Phase 2 Technical Memorandum (Task #4)

CHATHAM COUNTY ATMS AND TRAFFIC MANAGEMENT CENTER – STRATEGIC PLAN

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1 Introduction

Intelligent Transportation Systems (ITS) is generally defined as the application of advanced technology and high speed communications to transportation management challenges. ITS evolved out of the realization that agencies could not always “build their way out of congestion” and would have to find ways to better manage their facilities and the traffic that uses them. While ITS has demonstrated enormous benefits in many deployments throughout the world, its application must be tempered with a strong operational concept and focus on functionality. ITS must be viewed as a tool to facilitate safe and efficient travel, not strictly as just an application of technology.

There are two key characteristics to ITS. First, the whole is greater than the sum of the parts. That is, while individual pieces and systems have distinct benefits, when the systems are integrated together to achieve a regional system, the benefits are even greater. The key point to this characteristic is pieces need to be developed in a logical manner. Technology can advance on many fronts and to various levels, but a common vision and goals are critical to achieving “the whole”. The second characteristic is that to achieve integration of the various systems, a traffic management center is necessary. An individual system can function by itself, but when it receives information from other systems the first one can fine tune operations and achieve greater efficiencies.

This five Year Deployment Plan (Plan) establishes a guide for the development of a regional traffic management center, operational improvements throughout the region, and the supporting ITS infrastructure. To be successful, the Plan must stress functionality, yet remain flexible to emerging technology, changing trends, and funding availability. Technology evolves rapidly and the Plan must take advantage of these advances to further the goal of safe and efficient traffic management.

The high level goals and objectives have been identified for this plan using the systems engineering process. The plan is focused on helping Savannah to achieve these objectives through the continued use of ITS and operations. The goals and objectives identified in the Task 1 document are consistent with the overall vision of the region. The three primary goals were to reduce congestion, enhance travel safety, and to improve regional transportation system operations. Sixteen objectives were identified across these three goals.

2 Approach

This report outlines the program – the schedule of projects – that is recommended to move forward with further deployment of both ITS systems and additional agency and regional TMC development in the Savannah region. There are several key aspects to this program. First, is the timeframe. The program is for five years, although longer term efforts are identified. A five-year horizon helps to eliminate problems with obsolescence and provides evolution flexibility. It is accepted that standards will change and the technology that is standard today will likely not remain five years from now. Standards should not be considered an issue with this program because the projects that are identified and developed as part of this plan will be largely "future-proof". That is, while we expect technology and standards to evolve, all of the projects identified should be viable and functional for their entire lifespan. As an example, camera technology has evolved and improved, but older cameras continue to work well in the field. It is more important that the underlying communications infrastructure, regional TMC hardware/software system, and physical features such as cabinets and poles remain and are updated as needed. Those items have a much longer lifespan than the camera itself. The camera can be replaced on a recurring basis while the system continues to operate normally.

The evolution flexibility refers to the dynamic nature of operations. An assumption is that all operations must provide a core level of service expected by the public first. However, operations need to respond to new tools and changing directions to continue to meet the agency's vision. The key is that all projects should provide some functional improvement and will evolve as the agency and its capabilities evolve. As an example, once a TMC is established, it may be more important that additional features and capabilities be developed instead of continuing to follow a program of adding new sensors in a rural area that was established years ago. Another example is a changing vision in response to a specific event. Pedestrian safety, transit connections, improved hurricane evacuation, bridge incident management could all be elevated in importance due to specific events that may occur. While capital projects may take years to design and build, many operations projects can be implemented quickly and are frequently sought to demonstrate agency responsiveness. This all translates to operations plans need to be focused on the short term because the needs and mission statements change quickly.

A second key aspect is that the projects identified often build directly upon each other. For most long range plans, the order of the major projects is not important. For short range plans, not only is the order often important, but these plans are frequently updated with changes as project funding and other issues result in some projects being delayed and others accelerated. For some projects, it doesn't matter what order they occur. If you are building a fiber optic ring, you can build pieces A and B in any order so long as they are built to the same standard to facilitate integration, and everyone recognizes the ring is not complete until both projects are completed. But other projects need to occur in a specific order. For example, a traffic management center should be built after the field devices are in place, not vice versa. Cameras should be installed as or after the communications network is completed. Sensors should not be placed in pavement that is scheduled to be replaced next year. ITS projects are systems – they depend on each component functioning properly, and their inter-relationships are not always linear. If one foundational project is delayed, it could affect numerous others.

In summary, there are several key points to the approach. The first is the approach follows the Systems Engineering process. This is the proven process for ITS projects that builds from a requirements perspective.

The second key point is the approach will focus on needs and operations. Technology should not be deployed for technology's sake – it should be used to improve the efficiency of an agency or provide a service to the public. This plan remains focused on needs and goals.

Third, always look towards integration and regionalization. ITS systems really represent the concept that the whole is greater than the sum of the parts. While each individual system can have great benefits, the real benefits come when systems work together. To accomplish this, systems need to be tied together from a region, not just focused on a single corridor or agency. And the primary means to accomplish this is with a regional traffic management center.

And finally, projects need to be deployed in a logical manner. Sometimes you can move projects around in a program: one signal system doesn't have to be installed prior to a parallel system and vice versa. Sometimes the projects very specifically need to follow a progression: you shouldn't install 10 miles of large bandwidth fiber before you complete a communications needs assessment and determine what your needs are and where.

3 Conceptual Plans and Planning Level Cost Estimates

This section is to identify individual projects that collectively add up to a logical program for progressing towards a more regional approach to traffic management including a regional traffic management center. This builds on the work from earlier tasks that have identified a variety of needs as well as existing capabilities. By identifying individual projects and the owning agencies, these projects can be worked into the funding stream and move forward.

The individual projects are described at the conceptual level. They are grouped in four program areas to help illustrate how the recommended individual projects work together to form a cohesive implementation plan. Each project has an individual project sheet that includes descriptions prepared in simple, easy to read and understand terms. Cost information is provided based on knowledge of the consultant team, knowledge and experience of the MPO staff, and past project costs. These costs are estimates but expected to be sufficiently reliable, at the planning level, to ensure a phasing or funding plan that is realistic and achievable.

The projects identified are primarily construction and integration projects that have identified one time engineering and construction costs. The four areas are as follows: signals, communications, TMC, and other. The signal projects focus on upgrading, coordinating, and integrating signal systems. It is anticipated that many of the signal projects will include new or upgraded communications infrastructure. The communications group of projects focus on closing gaps and establishing physical links between agencies. The TMC projects are focused on creating, upgrading, and integrating the various TMCs into a regional network as defined in the Task 3 report. Finally, the other category includes projects that fall outside the three primary groups.

