
APPENDIX E

TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS

**BIRMINGHAM METROPOLITAN PLANNING
ORGANIZATION (MPO)**

**Transportation Systems Management
and Operations (TSMO) Plan**

This document is posted at
<http://www.rpcgb.org/transportation>

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1.0 INTRODUCTION

The Regional Planning Commission of Greater Birmingham (RPCGB), under the auspices of the Birmingham Metropolitan Planning Organization (MPO), has undertaken an assessment of Transportation Systems Management and Operations (TSMO). This TSMO plan will help the region identify strategies for implementation to increase the overall efficiency of the existing transportation system. Additionally, it will also establish a framework to prioritize TSMO-related programs and projects in a manner consistent with the 2040 Regional Transportation Plan (RTP) policy goals. Strategies will emphasize congestion relief, safety, air quality improvement, travel demand reduction, and transportation alternatives.

Formally incorporating TSMO strategies and initiatives into the RTP will provide a foundation for the region to advance projects and programs that will increase the overall efficiency of the transportation system in a cost-effective manner. This is consistent with RTP policy goals and will emphasize multimodal operational improvements, ITS system integration, and stakeholder coordination.

1.1 TSMO DEFINED

The current transportation bill, *Moving Ahead for Progress in the 21st Century (MAP-21)*, defines TSMO as

"integrated strategies to optimize the performance of existing infrastructure through the implementation of multimodal and intermodal, cross-jurisdictional systems, services, and projects designed to preserve capacity and improve the security, safety, and reliability of the transportation system." (Public Law 112-141 July 2012 126-422)

Essentially, TSMO utilizes cost-effective strategies to maximize operation of the transportation system without adding capacity, and creating a system that is more technologically integrated and manageable. As funding for large transportation infrastructure projects has diminished in the last few years, regions are looking for new, creative, cost-effective ways to improve their system, within fiscally constrained plans.

1.2 TSMO CONTEXT

The idea of TSMO has been discussed at the federal level for some time, but recently has become formalized in metropolitan regions across the country. The purpose of integrating TSMO into the RTP is to identify potential strategies that lower costs with faster delivery times but have significant, positive impacts on multimodal operations at a local and regional level.

As the financial landscape has changed over the last decade, the requirement of fiscal constraint has made it difficult for many regions to program and fund large-scale infrastructure projects. This will require more creativity at a regional level to identify effective projects. While the Federal Highway Administration (FHWA) has provided broad definitions of TSMO and its beneficial impacts, some regions such as Portland, OR, Seattle, WA and Orlando, FL have proactively incorporated TSMO into their regional planning process.

Because so much of the transportation system is built out, the policy focus has shifted from building to managing, operating, and maintaining, which can be costly. However, TSMO is an investment that will elongate the lifecycle of the existing infrastructure and needs a distinctive priority over capacity investments. Finally, as MAP-21 has demonstrated, performance measures are critical. By influencing regional transportation decisions with TSMO strategies, both the Birmingham MPO Transportation Improvement Program (TIP) and the 2040 Regional Transportation Plan (RTP) will reflect the prioritization of efficient management over capacity expansions.

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2.0 TSMO IN THE BIRMINGHAM REGION

The 2035 Regional Transportation Plan (updated in 2010) addresses TSMO. However, most of the TSMO information in the plan consists of policy to be considered in the general course of planning. The 2035 Plan also outlines various TSMO strategies and policies that should be kept in mind when selecting projects for the TIP. In an effort to advance these recommendations, the RPCGB not only initiated this work effort (as part of the 2040 RTP update), but also commissioned various TSMO-related funding programs, which are summarized in Table 1.

While these programs embody TSMO goals of efficiency, interagency coordination, and effective management, they were programmed separately and failed to form a cohesive, regional TSMO program. Table 2 provides a short summary of previous programs.

To understand the state of the transportation system and ITS infrastructure, interviews were conducted with major regional stakeholders. They provided a detailed description of the system under their jurisdiction. This was broken into four categories: roadway management operations and maintenance, regional transit management and operations, traveler information, and incident/emergency management.

2.1 ROADWAY MANAGEMENT, OPERATIONS, AND MAINTENANCE

In the Birmingham region, the Alabama Department of Transportation (ALDOT) is responsible for the interstates and state roads, while individual cities, towns, and counties are responsible for local roads within their respective jurisdictions. This responsibility includes maintaining the pavement, signage, and signals along those roadways, as well as any traffic management strategies each municipality deems necessary and affordable.

To manage traffic along these roadways, jurisdictions utilize traffic signal control systems. In Birmingham, Hoover, Jefferson County and Shelby County, there are over 1,200 signals using a range of technologies. Of these signals, approximately 640 are coordinated with other signals, the majority of which are located in Birmingham. Most of these signals are coordinated using copper wire, with recent upgrades to fiber optics alongside new signals or intersection construction. There are approximately 700 signals within Birmingham city limits and 105 traffic signals managed by the City of Hoover.

There is no set protocol for signal coordination across jurisdictional boundaries. Within each jurisdiction, there are corridors with multiple, coordinated traffic signals. However, there are no examples of signal coordination over jurisdictional boundaries, with the exception of US 280 corridor, managed by ALDOT. The US 280 corridor is one of 14 across the nation to be awarded FHWA *Highways for LIFE* grant in 2013 for \$2 million. This grant is to deploy traffic operations and management at intersections along US 280 in Jefferson and Shelby counties. The project involves implementing a coordinated adaptive signal system to be managed across jurisdictional boundaries. The traffic signal system used in the corridor is the Sydney Coordinated Adaptive Traffic System (SCATS).

There are two traffic management centers (TMCs) in the Birmingham region operated by ALDOT and the City of Birmingham. ALDOT Third Division TMC operates 53 analog cameras and eight variable messaging signs (VMSs) along regional interstates. The cameras can be rotated to provide a wider view of the interstate within their area of surveillance. Only eight of these cameras are functioning. The Birmingham traffic engineering department operates its own TMC with nine cameras located under the I-20/I-59 bridges. Arterial cameras are planned for future installation.

In terms of roadway system management, operations, and maintenance, the City of Birmingham has noted the need for improved parking management. The primary issue is that the price for metered on-street parking (\$0.50/hour, ~6,000 spaces) is much cheaper than parking in one of the City garages, so travelers continually circle to locate a street space instead of using a garage.

The Birmingham Parking Authority is responsible for nine garages (\$8/day) and two surface lots (\$3 - \$4/day) with a total of 8,429 spaces.⁴ Another issue is that the Birmingham Parking Authority is responsible for the garages and surface lots, while the traffic engineering department is responsible for the metered parking.

