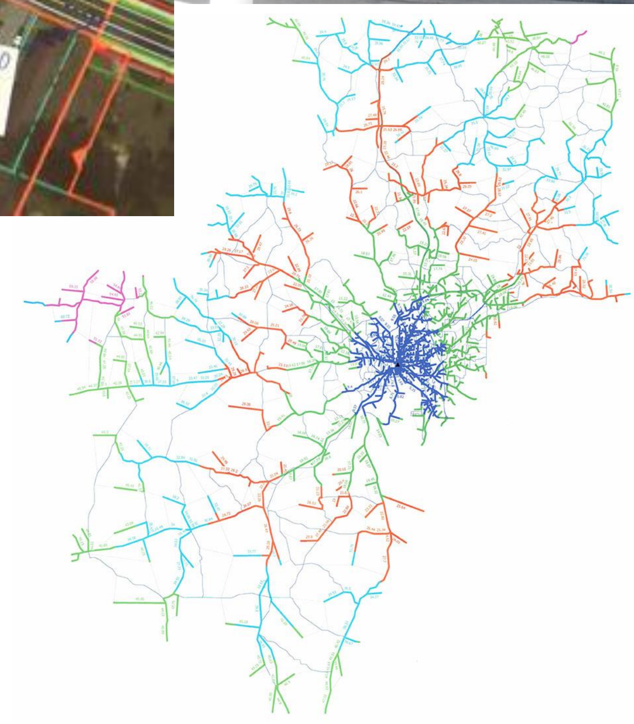
2016 CONGESTION MANAGEMENT PROCESS



Columbus-Phenix City Metropolitan Planning Organization

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TABLE OF CONTENTS

CHAPTER 1 -

INTRODUCTION

The Columbus-Phenix City Metropolitan Planning Organization (CPCMPO) was established in 1964 to serve as the body for facilitating transportation planning decisions in the Columbus and Phenix City region in a manner that is coordinated, comprehensive and continuous. Our jurisdiction encompasses all of Muscogee County, Chattahoochee County, the northeastern quadrant of Russell County and southeastern quadrant of Lee County in Alabama. One way in which we continually monitor the status of transportation needs for the region is through the Congestion Management Process (CMP), which is performed biannually and whose results are released in a report.

Under federal regulations, the Congestion Management Process is required of all metropolitan areas with a population greater than 200,000. The CPCMPO has now conducted five iterations of this study (2003, 2005, 2007, 2009, and 2011). All roadways deemed “regionally significant” were included for measurement in this study. The CMP is a systematic approach, collaboratively developed and implemented throughout the metropolitan region to provide for the safe and effective management and operation of new and existing transportation facilities through the use of demand reduction and operational management strategies.

On an annual basis, the CPCMPO prepares the Unified Planning Work Program (UPWP), which identifies all transportation planning activities agreed upon to be performed by the CPCMPO participants and funded by federal grants and state contracts in the coming year. We also prepare a Transportation Improvement Program (TIP), which prioritizes projects for a four year window and the Long Range Transportation Plan (LRTP) every fifth year, which projects the needs for transportation investments twenty years into the future.

Study Tasks

Activities undertaken during the development of the Congestion Management Process study

1. Identify Corridors to Be Measured.
2. Define Goals and feasible Congestion Management Strategies
3. Development of Congestion Related Performance Measures
4. Data Collection and Monitoring
5. Summary of Findings and Recommendations.

The Congestion Management Process has previously been described as consisting of “7 Steps”. With the 2011 version, policy guidance revisions led to the addition of a new step, making it an “8 Step” process.

1. Develop Congestion Management Objectives;
2. Identify Area of Application;
3. Define System or Network of Interest;
4. Develop Performance Measures;
5. Institute System Performance Monitoring Plan;
6. Identify and Evaluate Strategies;
7. Implement Selected Strategies and Manage Transportation System; and
8. Monitor Strategy Effectiveness.

1. Develop Congestion Management Objectives;
The objective of the CPCMPO is to have a baseline target of Level of Service “C” or better on roads in our route network. Level of Service can be defined as a term used to qualitatively describe the operating conditions of a roadway based on factors such as speed, travel time, maneuverability, delay, and safety.

2. Identify Areas of Application;
Our objective is to measure levels of congestion and delay along major corridors in our network during three different periods of day.

3. Define System or Network of Interest;
Thirty-eight different segments of roadway in the Columbus-Phenix City region were selected for measurement in the 2015 Congestion Management Process report. Their individual characteristics, such as intersections, speed limits and roadway category were programmed into our software package, TravTime.

4. Develop Performance Measures;
The TravTime software used in this study offered a variety of data set results from which we could choose for use in this report. This study opted to use “Congested Time”. This is represented as the period of time (in seconds) where the monitored vehicle recording data traveled below 20 miles per hour. This category of measurement was chosen as the indicator of system performance as it is a relatively easy to understand.

5. Institute System Performance Monitoring Plan;
The routes of the Congestion Management Process are subject to varying degrees of monitoring, ranging from recurring presence and evaluation in biannual reports, to individual corridor and intersection capacity studies to regular monitoring through our soon to be operational Automated Traffic Management Center. As improvement projects are completed, such as Whittlesey Road, Forrest Road and Moon Road widening, we will continue to monitor conditions to see how traffic flow has been affected.

6. Identify and Evaluate Strategies;
Identifying strategies to achieve operations objectives is best accomplished when transportation planners and system operators collaborate. Planners have access to data on current and forecasts on future mobility concerns. Operators of transit and freight have practical awareness of existing conditions as well as the best practices utilized elsewhere that could be implemented.

Maintenance and Operations (M&O) strategies may also be implemented. This aims to enhance system performance based on the infrastructure that we already have, as opposed to building new physical capacity. It is important to note that M&O does not encompass traditional maintenance activities, such as grading, pothole repair, or resurfacing. Rather, M&O strategies focus on optimizing the performance of the transportation system.

• Operating Existing Capacity More Efficiently: Getting more out of what we have through improvements to system operations. These could include:

- Metering traffic onto freeways.
- Optimizing the timing of traffic signals.
- Improving incident response.
- Adjusting transit service schedules.
- Improving management of work zones.
- Identifying weather and road surface problems and rapidly targeting
- responses.
- Installing a transit signal priority system.
- Implementing access management.

• Demand Management: Encouraging changes in travel mode, time, location, or route. These changes could include:

- Programs that encourage transit use, ridesharing, bicycling, and
- walking.
- Parking management.
- Employer-based programs.
- Telecommuting programs.
- Providing real-time information on transit schedules and arrivals.

• Land Use Strategies: Strategies designed to alter development patterns and design. These strategies could include:

- Transit-oriented development.
- Clustering development.
- Urban design.

• Infrastructure Development: New highway, transit, or bicycle/pedestrian capacity. This sort of development could include:

- Adding capacity to the transit system (buses, urban or commuter rail).
- Adding travel lanes on major freeways and streets.
- Removing bottlenecks by realigning intersections.
- Installing overpasses or underpasses at congested locations.

7. Implement Selected Strategies and Manage the Transportation System; and

8. Monitor Strategy Effectiveness; successive congestion management process reports can illustrate whether strategies have been effective.

Monitoring and evaluation helps to inform better decision making by transportation planners and engineers. The ways in which this may occur are as follows:

- Better understanding of the effectiveness of transportation strategies and investments. This helps with the planning of future investments and strategies to meet regional objectives.
- Fine-tuning the operation of projects already implemented and the implementation of ongoing operations programs (e.g. signal re-timing, bus schedule revisions).
- Helping to calibrate and refine planning models, such as the Columbus-Phenix City traffic model, so that conditions are properly reflected.
- Improving collaboration between agencies in collecting and monitoring data, which can yield benefits in terms of both developing and refining operations objectives and performance measures as well as in identifying successful strategies.

Monitoring and evaluating information also improves the effectiveness of communications with decision makers, stakeholders, and the public, enabling:

- Understanding the current status of transportation system performance more clearly, based on valid data rather than anecdotal perception.
- A way to see how progress has been made in meeting operations objectives and where opportunity for further improvement remains.

The Congestion Management Process helps the Columbus-Phenix City Metropolitan Planning Organization to:

- Identify congested locations;
- Determine the causes of congestion;
- Develop alternative strategies to mitigate congestion;
- Evaluate the potential of different strategies;
- Propose alternative strategies that best address the causes and impacts of congestion;
- Track and evaluate the impact of previously implemented congestion management strategies.

The Congestion Management Process is as much a way of thinking about congestion related issues as it is a set of technical tools. To put it another way, it uses a number of analytic tools to define and identify congestion near an activity center, in a corridor or an entire region and offers strategies, where applicable, to reduce congestion or mitigate the impacts of congestion.

The Congestion Management Process benefits greatly from a systematic approach to collecting and managing data for performance measurement. Collection of travel and delay time data is an important component of this process, but is not sufficient in and of itself for the purposes of effectively managing congestion. The Congestion Management Process also requires analysis and strategy development components. The Congestion Management Process is intended to provide strategies for inclusion in the metropolitan long range transportation plan, and may also be used for intermediate and short-term planning purposes.

Fig 1-1 Historical Traffic Volume Trends – Muscogee County

CMP Strategies

Strategies can be grouped into the following broad categories:

1. Adding More Base Capacity

Increasing the number and size of highways and providing more transit and freight rail service. This can include expanding the base capacity (by adding additional lanes or building new highways) as well as redesigning specific bottlenecks such as interchanges and intersections to increase their capacity. This approach is not always possible due to constraints, both physical and fiscal, but it remains an important approach to addressing congestion, alone and in combination with other strategies.

Examples:

• Adding travel lanes on freeways, roads and streets.
• Adding capacity to the transit system.

2. Operating Existing Capacity More Efficiently

Getting more out of what we have. This is a strategy that deals with the operation of the existing network of streets, highways, transit systems and freight services. Many operations-based strategies are enhanced by the use of enhanced technologies or intelligent transportation system projects. Examples of strategies that could be potentially deployed include:

Examples:

• Optimizing the timing of traffic signals;
• Pre-emptive action or faster responses to traffic incidents;
• Restricting turns at key intersections;
• Geometric improvements to roads and intersections;
• Converting streets to one-way operations; and
• Access management.

3. Efficient Travel and Land Use Patterns that Generate Less Congestion

Utilization of Travel Demand Management (TDM), encouragement of nonautomotive travel and land use management are strategies aimed to reduce the number of single-occupancy vehicle trips. In some instance the goal is to substitute communications for travel, or to encourage regional cooperation to change development patterns and reduce sprawl.

Examples:

- Programs that encourage transit use and ridesharing;
- Curbside and parking management;
- Flexible work hours;
- Telecommuting Programs;
- Bikeways and other strategies that promote non-motorized travel;
- Land use controls or zoning;
- Growth management restrictions such as urban growth boundaries;
- Development policies that support transit oriented designs for corridors and communities involving homes, employment centers and retail areas.
- Incentives for high-density development, such as tax incentives.

CHAPTER 2 –

OVERALL INTENT

The intent of the Congestion Management Process is to protect the region's investment in, and improve the effectiveness of, the existing and future transportation networks. This is achieved by using the Congestion Management Process to provide decision makers with information about transportation system performance and alternative strategies to reduce congestion, and enhance the mobility of persons and goods. Recommendations on strategies considered most appropriate for congested locations in the area will be developed during later tasks in the study.

The Congestion Management Process is a decision support tool in the development of the Long Range Transportation Plan. The Congestion Management Process is especially helpful in identifying transportation deficiencies, transportation needs and priorities related to congestion within the CPCMPO planning boundaries. These findings can subsequently be used as justification for projects suggested for inclusion in the Long Range Transportation Plan.

What is a Congestion Management Process?

A Congestion Management Process is a continuous cycle of transportation planning activities designed to provide decision-makers with better information about transportation system performance and the effectiveness of alternative strategies to deal with congestion.

A Congestion Management Process consists of four thematic components:

- Measurement and identification of congestion;
- A matrix of congestion mitigation strategies;
- Monitoring of effectiveness after implementation; and
- An orderly evaluation process.

The current federal highway authorization bill titled the Safe, Accountable, Flexible, Efficient Transportation Equity Act:

MAP-21 requires that congestion relief be considered in the selection of transportation improvement projects, and that all urbanized areas with populations in excess of 200,000 (termed Transportation Management Areas [TMAs]) develop and implement a Congestion Management Process.

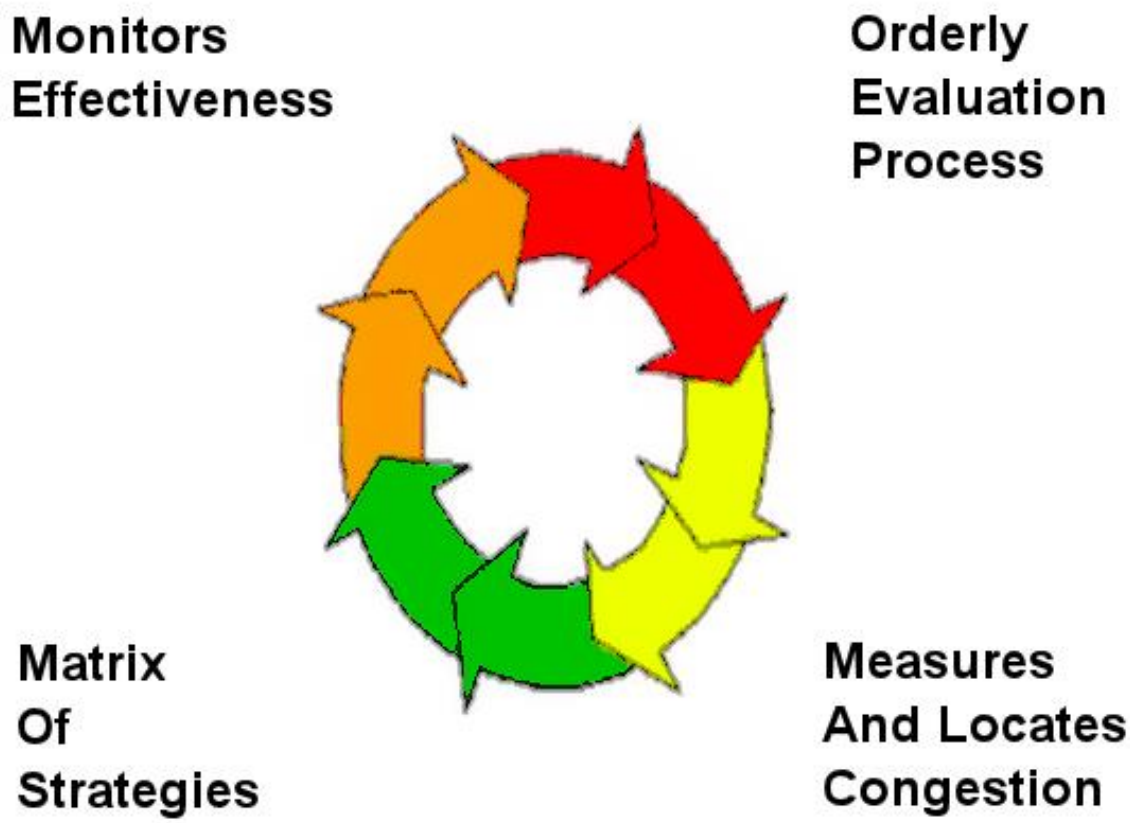


Figure 2-1

As shown in Figure 2-1 the components of the Congestion Management Process form a continuous cycle of transportation planning activities. By monitoring the effectiveness of congestion mitigation strategies and evaluating their benefits in an orderly, consistent manner, planners and decision makers can improve their ability, over time, to select the most cost-effective strategies appropriate to their specific local conditions and needs.

Congestion Management: A Cyclical Process

The Federal Highway Administration (FHWA) has issued guidelines on what constitutes a fully operational Congestion Management Plan. The guidelines are summarized under the following steps:

- System Monitoring and Identification of Congested Locations;
- Performance Measure Development;
- Identification of Congestion Causes;
- Identification and Ranking of Mitigation Strategies;
- Implementation of Strategies; and
- Monitoring of Effectiveness.

System Monitoring

With respect to congestion management planning, system monitoring is an all inclusive term meant to encompass all the various activities that transportation planners engage in to collect data relevant to transportation system performance. System monitoring should occur on all “regionally significant” roadway and transit facilities, with data collected continuously to identify the location and extent of congestion on these facilities. With respect to roadways, this would include facilities classified as arterial or higher. System monitoring activities typically incorporate one or more of the following:

1. National Performance Measures Research Data Set (NPMRDS)

The NPMRDS is a data set released each month in a partnership between the FHWA and HERE. The data set is a collection of travel times along travel time links or TMCs collected anonymously from the public as well as private fleet vehicles and freight trucks. The data provided is based on real traffic movements and is not derived from statistical models or historical trends.

2. Floating Car Travel Time

This method of data collection involves recording the time and position of a vehicle “floating” within the traffic stream at control points along a roadway facility. The speed / time / delay data may be obtained via a tape recorder or stopwatch.

Often, travel time / delay runs will indicate segments along a route, or at an intersection, where traffic counts may need to be collected. These “as-needed” counts are an important component of the system monitoring process. Time and delay runs and traffic counts serve as integral inputs to the third mechanism to monitor system performance.

3. Traffic Count Collection / Analysis

Traffic count data was acquired from the Georgia Department of Transportation (GDOT), Alabama Department of Transportation (ALDOT) and Columbus Consolidated Government (CCG) traffic counters to monitor traffic volumes on routes in the network. Many of these counts have been performed on an annual basis, allowing for the comparative review of volumes over a number of years.

4. Regional Travel Demand Model

The regional travel demand model can be a component of monitoring system performance in two ways.

• First, it provides a method of determining likely speed and traffic volume on facilities not directly observed under either of the system monitoring processes described above.

• Second, it allows for the forecasting of future traffic congestion along broadly defined roadway corridors or activity center areas.

Some ways in which travel demand can be visually represented is through the development of “build/no build” scenario traffic models and travel time shed models.

The build/no build traffic models depicts various scenarios depicting the effect that building or omitting planned transportation improvements would have on traffic volumes. How the model works is as follows - demographic forecasts are made as to the likely number of homes, businesses and retail stores in a specific area.

Formulas are then applied to calculate how many daily trips each would generate as well as attract. These projections are then aggregated to depict what overall traffic volumes would be in the area. These volumes are then “loaded” by the software to try to get all of the trips completed, from origin to destination, using the road network. Various projects can be added or detracted from the network, which then affects the volumes on existing roads. If a new project were to be represented on the model, some of the traffic in the network would be diverted to the new route. If a project is not built, this traffic is diverted to existing routes. The model calculates what the likely path of trips will be, given the route network and costs in terms of time and distance, between the point of origin and the destination. Doing this allows planners to forecast where future investment may be needed and thus begin the process of preparing projects to address identified issues. The following maps represent the present traffic conditions followed by the 2040 “no build” traffic model for the region. It is based on the assumption that none of the planned projects listed in our present Long Range Transportation Plan are constructed. This was done by taking the projected volumes for the road and comparing them to the capacity thresholds for that type of road.

CHAPTER 3

CONGESTION MANAGEMENT STRATEGIES

INTRODUCTION

A key task in the development of a Congestion Management Process is the identification and structuring of congestion mitigation strategies in a fashion that is easily understood by not only technical staff, but also the public. This chapter provides a focused discussion of those strategies thought most applicable to the congestion problems identified in the CPCMPO area during this study.

STRATEGY CLASSES

Strategy classes represent broad groupings of individual strategies and improvement measures.

The strategies in this discussion have been broken into the following twelve classes, as identified in the Federal Congestion Management Process Final Rule 1 for the Congestion Management Process:

1. Transportation demand management (TDM) measures
2. Traffic operations improvements
3. Measures to encourage high occupancy vehicle (HOV) use
4. Public transit capital improvements
5. Public transit operational improvements
6. Measures to encourage the use of non-motorized modes
7. Congestion pricing
8. Growth management
9. Access management
10. Incident management
11. Intelligent Transportation Systems (ITS)
12. General purpose capacity expansion

For each strategy class, groups of distinct strategies have been identified, as well as representative measures of effectiveness (MOEs) to assess the pre- or post implementation effectiveness of a given strategy group. Note that Congestion Management Process guidelines do not specify that all possible strategies be analyzed for every location of congestion. Only those that could potentially mitigate congestion at the given location in a reasonable manner should be analyzed.

TABLE 1

STRATEGY CLASS	STRATEGY GROUP	REPRESENTATIVE STRATEGIES
1. Transportation Demand Management	A. Ride sharing Programs	Ride share matching, Marketing and promotion, Vanpool Operations.
	B. Alternative Work Arrangements	Telecommuting, Flextime or compressed workweeks, Staggered work hours.
	C. Transit/Carpool Incentives	Employer-paid transit passes, Subsidized vanpool
	D. Parking Management	Preferred carpool/vanpool parking, Carpool/Vanpool parking discounts, Increased parking fees
	E. Guaranteed Ride Home (GRH) Programs	Used in conjunction with vanpool or HOV Programs to provide participants a ride home in event of emergency, thus alleviating their perception that they need to drive their personal vehicle daily as a contingency for such situations.

2. Traffic Operational Improvements	A. Improved signalization patterns B. Roadway geometry improvements	Signal retiming, coordinated systems, demand responsive systems Turn lanes, channelization, acceleration/deceleration lanes, bus turnouts, lane widening, one-way couplets, grade separation.
	C. Time of Day Restrictions	Turning restrictions, parking restrictions, truck access restrictions
	D. Ramp Metering	Localized ramp metering, coordinated ramp metering, demand responsive metering, HOV bypass metering.
	E. Commercial Vehicle Improvements	Commercial vehicle facilities, intermodal facilities, geometric improvements, truck routes
	F .Construction Management	Management plans, detour signing improvements, advance information of closures and alternate routes.
3. HOV Measures	HOV Priority Systems and Support Services	HOV priority lane, HOV ramps, transit signal priority, park and ride facilities.
	B. Fleet Improvements	Fleet expansion, vehicle replacement/upgrades, transit vehicle management systems, vehicle type changes.
	C. Transit support facilities	Park and ride facilities, transit centers, improved stations/stop facilities

5. Transit Operational Improvements	A. Transit Service Improvements	Increased frequency, add stops, modify operating hours, express routes, route modification
	B. Transit Marketing/Information	Marketing Programs, agency coordination, transit information systems
	C. Fare Incentives	Fare reductions, fare packages
	D. Traffic Operations for Transit	Traffic signal priority, signal coordination, bus turnouts, railroad crossing coordination
6. Non-Motorized Modes	A. Bicycle/pedestrian infrastructure improvements	Bike lanes, bicycle/pedestrian paths, bicycle route marking, sidewalks
	B. Bicycle/pedestrian support services	Bike rack/lockers, transit vehicle bike carriers, employer showers, bicycle/pedestrian planning, bicycle route maps
7. Congestion Pricing	A. Road user fees	Tolls, time of day pricing, HOV facility fees
	B. Parking fees	Surcharges, time of day pricing.
8. Growth Management	A. Compact development	Density standards
	B. Redevelopment/Plan	Site reclamation/reuse, incentives to develop in areas with existing infrastructure.
	C. Mixed use development	Zoning regulations
	D. Jobs/Housing balance	Zoning regulations
	E. Transit-Oriented Development	Density standards, bicycle/pedestrian access, design requirements
	F. Corridor land use & transportation coordination	Intergovernmental agreements

9. Access Management	A. Driveway management	Policies and standards, side street/alley access, shared access/common driveways
	B. Median management	Policies and standards, establishing medians, bi-directional turn lanes
	C. Frontage roads	Used to provide access to parcels alongside a roadway while minimizing the number of
10. Incident Management	A. Incident Detection	Emergency traffic patrols, emergency monitoring, roadway detectors/surveillance.
	B. Incident response	Emergency vehicle priority, emergency traffic patrols, communication systems protocol.
	C. Incident clearance	Emergency response team's, service patrols
	D. Incident Information/routing	Highway advisory radio, alternative route planning, variable message signs.
11. Intelligent Transportation System	A. Advance Traffic Management Systems	Freeway management, traffic signal control, emergency management,
	B. Advance Traveler Information Systems	Multi-modal regional traveler information.
	C. Advance Public Transportation Systems	Vehicle management systems, automated vehicle location systems, electronic fare payment.
	D. Commercial Vehicle Control Systems	Weight-in-motion system, electronic credential checking.
	E. Advance Vehicle Control Systems	Collision avoidance system. Vehicle guidance system.
12. General Purpose Capacity Expansion	A. Expressway lanes,	Add lane to existing facilities or construct new facilities.
	B. Arterial lanes	

CHAPTER 4

PERFORMANCE MEASURES

Performance measures provide the basis for evaluating transportation system operating conditions and for identifying the location and severity of congestion. Performance measures typically used in a Congestion Management Process are discussed in detail.

The Chapter ends with a discussion of measures appropriate to the current CPCMPO Congestion Management Process plan.

TYPICAL MOES FOR CONGESTION MANAGEMENT PROCESS

As noted in the previous chapter, Measures of Effectiveness (MOEs) typically considered in Congestion Management Process plans include.

- Travel Time Measures (vehicle hours traveled by mode, delay and speed)
- Volume to capacity ratios
- Annual traffic counts
- Intersection Level of Service
- Percentage of Households and Employment within "X" miles of a Bus Route
- Percentage of Households and Employment within "X' miles of an interchange
- Transit System measures (rider volumes, reserve capacity, et cetera)
- Vehicle occupancy
- Incident Measures

Of these measurements of effectiveness, travel time measures are often used as the primary measure of effectiveness in Congestion Management Process plan development. Typically, volume to capacity ratios are used as a secondary measure of effectiveness. MOEs are frequently selected based on consideration of the following factors:

- Availability of data from existing sources;
- Ease of data collection and processing;
- Applicability of those measures in quantifying system performance; and
- Ability of the performance measure to help forecast future system deficiencies.
- The following pages go on to describe the various measures used in the development of the current study.

Descriptions of Congestion Management Process performance measures follows:

CONGESTION MEASURES

Volume-to-Capacity (V/C) Ratio[1]

Due to the wide availability of volume and capacity figures, as well as the straightforward nature of the measure, Volume-to-Capacity (V/C) ratios[1] are widely used as general measures of congestion in transportation planning. The Transportation Research Board's (TRB) Highway Capacity Manual (HCM) has established relationships between V/C ratio and traffic operation, and is a standard guide in the field. V/C ratios are useful for identifying potential areas where congestion is likely but it is not in itself a measurement of observed congestion. In this report, the V/C Ratio analysis uses model predicted Average Annual Daily Traffic (AADT) to Capacity. Predicted AADT is derived and validated through the 2014 Travel Demand Model.

Congested Time and Travel Speed

Congested time and travel speed[2] are closely related measures that illustrate the reduction in mobility people experience during congestion. Congested time and speed experienced under congested conditions can be compared to those found in free flow operating conditions to assess the magnitude of congestion. The duration of congestion can also be determined by measuring the reduced travel speeds over a period of time. Future travel time and speed can be projected through model forecast data, while present day conditions can be determined through the "floating car" travel time run methodology utilized for this report. Some surveillance detectors (occupancy loop or video detection), or signal control detectors can also provide speed data. These data may be summarized at any analysis level desired: link, corridor or region-wide. Travel Time and Speed are derived from the FHWA National Performance Research Data Set (NPMRDS) which is described in greater detail in Chapter 5.

SYSTEM EFFICIENCY MEASURES

Vehicle Miles Traveled (VMT)

Vehicle miles traveled[3] is defined as the number of miles traveled by a vehicle in each trip and is a direct output of regional travel demand models. VMT can be reported for a link, corridor, major activity center or region wide. VMT is a good indicator of travel demand, as well as air quality emissions.

VMT projections readily allow for comparisons between various alternatives of a given scenario, and can also report the frequency of travel between two defined areas.

While VMT can report travel by different modes, the measure cannot be used to make comparisons between various modes. As a measure of performance, VMT is best used when:

- Comparing similar links, corridors, and areas;
- Comparing system scenarios in different planning years; and
- Evaluating highway-related project alternatives.

INCIDENT (NON-RECURRING CONGESTION) MEASURES

Incident measures[4] differs from the other performance measures, which all attempt to measure recurring congestion. An attempt should be made to measure incident congestion, which accounts for much of the congestion experienced in Columbus and Phenix City

- Accident Location and Frequency
- Incident-Related Delay
- Incident Duration

Due to the nature of incidents (which include vehicular crashes or special events), this information is very difficult to obtain in a systematic way.