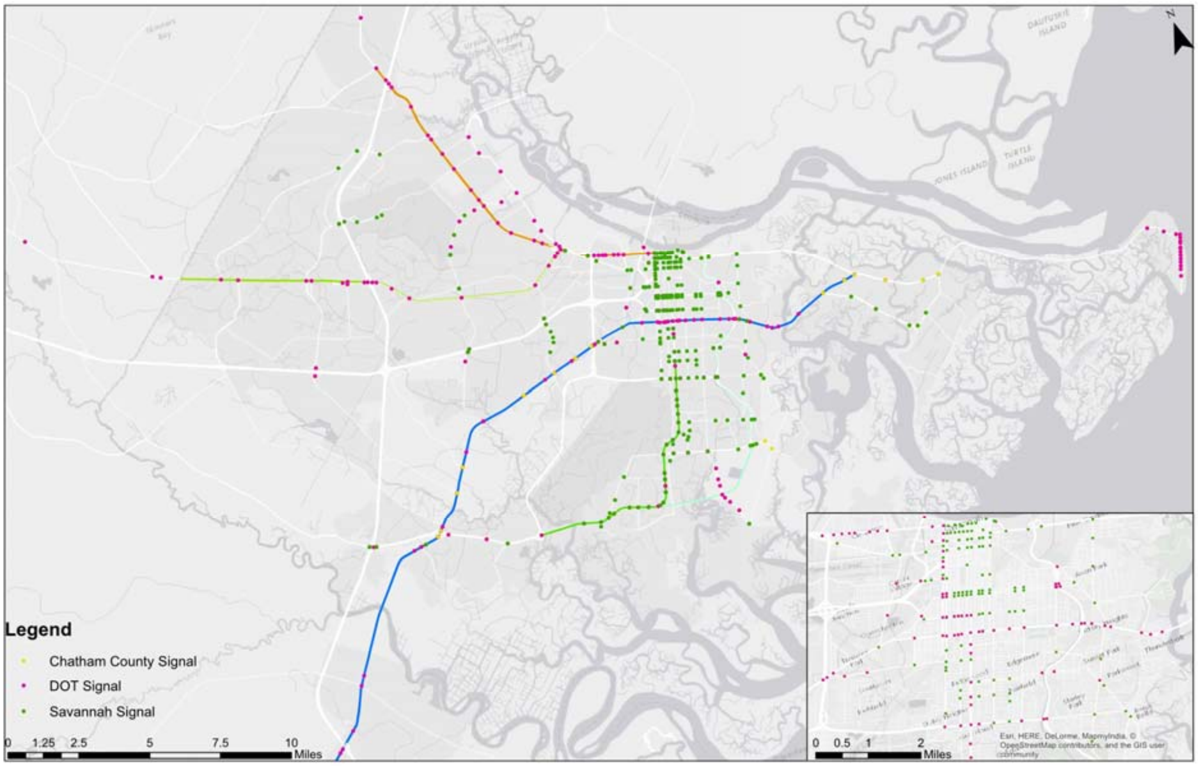
This section addresses each of the four areas identified above. Each section describes the types of projects identified within that area, and addresses any unique needs or challenges. The projects themselves are listed individually in **Appendix A**. The individual project sheets give greater detail in addition to anticipated schedule and costs.

3.1 Signals

Traffic signals are the most common and effective way of managing traffic – especially in the Savannah region. This section examines the improvements that can affect the management and operations of the signal systems in the region. There are two basic types of signal projects identified and described below. The third type of project relates to communications and is covered in that section.

The three largest owners of signals in Chatham County are the City of Savannah, the County of Chatham, and GDOT. The map shown in **Figure 3-1** was developed from Information provided by these three agencies. Based on these existing signals, and the corridors identified in the Task 2 document, numerous signal systems have been identified. For many of these systems, the signals can be operated in a coordinated manner. Some of the larger and more spread out systems may be too far for effective coordination, but are still grouped together for either larger integrated corridor operations considerations, or for ease of project programming.

Figure 3-1: Signals and Corridors in the Region



3.1.1 Optimizing Coordination Timing and System Projects

Per the inventory information provided, several projects were grouped to form signals operating in a coordinated system. These projects involve optimizing the timing of the corridor and evaluating changing systems with fixed time intersections to more of detector based intersections in areas that are reasonable and would benefit from the detection. This is primarily in the City of Savannah where the signals are in closer proximity.

The traffic engineering evaluation and timing optimization of this system were estimated at an average cost of $2,500 per intersection in the system and another $1,000 per intersection for the implementation.

3.1.2 Installing Detection (Actuation) for Intersections

Inventory information and engineering evaluation of converting intersections to detection based over a "fixed time" operation system with no detection (actuation) allow this type of project set to be developed. This type of project would consist of installing vehicle detectors and appurtenances. Vehicles detected by loops or video send a call to the controller requesting green time for the vehicle creating more efficiency for turning vehicles on the main street and for side-street movements. For planning purposes, loop detection is assumed. Depending on a variety of factors, vehicle detection using other technologies may be more desirable, but the planning level costs should be similar. As a part of the installation of the new in pavement loop detection the following would be needed and included in the project:

- In-pavement detector loops
- In-ground installation of pull-boxes for detector loop termination
- Conduit installation to connect pull-boxes to poles and signal cabinet
- Shielded cable to connect detector loops from pull-box to pull-box and the signal cabinet
- Modification to signal cabinet to include detector units that will allow the traffic signal controller to communicate with the installed in-pavement detector loops

For project intersections to operate with detection in lieu of fixed time operation this project type estimated an average number of loop installations, pull boxes, cabinet modifications, shielded cabling, and associated traffic engineering that would typically be required. This work was then estimated using historical information for cost.

3.1.3 Other Signals

There are other signal systems installed in the region that need to be considered for overall operations. First, other agencies do own signal systems such as the City of Pooler. Any other signal systems within the region should be considered in regional operations. In addition, signal priority and preemption are likely the two types of project that have the greatest impact on signal operations. Typically, priority involved transit related efforts while preemption involves emergency vehicles. In addition, there are existing school flashers, pedestrian flashers, and potentially grade crossing improvements. These types of signals have less direct impact on traffic, but will still need to be integrated into any traffic management system.

3.2 Communications

All ITS and operations projects depend on communications – either the physical type (such as fiber optics) or the personal type (such as integration of dispatch services). There are two typical types of projects in communications. The first is those that are imbedded within other construction contracts. Signal work is a common example. If the signal equipment is being upgraded along a corridor, it is logical to also implement or upgrade the communications along that same corridor. In this plan, many of the communications projects are related to signal projects.

