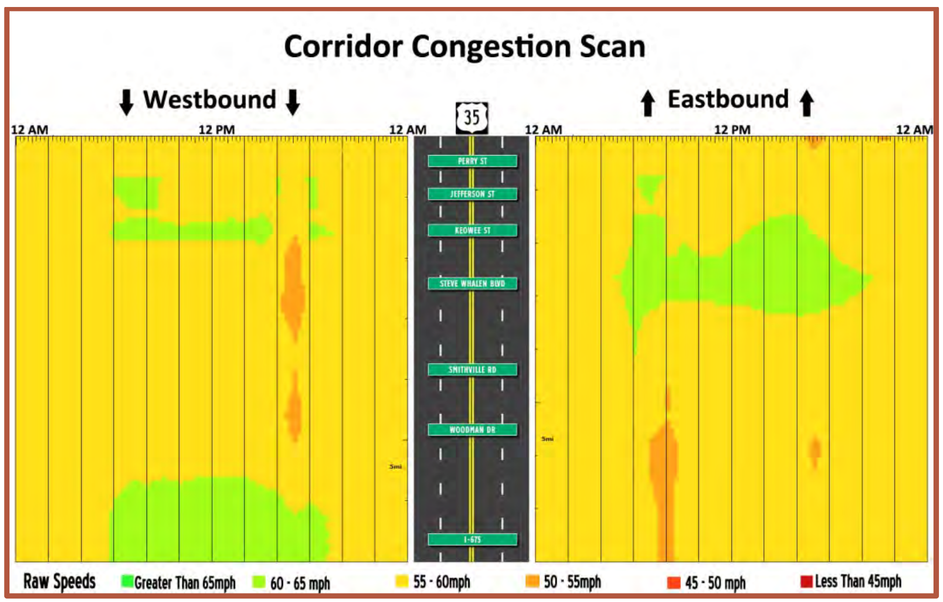
| Corridor Profile | | |
|---|---|---|
| **Length** | 12.78 miles | |
| **Functional Class** | Interstate | |
| **Access Control** | Limited | |
| **Lanes** | 6 | |
| **Intelligent Transportation Systems** | **Designated Corridor?** Yes | |
| | **ITS Deployment:** Cameras, Dynamic Message Sign | |
| **Served by Transit?** | No | |
| **Part of National Freight Network?** | No | |
| **Intermodal Connector / Facility** | No | |
| **Corridor Summary Data** | | |
| **Daily Volume: 2010/2040 (est.)** | 65,700 | 81,200 |
| **Truck Volume: 2010/2040 (est.)** | 4,500 | 7,000 |
| **Posted Speed** | 65 mph | |
| **Average Speed (AM Peak Hour: 7-8AM)** | 67.1 mph | |
| **Average Speed (PM Peak Hour: 4-5PM)** | 67.3 mph | |
| **V/C Ratio: 2010/2040 (est.) – AM Peak** | 0.84 | 1.10 |
| **V/C Ratio: 2010/2040 (est.) – PM Peak** | 0.83 | 1.09 |
| **Travel Time Index (2013 – Peak Hours)** | 0.97 | |
| **Cost of Vehicle Delay (2013)** | $573,034 | |
| **Total Crash / Crash Rate (2011-2013)** | 757 crashes | 0.82 per MVMT |

## Other Corridor Characteristics

- The I-675 corridor, south of US 35, is primarily a suburban corridor surrounded by low to medium density residential areas and scattered commercial uses. The corridor connects to I-75 and Dayton Mall area at its southern tip.
- Completed in 1986, this auxiliary interstate highway serves as an eastern bypass of Dayton for traffic that doesn't need to go through downtown Dayton and would otherwise have added to the congestion in the downtown area.

# Figure 2.11 — Corridor 8: US 35- I-75 to I-675



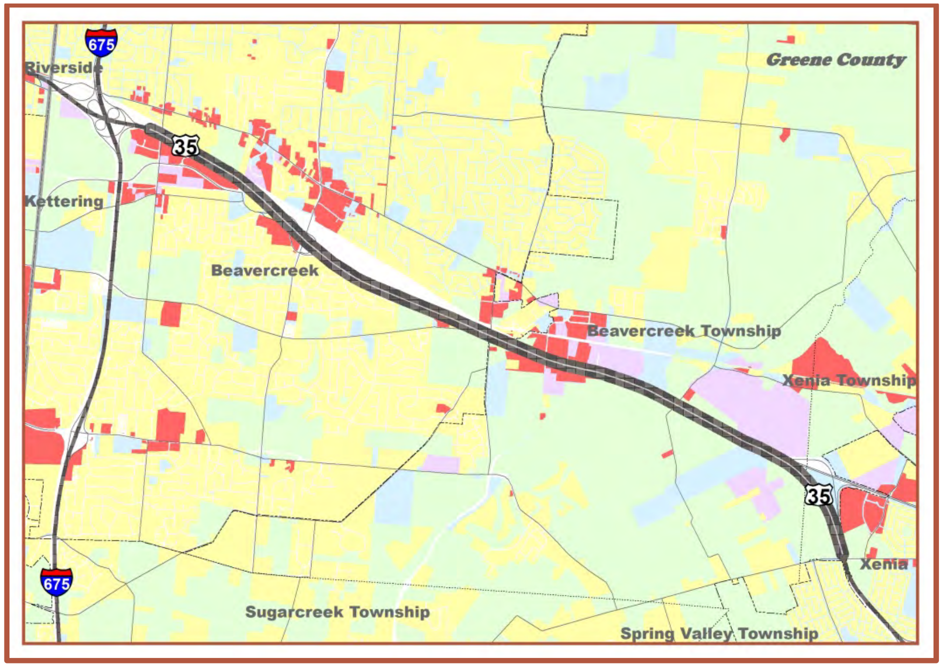

## Profile & Statistics

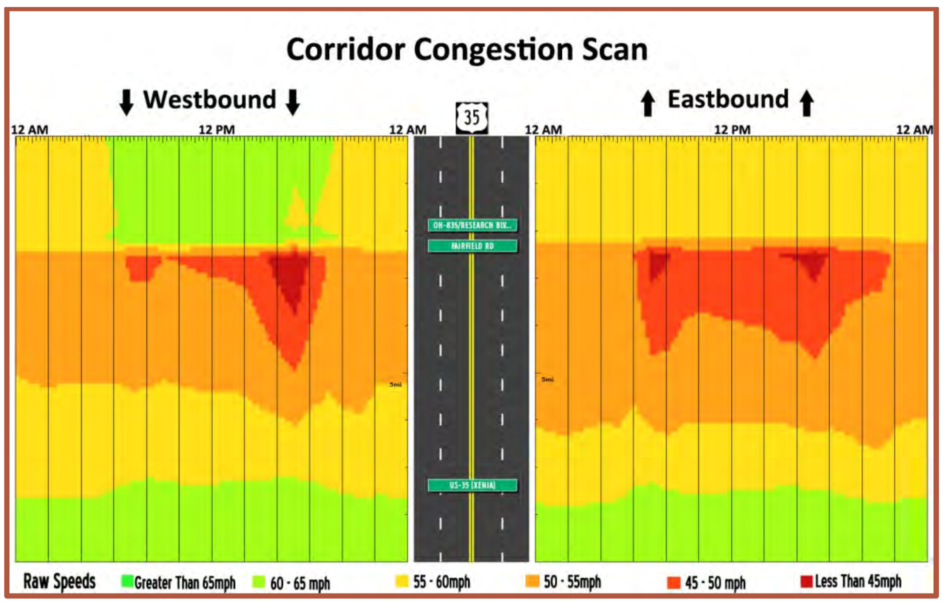
| Corridor Profile | | |
|---|---|---|
| **Length** | 7.29 miles | |
| **Functional Class** | Freeway | |
| **Access Control** | Limited | |
| **Lanes** | 4 - 6 | |
| **Intelligent Transportation Systems** | **Designated Corridor?** Yes | |
| | **ITS Deployment:** Cameras, Highway Advisory Radio | |
| **Served by Transit?** | No | |
| **Part of National Freight Network?** | No | |
| **Intermodal Connector / Facility** | No | |
| **Corridor Summary Data** | | |
| **Daily Volume: 2010/2040 (est.)** | 72,300 | 81,100 |
| **Truck Volume: 2010/2040 (est.)** | 4,600 | 5,600 |
| **Posted Speed** | 55 mph | |
| **Average Speed (AM Peak Hour: 7-8AM)** | 58.6 mph | |
| **Average Speed (PM Peak Hour: 4-5PM)** | 58.5 mph | |
| **V/C Ratio: 2010/2040 (est.) – AM Peak** | 0.87 | 0.97 |
| **V/C Ratio: 2010/2040 (est.) – PM Peak** | 0.85 | 0.94 |
| **Travel Time Index (2013 – Peak Hours)** | 1.01 | |
| **Cost of Vehicle Delay (2013)** | $1,146,666 | |
| **Total Crash / Crash Rate (2011-2013)** | 467 crashes | 0.94 per MVMT |

## Other Corridor Characteristics

- The US 35 corridor between I-75 and I-675 is an urban freeway surrounded by high to medium density residential areas as well as some commercial, institutional, and industrial uses.
- This corridor runs east-west connecting downtown Dayton to Greene County. A project to widen MOT-35 to three lanes is currently under development.

# Figure 2.12 — Corridor 9: US 35- E of I-675



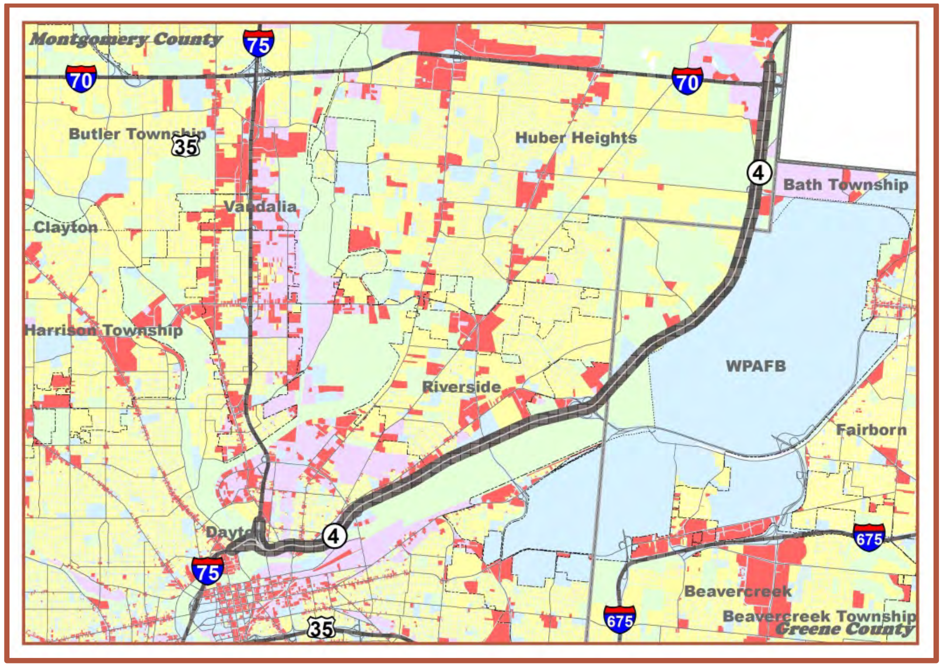

## Profile & Statistics

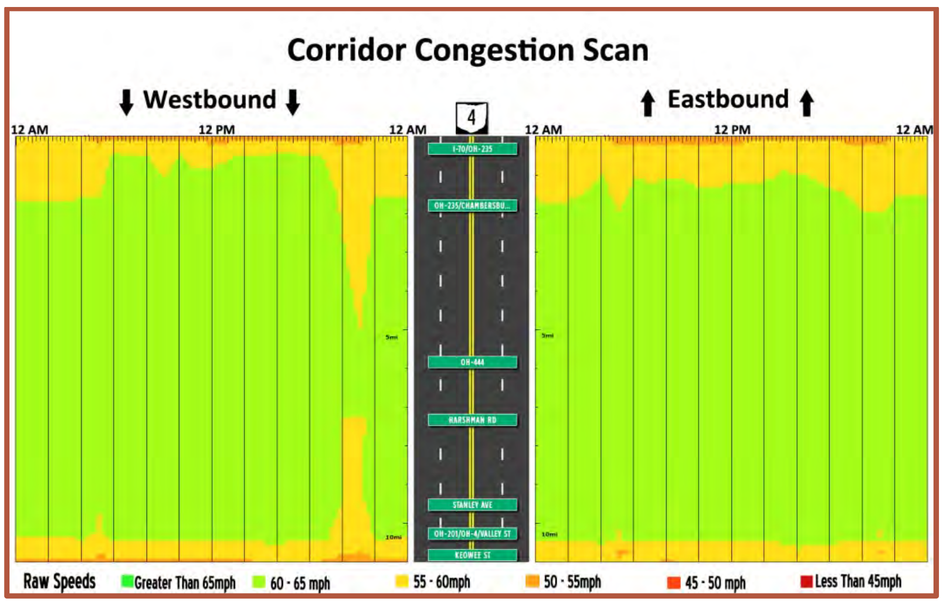
| Corridor Profile | | |
|---|---|---|
| **Length** | 7.34 miles | |
| **Functional Class** | Freeway / Other Principal Arterial | |
| **Access Control** | Limited (partial) | |
| **Lanes** | 4 | |
| **Intelligent Transportation Systems** | **Designated Corridor?** Yes – Partial; West of N. Fairfield Rd. | |
| | **ITS Deployment:** Camera, Dynamic Message Sign | |
| **Served by Transit?** | No | |
| **Part of National Freight Network?** | No | |
| **Intermodal Connector / Facility** | No | |
| **Corridor Summary Data** | | |
| **Daily Volume: 2010/2040 (est.)** | 39,600 | 52,100 |
| **Truck Volume: 2010/2040 (est.)** | 4,100 | 6,600 |
| **Posted Speed** | 50 mph – 55 mph | |
| **Average Speed (AM Peak Hour: 7-8AM)** | 58.6 mph | |
| **Average Speed (PM Peak Hour: 4-5PM)** | 53.4 mph | |
| **V/C Ratio: 2010/2040 (est.) – AM Peak** | 0.48 | 0.62 |
| **V/C Ratio: 2010/2040 (est.) – PM Peak** | 0.62 | 0.79 |
| **Travel Time Index (2013 – Peak Hours)** | 1.07 | |
| **Cost of Vehicle Delay (2013)** | $1,399,195 | |
| **Total Crash / Crash Rate (2011-2013)** | 462 crashes | 1.61 per MVMT |

## Other Corridor Characteristics

- The US 35 corridor, east of I-675, is primarily a rural corridor running east-west, connecting the cities of Beavercreek and Xenia, and surrounded by low density residential, commercial, and industrial uses.
- The GRE-35 project, that involves conversion of five existing at-grade intersections into two limited access interchanges, is currently under development along this corridor. When completed, the project will mitigate congestion and improve safety for both local residents and through travelers.