CHAPTER 5

DATA COLLECTION

INTRODUCTION

This chapter describes the data collection activities undertaken for the CPCMPO Congestion Management Process study. It covers new data collected by the study team such as travel time data, the use of existing data and other data such as additional traffic counts, obtained from other government agencies. The processing of these data and the generation of Measures of Effectiveness (MOEs) are also described.

TRAVEL TIME ANALYSIS

National Performance Measures Research Data Set (NPMRDS)

The NPMRDS is a dataset released on a scheduled basis by the Federal Highway Administration (FHWA). The data set contains the travel times of freight and passenger vehicles traveling along major state routes and interstates. These travel times are collected as a vehicle travels from segment to segment along a route through collection of data from navigational systems such as TOM-TOM, cell phone signals, app data, and GPS embedded in vehicles and freight. Freight travel times are provided by the American Transportation Research Institute through fleet navigational systems. In previous congestion management updates, this dataset was not available, requiring MPO staff to conduct the floating car analysis using TravTime software. Additionally, TravTime software is no longer servicing updates or renewals of the software, requiring a new approach to travel time analysis. The disadvantage of doing the floating car survey is that the sample size is limited and requires significant staff time. With the NPMRDS, thousands of vehicles passively contribute travel time data, making the data set more robust and less time intensive. The FHWA has recently proposed that all state Department of Transportation's use similar techniques and datasets in the evaluation of the National Highway System. Using the NPMRS at the MPO level will allow for consistency between MPO reporting and state reporting of travel time delay.

Methodology of NPMRDS Travel Time Data Processing

The NPMRDS provides data for every 5-minute increment or "epoch" of every day of the year. There are 288 5-minute increments in a 24 hour day. For this report the data collected from August-December of 2015 was used to analyze travel time delays. Weekends and holidays were excluded from the analysis. The procedure for removing outliers was twofold. Firstly, all recorded speeds greater than 100 miles per hour and less than 2 miles per hour were removed. Next, all values that were 2 standard deviations above or below the median average were removed. The median average was then calculated for each epoch for each day for each Traffic Message Channel (TMC) using a series of Microsoft Excel formulas. A sample of the NPMRDS data set is provided below

TABLE 2: SAMPLE TRAVEL TIME DATA FROM NPMRDS

TMC	DATE	EPOCH	TT_ALL_VEHICLES	TT_PASSENGER	TT_FREIGHT
101N04802	12012015	59	19		19
101N04802	12012015	60	19		19
101N04802	12012015	64	19	19	
101N04802	12192015	105	20	19	21
101N04802	12192015	110	21	21	
101N04802	12192015	111	19	19	
101N04802	12192015	116	17	17	
101N04802	12192015	119	18		18
101N04802	12192015	120	17	17	

TMC – Unique route segment identifier
Date – Date of data capture
Epoch – 24 hour day broken into 288 five minute increments (See appendix for Epoch to time table)
TT All Vehicles – Weighted travel time in seconds for passenger vehicles and trucks
TT Passenger – Travel time in seconds for passenger vehicles alone
TT Freight – Travel time in seconds for trucks

MEASURING CONGESTION USING NPMRDS

The metric used to define congestion is Travel Time Ratio. This is the average travel time as derived by the NPMRDS divided by the base free flow travel time as derived from the 2014 Travel Demand Model developed by GDOT. Two separate measurements were defined for arterials and interstate/highways to account for design features. Arterials will have a higher tolerance to travel time delays due to signalized intersections, school zones, and other designed delays in travel time. The measurement for highways and interstates is much more sensitive to delays. The thresholds used and described below were derived with guidance from the Highway Capacity Manual.

LEVELS OF CONGESTION FOR ARTERIALS:

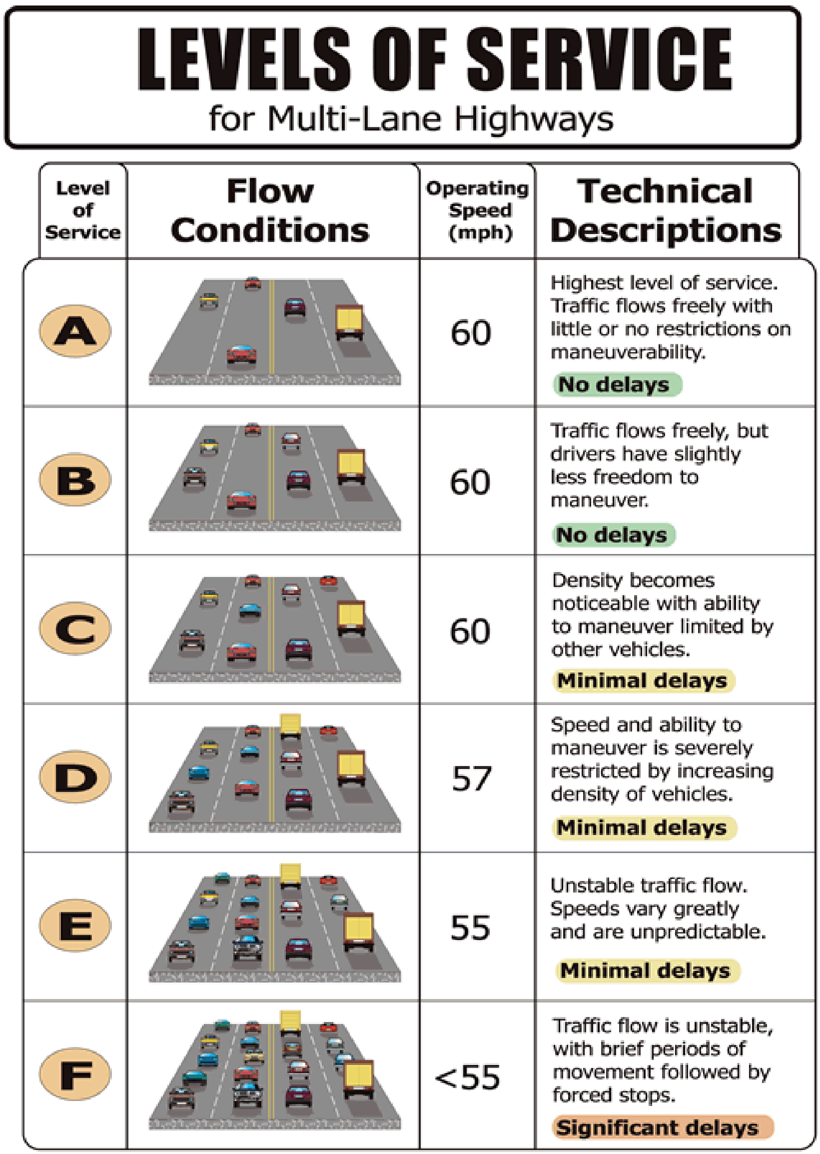
Negative Delay:
Qualitative Level of Service: A
>100% The average travel speed is greater than the base free flow travel speed

No Congestion:
Qualitative Level of Service: A-B
85% - 100% The average travel speed is no less than 85% of the base free flow travel speed

Mild to Moderate Congestion:
Qualitative Level of Service: C-D
50% - 84.9% The average travel speed is between 50% and 84.9% the base free flow travel speed

Heavy Congestion:
Qualitative Level of Service: E-F
<50% The average travel speed is less than 50% of what the base free flow travel speed.

Fig. 5-1



Source: 2000 HCM, Exhibit 21-3, Speed-Flow Curves with LOS Criteria for Multi-Lane Highways

- 75-79% E - Heavily Congestion
- 80-84% D – Mild-Moderate Congestion
- 85-89% C – Mild Congestion
- 90-95% B - Uncongested
- <95% A - Uncongested

System Monitoring

With respect to congestion management planning, system monitoring is an all inclusive term meant to encompass all the various activities that transportation planners engage in to collect data relevant to transportation system performance. System monitoring should occur on all "regionally significant" roadway and transit facilities, with data collected continuously to identify the location and extent of congestion on these facilities.

With respect to roadways, this would include facilities classified as arterial (23 CFR 500.109(b)) or higher. System monitoring activities typically incorporate one or more of the following:

Traffic Count Collection / Analysis:

Traffic count data was used from GDOT, ALDOT and Columbus Consolidated Government counters to monitor roadway system performance. Often, travel time / delay runs will highlight segments along a route, or at an intersection, where traffic counts may need to be collected.

These "as-needed" counts are an important component of the system monitoring process. Time and delay runs and traffic counts serve as integral inputs to the third mechanism to monitor system performance.

Regional Travel Demand Model:

The CPCMPO has worked with GDOT Office of Transportation Planning to produce and maintain a regional traffic model, which is prepared in a software package known as Cube. The regional travel demand model can serve a two-fold purpose with respect to monitoring system performance. First, it provides a method of determining speed and volume values on facilities not directly observed under either of the system monitoring processes described above.

Second, it allows for the forecasting of future traffic congestion along broadly defined roadway corridors or activity center areas. The Travel Demand Model was updated in 2014 to reflect the latest socio-economic data and network changes.

PERFORMANCE MEASURES

Performance measures (and associated threshold values) are used to identify congested conditions at individual locations, or within corridors and activity centers. These adopted measures are the primary means by which congestion information is communicated among transportation professionals and the public. Therefore, care must be taken in the selection, organization and presentation of these measures so that they are:

- Clearly understood;
- Sensitive to all travel modes;
- Sensitive to time;
- Supported by data that are neither costly nor difficult to collect;
- Supported by data that may be forecast into the future and able to measure the effects of strategies meant to mitigate congestion.

FHWA also suggests that selected performance measures be categorized as follows:

1. Those that measure congestion (facility-based measures, such as V/C ratios);

2. Those that measure mobility (travel time-based measures);

3. Those that measure accessibility (activity-based measures, such as the number of jobs within 35 minutes of a particular facility, or within ½ mile of a transit stop);

4. Those that measure system efficiency (measures that provide an overall assessment of system wide performance, such as the number of congested lane-miles, or VMT under congested conditions).

2014 Travel Demand Model Time-Shed Analysis

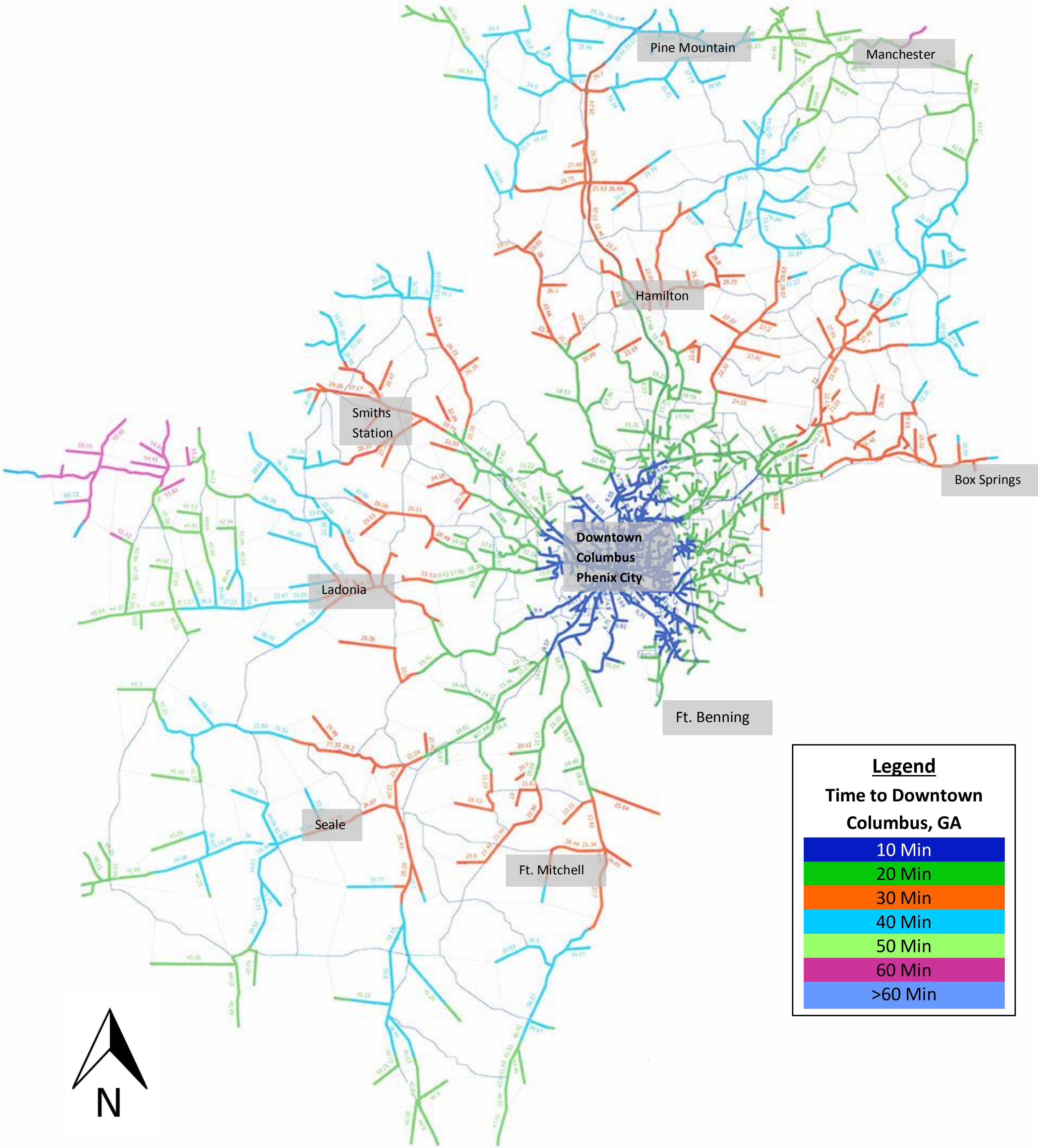


Fig. 2-2 2014 Model Assigned Volume to Capacity Ratios

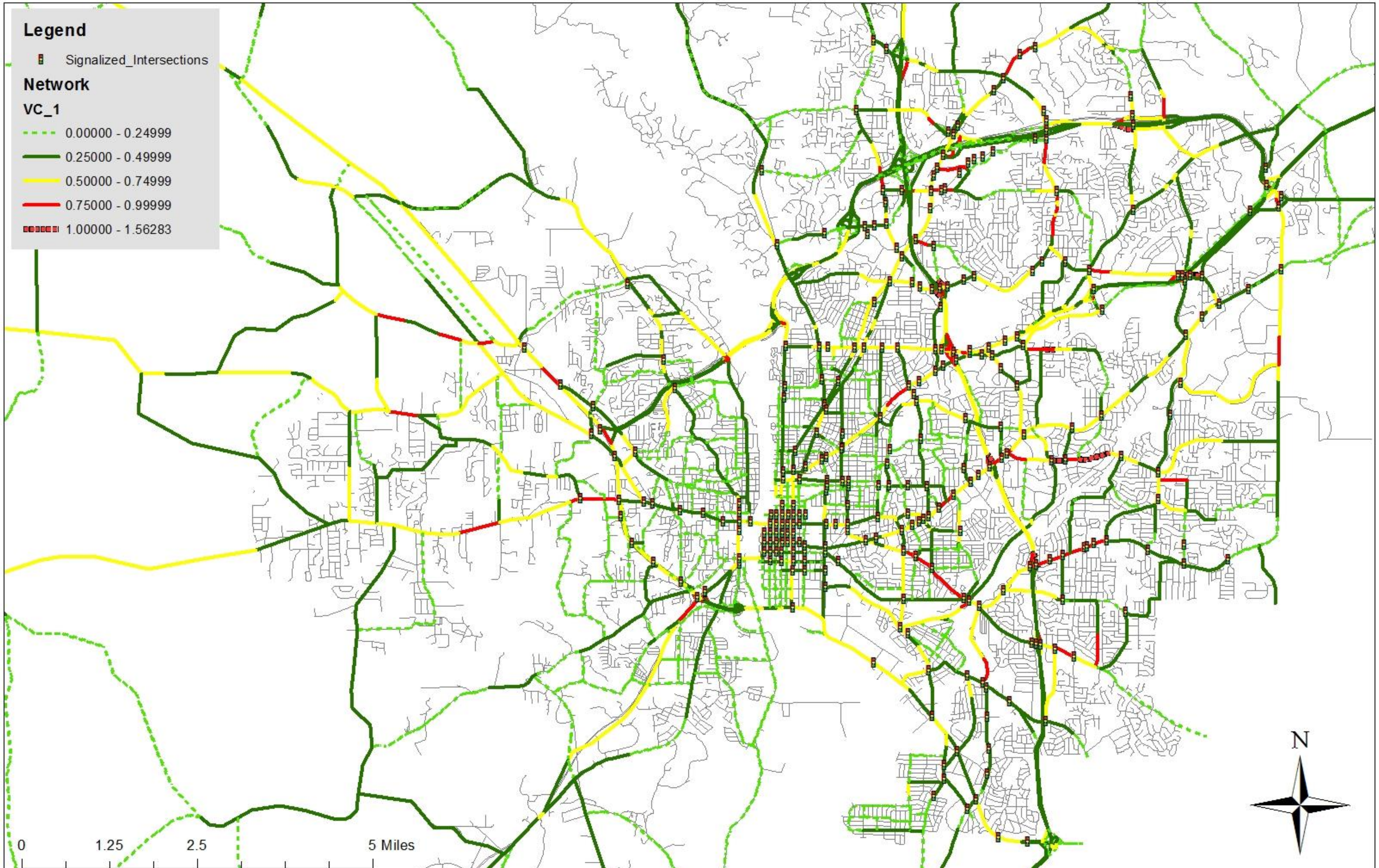


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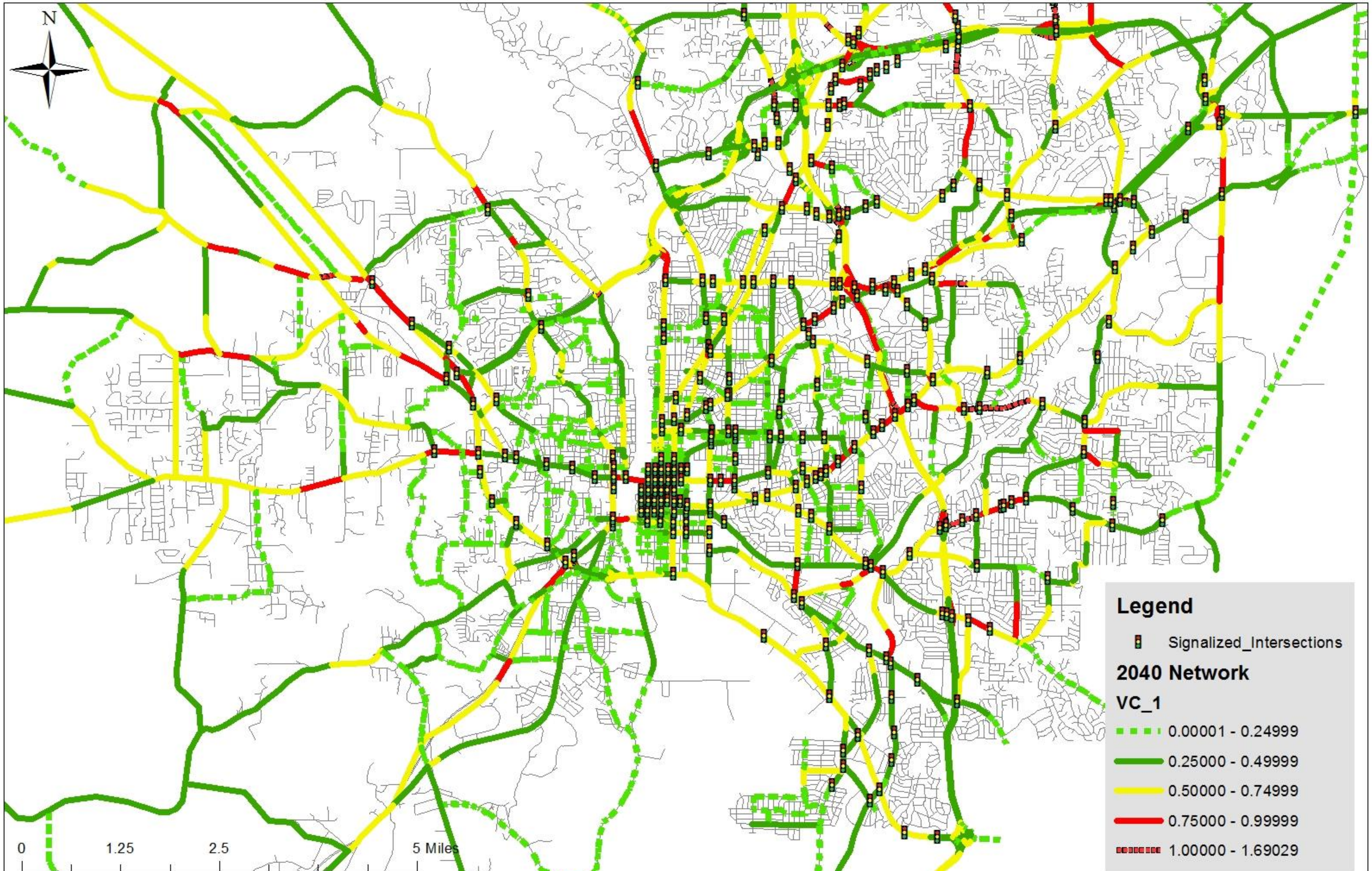
Fig. 2-3 2040 Model Assigned Volume to Capacity Ratios (STIP)



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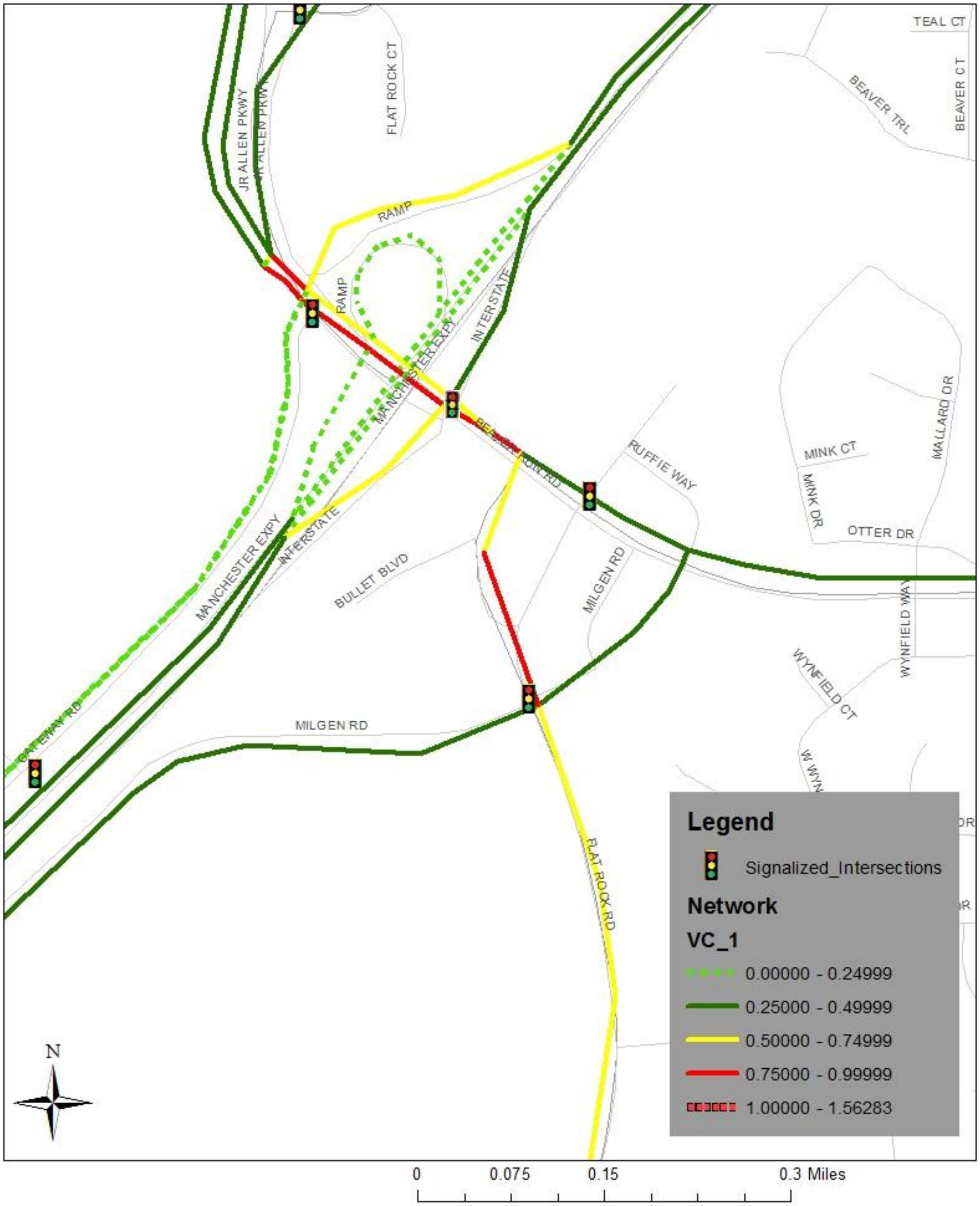
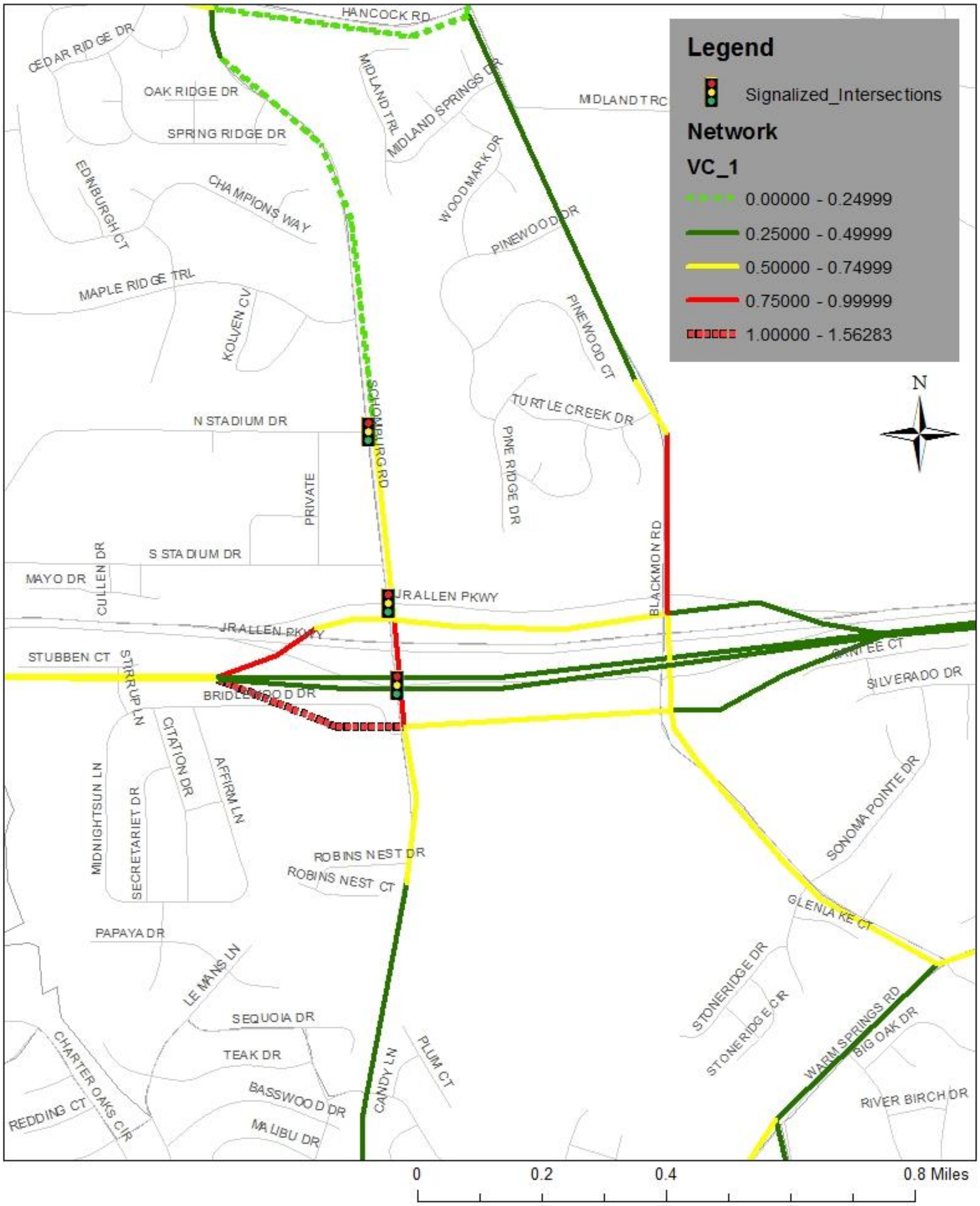
2014 Travel Demand Model V/C Analysis