The second type of communications projects are the "gap" projects. While many large sections of a network are implemented as part of other projects, there are always a few gaps that need to be closed in order to create a redundant network. It is critical for communications that multiple paths exist so that a break in communications (e.g., a construction crew digs up a fiber optic cable) does not result in the complete loss of connectivity and control.

3.2.1 Regional Communications Plan

Communications represent their own network, with unique demands and needs. Transportation and communications networks are often collocated as the architecture of both are similar – multiple paths of varying capacity that connect all points. However, the demands of network capacity are not always directly related to those of vehicles. Additionally, structures and densely developed areas such as bridges and downtowns sometimes present new and unique challenges to the communications network. Finally, while gaps in transportation networks are obvious to all, gaps in communications networks are invisible to almost everyone.

Consequently, the first step in creating a communications network is always to complete a communications plan. This study identifies the communication needs of the various agencies in terms of bandwidth and locations, and then matches against existing infrastructure. While fiber optic is often the median of choice, there are many circumstances where wireless is preferred. An example may be in an older downtown district where signals are relatively close and in a straight line, high speed wireless may be easier to install and maintain while still meeting the needs of the users. A regional communications plan will identify these potential opportunities.

The regional plan will be able to provide a gap analysis and identify locations where the communications network has holes. In addition, as a coastal region, the communications plan should identify improvements that help the network to function within or survive hurricanes. This includes looking at power, flooding, and cost issues so the region can best plan for the future.

As of the submittal of this strategic plan, the City of Savannah has already engaged a consultant to provide a city-wide communications plan. The communications study will examine the needs of all city departments including police and education. The City staff have agreed in principal to include the regional stakeholders into the process to try to have this project address the needs of the region, not just the City of Savannah.

3.2.2 Installing Communications and Interconnection Upgrades at Intersections

This project type would include upgrading existing system communications. This is typically through the installation of fiber optic communication cable, although a good plan will examine all options including wireless for each project. This project type will involve installing system appurtenances identified in the design which may include radios, towers, fiber optic switches, splices, splice boxes, cabinet upgrades, new fiber optic cable, and new conduit with pull boxes where necessary. Several projects will likely involve only changing twisted copper pair cable to fiber optic cable while other projects include full installation of conduit and appurtenances with the new fiber optic cable or wireless communications. The project work for was scoped assuming an estimated amount of needed items and estimated using historical information for cost.

3.2.3 Installing Communications and Interconnection Upgrades Along Interstates

With a coastal location, Savannah does not have a typical layout of hub and spoke interstate roadways. However, there are interstates in the county that come near the downtown area, and much of the new growth in the region is along the interstates west of Savannah. Interstates offer convenient paths for communications as state DOT's often need them for their own ITS devices, and the rules for access are stricter than arterials so the lines are more protected. Communications infrastructure along the interstates will likely be a critical component to the overall regional communications plan as they offer relatively long and protected right of way paths. With many of the regional issues focused in the more urban portions of Savannah, communications on the arterials will be more important than many other regions, but in terms of quickly and efficiently connecting portions of the network and in providing alternative paths, the interstate right of way will remain an important component of the overall network.

3.2.4 Communications Gaps and Upgrades

Per the Communications plan, projects in this category are needed to either close gaps in the network, or to upgrade existing links. The communications plan should identify not only holes in the network, but bottlenecks. Where additional bandwidth is needed, links can be upgraded or replaced. Where equipment is obsolete, it can be upgraded. And were additions in robustness and survivability are desired, portions can be built or rebuilt to higher standards.

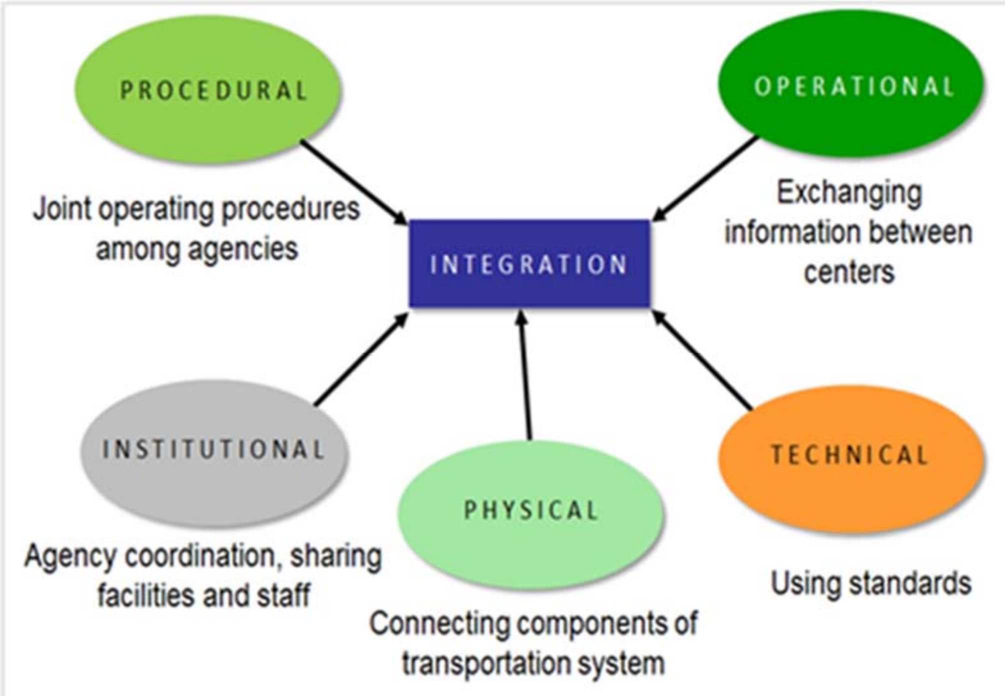
Additionally, the stakeholders should take on the responsibility of considering regional communications in any project that involves earthwork. In particular, any transportation project that involves reconstruction should also be studied to see if regional communications should be also installed while the section is under construction. Generally, once the ground has been opened, adding the communications backbone is a relatively marginal cost. Not all projects will be helpful, but the agencies should at least consider this possibility in all of their construction projects.

3.3 TMC

Individual ITS systems can either run by themselves in the field with very little oversight (e.g., a dynamic speed curve warning system that flashes when a vehicle approaches at a high speed), or can require near constant monitoring (e.g., active traffic management systems). Regardless of the size and scope of an individual system, within ITS it truly is a case that the whole is greater than the sum of the parts. Specifically, systems work best when integrated together. As a region adds more and more systems, the owning agencies will need to spend more time managing those systems. Inevitably, these systems will be managed from a traffic management center – whether it is an office space with a few separate computers or a new facility with a single all-encompassing software system that manages everything.

