Attachment 4A

AKRON METROPOLITAN AREA TRANSPORTATION STUDY

M E M O R A N D U M

TO: **Policy Committee**
Technical Advisory Committee
Citizens Involvement Committee

FROM: **AMATS Staff**

RE: **Final Congestion Management Process Report**

DATE: **January 12, 2017**

This AMATS Congestion Management Process (CMP) report identifies existing and projected future congestion on our region's freeways, arterials and intersections. It also examines public transit levels of service availability, freight needs, and the impact that crashes have on congestion. It identifies demand and supply-side strategies to manage regional congestion. In the final section, specific recommendations to address congested areas are presented.

In December, a draft version of the CMP report was brought before the AMATS committees, seeking their comments and input. Minimal grammatical comments were received and the changes have been incorporated into the final version of the report.

This final CMP report includes 33 specific highway recommendations and various transit, freight, and system-wide recommendations based on congestion and safety. These recommendations will be considered for inclusion in the upcoming 2040 regional transportation Plan and will be pared down based on fiscal constraint and greatest congestion relief.

The complete Congestion Management Process report is available on the AMATS website at: www.amatsplanning.org

The staff recommends approval of this document.

CONGESTION MANAGEMENT PROCESS

AKRON METROPOLITAN AREA TRANSPORTATION STUDY
806 CITICENTER BUILDING
146 SOUTH HIGH STREET
AKRON, OHIO 44308

January 2017

This report was prepared by the Akron Metropolitan Area Transportation Study (AMATS) in cooperation with the U.S. Department of Transportation, the Ohio Department of Transportation, and the Village, City and County governments of Portage and Summit Counties and Chippewa and Milton Township in Wayne County. The contents of this report reflect the views of AMATS, which is responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official view and policies of the Ohio and/or U.S. Department of Transportation. This report does not constitute a standard, specification or regulation.

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INTRODUCTION

As the Metropolitan Planning Organization (MPO) for the Akron metropolitan area, it is one of the primary duties of the Akron Metropolitan Area Transportation Study (AMATS) to identify congestion in our region, as well as to provide solutions to reduce or eliminate congestion on our streets, intersections and highways. More than just a daily inconvenience, congestion affects our overall economy, reducing our ability to travel reliably to work, school and to complete the timely delivery of goods and services. Idling vehicles emit unnecessary pollutants into the atmosphere and waste costly and limited fuel.

This AMATS Congestion Management Process (CMP) report identifies existing and projected future congestion on our region's freeways, arterials and intersections. It examines public transit levels of service availability and freight needs. It also isolates and examines congestion related to traffic incidents. Later sections identify demand and supply-side strategies to manage regional congestion. In the final section, specific recommendations to address congested areas will be presented.

CHAPTER 1

CONGESTION MANAGEMENT PROCESS REQUIREMENTS

The Congestion Management Process (CMP) is a systematic process that ensures the region's traffic congestion is accurately monitored, evaluated and alleviated. The intent of the process is to produce a continuous monitoring system of congested roadways, implemented strategies and success of those strategies. The CMP includes the following procedures:

1) Define congestion management objectives and identify the appropriate performance measures to assess existing and future congestion
2) Establish a program for data collection and analysis
3) Identify and evaluate congestion management strategies to alleviate congestion
4) Identify an implementation schedule and funding sources for each recommended strategy
5) Implement an assessment program for the effectiveness of congestion management strategies

Objectives and Performance Measures

The objective of the CMP is to minimize congestion and delay on the transportation system. Minimizing congestion and delay will improve the efficiency of the movement of people and goods.

In order to assess system-wide and specific location congestion it is necessary to outline the performance measures used for evaluation. The CMP considers the following performance measures:

1) Volume-to-capacity (V/C) ratio – based on the volume of traffic versus the capacity of the roadway used to determine the level of service of arterials and intersections
2) Density – based on the inverse of vehicle spacing – used to determine freeway level of service
3) Transit LOS (headways) – both peak time and standard headways between buses, as well as availability
4) Vehicle hours traveled (VHT) – total hours traveled in a 24-hour period
5) Vehicle miles traveled (VMT) – total miles traveled in a 24-hour period

These performance measures are used to determine existing and future transportation system congestion.

Data Collection and Analysis

It is necessary to collect traffic data in order to measure the performance of the transportation system. Traffic counts are taken on a regular basis on the roadway network. This data is then used as an input to model traffic congestion on the existing and future roadway network. From the modeling output, the roadway network is analyzed to determine areas of high traffic congestion. The process is described in detail in chapters 2 and 3. Public transit information

was received from both transit agencies (METRO RTA and PARTA) within the AMATS area. This information is summarized in chapter 4. Freight analysis can be found in chapter 5.

The CMP focuses on traffic congestion that is identified both at specific locations and at the system level by evaluating the existing and future roadway networks. The roadway network considered for the CMP analysis is made up of 540 miles of roadways and 34 intersections in the Akron metropolitan area and is shown on Map 1-1. These roadways and intersections are the locations where congestion measuring and monitoring activities are concentrated. The following roadways are included in the network for the CMP:

1) All roadways included on the National Highway System
2) All roadways classified as Principal Arterials in the Federal Functional Classification System
3) Major intersections that experience high traffic volumes
4) All roadways identified as potential congestion problems by the AMATS Policy Committee
5) Other roadways to ensure a continuous CMP highway system

Identify and Evaluate Congestion Management Strategies

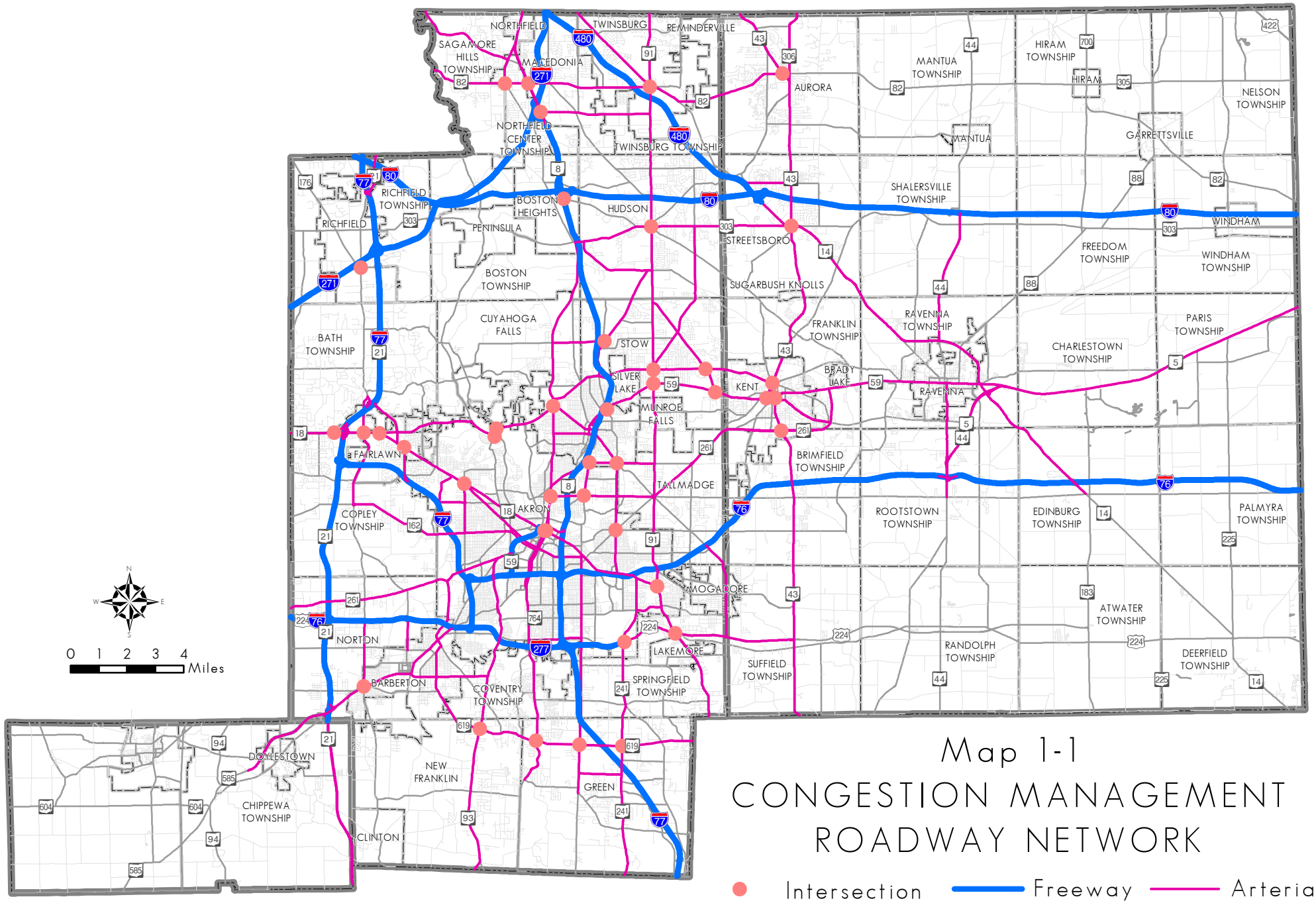
There are many strategies that can assist in addressing traffic congestion in the Akron metropolitan area. As part of the CMP, these strategies will be identified, described and considered as possible alternatives to alleviate traffic congestion. Congestion management strategies include: capacity improvements, intelligent transportation systems (ITS), non-motorized transportation, operational improvements, public transportation systems and miscellaneous transportation demand management strategies.

Identify an Implementation Schedule and Funding Source

An important part of the CMP is identifying funding sources for project recommendations as well as an implementation schedule. While the CMP report identifies recommendations, this identification of funding source and schedule will be developed as part of the upcoming long-term regional transportation plan (the Plan). When the Plan is completed, it will detail the funding source for each congestion management recommendation, as well as outline when the project will most likely be constructed.

Assess Congestion Management Recommendations

To effectively understand how past congestion management projects have impacted roadway congestion, an assessment program has been developed. This program analyzes the level of service of the roadway before the project was completed against the level of service of the roadway after project completion. This analysis determines if the recommended project was effective in alleviating congestion. The assessment program helps to identify types of projects that are particularly successful in reducing traffic congestion, and the results will be applied to future CMP reports.



F:\Land Use & GIS\Engineering Section\2016Maps\December 2016 - Congestion Management Process - Map 1-1 - Congestion Management Roadway Network.mxd

CHAPTER 2

EXISTING TRAFFIC CONGESTION

In order to effectively plan for transportation improvements, it is necessary to understand the existing performance of the transportation system. The existing performance is based on actual traffic count data and current roadway conditions. Furthermore, a location with existing traffic congestion is more critical than one with future traffic congestion given that the condition currently exists and is based on actual data, not forecasted data.

In this chapter, existing traffic congestion is identified based on the *Existing Congestion Study 2015*, which was approved by AMATS in December 2015. The purpose of this chapter is to quantify the level of existing traffic congestion on the freeways, arterials and intersections that comprise the AMATS congestion management roadway system.

Freeway Level of Service Analysis

This analysis determines the extent to which there is sufficient capacity on the freeway system to accommodate existing peak-hour traffic volumes at a reasonable level of service (LOS). In all, 165 miles of freeway were divided into 206 directional segments that were analyzed during the peak hour. The LOS was determined using a methodology described in the *Highway Capacity Manual 2010* (HCM2010). The freeway LOS is based on density, which takes both volume and capacity into account.

Freeway segments operating at a density greater than 26.0 (LOS "D", "E" or "F") in the peak hour were identified as congested. According to this analysis, 42 of the 206 freeway segments are identified as congested. These congested segments are shown in Appendix A and on Map 2-1, ranked according to their density.

A freeway weaving segment analysis was also examined due to closely spaced interchanges. Weaving segments operating at a density of greater than 28.0 (LOS "D", "E" or "F") in the peak hour were identified as congested. Please note that most weaving sections were determined to be congested and were chosen locations because of expected congestion. The congested weaving segments are shown on Appendix B and Map 2-2.

Arterial Level of Service Analysis

This analysis determines the extent to which there is sufficient capacity on arterial roadways to accommodate existing peak-hour traffic volumes at a reasonable level of service (LOS). In all, approximately 375 miles of arterials were divided into 597 separate segments, which were analyzed using a methodology that compares peak-hour traffic volumes to peak-hour roadway capacities. Arterial LOS is based on volume-to-capacity (V/C) ratio.

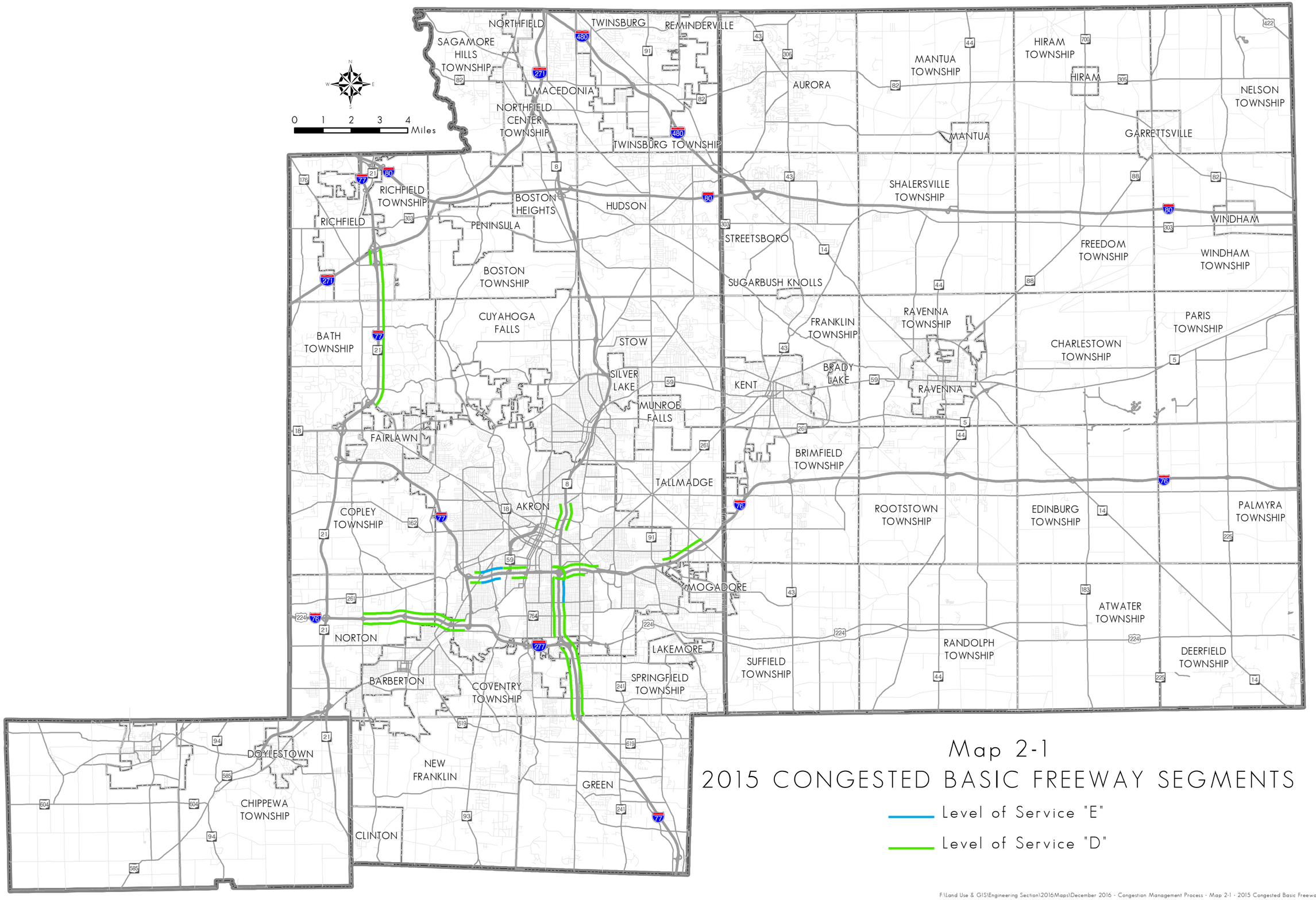
Arterial segments operating at a V/C ratio greater than 1.0 (LOS "D", "E" or "F") in the peak hour were identified as congested. According to this analysis, 35 of the 597 arterial segments are

congested. These segments are shown in Appendix C and on Map 2-3, ranked according to their V/C ratio.

Intersection Capacity Analysis

This analysis determines the extent to which there is sufficient capacity at intersections to accommodate existing peak-hour traffic volumes. Intersection capacity is analyzed using the planning analysis method described in the HCM2010. The intersection analysis, unlike the freeway and arterial analyses, uses "operational status" instead of LOS to quantify congestion. The operational status of an intersection is determined based on the entering volume of traffic and the capacity of the intersection.

Intersections operating at a V/C ratio greater than 0.85 (near, at or over capacity) in the peak hour were identified as congested. According to this analysis, 30 of 34 intersections analyzed were congested. These intersections are shown in Appendix D and on Map 2-4, ranked according to their V/C ratio.