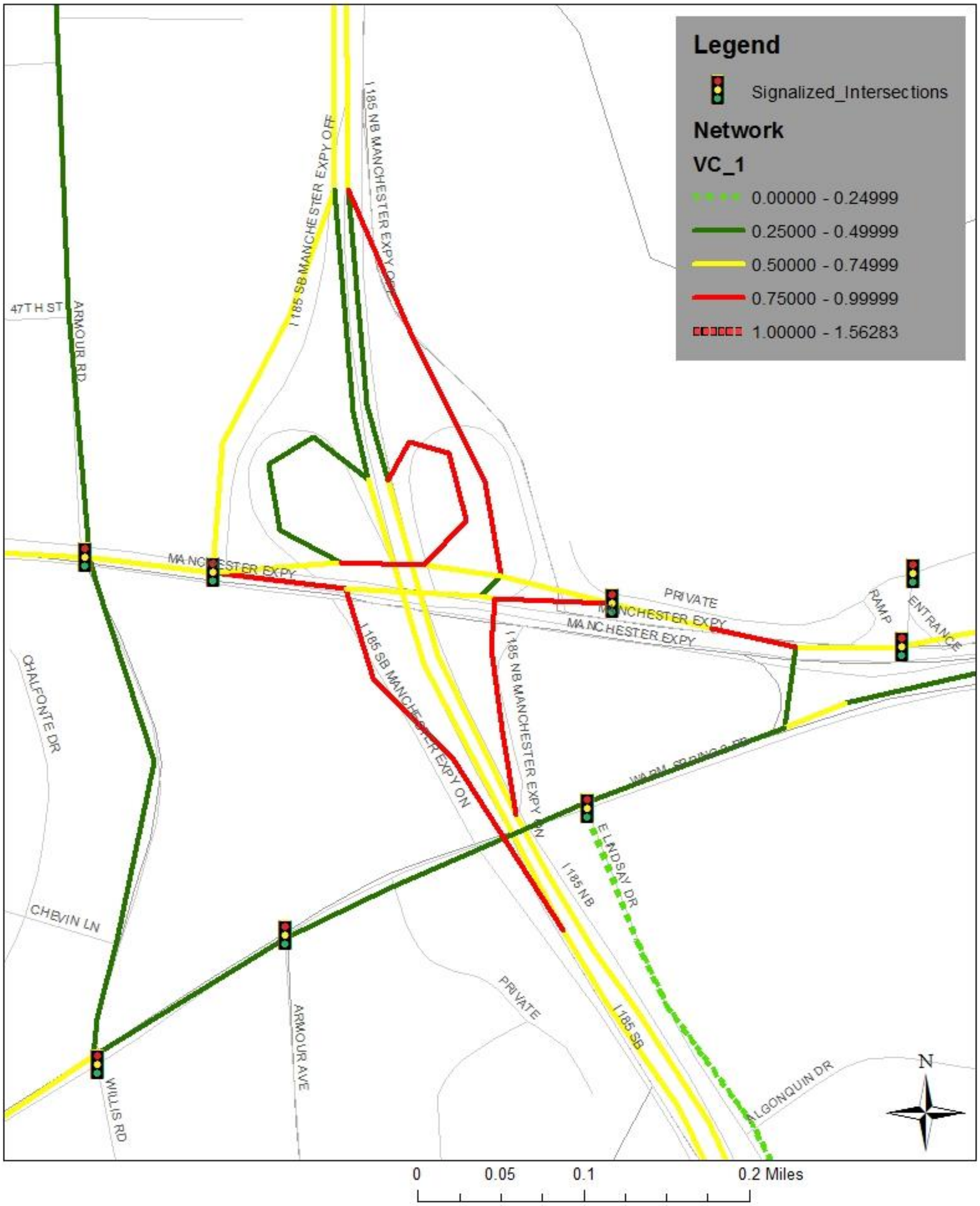
Beaver Run Road



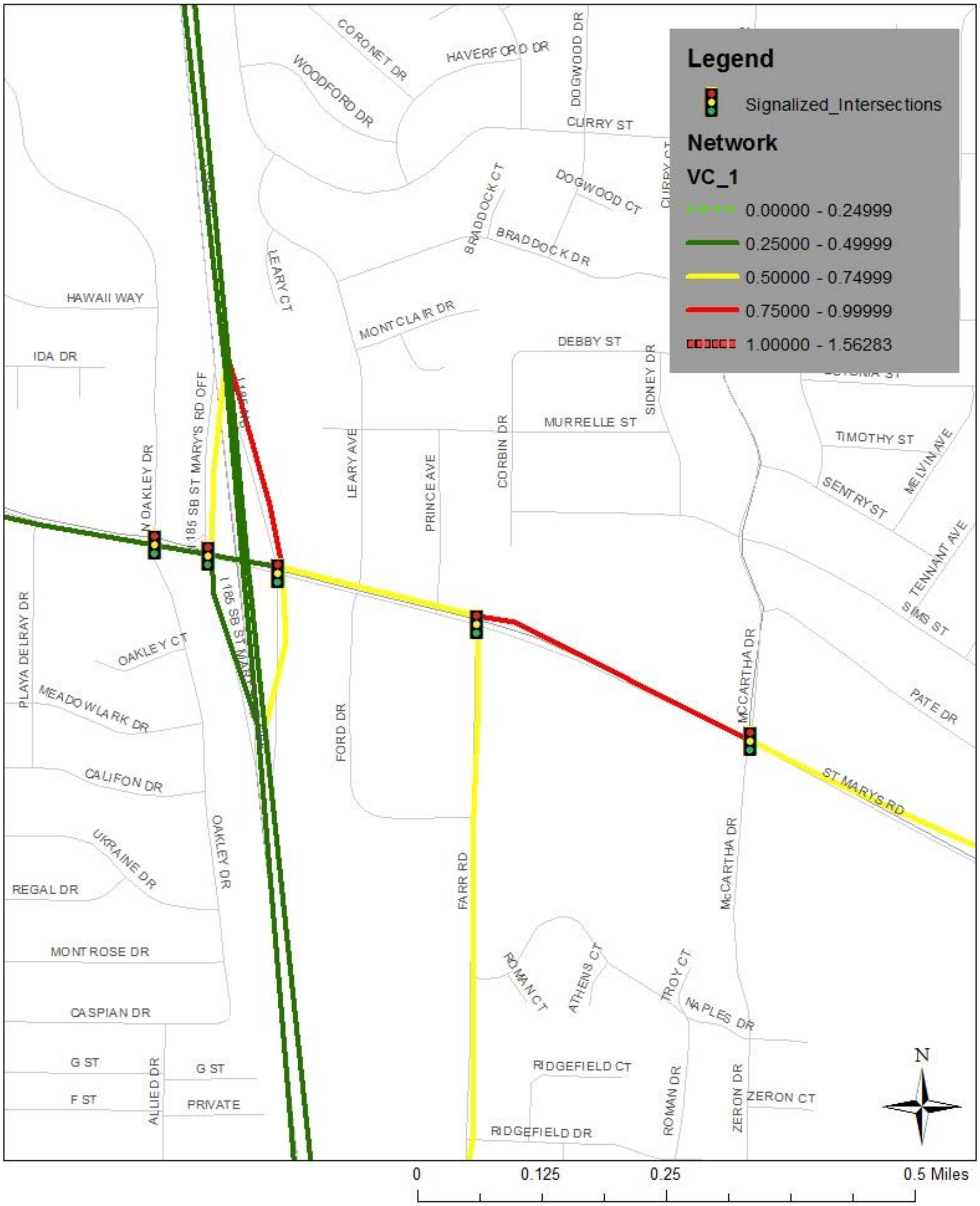
Jr Allen / Blackmon / Schomburg



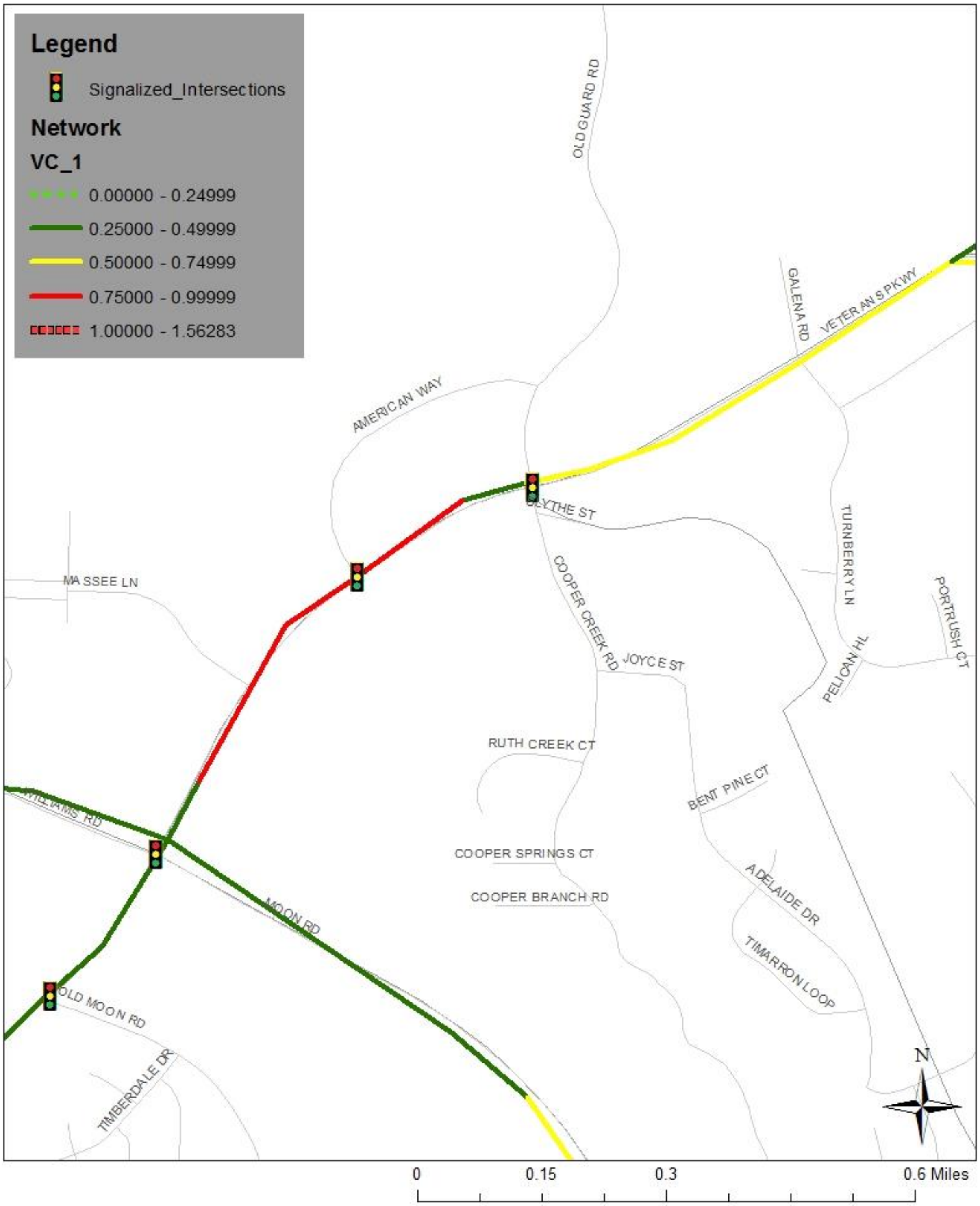
Manchester Expy / 185 Interchange



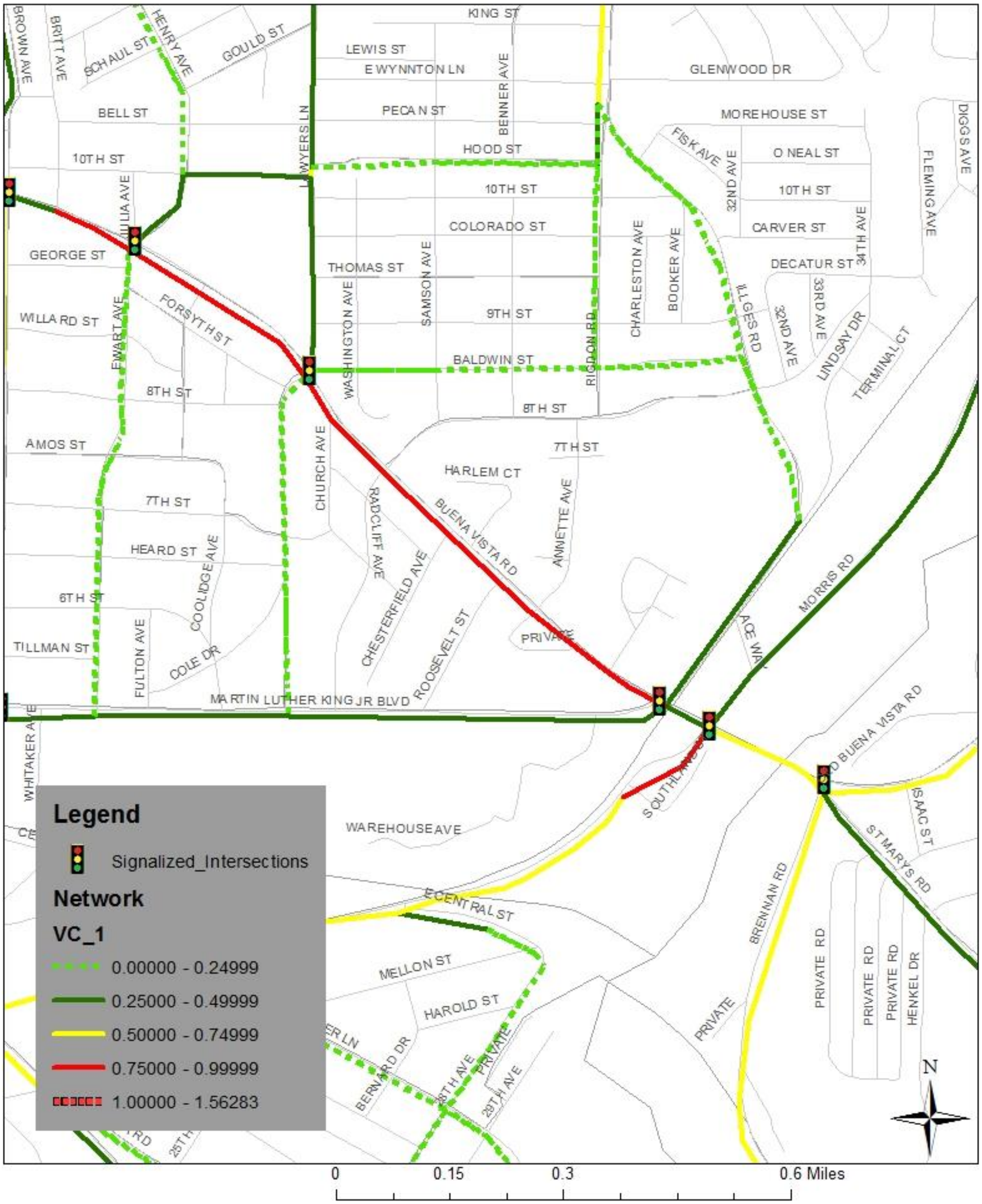
St. Mary's Road



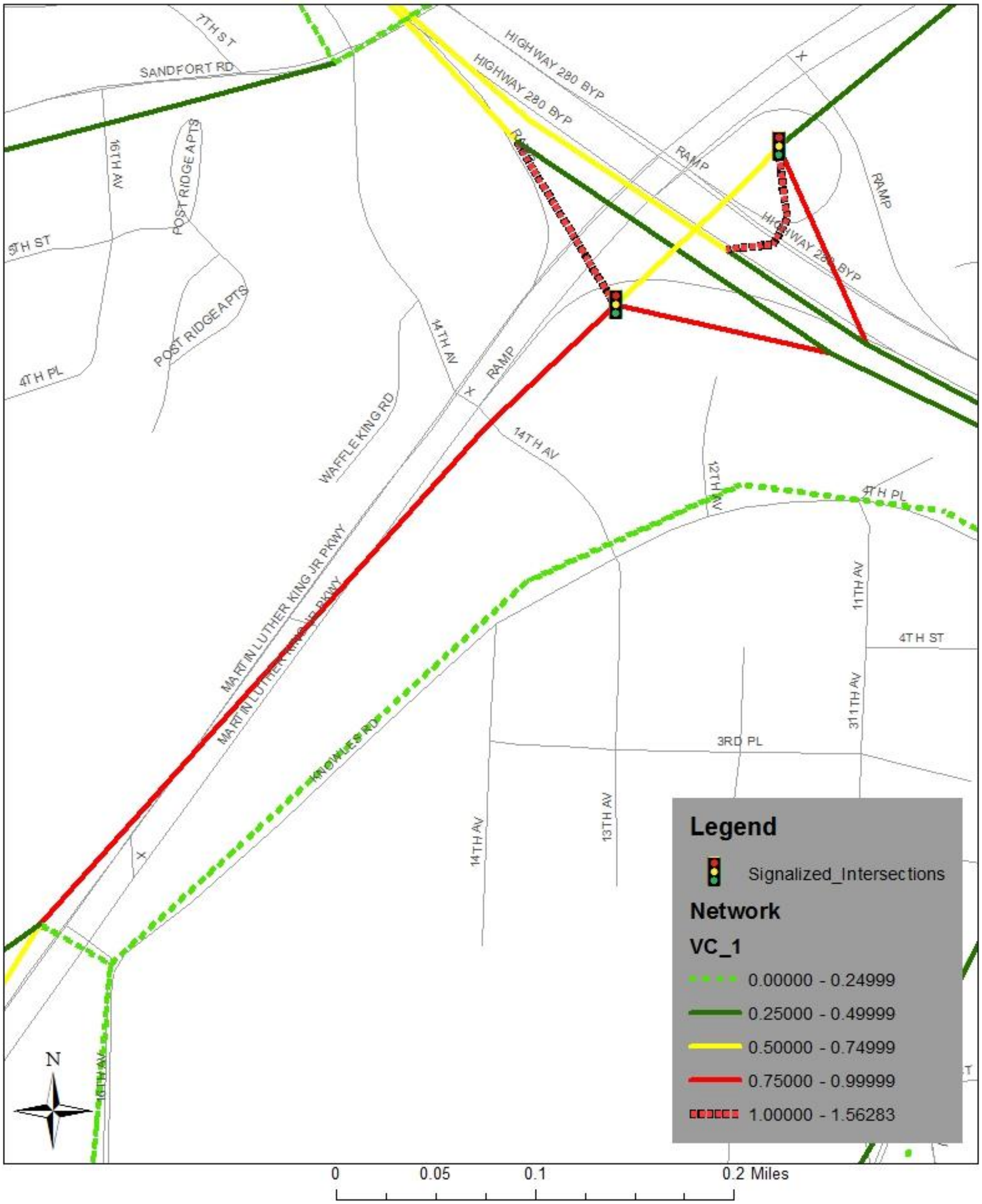
Veteran's Pkwy



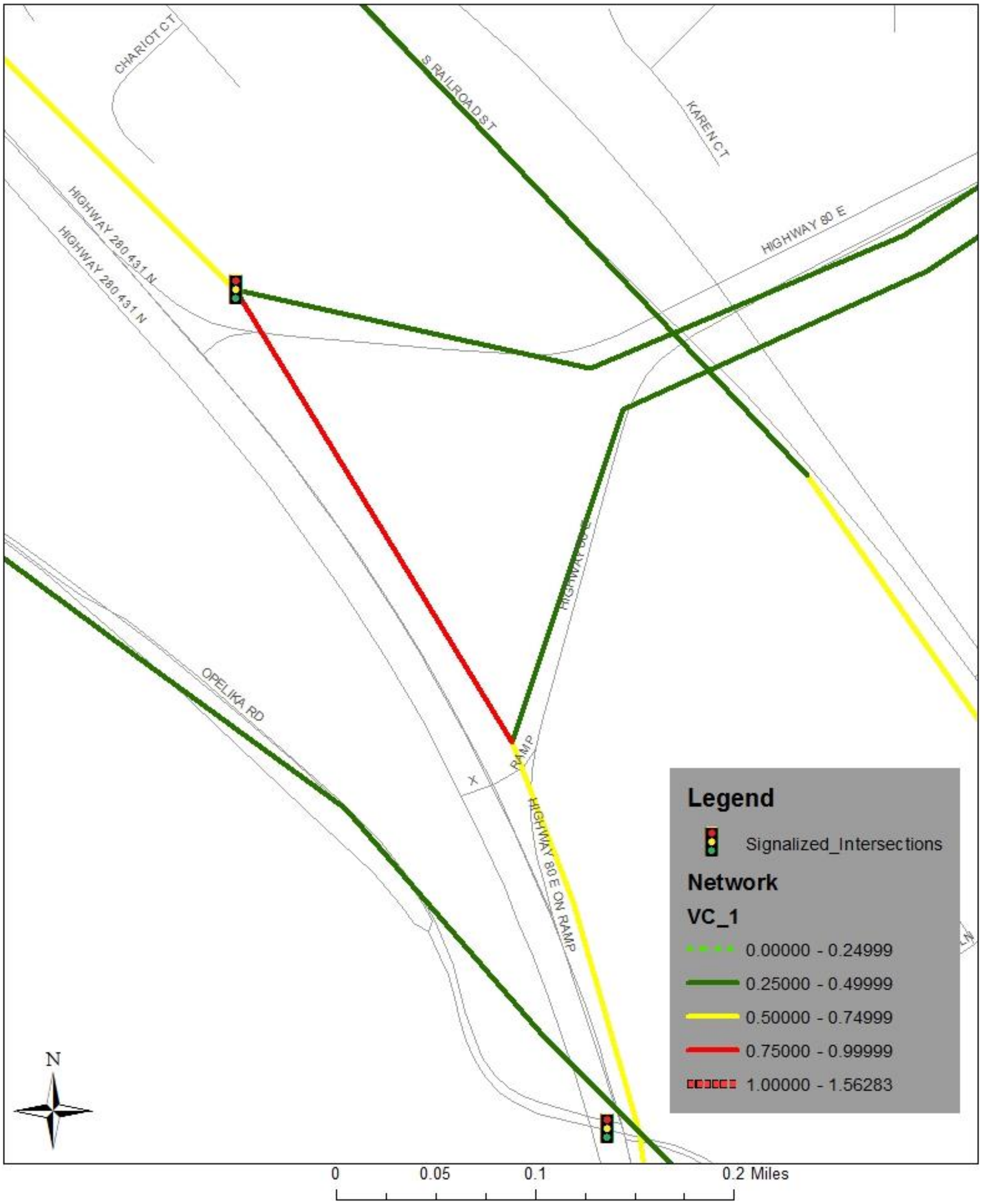
Buena Vista Road



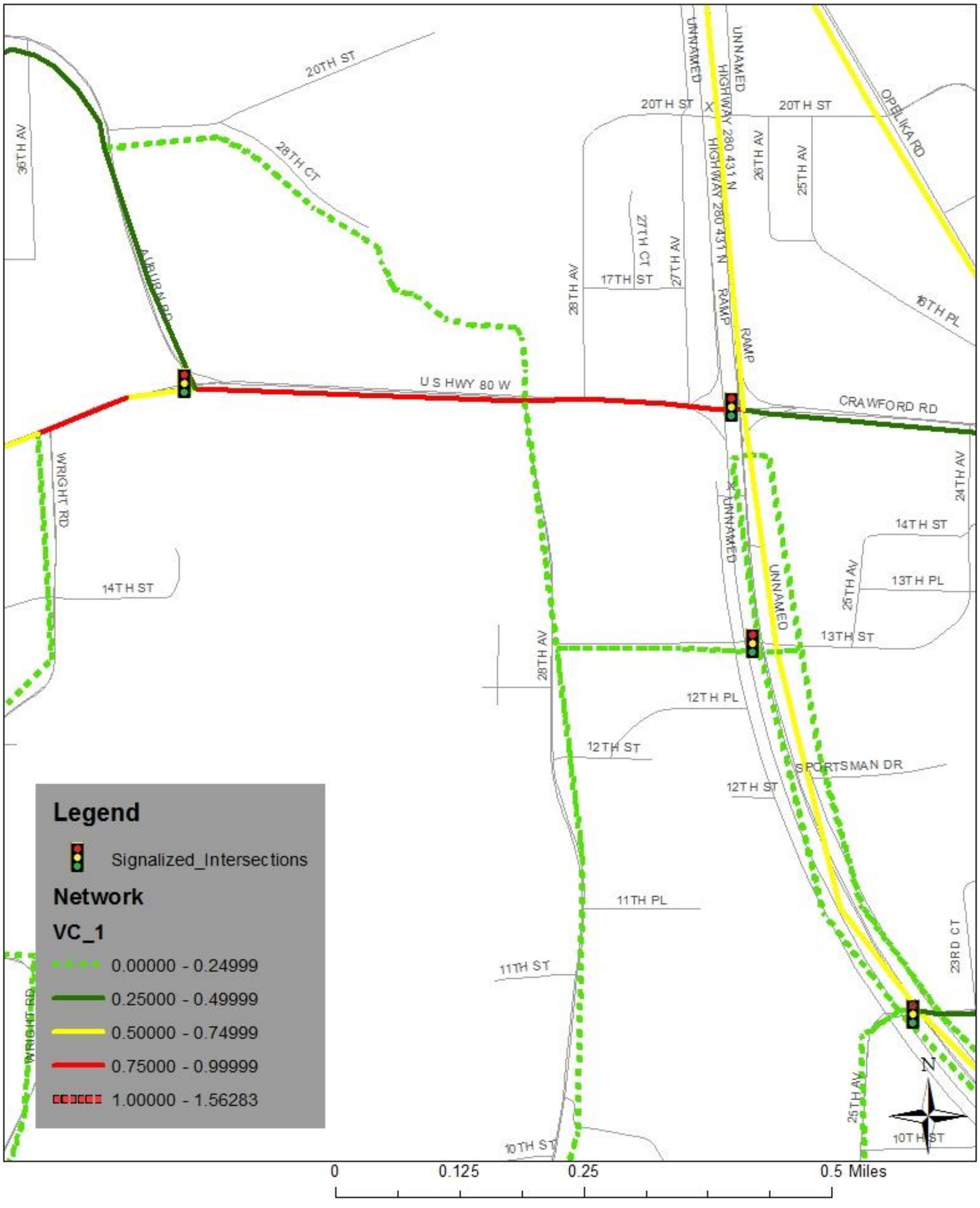
Martin Luther King Jr. Pkwy (AL)