The various types of TMC integration were discussed in the Task 2 report. The concept presented is that each agency can develop their own TMC and then choose whether they want their TMC to be a subset of a regional TMC. However, it is in everyone’s best interest that all TMCs in the region should be integrated together. That is, where your staff and computers are primarily located is not as important as providing backup centers, sharing information, and coordinating activities. This means that many of the stakeholders will have (if they do not already) their own TMC, but will commit to integrating throughout the region. Again, a TMC can be as simple as a computer on a desk, or as complex as a dedicated facility.

Figure 3-2: Types of TMC Integration



Of the types of integration discussed in Task 2, only a few actually translate to capital projects. The majority of the types require cooperation and sharing among agencies: agreements on sharing of information, agreements on approaches to addressing regional issues, agreement on using national standards, etc. These are critical activities that should precede any integration, but they are not included as projects in the plan. They are addressed in the operational responsibilities section below. The various TMCs will need to be physically connected with communications, and any regional center should have the capability to back up and serve as a remote operation for the other TMCs.

Following the systems engineering process, each TMC should be preceded by a needs or feasibility report. Depending on the anticipated size of the TMC and scope of its functions, some of this may be completed by in house staff, or under a single regional contract. After the project is better defined and the requirements developed, the TMC should go to design and then construction. The capital costs of construction will include any physical room/building costs as well as hardware and software. Often initial communications and integration is included in the initial procurement.

Five initial TMCs have been identified. Each is identified in the program with a description for the level of detail of responsibilities. They are as follows:

3.3.1 City of Savannah

The City of Savannah has an existing TMC that monitors signal systems and coordinates with police on special events. Expected additions include increased camera coverage, improved signal coordination and management, additional staffing for increased hours of coverage, and improved incident and special event management. Others may include pedestrian and other signals, emergency vehicle preemption, and at grade crossings. Much of this can be accomplished within a smaller office footprint, but will require increased coordination and integration with other systems and centers.

3.3.2 Chatham County

Discussions have been included concerning use of space at a new Chatham County EMA facility for traffic management. Not only will the county use this space for monitoring and managing the signal systems, but being collocated with the EMA, this is a natural choice location for special event management and incident management for the County. Additionally, as the facility is being built to survive large hurricanes, this facility becomes a logical choice for any backup systems for other TMCs.

One of the projects identified is a study of this facility and the two distinct management centers that are expected within. It is understood that the County EMA is moving forward with the building for it's own purposes. Many of these are transportation related, but by virtue of the EMA responsibilities, all functions are primarily for emergency management. The Chatham County Traffic is a separate agency within the county, and their needs have to be studied and developed in parallel with those of the EMA. The end result is an expected single structure, but at least two functional management centers within the building.

3.3.3 Georgia DOT

Georgia DOT has invested in a statewide TMC for over two decades. This includes an established procedure and logic for creating smaller regional TMCs. Georgia DOT has responsibility over the interstates within the region, but also the signals on the state routes. Existing TMC software should be implemented as the field devices are installed. The physical equipment for monitoring field devices will be located at the division office in Jesup, outside of the Chatham County region. This decision helps to highlight the importance of communications and integration. Distance from the region is not as important as sharing of data and coordinating operations.

3.3.4 City of Pooler

The City of Pooler has a relatively new adaptive signal management system on Pooler Parkway. It is expected that additional features may eventually include increased camera coverage, improved signal coordination and management with others, and improved incident and special event management. Much of this can be accomplished within the existing office footprint, but will require increased coordination and integration with other systems and centers.

3.3.5 Chatham Area Transit

The agency currently has two ITS software packages for services; Trapeze for fixed-route and RouteMatch for demand response. The agency has expressed interest in reviewing opportunities for consolidation. They are moving forward with several grant funded ITS projects including; fare box upgrades to accept multiple types of fare media, expanded interactive website, real time information for customers, the use of Google Transit, and updated passenger amenities. The increased functionality that is desired argues more for a single consolidated system and location. While signal priority or preemption may be further in the future, increased coordination and information sharing with those agencies that operate signal systems would be beneficial to transit.

Previously it was identified that Coastal Regional Coaches (CRC) received federal funding for a broad system plan that would include: call center, scheduling/dispatching, mobile data computers, and fare media. They are currently awaiting GDOT approval for a statewide IT coordination contractor. Initial indications are that collocating with the Chatham Area Transit would likely be beneficial to both agencies.

3.3.6 Regional TMC

In addition to the individual TMCs, the program includes projects for connecting and backing up each system at a currently unidentified regional center. As discussed earlier, the new County EMA building would be a likely candidate as a backup location, but this needs to be resolved by the stakeholders at a later date. In any case, the region should proceed with addressing the institutional challenges required to establish a regional TMC, and all individual TMC projects should consider, design, and fund backup locations and integration with other agencies within the region. This integration should be considered an equal requirement and function in all TMC designs. As the region moves forward, the exact shape and function of the regional TMC will become more apparent.

3.4 Other

There were several possible systems and operations that were identified in the initial Phase I needs assessment. Many of these are longer term and more standalone systems that are not addressed in this document.

3.4.1 Regional ITS Architecture

FHWA requires an ITS Architecture for all federally funded ITS projects. Without a current regional architecture, any ITS projects in the Savannah region would be covered by the Georgia statewide ITS Architecture. If the region is going to actively move forward with ITS projects, it is an appropriate time to create a regional ITS architecture specific to the Savannah region.

In the appendix this project is identified as a consultant project, but the FHWA has made it relatively easy for agencies to create their own ITS Architectures using the free Turbo Architecture tool. The tool is free, and agencies can request training and workshops from FHWA. Much of the information required by the tool is available from this current project files and could require as much as 200 hours of staff time. The output of the tool is essentially the ITS architecture for the region. This architecture will have to be maintained and updated every few years or if major changes have occurred.

3.4.2 Parking Management

Parking in the historic area of Savannah can be limited. The one way streets and the lack of many large parking structures can make it difficult for travelers to find legal parking. A smart parking system can have a great impact on reducing congestion and improving air quality by directing people quickly and efficiently to available parking. This can work well for both visitors and commuters.

The City of Savannah has just completed the “Parking Matters” strategic plan. There are a number of recommendations trying to address better use of available parking. These include time of day and tiered parking rates. The plan addressed a number of issues in great detail, but did not directly address the role of a smart parking system. A typical smart parking system may use DMS on approach arterials, the internet and smart phone applications, or can be as detailed as installing numerous parking sensors or providing a reservation system. The appendices have identified projects in four categories focused on moving smart parking forward in the City.