Table 1. TSMO-Related Programs and Projects

TSMO-Related Programs and Projects	
Transportation System Maintenance Fund	This fund was programmed in 2008 for \$10 million with another \$10 million after initial success. The program provided funding to local governments to resurface deteriorating roadways, which could be used to resurface a roadway and extend its useful life, if no capacity was added to the roadway.
Arterial Signal Coordination and Maintenance Fund	As part of the 2035 RTP, \$1.5 million was programmed in 2008 to retime signals along major arterials. In 2001, the signals along selected arterials were upgraded so that they could be coordinated. In 2008, this program funded the retiming of these corridors to adapt the timing to existing conditions. Continuous management of signals and ensuring timing for maximized throughput is essential.
Regional ITS Architecture	Currently, the ALDOT central office houses the regional ITS architecture. This architecture specifies ITS systems and projects to facilitate efficient deployment throughout the region. ALDOT will begin developing a new statewide ITS architecture in the next year.
Alabama Service Assistance Patrol (ASAP)	ASAP is administered by ALDOT to minimize non-recurring congestion on the interstates by clearing wrecked or disabled vehicles from the roadway lanes, providing traffic control at incident scenes, and assisting stranded motorists. ASAP vehicles patrol the interstates within Jefferson County and parts of I-65 in Shelby County to quickly respond to travelers in need.
Incident Management Function (IMF)	For a limited time beginning in 1998, the IMF was formed by the MPO to examine ITS tools, identify technology gaps, identify effective solutions from other agencies, improve communications between agencies, and identify activities to improve incident management.
Birmingham Regional Transportation Data Center	As part of the Congestion Management Plan (CMP), the MPO, in conjunction with University of Alabama at Birmingham, established a transportation data center to keep both the public and decision-makers informed about the transportation system information and performance. As funding becomes available, the Data Center is looking to add air quality data, safety information, transit information and real-time travel data.
Advance Planning, Programming, and Logical Engineering (APPLE) Program	The APPLE program informs and educates local governments about the planning process, assists in decision-making, and provides funding to develop and advance community-level transportation projects. Through the APPLE program, the RPCGB manages a consultant for municipalities to develop advanced planning reports (APRs), such as a feasibility analysis or environmental assessment and other local needs.
Community Planning Program	The RPCGB provides assistance to communities in developing comprehensive plans, including TSMO-related strategies, such as Complete Streets, plans that incorporate all transportation modes, and plans that mandate smart growth land use strategies to reduce travel demand.
CommuteSmart	CommuteSmart is a travel demand management program administered by RPCGB. By advocating transportation demand management, the CommuteSmart program promotes carpooling, vanpooling, transit, telecommuting, and commuting in non-peak hours. Through CommuteSmart, roughly 13.6 million fewer miles were traveled in the Birmingham region in 2012.
US 280 Corridor Management	US 280 is a major commuting route into Birmingham from the southeast. To improve operations, ALDOT initiated a corridor management program and adaptive signal technology along the corridor. ALDOT continuously manages the signal system and contracts with local municipalities to maintain and repair infrastructure.

2.2 TRANSIT MANAGEMENT AND OPERATIONS

The Birmingham Jefferson County County Transit Authority (BJCTA) provides public transit throughout the City of Birmingham and Jefferson County. There are 23 local bus routes, two limited stop/express routes, two shuttles, and six commuter bus routes serving the greater Birmingham area. BJCTA also operates the DART service, which includes three downtown circulator routes, and paratransit service for those who are unable to access the fixed route, from Monday through Saturday.

BJCTA does not have a transit signal priority (TSP) system, and this is not a priority for BJCTA. Currently, the main priority is to upgrade computing capacity and to handle the installation of automatic passenger counters (APCs) and automated vehicle locators (AVLs) on all buses. BJCTA is working on a Fleet Management Plan which will outline management and maintenance of the vehicles, as well as when to replace them.

The vehicles are currently stored at the maintenance facility at 31st Street and 8th Avenue in the City of Birmingham. The facility encompasses approximately a block and a half on the southeast side of 8th Avenue, and also houses the operations and planning departments. Across the street is a large parking lot for overnight vehicle storage. One of the main issues with this facility is that it significantly floods during heavy rains. This keeps some buses from service and contributes to on-time performance and service issues on rainy days. There is a need to either upgrade or relocate the maintenance facility.

2.3 TRAVELER INFORMATION

The only real-time travel information is provided by ALDOT through their ITS website <<http://www.dot.state.al.us/DSWEB/Traffic/index.html>>. Here, travelers can view congestion, as reported by INRIX.com (traffic data collection firm) along interstates and major roads. This website also allows travelers to view the real-time traffic flows from the functional ALDOT cameras and the locations of construction sites that may affect congestion. This information is provided statewide and not limited to the Birmingham region. Other than ALDOT, there are no other sources of real-time data for travelers in the Birmingham region.

The RPCGB provides traffic data in the form of traffic counts from previous years. The RPCGB is looking into sharing the INRIX data with ALDOT to both inform travelers and use archived data for planning. Additionally, HERE data is currently being used by the Birmingham MPO for planning purposes. A webpage provides this information to the public, but a source for real-time data has not been identified.

With regards to BJCTA schedules, riders can obtain information at Central Station. Go to BJCTA on-line, or by calling customer service. BJCTA is currently working on a trip planner for their website and mobile phones that would assist riders in planning trips, especially if a transfer is needed.

2.4 INCIDENT/EMERGENCY MANAGEMENT

Fast and efficient incident and emergency management can significantly reduce non-recurring congestion. To address this along interstates within Jefferson County, and US 280 and I-65 in Shelby County, ALDOT operates ASAP, a traveler assistance program. For all other roads within the region (US highways, state roads, county, and local streets), clearing incidents is the responsibility of the jurisdiction where the incident occurs. Incident management and clearance typically involves local law enforcement, fire, and rescue services. ASAP units may assist with traffic control if the incident occurs on the interstates.

The ALDOT District 3 TMC assists ASAP and alerts them when an accident is viewed on one of the cameras. ASAP has ten vehicles that patrol the interstates within Jefferson County as well as an extension of I-65 south into Shelby County. These vehicles are equipped to provide assistance to motorists who need help changing a tire, have run out of gas, or have other difficulties. ASAP vehicles are not equipped with towing gear, but they do have push bumpers to move vehicles from the travel lanes. ASAP vehicles are also equipped with Vehicle Management Systems (VMS) to direct and manage traffic around incidents when travel lanes are blocked. In 2012, ASAP patrols responded to 19,883 motorists whom they either saw during patrols or were called to assist.

In addition to incident and emergency management functions, local law enforcement agencies manage traffic during large events and holiday shopping.