Map 2-1
2015 CONGESTED BASIC FREEWAY SEGMENTS

Level of Service "E"

Level of Service "D"

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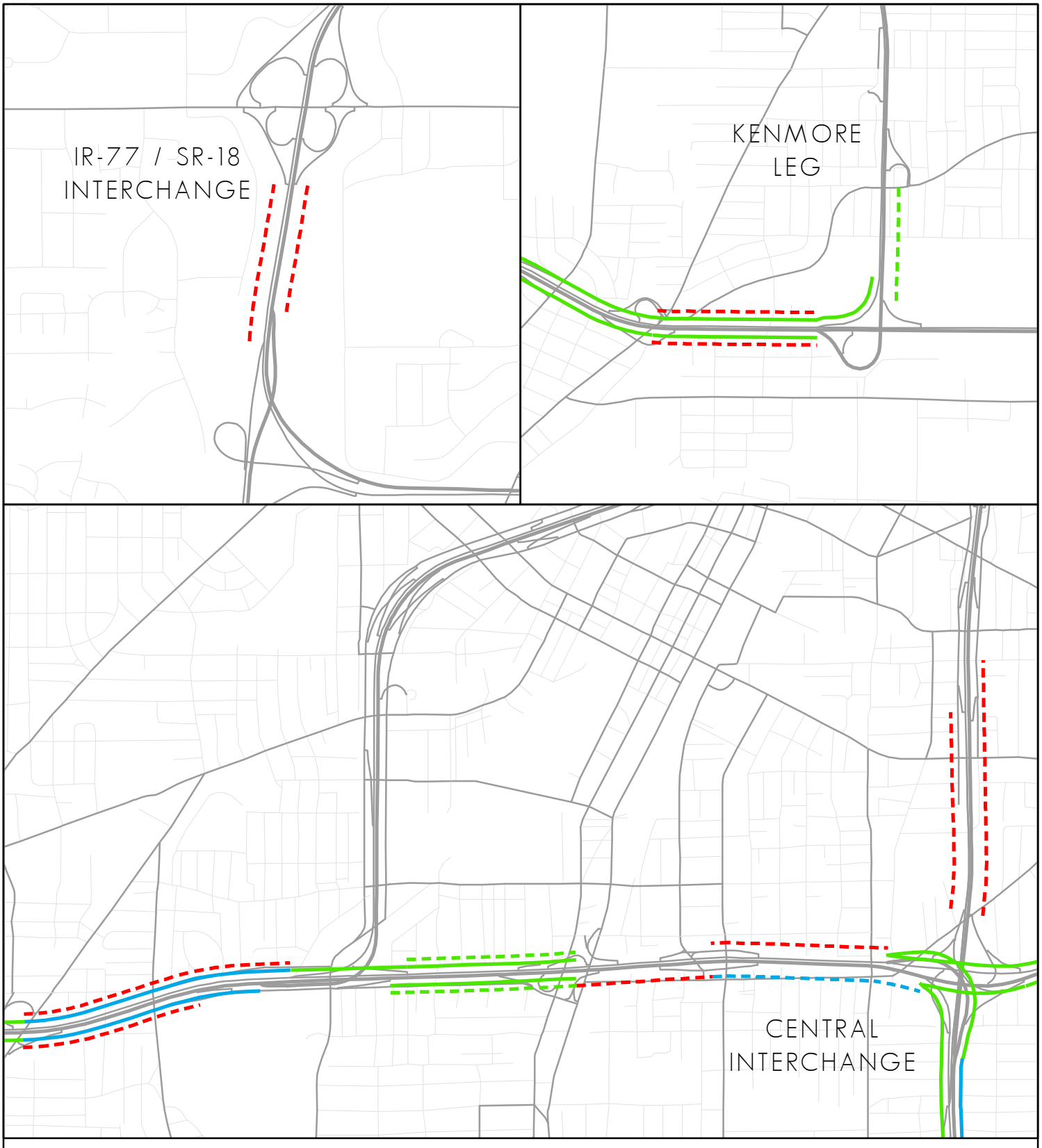

Map 2-2

2015 CONGESTED WEAVING AREAS

BASIC	WEAVE
Level of Service "F"	Level of Service "F"
Level of Service "E"	Level of Service "E"
Level of Service "D"	Level of Service "D"

N
W E
S

0 0.1 0.2 0.3 0.4
Miles

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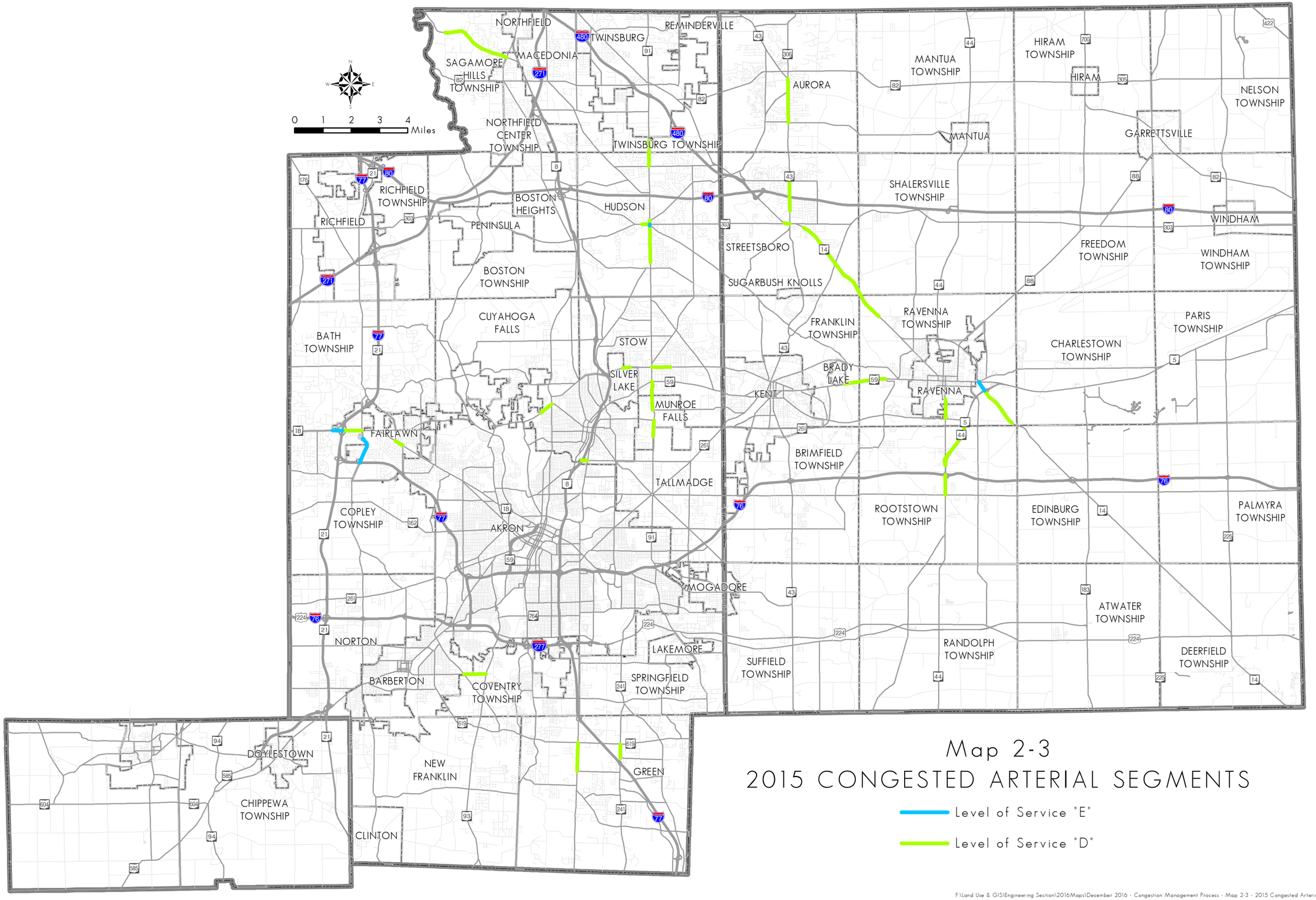

Map 2-3
2015 CONGESTED ARTERIAL SEGMENTS

Level of Service "E"

Level of Service "D"

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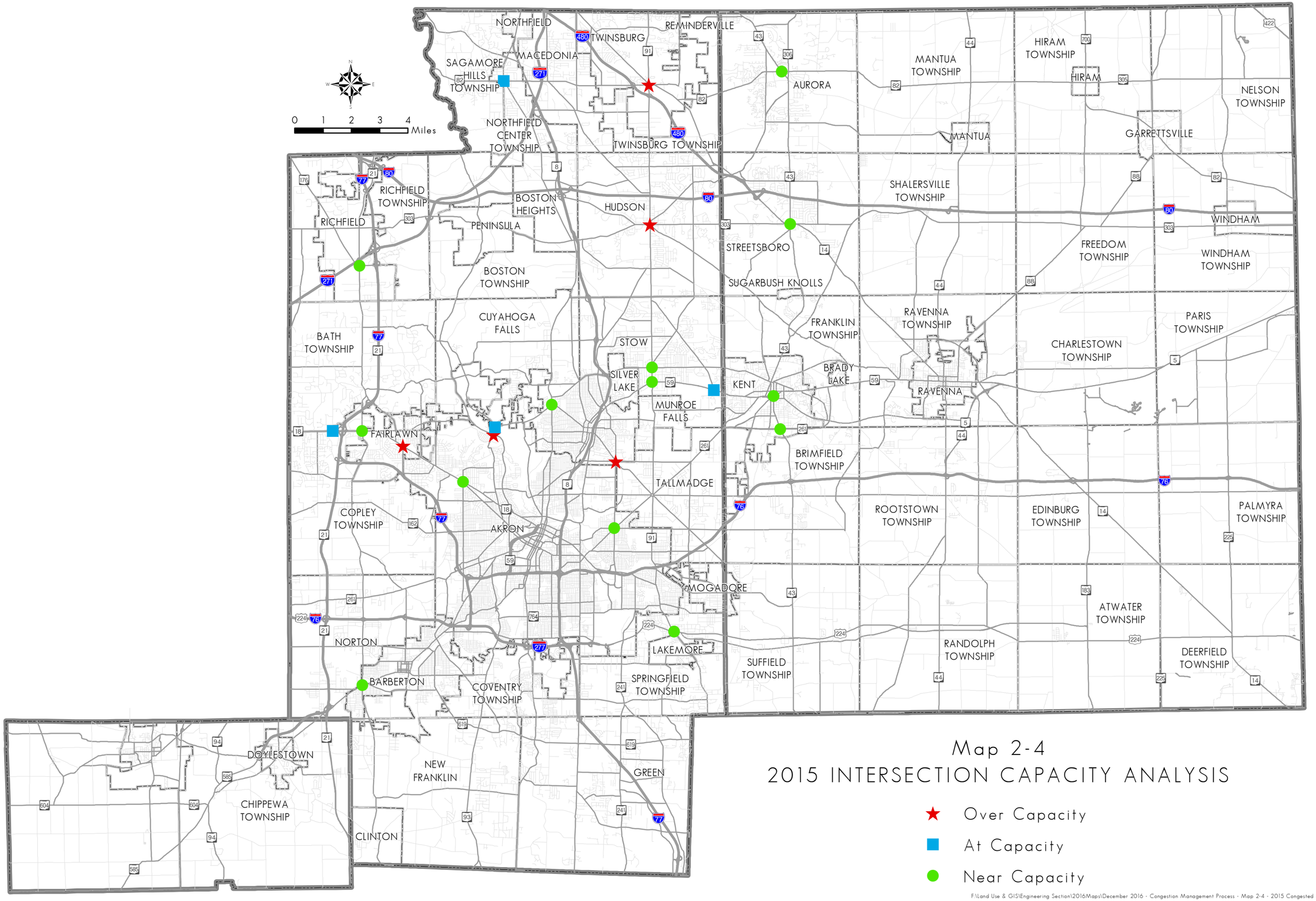


Map 2-4
2015 INTERSECTION CAPACITY ANALYSIS

★ Over Capacity

■ At Capacity

● Near Capacity

F:\Land Use & GIS\Engineering Section\2016Maps\December 2016 - Congestion Management Process - Map 2-4 - 2015 Congested Intersections.mxd

CHAPTER 3

FUTURE TRAFFIC CONGESTION

It is imperative to recognize that congestion conditions vary with time, changes in the transportation system and changes in land use. For example, some municipalities in the AMATS region are experiencing minimal growth, while others are growing rather rapidly. As a result, it is necessary to understand the future performance of the transportation system, in order to effectively plan for future transportation improvements.

In this chapter, future traffic congestion is identified based on the *2040 Future Congestion Study*, which was completed by AMATS in July 2016. The purpose of this chapter is to quantify the level of future traffic congestion on the freeways and arterials that comprise the AMATS congestion management roadway system. The level of future congestion at intersections was not analyzed due to the difficulty of accurately forecasting turning movements.

2040 Freeway Level of Service Analysis

This analysis determines the extent to which there will be sufficient capacity on the freeway system in 2040 to accommodate future peak-hour traffic volumes at a reasonable level of service (LOS). In all, 165 miles of freeway were divided into 196 directional segments that were analyzed during the peak hour of travel. The LOS was determined using a methodology described in the *Highway Capacity Manual 2010* (HCM2010). In addition, freeway segments with high levels of traffic weaving, known as weaving segments, were analyzed using a methodology prescribed in HCM2010. Please note that the approximately 34 miles of the Ohio turnpike were not analyzed.

The analysis was conducted assuming that the arterial system would remain as it is today with the exception of several upcoming improvements. These upcoming improvement projects are:

- **I-76** from SR 21 to SR 619 (widen to 6 lanes)
- **I-76** from Central Ave to 27th St (reconstruction of Wooster Rd/East Ave interchange)
- **I-76/77** at Main/Broadway and Grant/Wolf Ledges (reconfigure interchanges)

The 2040 traffic volume on each freeway segment was forecasted using the AMATS travel demand model and the corresponding capacity was calculated using HCM2010 procedures. The freeway LOS is based on density, which takes both volume and capacity into account.

Freeway segments forecasted as operating at a density of greater than 26.0 (LOS "D", "E" or "F") in the peak hour were identified as congested. According to the analysis, 78 of the 196 total freeway segments will be congested by 2040. Of the 20 total weaving segments identified, 7 were not analyzed due to extensive reconfiguration, 5 were identified as congested or operating at LOS "D" or worse by 2040. These segments are listed in Appendices E and F. They are also shown on Maps 3-1 and 3-2, ranked according to their density.

2040 Arterial Level of Service Analysis

This analysis determines the extent to which there will be sufficient capacity on arterial roadways in 2040 to accommodate future peak-hour traffic volumes at a reasonable LOS. In all, 375 miles of arterial roadways were divided into 596 segments, and were analyzed using a methodology which compares the future peak-hour volumes to peak-hour roadway capacities.

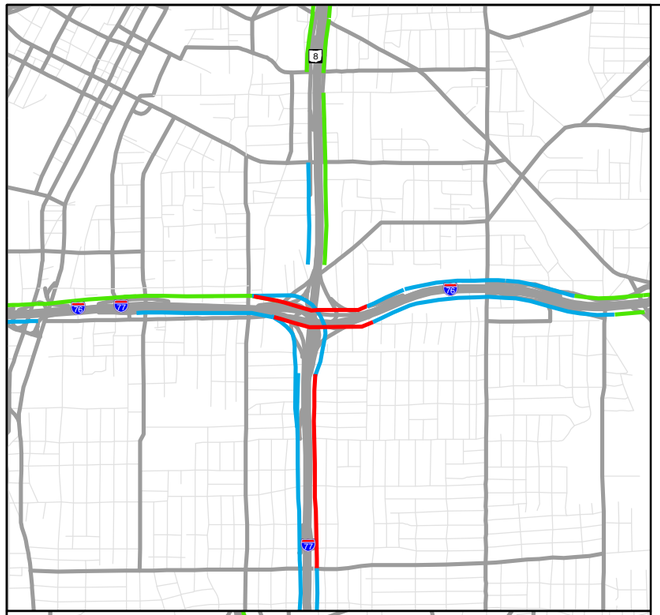
The analysis was conducted assuming that the arterial system would remain as it is today with the exception of several upcoming improvements. These upcoming improvement projects are:

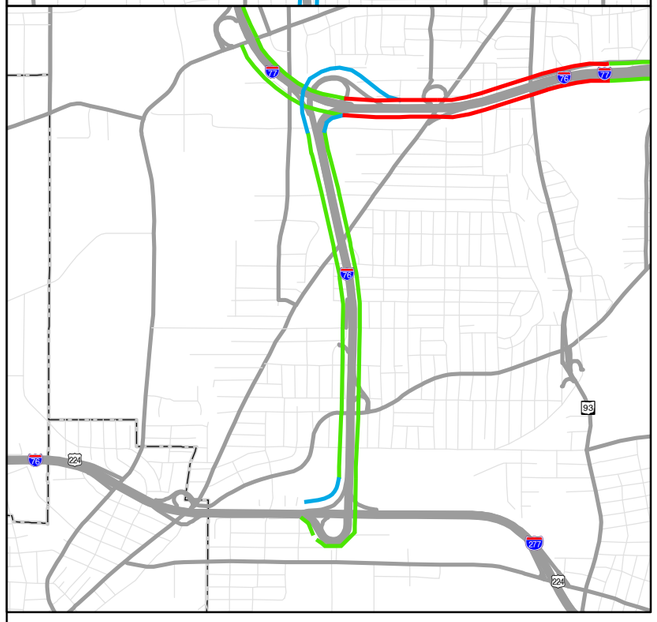
- **SR 14** at Tallmadge Rd (turn lanes)
- **SR 14** at SR 59 / Newton Falls Rd (intersection improvements)
- **SR 18** at Montrose West Ave (relocate Montrose West to Heritage Woods Dr and add EB right turn lane onto I-77 SB ramp)
- **SR 18 (West Market St)** from Hawkins Ave to Portage Path (signal coordination, remove Kenilworth / Elmdale signal)
- **SR 18 (West Market St)** from Portage Path to Summit St (signal upgrade)
- **SR 43** from SR 261 to Summit St (signal coordination, turn lanes)
- **SR 59** from Exchange St to Main/Howard St (reroute traffic onto Dart and Rand Ave, close mainline)
- **SR 91 (Canton Rd)** at SR 18 (Market St) (turn lanes)
- **SR 91 (North Ave)** from Tallmadge Cir to Garwood Dr (turn lanes)
- **SR 91 (Darrow Rd)** from Fishcreek Rd to Norton Rd (turn lanes, new signal at Fishcreek Rd)
- **SR 91 (Darrow Rd)** at Norton Rd (turn lanes)
- **SR 91 (Darrow Rd)** at Prospect St (signal coordination, bike lanes)
- **SR 91 (Darrow Rd)** from Brandywine Rd to Middleton Rd (turn lanes, bike lanes)
- **SR 91 (Darrow Rd)** from north of Glenwood Blvd to north Twinsburg corp. line (widen to 4 lanes, roundabout at Ethan Dr / Meadowood Blvd)
- **SR 162 (Copley Rd/Maple St)** from Collier Rd to Glendale Ave (signal coordination)
- **SR 261 (Tallmadge Ave)** from Home Ave to Brittain Rd (signal coordination)
- **Arlington Rd** from Green north corp. line to Akron south corp. line (signal coordination, NB turn lane at Warner Rd)
- **Brittain Rd** from East Market St to Eastwood Ave (signal coordination)
- **Canton Rd** from south of Springfield Lake Dr to Farmdale Rd (turn lanes, standard lanes widths, new center median)
- **Cleveland Massillon Rd** from Weber Dr to Greenridge Rd (median turn lane and intersection improvements)
- **Exchange St /Cedar St** from S. Portage Path to Broadway St and Rhodes Ave to Broadway St (signal coordination, lane reduction, parking, and bike lanes)
- **Frost Rd** from I-480 to Philipp Pkwy and at SR 43 (signal coordination, turn lanes)
- **Seiberling Way** from Englewood St to Eagle St (new roadway)
- **East Summit St** from South Lincoln St to Loop Rd (signal coordination, new center median, and intersection improvement at Lincoln St)

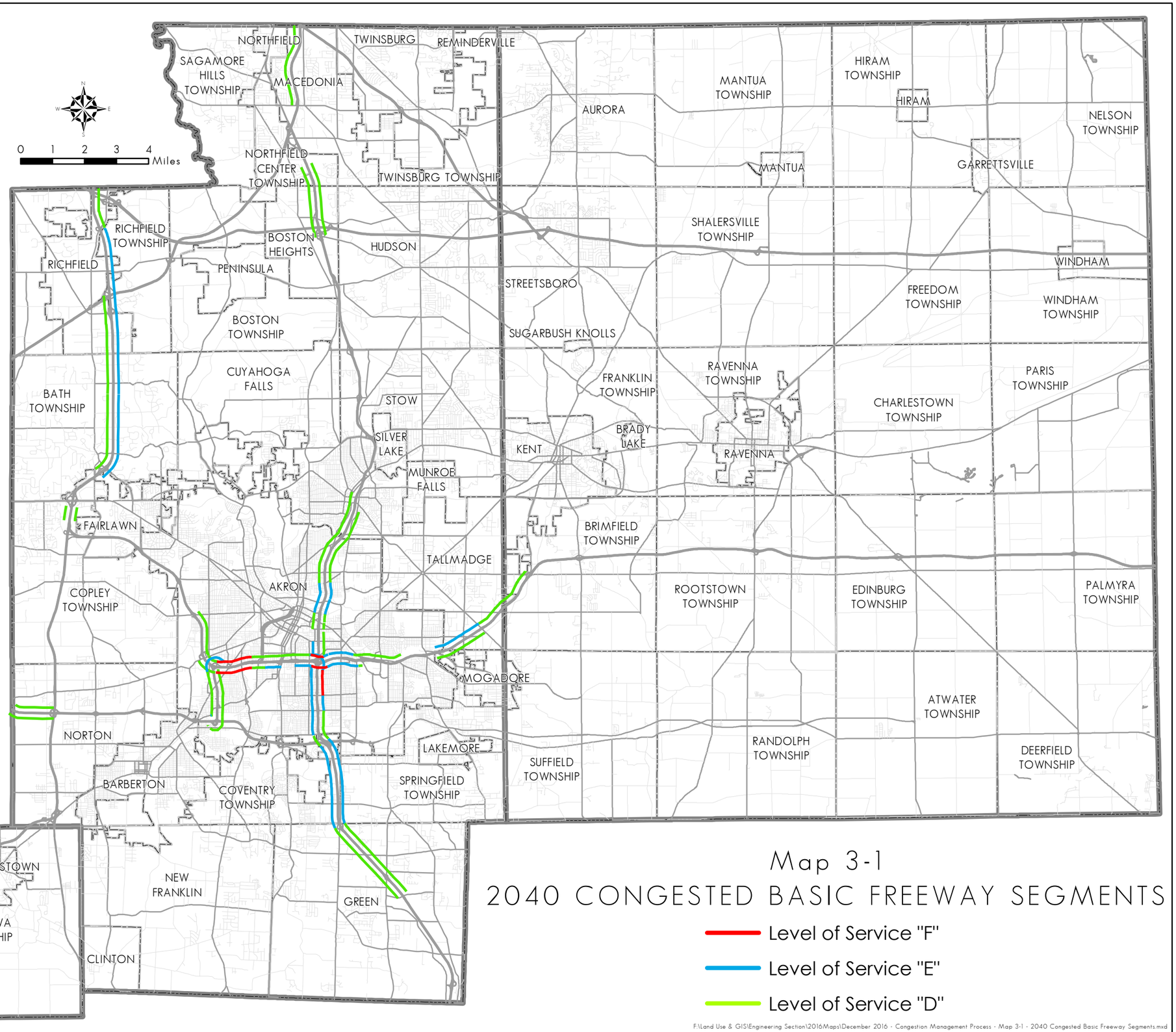
- **West Side Signals** at Highland & Diamond/Sycamore and Diamond & Cleveland (signal coordination & preemption)
- **White Pond Pkwy** across from First Energy Dr (new roadway)

Assuming these improvements, the 2040 traffic volume on each arterial segment was forecasted using the AMATS travel demand model and the corresponding capacity, which was based on number of lanes, presence of dedicated turn lanes and number of signals. Arterial LOS is based on the volume-to-capacity (V/C) ratio.