# Figure 2.13 — Corridor 10: SR 4- I-75 to I-70




## Profile & Statistics

| Corridor Profile | | |
|---|---|---|
| **Length** | 10.67 miles | |
| **Functional Class** | Freeway / Other Principal Arterial | |
| **Access Control** | Limited | |
| **Lanes** | 4 | |
| **Intelligent Transportation Systems** | Designated Corridor? Yes | |
| | ITS Deployment: Cameras | |
| **Served by Transit?** | Yes – Express Route 1A | |
| **Part of National Freight Network?** | No | |
| **Intermodal Connector / Facility** | Yes; Valley Street Pipeline Terminal | |
| **Corridor Summary Data** | | |
| **Daily Volume: 2010/2040 (est.)** | 21,600 | 28,700 |
| **Truck Volume: 2010/2040 (est.)** | 1,700 | 4,700 |
| **Posted Speed** | 50 mph – 60 mph | |
| **Average Speed (AM Peak Hour: 7-8AM)** | 61.5 mph | |
| **Average Speed (PM Peak Hour: 4-5PM)** | 61.6 mph | |
| **V/C Ratio: 2010/2040 (est.) – AM Peak** | 0.39 | 0.39 |
| **V/C Ratio: 2010/2040 (est.) – PM Peak** | 0.42 | 0.45 |
| **Travel Time Index (2013 – Peak Hours)** | 0.99 | |
| **Cost of Vehicle Delay (2013)** | $113,932 | |
| **Total Crash / Crash Rate (2011-2013)** | 152 crashes | 0.58 per MVMT |

## Other Corridor Characteristics

- SR 4 between I-75 and I-675 connects Dayton to Springfield and provides access to the Wright Patterson Air Force Base in Fairborn. SR 4 also provides access to an intermodal connector (the truck-pipeline terminal off Valley Street) and surrounding industrial areas.

### 2.4.5 Conclusions

Congestion is most noticeable on I-75 and US 35, reaching its highest levels during the evening peak period as shown in Figures 2.7, Figure 2.8, and Figure 2.12. On I-75, congestion levels are the highest between the Grand Avenue and Dryden Road exits in the northbound direction in the evening peak periods. This is primarily owing to the construction impacts of the ongoing phase 2 of the downtown subcorridor reconstruction project. The I-75 corridor, south of US 35, has the highest number of total crashes amongst all freeways in the Region as well as the largest cost associated with vehicle delays. On US 35, east of I-675, congestion is spread out over a larger daily time window in both directions primarily along the section in the corridor that has three at-grade intersections. This corridor also has the highest crash rate of 1.61 per MVMT of all analyzed corridors in the Region.

Over the past decade, MVRPC has funded a number of studies to address congestion on freeways. Several projects, including interchange modifications and freeway widening and reconstruction, are included in the LRTP to improve freeway performance. Intelligent Transportation Systems (ITS), have also been deployed to improve freeway performance. Each corridor profile provides a brief mention of recently completed or ongoing projects along that corridor to address congestion.

## 2.5 Recurring Congestion and Regional Freight Movement[1]

To minimize costs, the trucking industry requires a highly efficient and reliable freeway network for delivery of raw materials to manufacturers and goods to market. The combination of industry deregulation and investment in the highway system led to a growth in the cost-saving 'just-in-time' delivery system in the late 1980s and early 1990s. Just-in-time delivery relies on accurate information and a reliable transportation system to deliver raw materials and finished goods on an as needed basis, relieving the costs associated with on-site storage. The manufacturing and retailing industries have adapted to this tightly integrated and highly efficient transport system, generating vast savings for businesses, expanding the choices of available goods and services for consumers, and allowing U.S. businesses to compete in the global marketplace. However, roadway congestion can easily disrupt the delicate balance between productivity and transportation by increasing transport times, reducing delivery reliability, and raising transportation costs. These costs are inevitably passed along to shippers and consumers. Estimates produced by the Federal Highway Administration (FHWA) indicate that increases in travel times costs shippers and carriers an additional $25 to $200 per hour depending on the commodity.

Though truck volume patterns are heavily influenced by local economic activity, the presence — or absence — of large through-freight movements has a considerable effect on local recurring congestion. In the Dayton Region, I-70 and I-75 serve as the main transportation routes for interstate commerce. In association with the Miami Valley Freight Movement Study, MVRPC

[1] Sources: "2012 Urban Mobility Report" *Texas Transportation Institute* (2012) and "Miami Valley Freight Movement Study" *MVRPC* (2006).

conducted a freight movement workshop in 2006 for representatives of regional public and private stakeholders in the freight movement industry. As identified by the participants, several roadway segments in need of capacity improvements were noted as significant obstacles to the efficient movement of goods within the Region, including I-75 through downtown Dayton and US 35 in western Greene County.

According to the 2012 Urban Mobility Report by the Texas Transportation Institute, the value of all commodities moved by trucks in the Dayton urban area in 2011 was estimated to be over $34 billion. This corresponds to approximately 7.5% of the total commodity value moved by trucks in the state of Ohio. In 2011, the total annual truck delay was estimated to be about 686,000 hours in the Dayton urban area resulting in a truck congestion cost of $52 million. The modernization and reconstruction of I-75 through downtown Dayton, which is currently in progress, is projected to minimize the economic impact of roadway congestion along this major transportation artery.

The economic health of both the Region and the Nation depends on the regional transportation system to function properly and move people efficiently into and out of the Dayton Region. Since the Region's roadways carry a high volume of international trade and connect many high-profile industries, the importance of the interstate to commerce, and specially to trucking, cannot be overstated.

## 2.6 Recurring Congestion and Roadway Safety

Recurring roadway congestion can have a significant impact on regional roadway safety. It is a simple matter of exposure. The more tightly packed vehicles on the road, the more likely they are to come into contact with one another.

Furthermore, roadway congestion may cause some motorists to become more aggressive, showing behaviors such as speeding, tailgating, and sudden or frequent lane changes to maneuver around slower traffic. These behaviors often lead to severe, and occasionally fatal, traffic crashes. The more severe the crash, the longer it will take for emergency crews to clear the incident. If a crash takes place during periods of recurring congestion (peak period), the resulting traffic queue can grow to a great distance and last for a considerably longer period of time. Therefore, it is important to understand traffic crash patterns related to recurring congestion.

Figures 2.4 to 2.13 report total crashes and crash rates on each of the corridors selected for freeway corridor analysis. A detailed examination of roadway safety and congestion is presented in Chapter 3.

# Chapter 3 — Non-Recurring Congestion

## 3.1 Introduction

Non-recurring congestion occurs when random incidents or unplanned events temporarily reduce capacity on the transportation network and cause unexpected delay. These incidents can include vehicular crashes, breakdowns, inclement weather, construction, and special events. Non-recurring congestion can have large adverse impacts on roadway travel. According to research by the Federal Highway Administration, more than half (55%) of all congestion can be attributed to non-recurring incidents as shown in Figure 3.1.

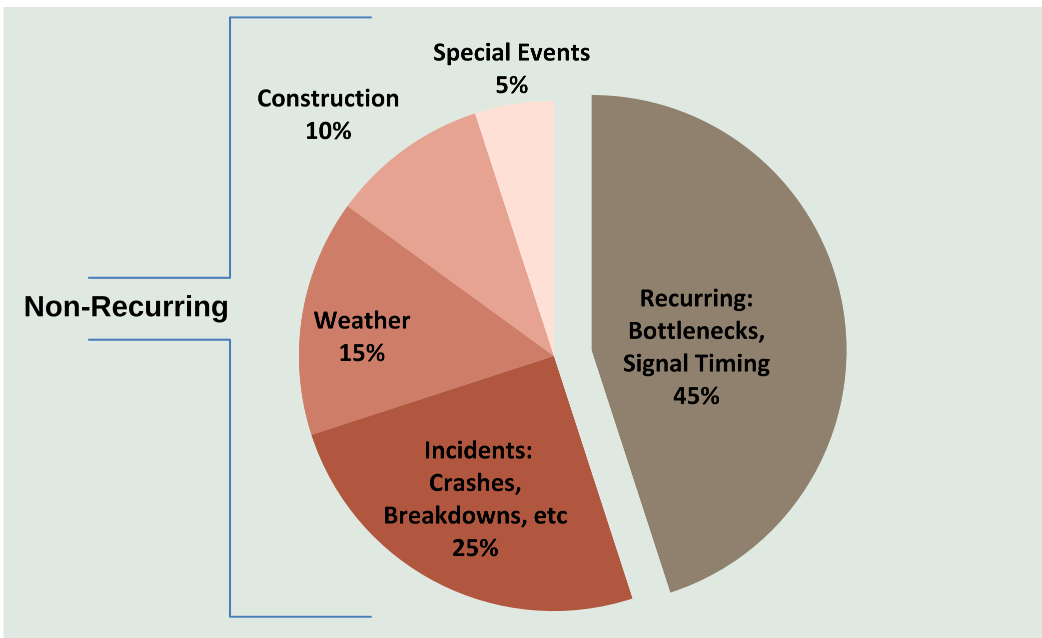



**Figure 3.1 — Causes of Congestion**

Source: "Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance", *FHWA* (2008)

The random characteristic of non-recurring incidents makes it difficult to identify, measure, and address this type of congestion. However, by using available data, we can begin to examine areas on the regional freeway network that are more prone to non-recurring congestion. A series of data sources were consulted for these examinations. Data of reported crashes that occurred from 2011 through 2013 was acquired from the Ohio Department of Transportation (ODOT). INRIX, a company that provides traffic and travel time information, sourced historical travel speed data. Internal MVRPC and ODOT sources were consulted for information regarding the location of construction projects. And finally, the transit information was gathered from the National Transit Database.

The following sections summarize the data to help identify locations on the regional freeway network most susceptible to non-recurring congestion. An understanding of where non-recurring congestion is likely to occur can allow transportation agencies to target locations for congestion management strategies.

## 3.2 Safety and Congestion

The relationship between roadway safety and congestion has two facets. First, congestion correlates to a diminishing of road safety. During times of recurring congestion, when the roadway is at or over capacity, there is usually an increase in crash frequency. These periods are usually during peak travel times in the morning (AM peak: 6 to 9AM) and evening (PM peak: 4 to 7PM). The chart in Figure 3.2 illustrates the percent of total crashes that occurred by hour and weekday. As indicated by the red colors, a higher percent of crashes occurred during the weekday AM and PM peak, than in the midday, early morning, late night or weekends.

| Day | 12A | 1A | 2A | 3A | 4A | 5A | 6A | 7A | 8A | 9A | 10A | 11A | 12P | 1P | 2P | 3P | 4P | 5P | 6P | 7P | 8P | 9P | 10P | 11P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sun | 0.5% | 0.3% | 0.5% | 0.4% | 0.2% | 0.2% | 0.3% | 0.3% | 0.2% | 0.2% | 0.3% | 0.3% | 0.4% | 0.6% | 0.7% | 0.6% | 0.7% | 0.7% | 0.7% | 0.4% | 0.5% | 0.4% | 0.4% | 0.4% |
| Mon | 0.3% | 0.2% | 0.3% | 0.3% | 0.3% | 0.4% | 0.7% | 15% | 0.8% | 0.7% | 0.5% | 0.7% | 0.7% | 0.7% | 0.7% | 0.8% | 10% | 11% | 0.5% | 0.6% | 0.4% | 0.5% | 0.4% | 0.2% |
| Tue | 0.4% | 0.3% | 0.2% | 0.3% | 0.3% | 0.4% | 0.7% | 12% | 0.9% | 0.5% | 0.8% | 0.7% | 0.7% | 0.7% | 10% | 10% | 12% | 13% | 0.8% | 0.2% | 0.4% | 0.6% | 0.3% | 0.3% |
| Wed | 0.2% | 0.3% | 0.2% | 0.1% | 0.2% | 0.4% | 0.6% | 16% | 12% | 0.5% | 0.5% | 0.4% | 0.6% | 0.7% | 0.9% | 0.8% | 11% | 14% | 0.8% | 0.6% | 0.6% | 0.3% | 0.4% | 0.3% |
| Thu | 0.3% | 0.3% | 0.2% | 0.2% | 0.2% | 0.2% | 0.5% | 10% | 10% | 0.5% | 0.7% | 0.9% | 0.9% | 0.8% | 10% | 10% | 14% | 15% | 0.8% | 0.5% | 0.6% | 0.4% | 0.4% | 0.3% |
| Fri | 0.4% | 0.3% | 0.2% | 0.3% | 0.3% | 0.4% | 0.8% | 12% | 10% | 0.7% | 0.6% | 0.9% | 0.8% | 0.7% | 10% | 12% | 13% | 18% | 11% | 0.9% | 0.6% | 0.6% | 0.6% | 0.6% |
| Sat | 0.4% | 0.4% | 0.4% | 0.4% | 0.2% | 0.3% | 0.3% | 0.4% | 0.5% | 0.8% | 0.5% | 0.6% | 0.6% | 0.6% | 0.6% | 0.8% | 0.6% | 0.4% | 0.6% | 0.5% | 0.4% | 0.4% | 0.4% | 0.3% |
| | | | | | | | | 17% **AM Peak** | | | | | 34% **Midday** | | | | | 21% **PM Peak** | | | | | | |

**Figure 3.2 — Percent of Crashes by Time and Day**

Crashes that occurred during the peak times were usually rear-end crashes. Rear-ending represented 40% of crashes that occurred during 6 to 9AM and 4 to 7PM as shown in Figure 3.3. These crashes were likely contributed by motorists following too closely on roads with heavy volumes.

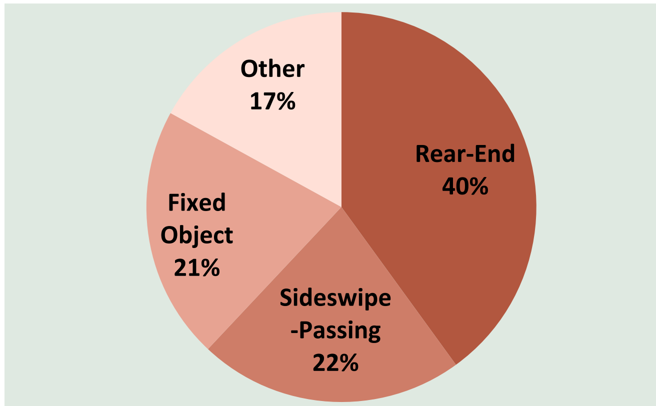



**Figure 3.3 — Top Crash Types During Peak (6-9AM, 4-7PM)**

The other facet of the relationship between safety and congestion is the occurrence of a crash incident contributing to congestion. As noted previously, traffic incidents, which include crashes, are a contributor of non-recurring congestion and are attributed to 25% of congestion (Figure 3.1). During the midday hours (9AM to 4PM) when the roadways are not at or near capacity, high traffic volumes are less likely contributing to congestion. Therefore, the effect of crashes contributing to non-recurring congestion is most evident during midday travel periods.

To identify areas on the regional freeway network that may be prone to non-recurring congestion, an analysis was performed on crashes occurring during midday period. Segments of the freeway with frequent midday crashes are identified in the map in Figure 3.4. These freeway segments have a higher potential for significant non-recurring congestion due to crashes. These segments had 10 or more total crashes from 2011 through 2013, with at least 1/3 of those crashes occurring midday.