In the past, when the Incident Management Function group was meeting, the Jefferson County Emergency Management Agency (JCEMA) was a part of that group. While JCEMA does not manage, operate, or maintain any of the transportation system, its role in incident management and capability to facilitate coordination between agencies make it an important TSMO stakeholder in the region.

The system JCEMA uses to accomplish this is called Web Emergency Operations Center (EOC) which is produced by Environmental Systems Research Institute (ESRI) (the same company that produces ArcGIS). WebEOC is a virtual, collaborative incident management system that integrates multiple platforms of data into one usable interface. Currently, the JCEMA is in the process of connecting and interfacing with other counties around the state so that during emergencies all agencies can effectively collaborate. This communication allows data to be easily shared across the WebEOC interface, with the eventual goal of coordinating information throughout the whole state.

As easy as it has been for the JCEMA to coordinate with other EMAs and its partners, there has been no attempt to coordinate with ALDOT. The JCEMA is called when an incident requires it, but the JCEMA has no access to the ALDOT cameras throughout the region. The WebEOC could be used to coordinate between multiple agencies with regards to traffic, incident management, weather, and other issues that may affect the region. Each agency would simply have to supply its own data feed, such as cameras, counters, and sensors.

Based on these analyses, Table 2 summarizes regional needs that are TSMO-related. These needs were used to select and individualize recommendations for the Birmingham region.

Table 2. TSMO Needs

System	Needs
RPCGB Programs	1. Formally incorporate TSMO into the RTP project selection process
Roadway Management, Operations, and Maintenance	2. Update Intelligent Transportation Systems (ITS) Infrastructure for the ALDOT Traffic Management Centers, including fiber audit and new digital cameras 3. Implement a Parking Management Plan for the City of Birmingham 4. Identify Protocols for inter-jurisdictional signal coordination 5. Upgrade ITS infrastructure along US 280, including cameras, sensors, counters and begin usage of the BlueToad existing infrastructure
Regional Transit Management and Operations	6. Significantly improve vehicle storage area or construct new maintenance facility location 7. Upgrade BJCTA computer and server system to standards that could support Automatic Vehicle Location (AVL) data collection, analysis, and archiving data 8. Install AVLs on each bus to produce real-time bus location data and Auto Passenger Counters (APCs) to collect ridership
Traveler Information	9. Coordinate RPCGB Data Center website with ALDOT’s traffic website 10. Create a General Transit Feed Specifications (GRFS) feed for BJCTA to provide web and mobile trip planner applications and real-time arrival information (when available)
Incident/ Emergency Management	11. Implement measurement of response-time and clearance-time for all incidents 12. Include Jefferson County Emergency Management Agency (JCEMA) in data coordination efforts 13. Identify a Incident Management (IMF) Champion to formally bring multiple incident management stakeholders together

3.0 BEST PRACTICES

After concluding an extensive review of TSMO national best practices by MPO staff, the following are brief descriptions of the programs and projects thought most applicable to the Birmingham area.

3.1 ATLANTA, GEORGIA

In the Metropolitan Area of Atlanta (Metro Atlanta), the Georgia Department of Transportation (GDOT) has implemented the Regional Traffic Operations Program (RTOP). The purpose of this program is to improve traffic flow and reduce vehicle emissions through efficient signal timing along major arterials in the region. Since 2010, RTOP has reduced the number of stops along these corridors by 8.3%, reduced stopped time delay by 12%, and increased traffic volume throughput by 9%. In the last year alone, 1.2 million hours of delay were eliminated and 700,000 gallons of fuel were saved. For each corridor, GDOT performs a system evaluation, implements active management strategies, maintains the system, routinely identifies operational improvement, and monitors performance. For each corridor selected, either GDOT or one of the local agencies is identified as the lead, and consultants are brought in as necessary. Under this program, someone is in the field at least once each week checking on the signal infrastructure and traffic flows.

By incorporating intelligent transportation systems (ITS) infrastructure and traffic management centers, agencies can know what is happening in real time on roads that are heavily travelled. The combination of available ITS technologies and analyzing previous data can contribute to roads that are properly managed and maximize vehicle throughput.

The RTOP corridor management is similar to what ALDOT has successfully done on US 280 at a regional level. By using this corridor as a starting point, Birmingham can build upon the success and reduce congestion along other major arterials leading into Birmingham and Hoover. Since implementation, US 280 has seen a significant reduction in travel time along the corridor in peak hours. Expanding this corridor management to other arterials in the region may serve as a cost-effective alternative to construction of additional lanes along other congested corridors.

3.2 STATE OF CALIFORNIA

California took a statewide stance on the issue of signal coordination over jurisdictional boundaries and passed the California Assembly Bill 3418 in 1996, which required that all new or upgraded signals would have to be coordinated. This effectively eliminated the technological barrier and allowed all new signals to be a compatible standard. A similar step in the Birmingham region would make it easy for all newly installed signals to be coordinated across city and county lines as new development occurs and new signals are warranted in these boundary areas. By bringing all traffic departments together to identify a common course of action for new signals, the system will become more regionalized.

3.3 WISCONSIN DEPARTMENT OF TRANSPORTATION

The Wisconsin Department of Transportation (WisDOT) has created a statewide Transportation Incident Management Enhancement (TIME) program, which responds to traffic incidents along state highways. Through this program, meetings and training sessions are provided throughout the state, regional discussions are facilitated, a consistent statewide program is promoted, standards for communication between state departments are set, and the *WisDOT Emergency Traffic Control and Scene Management Guidelines* has been produced, so that all responders know what their respective roles are and how to act to clear incidents in a timely manner. One of the great successes of this program is they are constantly striving for statewide coordination and uniformity so that all agencies and travelers know what to expect should a major incident occur. In addition to the emphasis on clearing the highways, they are looking to extend the programs across jurisdictions.

In the past, the RPCGB has helped to facilitate and coordinate incident management through the Incident Management Function (IMF), a group who met to discuss, coordinate, and guide incident management programs and policies in the region. While meeting, the IMF was able to support and start the ASAP program and spur a regional ITS architecture. However, with no clearly identified champion, the group has since dissolved. Since the IMF stopped convening, the JCEMA has not been included in regional emergency and incident management discussions. By crowning a leader of either a re-established IMF or a similar group, the RPCGB could bring together multiple stakeholders, such as ALDOT and JCEMA, as well as local and state police and emergency responders.

ALDOT already has the ASAP patrols in place to monitor the interstates and quickly respond to incidents, but what makes the Wisconsin program stand out is the continuous effort to communicate and spur interagency discussions about improvements. This makes it easier for agencies to work together as they become familiar with each other and have a clear understanding of their roles before incidents happen. While ASAP vehicles help stranded motorists when there is an incident, other agencies, such as local police departments and the JCEMA, would also be involved. There is potential to set precedent in Birmingham for continuous coordination and clear roles during all types of incidents throughout the region and improve response time, which requires interagency coordination.