Arterial segments forecasted as operating at a V/C ratio greater than 1.0 (LOS "D", "E" or "F") in the peak hour were identified as congested. According to this analysis, 138 of the 596 segments analyzed will be congested by 2040. These segments are shown in Appendix G and on Map 3-3, ranked according to their V/C ratio.







Map 3-1
2040 CONGESTED BASIC FREEWAY SEGMENTS

- Level of Service "F"
- Level of Service "E"
- Level of Service "D"

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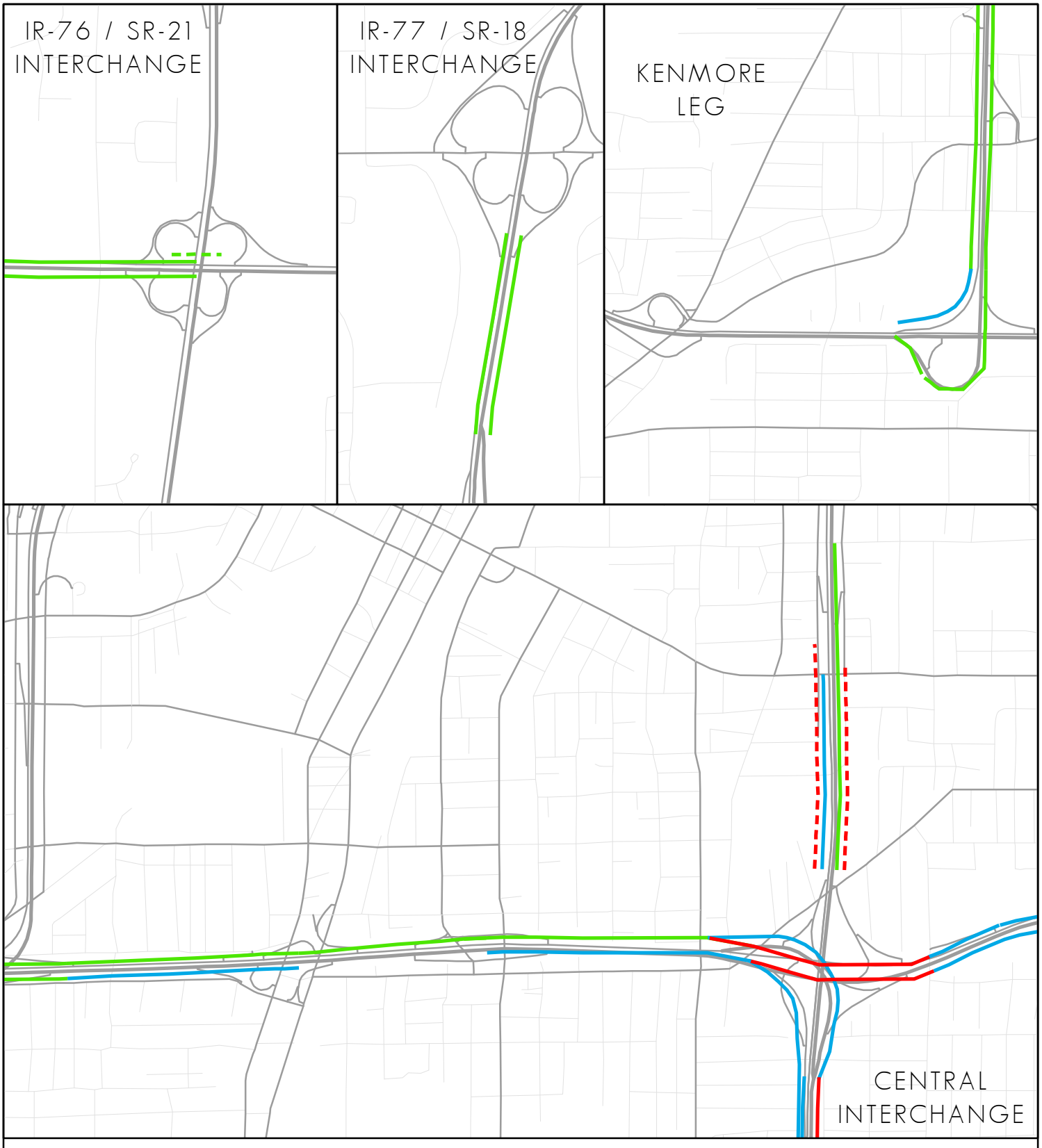

Map 3-2

2035 CONGESTED WEAVING AREAS

BASIC	WEAVE
Level of Service "F"	Level of Service "F"
Level of Service "E"	Level of Service "E"
Level of Service "D"	Level of Service "D"

N
W E
S

0 0.1 0.2 0.3 0.4 Miles

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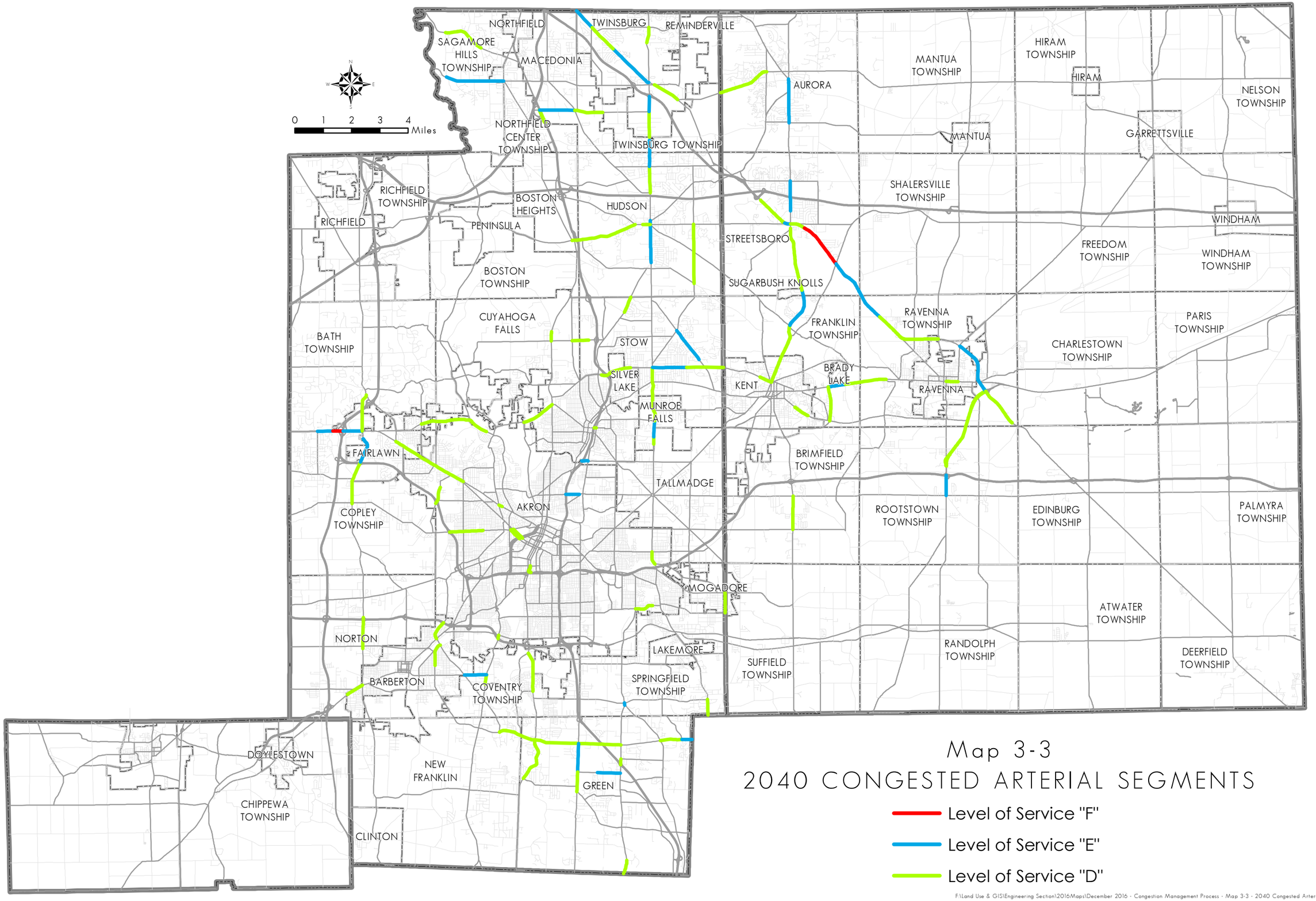


Map 3-3
2040 CONGESTED ARTERIAL SEGMENTS

- Level of Service "F"
- Level of Service "E"
- Level of Service "D"

F:\Land Use & GIS\Engineering Section\2016Maps\December 2016 - Congestion Management Process - Map 3-3 - 2040 Congested Arterial Segments.mxd

CHAPTER 4

REGIONAL PUBLIC TRANSIT SERVICE

AMATS' regional goals and objectives are primary points of connection between the Congestion Management Process and the Regional Transportation Plan. The goals and objectives identified in the plan update process provide the framework for identifying the appropriate strategies to resolve congestion issues. The CMP identifies multi-modal strategies to reduce congestion in the region by providing improved access and mobility using a broad range of strategies and solutions. Finding strategies to reduce congestion is an important component in the Congestion Management Process.

Funding and promoting transit is a key element in a multi-modal transportation system. With a reliable and efficient transit system in place, overall roadway congestion can be relieved. Improving transit operations, improving access to transit, and expanding transit service can help reduce the number of vehicles on the road by making transit more attractive and accessible. In this chapter transit level of service has been analyzed. It is discussed more fully in the *2016 AMATS Regional Public Transit Plan.*

There are two primary providers of public transportation in our region: METRO RTA, which serves Summit County, and the Portage Area Regional Transportation Authority (PARTA), which serves Portage County. Both agencies operate traditional fixed-route bus service, demand-response services for low-income, elderly and disabled passengers, and express bus service to key communities, such as Cleveland. AMATS assists these local transit agencies in providing the best possible public transportation service for the greater Akron area.

Recognizing that in many cases it is no longer feasible to add to the supply of our region's transportation network (building new roads, adding lanes, etc.), through the implementation of various strategies to reduce demand during peak travel hours, the existing network can function more efficiently and economically. In recent years, AMATS has been developing solutions to get the most out of our existing transportation network.

In 2010, AMATS's *Connecting Communities Initiative* examined the relationship between transportation and land use patterns, offering solutions as to how more compact development, non-vehicular transportation (bike, pedestrian and transit) and urban design can work to reduce regional vehicular demand. These solutions are by no means a panacea, but used effectively, can lead to a noticeable reduction in VMT.

Transit Level of Service

One way of showing the convenience of a transit line to potential riders is by calculating its level of service (LOS). Unlike highway LOS, which rates the level of congestion of a particular roadway, transit LOS represents the *convenience* of a transit line to potential passengers (*not* how close to capacity the buses are). Specifically, transit LOS represents the average headway, or time between bus arrivals at a particular location. A high LOS means that buses arrive frequently and service is highly attractive, whereas a low LOS means that bus arrivals are sparse

and passengers are likely to experience long wait times. Each transit line is assigned an LOS letter grade, from 'A' through 'F', based on the specifications shown in the key below:

Transit LOS Key:

LOS	Headway (min)	Veh/Hr	Comments
A	< 10	> 6	Passengers don't need schedules
B	10-14	5-6	Frequent service, passengers consult schedules
C	15-20	3-4	Maximum desirable time to wait if bus missed
D	21-30	2	Service unattractive to choice riders
E	31-60	1	Service available during hour
F	> 60	< 1	Service unattractive to all riders

Source: Transportation Research Board

For this LOS analysis, weekday time periods (peak and non-peak) were selected, based on predominant travel patterns observed in the AMATS planning area. Much of the demand for transit service is spread throughout the day, so average daytime and evening headways are also calculated. Using the most recently published timetables for each METRO and PARTA fixed-route line, inbound trips were separated into several time periods (peak and non-peak, daytime and evening), and the average time between buses was calculated. This average time was compared to the transit level of service table (as seen above) and an LOS score was then applied. The results of this analysis are shown on the following two tables:

Table 4-1
PARTA Fixed-Route LOS Analysis

Trip Frequency											
Route #	Description	AM Peak (7-9am) Headway (Mins)	LOS	Daytime (6am-7pm) Avg Headway (Mins)	LOS	PM Peak (4-6pm) Headway (Mins)	LOS	Evening (7pm+) Avg Headway (Mins)	LOS	Peak Vehicles	Inbound Trip Length (Mins)
	County Service										
10	Kent Circulator	No Service	N/A	130	F	One Trip	N/A	No Service	N/A	1	27
20	Gateway	No Service	N/A	35	E	One Trip	N/A	No Service	N/A	2	18
30	Interurban West (Kent to Stow)	45	E	38	E	33	E	44	E	2	22
35	Interurban East (Kent to Ravenna)	34	E	40	E	29	D	34	E	3	50
40	Suburban North	58	E	52	E	45	E	58	E	1	19
45	Suburban South	53	E	47	E	50	E	75	F	1	15
60	Black Squirrel	One Trip	N/A	30	D	30	D	No Service	N/A	1	9
70	Windham Garrettsville	One Trip	N/A	98	F	One Trip	N/A	No Service	N/A	1	49
80	Raven	One Trip	N/A	96	F	45	E	One Trip	N/A	0	20
90	Akron Express										40
100	Cleveland Express										100
	Campus Service										
51	Campus Loop	10	B	10	B	9	A	24	D	0	18
53	Reverse Loop	10	B	10	B	9	A	24	D	3	18
54	Student Center Express	17	C	12	B	15	C	No Service	N/A	2	10
55	Allerton	12	B	12	B	12	B	12	B	1	5
57	Stadium Loop	35	E	35	E	35	E	No Service	N/A	1	22
58	Summit East/Front Campus	13	B	12	B	9	A	18	C	4	14
59	Summit East/Stadium	16	C	12	B	16	C	27	D	2	30

Source: November 2016 Schedule

Table 4-2
METRO Fixed-Route LOS Analysis

Trip Frequency											
Route #	Description	AM Peak (7-9am) Headway (Mins)	LOS	Daytime (6am-7pm) Avg Headway (Mins)	LOS	PM Peak (4-6pm) Headway (Mins)	LOS	Evening (7pm+) Avg Headway (Mins)	LOS	Peak Vehicles	Inbound Trip Length (Mins)
1	West Market	22	D	24	D	29	D	70	F	6	45
2	Arlington	20	C	23	D	21	D	70	F	6	50
3	Copley/Hawkins	22	D	34	E	27	D	70	F	5	43
4	Delia/N Hawkins	36	E	43	E	30	D	No Service	N/A	4	35
5	East Market/Ellet	42	E	56	E	48	E	No Service	N/A	3	65
6	East Market/Lakemore	26	D	36	E	35	E	70	F	5	50
7/7A	Cuyahoga Falls Ave	28	D	36	E	32	E	70	F	4	33
8	Kenmore/Barberton	25	D	40	E	28	D	70	F	4	53
9	Wooster/East Ave	40	E	40	E	35	E	70	F	3	29
10	Howard/Portage Trail	34	E	38	E	30	D	70	F	4	48
11	South Akron	70	F	77	F	77	F	No Service	N/A	1	40
12	Tallmadge Hill	33	E	35	E	35	E	70	F	5	46
13	Grant/Firestone Park	25	D	40	E	36	E	70	F	4	34
14	Euclid/Barberton	27	D	34	E	30	D	70	F	5	68
17	Brown/Inman	31	E	38	E	28	D	70	F	5	38
18	Thornton/Manchester	32	E	36	E	38	E	70	F	3	31
19	Eastland	38	E	44	E	27	D	65	F	3	41
21	South Main	40	E	40	E	40	E	No Service	N/A	1	15
24	Lakeshore	60	E	37	E	40	E	No Service	N/A	2	12
26	W Exchange/White Pond	35	E	43	E	50	E	One Trip	N/A	2	38
28	Merriman Valley	45	E	57	E	37	E	No Service	N/A	3	40
30	Goodyear/Darrow	45	E	40	E	43	E	No Service	N/A	3	40
33	State Rd/Wyoga Lake	45	E	143	F	100	F	90	F	2	40
34	Cascade Village/Uhler	28	D	36	E	32	E	70	F	4	48
50	Montrose Circulator	30	D	27	D	28	D	40	E	3	29
51	Stow Circulator	40	E	37	E	35	E	One Trip	N/A	2	23
53	Portage/Graham	43	E	62	F	128	F	No Service	N/A	3	56
54	DASH/Downtown	10	B	10	B	10	B	15	C	4	18
59	Chapel Hill Circulator	44	E	56	E	60	E	55	E	2	42
X-60	Northcoast Express - Chapel Hill									2	96
X-61	Northcoast Express - Montrose									5	77
101	Richfield/Bath	50	E	60	E	80	F	One Trip	N/A	2	52
102	Northfield Express	52	E	57	E	80	F	67	F	2	50
103	Stow/Hudson	62	F	66	F	60	E	60	E	2	57
104	Twinsburg Creekside	56	E	51	E	44	E	67	F	3	52
110	Green/Springfield	55	E	99	F	45	E	One Trip	N/A	2	66

Proposed High Frequency Route

Source: August 2016 Schedule

Transit LOS Analysis Results

PARTA

PARTA's fixed-route service is very different from METRO's, as the two agencies' LOS statistics indicate. Whereas METRO provides broad service within most portions of the more urbanized Summit County, PARTA focuses its efforts on Kent State University and the smaller number of urban areas within more rural Portage County. With most service concentrated in the compact college town of Kent and the nearby county seat of Ravenna, PARTA is able to run frequent service in this compact geographical area.