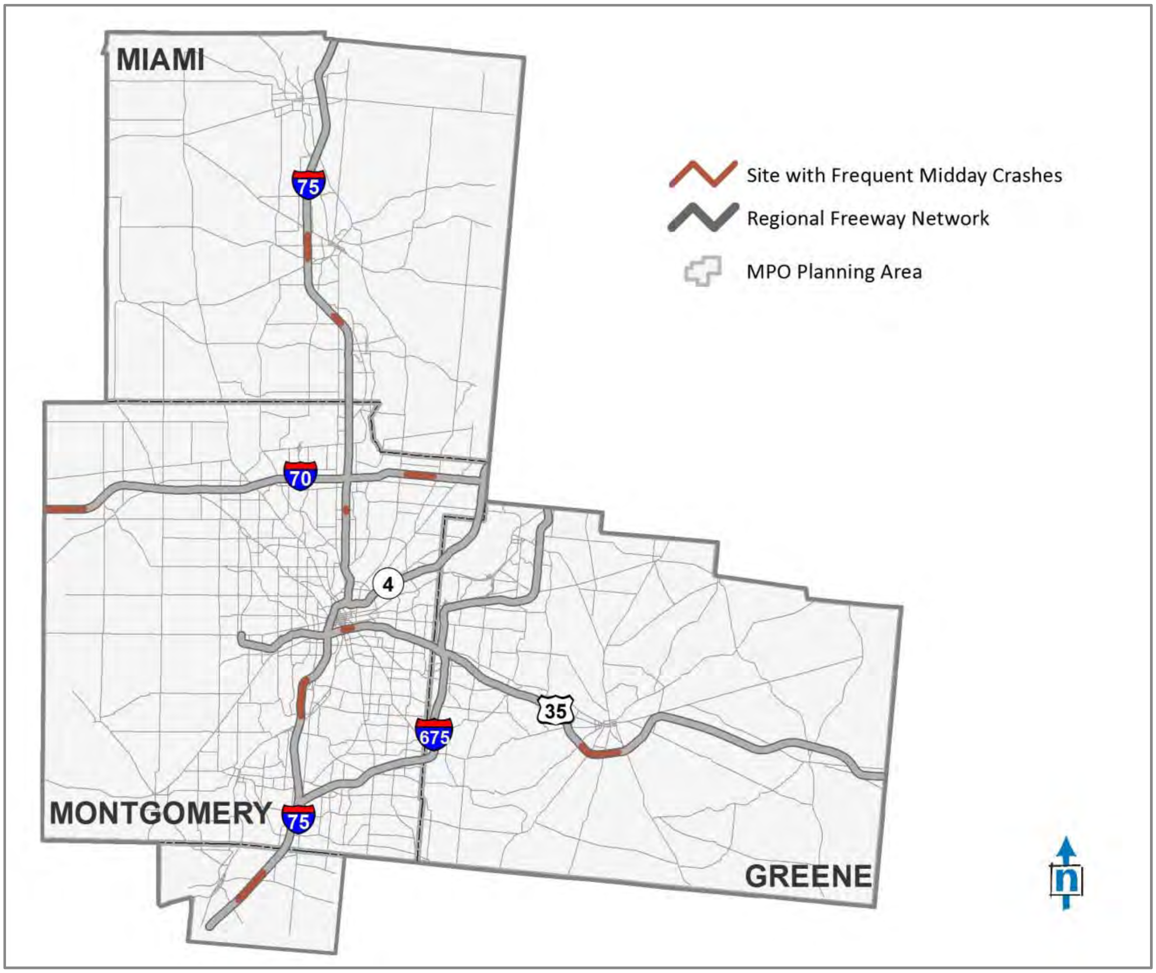



**Figure 3.4 — Freeway Segments with Frequent Midday Crashes**

By examining travel speed data collected from INRIX, we were further able to identify the relationship between crashes and congestion. The INRIX data included the average speeds for segments on the freeway network during each hour in the three years from 2011 through 2013. Times when freeway segments experienced a 50% or greater decrease in normal travel speeds were compared to the crash data to identify correlations. The map shown in Figure 3.5 illustrates locations on the regional freeway network where there were crashes 1 hour before or during the hour of travel speeds 50% slower than normal.

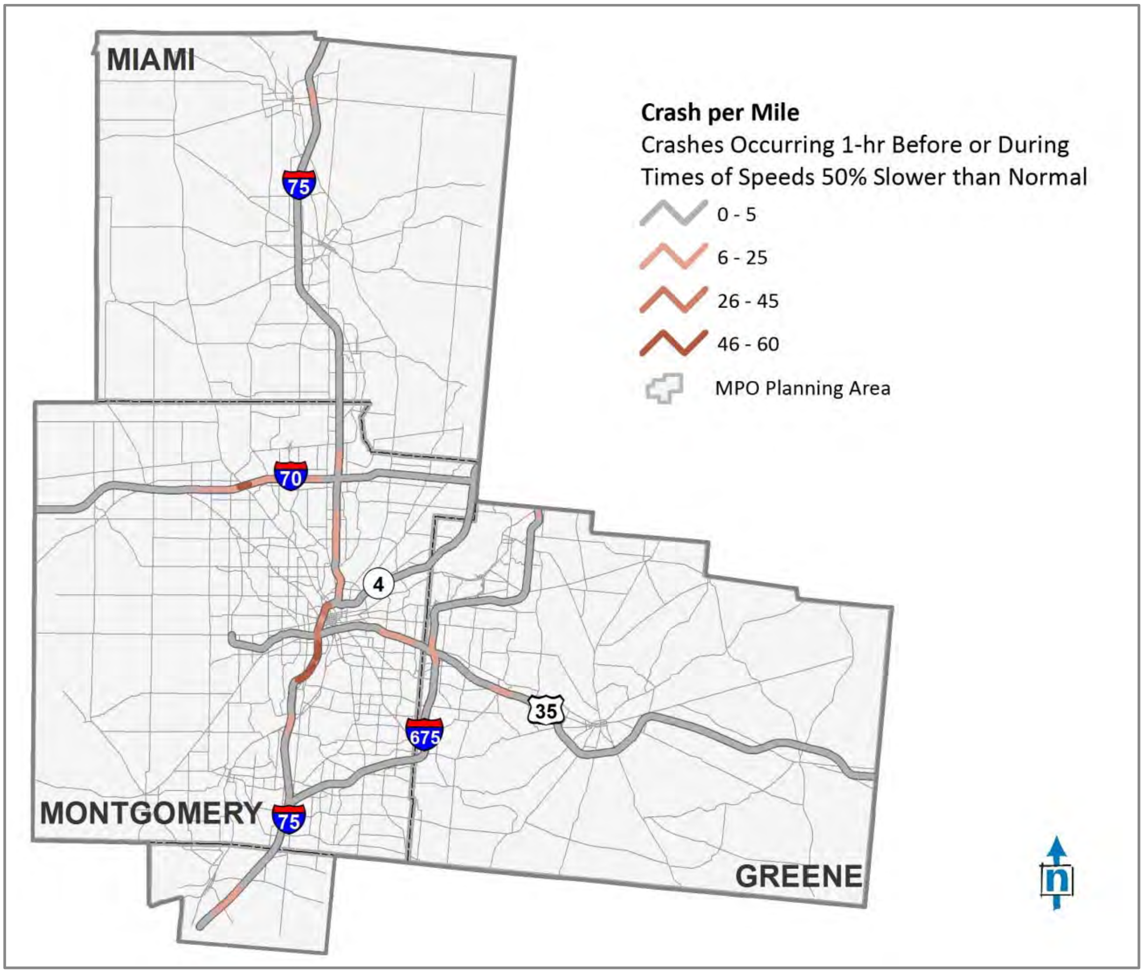



**Figure 3.5 — Crashes During Slow Travel Speeds**

Overall, 521 crashes occurred 1 hour before or during times of slow travel speeds. This represented 7% of all freeway crashes from 2011 through 2013. On average, these crashes correlated to a 68% decrease in travel speeds.

Data from INRIX was also insightful in providing further information on the impact of incidents, such as crashes, on the freeway system. For example, in 2013 the average duration of major non-recurring incidents was 98 minutes. These major incidents included crashes, occasional roadwork, obstructions, inclement weather, and other non-recurring events.

## 3.3 Construction and Congestion

As aforementioned, construction activities are considered a factor of non-recurring congestion and contribute up to 10% of roadway congestion. The map shown in Figure 3.6 illustrates roadway construction projects scheduled from 2011 through 2014 on the freeway system.

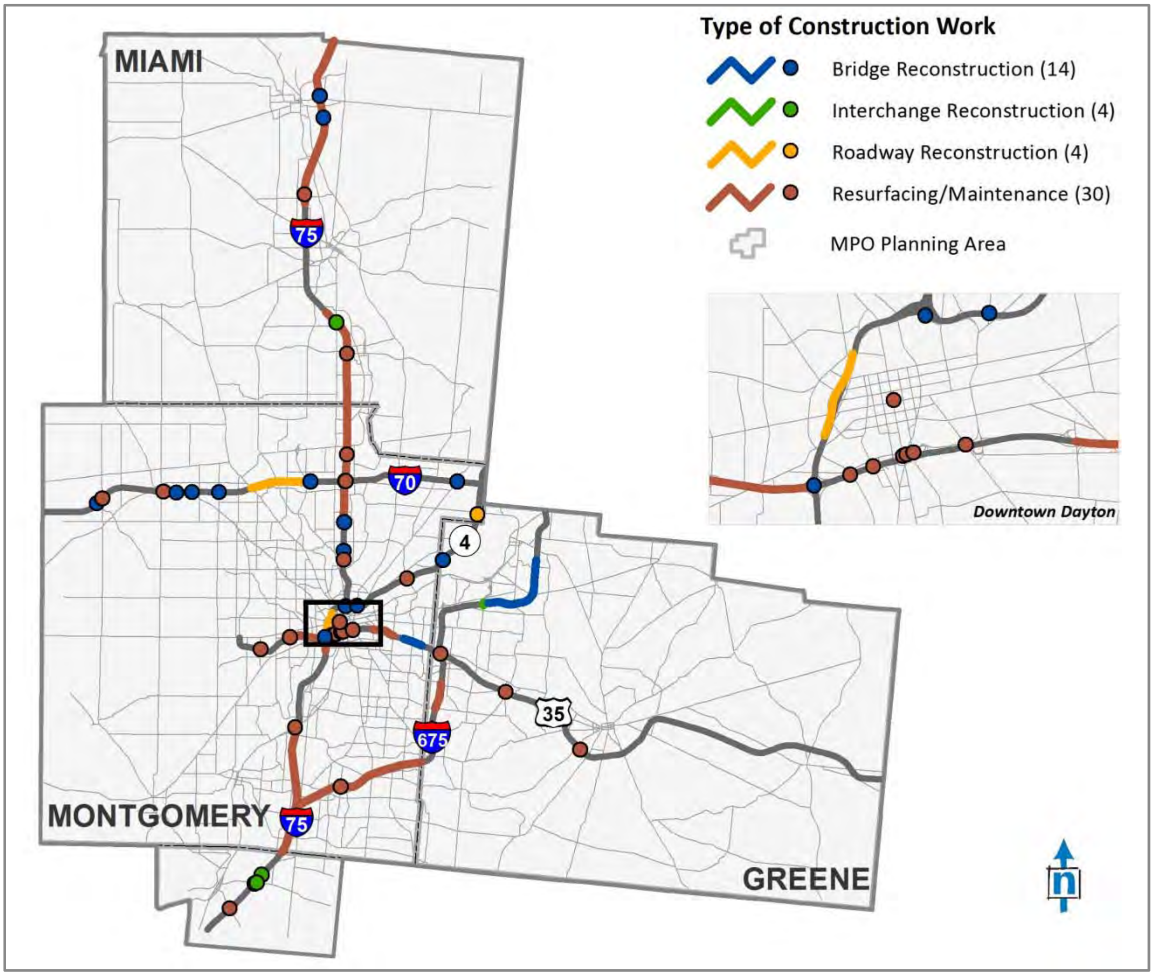



**Figure 3.6 — Scheduled Construction Projects (2011 to 2014)**

Different types of construction projects are mapped because road work can have varying impacts on congestion. Minor projects, such as roadway resurfacing and maintenance, may require only a short-term work zone to perform the necessary work, limiting the potential for extensive non-recurring congestion. However, more significant projects, such as interchange reconstruction, can require considerable alteration to normal lane and/or ramp configurations, increasing the likelihood for congestion. Mapping the location of these projects on the freeway can begin to indicate areas in the network that may be prone to non-recurring congestion.

The impact of construction projects on non-recurring congestion can be further exacerbated by the pairing of roadway crashes in construction work zones. From 2011 through 2013 there were 824 crashes that were reported to occur in work zones on the regional freeway network. Eleven percent (11%) of all crashes that occurred on the freeway network were in work zones. Comparatively, in Ohio, 6.3% of freeway crashes occurred in work zones. The map in Figure 3.7 visualizes the percentage crashes in work zones on the freeway system.

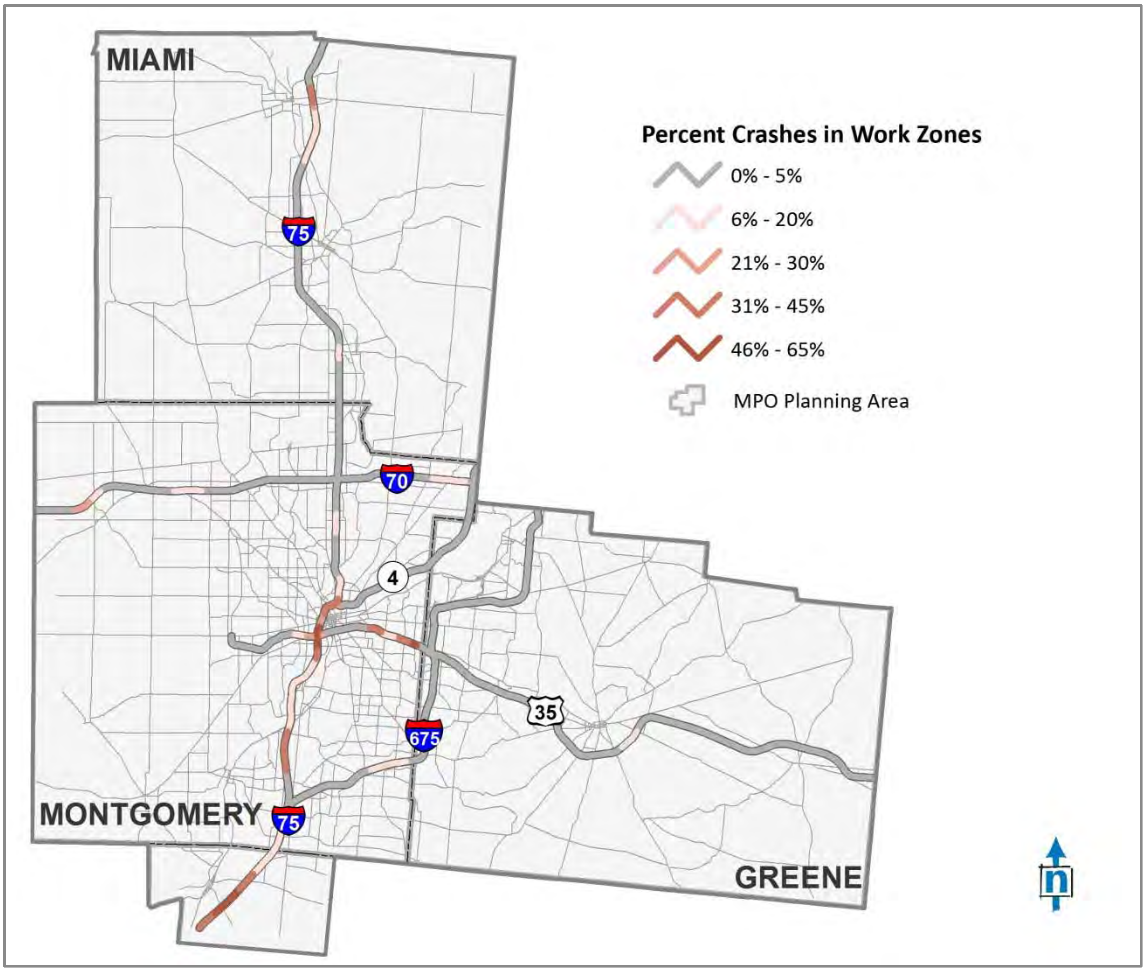



**Figure 3.7 — Percent of Crashes in Work Zones**

Further examination of the work zone crashes reveals the top contributing factors of these crashes. Twenty-nine percent (29%) of crashes in work zones were attributed to motorists following-too-closely, 17% were improper lane change, and 15% were drivers' failure to control the vehicles. The chart in Figure 3.8 indicates these and other top contributing factors. These top contributing factors are similar to the statewide trends for work zone crashes on freeways, where 35% were following-too-closely, 20% improper lane change, and 11% failure to control.