3.4.3 Traveler Information System

Traveler information is a key function of ITS systems: Congestion, incidents, special events, parking, evacuation, etc. There are two key parts to effective traveler information. First, information must be collected. Timely, accurate, valuable information is best. Relatively static information is often available on city web sites such as general special event information including parking and transit routes. ITS systems often provide much more dynamic information such as current congestion levels or travel times, current short term incidents, current transit status. While this information can be collected manually by an individual or agency, this type of data is typical of what a TMC collects.

The second part of the traveler information systems is the distribution of the information to the public. Georgia already has an effective statewide 511 system that a Savannah TMC will inevitably connect to. This can be supplemented with regional web sites and smart phone applications as well as deployment of more arterial DMS, a highway advisory radio system, or even future connected vehicle functions. Again, the vast majority of these distribution systems work best when managed by a TMC.

Only one project is currently identified as part of the program – a series of additional arterial DMS. The project assumes a functioning TMC that has identified locations of DMS. No assumptions are made on how these could be integrated

3.4.4 Commercial Vehicle Monitoring Systems

The port of Savannah is very active. Trucks generally stick to designated truck routes from the port to the interstate system. Additionally, it is not the responsibility of the city or the county to actively manage their operations. Still, commercial vehicle traffic does affect congestion and the overall regional system. Potential systems include weigh in motion to monitor the effects of trucks on the local roads, and over dimension warning systems if there are recurring issues at certain locations.

3.4.4.1 Summary

As identified above, the projects that make up the program have been split into four subject areas. Project summary sheets are shown in **Appendix A** with additional detail on the individual projects.

3.4.4.2 Schedule

As identified earlier in this document, the current plan is only for five years. Projects have been identified that go beyond this timeframe, but the plan should be re-evaluated after a few years and adjusted as needed. The schedule is summarized in **Figure 3-3** below. This schedule does not show interrelationships between projects. In ITS in particular, many of the projects need to build from others, or be concurrent to others. For example, having a sensor network is of little value if you don't have a system that monitors the data from the sensors.

Figure 3-3: Initial project schedule by group

Program Areas							
Signal System Upgrades	Project Number	Owner	Year 1	Year 2	Year 3	Year 4	Year 5
37th Street System Study	SIG 37TH 1	City of Savannah					
37th Street Signal Upgrades -	SIG 37TH UP1	City of Savannah					
37th Street Signal Upgrades -	SIG 37TH UP2	City of Savannah					
Abercorn Street system study	SIG AB 1	City of Savannah					
Anderson/Henry Street Syster	SIG AH 1	City of Savannah					
Broughton Street system stud	SIG BR 1	City of Savannah					
Broughton Street / Liberty Str	SIG C5 1	City of Savannah					
DeRenne Ave System Study	SIG DA 1	City of Savannah					
MLK Boulevard / Montgomery	SIG MLK UP1	City of Savannah					
MLK Boulevard / Montgomery	SIG MLK UP2	City of Savannah					
Southern Corridor/Victory Dri	SIG SOUTH	GDOT					
Northern Corridor/ GA 21 Bay	SIG NORTH	GDOT					
Western Corridor/ US 80	SIG WEST	GDOT					
GA 25	SIG GA 25	GDOT					
GA 204/ Whitfield Avenue	SIG GA 204	GDOT					
Islands Expressway/Johnny M	SIG ISLEX	Chatham County					
Southern Corridor	SIG SOUTH CHAT	Chatham County					
Other Signals	SIG CHAT OTH	Chatham County					
Pooler	SIG POOLER	City of Pooler					
Pooler	SIG POOLER AIRP	City of Pooler					
Upgrade All Signals to Min GD	SIG CHAT UPGRA	Chatham County					
Communications	Project Name	Owner	Year 1	Year 2	Year 3	Year 4	Year 5
Regional Communications Pla	COM REG 1	City of Savannah					
37th Street System Com Upgr	COM 37TH UP1	City of Savannah					
Broughton Street / Liberty Str	COM C5 1	City of Savannah					
Airways Avenue System Upgr	COM	City of Savannah					
I-95 Interchange	COM GDOT 95	GDOT					
Communications Gap State	COM GAP GDOT	GDOT					
Communications Gap Chatha	COM GAP CHT	Chatham County					
TMC/Integration	Project Name	Owner	Year 1	Year 2	Year 3	Year 4	Year 5
Savannah TMC Needs and Re	TMC SV 1	City of Savannah					
Savannah TMC Upgrade 1	TMC SV 2	City of Savannah					
Chatham TR TMC Needs and I	TMC CT 1	Chatham County Traffic					
Chatham TMC Upgrade 1	TMC CT 2	Chatham County Traffic					
GDOT Regional TMC Impleme	TMC GDOT 1	Georgia DOT					
Pooler TMC Needs and Requi	TMC PL 1	City of Pooler					
Pooler TMC Initial Implement	TMC PL 2	City of Pooler					
CT Dispatch Management Stu	TMC CT 1	Chatham Area Transit					
Regional TMC Integration Stu	TMC REG 1	CORE (Initially)					
Regional TMC Implementatio	TMC REG 2	CORE (Initially)					
Other	Project Name	Owner	Year 1	Year 2	Year 3	Year 4	Year 5
Regional ITS Architecture	OTH Arch 1	CORE MPO					
Parking Management Study	OTH PM 1	City of Savannah					
Parking Management System	OTH PM 2	City of Savannah					
Enhanced Traveler Informatic	OTH TI 1	City of Savannah					
WIM monitoring system	OTH WIM 1	Georgia DOT					
ITS Improvements on I-95	OTH I95 ITS	GDOT					

3.4.4.3 Costs

Planning level project cost estimates have been provided with the individual project descriptions. The summary of the annual capital costs are shown in **Table 3-1**. The individual project sheets in **Appendix A** breaks out the engineering and capital costs separately. **Table 3-2** shows a further breakdown of these costs, although two items need to be noted. First, these costs are typically all eligible to use funds from the same sources. Second, the engineering costs assume consultants are doing the work, though for many of the projects a portion or all may be completed in-house.