Service in and around Kent State University is very frequent, with nearly 1/3 of fixed-routes operating at LOS 'A' during mid-day time periods. Most of the lines classified as LOS 'D', 'E' or 'F' are the periodic trips to the farthest reaches of the county, or express trips to Akron or Cleveland. Long-haul express trips typically run infrequently for any transit agency, often once per hour for a very limited number of hours each day. Service in the City of Kent, Ravenna and through Kent State University is frequent and highly attractive.

Similarly to METRO (and most transit agencies), service drops off significantly in the evening and at night. Yet, even at night, a moderate percentage of PARTA's fixed routes provide LOS 'B' and 'C', which is beneficial to the local college students and city residents. PARTA is currently in the process of updating its fixed route system to provide more direct routes and improved headways. A restructured system should be in place in early 2017. Dial-a-ride demand response service remains a priority and is available for the general public.

METRO RTA

In recent years METRO has made improvements to their levels of service. Although bus lines offering service at a LOS 'A', 'B' or 'C' are less prevalent, there has been a strong increase in the number of bus lines offering a LOS 'D', and those operating at 'E' or 'F' have decreased proportionally. Although 'D' rated service generally precludes choice ridership (i.e. those who have access to personal automobiles or other transportation), it provides reasonable frequency to those who depend on transit. In terms of rider perception, the difference between 'C' and 'D' service might only be a matter of minutes. METRO's "Driving Forward" initiative will improve the level of service on high ridership routes, coinciding with areas of high traffic volume, thus alleviating roadway congestion.

METRO's fixed-route service provides broad coverage in central Summit County, particularly within the denser cities such as Akron, Barberton and Cuyahoga Falls. With limited funding and assets available, any transit agency faces a trade-off between maximum geographical coverage and frequency on each particular route. METRO strikes a good balance, providing wide coverage and more frequent service, especially on its highest ridership routes.

One area in need of service improvement is after 7:00pm evening hours. Fixed-route service is very infrequent, with most of the routes exhibiting a level of service of 'F'. This creates a transportation burden on second-shift workers, particularly those in lower-paying service industries, who are among the most likely to use transit to commute to their places of employment.

METRO is in the process of redeveloping its route structure and LOS to meet the needs of the area. METRO intends to increase the frequency of its buses on core routes during peak work hours, and may cut or reduce suburban routes, eliminate some bus stops and create new transfer hubs as part of a major overhaul of its fixed route system.

CHAPTER 5

FREIGHT ANALYSIS

The 2016 *AMATS Freight Plan* identifies the transportation systems in the AMATS area that are used to move freight. The report also addresses the factors and trends that affect multiple modes and the flow of freight, as well as the procedures used for planning and programming freight-related projects through the AMATS transportation planning process.

The *AMATS Freight Plan*:

- Defines those elements of the area's transportation system that are critical for the efficient movement of freight
- Identifies ways to measure system performance in terms of freight movement
- Develops freight-oriented data collection and modeling in order to identify problems and potential solutions, and ultimately
- Recommends broad strategies and specific projects designed to improve the movement of freight throughout the transportation network.

The highest priority needs in the AMATS area regarding freight movement involve improvements to the highway system. The AMATS Highway Preservation Needs Report and the Congestion Management Process (CMP) Report address the needs of the AMATS area in terms of highway improvements that streamline the flow of freight in the region.

Freight movement, by way of trucks, is heavily concentrated on freeways and major state routes. The number of trucks on these roads range from 50 to 15,000 trucks per day, with I-76 through Summit and Portage counties being the busiest freeway for trucks. Highway improvements such as the Central Interchange project will help improve the efficiency of freight movement on the area's roadways. Recommended grade separations will reduce delays and eliminate conflicts between trains and automobiles.

Since the approval of the current AMATS Freight Plan in December 2012, ODOT has completed Improvements to the ramp from I-76 EB to I-277 NB at the south end of the Kenmore Leg (safety issue related to crashes) to meet modern standards and geometrics. But the largest current project presently under construction is the new South Main/Broadway interchange with I-76/77 near downtown Akron. This $113 million project includes removing interchanges at Wolf Ledges Parkway and Grant Street, and reconstructing access points and re-aligning Main Street and Broadway.

In addition, work is now beginning on several more improvements to I-76 in the AMATS area, including the Central Interchange (I-76/I-77/SR 8) Project. A new project to reconstruct and realign three of the ramps at the Central Interchange is scheduled in FY 2017 and 2018 of the TIP using $2.7 million in Highway Safety Improvement Program (HSIP) funds and $3.6 million in funds approved by the Transportation Review Advisory Council (TRAC), along with other funding sources. Right-of-way is scheduled in FY 2019 using $900,000 in HSIP funds.

AMATS's freight planning process includes three primary strategies:

- Developing and maintaining databases and analysis tools for decision-making
- Interacting with AMATS members and freight stakeholders to better understand the freight system, identify common issues, and build consensus
- Incorporating freight into the regional transportation planning process

Freight recommendations are including in Chapter 9 of this report along with other highway and transit recommendations.

CHAPTER 6

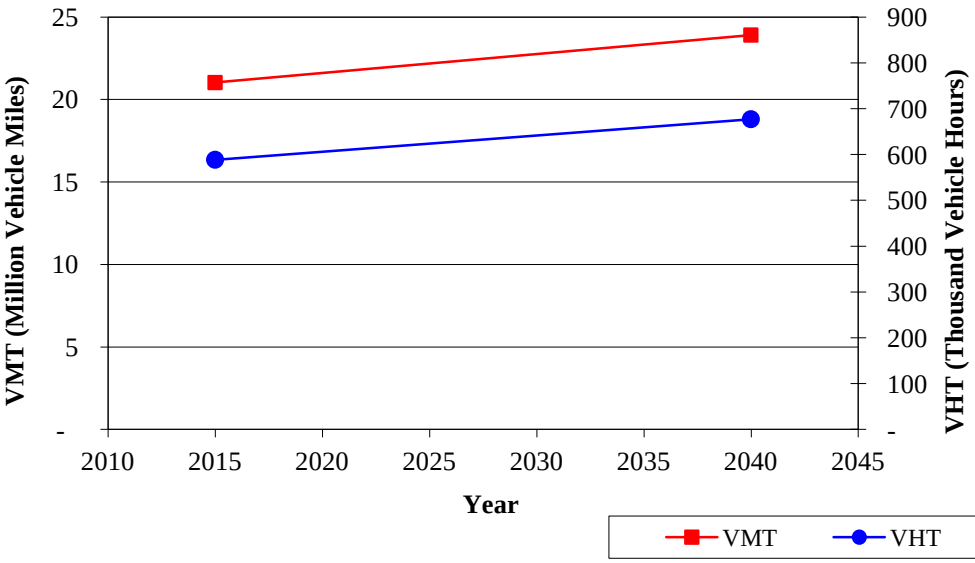
SYSTEMWIDE CONGESTION THROUGH THE YEARS

System statistics were developed to measure the performance and level of congestion on the highway system in the AMATS area over time. Monitoring of these statistics is an important step in determining which congestion management strategies are most effective and in determining congestion trends through the years.

Transportation planning models were used to generate various congestion statistics, and to project their growth from 2015 through 2040. The statistics used in this report are vehicle miles traveled (VMT) and vehicle hours traveled (VHT).

VMT represents the total number of miles driven by all motorists in the region, and VHT illustrates the total amount of time spent by all motorists on the roadway. The forecasted growth for VMT and VHT in the AMATS region is shown below in Figure 6-1.

Figure 6-1
Daily Vehicle Miles Traveled and Vehicle Hours Traveled



Forecasting VMT/VHT into the distant future is not an easy task. Regional trends are projected outward to paint a picture of the general trends we might expect over a long horizon. What these models fail to account for are the economic and social variables that can lead to significant changes over short-term periods. As shown in Figure 6-1, VMT and VHT are projected to grow at a slow and steady rate through 2040.

Although it is important to consider how projected increases in VMT/VHT might affect our transportation network in the distant future, AMATS invests its transportation dollars into

projects addressing current congestion problems, which are known and well documented, rather than funding speculative ones.

One way to evaluate system-wide congestion within the AMATS region is to look at the percentage of miles by LOS. This information is compared by year on Table 6-1 below.

Table 6-1
2010, 2015 and 2040 Level of Service Comparison

Arterial LOS	Percentage of Arterial Miles			Freeway LOS	Percentage of Freeway Miles		
	2010	2015	2040		2010	2015	2040
F	0%	0%	1%	F	3%	0%	2%
E	1%	0%	7%	E	4%	1%	8%
D	6%	7%	17%	D	33%	10%	13%
C or Better	93%	93%	75%	C or Better	60%	89%	77%

As shown on Table 6-1 above, the level of congestion on arterials dropped slightly from 2010 to 2015, but is expected to rise to higher levels by 2040. AMATS has invested millions of dollars into capacity and operational improvement projects throughout our region, to which we can attribute significant congestion reduction between 2010 and 2015, particularly on arterial streets. Over time, slow and steady growth in our region will lead, once again, to increases in congestion through 2040. Major freeway projects, which are already programmed in the next few years and are listed in chapter 3, help with maintaining better LOS percentages than in the past. Many of the arterial projects programmed are operational in nature and have limited impact on 2040 LOS.

Table 6-2 lists the congestion-reducing projects that were completed between 2010 and 2015. Some projects were also safety related projects and therefore should improve non-recurring congestion in the future. The LOS for 2010, 2015, and 2040 has been included, demonstrating the effectiveness of each project with regards to congestion reduction.

Table 6-2
Congestion Projects Completed Between 2010 and 2015

Roadway	Community	Location Description	Project	2010 LOS	2015 LOS	2040 LOS
SR 93 (Manchester Rd)	Coventry Twp	Robinson Ave to north of Cormany Rd	Widen to 5 lanes, intersection improvements	D	B	B
31st St	Barberton	Wooster Rd to Shannon Ave	Median turn lane, signal upgrade	D	C	B
Howe Ave	Cuyahoga Falls	Howe Ave at Main St	Extend turn lanes	D	D	E/C
Hudson Dr	Stow	Steels Corners Rd to Commerce Dr	Widen to 4 lanes, turn lanes, signal upgrade	D	A	B
Prospect St	Ravenna Twp	Summit St to Hayes Rd	Turn lanes, signals	D	D	C
State Rd	Cuyahoga Falls	Bath Rd to Steels Corners Rd	Turn lanes, signal upgrade, bike lanes	C	C	C

Several conclusions can be drawn from the table above. Most of the projects show an improvement in congestion upon completion, demonstrating the efficiency of these projects and the effectiveness of AMATS' transportation improvement expenditures. Please note that projects with the same LOS letter in 2010 and 2015 still showed an improvement. The improvement was just not enough to change LOS letter. Also notice that capacity improvements, such as SR 93 and Hudson Dr, have a larger LOS impact than operational improvements. Most projects have a long-term effect and deteriorate little to none by 2040. The long-term effectiveness of these projects is likely due to the slow growth rate experienced in the AMATS region. Projects completed in the Akron metropolitan region are likely to have a longer lifespan than in regions experiencing more rapid population and employment growth.

Based on the preceding information, it can be concluded that projects intended to alleviate congestion in our region have been successful. Most projects appear to have a lasting effect of well over a 20-year period. These types of projects will continue to be effective based on past performance and slow to modest regional growth. Similar projects should be considered throughout the congestion management process.

CHAPTER 7

INCIDENT-RELATED TRAFFIC CONGESTION

Incident-related traffic congestion is congestion that occurs due to a non-recurring incident. In most cases, this incident is a traffic crash. While crashes can happen anywhere at any time, some locations are more prone to crashes than others. Locations with both frequent crashes and recurrent congestion will be significantly more congested. Effective transportation planning requires that incident-related congestion be analyzed.

In order to analyze incident-related traffic congestion, traffic crash data must be reviewed. AMATS publishes an annual report detailing traffic crashes in our region; the latest version being published in September 2015. *Traffic Crashes 2012-2014* analyzed traffic crashes for freeways, arterials and intersections between 2012 and 2014, utilizing crash records provided by the Ohio Department of Public Safety (ODPS) and the Ohio Department of Transportation (ODOT) for the years 2012, 2013 and 2014.

Freeways

The freeway crash analysis in this report uses AASHTO's SafetyAnalyst software for highway safety management. Using state-of-the-art statistical methodologies, this software analyzes all freeway segments, takes a number of physical characteristics into consideration and establishes an anticipated number of crashes based on those characteristics. SafetyAnalyst flags freeway sections that exhibit higher-than-predicted crash frequencies or severity. The advantage of this system, particularly in an era of limited highway funding, is that only segments with a high potential for safety improvement are identified. These priority areas allow the state to invest funds into projects with the greatest likelihood of reducing crash frequencies and severity.

Please visit ODOT's website at:
http://www.dot.state.oh.us/Divisions/Planning/ProgramManagement/HighwaySafety/HSIP/Pages/Priority-Lists-Initiatives.aspx for additional information and the methodology that ODOT uses to rank freeway locations.

There were only four freeway crash locations identified in the previous AMATS CMP report for years 2008 to 2010. For this report, 6 locations were identified with 2 along the turnpike and the remaining 4 locations listed in Table 7-1, shown below, and Map on 7-1. These 2012-2014 locations do not correspond with any of the locations from the previous report which included three SR 8 locations and one I-77 location.

Table 7-1
High Crash Freeway Locations (2012-2014)

AMATS Rank	Freeway	Location	Length (miles)	Annual Crashes Per Mile	Location
1	I-76	Near Main/Broadway Interchange	0.1	357.86	Akron
2	I-76	Near SR 59 Interchange	0.1	239.22	Akron
3	I-76	Near Central Interchange	0.1	255.30	Akron
4	I-76	Near SR 14 Interchange	0.1	30.44	Edinburg Twp

Arterials

AMATS does not rely solely on ODOT's data for arterial roadway analysis. Areas of incident-related congestion are determined based on a composite score which considers both number of crashes and their severity to determine locations where incident-related congestion is most likely to occur. For a complete description of how the composite score is determined, please review the methodology in the AMATS *Traffic Crashes 2012-2014* report. Table 7-2 and Map 7-1 display the top 50 arterial locations.

Table 7-2
High Crash Arterial Sections (2012-2014)
ranked by composite score

Rank	Roadway Section	From	To	Composite	Location
1	W Exchange St	Rhodes Ave	Dart Ave	14.1	Akron
2	Manchester Rd (SR 93)	Carnegie Ave	Waterloo Rd	14.6	Akron
3	M.L. King Blvd (SR 59)	N Main St/N Howard St	N Broadway St	14.9	Akron
4	SR 14/44	SR 59	SR 5	15.1	Por Co-Ravenna Twp
5	Howe Ave	Cuyahoga Falls Corp Line	Main St	16.3	Cuyahoga Falls
6	S Water St	Haymaker Pkwy (SR 59)	E Main St	19.1	Kent
7	Brittain Rd	E Tallmadge Ave (SR 261)	Independence Ave	22.7	Akron
8	Medina Rd (SR 18)	I-77	Cleveland-Massillon Rd (CR 17)	22.9	Sum Co-Bath/Copley Twp
9	Broad Blvd	Second St	Newberry St	24.9	Cuyahoga Falls
10	SR 59	Alpha Dr	SR 261	26.5	Por Co-Franklin Twp
11	Arlington Rd	Turkeyfoot Lake Rd (SR 619)	Green North Corp Line	27.2	Green
12	Canton Rd (SR 91)	Akron South Corp Line	Triplett Blvd	28.1	Akron
13	W Market St (SR 18)	Cleveland-Massillon Rd	Smith Rd	29.0	Fairlawn
14	E Main St (SR 59)	Willow St	Luther Av	30.7	Kent
15	SR 44	Tallmadge Rd (CR 18)	I-76	31.6	Por Co-Rootstown Twp
16	Canton Rd (CR 66)	Sanitarium Rd (CR 136)	Waterloo Rd (US 224)	33.3	Sum Co-Springfield Twp
17	Canton Rd (SR 91)	Waterloo Rd (US 224)	Akron SCL	34.8	Sum Co-Springfield Twp
18	W Market St (SR 18)	Miller Rd	Fairlawn East Corp Line	35.8	Fairlawn
19	Copley Rd (SR 162)	St Micheals	S Hawkins Ave	35.9	Akron
20	W Market St (SR 18)	Ghent Rd	Miller Rd	37.0	Fairlawn
21	E Main St	Water St	Willow St	38.0	Kent
22	Massillon Rd (SR 241)	Boettler Rd	Turkeyfoot Lake Rd (SR 619)	38.7	Green
22	E Main St (SR 59)	Horning Rd	Kent East Corp Line	38.7	Kent
24	SR 14	SR 303	Diagonal Rd	39.3	Streetsboro

Table 7-2 (continued)
High Crash Arterial Sections (2012-2014)
ranked by composite score

Rank	Roadway Section	From	To	Composite	Location
25	N Portage Path	Merriman Rd	Portage Trail	39.5	Akron
26	Darrow Rd (SR 91)	Kent Rd (SR 59)	Stow Rd	39.6	Stow
27	E Cuyahoga Falls Ave	N Main St	Front St	40.4	Akron
28	Darrow Rd (SR 91)	E Highland Rd	Aurora Rd (SR 82)	40.9	Twinsburg
29	Arlington Rd (CR 15)	I-77	Killian Rd (CR 135)	41.0	Sum Co-Springfield Twp
30	Graham Rd	Hudson Dr	Silver Lake West Corp Line	41.7	Stow
31	S Arlington St	E Waterloo Rd	E Wilbeth Rd (SR 764)	42.0	Akron
32	Portage Trail	Second St	Newberry St/Munroe Falls Ave	42.2	Cuyahoga Falls
32	SR 5/44	I-76	Prospect St	42.2	Por Co-Rootstown Twp
34	Howe Ave	Main St	Buchholzer Blvd	43.8	Cuyahoga Falls
35	Wooster Rd N	Wooster Rd W	Hopocan Ave	45.5	Barberton
36	SR 59	SR 261	Brady Lake Rd (CR 162)	45.9	Por Co-Ravenna Twp
37	Market Square	SR 303	SR 43	47.2	Streetsboro
38	E Waterloo Rd	S Main St	Brown St	48.0	Akron
39	SR 14	I-480 ramp to Turnpike	SR 303	49.0	Streetsboro
40	N Main St (SR 91)	Munroe Falls Ave	N River Rd	49.2	Munroe Falls
41	S Maple St	Glendale Ave	W Market St (SR 18)	50.4	Akron
42	E Buchtel Ave	E Market St (SR 18)	N Arlington St	53.0	Akron
43	SR 43	SR 303	Frost Rd	53.2	Streetsboro
44	Graham Rd	Fishcreek Rd	Stow East Corp Line	53.4	Stow
45	W Streetsboro St (SR 303)	Boston Mills Rd	Main St (SR 91)	54.1	Hudson
46	N High St (SR 261)	E Market St (SR 18)	M.L. King Blvd (SR 59)	54.6	Akron
46	SR 59	Brady Lake Rd (CR 162)	Ravenna West Corp Line	54.6	Por Co-Ravenna Twp
48	E Main St (SR 59)	Freedom St (SR 88)	SR 14/SR 44	55.4	Ravenna
49	S Main St	Exchange St	Bowery St	55.6	Akron
50	Main St	Bowery St	M.L. King Blvd (SR 59)	56.2	Akron