3.4 ORLANDO, FLORIDA

MetroPlan Orlando, the MPO for the four counties of the Orlando, FL area, has a Management and Operations Plan as an appendix to their regional Congestion Management Plan (CMP). In addition to the adoption of this document, MetroPlan designated a Management and Operations Subcommittee in 2003 to program TSMO projects and move forward with TSMO policies for the region. In Orlando, the RTP includes projects in the TIP recommended by the CMP. Each year, the Management and Operations Subcommittee is responsible for programming \$4 million worth of projects selected using the TSMO criteria and prioritization factors.

For projects to be considered for annual TSMO funding, they must be short-term, require the acquisition of no or minimal right-of-way (ROW), have insignificant environmental impacts (are air quality exempt), have the support of local governments, and have available funding sources for the match. Projects which meet these criteria are then prioritized based on their operational improvement, safety improvement, system reliability, management efficiency, cost, regional impact, customer satisfaction, and ease of implementation. As guidance for local agencies wishing to fund TSMO projects, there are 22 examples of tools that fall into one of three categories: system management, demand management, and ITS. Potential TSMO projects can then utilize these strategies to identify the most cost-effective way to meet the needs and/or address various issues within the system.

By using the congestion management program as the representative for TSMO, the focus is on the positive impacts that TSMO strategies have on reducing congestion and delay.

3.5 GEORGIA DEPARTMENT OF TRANSPORTATION

The GDOT Operations Improvement Program provides funding for small, operational improvements at intersections to improve traffic flow at locations where there is no need to acquire ROW or impact utilities. The main approach is to optimize the existing system with projects having limited scope, small budgets, and the ability to be delivered quickly. This program provides funding for projects to make improvements to existing intersections, freeway ramps, or minor ITS projects along state routes. Currently, the annual budget is \$12 million and projects with a budget of \$1 million or less receive priority. The purpose is to identify projects with the highest return on investment, measured in delay reduction or throughput increases per dollar spent. Originally, this program had an annual budget of just over \$2 million, but the large benefits seen from these small projects has caused GDOT to increase the annual budget. An operational improvement committee meets quarterly and discusses projects that have been submitted. This committee consists of GDOT director of operations, director of engineering, chief engineer, director of field districts, and the state traffic engineer. Additionally, the offices of roadway design, utilities, engineering, ROW, and financial management provide input for project selection.

An adaptable program similar to this would benefit the Birmingham region, because the annual program budget can start out low and increase with success. The keys to success in this program is in keeping the project simple in scope and within the existing ROW, allowing the projects to quickly progress through project development. These projects provide visible improvements and quick delivery, and can have a positive response to how the public views the ability of local governments to implement new projects.

4.0 GOALS

This chapter describes how the TSMO plan aligns with the principles, goals, and objectives of the 2040 Regional Transportation Plan (RTP). Think Forward 2040, is a blueprint for regional transportation to support projected growth in the metropolitan area over the next 25 years. The RTP has identified three overarching goals for the growth of the region.

Goal 1: *Implement transportation projects and programs that improve the region's quality of life*

Goal 2: *Develop a sustainable, regional transportation system*

Goal 3: *Advance regional transportation system policies and investments to support economic growth and global competitiveness*

As previously mentioned, TSMO is focused on maximizing the existing transportation system. To do this, TSMO efforts are generally based on measured performance, active and continuous management, and efficient operations. By investing in the continuous management, maintenance, and operations of the system, fewer large scale repairs, replacements, and additions will be required over the long term. Nationally, bridge and roadway infrastructure continues to receive failing grades. Infrastructure is decaying and falling into disrepair due to lack of funding and irregular maintenance. This results in increased financial investment or repair to replace facilities. By prioritizing TSMO and investing in the infrastructure before it fails, costs like these can be avoided and more can be invested into maximizing travel throughout the system in a sustainable way.

The main goals of a TSMO program are to improve reliability of a system, provide accurate and up-to-date traveler information, support regional partnerships, and monitor system performance to identify and quickly mitigate failures. This will help sustain the system for years to come and increase travel time reliability.

The TSMO recommendations lend themselves to the regional goal of developing a sustainable regional transportation system by investing in a multimodal structure that performs efficiently in a cost-effective way. Table 3 shows the specific goals and objectives of the sustainability theme, all of which can be met by projects and policies that are driven by TSMO strategies.

Table 3. Sustainability Goals and Objectives

Goal 2: Develop a sustainable regional transportation system	
Principle: The regional transportation plan will provide a framework that establishes strategies that support maintenance of a safe, convenient, high-performing, multimodal transportation system without sacrificing the financial stability of this or future generations	
Sustainability Objectives:	
1. Maintain and Enhance the Regional Transportation System’s Infrastructure and Services	<ul style="list-style-type: none"> • Strategically invest in regional transportation infrastructure using analysis to determine economic value/loss of investment decisions • Bring existing transportation infrastructure into a state of good repair • Develop and implement alternative transportation infrastructures to provide better access to all system users
2. Improve the Transportation System’s Management and Operation	<ul style="list-style-type: none"> • Invest in technologies to modernize the transportation system and improve safety and efficiency • Encourage development of key locations in order to create a more balanced, predictable system
3. Ensure full funding of the Transportation System	<ul style="list-style-type: none"> • Develop reliable revenue streams • Employ innovative finance strategies • Increase regional and non-federal funding as a percentage of overall funding
4. Protect and Enhance the Region’s Environmental and Energy Resources	<ul style="list-style-type: none"> • Mitigate the negative impacts of transportation to the environment and air quality in the design, construction, and operation of the travel system • Promote energy efficiency and conservation

The sustainability goals and objectives focus on overall system efficiency and maximizing the existing system without major investments in new infrastructure, very similar to the goals of TSMO.

The TSMO recommendations come directly out of these specific objectives. They will include policies and programs that focus specific funding towards improvements to the existing system and putting technology in place that will improve the management and efficiency of the system. Formally including TSMO in the planning process will focus available funding on improving the sustainability of the system for the long term, improving the cost-effectiveness of the overall system, and directly supporting the goal for a sustainable regional transportation system.

5.0 RECOMMENDATIONS

This chapter provides recommendations for including TSMO-related programs and policies within the 2040 Regional Transportation Plan. These recommendations include five strategies for the region:

Strategy 1: Incorporate TSMO Strategies into the Project Prioritization and Selection Process

Strategy 2: Reactivate the Birmingham Congestion Management Committee

Strategy 3: Integrate Safety into Operations

Strategy 4: Advance Demand Management Practices

Strategy 5: Improve Transit Technologies

In discussions with major regional stakeholders and the RPCGB, as well as the goal of sustainability for the 2040, these recommendations include programs, committee actions, and policies the RPCGB should consider adopting to formally incorporate TSMO into the regional planning process to have a positive effect on the regional transportation infrastructure performance. The recommendations are relatively low in cost and could be gradually implemented as the success of the program grows and more funding becomes available to put towards TSMO efforts. Incorporating these recommendations will set the precedent for TSMO strategies to be included in the RTP and affect decision making and resource allocation in the future.