Table 3-1: Program Annual Costs (Millions)

Year 1 Costs	Year 2 Costs	Year 3 Costs	Year 4 Costs	Year 5 Costs
$ 1.486	$1.999	$2.680	$3.070	$1.770

Table 3-2: Program Annual Costs by Area

Area	Year 1	Year 2	Year 3	Year 4	Year 5	Total
All Engineering	$1,186,000	$1,140,000	$730,000	$1,050,000	$-	$4,106,000
Signals	$280,000	$400,000	$200,000	$150,000	$170,000	$1,200,000
Communications	$-	$459,000	$500,000	$500,000	$-	$1,459,000
TMC	$20,000	$-	$1,000,000	$70,000	$600,000	$1,690,000
Other	$-	$-	$250,000	$1,300,000	$1,000,000	$2,550,000
Total	**$1,486,000**	**$1,999,000**	**$2,680,000**	**$3,070,000**	**$1,770,000**	**$11,005,000**

Annual operations costs are addressed in section 5 below.

This program identifies 44 individual projects to be initiated within the next five years. Many of these projects require a separate engineering design project prior to implementation. Table 3-2 breaks out the engineering costs versus the construction costs.

In most transportation capital projects, engineering can often be estimated as approximately 8-10% of the capital costs. The split for this program is closer to 40%. There are two reasons for this. First of all, the rule of thumb or 8-10% typically does not work for ITS projects. Especially for a traffic management center, the rule of thumb is more typically 20%. Also, a large portion of the engineering is programmed for improving signal timing with a minimal amount of field upgrades. This is seen in the individual project sheets in the appendices.

The program is fairly well balanced, with between $1.5 million to $3 million a year in costs. The goal of these projects is to lay the foundation for future work, and to address many of the early winner projects that will improve traffic operations with a minimal cost. An individual benefits analysis was not completed for this report.

4 Potential Funding Sources

4.1 Federal

Signed into law on December 4, 2015, the Fixing America's Surface Transportation (FAST) Act provides updated federal guidance for transportation funding. A program that is continued in the FAST Act is the Intelligent Transportation Systems (ITS) Program, which funds the development of ITS infrastructure, equipment, and systems. Projects are eligible for up to 80 percent funding under this program. Types of projects eligible include traffic signals, other infrastructure systems, pedestrians, wireless devices, and automated vehicle systems.

The FAST Act contains new grant program named Advanced Transportation and Congestion Management Technologies Deployment, which is a fund matching program that funds $60 million per year for the period of 2016 through 2020. This match is eligible to State and local governments, transit agencies, MPOs, multijurisdictional groups, and research or academic institutions. Projects funding share can be matched up to 50 percent of the cost of the project. The projects type eligible for Advanced Transportation and Congestion Management Technologies Deployment Program include:

- Advanced traveler information systems;
- Advanced transportation management technologies
- Infrastructure maintenance, monitoring, and condition assessment;
- Advanced public transportation systems;
- Transportation system performance data collection, analysis, and dissemination systems;
- Advanced safety systems, including vehicle-to-vehicle and vehicle-to-infrastructure communications;
- Technologies associated with autonomous vehicles, and other collision avoidance technologies, including systems using cellular technology;
- Integration of intelligent transportation systems with the Smart Grid and other energy distribution and charging systems;
- Electronic pricing and payment systems; or
- Advanced mobility and access technologies, such as dynamic ridesharing and information systems to support human services for elderly and disabled individuals.

4.2 State

Passed in 2015, HB 170, the Transportation Funding Act of 2015, replaces the previous gasoline sales tax and generates an additional $900 million annually for transportation funding in Georgia. Funding priority is given to maintenance, expansion, and improvement of highway infrastructure in areas most impacted by traffic congestion and areas in the state which assist in attracting economic development to the area. Projects eligible for funding include:

- Construction of new highway projects;
- Maintenance of existing infrastructure;
- Bridge repairs and replacement;
- Safety enhancements; and,
- Administrative expenses.

4.3 Local

Locally, residents in Chatham County have the option to pass a Special Purpose Local Option Sales Tax (SPLOST) which funds capital improvements in roads, drainage, recreation, economic development, and civic projects in the County. The SPLOST has been approved in approved every three to four years since it was first placed on the ballot in 1985. The revenue generated from the one percent sales tax can be utilized for local funding matches.

5 Operational Responsibilities

This plan has focused on ITS systems, and traffic management centers in particular, but the core issue is Transportation System Management and Operations (TSM&O). ITS systems, and TSM&O, have needs that are different than typical transportation projects. In order to achieve the benefit of a road, the construction needs to be complete and the owning agency needs to repair the road when it starts to break – typically many years later. ITS is full time, hands on. The systems must be tested and "tweaked" before they can function and they only work when used, managed, and maintained properly. The good news is that for many of the systems proposed in this plan, the maintenance is not much different than what is already occurring. In some cases, if a system is upgraded the newer systems are typically more robust and self-sufficient and may actually decrease maintenance costs for some items.

Current responsibilities for management, operations, and funding of existing traffic management facilities in the region have been documented in Phase 1 of the study. In Phase 2, the Task 3 document discussed operational costs and responsibilities for several case studies. This section addresses how these responsibilities may evolve in order to achieve a more regional approach for Savannah.

5.1 Traffic Signals

The program proposed in this document primarily consists of replacing and upgrading signal systems. While the capital costs are equivalent to new systems, the operations costs should not be. Where actuation has been added, additional maintenance activities will occur. However, updated systems may come with new monitoring tools that allow the agencies to better know where and when problems are occurring and may actually help to reduce overall costs by recommending preventative maintenance, providing additional time for scheduling, and better informing crews before they respond.

The maintenance and operations costs strictly related to the traffic signals are not expected to change. Neither are the staffing costs – other than those addressed in the Traffic Management Center section below. Staff will need to be trained on any new systems, and inventory may need to be updated or changed

5.2 Traffic Management Centers

TMCs can be large or small, and may serve a variety of functions. However, certain core operational costs are involved in all systems. The follow sections address the common additional annual costs that must be funded and maintained so the TMC can continue to operate efficiently.

5.2.1 Software

For the smaller systems – similar to the City of Pooler – a vendor supplied software is often sufficient. Vendors have increased the capability of their systems beyond the timing and operations of signals to include reports, camera images, data export features, etc. Depending on the system, there may be annual licensing fees or maintenance contracts.

For the larger and more complex systems, typically a systems integrator is hired to develop software and user interfaces that help the agency to better manage the system. Usually this also involves integrating various systems under the single user interface, such as asset management, data archiving, web interfaces, etc. that are often stand alone systems. Vendor software can often handle some integration, but often at the price of flexibility and customization. Once developed, it is often required that the developer have a long term maintenance contract to ensure that problems with the software or systems can be handled quickly and efficiently. No software systems are completely immune to problems and when signal operations are involved, timeliness of response is critical. Licensing may also be required on portions of the software.