Intersections

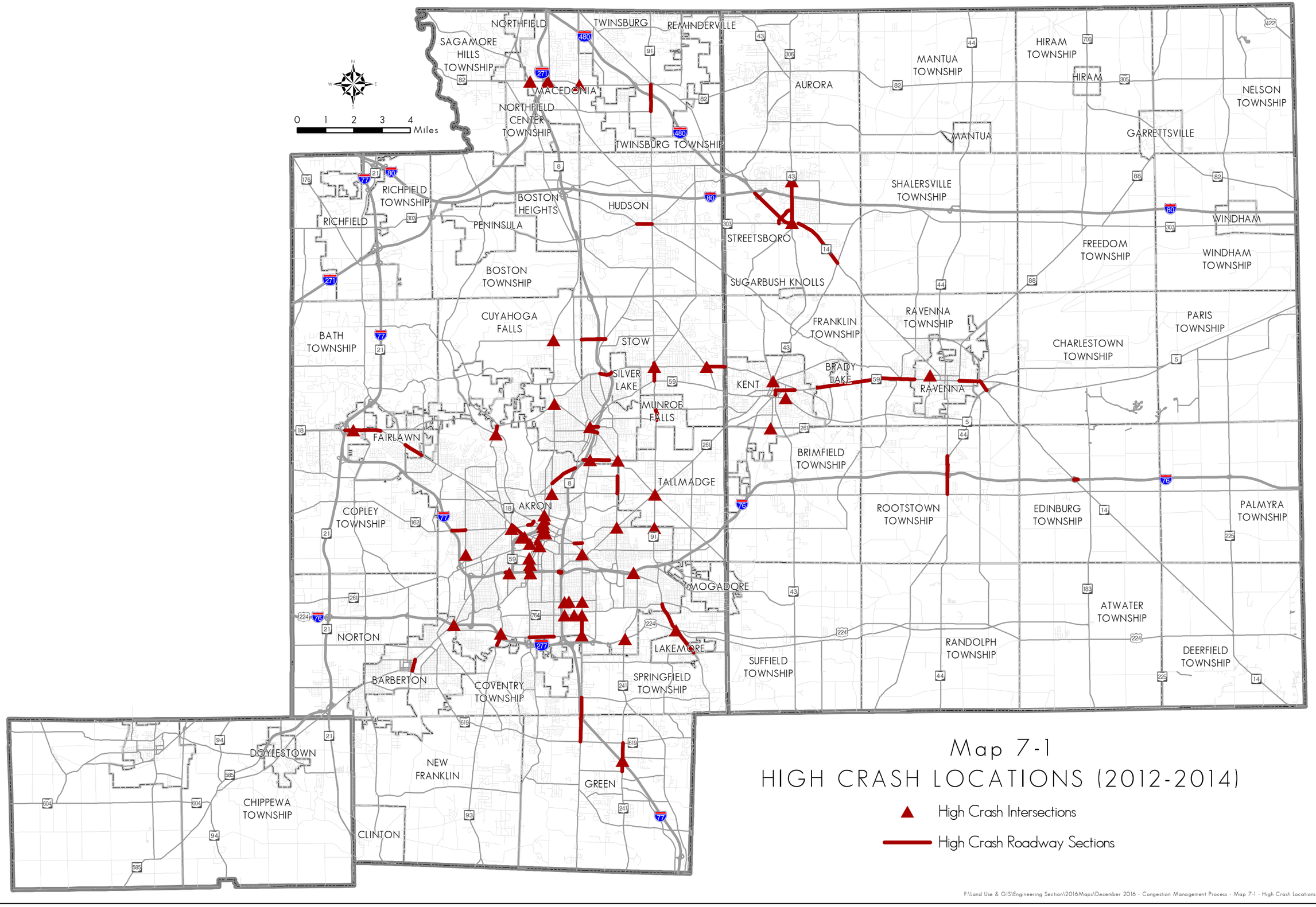
Similar to arterial segments, areas of incident-related intersection congestion are determined based on composite score. The top 50 high crash intersections are listed on Table 7-3, shown below, and displayed on Map 7-1.

Table 7-3
High Crash Intersections (2012-2014)
ranked by composite score

Rank	Street	Intersecting Street	Composite	Location
1	E Tallmadge Ave (SR 261)	Brittain Rd	30.5	Akron
2	E Market St (SR 18)	Mogadore Rd/I-76 EB Exit Ramp	40.2	Akron
3	E Waterloo Rd (US 224)	Canton Rd	40.5	Sum Co-Springfield Twp
4	S Maple St (SR 162)	S Rhodes Ave	42.5	Akron
5	E Waterloo Rd (US 224)	George Washington Blvd (SR 241)	43.9	Akron
6	N Main St (SR 261)	E Tallmadge Ave (SR 261)	44.7	Akron
7	Martin Luther King Jr Blvd (SR 59)	N Howard St/Main St	45.0	Akron
8	S Broadway St	E South St	49.7	Akron
9	W Exchange St	Dart Ave	54.4	Akron

Table 7-3 (continued)
High Crash Intersections (2012-2014)
ranked by composite score

Rank	Street	Intersecting Street	Composite	Location
10	Bailey Rd/Brittain Rd	Howe Ave/Northwest Ave/Tallmadge Rd	56.3	Cuyahoga Falls
11	Portage Trail	State Rd	56.4	Cuyahoga Falls
12	Darrow Rd (SR 91)	Graham Rd	56.5	Stow
13	Manchester Rd (SR 93)	W Waterloo Rd	57.9	Akron
14	SR 14/303	SR 43	58.1	Streetsboro
15	S Broadway St (SR 261)	E Exchange St	59.4	Akron
16	N Howard St	North St	59.5	Akron
17	S Main St	Thornton St	61.3	Akron
18	S Arlington St (SR 764)	E Wilbeth Rd (SR 764)	61.6	Akron
19	S Arlington St	E Waterloo Rd	63.0	Akron
20	Howe Ave	Main St	65.7	Cuyahoga Falls
21	N Mantua St (SR 43)	Fairchild Ave	67.4	Kent
22	W Cedar St	Dart Ave	69.4	Akron
23	Fishcreek Rd	Graham Rd	70.0	Stow
24	S Broadway St (SR 261)	E Mill St	70.1	Akron
25	Brown St	E Waterloo Rd	71.0	Akron
26	E Summit St	S Lincoln St	72.2	Kent
27	S Arlington St	E Exchange St	73.7	Akron
28	Cleveland Massillon Rd (CR 17)	I-77 NB Exit Ramp	74.1	Fairlawn
29	Tallmadge Circle		75.1	Tallmadge
30	SR 261	Franklin Ave/Sunnybrook Dr	76.1	Kent
31	S Arlington St	E Archwood Ave	76.3	Akron
32	E Wilbeth Rd (SR 764)	Hammel St	77.1	Akron
33	Merriman Rd	N Portage Path	77.6	Akron
34	E Archwood Ave	Inman St	78.1	Akron
35	Brittain Rd	Eastland/Eastwood Ave	78.6	Akron
36	N Wooster Rd (SR 619)	IR 76/US 224 Ramps/Kenmore Blvd	79.5	Barberton
37	S Hawkins Ave	Courtland Ave	79.9	Akron
38	E Wilbeth Rd (SR 764)	Virginia Ave	80.1	Akron
39	Lakeshore BL	W South St	81.7	Akron
40	Darrow Rd (SR 91)	Eastwood Ave	82.5	Akron
41	W Cedar St (SR 261)	W Bowery St	82.9	Akron
41	N Diamond St	W Highland Ave	82.9	Ravenna
43	Bartges St	S Main St	83.6	Akron
44	E Aurora Rd (SR 82)	S Bedford Rd/Freeway Dr	84.1	Macedonia
45	E Archwood Ave	Hammel St	84.2	Akron
46	E Aurora Rd (SR 82)	Shepard Rd	85.3	Macedonia
47	Medina Rd (SR 18)	Springside Dr (CR 537)	86.3	Sum Co-Bath Twp/Copley Twp
48	SR 8	Aurora Rd (SR 82)	86.5	Macedonia
49	E Market St (SR 18)	Main St	86.6	Akron
50	SR 43	Frost Rd	87.3	Streetsboro



Map 7-1
HIGH CRASH LOCATIONS (2012-2014)

▲ High Crash Intersections

— High Crash Roadway Sections

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Recurring and Incident-Related Congestion

To determine locations that have both recurring and incident-related congestion, maps of the existing recurrent congestion (Maps 2-1 through 2-4) were overlaid with the map of incident-related congestion (Map 7-1). The locations identified as having both recurrent and incident-related congestion are displayed in Map 7-2.

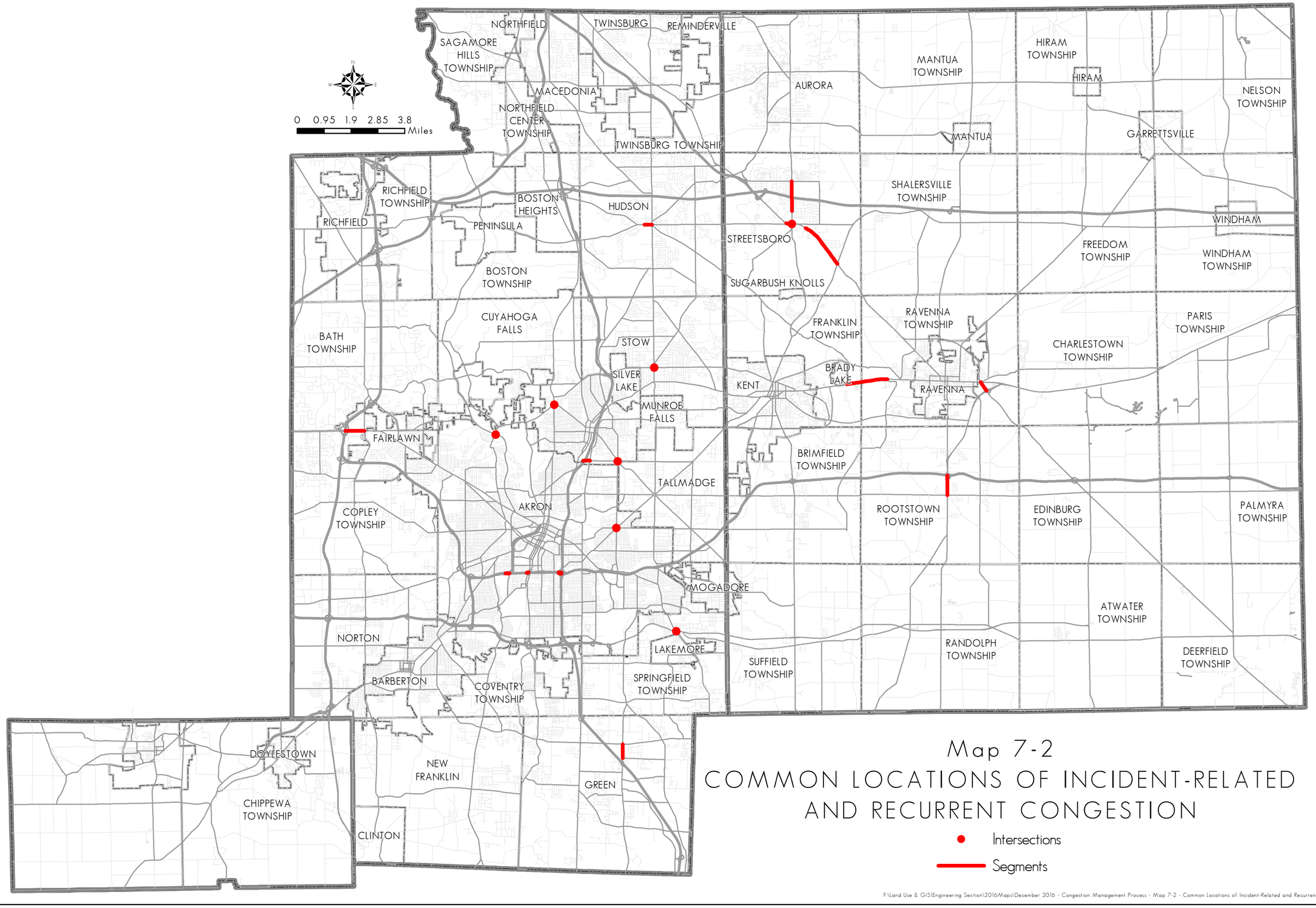
Frequent traffic crashes can have a significant impact on traffic congestion, especially when they occur in areas that experience recurring traffic congestion. The locations highlighted in Table 7-4 will be given priority for inclusion into the long-term regional transportation plan, as they exhibit both significant recurrent and incident-related congestion.

Table 7-4
Locations with Recurrent and Incident-Related congestion

Freeways		
Freeway	**Location Description**	**Location**
I-76	Near Main/Broadway Interchange	Akron
I-76	Near SR 59 Interchange	Akron
I-76	Near Central Interchange	Akron

Arterials		
Arterial	**Location Description**	**Location**
SR 241	From Raber Rd to SR 619	Green
Howe Ave	From SR 8 to Main St	Cuyahoga Falls
SR 18	From I-77 to Cleveland-Massillon Rd	Bath Twp
SR 303	From Atterbury Blvd to SR 91	Hudson
SR 14	From SR 303 to Broad St	Streetsboro
SR 14	From Portage Pointe Dr to Diagonal Rd	Streetsboro
SR 43	From Market Square Dr to Frost Rd	Streetsboro
SR 59	From Powder Mill Rd to Menough Rd	Franklin/Ravenna Twp
SR 14	From SR 59 to SR 5	Ravenna Twp
SR 44	From Tallmadge Rd to I-76	Rootstown Twp

Intersections		
Street	**Intersecting Street**	**Location**
US 224	SR 91	Springfield Twp
Brittain Rd	Eastwood / Eastland	Akron
Howe Ave	Brittain / Bailey / Northwest	Cuyahoga Falls
Merriman Rd	N Portage Path	Akron
State Rd	Portage Trail	Cuyahoga Falls
Graham Rd	SR 91	Stow
SR 14	SR 43 / SR 303	Streetsboro



Map 7-2
COMMON LOCATIONS OF INCIDENT-RELATED AND RECURRENT CONGESTION

Intersections

Segments

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CHAPTER 8

CONGESTION MANAGEMENT STRATEGIES

A major part of the Congestion Management Process (CMP) is identifying and evaluating strategies for reducing congestion. Chapters 2 through 7 identified congested areas in the Akron metropolitan area. The purpose of this chapter is to examine congestion strategies and evaluate if these strategies will successfully reduce congestion. The strategies identified and evaluated in this chapter will be used as the basis for developing project recommendations in Chapter 9.

Managing Supply vs. Managing Demand

A good way of understanding the effects of traffic congestion on our region is to think of the entire transportation network as a pipeline. As it is, the pipeline is only able to handle a certain amount of material (i.e. traffic flow) at any one time. When the volume exceeds the current capacity of the pipeline, the system greatly slows and occasionally fails altogether. At this point, congestion occurs as additional material is unable to flow through.

Supply-side strategies, also known as capacity improvements, are the equivalent of expanding the diameter of the pipeline. A wider pipe allows more material to flow through. The primary examples of supply-side strategies to street congestion would be the addition of new traffic lanes, or potentially, the construction of entirely new roads. Supply-side strategies have dominated the practice of congestion management since the dawn of the automobile age in America. However, as our national road network has grown dramatically over the last several decades, only a limited amount of funding remains for new road and lane construction; the "low-hanging fruit", if you will, has already been plucked. Right-of-way and construction costs for new road construction range from very expensive to astronomical. Often in our region, for both financial and political reasons, capacity improvements are completely unfeasible.

Demand-side strategies represent a more modern approach to managing traffic congestion. Returning to our pipeline example, demand-side strategies would include those that leave the diameter of the pipe at its original size, but regulate the volume of traffic flowing through it. The rush-hours experienced by essentially any city are an example of this: everyone seems to get off of work at the same time, and the three lane highway that easily accommodates traffic throughout most of the day is clogged with vehicles as everyone tries to use the same roadways at exactly the same time. An example of travel demand management would be for large area employers to stagger the ending times of their first shifts. Examples such as this one cost essentially nothing, but could prove unpopular. Generally, demand-side congestion strategies cost significantly less than supply-side ones do, although there are certain infrastructure-intensive solutions that are costly. Perhaps the greater consideration for demand-side strategies is their political feasibility, which can range from "very popular" to "not in a million years"!

CMP Strategies

The following tables identify various supply and demand-side congestion management strategies, organized into six possible categories: 1) Capacity improvements; 2) Intelligent transportation systems (ITS); 3) Non-motorized transportation; 4) Operational improvements; 5) Public transportation systems; and 6) Miscellaneous transportation demand management.

Table 8-1
Supply-Side Congestion Management Strategies

CAPACITY IMPROVEMENTS

Constructing new roads	New roadways to divert traffic off existing congested roadways
Construction of additional through lanes	New travel lanes built to add vehicle capacity to an existing roadway
Eliminating at-grade intersections/ crossings	Improvements to rail crossings or road intersections by physically separating the conflict to increase safety and acceptable speeds while reducing delay
Reconfiguring freeway ramps and interchanges	Adds capacity on the roadway network as well as reduces conflicts with merging on and off traffic

OPERATIONAL IMPROVEMENTS

Additional turn lanes	Construction or re-striping of one or more turn lanes on an existing road to remove left or right turning vehicles from the path of through vehicles
Median turn lanes	Adding a center turn lane to increase access to adjacent properties while increasing roadway capacity
Reconstructing roadways to standard widths	Reconstruct roadways to be standard pavement width, as defined by each jurisdiction, to improve roadway efficiency

PUBLIC TRANSPORTATION SYSTEMS

Passenger rail	Construction of rail lines to transport passengers from origin to destination

Table 8-2
Demand-Side Congestion Management Strategies

INTELLIGENT TRANSPORTATION SYSTEMS

Freeway management systems	Monitors flow of traffic on freeways and diverts traffic to alternative routes using message board systems
In-route mode shift information	Technology that displays real-time data on travel times to key destinations by mode. Allows travelers to make on-the-spot decisions and transfer to alternative transportation modes to achieve maximum travel time savings
Traveler information systems	Provision of pre-trip and en-route information to travelers on current traffic and other conditions and real-time guidance on route information
Public transportation systems	Automatic vehicle locator systems on buses to allow for real-time adjustments to schedules

Table 8-2 (continued)
Demand-Side Congestion Management Strategies

NON-MOTORIZED TRANSPORTATION

Bicycle facilities	Improvements to bicycle facilities to encourage the use of bicycles for trip making
Pedestrian facilities	Improvements to pedestrian facilities to encourage walking for trip making

OPERATIONAL IMPROVEMENTS

Access management	Roadway access is controlled through the number and design of driveways, medians and median turn lanes
Intersection improvements	Minor widening and lane restriping to increase intersection capacity
Lane control	Using digital signs posted over each traffic lane, lane direction may be changed depending on time of day, adding lanes as traffic flow dictates. May also be used to restrict lanes to calm speeds or to avoid accident or construction areas
Parking modifications	Changes to parking intended to improve the operation of roadways, such as elimination of parking spaces near dangerous intersections which might hinder sight lines
Ramp metering	During periods of congestion, signals at key entrance ramps regulate traffic flow onto the freeway
Traffic signal improvements	Improvements to traffic signals to allow for traffic to flow through intersections more efficiently
Variable speed limits	Speed limit may be altered on digital signs, based on current traffic and/or weather conditions

PUBLIC TRANSPORTATION SYSTEMS

Bus/HOV lanes	Lanes reserved for buses or high occupancy vehicles to allow for priority movement through congested areas
Enhancement of existing transit services	Improvements to the existing transit system to encourage ridership
Extension of transit services	Extends the reach of transit services to attract ridership
Fare reductions	Reducing the fare cost to encourage ridership
Improved paratransit	Improvements to scheduling and efficiency of paratransit services
Park and ride lots	Facilities that serve as a transfer terminal for single occupant vehicles to public transportation
Traffic signal preemption for buses	Signal priority to buses through intersections to ensure they remain on schedule and improve commute times
Usable shoulders	Street shoulders constructed to accommodate transit vehicles during peak travel periods. Requires proper signage and adjustment of rumble strips

Table 8-2 (continued)
Demand-Side Congestion Management Strategies

TRANSPORTATION DEMAND MANAGEMENT - MISCELLANEOUS

Alternative work hours	Reduces vehicle trip demand on roadways by shifting work start and stop times to avoid peak roadway hours
Carpooling	Reduces single occupancy vehicles due to commuters sharing a ride with one or more people for trips on a regular basis
Congestion pricing	Reduces congestion by charging for roadway use. Higher fees apply during the most congested times
Financial incentives	The use of various incentives to encourage alternative work hours, carpooling or the use of public transportation
Parking management	Alters supply and demand of parking to encourage alternative modes of transportation
Priority parking	Set asides of highly convenient parking spaces for those choosing to carpool
Satellite offices	Employers operate offices in multiple locations, with employees having options to work at alternate locations, usually temporarily or irregularly
Smart growth management	Encourages land use changes that reduce overall congestion and transportation costs
Telecommuting	Eliminates work trips by allowing employees to work from home using computer and telecommunications technologies

Evaluating CMP Strategies

Congestion management strategies were evaluated based upon their effectiveness and political feasibility. The effectiveness was determined by how well each strategy would reduce congestion in the AMATS area. To make this determination, the strategies were reviewed by examining regional characteristics, previous local success of the strategies and examples from other urban areas. Decisions on the effectiveness of each strategy were made based on the data collected and staff input. Political feasibility was rated by the degree to which the strategy could be realistically implemented in the region.