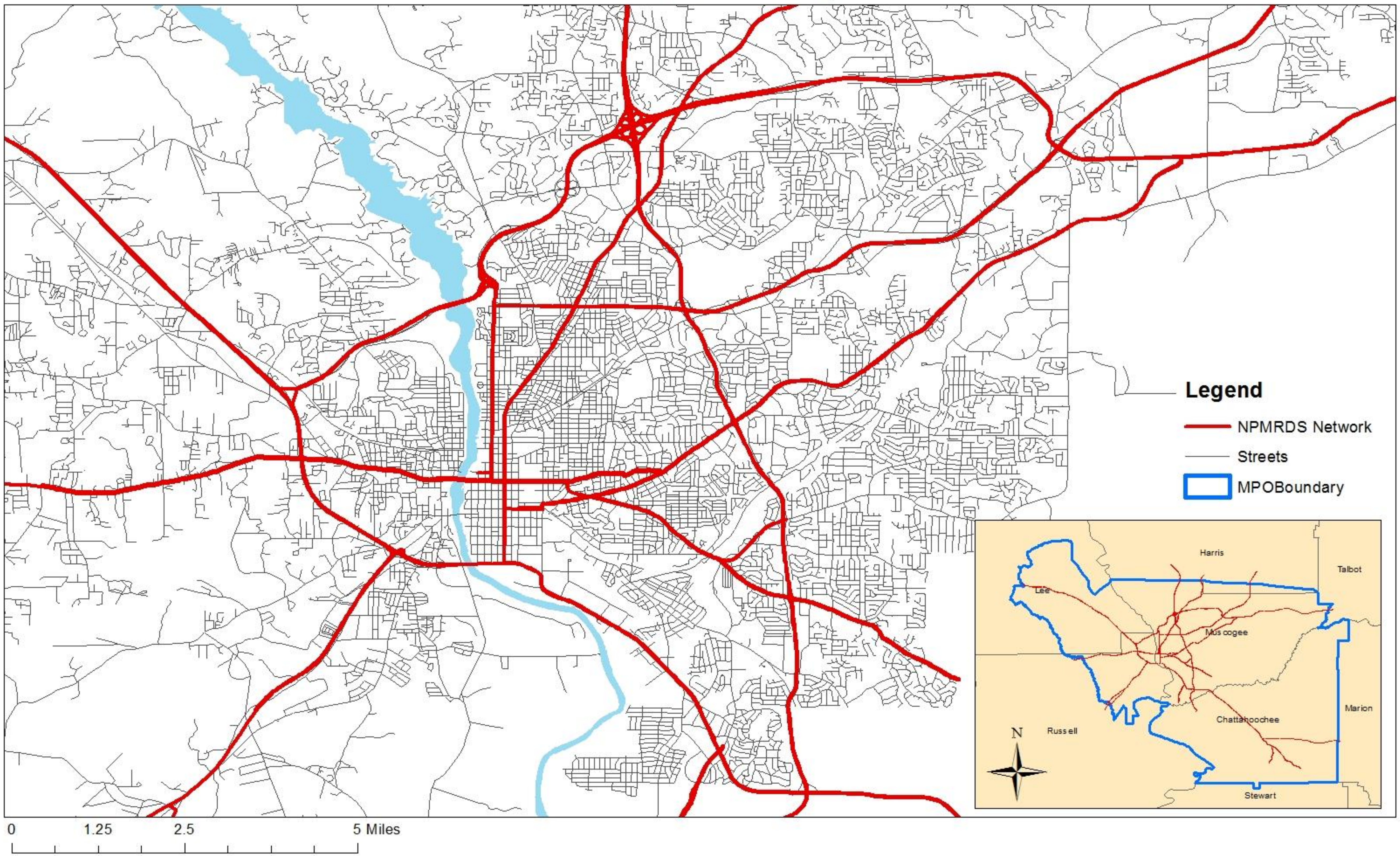
Highway 280 (AL)



Martin Luther King Jr. Pkwy (AL)



NPMRDS Network Coverage



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NPMRDS 2014 Traffic Counts

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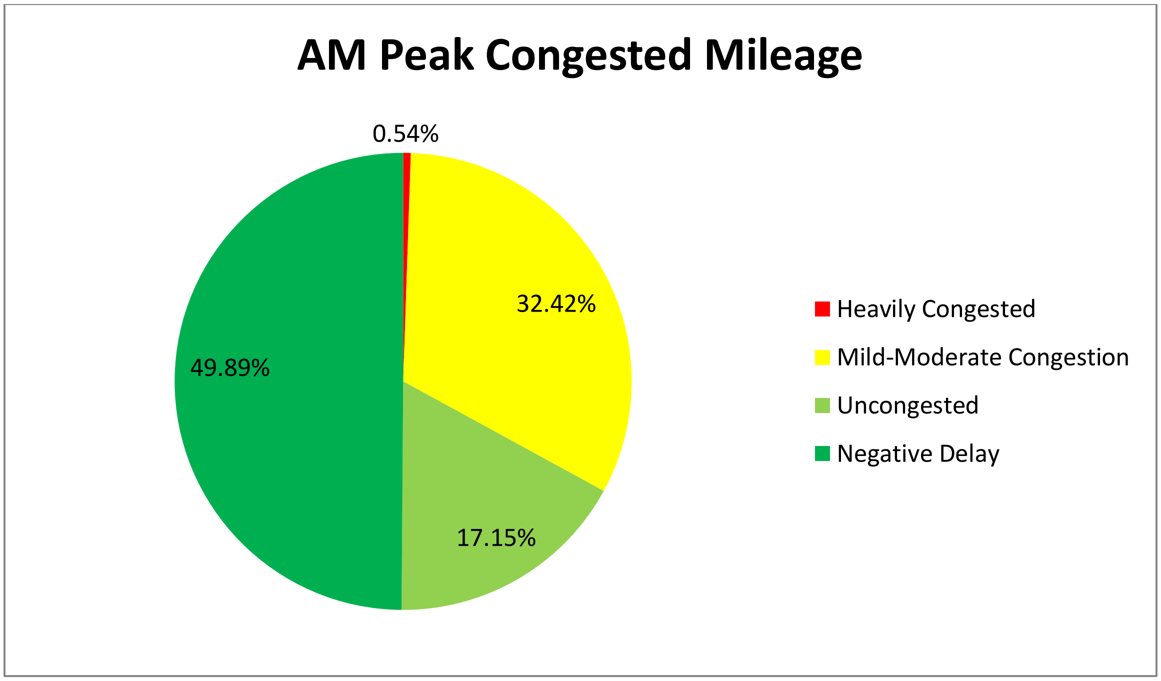
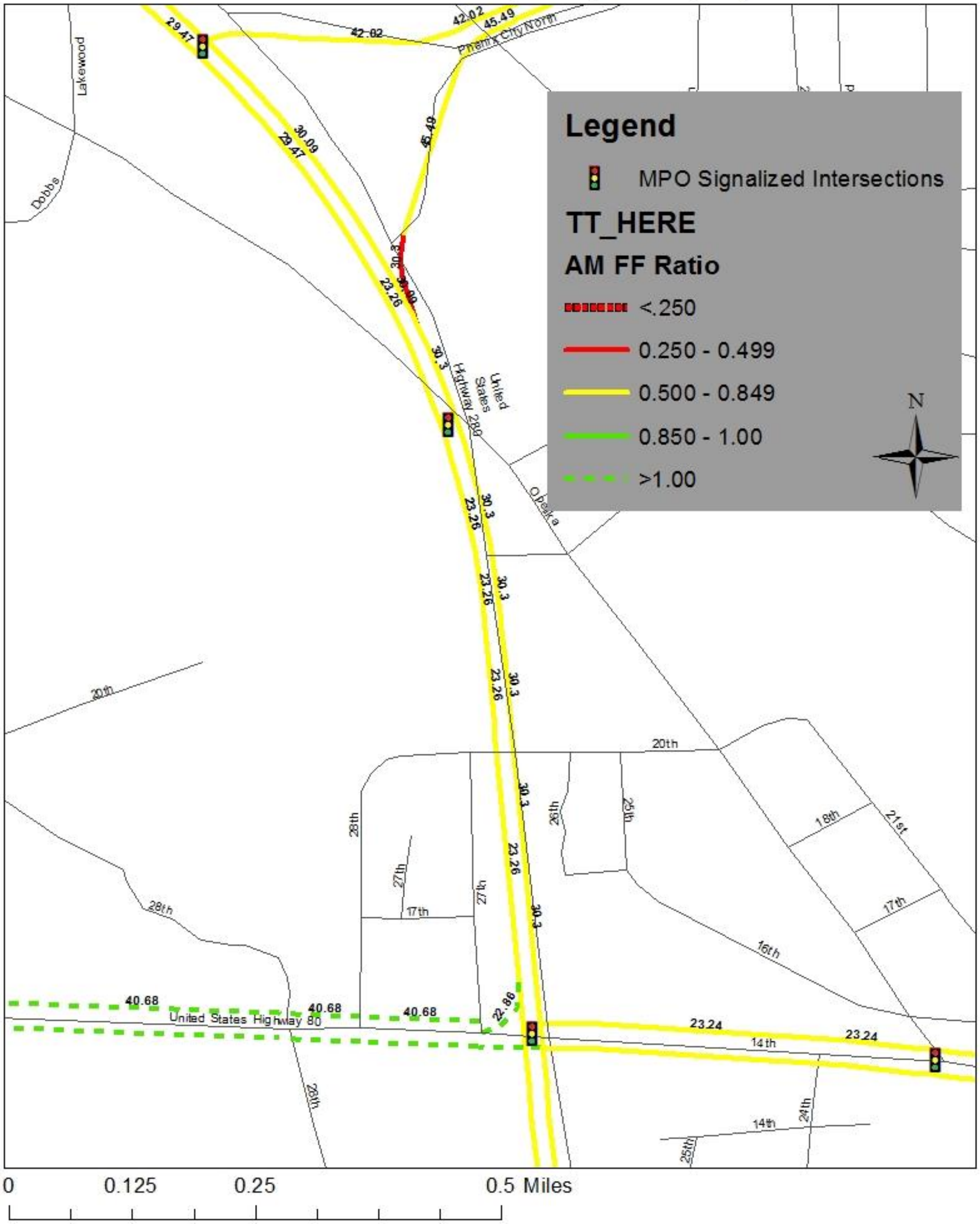
AM Peak 2015 Results

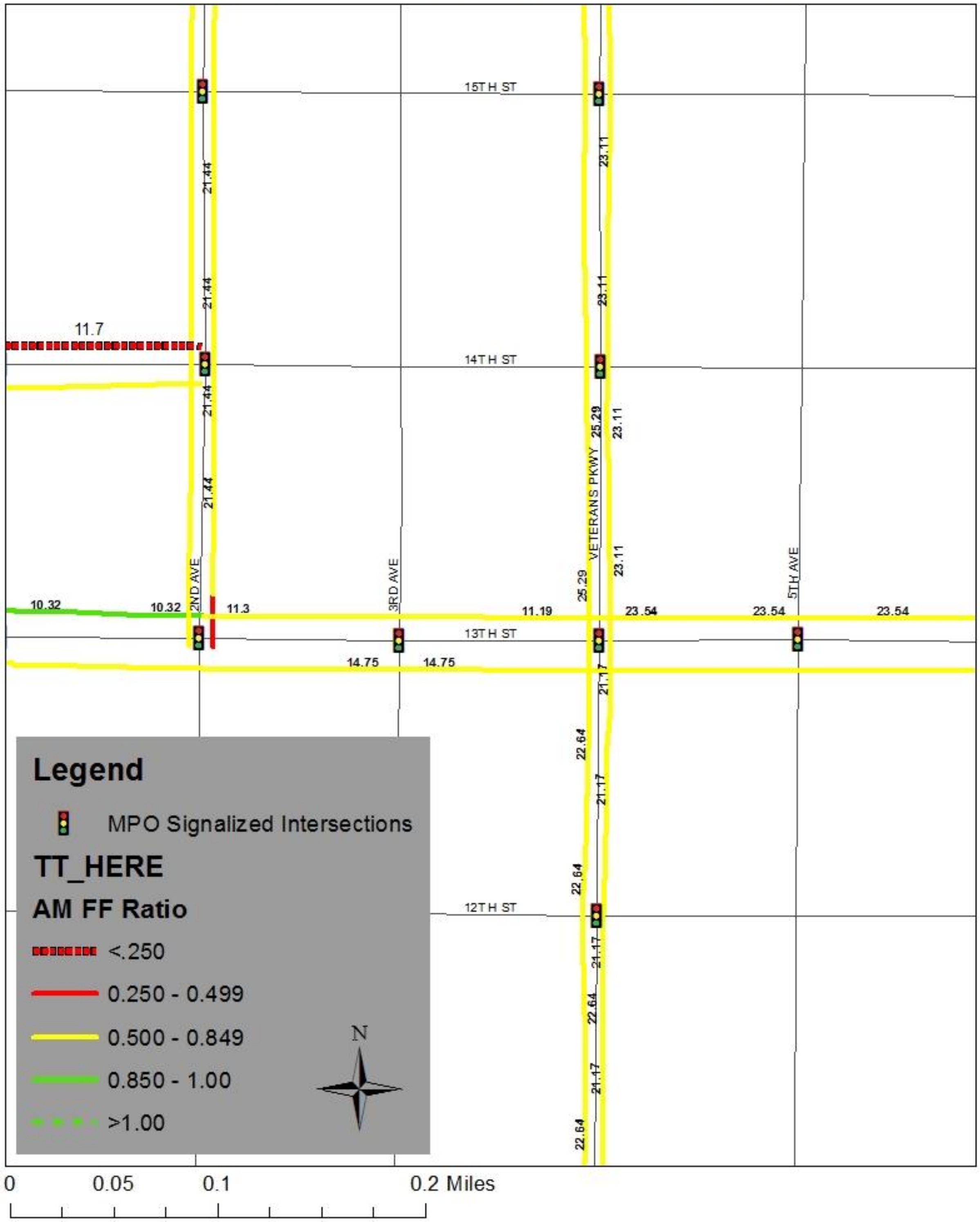


Heavily Congested	1.43 miles	.54%
Mild-Moderately Congested	86.55 miles	32.42%
No Congestion	45.79 miles	17.15%
Negative Delay	133.18 miles	49.89%
Total Network	266.95 miles	100%

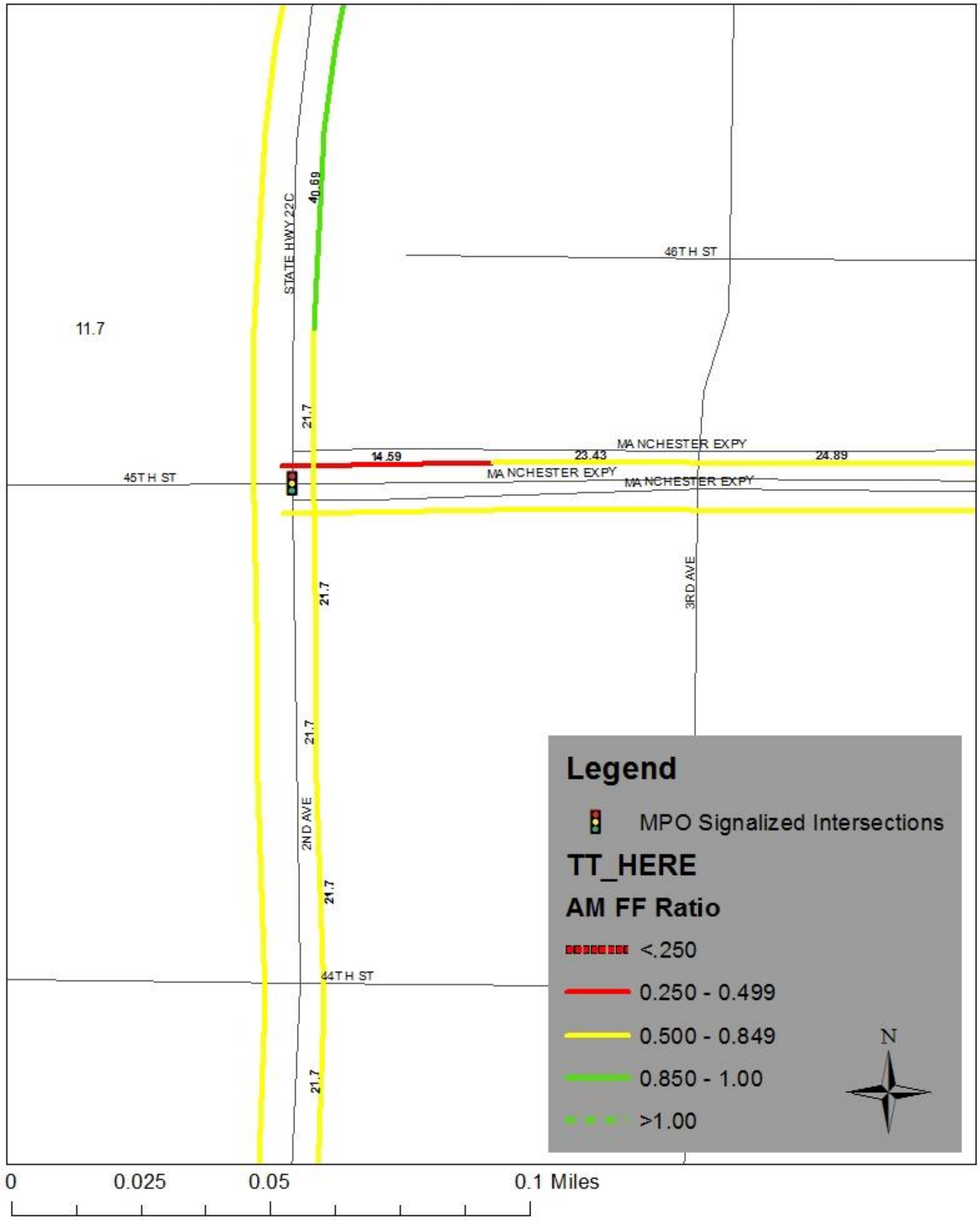
AM Peak - Highway 280 (AL)



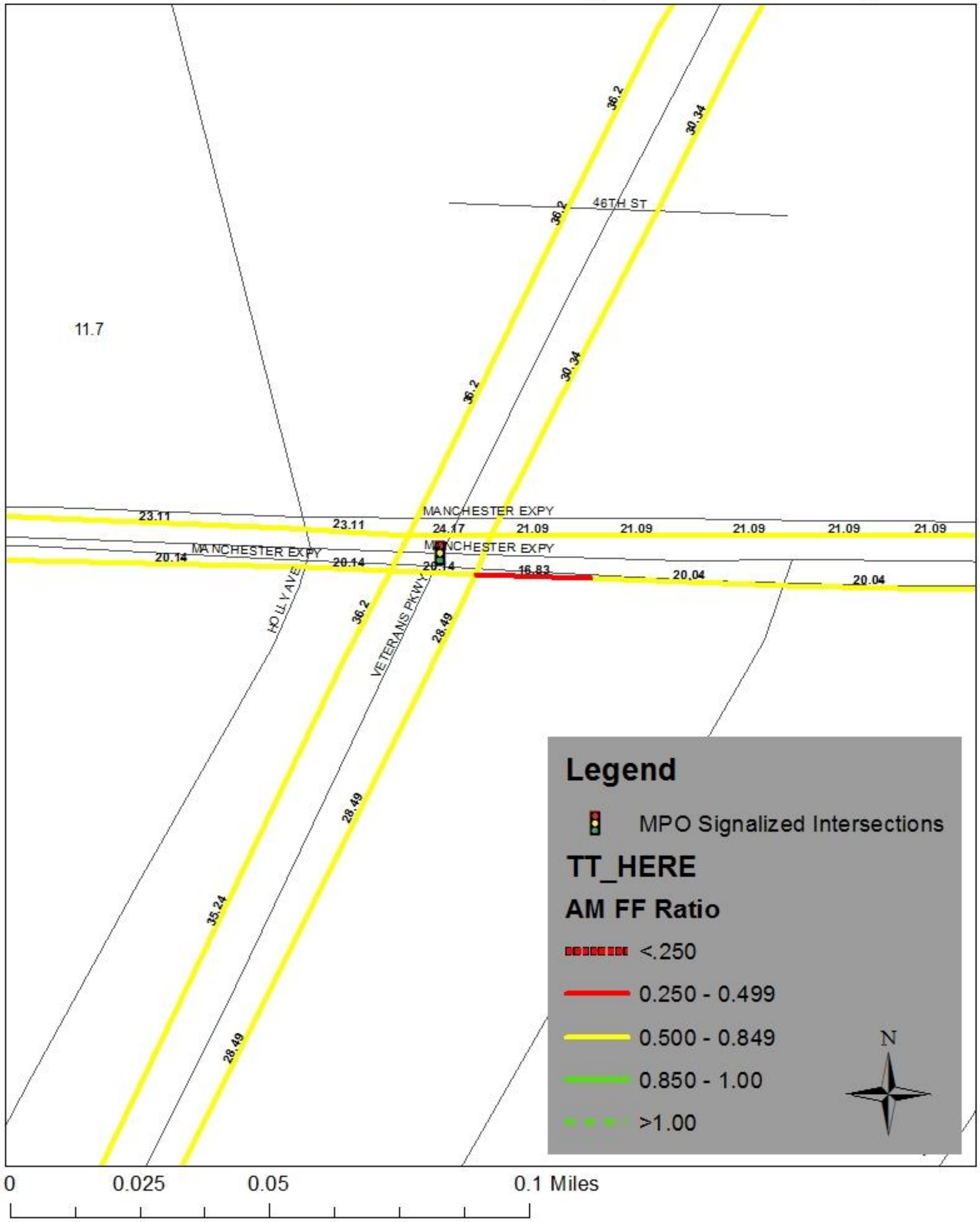
AM Peak - 2nd Avenue / 13th Street



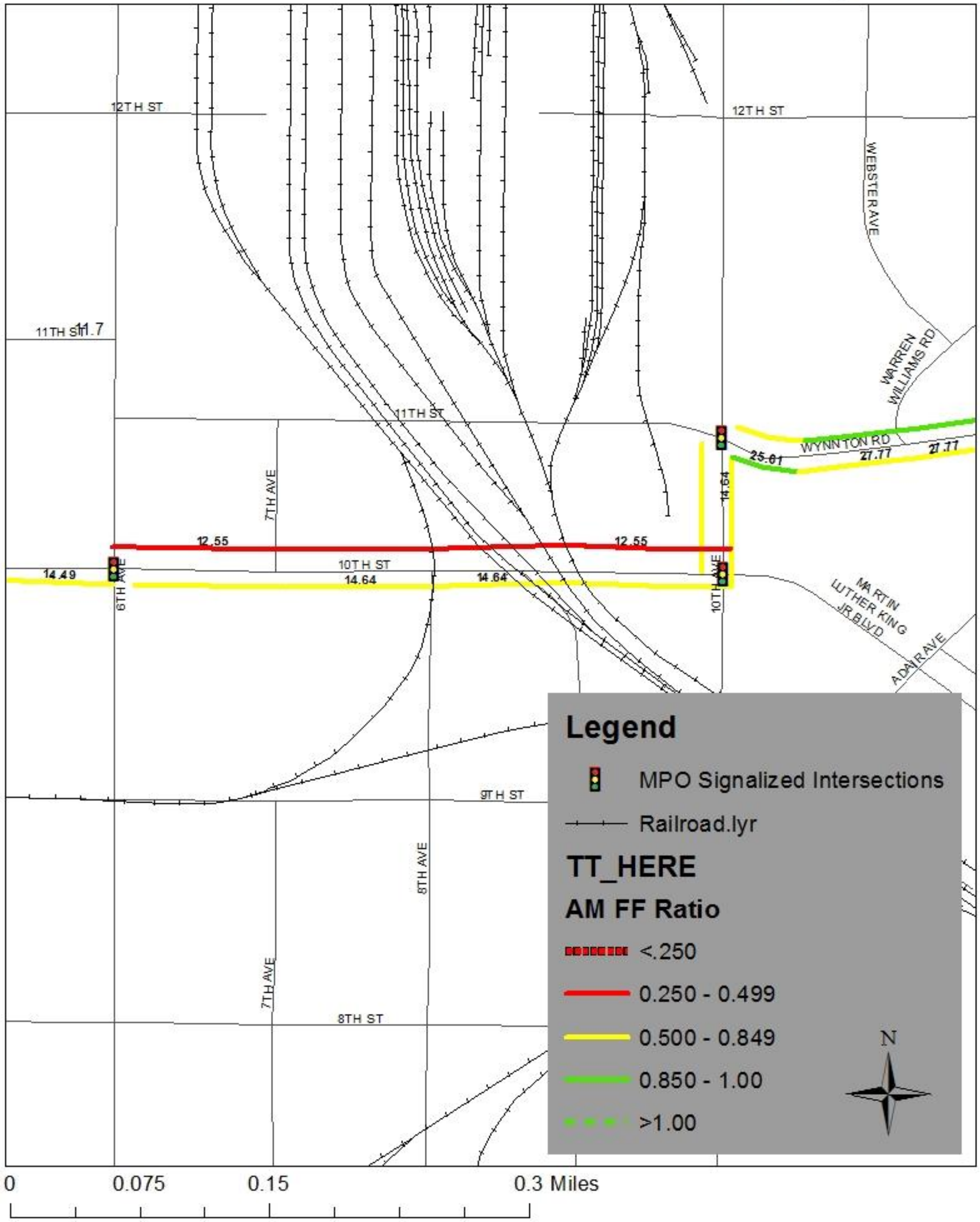
AM Peak - 2nd Avenue / Manchester Expy



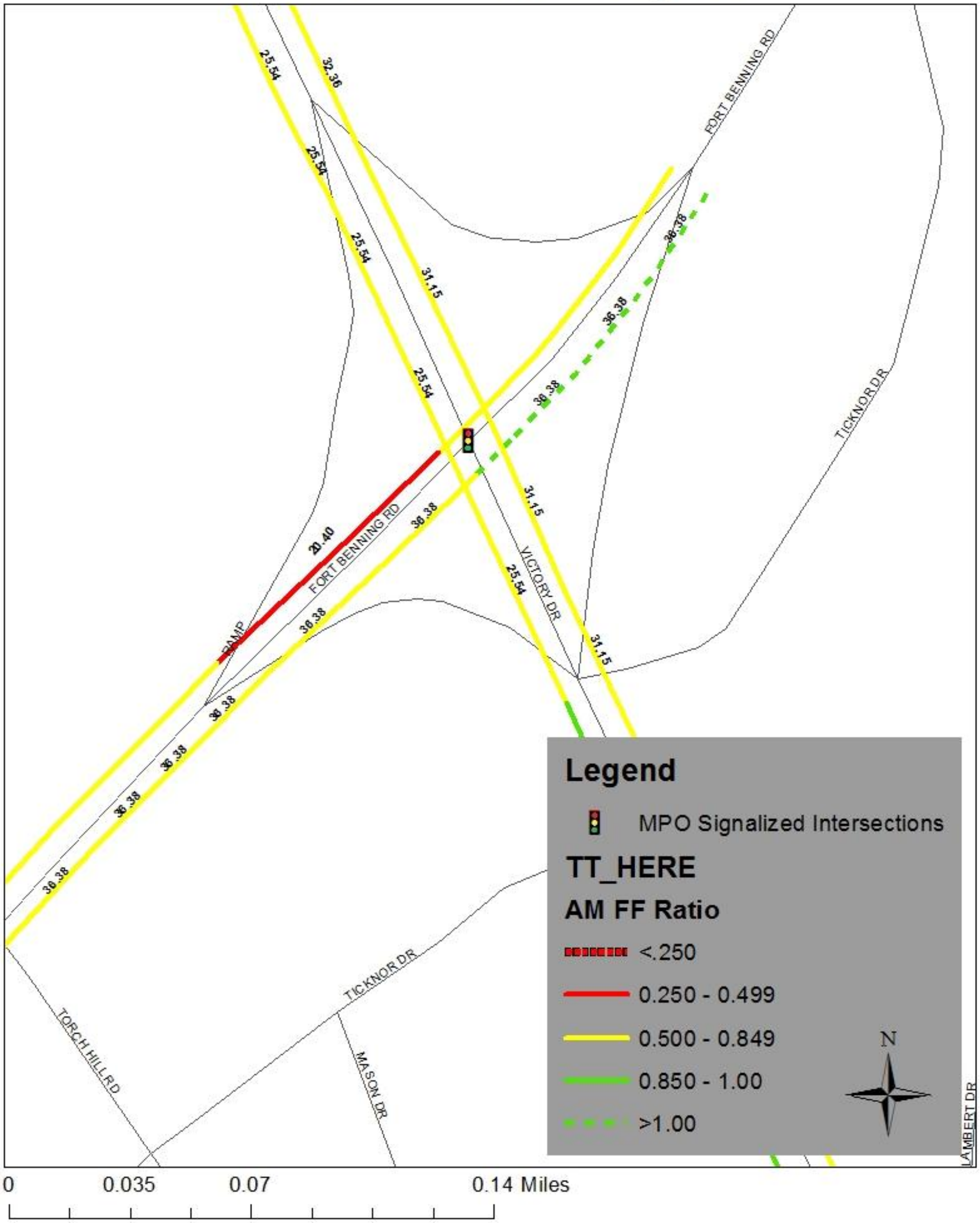
AM Peak - Manchester Expy / Veteran's Pkwy