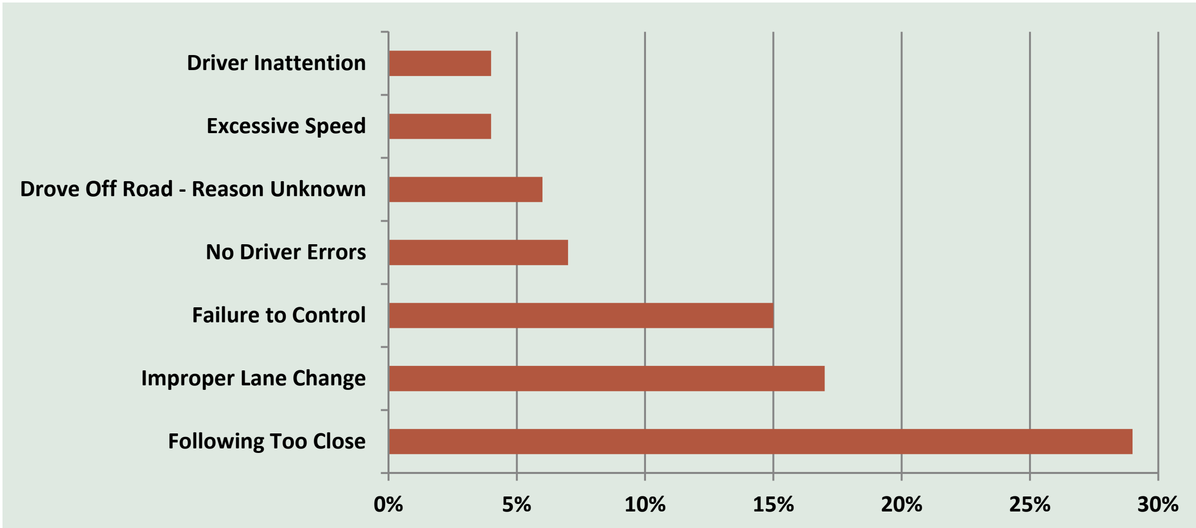



**Figure 3.8 — Percent of Contributing Factors Attributed to Crashes in Work Zones**

## 3.4 Transit Incidents

The importance of a robust transit system as a strategy for congestion management is explained in the following chapter on Public Transportation. However, similar to the roadway network, unplanned incidents in the transit system can cause non-recurring congestion or delays. Based on data reported to the National Transit Database, an average of 0.27 incidents occurred on the Region's three transit systems for every 100,000 passenger trips taken from 2011 to 2013. These incidents include collisions, falls, vehicles leaving roadway, and more. Table 3.1 compares the 3-year average incident rate for each of the Region's three transit systems. Miami Country Public Transit had the highest rate, with 7 incidents occurring in the three years, and 125,939 trips for a rate of 5.56 incidents per 100,000 trips. The Ohio statewide average rate was 0.31 and 0.21 nationally.

**Table 3.1 — Incidents for Every 100,000 Trips on Transit Systems, 2011 to 2013**

| | Incidents | Passenger Trips | Incidents per 100,000 Trips |
|---|---|---|---|
| Miami County Public Transit | 7 | 125,939 | 5.56 |
| Greater Dayton RTA | 72 | 29,176,794 | 0.25 |
| Greene County Transit | 1 | 517,925 | 0.19 |

In summary, non-recurring congestion can be a factor for up to 50% of the decreases in mobility experienced on roadways. Vehicular crashes, inclement weather, and construction are seemingly random and unplanned incidents, and so make non-recurring congestion difficult to measure and counteract. This section provided analyses of available data to examine locations on the regional freeway network that may be prone to experience a higher rate of non-recurring congestion. Locations with frequent midday crashes, freeways with scheduled construction projects and segments with a high rate of work zone crashes can be targeted with specific congestion management strategies. Strategies that generally improve the safety and reliability of the freeway can be applied to these locations to reduce the possibility of the roadway experiencing non-recurring congestion. Chapter 5 of this report outlines applicable congestion management strategies.

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# Chapter 4 — Public Transportation

## 4.1 Role of Public Transportation in Congestion Management

An important tool to manage recurring and non-recurring congestion is the regional public transportation system. Public transportation provides people with mobility and access to employment, community resources, medical care, and recreational opportunities in communities across the Region. It also has the potential to significantly reduce congestion on the regional roadway network. The role of public transit in roadway congestion management is to give commuters an alternative to the automobile for local trips. The Miami Valley Region is served by three transit agencies including the Greater Dayton Regional Transit Authority (GDRTA), offering fixed route services; GreeneCATS, offering deviated fixed route and demand responsive services; and Miami County Public Transit (MCPT) and Warren County Transit Service (WCTS) offering demand responsive services only (Figure 4.1).

## 4.2 Miami Valley Public Transit Agencies Overview

| Greater Dayton Regional Transit Authority (GDRTA) |
|---|
| **• Transit service (fixed-route and paratransit) is available with services that cover most of Montgomery County as well as Wright Patterson Air Force Base and Wright State University in Greene County.** |
| **• GDRTA operating characteristics:**<br>**• Monday – Friday, 4:30 AM – 1:30 AM; Saturday 5:00 AM – 1:30 AM; and Sunday, 5:00 AM – 1:30 AM.**<br>**• Approximately 10,000,000 passenger trips per year.** |
| **• Twenty-eight fixed-routes that include 9 local routes within the city of Dayton, 7 radial routes providing service between downtown and suburban areas, 4 cross-town routes, 3 rural routes, 3 express routes, and 2 neighborhood circulators.** |
| **• Twenty fixed-routes operate on Saturday and Sunday.** |
| **• Ten routes run with a frequency of 30 minutes or less during peak hours and 19 routes operate after 7:00 PM on weekdays.** |
| **• Two EZ Ride fixed-route services for seniors on weekdays, operating between senior apartment complexes and nearby shopping centers.** |
| **• Four limited-stop routes providing transportation service to public schools within Montgomery County, Monday - Friday during the academic year.** |
| **• Operates electric trolley buses on seven of the local routes in the city of Dayton.** |
| **• Complementary ADA paratransit service known as Project Mobility within ¾-mile and during the same operating times of their fixed-routes.** |

## GreeneCATS

• Flex-route transit service is available through the Greene County Transit Board (Greene CATS) circulating and connecting the communities of Beavercreek, Fairborn, Xenia, and Yellow Springs. A flex express route that connects Xenia to downtown Dayton is also provided.

• Greene CATS operating characteristics:

- Five routes Monday – Friday, 6:00 AM – 6:00 PM, with trips operating at a 90-minute frequency.
- Two trips on one route Monday – Friday, 8:50 PM – 12:00 AM, which connects all four communities (Beavercreek, Fairborn, Yellow Springs, and Xenia).
- All flex routes deviate up to ¾ miles to pick up or drop off passengers.
- Demand response service Monday – Sunday, 6:00 AM – 9:00 PM.
- Approximately 180,000 passenger trips per year.

• Greene CATS coordinates with the Greater Dayton Regional Transit Authority (GDRTA) at GDRTA's East Town and Wright Stop Plaza transit centers in addition to GDRTA's route to the Wright Patterson Air Force Base (WPAFB) and Wright State University.

## Miami County Public Transit (MCPT)

• Miami County Public Transit (MCPT) offers countywide demand response service for the general public. The service includes trips to two Greater Dayton RTA bus stops and two miles past the county line to Vandalia or Huber Heights in Montgomery County.

• MCPT operating characteristics:

- Monday – Friday, 5:00 AM – 6:00 PM.
- Saturdays, 8:00 AM – 2:00 PM.
- Approximately 60,000 passenger trips per year.

## Warren County Transit Service (WCTS)

• Warren County Transit Service (WCTS) offers demand response service throughout the county. WCTS also provides limited services to Dayton. The service is open to the general public.

• WCTS operating characteristics:

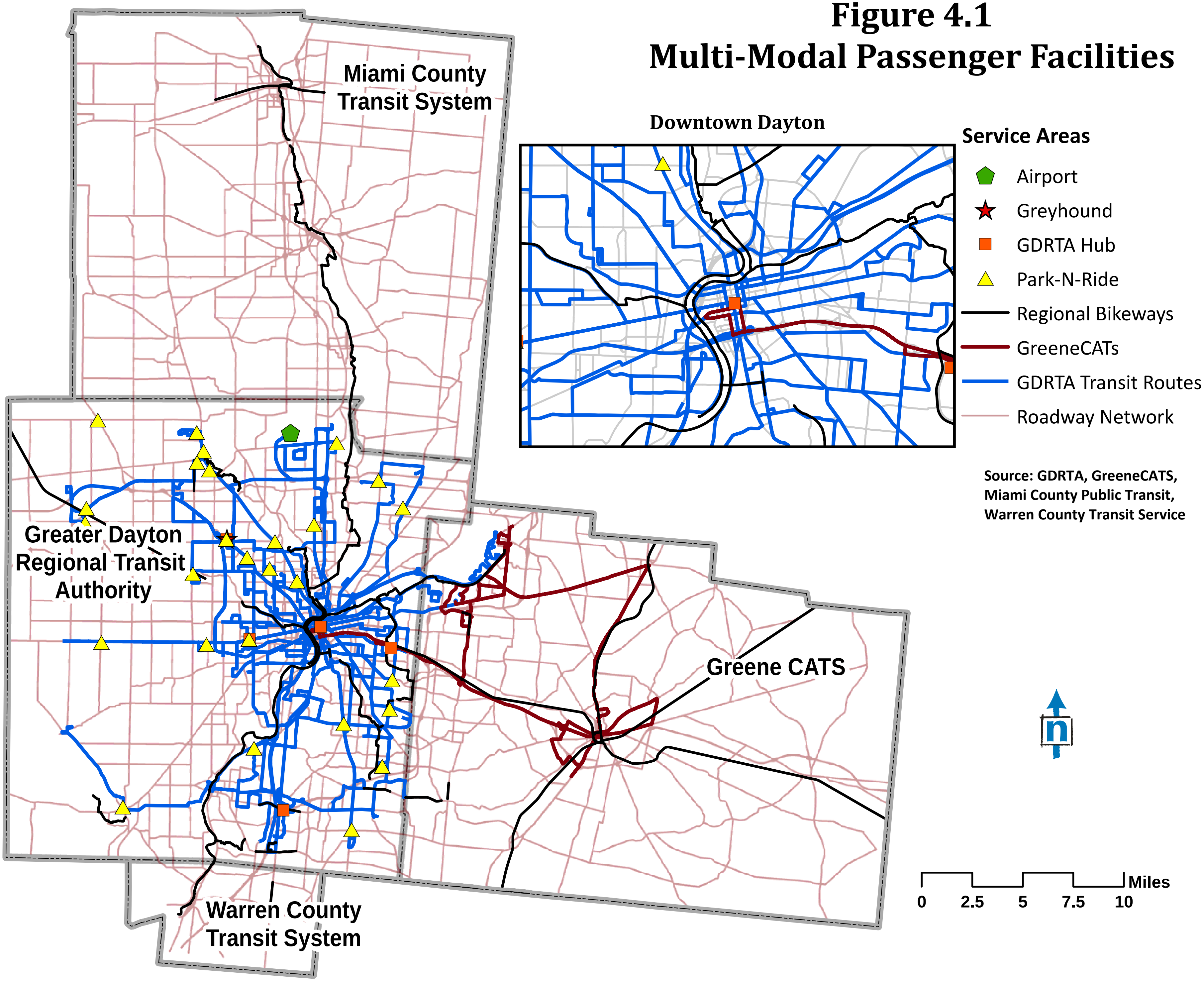
- Monday – Friday, 6:00 AM – 6:30 PM.
- Connects at the South Transit Center in Montgomery County with GDRTA.
- Approximately 66,000 passenger trips per year.

mvrpc

**Congestion Management Process**

**Technical Report, May 2015**

# Figure 4.1
# Multi-Modal Passenger Facilities





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## 4.3 Average Daily Ridership

### 4.3.1 Greater Dayton Regional Transit Authority

Ridership for the Region's largest fixed route system declined slightly from its 2007 Average Daily Ridership at both peak and off peak hours. Figure 4.2 shows the slight decrease in average daily ridership numbers from 2007- 2010 system-wide.