Any strategy determined to be both effective and feasible was considered as an alternative for project level recommendations. If a strategy was deemed ineffective or infeasible it was not carried forward as an alternative for project level recommendations.

Some strategies were thought to provide a travel reduction to the region as a whole, but not be appropriate for project level recommendations. These were considered to be supplemental strategies. Table 8-3 lists the strategies that will be considered for recommendations.

Table 8-3
Strategies Considered for Recommendations

PROJECT RECOMMENDATION STRATEGIES
Access Management
Constructing Additional Through Lanes
Constructing Additional Turn Lanes
Eliminating Intersections or Crossings
Enhancement of Existing Transit Services
Freeway Management Systems
Intersection Improvements
Lane Control
Median Turn Lanes
Park and Ride Lots
Passenger Rail
Priority Parking
Reconfiguring Freeway Ramps and Interchanges
Reconstructing of Roadways to Standard Widths
Traffic Signal Improvements

SUPPLEMENTAL STRATEGIES
Carpooling
Public Transportation Systems
Smart Growth Management
Traveler Information Systems

Appendix H of this report includes detailed tables displaying how each congestion strategy was rated. Chapter 9 will detail the project recommendations as well as further discuss each supplemental strategy.

CHAPTER 9

CONGESTION MANAGEMENT RECOMMENDATIONS

In the previous chapter, Congestion Management Process (CMP) strategies were identified and evaluated to determine their effectiveness and political feasibility. The last step in the CMP is to identify the most significant areas of congestion within the AMATS region, and to apply feasible strategies to each one.

Strategies Recommended

Strategies identified in Table 8-3 were used to develop recommendations. These recommendations were chosen based on the current and/or forecasted congestion at each location, each exhibiting its own unique situation. For the purposes of this report, each congested area has been given a generalized recommendation. These generalized recommendations will be further refined in the upcoming long-term regional transportation plan.

The generalized recommendations considered for congestion relief include the following:

- **Additional Capacity** – constructing additional through lanes on a roadway
- **Detailed Traffic Study** – conducting an in-depth traffic study for an area; typically reserved for areas involving the convergence of multiple highways and intersections, or of a particularly problematic nature.
- **Intersection Reconfiguration/Realignment** – the partial or entire re-design and reconstruction of a problematic intersection
- **Operational Improvements** – a wide variety of solutions, including (but not limited to): adding turn lanes, traffic signal coordination, access management strategies, widening lanes to standard widths and various intersection improvements
- **Improve Transit Service –** improve headways or make route adjustments
- **Remove at-grade rail crossings** – remove at-grade railroad intersections to improve safety and flow for all vehicles and trains

Although the majority of the recommendations involve expansion or operational improvements to area roadways, enhanced public transit service has been identified as a potentially effective solution in many of our region's most densely populated and traveled corridors. Identified areas possess unique qualities making them ideal for frequent and/or high-capacity fixed-route transit service. Also, removal of at-grade rail crossing not only increases capacity of the roadway it also improves safety at these location.

Recommendations

Highway

The following 33 locations (as shown in Tables 9-1 and 9-2) represent the areas of foremost concern, in regards to traffic congestion, in the AMATS region. Although more freeway sections, arterial segments and intersections were identified as "congested" in AMATS' existing

and future congestion studies, the omitted locations did not receive recommendations for one or more of the following reasons:

- Lack of political/financial/geographical feasibility
- Unwarranted due to decreasing congestion and/or traffic volumes
- Unwarranted due to an existing project scheduled since the analysis

Locations showing congestion, but not receiving specific recommendations, will continue to be closely monitored. These locations are not very congested and may improve with adjacent recommendations. These locations are listed in Appendix I.

Table 9-1
Freeway Recommendations

No.	Community	Location	Recommendation
1	Akron	I-76/77 Main/ Broadway Interchange	Tier 1 TRAC Project: Reconstruct Interchange: Under construction
2	Akron	I-76/I-77/SR 8	Tier 2 TRAC Project: Reconstruct Interchange
3	Akron	I-76/I-77 at Wolf Ledges Pkwy/Grant St	Close interchange: Upcoming Project
4	Akron	I-76/I-77/I-277/SR 8	Freeway System Study: Currently being studied
5	Akron	SR 8 from Perkins St to Glenwood Ave	Reconstruct bridge and improve ramp operations
6	Akron/Cuyahoga Falls	SR 8 at Howe Ave	Interchange Reconfiguration/ Improvements
7	Bath Twp/Richfield	I-77 from Ghent Rd to Cuyahoga County line	Widen to 6 lanes
8	Coventry/ Springfield Twp	I-77 from Arlington Rd to I-277	Widen to 8 lanes
9	Norton/Barberton	I-76 from SR 21 to I-277	Widen to 6 lanes and reconfigure State/Wooster Interchange

Comments on Freeway Recommendations

Overall, the freeways within the AMATS region function well, and most will continue to into the future. Expansion and operational improvement projects along SR 8, I-76 and I-77 have improved traffic flow throughout the region, and freeway levels of service (LOS) are more than adequate in most areas. However, as discussed in Chapter 6, slow but steady growth in vehicle miles and hours traveled will increase the strain on the current system in the future, eventually leading to deteriorating LOS.

The "Central Interchange" near downtown Akron, where SR 8, I-76 and I-77 converge, continues to be the primary freeway bottleneck in the AMATS region. Large-scale reconstruction of the interchange has been a long-standing priority for ODOT and AMATS, but its enormous cost has resulted in delays lasting decades. ODOT is planning to realign the left exit ramps from I-76 to improve flow through the interchange. Projects like these are encouraged, as they should provide incremental improvement in freeway congestion, and at a manageable cost.

The SR 8 interchange at Howe Ave on the Akron/Cuyahoga Falls border is of special concern to AMATS. Despite recently completed projects in the area, traffic still backs up several times throughout the day. The congestion at this interchange exceeds that of what a typical recommendation might address. Instead, AMATS is recommending that the improvements highlighted in a 2004 traffic study of the interchange (lengthening turn lanes, additional left-turn lane, separate right-turn lane, etc.) are implemented.

Table 9-2
Arterial & Intersection Recommendations

#	Community	Location	Recommendation
10	Akron	Brittain Rd at Eastland Ave/Eastwood Ave	Operational Improvements
11	Akron	N Portage Path at Merriman Rd	Operational Improvements, Enhance Transit
12	Akron	SR 18 (W Market St) at Hawkins Ave/W Exchange St	Operational Improvements, Enhance Transit
13	Akron/Cuyahoga Falls/Tallmadge	Howe Ave at Brittain Rd/Northwest Ave	Intersection Reconfiguration
14	Akron/Fairlawn	Miller Rd from Ridgewood Rd to SR 18 (W Market St)	Operational Improvements (Add/extend left turn lanes)
15	Barberton	SR 619 (Wooster Rd N) from Waterloo Rd to I-76	Operational Improvements (Potential Road Diet)
16	Bath Twp/Copley Twp/Fairlawn	SR 18 (Medina Rd) from Heritage Woods Dr to Cleveland-Massillon Rd	Additional Capacity, Operational Improvements, Enhance Transit, Existing Project (reconfiguration of Montrose West, right turn lane onto I-77 SB)
17	Copley Twp/ Fairlawn	Cleveland-Massillon Rd from I-77 to Bywood Ave	Existing Project (Widen to 4 lanes)
18	Cuyahoga Falls	Portage Trail from Valley Rd to State Rd	Operational Improvements
19	Cuyahoga Falls	State Rd at Portage Trail	Operational Improvements, Enhance Transit
20	Green	SR 241 (Massillon Rd) from Raber Rd to SR 619 (Turkeyfoot Lake Rd)	Existing Project (Widen to 5 lanes)
21	Hudson	SR 91 (Darrow Rd) from Ravenna Rd to SR 303	Add a Bypass and Intersection Improvements
22	Hudson	SR 91 (Darrow Rd) at SR 303	Operational Improvements
23	Hudson/Twinsburg Twp	SR 91 (Darrow Rd) from Middleton Rd to Twinsburg Rd	Operational Improvements (Add left turn lanes)
24	Northfield Center Twp	SR 82 at Olde Eight Rd/Brandywine Rd	Operational Improvements
25	Norton	Cleveland-Massillon Rd from Weber Dr to I-76	Existing Project (Add Median Turn Lane, Intersection Improvements), Enhance Transit
26	Ravenna	SR 14/44 from SR 59 to SR 5	Reevaluate after SR 59/SR 14/SR 44 intersection is complete
27	Richfield	SR 176 (Wheatley Rd) at Brecksville Rd	Operational Improvements
28	Springfield Twp	US 224 at SR 91	Project: Standard Lanes, Turn Lanes, Concrete Median
29	Stow	SR 59 (Kent Rd) at SR 91 (Darrow Rd)	Additional Capacity, Operational Improvements, Traffic Study, Enhance Transit
30	Streetsboro	SR 14 from Portage Pointe Dr to Diagonal Rd	Existing Project (Two way left turn lane)
31	Streetsboro	Streetsboro Town Center: SR 14/43/303	Detailed Traffic Study
32	Streetsboro	SR 43 from Market Square to Frost Rd	Reevaluate to see if counts changed after Philipp Pkwy was completed
33	Twinsburg	SR 91 at SR 82	Operational Improvements

Highway recommendations are shown on Map 9-1 and locations correspond to the "#" column.

Public Transit

As part of the congestion management process, AMATS identifies potential strategies to alleviate congestion and evaluates the expected effectiveness of those strategies in improving the efficiency and safety of existing and future transportation systems. As an established method for reducing single occupancy vehicles (SOVs), strategies aimed at making transit more attractive or accessible can help to reduce the number of vehicles on the road. The *2016 AMATS Regional Public Transit Plan* made a number of recommendations suited for congestion management. Specific strategies include: high frequency fixed route transit service in key corridors, realigning routes and services to meet demographic changes, flexible fare policies and employer-based incentive programs, transit oriented land use development, integrating the scheduling and services of the region's transit agencies and improving access to multiple modes of travel (pedestrian, bicycle, vehicle).

Public transportation will never completely replace the automobile for most people. However, with a well maintained and effective public transit system, an increasing percentage of people may come to rely on transit for their transportation needs. Ultimately, any increase in transit use will reduce congestion and vehicle emissions in the AMATS area.

Increase Service Frequency/Capacity in Nine Key Transit Corridors

As a result of the analyses performed in the AMATS Regional Public Transit Plan, nine key corridors, listed below, have been identified as warranting new or expanded service. The 9 Key Transit Corridors are: Market Street, South Arlington Street, State Route 91, Main Street/State Road, Kenmore Blvd/Wooster Road North, State Route 82, Graham Road/Fairchild Ave, State Route 59, and State Route 14. Each of these corridors connects multiple densely populated communities; contain large concentrations of demographic groups likely to use public transit, and dense clusters of land uses known to generate transit ridership.

Consider Transit Oriented Development/Design Codes at Key Transit Nodes

Certain intersections or neighborhoods are particularly viable for frequent transit service. Transit stops with characteristics such as high population and job densities, proximity to popular destinations and overall neighborhood vitality may be greatly enhanced through the establishment of transit oriented development/design (TOD) nodes.

METRO's restructured route system intends to use a number of nodes outside of the city center to connect multiple routes beyond the standard radial system. TOD at these nodes would aid in transit ridership and efficiency. Common TOD treatments include:

- Wide, pedestrian friendly sidewalks
- Buildings containing a mixture of uses, built near and facing towards the street
- Incorporation of an inviting ground-level feel: active uses, transparency, pedestrian shelters, bicycle racks, attractive signage, etc.
- Parking located behind the building, typically with alleyway access
- Well-designed bus shelters and bus pull-offs (bus bays) for comfortable waiting and loading/unloading

Continued Support for NEORide – Cross County Service and Coordination
Public transportation in Ohio has historically been funded through a dedicated portion of the county sales tax. Because of this funding structure, there has been a long-standing culture of only operating services within an agency's home county. NEORide is a Council of Governments (COG) formed by Akron METRO, PARTA and SARTA (Stark County) in 2014 to coordinate fixed route and demand response service in northeast Ohio. This on-going transit study is examining the potential for expanded transit service linking Portage, Summit and Stark counties. Integrated services would create transit connections that are needed by transit users across the three counties, improve the efficiency and effectiveness of existing services, and would reduce the operating costs of all three agencies. The NEORide Inter-County Transit study will identify these inter-county transit needs and develop innovative approaches to improve inter-county services in the region. Cross-county service is a key strategy to growing overall transit ridership and a positive transit culture in our region. Key cross-county corridors include:

- Aurora - Streetsboro - Hudson - Stow - Cuyahoga Falls - Akron
- Akron - Cuyahoga Falls - Stow - Kent - Ravenna
- Akron - Green - North Canton - Canton
- Akron - Barberton - Norton - Wadsworth
- Solon - Aurora - Streetsboro

Please see the *2016 AMATS Regional Public Transit Plan* for more specific details regarding transit recommendations.

Freight
Proper freight movement can help reduce congestion on highly traveled roadways. Most truck freight movement is on interstates and state routes so an improvement to those roadways will help both car and truck traffic. Specific highway improvements that would directly impact freight are listed below.

- Add a truck lane to I-77 NB in the Bath Township/Richfield area due to a steep grade, which slows down trucks
- Improve the I-77/SR 21/SR 18 Interchange (a $7.7 million project sponsored by ODOT is on-going)

Railroad-highway intersections are a source of congestion and safety concerns. Specific improvements related to rail recommendations are listed below.

- Provide support or engage in public-private partnerships to alleviate congestion on rail lines (such as CSX Lambert to Warwick section near Clinton and NS Cleveland to Pennsylvania Line that passes through Macedonia, Hudson and Ravenna on its way to Alliance)
- Improve rail lines owned by METRO RTA and make them available to local industry.
- Preserve out of service rail lines for future rail use or conversion to bike/pedestrian trails

- Consider public/private partnerships with the rail companies in order to improve freight service in the area

- Rail grade separation at the following locations:
  - The Stow Road crossing of the Norfolk-Southern Line in Hudson
  - The North Main Street (SR 91) crossing of the CSX Line in Munroe Falls
  - Hines Hill Road crossing of the Norfolk-Southern line in Hudson

Please see the *2016 Freight plan* for more detailed information regarding freight.

Supplemental Strategies

Supplemental congestion management strategies (those which could relieve congestion at a *regional* level but not at the individual *project* level) were identified in Chapter 6. After evaluating each strategy for its potential effectiveness and political feasibility, three were deemed worthy of consideration for our region:

Carpooling

According to the U.S. Census Bureau, 5.7% of workers in the Akron metropolitan area carpool to work. Encouraging carpooling can have a positive impact on congestion, as it can eliminate vehicles from the roadway during peak hours.

AMATS currently administers the OhioRideshare program in conjunction with two other MPOs in Northeast Ohio. This program works as an online database for commuters interested in finding a carpool partner. As fuel prices fluctuate, public interest in OhioRideshare should grow. While most potential carpoolers are interested in the cost savings, it can also have a tangible impact on congestion.

Smart Growth Management

Smart growth management can be an effective way of reducing congestion, but becomes less effective in areas already developed. Land use planning for the last 60 years has focused on separating land uses. More recently at the national level, some focus has returned to developments which incorporate different land uses in the same vicinity. The advantage of this is that people are not required to use an automobile for every trip, and the development's facilities encourage walking or biking. Brownfield sites or large-scale redevelopment efforts may also be able to include various modes of transportation to reduce congestion around the site. This strategy can impact congestion around new developments by designing them to be more walkable and including a variety of land uses. AMATS supports local communities using smart growth management in future developments.

Traveler Information Systems

The infrastructure for traveler information systems has already begun to sprout up along the AMATS region's freeways. These message boards, operated by ODOT, display travel times and distances to key exits or destinations, traffic alert messages and general emergency messages (Amber Alerts, missing persons, etc.).

Although this information is extremely useful, it is possible to increase the utility of this infrastructure through enhanced specificity and suggested travel alternatives. Examples of the more innovative information that could be displayed on the message boards include:

- Suggested alternative routes to avoid upcoming freeway congestion
- Specific lane closures ahead
- Guidance to alternate transportation modes (i.e. transit park-and-ride lots)
- Estimated travel times by mode (i.e. how many minutes to Downtown via car vs. minutes using transit)

Conclusion

Congestion management is an important element of the transportation planning process. The recommendations in this report will be considered for inclusion into the upcoming long-range regional transportation plan. If the recommendations from this report are adopted in the Plan, they will include a more detailed project description and will include costs and an estimated implementation schedule.

Compared to previous CMP reporting periods, existing congestion, projected future congestion and traffic crashes have all decreased. Millions of federal, state and local transportation improvement dollars have been invested in highly effective projects all throughout the AMATS region, which has greatly reduced overall congested within the region. With limited availability of funding for transportation improvements expected into the foreseeable future, it is to our advantage to focus our resources on these most congested segments of our region's roadway network.

In summary, there are fewer extremely congested areas today than in the past. The benefit of this reduction is that we can better leverage decreasing transportation funding by focusing on only the most important regional areas of concern. Unfortunately, most of these remaining areas of concern have not yet been addressed due to their tremendous complexity and/or cost. The many communities and agencies that comprise AMATS must continue diligently working together to find unique solutions to address our remaining congested areas, and to wisely allocate available resources to implement those solutions.

The recommendations contained in this CMP document will be considered for inclusion into the upcoming long-term regional transportation plan.