5.1 PROJECT PRIORITIZATION

A TSMO element of the RTP will require constant oversight and management. To do this, the Congestion Management Committee will work with the RPCGB to ensure that TSMO strategies focus on selection and prioritization of projects.

It is recommended that the Congestion Management Committee (CMC) be responsible for incorporating TSMO strategies into the project selection process as part of their evaluation of submitted projects.

5.2 CONGESTION MANAGEMENT COMMITTEE

The Congestion Management Committee (CMC) was first identified in the 1998 Birmingham Strategic Regional Multimodal Plan (SRMP), the MPO's first ever Congestion Management Strategy (CMS). Like the SRMP, the CMC was to manage the congestion management process. However, the CMC struggled with finding its place in the MPO structure in terms of having a clearly defined role and activities beyond its very limited tasks of maintaining a congestion management process and monitoring the system for congestion.

Since the 2008 update to the CMP, the CMC has met periodically in order to review and comment on roadway capacity projects that were being proposed for inclusion in the TIP. In addition to reviewing and commenting on roadway capacity projects, the CMC has met to fulfill its role in monitoring congestion in the metropolitan planning area, and providing review for the bi-annual congestion reports. The CMC has also met to provide guidance for the development of functional plans, namely a Regional Thoroughfare Plan and the TSMO plan that was developed for this effort. The incident management function of the CMC has not met or actively worked on any initiatives since 2010. Recommended actions for the reactivated CMC follow.

5.2.1 INCIDENT AND EMERGENCY MANAGEMENT

Nonrecurring bottlenecks due to traffic incidents is a major cause of congestion nationwide. By effectively and efficiently addressing incidents as they happen, this type of congestion can be reduced. ALDOT patrols the regional interstates to help stranded motorists and disabled vehicles through the Alabama Service Assistance Patrol (ASAP) program. The CMC would build upon the effort of the previous Incident Management Function (IMF).

It is recommended that the Incident Management Function (IMF) be reestablished as a subgroup to the CMC. The IMF would serve as a forum to bring together the following agencies at least twice a year to facilitate coordination during emergency situations and establish communication and response protocol for various incidents and emergencies:

- RPCGB
- ALDOT ASAP Program
- Jefferson County Emergency Management Agency
- Local Law Enforcement and Fire Rescue Services
- Jefferson County
- Shelby County

The particular incident management actions of the CMC will be to establish emergency communication protocols, work with ALDOT to ensure that a regional ITS Architecture is in line with the statewide ITS Architecture Plan and federal requirements, coordinate dispersion of public information during emergencies, and support the existing ASAP program.

One opportunity for coordination is to take advantage of the software capabilities that JCEMA has available. The JCEMA utilizes WebEOC software to manage essential information during emergencies. This software has the power to integrate with other systems and could be used to streamline information management during emergencies. The JCEMA bunker is equipped with multiple screens, computers, and phones to host a temporary management headquarters and coordinate agency efforts.

One of the first incident management-focused actions for the CMC will be to work with all agencies and establish protocols for integrating with WebEOC when necessary. This could be during weather emergencies or major vehicle incidents that significantly impact regional traffic along highways and major arterials.

Additionally, this protocol would include instructions on data sharing during incidents and emergencies that could heavily impact traffic and congestion. During major incidents and weather warnings, ALDOT relays this information via variable messaging signs (VMS) on the interstate. Including more agencies would allow the same information to be distributed on their websites and communication channels. In this way, the information could reach travelers when they are still home, before they make their travel decisions.

It is recommended that JCEMA demonstrate WebEOC capabilities and clearly determine communication protocols for various types of regional emergencies, including, but not limited to, weather emergencies, major interstate and arterial incidents, and responses to evacuations of those living in counties along the Gulf of Mexico.

A cohesive ITS architecture plan is essential for deploying, operating, and maintaining up-to-date ITS equipment. The CMC would be responsible for guiding the development of a new, regional ITS architecture. This would require local input and coordination with ALDOT, who is currently in the early stages of developing a statewide ITS architecture. The CMC would be responsible for ensuring that the plan meets federal ITS architecture requirements so that the region is eligible for federal funding. This ITS architecture plan would include identifying the equipment that needs upgrading and additional new equipment for purchase and installation. It would identify an agency to manage, operate, and collect data from the ITS equipment throughout the region.

It is recommended that the IMF identify and actively manage incidents along critical regional arterials, as identified by the IMF and managed by a subgroup of the IMF.

In the past, the IMF supported the ASAP program, which will be the same for the CMC. The CMC will work with regional stakeholders to improve the service area of ASAP without compromising patrol services. This could include actions such as exploring potential sponsorships, gathering input from local cities and counties to provide coverage for their major arterials, and assist in applying for qualifying federal grants. This will be an ongoing effort to support and grow the coverage of ASAP.

It is recommended that the IMF continue its previous support for ASAP, explore additional funding options, and identify regional arterial corridors where ASAP coverage would improve incident management and response time.

The main purpose of providing an incident management forum is to bring agencies together to facilitate communication and improve response through coordinated efforts. As additional funding becomes available, the CMC could identify projects it recognizes as important to improving incident management in the region, such as infrastructure or software.

By bringing this group together at least twice a year, the CMC would provide a forum for all agencies to become familiar with each other and prepare their communications equipment and software for compatibility. Should an emergency occur, response delay will be reduced and agencies will be ready.

5.2.2 BOTTLENECK ELIMINATION/REDUCTION

The TSMO Implementation Program will allocate funds to projects in the region that improve the operations of existing transportation infrastructure for all modes. This could include infrastructure improvements and retrofits, as well as ITS equipment installation and upgrades. The goal of this program is to quickly deliver small scale projects that will have visible improvements on transportation operations for vehicular traffic, cyclists, pedestrians, and transit vehicles.

These quick-fix projects will enhance and modify existing roadway facilities and will not involve major capacity improvements. In this way, the facilities already being used for transportation infrastructure can be utilized more efficiently and allow the existing system to operate in a way that reduces overall delay and wait times for travelers.

It is recommended that the RPCGB establish a new program to fund small, short-term, TSMO projects.