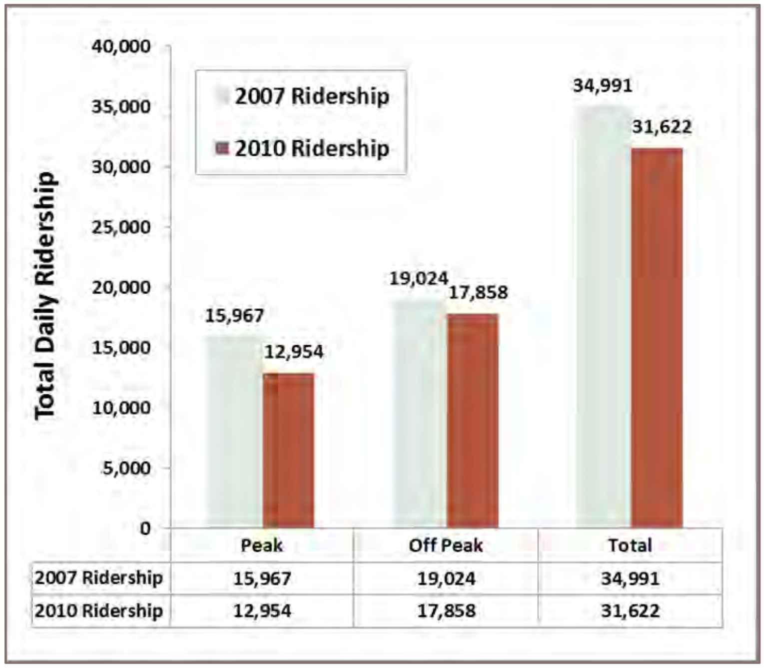



**Figure 4.2 — GDRTA Average Daily Ridership 2007-2010**

Source: GDRTA

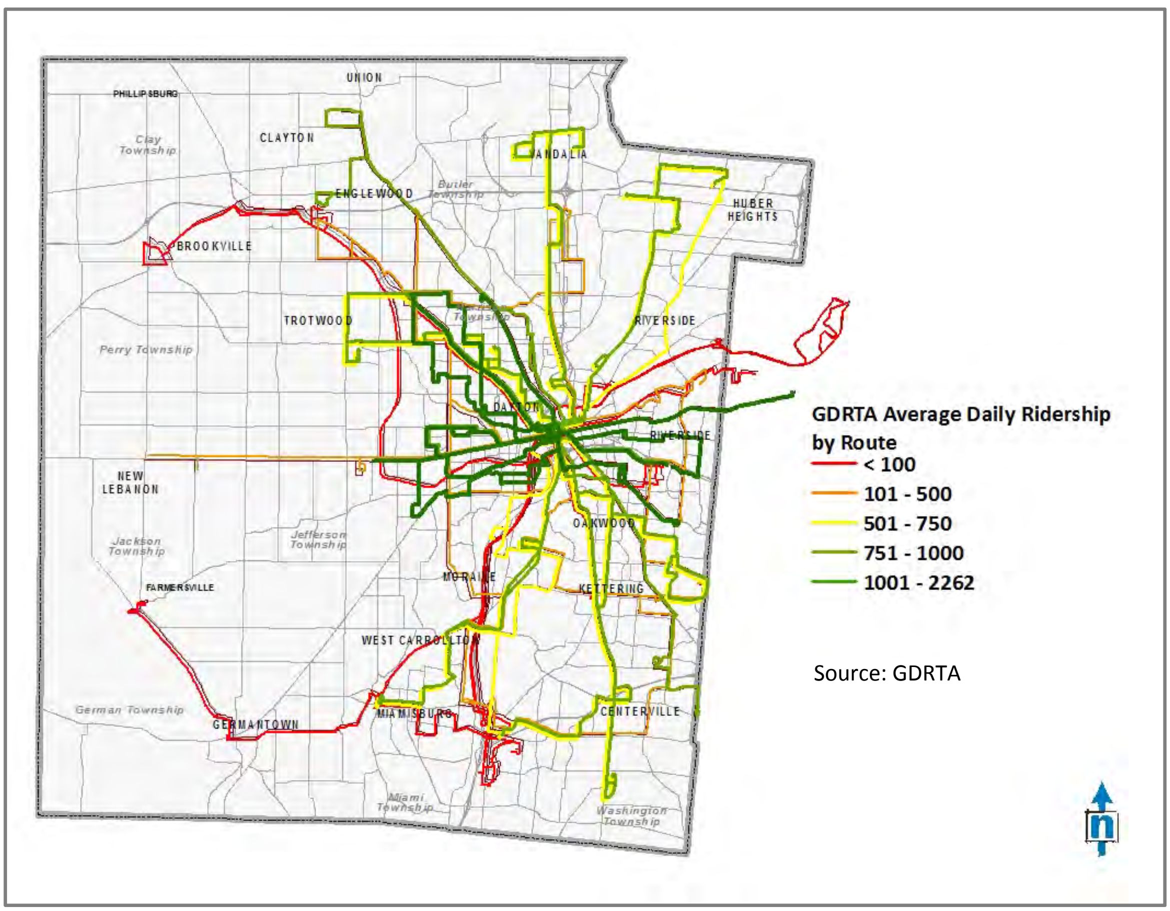
Corridors with the highest daily ridership, totaling over 1,000 passengers a day, include the North-South Salem Avenue Corridor, the North-South Main Street Corridor, as well as the East-West Third Street Corridor. Routes with the highest average daily ridership were located within the Dayton city limits, servicing the most transit dependent neighborhoods, particularly Dayton's west side.

Table 4.1 shows the GDRTA routes with the highest average daily ridership, with over 1,000 passengers per day. Figure 4.3 displays a system wide map of the routes and their average daily ridership.

## Table 4.1 — GDRTA Routes with Top Average Daily Ridership

| Route Number | Route Name | 2010 Peak 4:30AM-9:30AM; 2:30PM-6:30PM | 2010 Off Peak 9:30AM-2:30PM; 6:30-1:00AM | 2010 Total 4:00AM-2:00AM |
|---|---|---|---|---|
| 8N | Salem Ave.-Northwest Hub | 867 | 1,395 | 2,262 |
| 7N | N. Main St. | 903 | 1,146 | 2,049 |
| 8S | Nicholas-Westown Hub | 732 | 1,041 | 1,773 |
| 9S | Miami Chapel | 714 | 1,044 | 1,758 |
| 7S | Watervliet | 755 | 862 | 1,617 |
| 9N | Greenwich Village | 504 | 868 | 1,372 |
| 1W | W. Third-Drexel | 570 | 793 | 1,363 |
| 4W | Hoover-Delphos | 514 | 780 | 1,294 |
| 2E | Linden Ave.-Eastown Hub | 529 | 687 | 1,216 |
| 1E | E. Third-Mount Crest | 459 | 685 | 1,144 |
| 2W | Otterbein-Lexington-Turner | 404 | 689 | 1,093 |

Source: GDRTA




## Figure 4.3 — Greater Dayton RTA 2010 Average Daily Ridership by Route

### 4.3.2 GreeneCATS

Ridership for the Greene County flex-route service provider has steadily increased from 2011-2013. Annual ridership increased from approximately 45,000 flex route riders in 2011 to approximately 67,000 riders in 2012. Ridership for 2013 was on pace to increase to 80,000 passenger trips through July 2013. Table 4.2 below displays the system-wide Average Daily Ridership for 2013 for each flex route.

**Table 4.2 — GreeneCATS 2013 Ridership Statistics**

| Flex Route | Service Area | Total Ridership | Average Daily Ridership |
|---|---|---|---|
| Blue/ Yellow | Blue: (Fairborn Circulator); Yellow: (Xenia-Yellow Springs-Fairborn Connector) | 30,053 | 120 |
| Red | Xenia- Dayton Connector | 14,024 | 56 |
| Green | Xenia Circulator | 14,409 | 58 |
| Orange | Beavercreek Circulator | 9,985 | 40 |
| Purple | Late Night Connector | N/A | N/A |

Source: GreeneCATS

## 4.4 Load Factor Analysis

Transit is less attractive when passengers must stand for long periods of time, especially when transit vehicles are highly crowded. When passengers must stand, it becomes difficult for them to use their travel time productively, which eliminates a potential advantage of transit over the private automobile. Crowded vehicles also slow down transit operations, as it takes more time for passengers to get on and off[1]. Load factor is a measure of ridership compared to seating capacity of a route for a given period of time. Similar to level of service on roadways, the relative comfort that a passenger may experience while seated on a transit vehicle is given a level of service label of A through F as seen in Table 4.3. A load factor of 1.0 means that all seats are taken.

**Table 4.3 — Transit Vehicle LOS and Load Factor [2]**

| LOS | Load Factor | Passenger Conditions |
|---|---|---|
| A | 0.00-0.50 | No passenger needs to sit next to another |
| B | 0.51-0.75 | Some passengers may need to sit together, but not all |
| C | 0.76-1.00 | All passengers may sit together, limited seat choice |
| D | 1.01-1.25 | Some passengers will need to stand |
| E | 1.26-1.50 | Full vehicle, spacing between passengers at maximum level of tolerability |
| F | >1.50 | Crush load, extremely intolerable |

[1]Transit Capacity and Quality of Service Manual—2nd Edition
[2] TCRP Report 100: Transit Capacity and Level of Service Manual 2003

Table 4.4 below shows all GDRTA fixed routes that experienced a LOS D or worse for each specific time period.

## Table 4.4 — Maximum Load Factor Level of Service

| Maximum Load Factor Level of Service AM Peak (4:30AM-9:30AM) | | | | |
|---|---|---|---|---|
| **Route Name** | **Route Name** | **Peak Headway** | **Load Factor AM Peak** | **LOS AM Peak** |
| **12N** | Five Oaks | 30 | 1.48 | E |
| **8N** | Salem Ave.-Northwest Hub | 15 | 1.41 | E |
| **9S** | Miami Chapel | 25 | 1.24 | D |
| **9N** | Greenwich Village | 25 | 1.11 | D |
| **7N** | N. Main St. | 15 | 1.05 | D |
| **17N** | Vandalia | 30 | 1.03 | D |
| **Maximum Load Factor Level of Service PM Peak (2:30PM-6:30PM)** | | | | |
| **Route Name** | **Route Name** | **Peak Headway** | **Load Factor PM Peak** | **LOS PM Peak** |
| **8N** | Salem Ave.-Northwest Hub | 15 | 1.85 | F |
| **12N** | Five Oaks | 30 | 1.72 | F |
| **8S** | Nicholas-Westown Hub | 15 | 1.68 | F |
| **9N** | Greenwich Village | 25 | 1.47 | E |
| **1W** | W. Third-Drexel | 20 | 1.26 | E |
| **7N** | N. Main St. | 15 | 1.17 | D |
| **9S** | Miami Chapel | 25 | 1.03 | D |
| **Maximum Load Factor Level of Service Off Peak (9:30AM-2:30PM, 6:30PM-1:00AM)** | | | | |
| **Route Name** | **Route Name** | **Off Peak Headway** | **Load Factor Off Peak** | **LOS Off Peak** |
| **12N** | Five Oaks | 25 | 1.38 | E |
| **9S** | Miami Chapel | 25 | 1.29 | E |
| **9N** | Greenwich Village | 25 | 1.21 | D |
| **19S** | Moraine-South Hub | 60 | 1.18 | D |
| **14N** | Trotwood | 60 | 1.16 | D |
| **7N** | N. Main St. | 20 | 1.12 | D |
| **16N** | Union | 60 | 1.08 | D |
| **19N** | Huber Heights | 60 | 1.08 | D |
| **7S** | Watervliet | 20 | 1.05 | D |
| **14S** | Centerville | 60 | 1.05 | D |

Source: GDRTA

The results of the Load Factor analysis indicate that the majority of the GDRTA routes are experiencing Levels of Service less than 1.0 with acceptable levels of passenger congestions. Only routes 1W, 7N/S, 8N/S, 9N/S, 12N, 14N/S, 17N, 19N/S experience passenger congestion greater than 1.0 during one or more time periods. Most of these routes correlate directly with routes that experienced the highest average daily ridership and operate in the Region's most transit dependent areas.

## 4.5 Accessibility Analysis

Using ¼ and ½ mile buffers from the 2014 GDRTA fixed transit lines; the accessibility of transit was measured with respect to the location of population and employment in Montgomery County. Montgomery County is the only county in the Region analyzed because it is the only county regularly served by fixed-transit routes. Transit lines were used as the basis of the analysis because it was determined that bus stops were spaced frequently enough (spaced less than ¼ mile apart). The transit buffers were superimposed using GIS onto the Traffic Analysis Zones (TAZ) demographic data to identify how much access the general population, as well as certain target population groups, has to transit in the Region.

Using the assumption that population is evenly distributed throughout the underlying buffer areas, the percentage of the general population and target population groups covered in the buffer was calculated using 2010 Census data. The results indicate that 60.4% of the general population and 75% of total employment is located within ¼ mile of transit. Increasing the buffer to ½ mile increased the general population and total employment covered to 79.5% and 89.3% respectively. Figure 4.4 displays the results of the analysis.

## 4.6 On-Time Analysis

Reliability affects the amount of time passengers must wait at a transit stop for a transit vehicle to arrive, as well as the consistency of a passenger's arrival time at a destination from day to day. Reliability also affects a passenger's total trip time: if persons believe a transit vehicle may depart early, they may arrive earlier than they would otherwise to ensure not missing the bus. Similarly, if passengers are not confident of arriving at their destination on time, they may choose an earlier departure than they would otherwise, to ensure that they arrive on time, even if it means often arriving much earlier than desired.[1] An unreliable transit system can even discourage a potential rider from using transit, if they do not believe it will be an efficient use of time or an effective mode of transportation.

Reliability is influenced by a number of factors, some under the control of transit operators and some not. These factors can include: traffic conditions, road construction, route length, number of stops, and schedule achievability amongst other potential factors. In 2010, GDRTA's on-time average was 79.1% system wide. The GDRTA has a goal of increasing on-time percentage to 90%.[2] Figure 4.5 displays a system wide map the on-time percentage for each route.