Intersection Recommendations

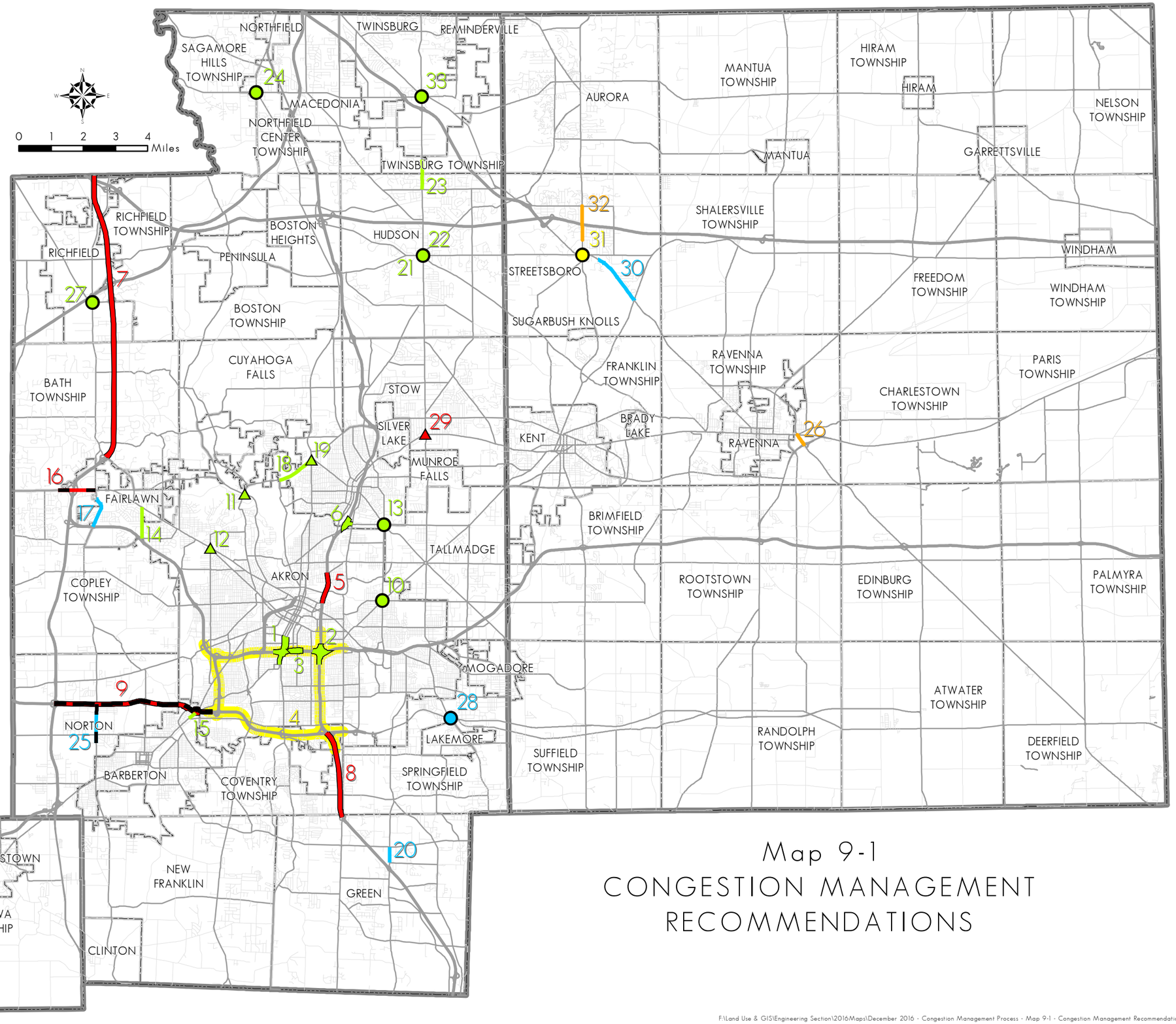
- Capacity with Additional Measures
- Existing Project
- Operational
- Operational with Additional Measures
- Detailed Traffic Study

Arterial Recommendations

- Capacity
- Capacity with Additional Measures
- Existing Project
- Existing Project with Additional Measures
- Operational
- Reevaluate after Project

Freeway Recommendations

- Capacity
- Capacity with Additional Measures
- Operational
- Detailed Traffic Study



Map 9-1
CONGESTION MANAGEMENT RECOMMENDATIONS

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APPENDICES

Appendix A
2015 Congested Basic Freeway Segments

Freeway	From	To	Density	LOS
I-76/77 WB	Innerbelt (SR 59)	East Ave	42.9	E
I-77 NB	Archwood Ave	SR 8	37.2	E
I-76/77 EB	East Ave	South St Off-Ramp	36.6	E
I-76/77 EB	South St Off-Ramp	Innerbelt (SR 59)	35.8	E
I-76/77 WB	East Ave	I-77	35.0	D
I-76 EB	Through the Central Interchange		34.4	D
I-76/US 224 EB	Wooster Rd North	I-277	33.7	D
I-77 SB	SR 8	Archwood Ave	33.5	D
I-76 WB	Through Central Interchange		33.3	D
I-76/77 EB	I-77	East Ave	32.6	D
I-76/US 224 WB	I-277	Wooster Rd North	31.9	D
I-76 EB	Ramp from NB Kenmore Fwy	I-76/77 EB	31.4	D
I-77 NB	Wilbeth Rd	Archwood Ave	30.9	D
I-77 NB	Waterloo Rd	Wilbeth Rd	30.6	D
I-76/77 WB	Main St/Broadway	Russell Ave	30.4	D
I-76/77 WB	Russell Ave	Innerbelt (SR 59)	30.4	D
I-76 WB	Ramp from SB Kenmore Fwy	I-76/US 224 WB	30.0	D
I-77 NB	Wheatley Rd	I-271	29.7	D
I-76 WB	Arlington St Off-Ramp	Kelly Ave On-Ramp	29.6	D
I-76 WB	Kelly Ave On-Ramp	Inman St Off-Ramp	29.6	D
I-76 WB	Inman St Off-Ramp	I-77/SR 8	29.6	D
I-77 NB	Arlington Rd	US 224	29.3	D
I-77 SB	US 224	Arlington Rd	29.3	D
I-76/US 224 EB	Barber Rd	State St	28.6	D
I-77 SB	Archwood Ave	Wilbeth Rd	28.3	D
I-77 SB	Wilbeth Rd	Waterloo Rd	28.0	D
I-77 NB	Ghent Rd	Wheatley Rd	27.7	D
I-76 EB	I-77/SR 8	Kelly Ave Off-Ramp	27.3	D
I-76 EB	Kelly Ave Off-Ramp	Arlington St On-Ramp	27.3	D
I-76/US 224 WB	State St	Barber Rd	27.2	D
I-76/US 224 EB	Cleveland-Massillon Rd	Barber Rd	27.1	D
I-76/77 EB	South St On-Ramp	Main St/Broadway	27.1	D
I-76/US 224 WB	Barber Rd	Cleveland-Massillon Rd	27.1	D
SR 8 SB	Glenwood Ave	Perkins St (SR 59)	26.9	D
I-77 NB	Through Central Interchange		26.9	D
I-77 NB	US 224	Waterloo Rd	26.8	D
I-76/US 224 EB	State St	Wooster Rd North	26.7	D
I-77 SB	Through Central Interchange		26.5	D
SR 8 NB	Perkins St	Glenwood Ave	26.2	D
I-76 WB	Southeast Ave	Gilchrist Rd	26.2	D
I-76 WB	Martha Ave	Arlington St Off-Ramp	26.2	D
I-77 SB	I-271	Wheatley Rd	26.2	D

Appendix B
2015 Congested Weaving Freeway Segments

Freeway	From	To	Revised Density*	Revised LOS*
I-76/77 WB	I-77/SR 8	Wolf Ledges/Grant St	**v/c=1.2**	**F**
SR 8 SB	Carroll St	I-76/77 Interchange	**v/c=1.2**	**F**
I-76/77 WB	Main St/Broadway	Russell Ave	**41.1**	**E**
I-76/77 WB	SR 59 Innerbelt	East Ave	**39.4**	**E**
I-76/77 EB	East Ave	SR 59 Innerbelt	**36.0**	**E**
I-76/77 EB	Wolf Ledges/Grant St	I-77/SR 8	**32.9**	**D**
I-76/77 EB	South St On-Ramp	Main St/Broadway	**32.2**	**D**
I-76/77 EB	Main St/Broadway	Wolf Ledges/Grant St	**28.8**	**D**
SR 8 NB	I-76/77	Carroll St	**28.7**	**D**
I-76/US 224 WB	I-277	Wooster Rd North	**26.6**	**C**
I-76/US 224 EB	Wooster Rd North	I-277	**26.4**	**C**
I-76/US 224 WB	Through SR 21 Interchange		**25.6**	**C**
I-76 EB	I-277	Kenmore Blvd	**21.1**	**C**
I-77 SB	SR 18	SR 21	**20.6**	**C**
I-77 NB	SR 21	SR 18	**20.4**	**C**
I-77 NB	Through SR 18 Interchange		**16.9**	**B**
SR 21 SB	Through I-76/US 224 Interchange		**15.8**	**B**
I-77 SB	Through SR 18 Interchange		**15.7**	**B**
I-76/US 224 EB	Through SR 21 Interchange		**14.8**	**B**
SR 21 NB	Through I-76/US 224 Interchange		**12.5**	**B**

* The existing weaving sections were revised in April of 2016 because an error was found in the way the volume for the different components was calculated.

Appendix C
2015 Congested Arterial Segments

Highway	From	To	County	V/C Ratio	LOS
Cleveland-Massillon Rd	I-77 NB Ramp	Elgin Rd	Summit	1.44	E
SR 14/44	SR 59	SR 5	Portage	1.39	E
Cleveland-Massillon Rd	Elgin Rd	Bywood Rd	Summit	1.35	E
SR 18 (Medina Rd)	Crystal Lake Rd	I-77	Summit	1.32	E
SR 91 (Main St)	Ravenna Rd	SR 303	Summit	1.25	E
SR 91 (Darrow Rd)	Middleton Rd	Twinsburg Rd	Summit	1.20	D
SR 43 (Chillicothe Rd)	Aurora-Hudson Rd	SR 306	Portage	1.19	D
SR 91 (Main St)	SR 303	Aurora St	Summit	1.19	D
SR 5/44	Prospect St	Hayes Rd	Portage	1.16	D
SR 14	Diagonal Rd	Price Rd	Portage	1.15	D
SR 91 (Darrow Rd/Main St)	Hudson Dr	Ravenna Rd	Summit	1.14	D
SR 44	Tallmadge Rd	I-76	Portage	1.14	D
SR 43	Market Square Dr	Frost Rd	Portage	1.14	D
Robinson Av	State St	SR 93 (Manchester Rd)	Summit	1.12	D
SR 303 (Streetsboro St)	Atterbury Blvd	SR 91 (Main St)	Summit	1.12	D
SR 18 (W. Market St)	Ghent Rd	Miller Rd	Summit	1.10	D
SR 91 (Main St)	Northmoreland Av	Munroe Falls Av	Summit	1.09	D
Valleyview Rd	Chaffee Rd	Boyden Rd	Summit	1.09	D
SR 14	SR 303 (W. Leg)	SR 43	Portage	1.09	D
SR 59	Powder Mill Rd	Menough Rd	Portage	1.09	D
SR 14	Portage Pointe Dr	Diagonal Rd	Portage	1.08	D
Portage Trail	Valley Rd	State Rd	Summit	1.08	D
SR 241 (Massillon Rd)	Raber Rd	SR 619 (Turkeyfoot Lake Rd)	Summit	1.07	D
SR 14	Price Rd	Dawley Rd	Portage	1.06	D
SR 43 (Chillicothe Rd)	Mennonite Rd	Aurora-Hudson Rd	Portage	1.06	D
Howe Av	SR 8 SB Ramps	Main St	Summit	1.04	D
Valleyview Rd	Boyden Rd	Olde Eight Rd	Summit	1.03	D
SR 18 (Medina Rd)	I-77	Cleveland-Massillon Rd	Summit	1.03	D
Graham Rd	SR 91 (Darrow Rd)	Charring Crossing Dr	Summit	1.02	D
Arlington Rd	Boettler Rd	SR 619	Summit	1.02	D
Graham Rd	Dover Rd	Baumberger Rd	Summit	1.01	D
SR 91 (Main St/Darrow Rd)	North River Rd	SR 59 (Kent Rd)	Summit	1.01	D
SR 14	SR 5	Hayes Rd	Portage	1.01	D
Prospect St	Summit Rd	Hayes Rd	Portage	1.00	D
Prospect St	Hayes Rd	Lake Av	Portage	1.00	D

Appendix D
2015 Congested Intersections

Intersection	ADT Volume	Peak Hour Volume	Count Year	Peak Hour	V/C Ratio	Status Criteria
SR 82/SR 91 (Darrow Rd)	36,480	3,256	2013	5:00-6:00	**1.07**	Over Capacity
N Portage Path/Merriman Rd	27,240	2,740	2013	5:00-6:00	**1.05**	Over Capacity
SR 18 (W Market St)/Miller Rd	39,990	3,945	2013	5:00-6:00	**1.05**	Over Capacity
SR 91/SR 303	27,060	2,938	2013	4:45-5:45	**1.04**	Over Capacity
Howe Ave/Brittain Rd/Northwest Ave	29,860	2,818	2011	5:00-6:00	**1.01**	Over Capacity
SR 82/Olde Eight Rd/Brandywine Rd	25,010	2,134	2013	5:00-6:00	**0.99**	At Capacity
Portage Trail/Akron-Peninsula Rd	20,540	2,015	2013	5:00-6:00	**0.99**	At Capacity
SR 18 (Medina Rd)/Crystal Lake Rd	42,400	3,876	2012	4:45-5:45	**0.95**	At Capacity
SR 59 (Kent Rd)/Fishcreek Rd	28,980	2,742	2014	5:00-6:00	**0.95**	At Capacity
SR 59 (Kent Rd)/SR 91 (Darrow Rd)	37,240	3,412	2014	5:00-6:00	**0.94**	Near Capacity
SR 91 (Darrow Rd)/Graham Rd	41,200	4,199	2015	4:45-5:45	**0.92**	Near Capacity
SR 14/SR 43/SR 303	48,390	3,921	2014	5:00-6:00	**0.90**	Near Capacity
SR 176 (Wheatley Rd)/Brecksville Rd	17,470	1,906	2011	5:00-6:00	**0.90**	Near Capacity
SR 43 (Water St)/SR 59 (Haymaker Pkwy)	30,530	2,688	2012	5:00-6:00	**0.90**	Near Capacity
State Rd/Portage Trail	33,660	3,133	2015	4:15-5:15	**0.90**	Near Capacity
SR 18 (W Market St)/Cleveland-Massillon Rd	46,590	4,531	2013	12:00-1:00	**0.90**	Near Capacity
SR 91 (Canton Rd)/US 224	39,290	3,500	2013	4:45-5:45	**0.90**	Near Capacity
Wooster Rd W/31st St S.W.	23,840	2,089	2011	5:00-6:00	**0.90**	Near Capacity
SR 43/SR 261	31,970	3,071	2013	4:45-5:45	**0.89**	Near Capacity
Brittain Rd/Eastland Ave/Eastwood Ave	21,190	1,893	2011	4:30-5:30	**0.86**	Near Capacity
SR 43/SR 82	21,320	2,046	2013	4:45-5:45	**0.86**	Near Capacity
SR 18 (W Market St)/Hawkins Ave/W Exchange St	29,760	2,536	2013	5:00-6:00	**0.85**	Near Capacity

Appendix E
2040 Congested Basic Freeway Segments

Freeway	From	To	Density	LOS
I-76 EB	Through the Central Interchange		89.6	F
I-76 WB	Through Central Interchange		81.6	F
I-76/77 WB	Innerbelt (SR 59)	East Ave	70.4	F
I-76/77 EB	East Ave	South St Off-Ramp	54.7	F
I-76/77 EB	South St Off-Ramp	Innerbelt (SR 59)	52.7	F
I-77 NB	Archwood Ave	SR 8	51.8	F
I-76/77 WB	East Ave	I-77	51.0	F
I-76/77 EB	I-77	East Ave	46.0	F
I-77 SB	SR 8	Archwood Ave	44.8	E
I-76 EB	Ramp from NB Kenmore Fwy	I-76/77 EB	43.7	E
I-76 WB	I-76/77 WB	SB Kenmore Freeway	43.2	E
I-76 WB	Ramp from SB Kenmore Fwy	I-76/US 224 WB	41.9	E
I-77 NB	Through Central Interchange		41.1	E
I-77 SB	Through Central Interchange		41.0	E
I-77 NB	Wilbeth Rd	Archwood Ave	40.3	E
I-76 WB	Arlington St Off-Ramp	Kelly Ave On-Ramp	40.2	E
I-76 WB	Kelly Ave On-Ramp	Inman St Off-Ramp	40.2	E
I-76 WB	Inman St Off-Ramp	I-77/SR 8	40.2	E
SR 8 SB	Glenwood Ave	Perkins St (SR 59)	38.4	E
I-77 NB	Arlington Rd	US 224	38.4	E
I-77 NB	Wheatley Rd	I-271	38.4	E
I-77 SB	US 224	Arlington Rd	38.4	E
I-76/77 EB	Wolf Ledges/Grant St	I-77/SR 8	38.3	E
SR 8 NB	Perkins St	Glenwood Ave	37.0	E
I-76 EB	Arlington St On-Ramp	Martha Ave Off-Ramp	36.4	E
I-76 EB	I-77/SR 8	Kelly Ave Off-Ramp	36.1	E
I-76 EB	Kelly Ave Off-Ramp	Arlington St On-Ramp	36.1	E
I-77 SB	Archwood Ave	Wilbeth Rd	36.0	E
I-77 NB	Ghent Rd	Wheatley Rd	35.9	E
I-76/77 EB	South St On-Ramp	Main St/Broadway	35.8	E
SR 8 SB	Carroll St	I-76/77 Interchange	35.6	E
I-77 SB	Wilbeth Rd	Waterloo Rd	35.4	E
I-76 WB	Southeast Ave	Gilchrist Rd	35.3	E
I-76/77 WB	Main St/Broadway	Russell Ave	34.9	D
I-76/77 WB	Russell Ave	Innerbelt (SR 59)	34.9	D
SR 8 NB	I-76/77	Carroll St	34.7	D
I-76 WB	Martha Ave	Arlington St Off-Ramp	34.3	D
SR 8 SB	Tallmadge Ave	Glenwood Ave	34.2	D
I-77 NB	US 224	Waterloo Rd	33.7	D
SR 8 SB	Cuyahoga Falls Ave	Tallmadge Ave	33.6	D
I-77 SB	I-271	Wheatley Rd	32.7	D
SR 8 SB	Broad Blvd On-Ramp	Howe Ave	32.0	D
SR 8 SB	Perkins St	Buchtel Ave	31.9	D
SR 8 NB	Buchtel Ave	Perkins St	31.2	D
I-76 WB	Brittain Rd On-Ramp	Martha Ave	30.8	D
I-76/77 EB	Innerbelt (SR 59)	South St On-Ramp	30.6	D