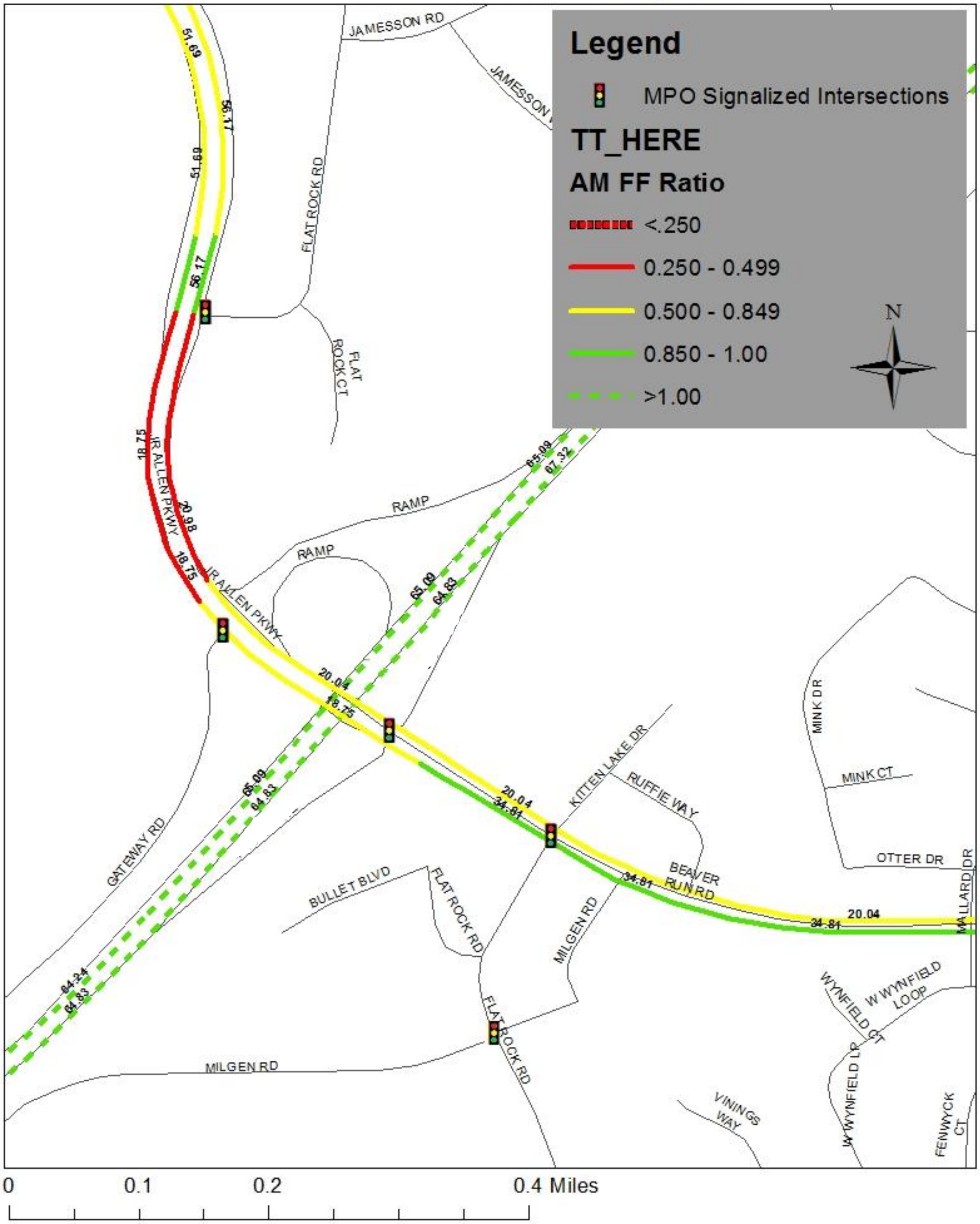
AM Peak - 10th Street, Railroad Crossing



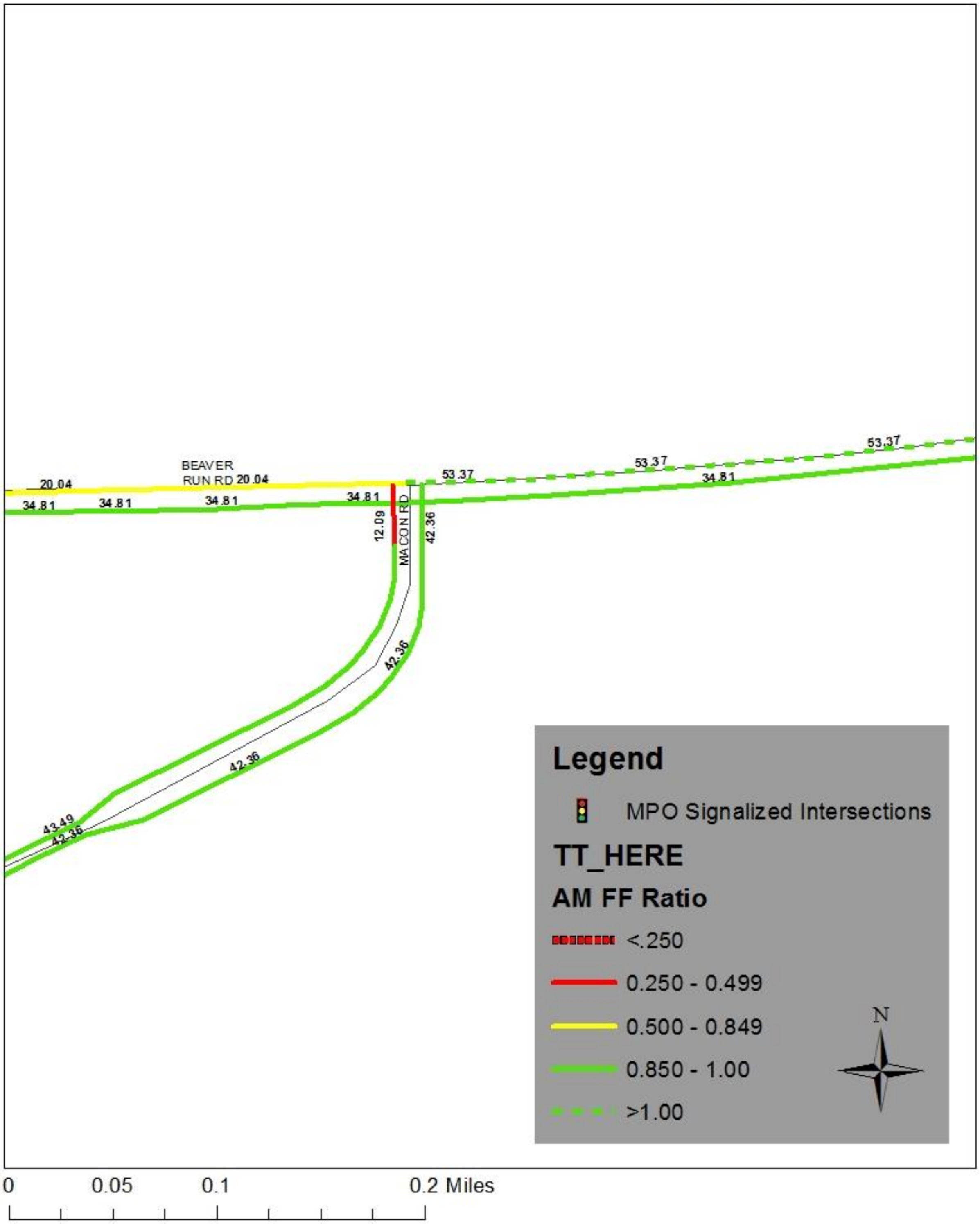
AM Peak - Fort Benning Road



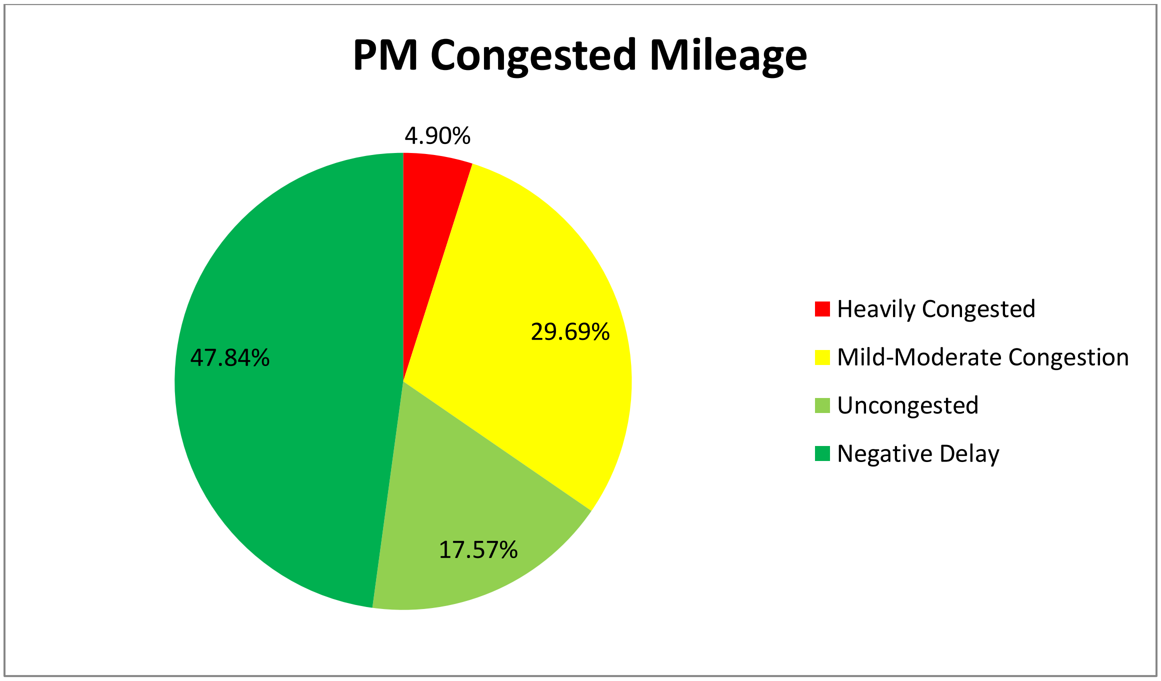
AM Peak - **BEAVER RUN**



AM Peak - Beaver Run / Macon Road

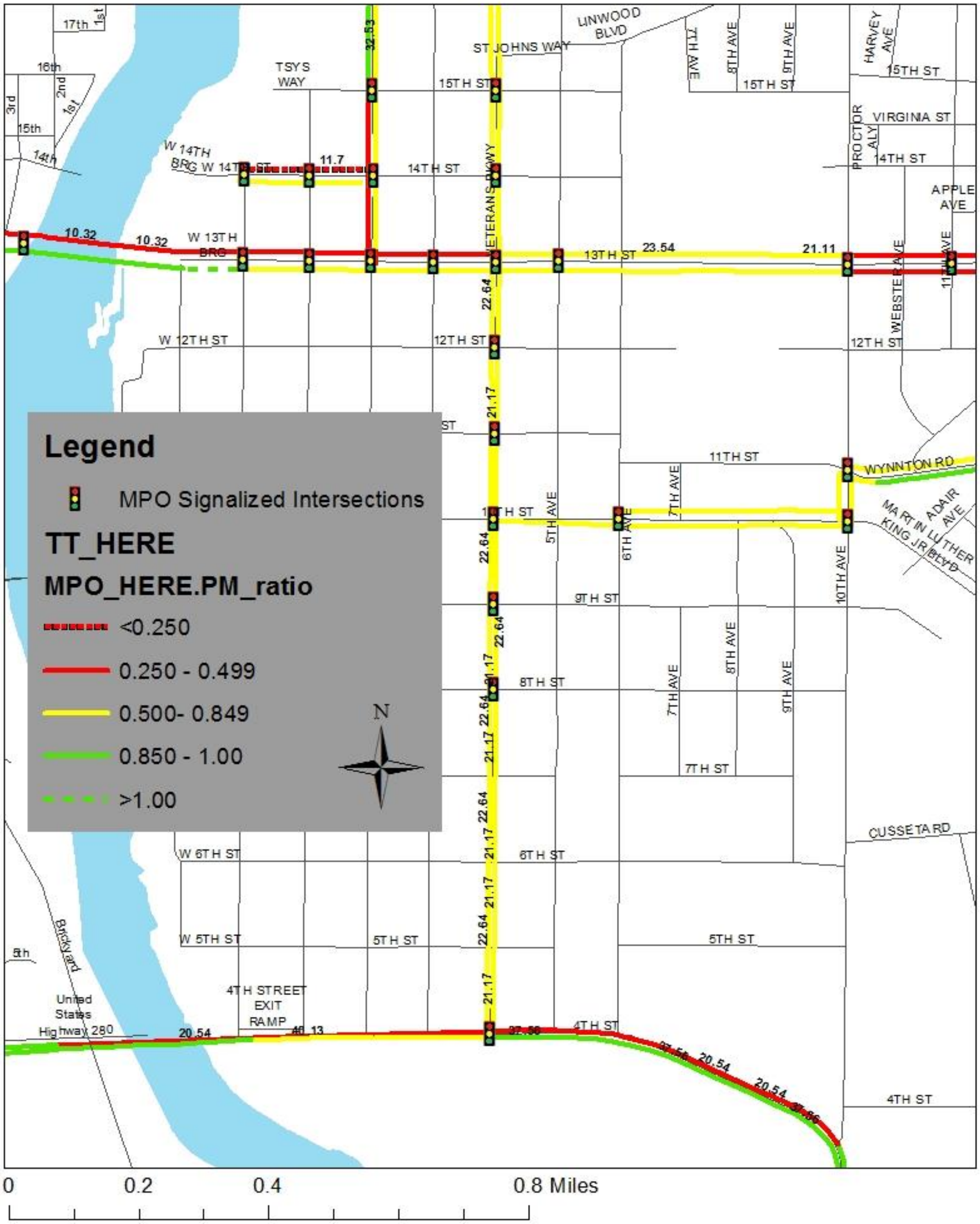


PM Peak 2015 Results

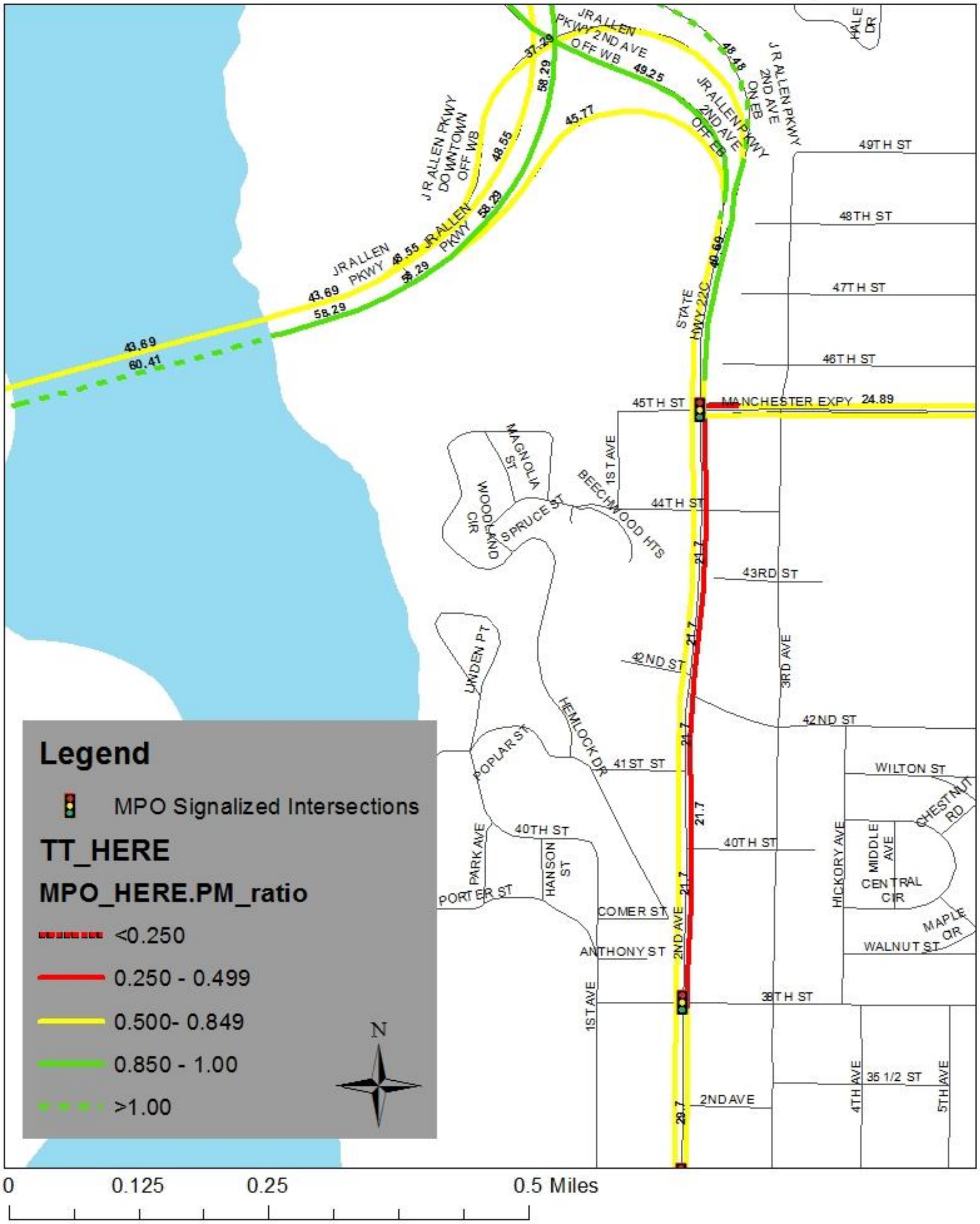


Heavily Congested	13.09 miles	4.9%
Mild-Moderately Congested	79.25 miles	29.69%
No Congestion	46.89 miles	17.57%
Negative Delay	127.72 miles	47.84%
Total Network	266.95 miles	100%