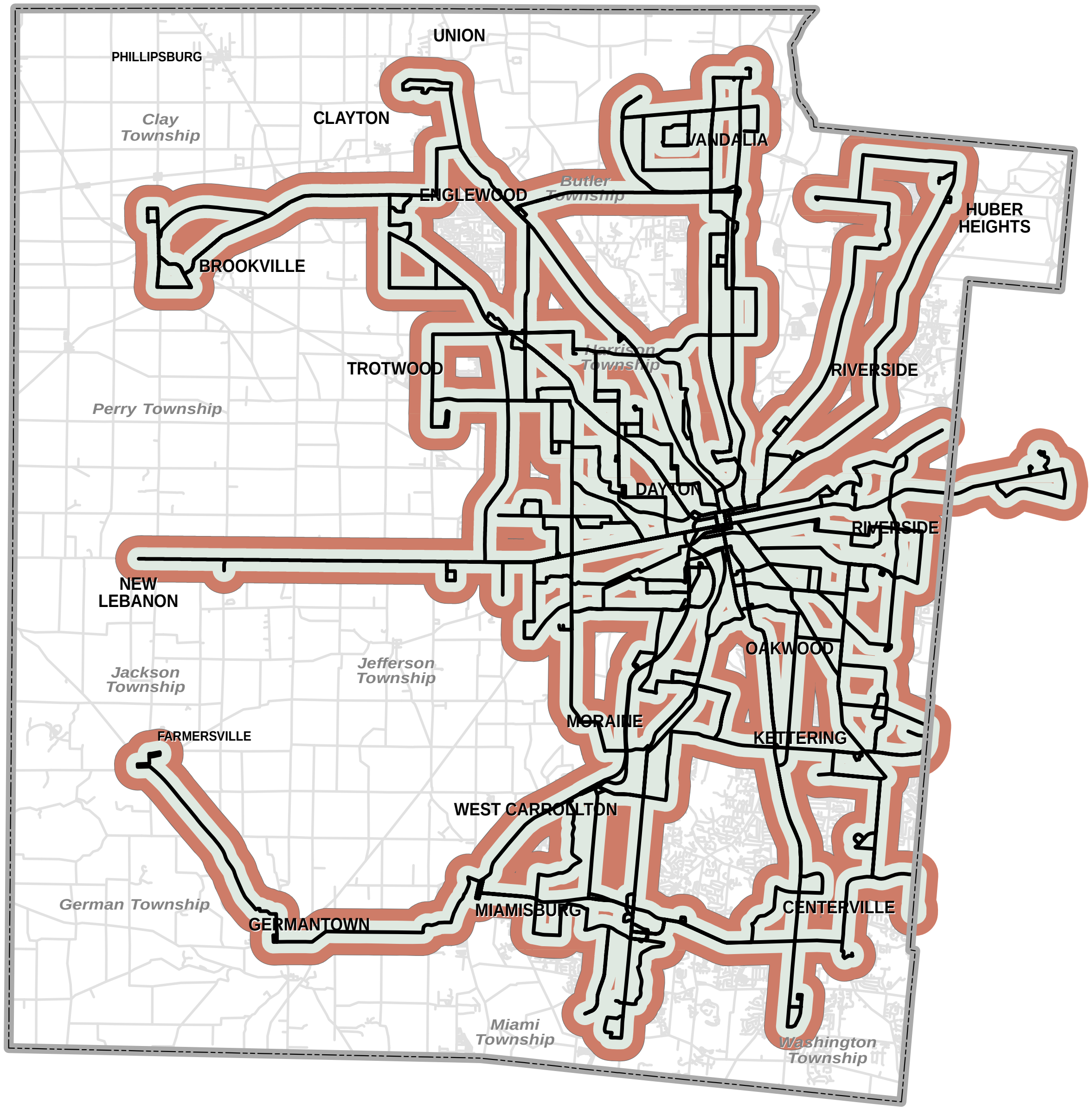
[1] Transit Capacity and Quality of Service Manual—2nd Edition.
[2] 2012-2015 RTA Strategic Plan

mvrpc

Congestion Management Process

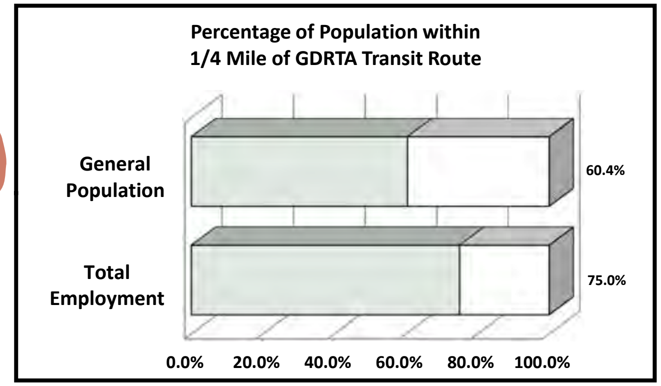
Technical Report, May 2015

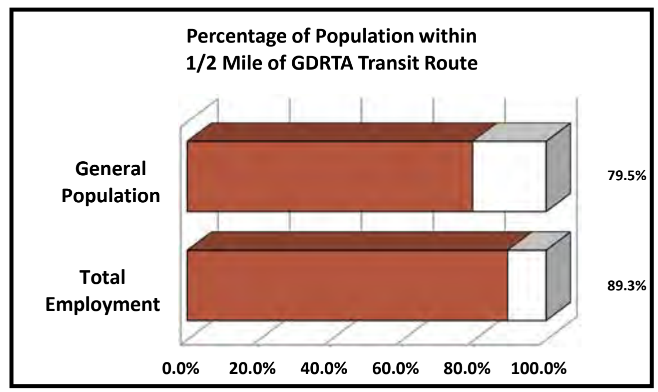
# Figure 4.4
# Transit Accessibility Analysis




## Service Areas

- 2014 GDRTA Transit Routes
- 1/4 Mile Buffer
- 1/2 Mile Buffer




* Express Routes are not inlcuded.

Source: 2014 GDRTA bus routes;
2008-2012 American Community Survey;
2010 U.S. Census

0 1.5 3 4.5 6 Miles

n


Miami Valley
Regional Planning Commission
10 N Ludlow St, Ste 700
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Fax (937) 223-9750
Web www.mvrpc.org

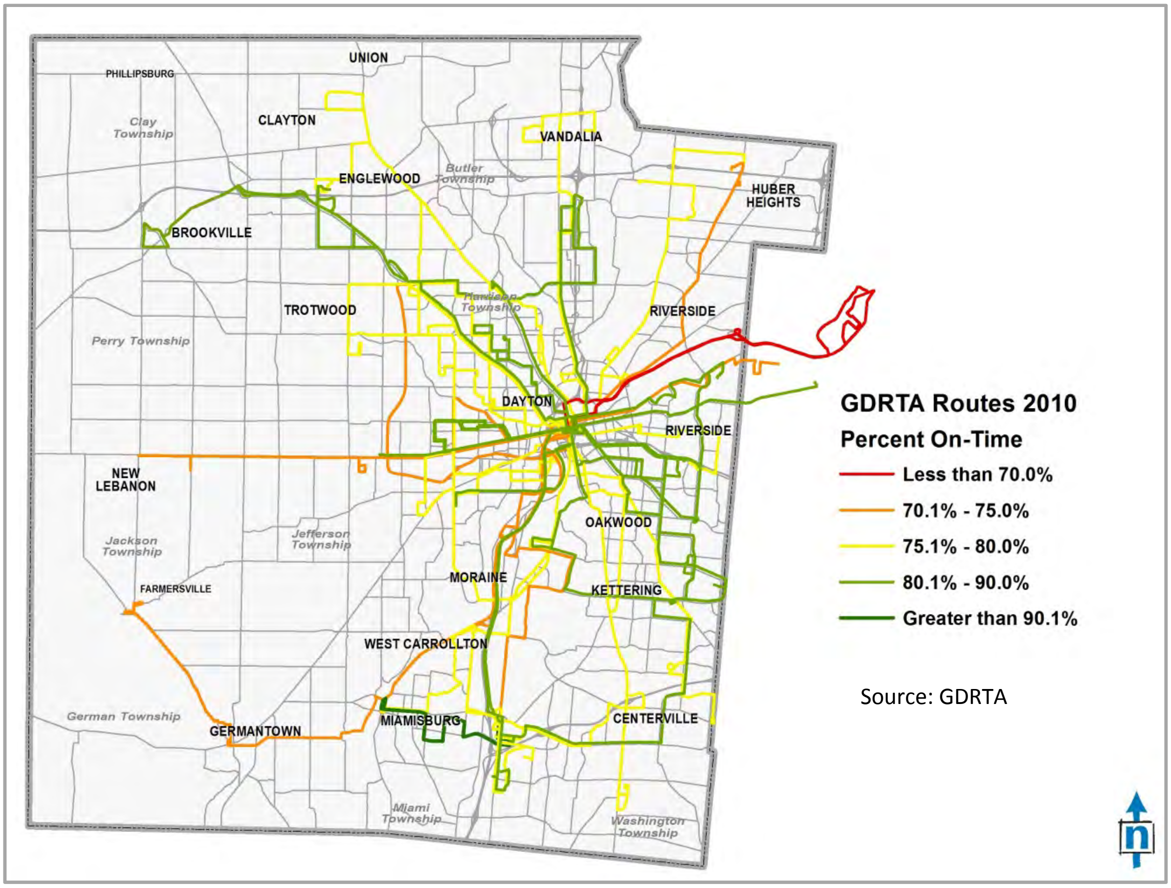


**Figure 4.5 — Greater Dayton RTA 2010 On-Time Percentage by Route**

## 4.7 Regional Analysis

The vast majority of the Miami Valley Region population commutes by single occupancy vehicle. Transit remains a very small portion of the regional commuting profile. Being that Montgomery County is served by the largest and only fixed-route system, its residents use public transit more than any other county in the Region. About 2.5% of Montgomery County residents use public transit on a daily basis compared to less than 1% for Greene, Miami, and Warren Counties. While all counties in the Region use public transit less than the United States average, Montgomery County residents use public transit in greater numbers than Ohio residents as a whole. Figure 4.6 displays public transit usage for all counties in the Region compared to both the Ohio and United States averages.

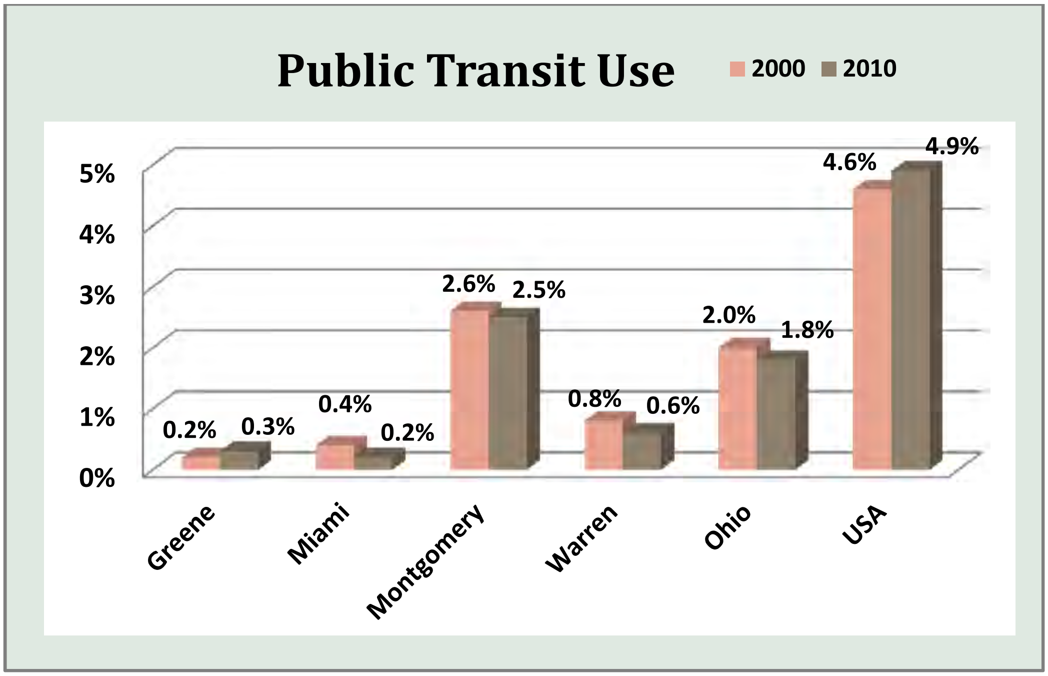


**Figure 4.6 — Regional Public Transit Use**

Source: CTTP 2000; American Community Survey 2006-2010

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# Chapter 5 — Congestion Mitigation Strategies

## 5.1 Introduction

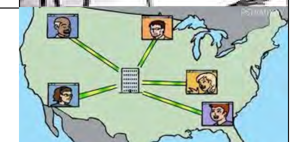
Currently, there are a number of strategies that transportation planners and engineers implement to reduce the geographic and temporal extent of roadway congestion. These countermeasures include both physical and operational roadway improvements. More often, two or more of these strategies are combined to provide for maximum congestion relief. Below is an abbreviated list of potential roadway congestion countermeasures:

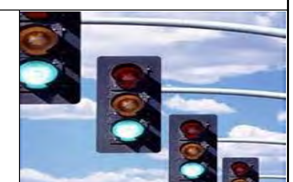
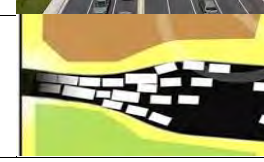
- ACCESS MANAGEMENT — These physical roadway treatments attempt to regulate the manner in which motorists access adjacent land uses by consolidating multiple driveways, providing exclusive turning lanes, and/or incorporating various median treatments including two-way left-turn lanes and non-traversable barriers.
- TRAFFIC SIGNAL TIMING — Adjusting signal times for current roadway demand can be a cost effective way to increase roadway capacity and is one of the most basic roadway congestion countermeasures.
- FREEWAY MANAGEMENT SYSTEMS — These systems integrate a number of operational enhancements, such as cameras, dynamic message signs, and highway advisory radio, into a traffic management center which provides the motoring public with up-to-the-minute updates on current traffic conditions, allowing them to by-pass areas with roadway congestion.
- TRAVEL DEMAND MANAGEMENT — A transportation policy that aims to spread transportation demand amongst numerous modes, including carpooling, transit, and bikeway/pedestrian pathways, to reduce dependence on the automobile.
- TRAFFIC INCIDENT MANAGEMENT — A program that encourages the quick, safe, and coordinated removal of traffic incidents to restore normal traffic flow.
- VALUE PRICING — A strategy that charges travelers a user fee to access congested corridors during pre-determined periods of high demand.
- ADDING CAPACITY – By increasing the carrying capacity of a roadway, the growth of congestion may be alleviated.

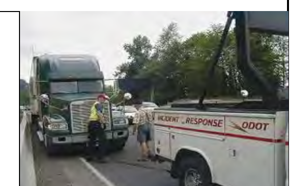
Table 5.1 presents a toolbox of congestion countermeasures either currently implemented in the Region or their suitability for application in the Region in the future. As technologies emerge and our understanding of roadway congestion expands, the use of these and other strategies will have a significant effect on reducing roadway congestion, thus providing a safer and more reliable transportation network.