5.2.2.1 FUNDING

This formal TSMO Implementation Program will be established with a specified amount of money set aside each year to fund eligible projects. The program will use federal funds to finance low-cost projects that have undergone scoping with estimated timelines less than 18 months. Because this program will focus on relatively small projects, it is recommended that the project maximum be set at \$2 million. The annual programmed amount will determine the number of projects that can be accepted and allow the program to be flexible over time, as more funding becomes available.

Projects that are selected will demonstrate an improvement in vehicle throughput or reduction in delay with a relatively low-cost modification as evidenced by a completed study, which may be accomplished through the APPLE Program.

5.2.2.2 PROJECT SELECTION

The CMC will be responsible for selecting projects for TSMO funding. The CMC would work in conjunction with the TIP Subcommittee to set limits on the cost of each project and to discuss project prioritization. In order to successfully incorporate TSMO into the selection process, projects will need to address the following:

- Description of the project need
- Previously completed study
- Description of the proposed solution design
- Performance benefits identified for the proposed project; and the benefits for the project
- The sponsor and demonstrated ability for required matching funds

5.2.2.3 ELIGIBLE PROJECT TYPES AND EXAMPLES

There are many small projects that can have positive impacts on traffic operations. One major source of operational improvement is local bottlenecks, many of which can be addressed with small, focused projects.

<p>Common bottleneck causes that CAN be addressed through the TSMO Program:</p> <ul style="list-style-type: none"> • Insufficient turn lane capacity • Driveway spacing • Intersection Geometrics • Signal timing • Signal spacing 	<p>Common bottleneck causes that CANNOT be addressed through the TSMO Program:</p> <ul style="list-style-type: none"> • Change in physical capacity/lane drop • Horizontal and vertical alignment (grades or curves) • Railroad crossing • Heavy freight volumes
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These examples provide project types that are consistent with the program goals, can improve operations, and reduce the vehicle stops by through-traffic at non-signalized intersections, bus stops, or major driveways. To award funding for these projects, the CMC is ultimately responsible and will consider all applications with regards to program goals.

- **Addition of a turn lane** at an intersection where there is a history of high turning volumes in a certain direction. By adding a turn lane, through traffic would be able to more easily move through the intersection, and the signal timing could be changed to reflect the new intersection layout. In the 2013 TIP, there were two projects categorized as the addition of turn lanes, one on Patton Chapel Road and one at SR 119 and CR-80. These projects were programmed for \$500,000 and \$700,000 respectively, both of which would fall under the recommended maximum project budget for the TSMO program.
- **Extension of a turn lane** is a similar concept and would be applicable where a high volume of turning vehicles exceeds the capacity for the existing turn lane. The extension would allow more turning vehicles to wait in their lane and not impede through traffic. In Georgia, this was done at multiple intersections to allow more vehicles to sit in the turning queue without hindering through-traffic movements.
- **Restriping of an intersection** allows a reconfiguration of the intersection without having to pave additional area. If traffic volume has changed since original striping of the intersection, this could allow an additional through-lane, turn lanes could be added or removed, and lane width could be altered if necessary. Restriping would be better suited to handle current traffic while still fitting in the existing ROW. On State Route 144 in Georgia, a large shoulder was restriped to be an additional through lane, with improved intersection throughput.
- **Retrofitting an intersection** would require more time and investment than a simple restriping, but could drastically change the operations of an intersection within the existing ROW. Some examples include converting intersections to roundabouts and rotaries, development of continuous flow intersections, or changing an existing interchange to a diverging diamond. In Georgia, instead of reconstructing an interchange for approximately \$58 million, they retrofitted the existing bridge with striping and medians for a diverging diamond interchange at a cost of only \$4 million.
- **Addition of a bus pull-out** may require a small amount of ROW, but would allow traffic to operate continuously while the bus is stopped. This includes the addition of signage for vehicles to yield to buses as they re-enter traffic, but would allow traffic to continue to flow and ensure that the bus was not rushed for stops because of traffic behind it.

- **New/upgraded traffic signal or ITS equipment** improves the management and operation of a signal. Depending on the equipment, the signal could change the cycle length according to real-time traffic volumes, allow remote management, and/or collect traffic counts to improve information on that particular intersection. Funding could be used to install adaptive signal technology or transit signal priority throughout a corridor to improve reliability of transit operations along that route.

As the program funds more and more successful projects and grows in annual amount, it can provide financial assistance to address more bottlenecks.

5.2.3 CORRIDOR MANAGEMENT

In addition to being responsible for programming TSMO funding, the CMC will take on the responsibility for policy guidance over incident management and corridor management. The following sections will describe these two items in more detail and include specific actionable items for the CMC to undertake in the application of the TSMO plan.

It is recommended that the CMC establish a Corridor Management Program to provide funds, identify critical regional corridors, install technology to improve signal coordination and optimization, and hire Corridor Managers.

One of the best TSMO examples in the Birmingham region is the traffic management of US 280 currently performed by ALDOT. Using ITS equipment and inter-agency memos of understanding, ALDOT has been able to reduce travel times along this corridor during peak hours without roadway expansion.

To build on this success, it is recommended that the CMC provide guidance and take action to manage critical regional corridors. The CMC will be tasked with identifying major arterial corridors, establishing technology and equipment standards to be used along specified corridors, programming funds to manage and oversee these corridors, and providing oversight for parties overseeing the corridors on a day-to-day basis. To do this, it is recommended that the CMC bring the following parties together at least twice a year as a forum to focus on corridor management:

- RPCGB
- ALDOT Overall Traffic Operations
- ALDOT US 280 Management
- Shelby County Traffic Department
- Jefferson County Traffic Department
- Birmingham City Traffic Department
- Hoover City Traffic Department

To identify which roadways are of regional significance, a Regional Thoroughfare Study will need to be conducted and a Thoroughfare Plan developed. Thoroughfare plans can be used to identify corridors that meet certain criteria that will be set by the CMC. In this case, the priorities will be in identifying the corridors with the highest volumes, most congestion, and those with high and unreliable travel times. A process similar to that used in the Congestion Mitigation Plan (CMP) in 2008 could be used to identify congested corridors that would benefit from uniform management. Factors that may affect the selection of a corridor include the congestion index, volume to capacity ratio, intersection level of service (LOS), and queue spillback. The CMC will be responsible for prioritizing which factors are the most important in selecting corridors of regional significance. The local agencies involved in this forum will also be able to provide valuable insight to specific traffic bottleneck or problem locations within their respective jurisdictions that can be addressed in the next CMP update.

Based on funding availability and the results of the thoroughfare study, the CMC can select which corridors to actively manage. This will allow the corridor management program to grow gradually as more corridors need congestion mitigation and as funding becomes available.