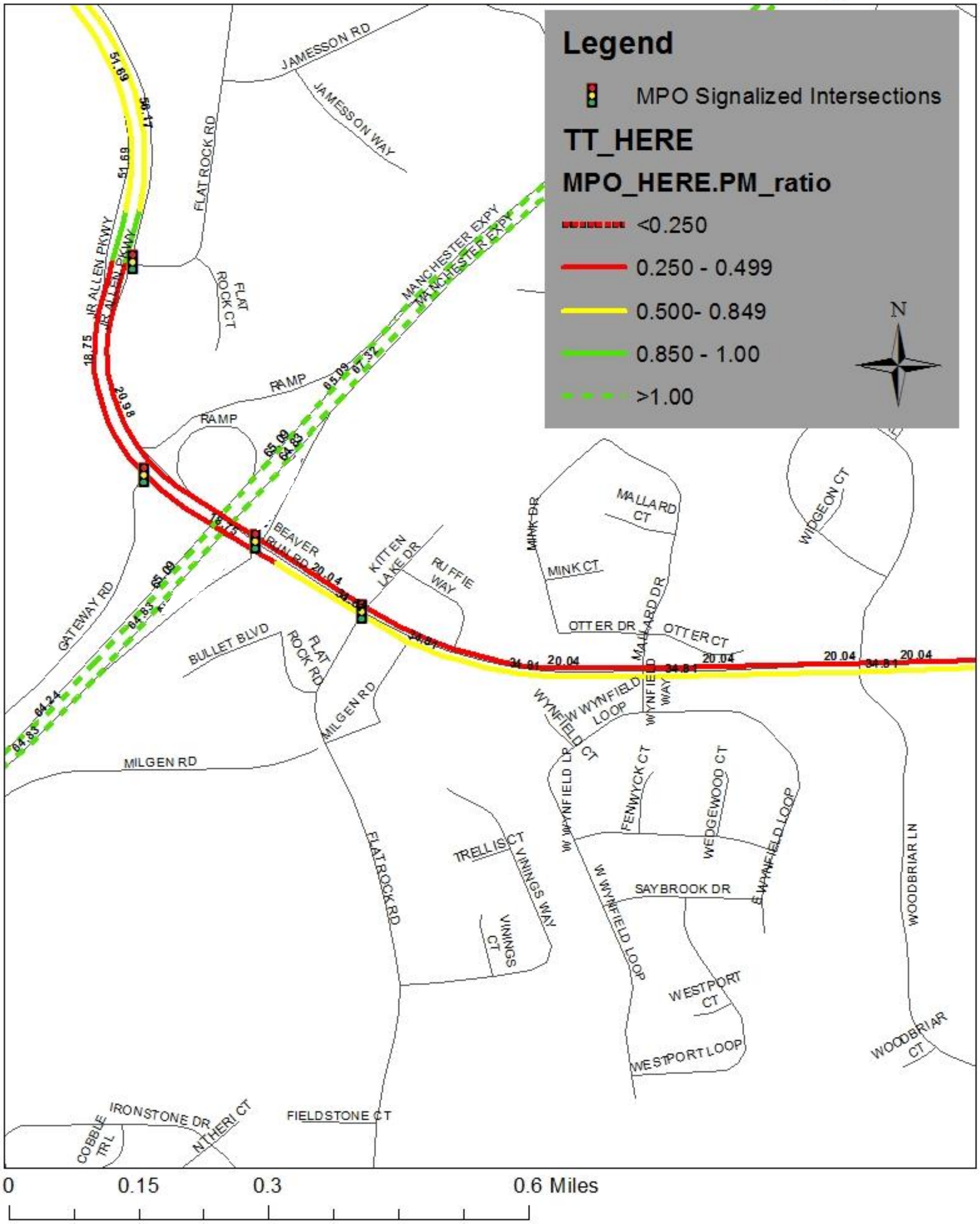
PM Peak - Downtown Columbus



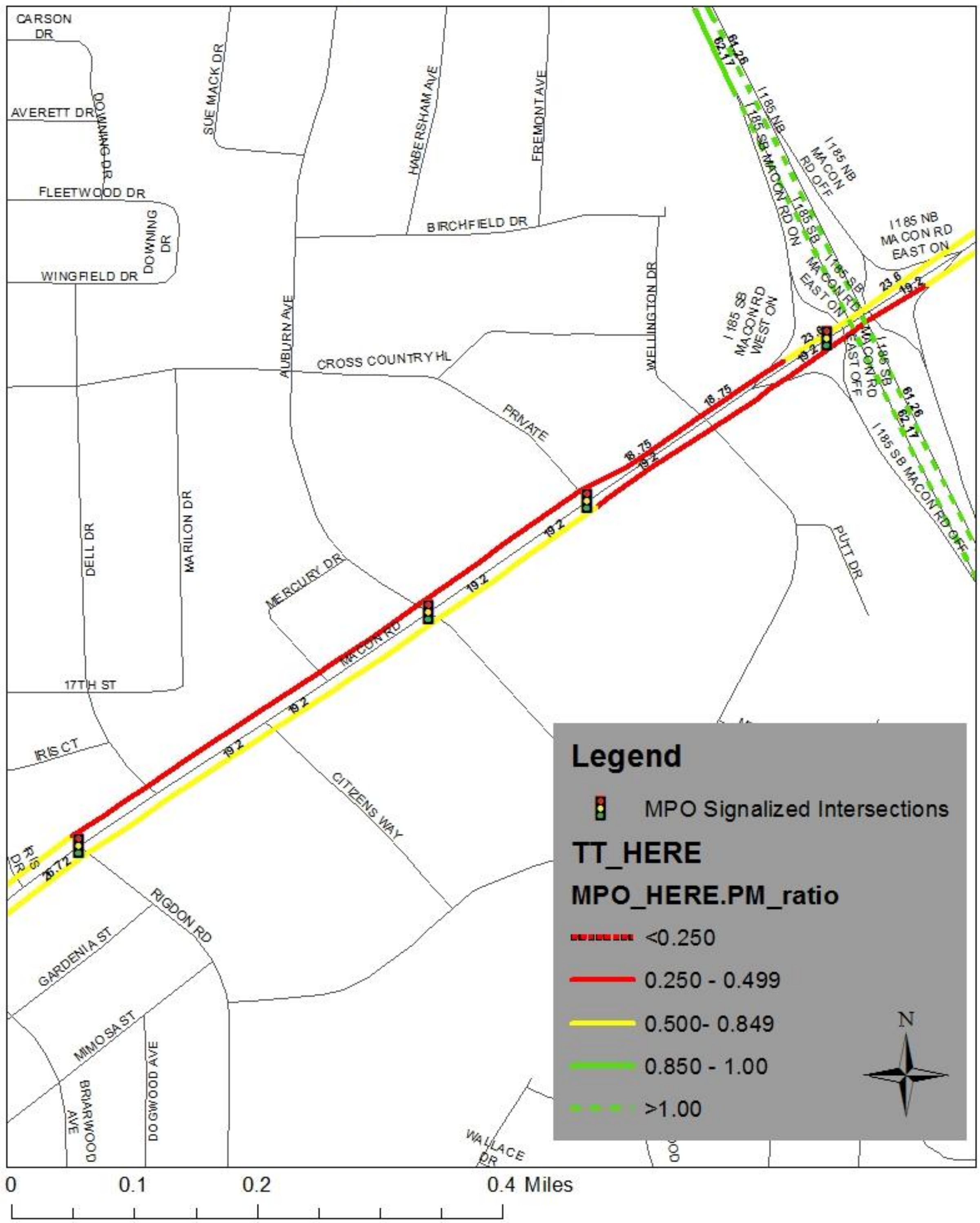
PM Peak - 2nd Ave / Manchester Expy



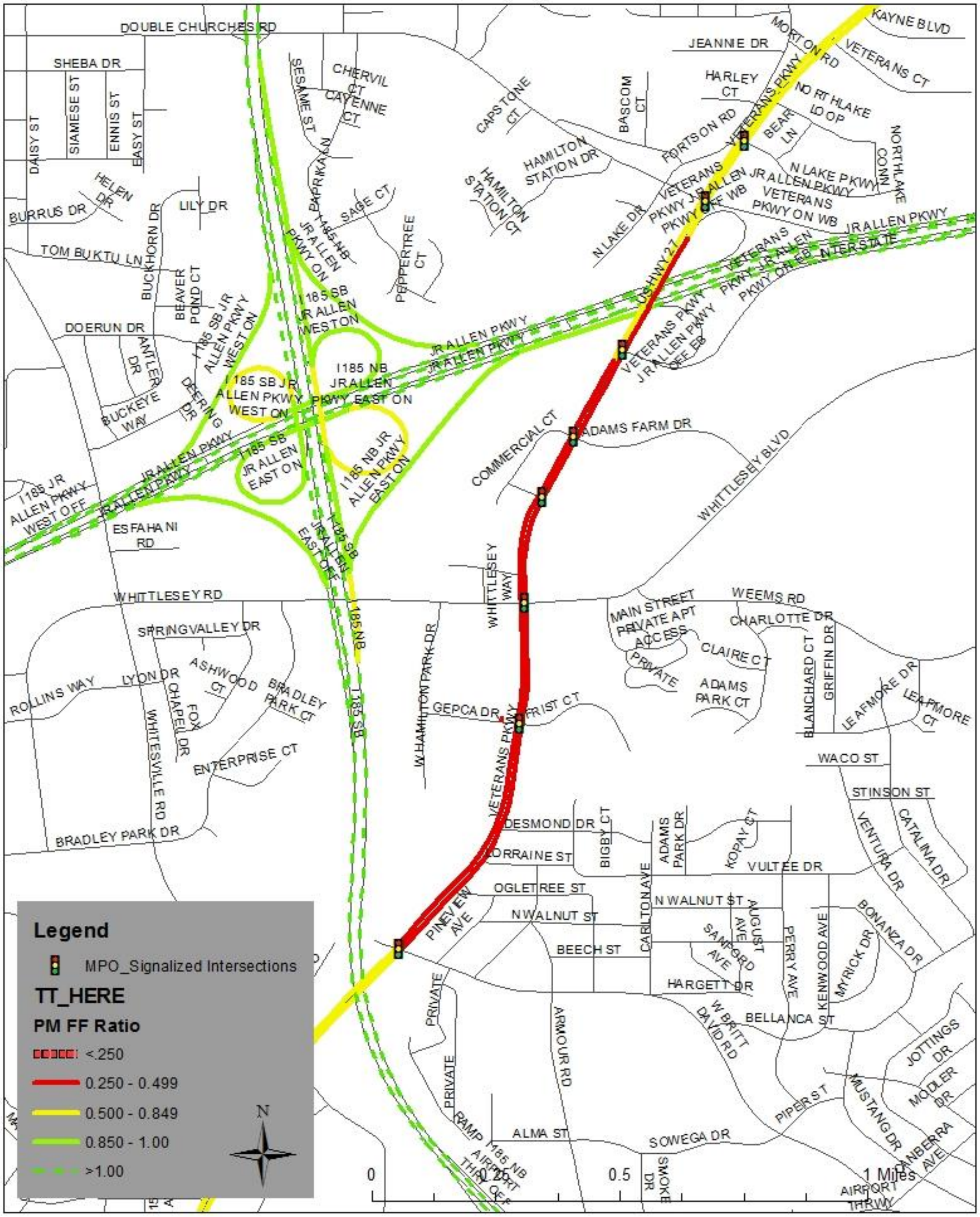
PM Peak - Beaver Run / Manchester Expy

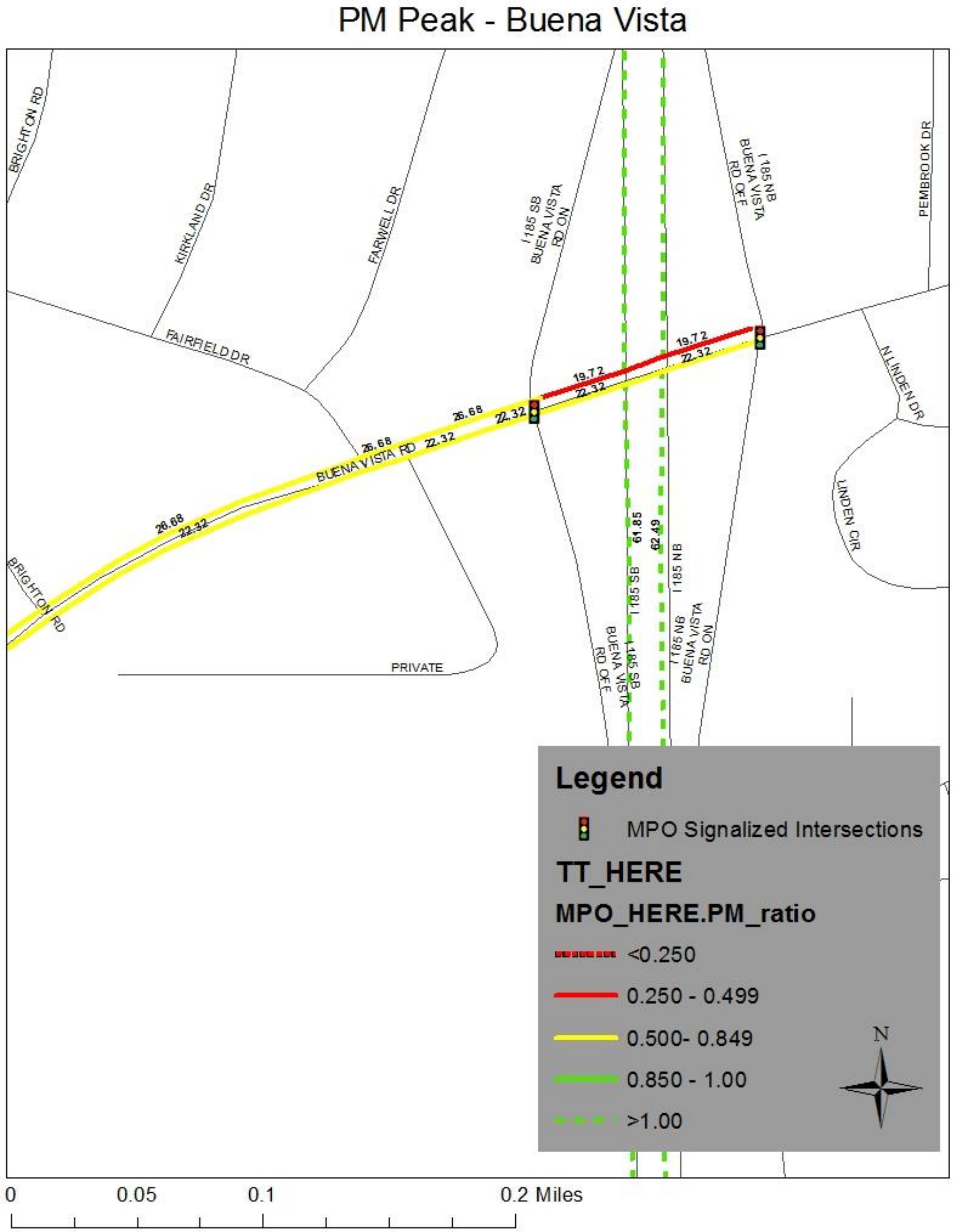


PM Peak - Macon Road



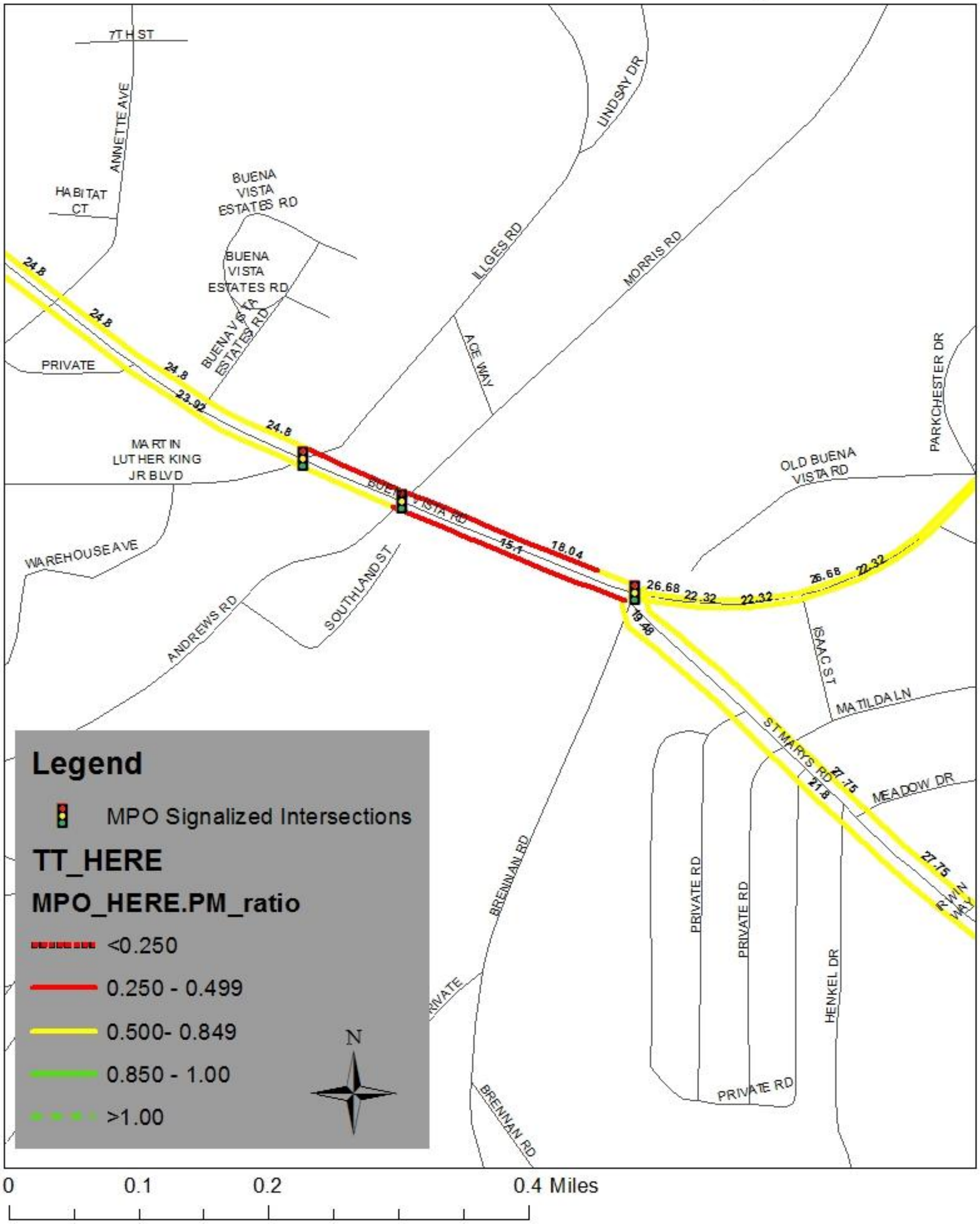
PM Peak - Veterans Pkwy



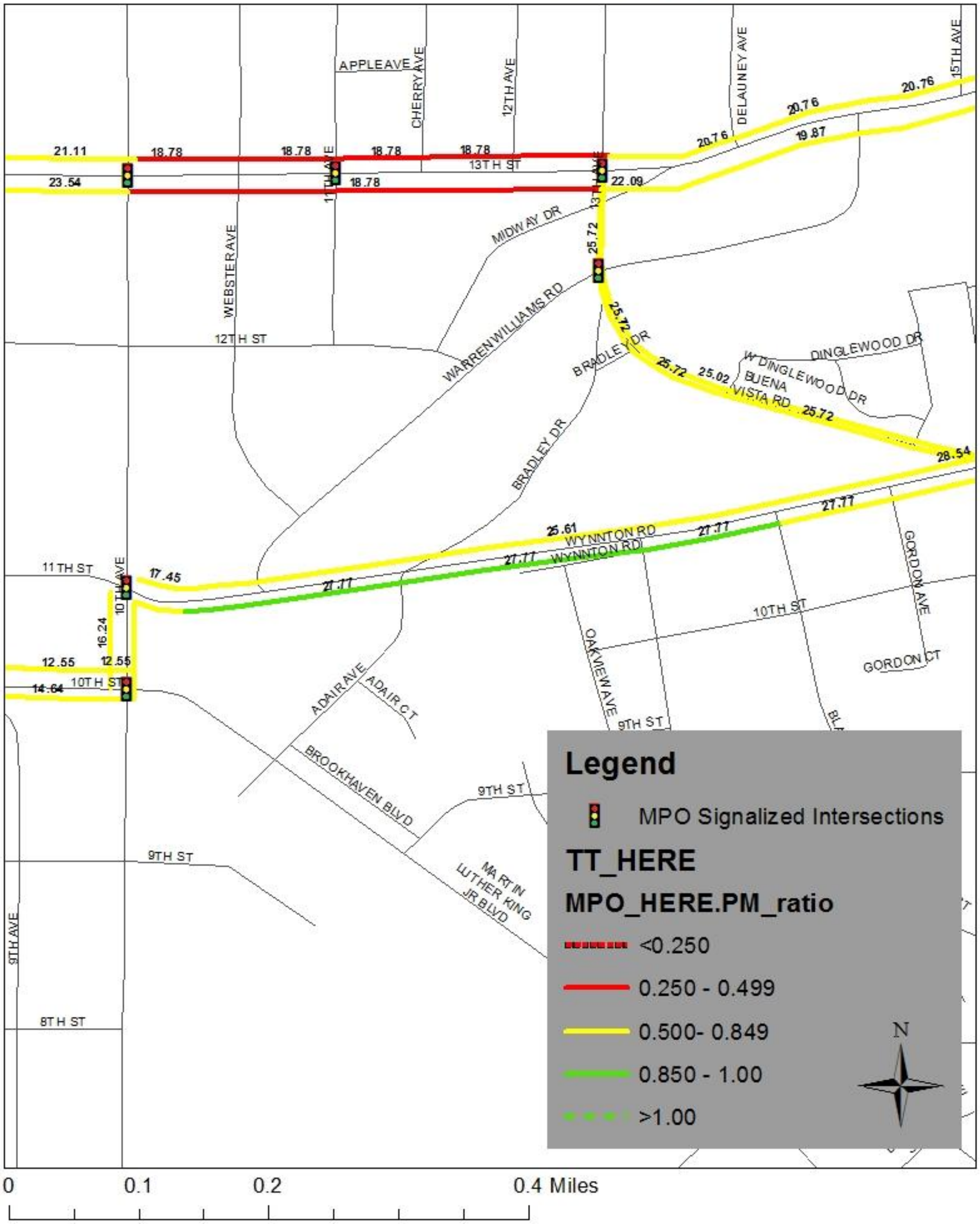


Westbound on Buena Vista Road at the 185 Interchange

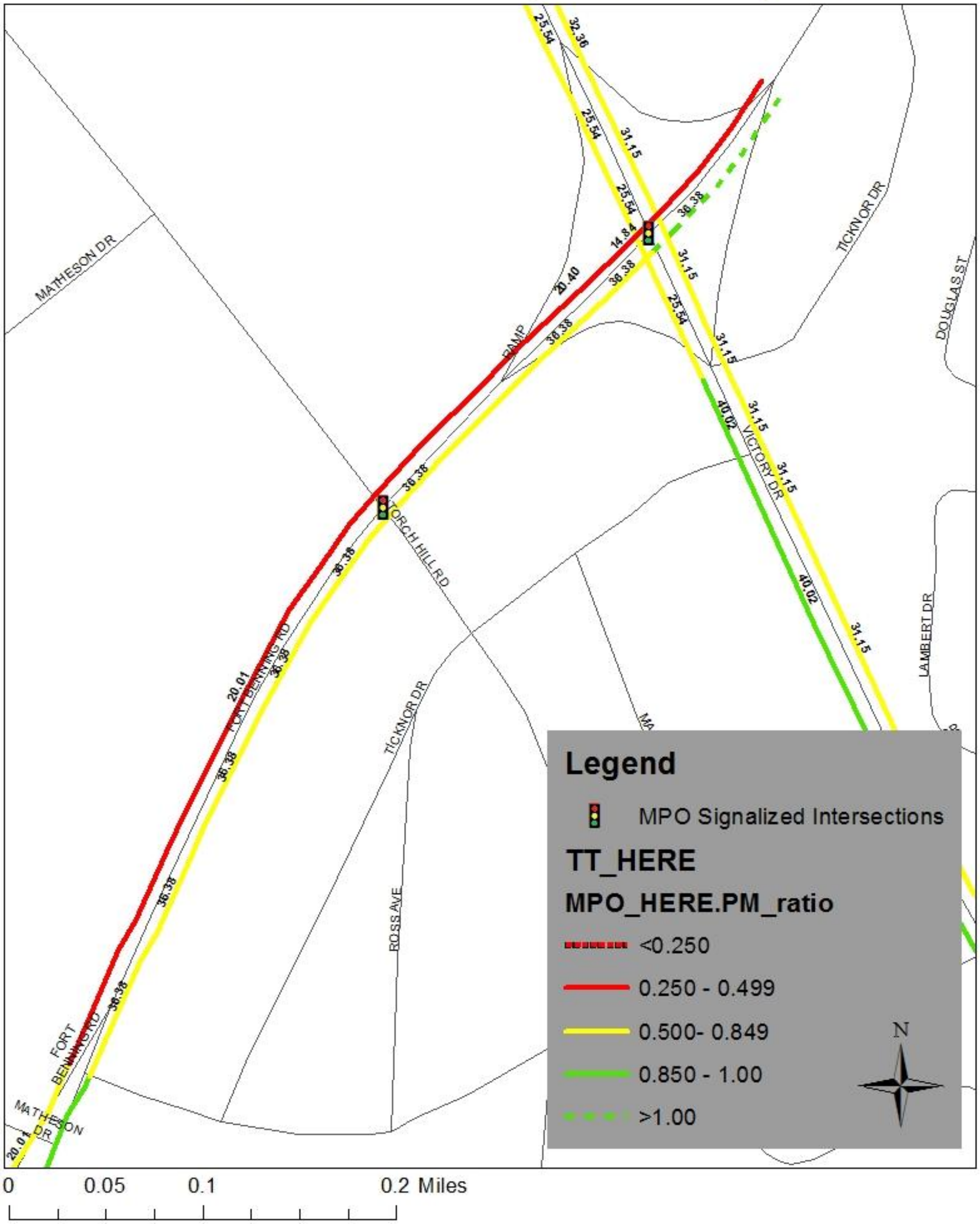
PM Peak - Buena Vista / St. Mary's

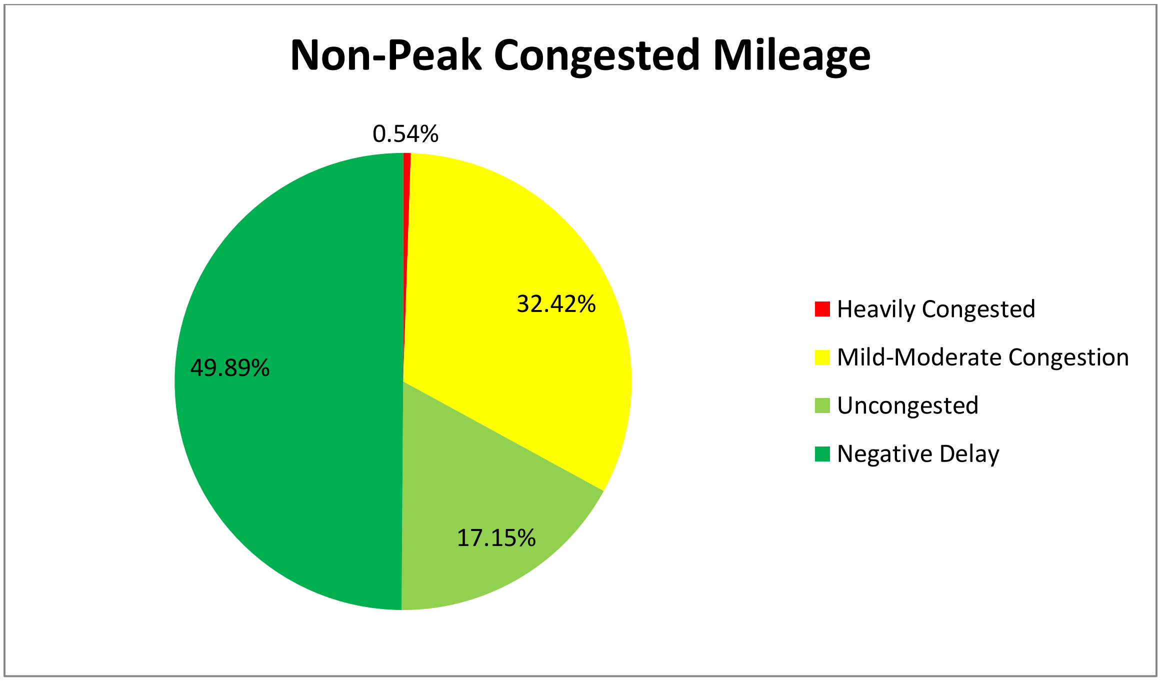


PM Peak - 13th Street / Buena Vista



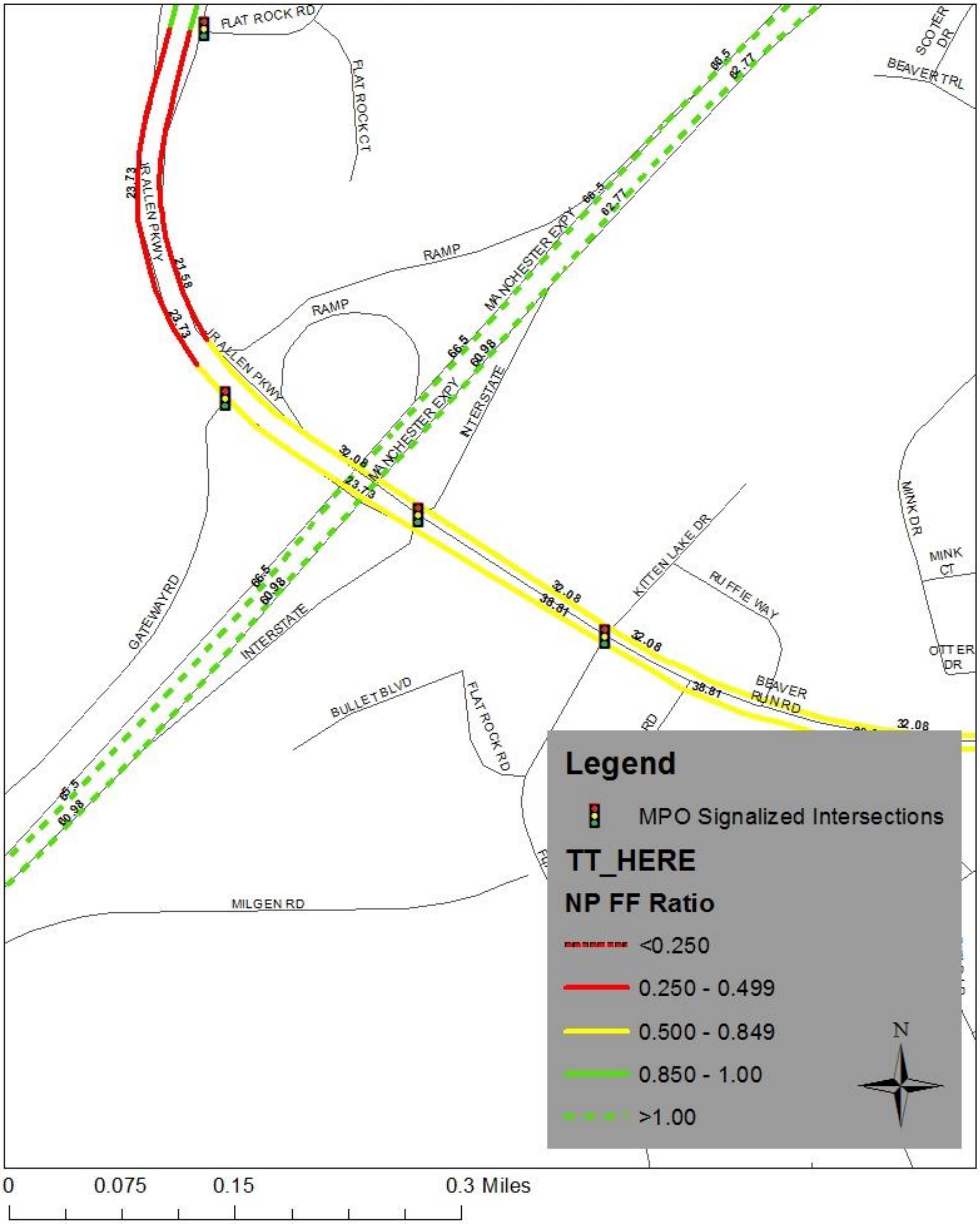
PM Peak - Fort Benning Road / Victory Drive



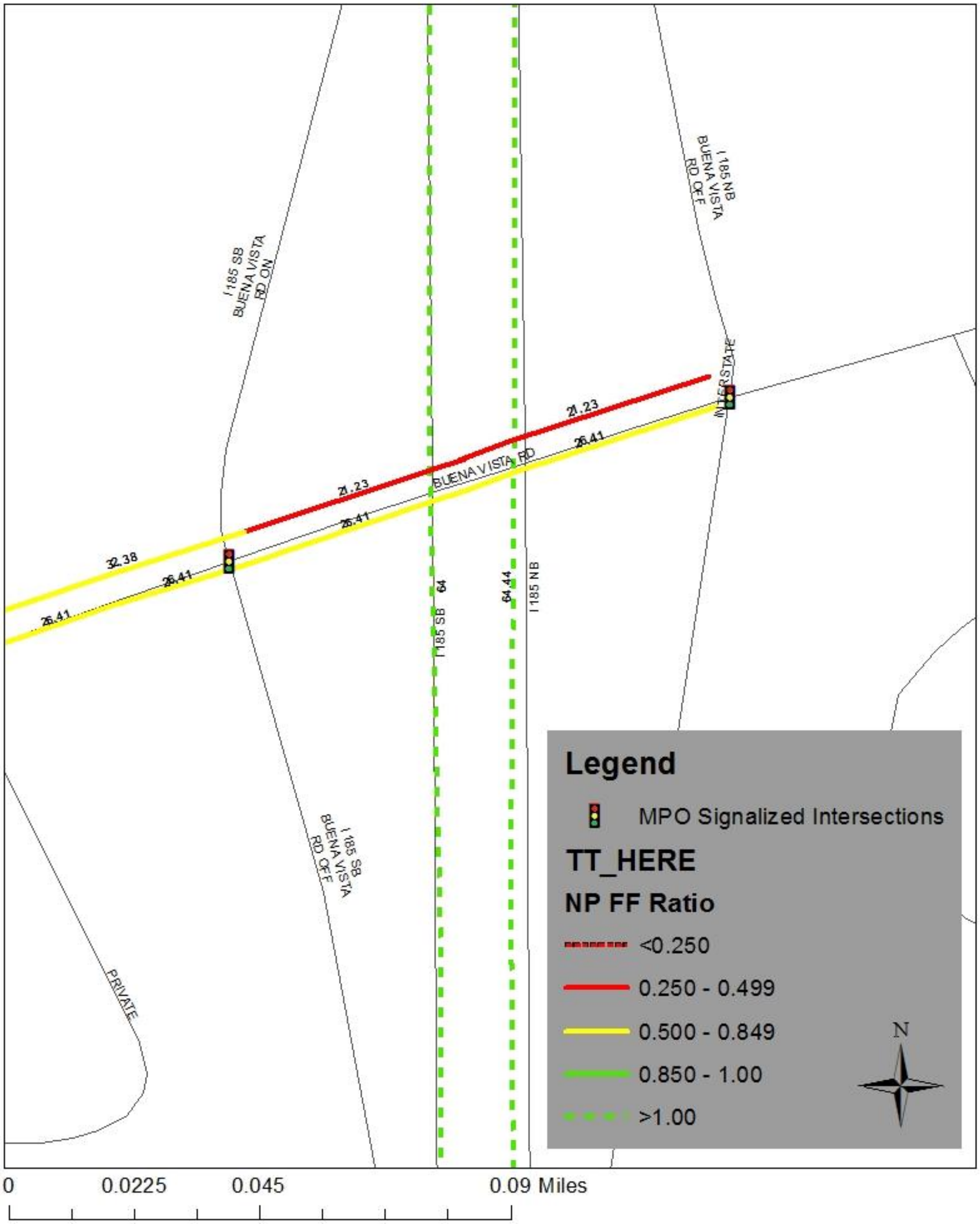


Heavily Congested	1.43 miles	.54%
Mild-Moderately Congested	86.55 miles	32.42%
No Congestion	45.79 miles	17.15%
Negative Delay	133.18 miles	49.89%
Total Network	266.95 miles	100%