## Table 5.1 — Congestion Mitigation Strategies

| Congestion Mitigation Strategy | Description | Currently Implemented in Dayton | Suitability of Application to MPO Region | Illustration / Photograph |
|---|---|---|---|---|
| **Highway Capacity Addition Strategies** | | | | |
| **Highway Capacity Expansion** | This strategy involves increasing the capacity of congested roadways through additional general purpose travel lanes and/or upgrading interchanges on freeways. Strategies to add capacity are the most costly and least desirable strategies. They should only be considered after exhausting all feasible demand and operational management strategies. | Yes; Downtown Dayton Subcorridor Reconstruction Project; I-70/I-75 Interchange Modification, Upgrade of South Dixie Interchange from Partial to Full Interchange; Various I-70 Widening Projects. | Medium - Selected locations only. |  |
| **Alternative Transportation Mode Strategies** | | | | |
| **Transit Projects Including Capacity Expansion, Implementing Premium Transit, Increasing Bus Route Coverage and Providing Real-Time Information on Transit Routes** | Transit services and infrastructure projects have traditionally been implemented in regions to provide an alternative to automobile travel potentially reducing peak-period congestion and improving mobility and accessibility for commuters. These strategies add new vehicles or increase service hours to expand transit services, and provide better accessibility to transit to a greater share of the population. Premium transit such as Bus Rapid Transit (BRT) best serves dense urban centers where travelers can walk to their destinations. Providing real-time information on bus progress either at bus stops, terminals, and/or personal wireless devices makes bus travel more attractive. | Yes. Partial Real Time Information Available. GDRTA is in the process of implementing a mobile app project which would allow app users to select their route to see real-time tracking data on all running buses. The app is expected to be implemented in 2015. | Low (Premium Transit); High (Real-time passenger information). |  |
| **Bicycle and Pedestrian Projects Including Exclusive Non-Motorized ROW and New Sidewalk Connections** | Investments in these modes can increase safety and mobility in a cost-efficient manner, while providing a zero-emission alternative to motorized modes. In many cases, bicycle lanes can be added to existing roadways through restriping. Abandoned rail rights-of-way and existing parkland can be used for medium-to-long distance bicycle trails, improving safety, and reducing travel times.Increasing sidewalk connectivity encourages pedestrian traffic for short trips. | Yes. Implementation of new Regional Bikeways and Trails as well as Designated Bicycle Lanes on Facilities and Routes at the local level. Implementation of the federally-funded Safe Routes to School program provides 100 percent funding to communities to invest in pedestrian and bicycle infrastructure surrounding elementary schools. A Bikeshare program is being implemented in Dayton in spring of 2015. | High. |  |
| **Transit Oriented Managed Lanes** | Exclusive right-of-way includes bus ways, bus-only lanes, and bus bypass ramps. This Strategy is applied to freeways and major highways that have routes with high ridership. | No. | Low. |   |
| **Complete Streets** | Routinely design and operate the entire right-of-way to enable safe access for all users including pedestrians, bicyclists, motorists, and transt. Elements that maybe found on a complete street include sidewalks, bike lanes, special bus lanes, comfortable and accessible transit stops, frequent crossing opportunities, comfortable and accessible transit stops, frequent crossing opportunities, median islands, accessible pedestrian signals, curb extensions, and more. | MVRPC adopted its Regional Complete Streets Policy in January 2011. (http://www.mvrpc.org/transportation/complete-streets) | High; Since 2011, three jurisdictions (Dayton, Riverside and Piqua), have adopted Complete Streets Policies. |  |
| **Alternative Mode Marketing and Education** | Providing education on alternative modes of transportation can be an effective way of increasing demand for alternative modes. This strategy can include mapping websites that compute directions and travel times for multiple modes of travel. | MVRPC coordinates with GDRTA to promote transit through discounted bus passes and/or special promotions, promotion of the "Bike on Bus" program to emphasize the availability of bike racks on buses, and encouragement of displaced transit riders to use RIDESHARE as an alternative commuting option. Many local communities have promoted non-motorized forms of transportation by providing marked routes, paths, and sidewalks that connect and/or guide users to the Miami Valley Recreational Trail system (http://www.mvrpc.org/transportation/bikeways-pedestrians). | High. |   |

| Congestion Mitigation Strategy | Description | Currently Implemented in Dayton | Suitability of Application to MPO Region | Illustration / Photograph |
|---|---|---|---|---|
| **Travel Demand Management Strategies** | | | | |
| Transportation demand management (TDM) strategies are used to reduce travel during the peak, commute period. They are also used to help agencies meet air quality conformity standards, and are intended to provide ways to provide congestion relief/mobility improvements without high cost infrastructure projects. | | | | |
| **Ridesharing and Emergency Ride Home** | In ridesharing programs, participants are matched wth potential candidates for sharing rides. This is typically arranged / encouraged through employers or transportation management agencies, which provide ride-matching services. Emergency Ride Home programs provide a safety net to those people who carpool or use transit to work so that they can get to their destinations due to unexpected work demands or an emergency. | Currently, there are approximately 2000 people enrolled in MVRPC's RIDESHARE program. Additionally, MVRPC also provides subsidies to encourage the formation of new vanpools. MVRPC implements a region-wide promotion to encourage residents to pledge to reduce the amount of single occupant vehicle (SOV) travel they do during a typical month's travel time. More information is available on the campaign's website at http://www.drivelesslivemore.org/. | Medium | RIDESHARE www.miamivalleyrideshare.org 223-SAVE or 1-800-743-SAVE |
| **Alternative Work Hours** | There are three main variations: staggered hours, flex-time, and compressed work weeks. | Yes; Alternative Work Hours are becoming more common. WPAFB, the Region's largest employer, allows a variety of work schedules. | Medium to High. |   |
| **Telecommuting** | Telecommuting policies allow employees to work at home or a regional telecommute center instead of going into office, all of the time for a certain number of days per week. | Yes; Telecommuting has become more common, either on a regular basis or as a way to minimize weather related events. | Medium to High. |  |
| **High Occupancy Vehicle (HOV) Lanes** | Corridor capacity is increased, while, at the same time, providing an incentive for single-occupant motor vehicle drivers to shift to ridesharing. | No. | Low. |   |
| **Managed Lanes** | FHWA defines managed lanes as highway facilities or a set of lanes in which operational strategies are implemented and managed (in real time) in response to changing conditions. Examples include high-occupancy toll (HOT) lanes, HOV and clean air and/or energy-efficient vehicle lanes, and HOV lanes that could be changed into HOT lanes in response to changing levels of traffic and roadway conditions. | No. ODOT is in the process of studying the suitability of various strategies for congested freeway corridors in urban areas. | Low. | |
| **Congestion Pricing** | Congestion Pricing can be implemented statically or dynamically. Static congestion pricing requires that tolls are higher during traditional peak periods. Dynamic congestion pricing allows toll rates to vary depending upon actual traffic conditions. | No. | Low. |  |
| **Parking Management** | This strategy reduces the instance of free parking to encourage other modes of transportation. Options include reducing the minimum number of parking spaces required per development, increasing the share of parking spaces for HOVs, introducing or raising parking fees, providing cash-out options for employees not using subsidized parking spaces, and expanding parking at transit stations or park-and-ride lots. | No. | Low. |   |

| Congestion Mitigation Strategy | Description | Currently Implemented in Dayton | Suitability of Application to MPO Region | Illustration / Photograph |
|---|---|---|---|---|
| **Intelligent Transportation Systems (ITS) Strategies** | | | | |
| The strategies in ITS use new and emerging technologies to mitigate congestion while improving safety and environmental impacts. Typically, these systems are made up of many components, including traffic sensors, electronic signs, cameras, controls, and communication technologies. | | | | |
| **Dynamic Messaging** | Dynamic Messaging uses changeable message signs to warn motorists of downstream queues; it provides travel time estimates, alternate route information, and information on special events, weather, or accidents. | The Dayton/Springfield Freeway Management System (http://www.mvrpc.org/transportation/long-range/its), combines technological and operational solutions to manage congestion growth. It also enhances existing incident and traffic management activities on the regional freeway network and provide timely and accurate traveler information to motorists. In 2013, ODOT launched a new website (www.ohgo.com) designed to provide motorists with real-time travel information using ITS technology on Ohio's roadways. GDRTA is in the process of implementing a mobile app project which would allow app users to select their route to see real-time tracking data on all running buses. The app is expected to be implemented in 2015. | High. |   |
| **Advanced Traveler Information Systems (ATIS)** | ATIS technology provides access to an extensive amount of data to travelers, such as real-time speed estimates and information on alternate route options. | | High. | |
| **Integrated Corridor Management (ICM)** | This strategy provides for the coordination of the individual network operations between parallel facilities creating an interconnected system. A coordinated effort between networks along a corridor can effectively manage the total capacity in a way that will result in reduced congestion. | No. | High. |  |
| **Transit Signal Priority (TSP)** | This strategy uses technology located onboard transit vehicles or at signalized intersections to temporarily extend green time, allowing the transit vehicle to proceed without stopping at a red light. | No. | Medium. | |
| **Transportation System Management Strategies** | | | | |
| **Traffic Signal Coordination** | Signals can be pre-timed and isolated, pre-timed and synchronized, actuated by events, set to adopt one of several pre-defined phasing plans or set to calculate an optimal phasing plan based on current conditions. | Yes. There are numerous examples throughout the Region. This strategy is particularly well-suited for built-up urban areas where capacity expansion is difficult or unfeasible. | High. |  |
| **Channelization** | This strategy is used to optimize the flow of traffic for making left or right turns usually using concrete islands or pavement markings. | Yes. There are numerous examples throughout the Region. This strategy is particularly well-suited for built-up urban areas where capacity expansion is difficult or unfeasible. | High. |  |
| **Intersection Improvements** | Intersections can be widened and lanes restriped to increase intersection capacity and safety. This may include auxiliary turn lanes and widened shoulders. | Yes. There are numerous examples throughout the Region. This strategy is particularly well-suited for built-up urban areas where capacity expansion is difficult or unfeasible. | High. |  |
| **Bottleneck Removal** | This strategy removes or corrects short, isolated, and temporary lane reductions, substandard design elements, and other physical limitations that form a capacity constraint that results in a traffic bottleneck. | ODOT has established the ODOT Ramp Clear program, a freeway bottleneck removal program, that will help clear queues from freeway exit ramps. | High. |  |

| Congestion Mitigation Strategy | Description | Currently Implemented in Dayton | Suitability of Application to MPO Region | Illustration / Photograph |
|---|---|---|---|---|
| **Vehicle Use Limitations and Restrictions** | This strategy includes all-day or selected time-of-day restrictions of vehicles, typically trucks, to increase roadway capacity. | Yes; used during construction and special events. | Medium. |  |
| **Intermodal Enhancements** | These enhancements typically include schedule modifications to reduce layover time or increase the opportunity for transfers, creation of multi-modal facilities, informational kiosks, and improved amenities at transfer locations. | No. | Low. |  |
| **Construction Management** | This strategy includes preparing construction managment plans, implementing detour signing improvements and providing advance information of closures and alternate routes. | Yes, in cooperation with ODOT and local jurisdictions. | High. (I-75) |  |
| **Other Miscellaneous Strategies** | | | | |
| **Traffic Incident Management** | This strategy addresses primarily non-recurring congestion, typically includes video monitoring and dispatch systems, and may also include roving service patrol vehicles. | Yes; ODOT, in collaboration, with State Farm, launched the State Farm Safety Patrol Program that provides for freeway incidence response vehicles to improve traffic flow and reduce traffic congestion due to stalled vehicles as well as offers roadway assistance to mortorists in need. | High. |  |
| **Access Management Strategies** | Access management is a broad concept that can include everything from curb cut restrictions on local arterials to minimum interchange spacing on freeways. Restricting turning movements on local arterials can reduce accidents and prevent turning vehicles from impeding traffic flow. Similarly, eliminating merge points and weaving sections at freeway interchanges increases the capacity of the facility. | Yes. | High in conjunction with other planned improvements. |  |
| **Land Development Strategies** | Land development strategies can include limits on the amount and location of development until certain service standards are met, or policies that encourage development patterns better served by public transportation and non-motorized modes. | Yes; In SFY2014, MVRPC completed an initiative in cooperation with local jurisdictions and regional leaders to develop a shared land-use vision to guide the Region's growth patterns and achieve consistency between transportation investment, infrastructure, and development, while protecting the Region's environmental resources. | Low. | |

## 5.2 MVRPC Investment Profile

MVRPC's most direct contribution to addressing congestion is through its allocation of regionally controlled STP, CMAQ, and TA funds. In 2003, MVRPC embarked on a regional visioning process that resulted in a new Project Evaluation System (PES). The new PES was used to allocate funds starting in 2005. This section profiles the current mix of active projects roughly corresponding with SFY 2015-2020. During this period, MVRPC plans to allocate $117 million of STP, CMAQ, and TA funds towards numerous multimodal transportation projects and improvements. Approximately $72 million will be funded by the Surface Transportation Program, $38.8 million by CMAQ, and $6.8 million by TA. Figure 5.1 displays a breakdown of the three MVRPC funds planned for SFY 2015-2020.

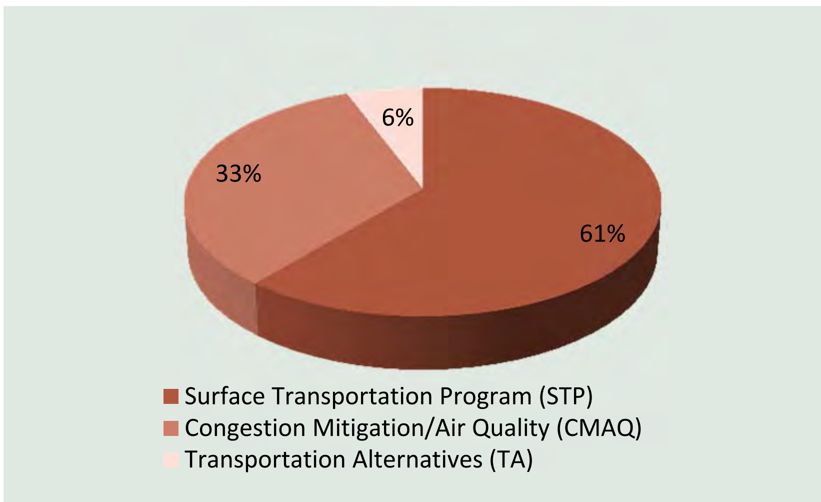



**Figure 5.1 — MVRPC Planned Allocation of Funds for SFY 2015-2020 by Program**

MVRPC controlled funds are not large enough to fund costly freeway reconstruction or expansion projects. However, they are a major funding source toward the improvement of the regional arterial and collector system as well as bike and pedestrian projects. A breakdown of the programs shows that a majority of the investment is targeted towards Highway Operational, Maintenance and Capacity improvements. Table 5.2 details the investment profile for each program. Roughly $86 million or 73% of all investment will go towards improving or maintaining the regional roadway system.

Investment towards alternative transportation improvements is also identified, including $16.4 million in bikeway and pedestrian oriented investments. However, 73% of roadway specific projects do have bikeway or pedestrian improvements included as well. Additionally, $5.9 million has been identified for MVRPC's commuter match RIDESHARE program as well as various planning studies including: regional land-use planning, air quality program, and safety.

## Table 5.2 — MVRPC Investment Profile for SFY 2015-2020

| Funding Program SFY 2015-2020 | Percent | Total |
|---|---|---|
| **Surface Transportation Program (STP)** | | |
| Highway Operational / Intersection Improvement | 27% | $19,714,046 |
| Highway Capacity | 10% | $7,055,350 |
| Highway Maintenance/ Reconstruction | 59% | $41,981,760 |
| Bike/Pedestrian | 1% | $1,062,616 |
| Planning/Studies | 3% | $1,888,547 |
| | **STP Total:** | **$71,702,319** |
| **Congestion Mitigation / Air Quality (CMAQ)** | | |
| Highway Operational/ Intersection Improvement | 44% | $17,161,225 |
| Transit | 23% | $9,067,158 |
| Bike/Pedestrian | 22% | $8,575,428 |
| Rideshare | 7% | $2,768,158 |
| Planning/Studies | 3% | $1,252,923 |
| | **CMAQ Total:** | **$38,824,892** |
| **Transportation Alternatives (TA)** | | |
| Bike/Pedestrian | 24% | $1,601,427 |
| Streetscape | 76% | $5,184,150 |
| | **TA Total:** | **$6,785,577** |
| | **Grand Total:** | **$117,312,788** |

As described in MVRPC's Project Evaluation System (PES), several indicators from categories that include Regional-Context/Cooperation, Transportation-Choices, Transportation System Management, Land Use, Economic Development and Environment are assessed for each project to ensure all investments advance transportation projects that are consistent with regional transportation priorities and the Long Range Transportation Plan. Ensuring that investments made into the Region's transportation system improve livability, support economic development, and include alternative modes of transportation, are important to each project's merit and advancing the Region's goals.