Continuous oversight and management of these regionally significant corridors will require annual funding to upkeep the equipment and to cover management costs. The CMC will be responsible for selecting a consultant to actively manage the timing, lane structure, and ITS infrastructure of the corridor so that it can adapt to changing traffic conditions and improve daily throughput. This is very similar to the Regional Traffic Operations Program (RTOP) run by GDOT, which contracts day-to-day management of equipment and daily oversight of the corridors to ensure that all signals are adequately timed and coordinated. The CMC and RPCGB must work together to provide financing for corridor management, which may qualify for CMAQ or other federal funds.

It is recommended that a Regional Thoroughfare Study is conducted to identify and prioritize arterial corridors that would benefit from active traffic management. For corridors most highly prioritized from the Thoroughfare Plan, select corridor managers to program projects to install necessary ITS and data collection equipment and manage the corridors on a daily basis.

Along with overseeing arterial corridors of regional impact, the CMC will work to pass resolutions identifying strategies to improve connectivity between traffic systems. This will allow for future signals near jurisdictional boundaries to be easily coordinated with each other should the traffic warrant such action. One such resolution should be the identification of traffic signal technology and equipment requirements for all new signals. This will ensure standards of uniformity across the region and easy system integration. Other possible issues for the CMC are access management policies, data collection policies, and freight corridor designation.

It is recommended that the CMC identify strategies that will help to improve traffic flow through major corridors. This could include, but is not limited to, access management, equipment standards, and freight corridor designations.

These forums will allow the agencies to interface with each other more often and improve regional inter-agency collaboration. Each of these recommendations has been designed to be conscious of fiscal constraints, but also allow room to grow as the programs and CMC actions become successful and have significant impacts on congestion and travel in the region.

5.3 SAFETY

5.3.1 ITS

ITS is a practicable strategy for addressing safety concerns and system operations. As integrated public safety and transportation operations technologies are planned and deployed, they are becoming more economical, reliable, and sustainable. These emerging technologies that are broadly incorporated into related transportation operations plans, programs, and institutional structures, will support and accelerate development of operational services.

The Birmingham region's track record with deploying ITS technologies is checkered with both successes and failures. Overall ITS strategies have not been viewed favorably, mostly because rapid changes in technology can have a learning curve for system users, significant costs, and complex implementations. However, the region has not given up on developing and deploying ITS technologies. Corridors like US 280 have been able to demonstrate that ITS can be a workable solution for addressing traffic congestion. The US 280 corridor also has other technology, specifically cameras and BlueToad™, that can monitor both traffic volumes and conditions. These technologies have application in other corridors and need to be provided in a toolbox for corridor managers.

5.3.2 PARTNERSHIPS

The Birmingham MPO's CMC-IMF Group improved communications before, during, and after traffic incidents as a critical element for safety. Beginning in 2008 when the IMF was first assembled, the Jefferson County Emergency Management Agency (EMA), as an IMF member, advocated for the deployment of a web-based communications tool called Web Emergency Operations Center (WebEOC). WebEOC would allow ALDOT's traffic management center (TMC), neighboring county EMAs, local emergency /E-911 dispatch centers, and local TMC's to communicate seamlessly with one another during traffic and/or emergency incidents. This is done through WebEOC boards, which allow dispatchers, emergency managers, and responders to post updated information for sharing statuses, equipment needs, clearance time estimates, and resolutions. This information can then be communicated with the public, as appropriate.

5.3.3 COMMUNICATION AMONG EMERGENCY RESPONDERS

The WebEOC software has undergone significant modification since 2008, and is an even more viable option today. Jefferson County EMA has removed the cost barrier for developing a traffic incident board, and now has the ability to deploy the software, linking in any agency that wishes to participate via an accessible web portal. Getting the region's county and local emergency agencies to participate needs to be a priority.

5.3.4 MILEPOST MARKERS

ALDOT's 3rd Division recommended the placement of milepost markers every 1/10 mile along the region's interstate network so first responders and travelers could better communicate their locations during an incident. Milepost markers would be placed on the center barrier separating directional traffic and would include directionality.

5.3.5 TRAVELER COMMUNICATIONS

The Alabama Division of the FHWA identified the successful implementation of a statewide 511 as one of its initiatives. Alabama is one of just a few states that have not implemented a 511 program, and is the only state in the southeast without a program. The RTP recommends that existing traveler information systems, such as dynamic message boards, transit information, and highway patrol reporting, be consolidated under a single point of contact. Ideally, ALDOT will be the champion for this effort. In the past, however, this task has fallen to RPCGB. It was RPCGB, through the MPO's CMC, that convened the IMF. FHWA also has encouraged RPCGB to take the lead in this effort because of the agency's previous work with the IMF, its work in pursuing a consolidated One Call number for human service transportation, and because of the agency's role as a facilitator in regional issues.

5.3.6 TOWING AND RECOVERY

An early recommendation of the IMF was the development of a towing and recovery program to support existing incident management activities. This program would focus on quick clearance of traffic incentives, and possibly provide monetary incentives to wrecker companies who could clear crashes within a set time period. The IMF recommended that this program be considered primarily for large crashes involving commercial vehicles where heavy duty recovery equipment is needed to clear the incident. As the IMF reactivates, revisiting this idea may be appropriate, and MPO funding may be considered to secure these services.

5.3.7 PUBLIC OUTREACH/MESSAGING

In addition to advocating for modern transportation facility design, RPCGB also has undertaken public outreach campaigns to educate travelers about the roles and rights of all system users. All too often, drivers block crosswalks and pedestrians cross against the light. Drivers and pedestrians are commonly distracted by technology. The addition of cyclists to the facility complicates rules and lead to confused and angry system users. Previous public outreach campaigns have targeted drivers, cyclists, and pedestrians. Some of the messages promoted include teaching cyclists how to ride in mixed traffic and cycling safety for children. Campaigns targeting drivers have encouraged awareness of other roadway network users and vigilance while driving.

The RPCGB will continue to support existing and/or develop targeted public outreach campaigns to affect driver/traveler behavior. Messages will focus around key topics such as distracted driving and cyclist/pedestrian safety. Partnerships with ALDOT and other nonprofit organizations to advance these messages are strongly encouraged.

5.4 DEMAND MANAGEMENT

It is recommended that the RTP continue to support CommuteSmart, which is currently set to receive approximately \$35 million of funding through 2040. In addition, new demand management strategies should be considered as the region continues to grow and travel patterns change.

5.5 TRANSIT

It is recommended that RPCGB implement TSMO strategies to improve regional transit operations. To this end, TSMO strategies should be used to improve transit operations, make transit more convenient for riders, and automatically collect ridership data.

5.6 TOOLKIT

This Toolkit can be used as a guide for incorporating TSMO into local and regional planning. It includes project examples that are in line with TSMO goals as well as with long-term and ongoing multiagency coordination efforts that support TSMO strategies.