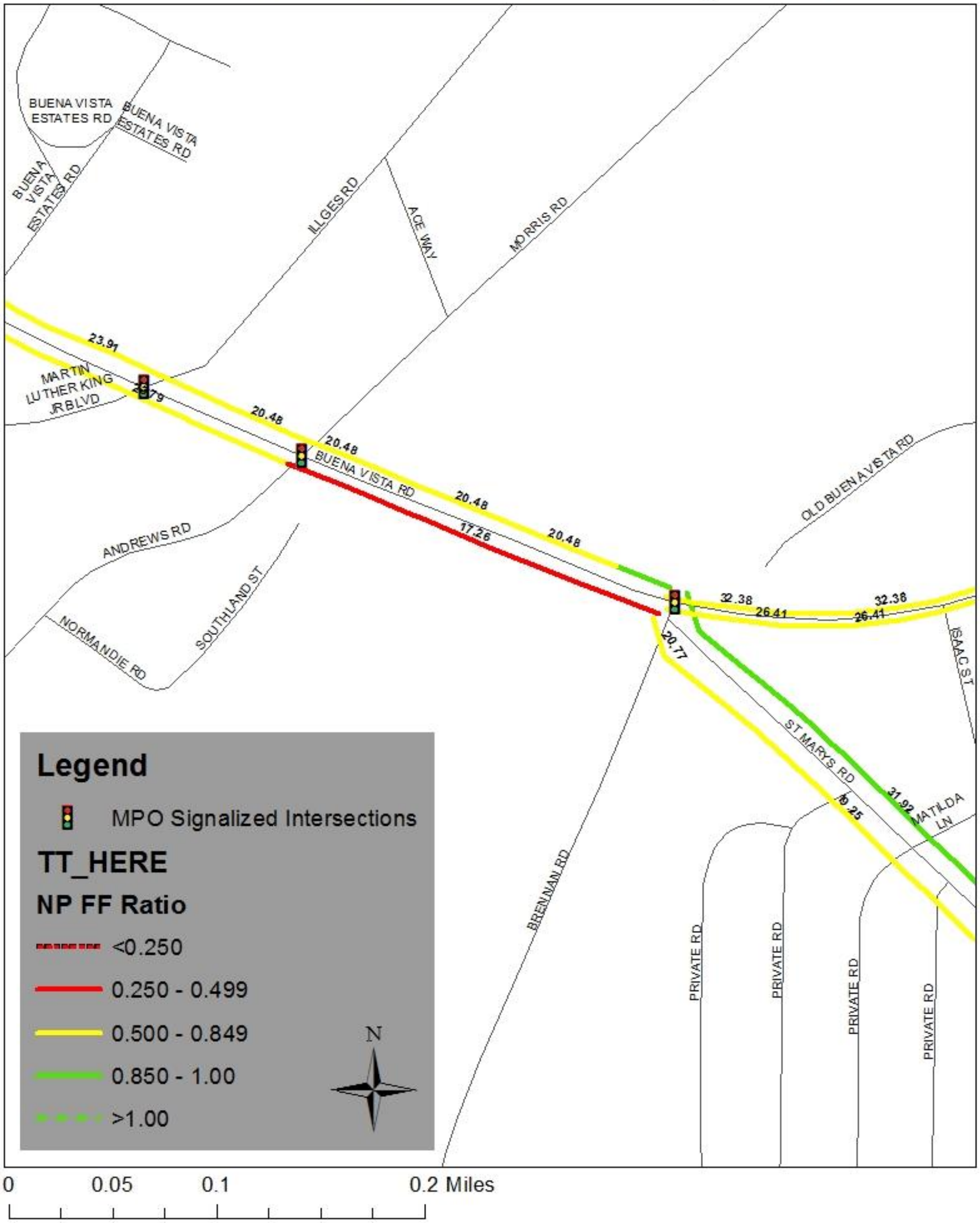
Non-Peak - Beaver Run / Manchester Expy



Non-Peak Buena Vista Road



Non-Peak Buena Vista / St. Mary's Road

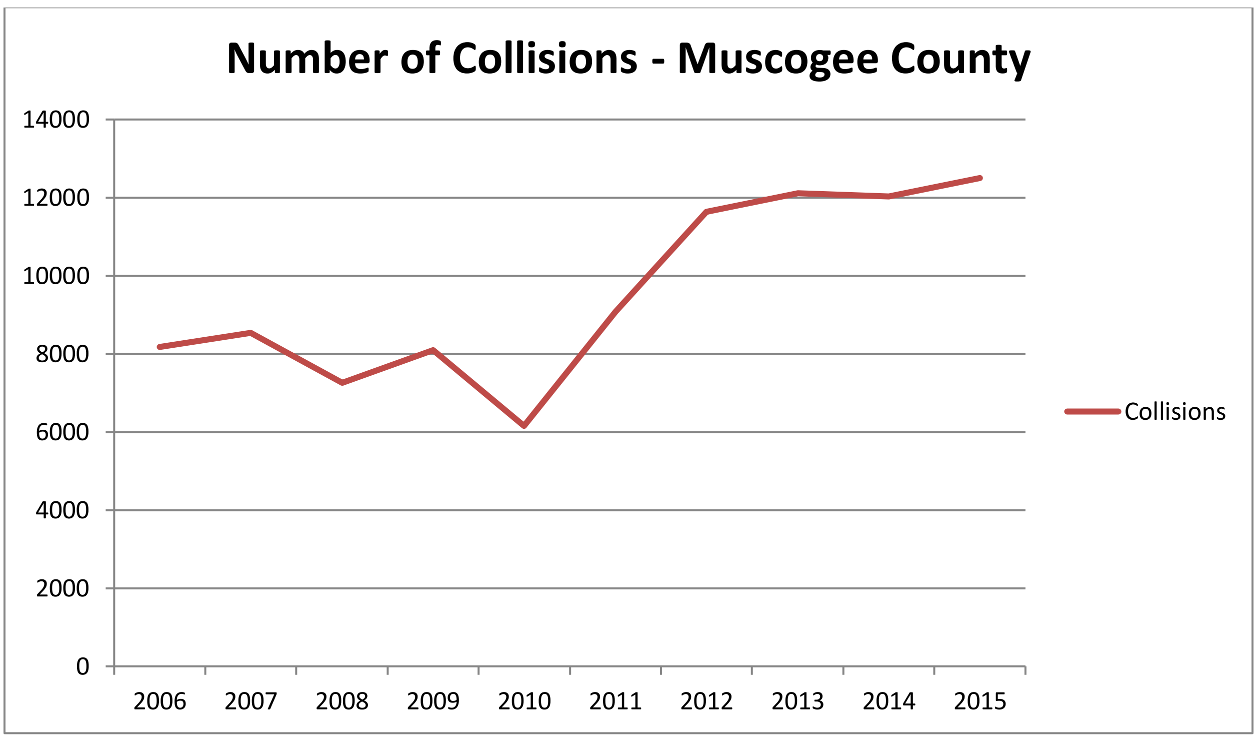


CHAPTER 7

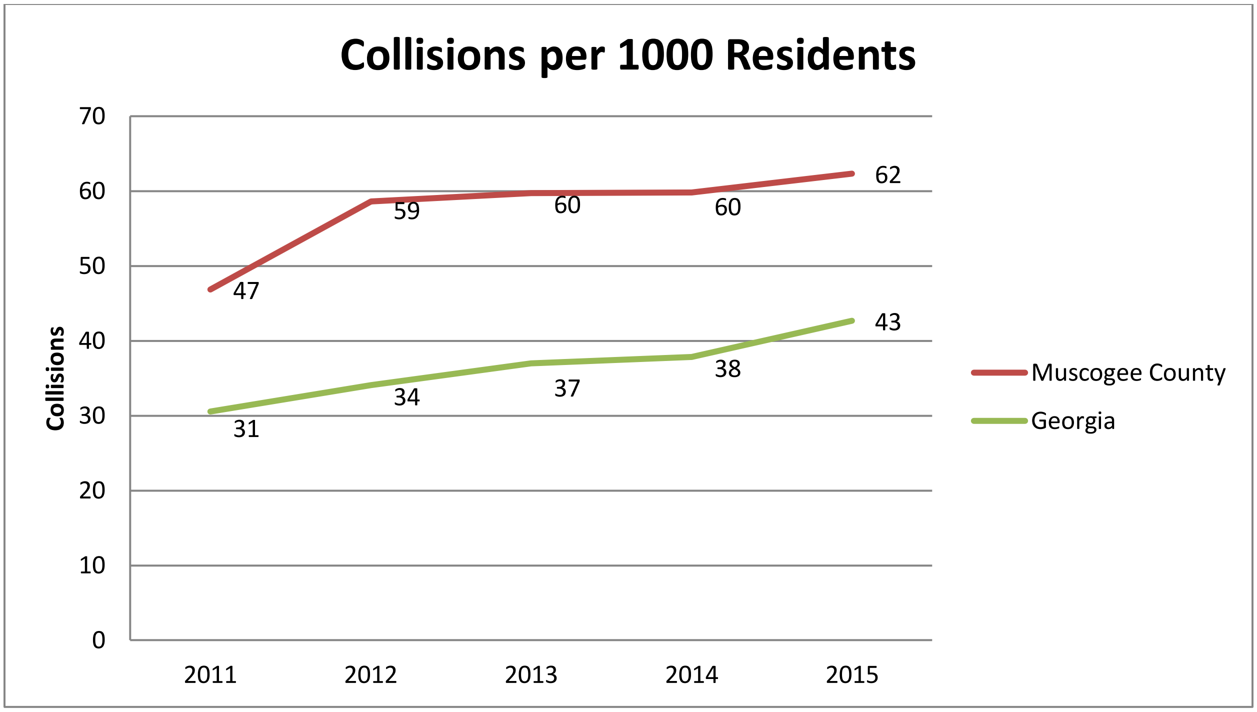
TRAFFIC COLLISION DATA

Georgia Traffic Collision Data

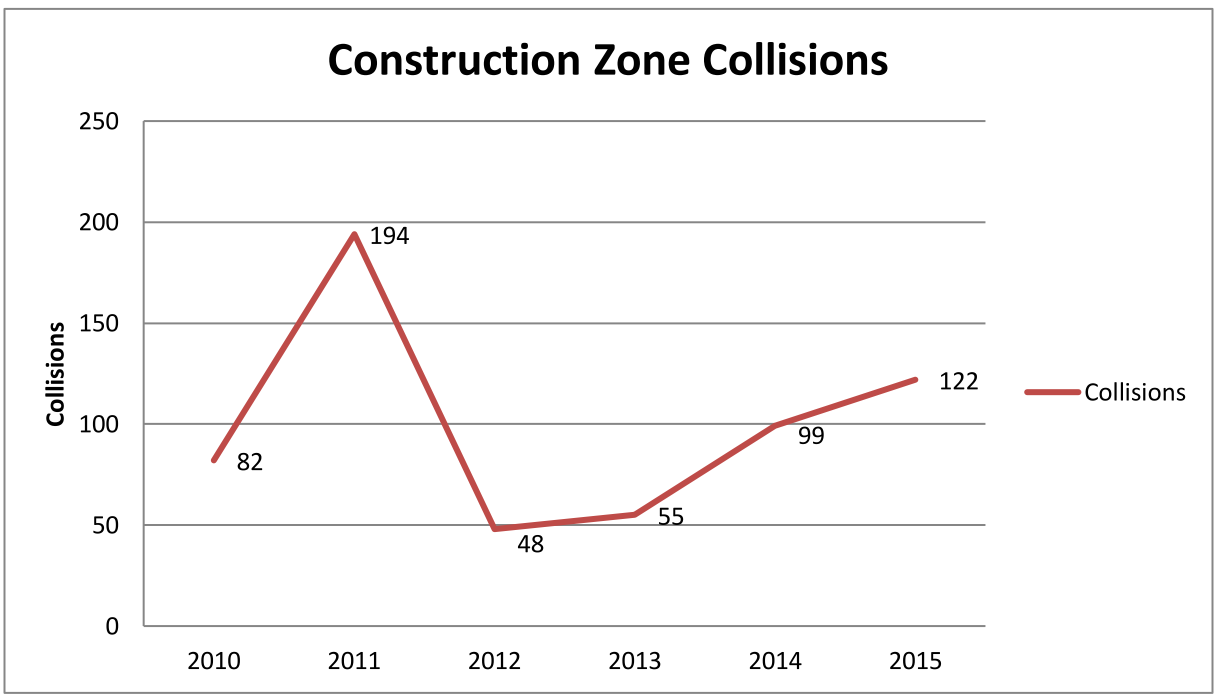
By analyzing traffic collision trends and locations, the MPO can target areas where traffic collisions may be contributing to congestion and travel time delay during peak times. Reflecting national trends, the PM peak hours hold the greatest percentage of collisions through the 24-hour day. Higher traffic volumes and congestion itself can increase collision rates during this time period, particularly rear end collisions. After locating the highest incident prone areas, an analysis of time of collision and type of collision will be conducted to determine the role and severity these collisions are having on congestion, if any.



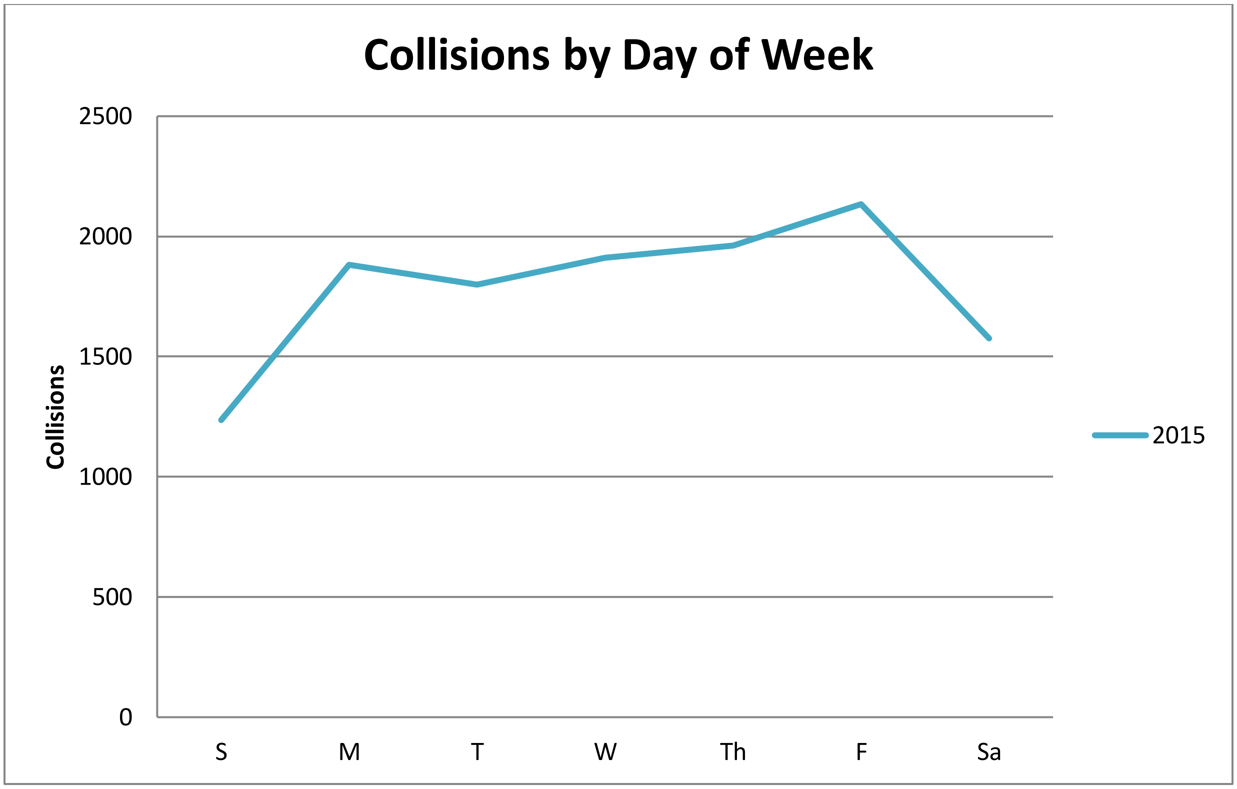
Source: Georgia Electronic Accident Reporting System (GEARS)



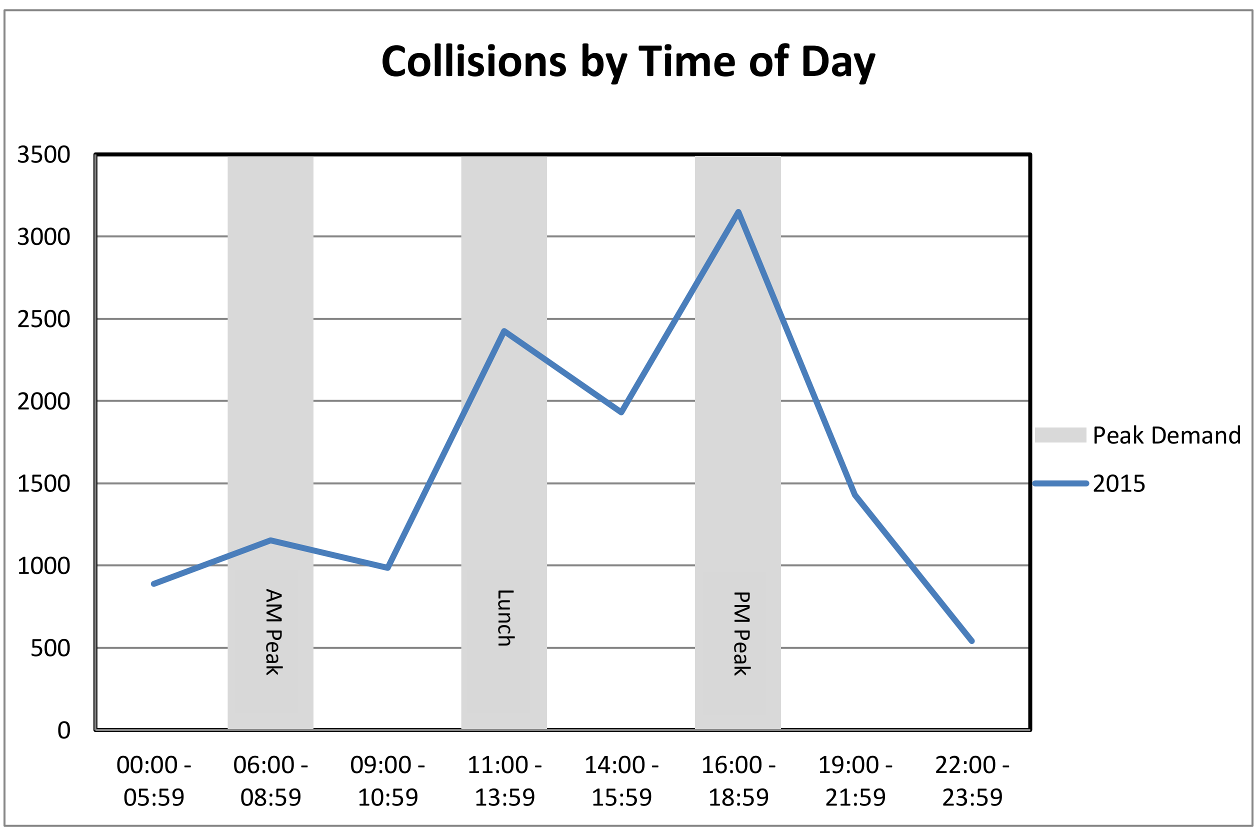
Source: GEARS, American Community Survey 5 Year Estimates



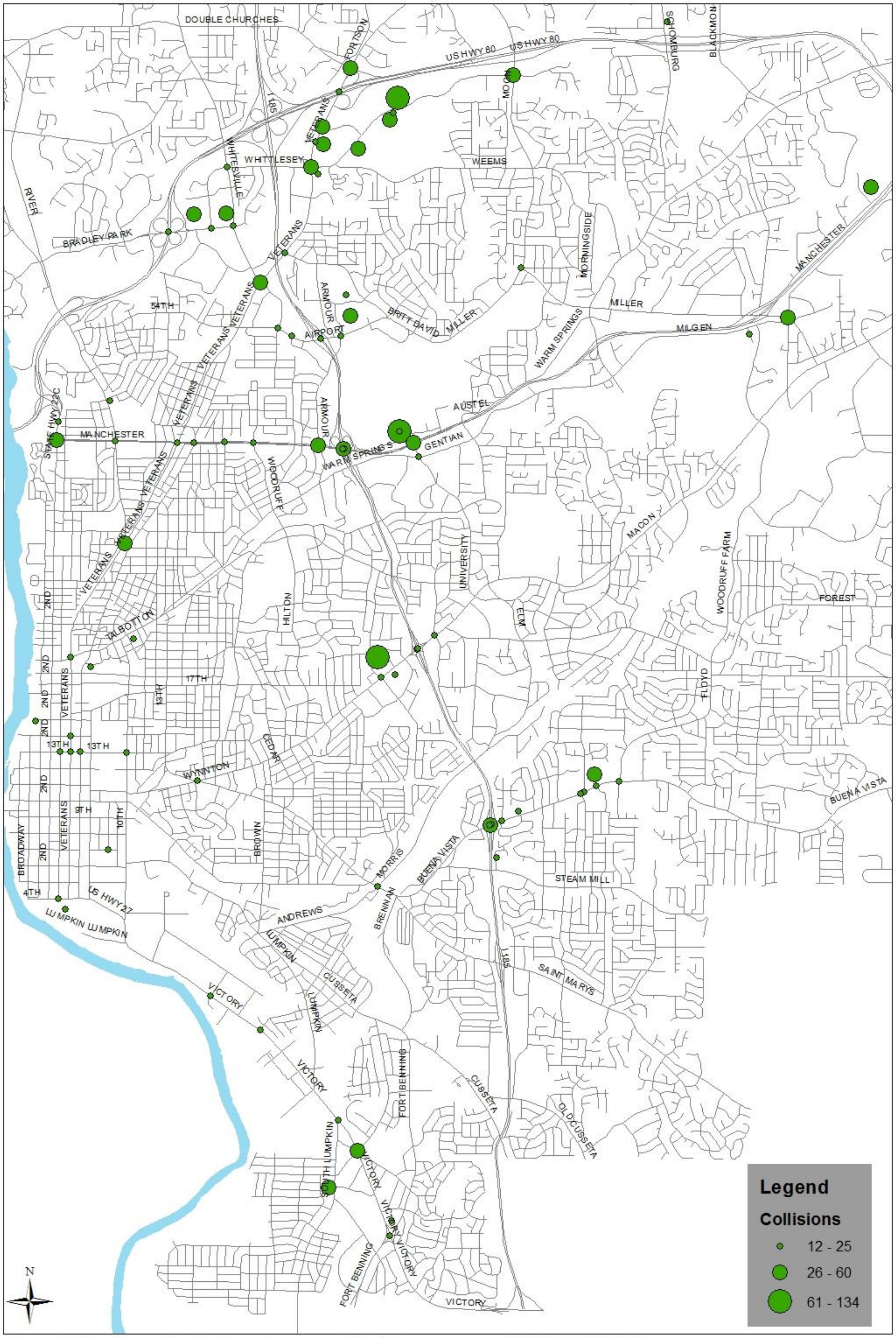
Source: GEARS



Collisions by Day of Week
2500
2000
1500
1000
500
0
Collisions
S
M
T
W
Th
F
Sa
2015



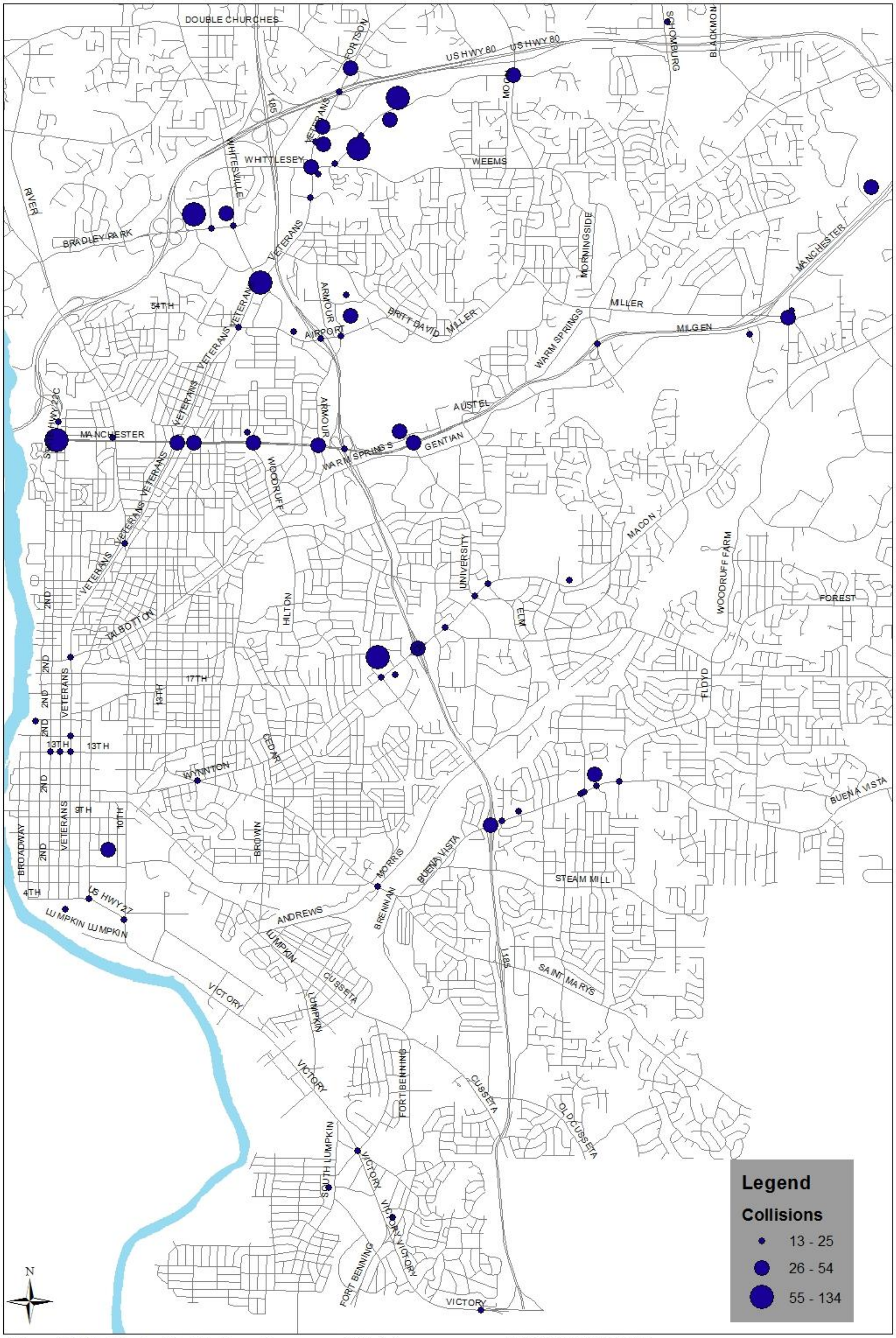
Collisions by Time of Day
3500
3000
2500
2000
1500
1000
500
0
AM Peak
Lunch
PM Peak
00:00 - 05:59
06:00 - 08:59
09:00 - 10:59
11:00 - 13:59
14:00 - 15:59
16:00 - 18:59
19:00 - 21:59
22:00 - 23:59
Peak Demand
2015



Top 100 High Collision Areas - 2013

0 0.5 1 2 Miles

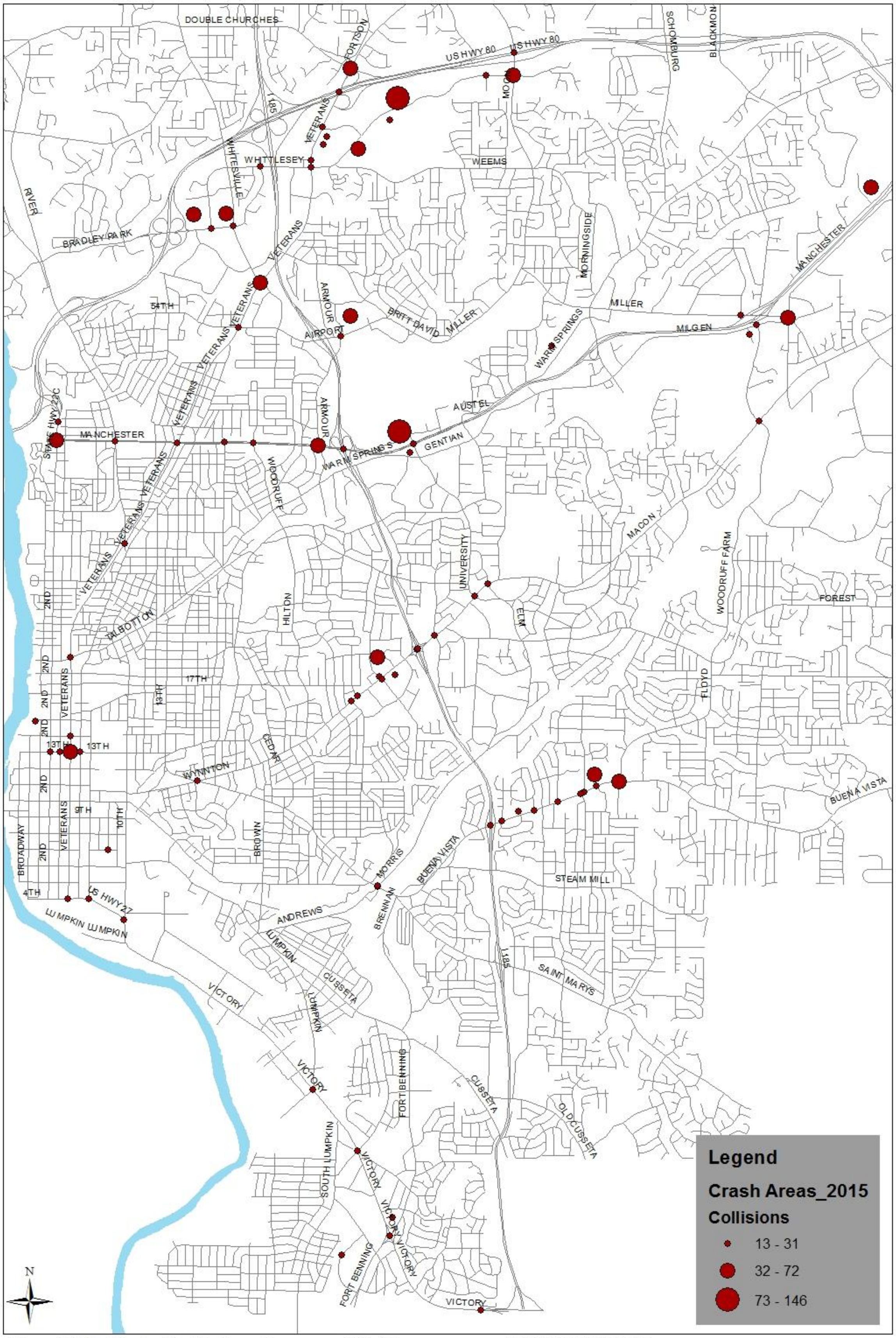
Map created by Logan Kipp
Date: 4/29/2016
Data Source: GEARS
For informational purposes only



Top 100 High Collision Areas - 2014

0 0.5 1 2 Miles

Map created by Logan Kipp
Date: 4/29/2016
Data Source: GEARS
For informational purposes only



Top 100 High Collision Areas - 2015

0 0.5 1 2 Miles

Map created by Logan Kipp
Date: 4/29/2016
Data Source: GEARS
For informational purposes only

Alabama Traffic Collision Data

It is the policy of the Alabama Department of Transportation and its partners not to publicly release data pertaining to traffic collisions. However, the MPO considers collision data in its prioritization of projects including how traffic collisions may pertain to congestion and travel time delay. For more information regarding the Alabama Department of Transportation policy on collision and accident reporting data, please refer to the Federal Driver Privacy Protection Act (Public Law 103-322) and Alabama State law.