Appendix E
2040 Congested Basic Freeway Segments

Freeway	From	To	Density	LOS
I-77 NB	Waterloo Rd	Wilbeth Rd	30.6	D
I-77 SB	Waterloo Rd	US 224	30.6	D
I-76 WB	I-77	Battles Ave	30.4	D
SR 8 NB	Glenwood Ave	Tallmadge Ave	30.3	D
I-77 NB	SR 241	Arlington Rd	30.1	D
I-77 SB	Arlington Rd	SR 241	30.1	D
SR 8 SB	Howe Ave	Cuyahoga Falls Ave	30.0	D
SR 8 NB	Tallmadge Ave	Cuyahoga Falls Ave	29.9	D
I-77 NB	I-271	Brecksville Rd	29.8	D
I-77 SB	Wheatley Rd	Ghent Rd	29.4	D
I-77 NB	Brecksville Rd	I-80 Ohio Turnpike	29.0	D
I-76 WB	Battles Ave	I-277	28.2	D
I-76 WB	Tallmadge Rd	Southeast Ave	28.1	D
I-76 EB	Martha Ave Off-Ramp	Seiberling St Off-Ramp	28.0	D
I-77 NB	I-76/77 West Interchange	Vernon Odom Blvd	27.9	D
I-76 EB	Gilchrist Rd	Southeast Ave	27.7	D
I-76 WB	East Market St	Brittain Rd On-Ramp	27.7	D
SR 8 SB	Portage Trail On-Ramp	Broad Blvd On-Ramp	27.5	D
I-76 EB	Kenmore Blvd	I-77	27.5	D
SR 8 NB	Cuyahoga Falls Ave	Howe Ave	27.4	D
I-77 NB	SR 21	SR 18	27.1	D
I-76/77 WB	I-77/SR 8	Wolf Ledges/Grant St	26.8	D
I-77 SB	SR 18	SR 21	26.7	D
SR 8 NB	Howe Ave	Broad Blvd Off-Ramp	26.6	D
SR 8 SB	Broad Blvd Off-Ramp	Portage Trail On-Ramp	26.6	D
I-77 NB	Vernon Odom Blvd	Copley Rd	26.6	D
I-77 SB	Vernon Odom Blvd	I-76/77 West Interchange	26.4	D
I-271 SB	Cuyahoga Co Line	SR 82	26.4	D
I-76 EB	I-277	Kenmore Blvd	26.2	D
I-76/US 224 EB	Medina Co Line	SR 21	26.1	D
I-76/77 WB	Wolf Ledges/Grant St	Main St/Broadway	26.1	D
I-76/US 224 WB	SR 21	Medina Co Line	26.1	D

Appendix F
2040 Congested Weaving Freeway Segments

Freeway	From	To	Density	LOS
SR 8 SB	Carroll St	I-76/77 Interchange	v/c=1.5	F
SR 8 NB	I-76/77	Carroll St	v/c=1.0	F
I-76/77 EB	East Ave	SR 59 Innerbelt	v/c=1.0	F
I-76/77 WB	SR 59 Innerbelt	East Ave	42.9	E
I-76/US 224 WB	Through SR 21 Interchange		30.0	D
I-76 EB	I-277	Kenmore Blvd	26.8	C
I-77 SB	SR 18	SR 21	25.1	C
I-77 NB	SR 21	SR 18	24.4	C
I-77 NB	Through SR 18 Interchange		19.8	B
SR 21 SB	Through I-76/US 224 Interchange		19.3	B
I-77 SB	Through SR 18 Interchange		18.2	B
I-76/US 224 EB	Through SR 21 Interchange		17.2	B
SR 21 NB	Through I-76/US 224 Interchange		15.1	B
I-76/US 224 EB	Wooster Rd North	I-277	See note below	
I-76/US 224 WB	I-277	Wooster Rd North	See note below	
I-76/77 EB	South St On-Ramp	Main St/Broadway	See note below	
I-76/77 WB	Main St/Broadway	Russell Ave	See note below	
I-76/77 EB	Main St/Broadway	Wolf Ledges/Grant St	See note below	
I-76/77 EB	Wolf Ledges/Grant St	I-77/SR 8	See note below	
I-76/77 WB	I-77/SR 8	Wolf Ledges/Grant St	See note below	

Note: These interchanges will be going through extensive modifications that directly affect the weaving section. They will be evaluated after the projects are finished and new data is collected.

Appendix G
2040 Congested Arterial Segments

Highway	From	To	V/C Ratio	2040 LOS
SR 18 (Medina Rd)	Crystal Lake Rd	I-77	1.66	F
SR 14	Portage Pointe Dr	Diagonal Rd	1.63	F
SR 14/44	SR 59	SR 5	1.56	E
Cleveland-Massillon Rd	I-77 NB Ramp	Elgin Rd	1.55	E
SR 14	Diagonal Rd	Price Rd	1.53	E
Cleveland-Massillon Rd	Elgin Rd	Bywood Rd	1.51	E
SR 18 (Medina Rd)	S. Hametown Rd	Crystal Lake Rd	1.49	E
SR 91 (Main St)	Ravenna Rd	SR 303	1.48	E
SR 619 (Turkeyfoot Lake Rd)	Myersville Rd	Stark County Line	1.45	E
SR 241 (Massillon Rd)	Mayfair Rd	Killian Rd	1.45	E
SR 59	SR 261	Powder Mill Rd	1.45	E
SR 43 (Chillicothe Rd)	Aurora-Hudson Rd	SR 306	1.42	E
SR 91 (Main St)	Northmoreland Av	Munroe Falls Av	1.42	E
Highland Rd	S. Bedford Rd	E. Valleyview Rd	1.40	E
SR 91 (Main St)	SR 303	Aurora St	1.40	E
SR 91 (Darrow Rd)	Middleton Rd	Twinsburg Rd	1.40	E
SR 91 (Darrow Rd/Main St)	Hudson Dr	Ravenna Rd	1.40	E
SR 43	Ravenna Rd (W. Leg)	Lake Martin Dr	1.37	E
SR 14	Price Rd	Dawley Rd	1.36	E
SR 43	Market Square	Frost Rd	1.34	E
Graham Rd	SR 91 (Darrow Rd)	Charring Crossing Dr	1.34	E
Robinson Av	State St	SR 93 (Manchester Rd)	1.33	E
Howe Av	SR 8 SB Ramps	Main St	1.33	E
SR 14/44	SR 88	SR 59	1.32	E
Fishcreek Rd	Stow Rd	Laurel Woods	1.32	E
SR 91 (Darrow Rd)	Highland Rd	I-480	1.32	E
Highland Rd	SR 8	S. Bedford Rd	1.32	E
SR 82 (Aurora Rd)	Boyden Rd	Olde Eight Rd	1.31	E
Ravenna Rd	E. Idlewood Dr	SR 91 (Darrow Rd)	1.30	E
Graham Rd	Charring Crossing Dr	Baird Rd	1.30	E
SR 14	SR 303 (W. Leg)	SR 43	1.30	E
Ravenna Rd	Cuyahoga County Line	Chamberlin Rd	1.30	E
SR 44	Tallmadge Rd	I-76	1.29	E
SR 18 (Medina Rd)	I-77	Cleveland-Massillon Rd	1.28	E
Boettler Rd	Golden Woods Way	SR 241 (Massillon Rd)	1.28	E
Arlington Rd	Boettler Rd	SR 619	1.26	E
SR 43 (Chillicothe Rd)	Mennonite Rd	Aurora-Hudson Rd	1.26	E
SR 82 (Aurora Rd)	Chaffee Rd	Boyden Rd	1.26	E
SR 261 (Tallmadge Av)	SR 8	Glenwood Av	1.26	E
SR 43	Ravenna Rd (E. Leg)	Ravenna Rd (W. Leg)	1.24	D
SR 241 (Massillon Rd)	I-77	Raber Rd	1.24	D
SR 91 (Main St/Darrow Rd)	North River Rd	SR 59 (Kent Rd)	1.24	D
SR 14	Dawley Rd	Cleveland Rd	1.23	D

Appendix G (continued)
2040 Congested Arterial Segments

Highway	From	To	V/C Ratio	2040 LOS
SR 59	Powder Mill Rd	Menough Rd	1.22	D
SR 91 (Darrow Rd)	Post Rd	Glenwood Dr	1.22	D
Arlington Rd	Greensburg Rd	E. Caston Rd	1.22	D
SR 303 (Streetsboro St)	Atterbury Blvd	SR 91 (Main St)	1.20	D
SR 43	Diagonal Rd	Ravenna Rd (E. Leg)	1.20	D
SR 18 (W. Market St)	Miller Rd	Revere Rd	1.19	D
Summit St	Campus Center Dr W	Loop Rd	1.17	D
Graham Rd	Fishcreek Rd	Portage County Line	1.17	D
Smith Rd	Revere Rd	Sand Run Rd	1.16	D
SR 303 (Streetsboro Rd)	Akron Cleveland Rd	Terex Rd	1.16	D
Stow Rd	Barlow Rd	Ravenna Rd	1.15	D
Broadway St ramp	I-76/77	Thornton St	1.15	D
S. Main St	Portage Lakes Dr	Warner Rd	1.15	D
SR 18 (W. Market St)	Sand Run Rd	Frank Blvd	1.15	D
SR 43	Lake Martin Dr	Seasons Rd	1.15	D
Stow Rd	Ravenna Rd	Canterbury Dr	1.14	D
SR 5/44	Hayes Rd	SR 14	1.14	D
SR 14	Infirmary Rd	SR 44	1.13	D
State Rd	Steels Corners Rd	Quick Rd	1.13	D
White Pond Dr	I-77 SB Ramps	First Energy (south drive)	1.13	D
SR 14	SR 5	Hayes Rd	1.13	D
State St	Wooster Rd N	I-76/US224	1.13	D
Portage Trail	Valley Rd	State Rd	1.13	D
Hudson Dr	McCauley Rd	Norton Rd	1.12	D
SR 619 (Turkeyfoot Lake Rd)	Pickle Rd	SR 241 (Massillon Rd)	1.12	D
S. Main St	Warner Rd	Turkeyfoot Rd	1.12	D
SR 18 (W. Market St)	Frank Blvd	Bryden Dr	1.12	D
SR 303 (Streetsboro Rd)	Terex Rd	Boston Mills Rd	1.12	D
SR 619 (Turkeyfoot Lake Rd)	Turkeyfoot Rd	S. Main St	1.11	D
Arlington Rd	E. Caston Rd	Boettler Rd	1.11	D
Graham Rd	Dover Rd	Baumberger Rd	1.11	D
SR 5/44	Prospect St	Hayes Rd	1.11	D
SR 261	Summit Rd	SR 59	1.11	D
Fairchild Av	Hudson Rd	SR 43	1.10	D
Stow Rd	Canterbury Dr	SR 303	1.10	D
SR 619 (Turkeyfoot Lake Rd)	State St	Turkeyfoot Rd	1.10	D
Smith Rd	Sand Run Rd	Riverview Rd	1.10	D
SR 18 (W. Market St)	Ghent Rd	Miller Rd	1.09	D
SR 43 (Mantua St)	Crain Av	Kent North Corp.	1.09	D
SR 93 (Manchester Rd)	Portage Lakes Dr	Robinson Av	1.08	D
SR 18 (W. Market St)	Portage Path	S. Highland Av	1.08	D
SR 43	Kent North Corp.	Diagonal Rd	1.08	D
SR 93 (Manchester Rd)	I-277	Waterloo Rd	1.08	D

Appendix G (continued)
2040 Congested Arterial Segments

Highway	From	To	V/C Ratio	2040 LOS
SR 8	New I-271 Ramps	Highland Rd	1.08	D
Ravenna Rd	Chamberlin Rd	E. Idlewood Dr	1.08	D
Wooster Rd W	Johnson Rd	31st St	1.07	D
SR 162 (Copley Rd)	Hawkins Av	Storer Ave	1.06	D
SR 162 (Copley Rd)	I-77	Hawkins Av	1.06	D
SR 14	Cleveland Rd	Infirmary Rd	1.06	D
Valleyview Rd	Chaffee Rd	Boyden Rd	1.06	D
SR 91 (North Av)	Steeplechase La	Northmoreland Av	1.06	D
Cleveland-Massillon Rd	Gardner Blvd	Norton Av	1.06	D
SR 18 (W. Market St)	Revere Rd	Sand Run Rd	1.05	D
Cleveland-Massillon Rd	Ridgewood Rd (N. leg)	I-77 NB Ramp	1.05	D
Graham Rd	SR 8 SB Ramps	Dover Rd	1.05	D
Cleveland-Massillon Rd	SR 162 (Copley Rd (S. Leg))	Ridgewood Rd (S. leg)	1.05	D
Merriman Rd/Riverview Rd	Weathervane Lane	Smith Rd	1.05	D
SR 18 (W. Market St)	Bryden Dr	Hawkins Av	1.05	D
SR 91 (Main St)	Munroe Falls Av	North River Rd	1.04	D
Cleveland-Massillon Rd	Embassy Pkwy	Ghent Rd	1.04	D
SR 619 (Turkeyfoot Lake Rd)	Cottage Grove Rd	Arlington Rd	1.04	D
Steels Corners Rd	Wyoga Lake Rd	Bridgewater pkwy	1.04	D
SR 619 (Turkeyfoot Lake Rd)	Arlington Rd	Pickle Rd	1.04	D
SR 91 (Darrow Rd)	SR 59 (Kent Rd)	Graham Rd	1.04	D
SR 59 (E. Main St)	Prospect St	SR 88 (Freedom St)	1.04	D
SR 619 (5th St NE)	SR 619 (State St)	Fairview Av	1.04	D
Cleveland-Massillon Rd	SR 18 (W. Market St/Medina Rd)	Springside Dr	1.04	D
Cedar St	SR 162 (Maple St)	Dart Av	1.04	D
SR 91 (Darrow Rd)	Old Mill Rd	Highland Rd	1.04	D
Highland Rd	E. Valleyview Rd	Chamberlin Rd	1.04	D
Cleveland-Massillon Rd	Springside Dr	Embassy Pkwy	1.04	D
Cleveland-Massillon Rd	Ridgewood Rd (S. leg)	Ridgewood Rd (N. leg)	1.04	D
SR 303 (Streetsboro Rd)	Olde Eight Rd	Akron Cleveland Rd	1.03	D
SR 82	Summit County Line	Bissell Rd	1.03	D
SR 43	Randolph Rd	Old Forge Rd	1.03	D
Portage Trail	Northampton Rd	Valley Rd	1.03	D
SR 14	SR 43	Portage Pointe Dr	1.03	D
Exchange St	SR 162 (Maple St)	Dart Av	1.03	D
Graham Rd	Baird Rd	Fishcreek Rd	1.03	D
Wooster Rd W	Taylor Rd	Johnson Rd	1.02	D
Canton Rd	Stark County Line	Killian Rd	1.02	D
SR 91 (Darrow Rd)	Valleyview Rd	Middleton Rd	1.02	D
SR 91 (Canton Rd/ Darrow Rd)	Gilchrist Rd	Newton St	1.02	D
Cleveland-Massillon Rd	Norton Av	I-76 WB Ramps	1.02	D
SR 241 (Massillon Rd)	Stark County Line	International Gateway	1.02	D
Fairchild Av	Majors Lane	Hudson Rd	1.01	D

Appendix G (continued)
2040 Congested Arterial Segments

Highway	From	To	V/C Ratio	2040 LOS
SR 619 (Turkeyfoot Lake Rd)	S. Main St	Cottage Grove Rd	1.01	D
Triplett Blvd	Hilbish Av	Abington Rd	1.01	D
Portage Trail	SR 8 NB Ramp	Munroe Falls Av	1.01	D
SR 532 (Cleveland Av)	Albrecht Av	Mogadore Rd	1.01	D
SR 82 (Ravenna Rd)	Ravenna Rd (N. Int)	Ravenna Rd (S. Int)	1.01	D
S. Main St	Caston Rd (N. Leg)	SR 619 (Turkeyfoot Lake Rd)	1.00	D
SR 14	I-80	SR 303 (W. Leg)	1.00	D
SR 619 (5th St NE)	Fairview Av	Paige Av	1.00	D

Appendix H
Congestion Management Strategy Evaluation

Capacity Improvements	Effectiveness	Feasibility
Constructing new roads	Moderate	Minimal
Construction of additional through lanes	High	Moderate
Eliminating at-grade intersections/crossings	Moderate	Moderate
Reconfiguring freeway ramps and interchanges	High	Moderate

Intelligent Transportation Systems	Effectiveness	Feasibility
Freeway management systems	Moderate	Moderate
In-route mode shift information	Minimal	Minimal
Traveler information systems	Moderate	Moderate
Public transportation systems	Minimal	Moderate

Non-Motorized Transportation	Effectiveness	Feasibility
Bicycle facilities	Minimal	High
Pedestrian facilities	Minimal	High

Operational Improvements	Effectiveness	Feasibility
Access management	Moderate	Moderate
Constructing additional turn lanes	High	Moderate
Intersection improvements	High	High
Lane control	High	High
Median turn lanes	High	Moderate
Parking modifications	Minimal	Minimal
Ramp metering	Minimal	Minimal
Reconstructing roadways to standard lane widths	Moderate	Moderate
Traffic signal improvements	High	High
Variable speed limits	Minimal	Minimal

Public Transportation	Effectiveness	Feasibility
Bus/HOV lanes	Minimal	Minimal
Enhancement of existing transit services	Moderate	Moderate
Extension of transit services	Minimal	Minimal
Fare reductions	Minimal	Moderate
Improved paratransit	Minimal	Moderate
Park and ride lots	Moderate	High
Passenger rail	Moderate	Moderate
Traffic signal preemption for buses	Minimal	Minimal
Usable shoulders	Minimal	Minimal

Appendix H (continued)
Congestion Management Strategy Evaluation

TDM - Misc.	Effectiveness	Feasibility
Alternative work hours	Minimal	Minimal
Carpooling	Minimal	High
Congestion pricing	Minimal	Minimal
Financial incentives	Moderate	Minimal
Parking management	Minimal	Minimal
Priority parking	Moderate	Moderate
Satellite offices	Minimal	Minimal
Smart growth management	Moderate	Moderate
Telecommuting	Minimal	Moderate

Appendix I
Congested Locations to Monitor

Highway	From	To	County	LOS
Prospect St	Summit Rd	Lake Av	Portage	D
SR 5/44	Prospect St	Hayes Rd	Portage	D
SR 14	Diagonal Rd	Dawley Rd	Portage	D
SR 14	SR 5	Hayes Rd	Portage	D
SR 43	at SR 261		Portage	near capacity
SR 43 (Water St)	at SR 59 (Haymaker Pkwy)		Portage	near capacity
SR 43 (Chillicothe Rd)	Mennonite Rd	SR 306	Portage	D
SR 43	at SR 82		Portage	near capacity
SR 44	Tallmadge Rd	I-76	Portage	D
SR 59	Powder Mill Rd	Menough Rd	Portage	D
Arlington Rd	Boettler Rd	SR 619	Summit	D
Graham Rd	SR 91 (Darrow Rd)	Charring Crossing Dr	Summit	D
Graham Rd	Dover Rd	Baumberger Rd	Summit	D
Howe Av	SR 8 SB Ramps	Main St	Summit	D
I-76 WB	Southeast Ave	Gilchrist Rd	Summit	D
Robinson Av	State St	SR 93 (Manchester Rd)	Summit	D
SR 18 (Medina Rd)	I-77	Cleveland-Massillon Rd	Summit	D
SR 18 (W. Market St)	at Cleveland Massillon Rd		Summit	near capacity
SR 18 (W. Market St)	Ghent Rd	Miller Rd	Summit	D
SR 91 (Main St)	Northmoreland Av	Munroe Falls Av	Summit	D
SR 91 (Main St/Darrow Rd)	North River Rd	SR 59 (Kent Rd)	Summit	D
SR 91 (Darrow Rd)	at Graham Rd		Summit	near capacity
SR 91 (Darrow Rd/Main St)	Hudson Dr	Ravenna Rd	Summit	D
Valleyview Rd	Chaffee Rd	Olde Eight Rd	Summit	D