5.2.2 IT Support and Hardware

Most TMC hardware networks continue to look more like a typical office networks. As they are involved in managing field devices, the TMC hardware should always be on its own separate network, with the potential for hacking and disruption of service affecting more than the agency and it's staff. Higher end servers and redundancies are typically involved to ensure uptime is maximized.

Maintenance of the IT/HW can be accomplished in several manners. If the system is close in size, equipment, and function to an agency office network, the IT department can often provide procurement and troubleshooting on their own and under existing contracts. As the system becomes more complex, it may be beneficial to have a separate maintenance contract. This is often included as part of the software maintenance contract.

5.2.3 Staffing

By far, the one system that will require a significant increase in responsibility is the creation or expansion of a traffic management center. No matter what level of automation is built into the TMC, managing the system still requires staff – usually additional staff.

The City of Savannah already has an early stage TMC. This consists of a space and a computer system that monitors some signal systems and cameras. Chatham County does not have an existing TMC. GDOT has a statewide TMC that in conjunction with District 5 staff will serve as a TMC for the Savannah region. There are typically two common options – new agency staff or contracted operations. Smaller systems 3-5 staff are usually staffed in house as the contract to provide staff may actually become more cumbersome to maintain than is worth it for a small amount of staff. As most of these estimates are low, it is assumed that no TMC staffing will be contracted.

Based on the case studies in the Task 3 report, the following initial assumptions are made on additional staff:

- The City of Savannah may have to hire one or two people depending on current staff responsibilities and the new capabilities of a larger and more comprehensive TMC
- Chatham County will have to hire several new staff for the TMC. A minimum number to start from scratch would be three – one manager (that could be part time with other responsibilities) and two operators

- GDOT may have to hire one new person

In addition to the operations staff, all TMCs require support for the hardware and software. This can vary greatly depending on the complexity of the system. For single vendor signal system, most of the hardware and software is maintained by the vendor for little or no fee. As other systems are integrated in, the hardware network becomes larger and more complex, and the software more customized. The costs assumed for the various systems are as follows:

- The City of Savannah TMC will likely require minimal hardware and software updates provided on a task order basis for the short term. As new functionality is added in, an annual support contract will likely be required
- Chatham County will require a support contract for the mid-term. All changes and updates can initially be built into the original development project as two year post turn on support. Beyond that, an annual support contract will likely be required.
- GDOT should have minimal support costs and these will likely be included as part of the statewide contracted operations.

5.3 Regional Cooperation

The real key to successful management of a regional system is cooperation. Travelers typically don't know which agency owns the roads they travel on; they just know if the system is functioning well or not. While the individual systems are capable of addressing many of the issues of the traveler, success as a system come with cooperation. There are a range of ways and levels at which cooperation needs to occur. Procedural, operational, institutional

5.3.1 Regional Planning

At the highest level of cooperation is regional planning. This is typically accomplished through regional interagency committees. These committees can be led by the MPO, or part of a larger group such as the I-95 coalition. Planning should be coordinated on a number of levels. This starts with long range planning – ensuring all agencies are coordinating the timing and the functionality of their longer range projects. This can be accomplished through ITS architectures as well as regional and state long range plans. This type of cooperation allows agencies to plan for how their various systems should and will interact with related systems from other agencies.

The committee structure also facilitates more immediate even planning, cooperation, and review. For example, multi department and jurisdiction planning for how traffic related to Saint Patrick's Day events are managed. Or providing a forum for agencies to provide an after action debriefing of how a major incident was handled. This type of committee structure has proven to be successful in many regions including Atlanta.

These organizations need to be managed. Specifically, someone needs to take the lead in organizing the committees, recording minutes, providing a library of support documents and information, etc. This is typically accomplished through one of two means. Either the agencies involved cooperatively fund a consulting contract to provide these services, or one agency volunteers staff time. MPO's have sometimes been able to fill this staffing role. The level of support can be as basic as just meeting management up to having the support staff write white papers and conduct research. The cost for providing this support is at least 200 staff hours – internal or consultant. Even those agencies just participating in the organization can assume a minimum of 100 hours of staff time dedicated to this group every year.

5.3.2 Formal Agreements

As cooperation occurs at the committee level, real world issues will continue to occur and need to be addressed. There may already be numerous formal intergovernmental agreements in place such as mutual aid agreements, bridge structure maintenance agreements, etc. As particular issues are noted, some formal agreements may be desired to help define responsibilities. Examples may be maintenance and operations of a regional communications network, data sharing agreements, and video sharing agreements. The committee structure identified above can be a forum for aiding the development of these agreements, but many agreements may be specific to a subset of agencies that may find it easier to work separately on the agreement. It is expected at a minimum that the local agencies will have agreements with GDOT relative to the statewide 511 system.

It is important to also look at other related studies and the agencies and departments that are involved. Two good examples are the recently completed parking study and the upcoming airport area study. Stakeholders identified in related studies need to be brought into the ITS and operations process to make sure all new efforts are coordinated.

5.3.3 Technical Cooperation

In general, the purpose of an ITS architecture is to illustrate how various systems need to integrate and exchange data at the earliest levels. This should serve as the starting point, but the details of that integration are typically documented and addressed in the individual system design. Some typical systems expected are as follows:

Signal coordination – many of the projects identified provide for upgrading signal systems and installing some signal systems in specific corridors. These are typically fairly short sections and limited to a single main arterial. The next step in cooperation is managing signals along multiple parallel streets in a corridor with the ultimate system being a single regional system managing all traffic on all roads. The initial five year plan will be very successful with just the numerous upgrades identified. Corridor level integration is more likely to occur when the various agencies have already achieved some experience and success with the current planned upgrades.

TMC backup systems – As identified in tasks 2 and 3, the initial development of the TMCs should at the minimum include providing some level of backup and remote control from other locations. This will typically include the development of a communications link and provision of a remote workstation. This does not provide a level of integration between the systems, but is the first step to achieve that integration. As the various TMCs are developed and deployed within the region, if they are able to include a higher level of integration (e.g., direct data or video sharing), that integration should be encouraged and supported. At the very least, the remote locations should provide remote back up for the primary system.

Communications network – several communications projects have been identified in the program. While communications is critical for individual ITS systems, developing a single network that connects the various TMCs is critical for the long term management of the region. The keys will be agreement on equipment and network design, and will likely require formal agreements to ensure any break of the system is addressed quickly by the owning agency.

5.4 Summary

In order for the ITS systems identified in this plan to achieve their full potential in TSM&O, a new level of cooperation will be needed across the region. This can only be achieved through a commitment of staff time and a commitment to maintaining new equipment and systems. The following table summarizes the potential costs in terms of time and money for operating the systems identified in this plan.