As shown in Figure 5.2, roughly 73% of MVRPC's future investment will create, improve, or enhance connectivity among different transportation modes including pedestrian and bikeway improvements. Improving livability is another factor evaluated in advancing the Region's transportation priorities. Sixty-six percent (66%) of all transportation investments will aim to reduce and minimize sprawl; revitalize or preserve an urban center; have a positive impact within a concentrated minority and/ or poverty area; and be compatible with a local jurisdiction's comprehensive land use or thoroughfare plan. And lastly, economic development is also assessed in the Project Evaluation System with 43% of projects contributing to the creation of new jobs, retention of existing jobs, or improvement of access to employment centers.

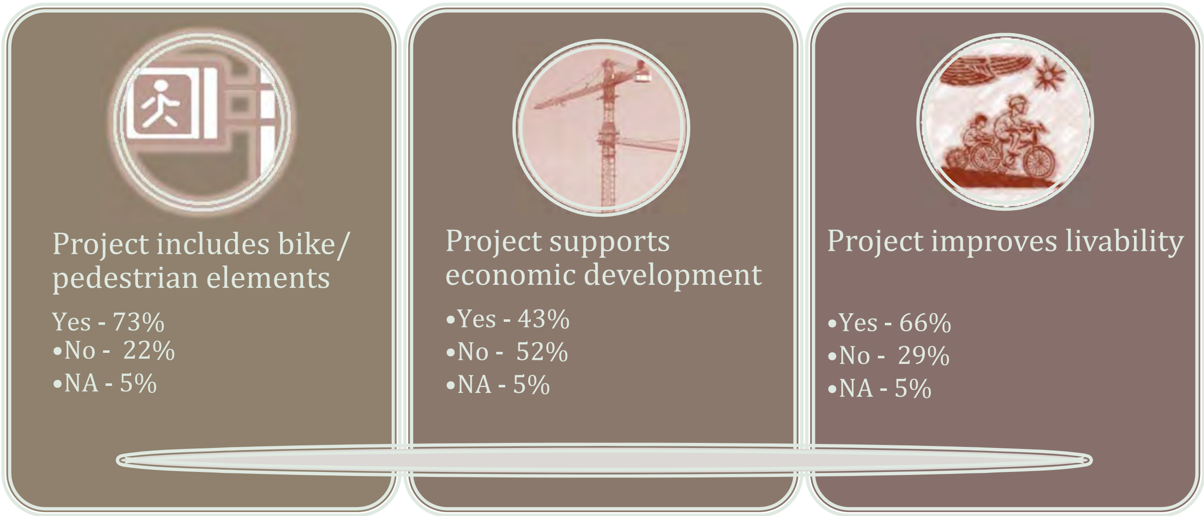



**Figure 5.2 — Breakdown of Projects Supporting Regional Transportation Priorities**

# Chapter 6 — Future Outlook and Conclusions

Both the Federal and State of Ohio governments have undertaken initiatives to manage roadway congestion. These efforts primarily focus on providing leadership, education, and financial resources through a multitude of guidelines, directives, workshops, programs, grants, and legislation. Regional and local governments can then access these resources to manage roadway congestion at the local level. MVRPC has assimilated many of the state and federal goals, strategies, and programs to manage congestion through its Long Range Transportation Plan (LRTP), Transportation Improvement Program (TIP), and various regional projects, programs, and initiatives.

## 6.1 Overview of MAP-21 and Performance Measurement

At the federal level, congestion management typically takes the form of programs and legislation meant to provide guidance and funding to state and local governments. The Federal Highway Administration (FHWA), U.S. Department of Transportation (U.S. DOT), and Federal Transit Administration (FTA) are the primary distributors and administrators of national congestion management guidance and funding. These agencies also maintain extensive websites that provide a wealth of information and resources for both public agencies and private citizens.

A collection of federal programs designed to alleviate roadway congestion was authorized by the Moving Ahead for Progress in the 21st Century Act (MAP–21) of 2012. These programs were intended to promote the safe and efficient management and operation of integrated, intermodal surface transportation systems to mitigate the impacts of roadway congestion and improve system reliability. The most prominent of these programs is the Congestion Mitigation and Air Quality Improvement (CMAQ) Program. The purpose of the CMAQ program is to fund transportation projects or programs that will contribute to attainment and maintenance of the national standards for ozone, carbon monoxide (CO), and particulate matter (PM). The CMAQ program supports two goals of the U.S. DOT: improve air quality and relieve congestion. Historically, MVRPC has received approximately $6 million of CMAQ funds annually.

MAP-21 contains major changes to the metropolitan transportation planning process including the establishment of a performance-based planning and performance management for both highways and public transportation. MPOs, States, and transit providers are required to establish performance targets that address national performance measures established by the Secretary that are based on seven national goals. These targets must be set in coordination with the state and public transportation providers, within 180 days after the relevant state or public transportation provider sets performance targets.

The national goals outlined in Section 1203 of MAP-21 are as follows:

1. SAFETY: Achieve reduction in fatalities and serious injuries on all public roads.

2. INFRASTRUCTURE CONDITION: Maintain highway infrastructure assets in state of good repair.
3. CONGESTION REDUCTION: Achieve reduction in congestion on the National Highway System.
4. SYSTEM RELIABILITY: Improve the efficiency of the surface transportation system.
5. FREIGHT MOVEMENT AND ECONOMIC VITALITY: Improve freight networks, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development.
6. ENVIRONMENTAL SUSTAINABILITY: Enhance the performance of the transportation system while protecting and enhancing the environment.
7. REDUCED PROJECT DELIVERY DELAYS: Reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices.

The CMP requirement was carried into MAP-21 from the previous law, SAFETEA-LU, and includes "Congestion Reduction" and "System Reliability" as two of the seven national performance goals for Federal highway programs. Consistent with the performance measurement and monitoring emphasis of MAP-21, there is now an even greater emphasis on integrating effective target setting, monitoring, and reporting into the CMP process.

The cornerstone of MAP–21's Federal- aid highway program transformation is the transition to a performance and outcome-based program. As part of this program, recipients of Federal-aid highway funds would invest resources in projects to achieve individual targets that collectively would make progress toward national goals. The FHWA organized the many performance-related provisions within MAP-21 into six elements as defined in Figure 6.1. Performance measures and standards outlined in MAP-21 are as follows:

- Minimum standards for bridge and pavement management systems to be used by states;
- Performance measures for pavement condition on the Interstate system;
- Performance measures for pavement condition on the non-Interstate system;
- Performance measures for bridge conditions on the NHS;
- Performance measures for the performance of the Interstate System;
- Performance measures for performance of the non-Interstate NHS system;
- Performance measures to assess serious injuries and fatalities per VMT;
- Performance measures to assess the number for serious injuries and fatalities;
- Performance measures for traffic congestion;
- Performance measures for on-road mobile source emissions; and
- Performance measures to assess freight movement on the Interstate System.

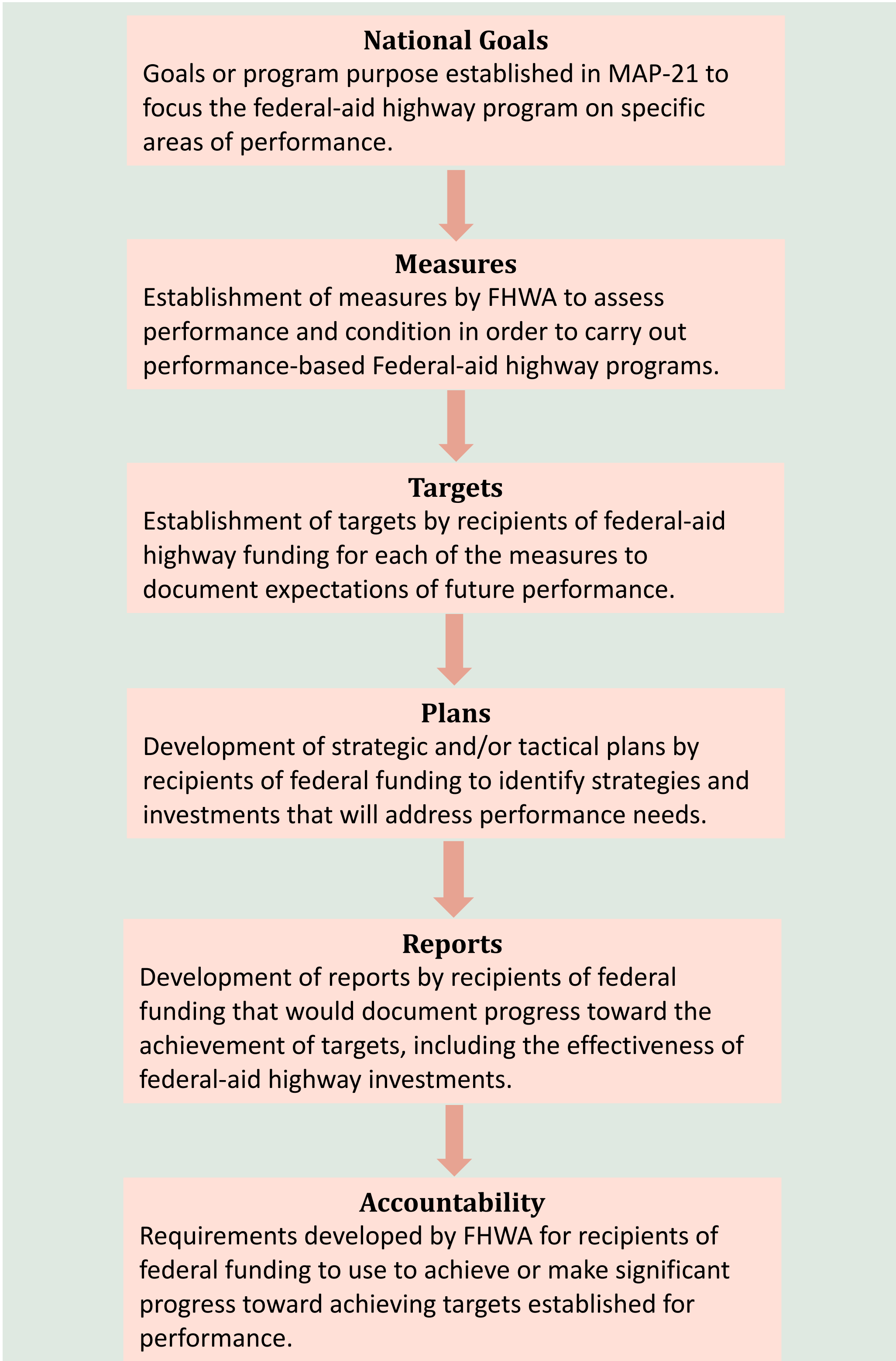



**Figure 6.1 — Organization of MAP-21 Performance-Related Provisions**

Source: FHWA

The performance measures and standards are based on national goals and aligned to various program and policy areas including the National Highway Performance Program (NHPP), Highway Safety Improvement Program (HSIP), the Congestion Mitigation and Air Quality Improvement Program (CMAQ), and the National Freight Policy.

The MAP–21 provisions that focus on the achievement of performance outcomes are contained in a number of sections of the law that are administered by different DOT agencies. Section 1203 of MAP–21 requires the Secretary to promulgate a rule to establish performance measures in specified Federal-aid highway program areas, including:

- Propose and define national measures for the Highway Safety Improvement Program (HSIP);
- Propose and define national measures for the condition of NHS pavements and bridges; and
- Propose and define national measures for the remaining areas under 23 U.S.C. 150(c) that require measures and are not discussed under the first and second measure rules, which includes the following: National Performance Measures for Performance of the Interstate System and non-Interstate National Highway System; CMAQ—Traffic Congestion; CMAQ—On-Road Mobile Source Emissions; and Freight Movement on the Interstate System.

The FHWA has currently issued first two of the three proposed separate Notice of Proposed Rule Makings (NPRMs) to meet this requirement.

All state DOTS, including ODOT, shall define targets for identified performance measures within a year of the final rules being issued by FHWA (currently proposed for no later than October 1, 2015). Once state targets are set, all MPOs, including MVRPC, will have another 180 days to set their targets in consultation with the State DOTs. MVRPC has been keeping abreast of national trends in performance measurement and has been monitoring regional safety, system reliability, bridge sufficiency and pavement ratings as part of its ongoing transportation plans and studies. This should facilitate and expedite the process of target setting, in consultation with ODOT, when the MPO timeframe window for setting targets begins.

MAP-21 also furthers several important goals with respect to public transportation, including safety, state of good repair, performance, and program efficiency. MAP-21 gives the Federal Transit Administration (FTA) significant new authority to strengthen the safety of public transportation systems throughout the United States. MAP-21 also puts new emphasis on restoring and replacing aging public transportation infrastructure by establishing a new needs based formula program and new asset management requirements. In addition, it establishes performance based planning requirements that align federal funding with key goals and tracks progress towards these goals. Finally, MAP-21 improves the efficiency of administering grant programs and streamlining the major capital investment grant program known as “New Starts”. MAP-21 also requires that MPOs in urbanized areas designated as transportation management areas must include transit officials on their policy boards.

## 6.2 Conclusions

In summary, the current (2010) temporal length of recurring traffic congestion is primarily contained within the morning and evening peak travel periods, from 7:00AM to 9:00AM and 3:00PM to 6:00PM. Geographically, recurring congestion is concentrated on the regional freeway network and nearby interchanges and surface roadways. Some significant peak period recurring congestion is also evident on surface arterials and collectors away from the freeway system. However, analysis indicates that implementation of the Long Range Transportation Plan can slow the growth of recurring congestion on much of the Region's roadway network. Without LRTP implementation, recurring roadway congestion may continue to expand both temporally and geographically at a much more rapid pace, potentially diminishing personal quality-of-life and inhibiting economic growth in the Region, particularly in growth sectors such as the logistics industry that rely heavily on the transportation system.

Non-recurring congestion analyses focused primarily on the regional freeway network. Using available data sources, it appears that non-recurring roadway congestion within the Region can occur at virtually any point along the freeway network, though some segments appear more prone to non-recurring congestion due to high traffic volumes, mid-day period crashes, or construction.

As discussed in the congestion mitigation matrix, MVRPC, ODOT, and local jurisdictions have implemented a number of physical and operational improvements intended to manage recurring and non-recurring congestion. Additional improvements are planned and/or funded for implementation within the LRTP plan horizon (2040). Together, public transportation agencies at the national, state, and local level, along with partners in the private sector, are working together to mitigate the strangling effects that roadway congestion is having on the Nation's freeway and surface transportation systems.

As part of its congestion management process, MVRPC will continue to gather relevant transportation data; evaluate current and future trends in roadway congestion and transportation science; identify proactive strategies to curb roadway congestion expansion; and partner with our local, state, and federal partners to efficiently implement roadway congestion countermeasures.

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This document was prepared in cooperation with the U.S. Department of Transportation, the Federal Highway Administration, the Ohio Department of Transportation and local communities. The contents of this report reflect the views of MVRPC, which is responsible for the facts and accuracy of the data presented herein. The contents do not reflect the official view and policies of the State of Ohio and/or Federal agencies. This report does not constitute a standard specification or regulation.

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