CHAPTER 8

BICYCLE AND PEDESTRIAN DATA

Data Collection

The C-PCMPO partnered with computer engineering students from Auburn University to develop Fountain City Cycling, a mobile app for android and iOS operating devices. The app is a reboot of CycleTracks developed by San Francisco County Transportation Authority and later adopted by Atlanta Regional Commission as Cycle Atlanta. The data collected from the app is the C-PCMPO's primary source of data about cyclists and travel times. While the app may have some self selection bias in that it is primarily used by experienced cyclists who are cycling for exercise or recreation, it still proves to be a useful tool for determining if cyclists are experiencing delays along multi-use trails and other bicycle infrastructure. Below are the comments the MPO received from cyclists using the app's Note feature which allows users to submit a note or issue with a geo-referenced location.

1. Linwood Boulevard at 10th Avenue bicycle detection box seems to not be triggering
2. The lights at 14th St and 2nd Ave are not well timed
3. Wynnton Rd and 13th St need a bicycle detection box
4. The Fall Line Trace has debris and trash on it
5. There are no curb cuts on 1st Avenue when trying to get back onto the Riverwalk

Find the full report here: http://www.columbusga.org/Planning/FCC/pdfs/FCCreport.pdf

The C-PCMPO does not currently collect data about pedestrian travel times. That said, the C-PCMPO does have a Complete Streets policy, adds ADA compliant sidewalks and trails, and adds pedestrian crosswalk and signal phases where warranted.

CHAPTER 9

TRANSIT TRAVEL TIME DATA

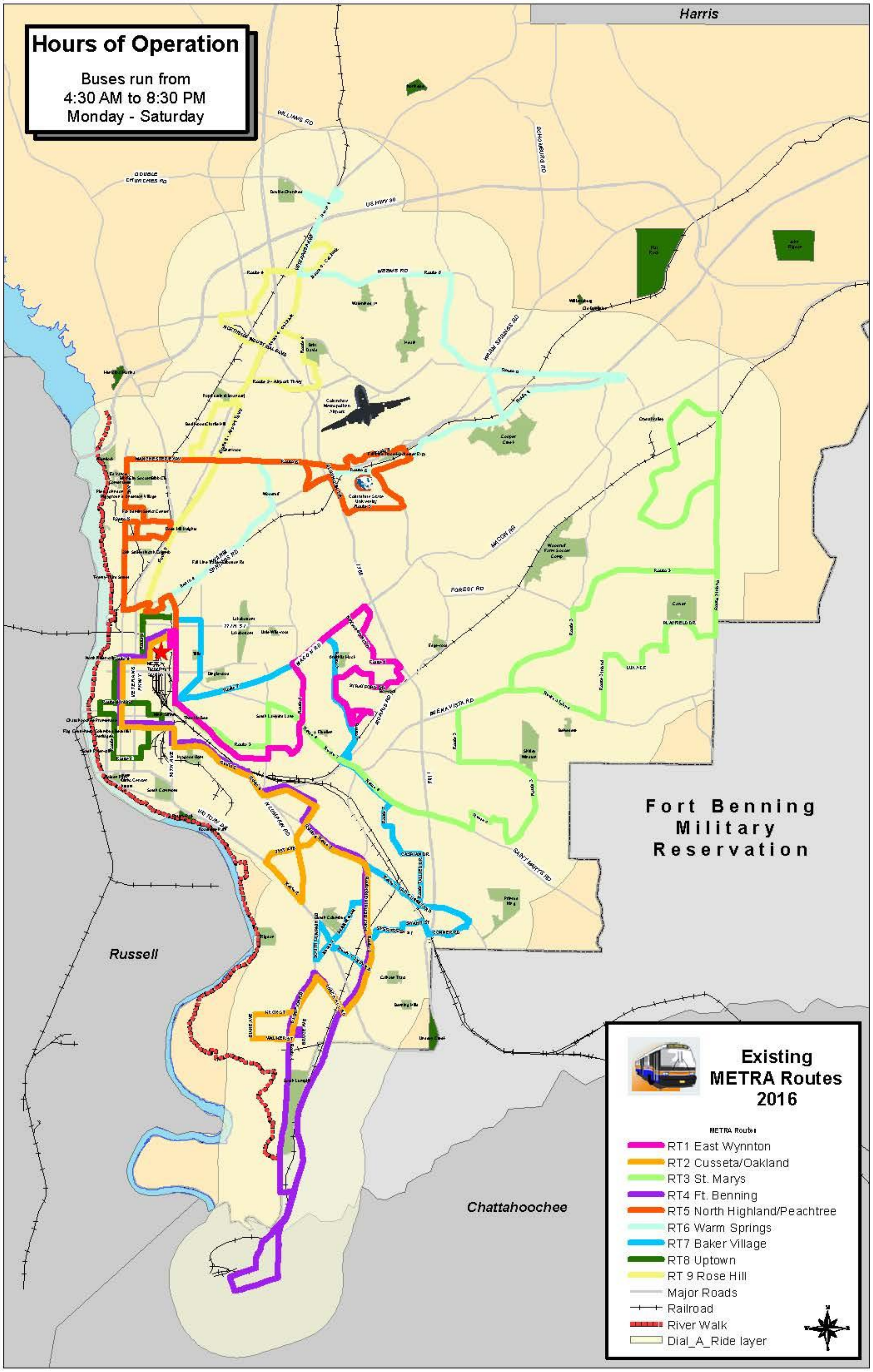
Data Collection

METRA monitors the arrival and departure times for every bus on every route. Buses that arrive or depart more than five minutes beyond their scheduled arrival or departure are considered late and are recorded. Overall, travel time delay was not found to be significant for the transit authority. In 2015, METRA operated 40,250 total weekday trips and 5,940 weekend trips. Of these trips, less than 1% arrived or departed more than five minutes from the scheduled arrival or departure. The average delay for late buses was approximately 3 minutes. The most commonly cited causes for arrival or departure tardiness by staff was peak hour congestion, equipment failure, traffic accidents, and unexpected construction delays along specific routes. These delays were minimal as noted by the low percentage of late arrivals and/or departures.

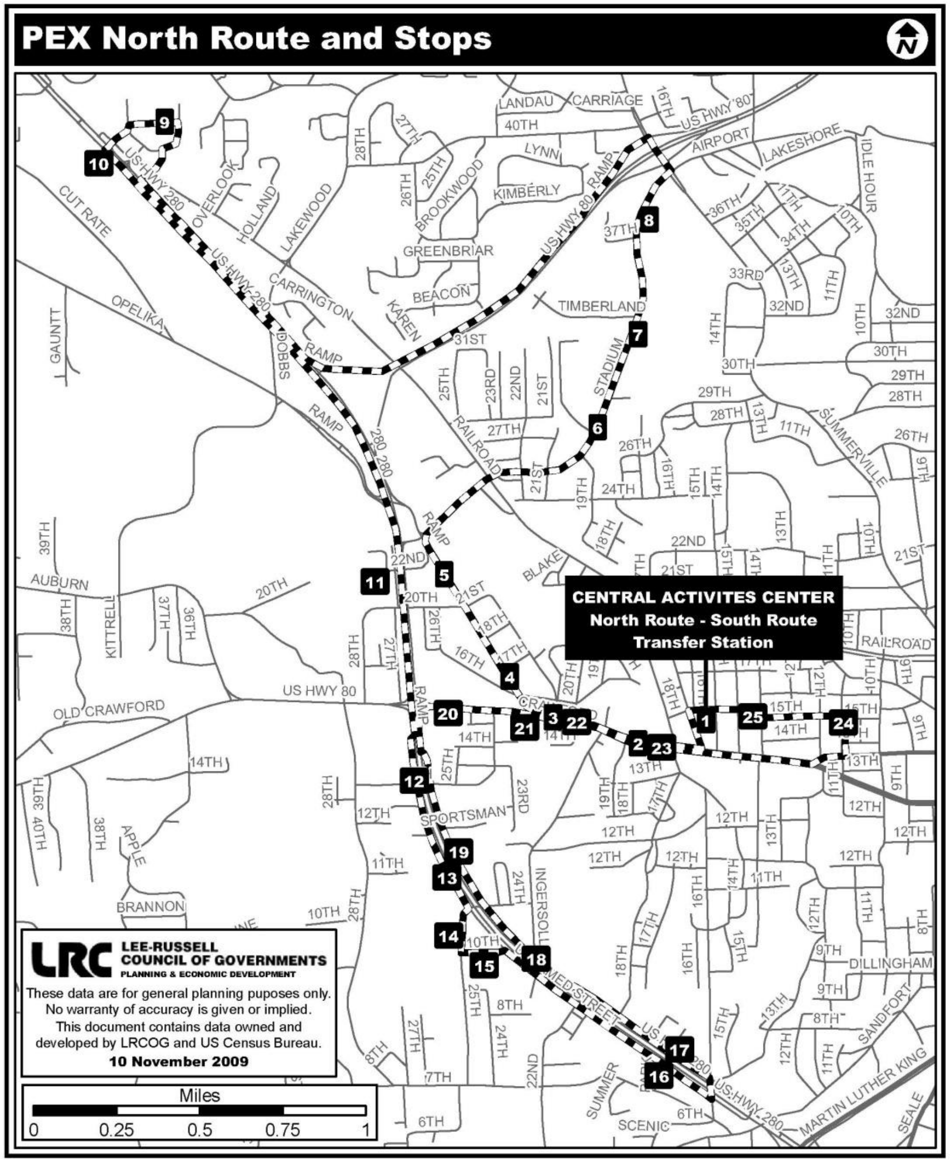
Type	Late Arrivals & Departures
Weekday	48 Trips (.12%)
Weekend	3 Trips (.05%)

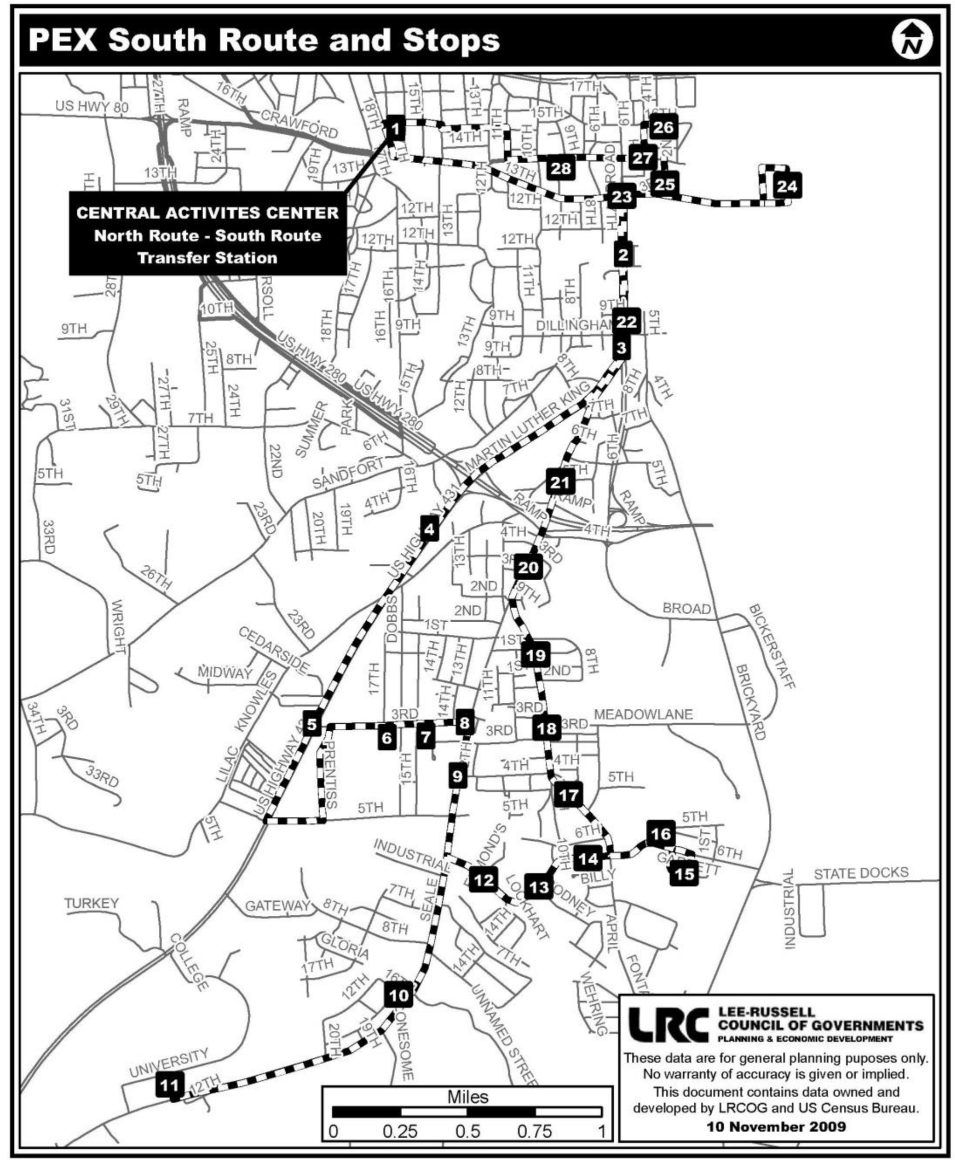
In future years METRA intends to further break down late arrivals and departures by cause of delay (bus breakdown, unexpected train delay, construction, etc.) and time of day in which the delay occurred. This will provide valuable insight to the MPO about where specific improvements can be made to infrastructure along transit routes so that transit travel time can be improved. When transit travel time is improved, customers using the transit service can expect more reliability and convenience.

Columbus, Georgia Transit Operations



Phenix City, Alabama Transit Operations





Conclusion:

Columbus and Phenix City remain an area where most destinations can be typically reached within a window of 15-20 minutes of travel time. We are fortunate not to have the high population of Atlanta and as such do not experience conditions where crushing levels of traffic volume overwhelm our road network. The feasibility of road widening has reached its peak for the time being, meaning that congestion management and monitoring of the system will become increasingly important.

There are challenges pending for future capacity in the road network. These include how to accommodate significant cross border traffic from those who reside in Alabama and in Harris County but work in Columbus. Daily traffic volumes on US 280 in Alabama between the North Bypass (US 80) and the Oglethorpe Bridge have been measured at levels equivalent to Level of Service “E”. It is important that future growth along this corridor, particularly likely to occur towards Smith Station, be considered for its impact in the form of new trips that will be generated or attracted and thus loaded on US 280. The adoption and application of access management strategies along this corridor can help maintain the presently free flowing conditions.

Traffic volumes are also high on US 80, from Crawford Road towards Ladonia through the North Bypass and onto J.R. Allen Parkway until Veterans Parkway. This is a segment that may need additional lane capacity.

Elsewhere in the network projects are presently underway to provide widening to Whittlesey Road between Whitesville Road and Veterans Parkway, as well as on two segments of Moon Road between Veterans Parkway and Wilbur Drive.

Intersection improvements are soon to get underway at Double Churches Road and Veterans Parkway as well as at Double Churches at Whitesville Road. At both locations additional turn lanes are to be constructed to handle the evident demands of traffic. Forrest Road is to be receiving a two-way center turn lane, which will largely eliminate problems with existing conditions, as traffic volume itself is not the primary source of delay, but rather queues related to traffic attempting to turn left from the two lane segments seems to be.

Further deployment of roundabouts should continue to receive consideration where intersections have traffic volumes and topography that meet feasibility criteria. This will help create a smoother traffic flow in lieu of installing a traffic signal as well as reduce the severity of crashes between vehicles. The roundabouts being placed at River Road, Cusseta Road, Fort Benning Rd, and in other locations throughout the community will help.

The development of the Riverwalk, Fall Line Trace, and Follow Me Trail in Columbus are laudable projects in terms of creating alternatives to automobile use. Further study should be conducted to consider the feasibility of increasing accessibility to them and perhaps spur more use of bicycles as a form of daily transportation in the city for commuting purposes.

Frequently Asked Questions

Why aren't the signals timed so I never have to stop?

Closely spaced signals, intersections where major streets cross, and changing traffic volumes all add to the difficulty of minimizing stop and go traffic for all directions of travel.

Why do I have to wait when there's no one coming?

Older signals don't have the necessary equipment to detect when cars are approaching, so green times are set longer. In some other instances, some signals operate on pre-timed phasing. With the new ATMS center operations, these signals will be able to be adjusted remote as circumstances necessitate it, such as clearing out traffic after large events at the river front.

Generally at pre-timed intersections, minor streets get less green time than major streets so that the higher volumes can keep moving and don't build up. Pedestrian crossing times (Walk and Don't Walk) may require longer green intervals. A group of cars may come from one direction, then there might be a gap before cars arrive from the other direction.

Why don't I always get a left turn arrow?

Left turn arrows take green time away from heavier through movements. Left turns can usually be made in gaps in traffic. Left turn arrows are sometimes turned off during lower volume times of day when the turns can be made through existing gaps.

Will a traffic signal reduce crashes at our intersection?

Traffic signals don't always prevent collisions. Typically, when a signal is installed, the total number of crashes increases, but the severity decreases. Where signals are used, the most common result is a reduction in right-angle collisions, however, rear-end crashes are prone to show an increase. Signals also may give pedestrians a false sense of security.

When are traffic signals installed?

Traffic signals are intended to facilitate the orderly movement of traffic. As the most restrictive form of traffic control, traffic signals are installed only where less restrictive signs or markings do not provide a sufficient level of control. Most intersections would not necessarily be improved or made safer by the installation of a traffic signal.

Unnecessary signals cause wasteful and annoying delays to the flow of traffic. They can increase traffic on the side streets as drivers seek alternative routes through neighborhoods. Excessive starting and stopping burns needless amounts of gasoline, resulting in pollution and economic loss. And as previously mentioned, they can increase the total amount of crashes at an intersection.

What are the official guidelines?

The Cities of Columbus and Phenix City follows City policies and state law, which requires us to follow the national guidelines outlined in the Manual on Uniform Traffic Control Devices (MUTCD) . Traffic control devices include signal lights, traffic signs and markings. The MUTCD covers all aspects on the placement, construction and maintenance of every form of approved traffic control.

In determining the need for signalization, traffic engineers ask several standard questions about the intersection.

1. Is the volume of traffic at the intersection such that a signal is needed to decrease congestion or confusion?

2. Will the installation of a signal allow for continuous, uniform traffic flow with a minimum number of vehicle stops?

3. Do a significant number of drivers on the side streets experience excessive delay in attempting to cross or enter the major streets?

4. Does the intersection have a high number of pedestrians whose crossing can be made safer?

5. Does the number of school children crossing at the intersection warrant special protection? If so, would a signal be the best solution?

6. Will probability of occurrence in the number and type of reported collisions be significantly reduced by a signal?

Traffic Studies

In order to answer these questions, a traffic study by a qualified and experienced traffic engineer is required of the intersection. As part of the study, traffic volume levels and crash history are compared with established national standards for signalization. Intersections which conform to these standards or warrants are the best candidates for signalization.

Installation of a traffic signal typically costs between $60,000 and $120,000 per location. Factors that contribute to this cost include highly specialized control equipment and hardware that is needed, plus the extent of the system installed underground.

Traffic Signal Warrants

Traffic signals should not be considered for installation unless one or more of the following warrants are met:

Warrant 1 - Eight-Hour Vehicular Volume

This warrant is intended for application where a large volume of intersecting traffic is the principal reason for consideration of signal installation. This warrant applies to operating conditions where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or hazard in entering a major street. Minimum volumes are given for each of any 8 hours of an average day.

<u>Warrant 2 - Four-Hour Vehicular Volume</u>

This warrant is satisfied when each of any 4 hours of an average day are above a certain volume combination for the major and minor streets.

<u>Warrant 3 - Peak Hour Vehicular Volumes</u>

This warrant is intended for application when traffic conditions are such that for a minimum of one hour of an average day, minor street traffic suffers undue traffic delay in entering or crossing the major street.

<u>Warrant 4 - Pedestrian Volume</u>

This warrant states that a traffic signal may be installed where the pedestrian volume crossing the major street at a location during an average day is:

- 100 or more per hour for each of any 4 hours or
- 190 or more during any one hour
- and there shall be less than 60 adequate gaps per hour in the traffic stream.

<u>Warrant 5 - School Crossing</u>

This warrant states a traffic signal may be installed at an established school crossing where the number of adequate gaps in the traffic stream is less than one per minute in the period when children are using the crossing and there are a minimum of 20 students crossing during the highest crossing hour.

<u>Warrant 6 - Coordinated Signal System</u>

This warrant specifies conditions where a traffic signal may be warranted in order to maintain proper platoon of vehicles.   A platoon refers to a “pack” of cars that the system tries to send thru as many green signals as possible before encountering one that has turned red.

<u>Warrant 7 - Accident Experience</u>

This warrant is satisfied when an adequate trial of less restrictive remedies has failed to reduce the crash frequency of five or more reported crashes of types susceptible to correction by traffic signal control and minimum vehicle and pedestrian volumes are present.

<u>Warrant 8 - Roadway Network</u>

This warrant specifies conditions where a traffic signal may be justified to encourage concentration and organization of traffic flow.

Intersection Controls - Roundabouts

Columbus has begun to install roundabouts at intersections as a way to channel traffic without use of stop signs or traffic signals. One has been installed by the city at Warm Springs Road and Blackmon Road, with another being presently constructed at Cargo Drive and Transport Drive.

Roundabouts, used in place of stop signs and traffic signals, are a type of circular intersection that can significantly improve traffic flow and safety. Where roundabouts have been installed, motor vehicle crashes have declined by about 40 percent, and those involving injuries have been reduced by about 80 percent. Crash reductions are accompanied by significant improvements in traffic flow, thus reducing vehicle delays, fuel consumption, and air pollution.

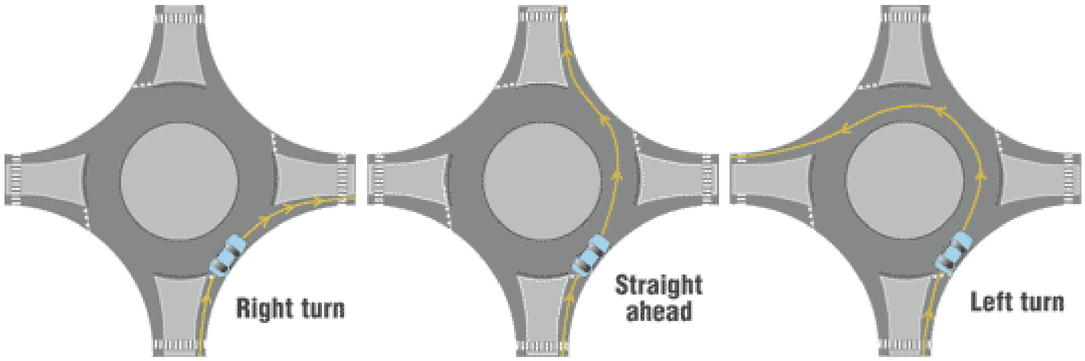
The modern roundabout is a circular intersection with design features that promote safe and efficient traffic flow. It was developed in the United Kingdom in the 1960s and now is widely used in many countries.

At roundabouts in the United States, vehicles travel counterclockwise around a raised center island, with entering traffic yielding the right-of-way to circulating traffic. In urban settings, entering vehicles negotiate a curve sharp enough to slow speeds to about 15-20 mph; in rural settings, entering vehicles may be held to somewhat higher speeds (30-35 mph). Within the roundabout and as vehicles exit, slow speeds are maintained by the deflection of traffic around the center island and the relatively tight radius of the roundabout and exit lanes.

Slow speeds aid in the smooth movement of vehicles into, around, and out of a roundabout. Drivers approaching a roundabout must reduce their speeds, look for potential conflicts with vehicles already in the circle, and be prepared to stop for pedestrians and bicyclists. Once in the roundabout, drivers proceed to the appropriate exit, following the guidance provided by traffic signs and pavement markings.

Figure 7-11

Movement of Traffic at Roundabout Intersection



Modern roundabouts are functionally different from older traffic circles (rotaries). Roundabouts require vehicles to negotiate a sharper curve to enter.

These differences make travel speeds in roundabouts slower than speeds in traffic circles. Because of the higher speeds in older circles, many are equipped with traffic signals or stop signs to help reduce potential crashes. In addition, some older traffic circles and rotaries operate according to the traditional "yield-to-the-right" rule, with circulating traffic yielding to entering traffic.

<u>Safety:</u>

Several features of roundabouts promote safety. At traditional intersections with stop signs or traffic signals, some of the most common types of crashes are right-angle, left-turn, and head-on collisions. These types of collisions can be severe because vehicles may be traveling through the intersection at high speeds. With roundabouts, these types of potentially serious crashes essentially are eliminated because vehicles travel in the same direction. Installing roundabouts in place of traffic signals can also reduce the likelihood of rear-end crashes and their severity by removing the incentive for drivers to speed up as they approach green lights and by reducing abrupt stops at red lights. The vehicle-to-vehicle conflicts that occur at roundabouts generally involve a vehicle merging into the circular roadway, with both vehicles traveling at low speeds — generally less than 20 mph in urban areas and less than 30-35 mph in rural areas.

Location:

Roundabouts may be an appropriate option at intersections where there are a high number of crashes, where there are a high number of left turning vehicles and at intersections involving a freeway ramp exit or entrance.

It is important that traffic volumes on all approaching roads are approximately equal. An intersection where there was very high traffic volumes on the main street and very light volumes on the side street would not function well for a roundabout as side street traffic would rarely have gaps to get through the intersection. Nor would a roundabout work at one isolated intersection in a network of traffic signals. The flow of traffic would not coincide with the phasing of the adjacent signals, resulting in backups spilling into the roundabout. Topography is another consideration, all entering roads need to approach the roundabout on a level grade, not on a hill. Additional right of way may need to be acquired to accommodate the radius of the roundabout.

Roundabouts can be constructed along congested arterials, intersections with in lieu of road widening, and at freeway exits and entrances, in lieu of traffic signals.

Larger Vehicles:

Well designed roundabouts can accommodate vehicles with large turning radii such as trucks, buses, and tractor-trailers, roundabouts provide an area between the circulatory roadway and the central island, known as a truck apron, over which the rear wheels of these vehicles can safely track. The truck apron generally is paved with materials like brick or cobblestone that have a different texture than the roadway to discourage smaller vehicles from using it.

Pedestrians:

Roundabouts generally are safer for pedestrians than traditional intersections. In a roundabout, pedestrians walk on sidewalks around the perimeter of the circular roadway. If they need to cross the roadway, they cross only one direction of traffic at a time. In addition, crossing distances are relatively short, and traffic speeds are lower than at traditional intersections.

Potential Relief Measures for Network:

Access Management – This strategy includes such practices such as shared access and intra parcel connectivity. Access management techniques strive to preserve the functionality of a facility by controlling movement to/from it. By providing intra parcel connectivity, consumers can access various services in proximity to one another by using the secondary roads as opposed to having to utilize the main route for short trips between the properties.

Travel Demand Management –

Travel Demand Management (TDM) is a strategy where employers attempt to reduce the amount of trips on the network at peak times by their employees. By shifting their work schedules to begin later than 8 A.M. and end later than 5 P.M., offering telecommuting options and incentivizing use of carpools and transit, more single occupancy vehicles can be removed from the road when traffic is presently at its peak.

Non-motorized modes –

Bicycle and pedestrian infrastructure improvements have been implemented in some corridors (e.g. Fall Line Trace and Riverwalk multi-use trails). Sidewalks and establishing bicycle routes will be considered during the evaluation of new projects.

Intelligent Transportation Systems –

Intelligent Transportation Systems (ITS) are constructed to provide travelers and system operators with information in a timely manner concerning travel conditions. In the event of learning about an obstruction through ITS, a traveler may decide to adjust their route to avoid it. ITS information can be disseminated through variable message boards, cell phones, the internet and also display scenes of traffic congestion to the control center. The Columbus Consolidated Government plans to soon launch their Automated Traffic Management System center at the Annex Building in the near future, which will allow a great deal of this functionality.