The short-term TSMO examples are project types that would qualify for recommended TSMO funding.

The multiagency efforts are coordination strategies that will improve the ongoing management and operation of all modes throughout the system over the long term. These activities will provide a framework in which the TSMO strategies can be supported and promoted, including data sharing between regional agencies, access management, and real-time monitoring of transit vehicles.

The following table outlines these projects and long-term strategies. While funding may not be specifically available for these efforts, it is important for local and regional agencies to keep them in mind when considering investments and new projects within their jurisdictions. By keeping all local agencies and municipalities on the same page about these prioritized, long-term TSMO efforts, all parties will be working towards the same goal of clear, comprehensive, transportation management and operations throughout the region.

Some of the strategies included in the toolkit are already underway in some form in the Birmingham region. One example is the CommuteSmart program administered by RPCGB, which reduces the number of daily vehicles and miles travelled throughout the region. By utilizing this toolkit, Greater Birmingham can work towards a more efficient and sustainable system.

Table 4. TSMO Toolkit for Short-Term Projects and Ongoing Management

Transportation System	Small, Short-term Projects with TSM&O Benefits	Ongoing Coordination and Management Strategies
Roadway Transportation System Management, Operations, and Maintenance	<ul style="list-style-type: none"> • Address localized bottlenecks <ul style="list-style-type: none"> ○ Updated signal timing ○ Turning lane additions/ extensions ○ Roundabouts ○ Intersection restriping • Local ITS equipment, new and upgrades at various locations (intersections, key pedestrian facilities, heavily traveled roadways) • Ramp metering • Retrofitting and reconfiguring intersections • Truck counters 	<ul style="list-style-type: none"> • Active Corridor Traffic Management <ul style="list-style-type: none"> ○ Centralized TMC/communication ○ Signal coordination along corridors ○ Real-time management of all ITS networks (all cameras, VMSs, counters) • Active freight network and monitoring • Regional access management plan • Travel Demand Management strategies, such as the current CommuteSmart Program
Incident and Emergency Management	<ul style="list-style-type: none"> • Work zone procedures • Roles and responsibilities for all agencies for defined types of emergencies 	<ul style="list-style-type: none"> • Software integration between all agencies involved in emergency management • Continuous coordination and communication • Sharing of data post emergencies to improve preparedness
Data Management and Traveler Information	<ul style="list-style-type: none"> • Real-time travel information for roadways • Active, up-to-date variable messaging signs that are coordinated and managed from a single location • Incident alerts, via multiple sources, such as a website, text messaging, and mobile applications 	<ul style="list-style-type: none"> • Multi-agency data sharing and publishing that works together and not different from each other
Transit System Management and Operations	<ul style="list-style-type: none"> • Installation of APC and AVL technology on buses • Real-time bus location mobile application and website for riders • Interactive trip planner 	<ul style="list-style-type: none"> • Transit signal priority along key corridors • Optimization of paratransit trips through automated routing • Real-time monitoring of bus locations and adjustments of schedules as needed

5.7 STAKEHOLDER INVOLVEMENT

As when introducing new programs and policies, it is important to inform local agencies and governments not only of the formation of these new opportunities, but also how to maximize the impact of them on local and regional transportation. The purpose of the aforementioned recommendations are to inform the region of TSMO and why it is important, allocate funding for low-cost projects with significant improvements, and provide overarching strategies local agencies and governments can consult when improving the management and operations of their part of the transportation system.

While many cities and counties within the region will be aware of the new funding program and actions by the CMC through their current representation on the Transportation Technical Committee (TTC), it will also be important to bring together the elected officials and explain to them why TSMO is a regional priority and which local projects have potential to win funding from this program. By actively engaging local lawmakers, leaders of local transportation departments, and regional planning agencies, efforts towards management and operations of the Birmingham transportation system can be coordinated and support each other.

This outreach should include an initial meeting of the elected officials and transportation department heads to discuss the funded TSMO program, new action items for the CMC, and long-term TSMO strategies. This forum should not only discuss the programs, but also focus on how investing in making the existing transportation system more efficient can improve operations and be cost-effective in the long term. This could include examples of projects, as previously described, that improve local bottlenecks and discussions about corridors that should be considered for oversight by the CMC.

In addition to the initial outreach to elected officials and heads of local transportation departments, the TTC should keep local municipalities and agencies apprised of changes in TSMO funding availability and any long-term strategies that the RPCGB currently is focused on and providing support for. For example, if funding becomes available for a regional access management plan, the TTC should include local municipalities and agencies in this discussion so that a regional access management can consider the needs and growth patterns of all communities as well as the region as a whole.

By continuing to keep the discussions open and collaborating between all invested stakeholders, the RPCGB can work to move forward regional TSMO strategies and improve the existing transportation system in a cost effective manner.

6.0 CONCLUSION

To guide the regional planning process, various TSMO strategies have been identified, along with how they can be applied. By formally incorporating TSMO strategies and initiatives into the RTP, a foundation will be built upon which the region can provide support to projects and programs that will reduce congestion and delay, while increasing the overall efficiency of the existing transportation system in a cost-effective manner. This framework will also be consistent with RTP policy goals and will place emphasis on multimodal operational improvements, ITS system integration, and stakeholder coordination.

The introduction of TSMO strategies into the regional planning process has been emphasized as part of the most recent federal transportation legislation, Moving Ahead for Progress in the 21st Century (MAP-21). The approach is a way to utilize cost-effective strategies to maximize the operation of the system without significant investment in large capacity projects, while creating a technologically integrated and managed system.

The recommendations presented herein include a proposed funding program for the region, an incident management forum, corridor management program, and TSMO toolkit. It is recommended that the incident management forum and corridor management program be overseen by the Congestion Management Committee (CMC), a subcommittee of the Transportation Technical Committee (TTC). The funding for TSMO programs should be included as a line item in the TIP and are to include a specified amount of money available for small, short-term projects that can have immediate positive impacts on traffic operations and management. Projects that are to be selected for funding will undergo a prioritization process by the CMC, based on applications submitted.

It is recommended that the TTC appoint the CMC to focus on programming TSMO funding, incident management coordination, and corridor management. The CMC will work to bring together local agencies involved in emergency management to facilitate communication and establish protocols for various types of incidents and emergency events. Additionally, the CMC will focus on corridor management by guiding ITS technology implementation and other similar management strategies on critical corridors in the region, as well as hiring consultants to actively manage those corridors with the most congestion.

A TSMO Toolkit provides guidance on identifying projects and establishing a long-term multiagency coordination framework to support TSMO strategies. In order to ensure overall success and buy-in of the TSMO program, it is important to establish a stakeholder involvement plan that will bring together local leaders and lawmakers.