Table 5-1: Potential Chatham County ATMS Operation System Costs

Function	Staff time	Maintenance costs	Notes
Signals	Minimal additional staff	Similar to current	Additional detection will add to costs. Additional training will also be required
TMC	1-3 full time staff for Savannah and Chatham County. 1 staff for GDOT. Regional TMC 5+ staff	$100K/year for field devices $150K/year for software and hardware	Contracted staffing a potential for larger systems.
Regional cooperation	200 hours a year per agency	$50k/year for support contract	Start with RTOC and GDOT TIME program
Communications network	To maintain interagency connections, one person half time	$100K/year to support fixes to network	

Many of the changes identified in this table have been discussed earlier in this section. Table 5-1 shows that the improvements in signal operations will come with minimal – if any – additional operational costs. No real additional staff are expected, and as the systems are upgraded and improved, they may actually be more easily maintained reducing the operational costs. This depends on a wide variety of factors and should be monitored over the next few years.

All improvements and additions to agency traffic management centers will need an increase in staff to realize the benefits of the center. The number of additional staff for the City of Savannah and Chatham County are largely dependent on the level of increased functionality. A minimum number of staff for any new regional TMC will be five as seen in other locations. TMCs also require additional support for software, communications, and hardware. This is typically accomplished through contracted services.

As discussed in section 5.3, for the agencies to best coordinate, integrate, and share operational information, it will require staff time. Approximately 200 hours per year – or 10% of an existing staff person's time – is estimated. This is included so that it is clear that staff will be asked to do more, and there may be some shifting of current responsibilities required in order for existing staff to properly coordinate with the other agencies. No new personnel are anticipated, but there will be an increased workload on existing staff.

Finally, all integration and cooperation requires good communications. A regional approach is necessary, and larger systems require more maintenance and repair. The operating budget should be sufficient for ensuring communications between systems is maintained in good working order.

6 Conclusion

This program has identified a variety of projects that are designed to guide the Savannah region forward towards better traffic management. Traffic management requires a commitment to tools, staff, and cooperation to achieve the best results. Better management is an ongoing process. There is no single item or system that can be bought that achieves this. There is no single threshold to be reached. The process should be viewed as one of incremental improvements that are all working towards a common goal. ITS and traffic operations are truly systems where the whole is greater than the sum of the parts. The entire system will benefit with each completed project.

In the Tasks 2 and 3 reports, the role of TMCs throughout the region was discussed in detail: the capabilities they provide, the costs they incur, the benefits they bring. This project has also demonstrated that TMCs are a logical outcome from adopting a Transportation System Management and Operations philosophy. The key concepts are as follows:

1. If you are going to manage your system, you will need some form of traffic management center; and
2. Traffic management, ITS, and operations in general work best when coordinated and integrated across agency lines.

The benefits are significant. Not just in reduced crashes and improved travel time but in terms of the impact on the environment and the preservation of natural resources.

CORE
COASTAL REGION MPO

7 Appendix A – Program Costs

Program Areas										Engineering Only				
Signal System Upgrades	Project Number	Owner	Engineering	Construction	Year 1 Costs	Year 2 Costs	Year 3 Costs	Year 4 Costs	Year 5 Costs	Year 1 Costs	Year 2 Costs	Year 3 Costs	Year 4 Costs	Year 5 Costs
37th Street System Study	SIG 37TH 1	City of Savannah	$ 60,000	$ -	$ 60,000	$ -	$ -	$ -	$ -	$ 60,000	$ -	$ -	$ -	$ -
37th Street Signal Upgrades - F	SIG 37TH UP1	City of Savannah	$ 20,000	$ 180,000	$ 200,000	$ -	$ -	$ -	$ -	$ 20,000	$ -	$ -	$ -	$ -
37th Street Signal Upgrades - F	SIG 37TH UP2	City of Savannah	$ 10,000	$ 100,000	$ 110,000	$ -	$ -	$ -	$ -	$ 10,000	$ -	$ -	$ -	$ -
Abercom Street system study	SIG AB 1	City of Savannah	$ 100,000	$ -	$ -	$ 100,000	$ -	$ -	$ -	$ -	$ 100,000	$ -	$ -	$ -
Anderson/Henry Street Systen	SIG AH 1	City of Savannah	$ 100,000	$ -	$ -	$ 100,000	$ -	$ -	$ -	$ -	$ 100,000	$ -	$ -	$ -
Broughton Street system stud	SIG BR 1	City of Savannah	$ 50,000	$ -	$ -	$ 50,000	$ -	$ -	$ -	$ -	$ 50,000	$ -	$ -	$ -
Broughton Street / Liberty Stre	SIG C5 1	City of Savannah	$ 50,000	$ -	$ 50,000	$ -	$ -	$ -	$ -	$ 50,000	$ -	$ -	$ -	$ -
DeRenne Ave System Study	SIG DA 1	City of Savannah	$ 40,000	$ -	$ 40,000	$ -	$ -	$ -	$ -	$ 40,000	$ -	$ -	$ -	$ -
MLK Boulevard / Montgomery	SIG MLK UP1	City of Savannah	$ 60,000	$ -	$ 60,000	$ -	$ -	$ -	$ -	$ 60,000	$ -	$ -	$ -	$ -
MLK Boulevard / Montgomery	SIG MLK UP2	City of Savannah	$ 70,000	$ -	$ -	$ 70,000	$ -	$ -	$ -	$ -	$ 70,000	$ -	$ -	$ -
Southern Corridor/Victory Dri	SIG SOUTH	GDOT	$ 250,000	$ 100,000	$ 250,000	$ 100,000	$ -	$ -	$ -	$ 250,000	$ -	$ -	$ -	$ -
Northern Corridor/ GA 21 Bay	SIG NORTH	GDOT	$ 250,000	$ 100,000	$ -	$ 250,000	$ 100,000	$ -	$ -	$ -	$ 250,000	$ -	$ -	$ -
Western Corridor/ US 80	SIG WEST	GDOT	$ 250,000	$ 100,000	$ -	$ -	$ 250,000	$ 100,000	$ -	$ -	$ -	$ 250,000	$ -	$ -
GA 25	SIG GA 25	GDOT	$ 100,000	$ 50,000	$ -	$ -	$ 100,000	$ 50,000	$ -	$ -	$ -	$ 100,000	$ -	$ -
GA 204/ Whitfield Avenue	SIG GA 204	GDOT	$ 100,000	$ 50,000	$ -	$ -	$ -	$ 100,000	$ 50,000	$ -	$ -	$ -	$ 100,000	$ -
Islands Expressway/Johnny M	SIG ISLEX	Chatham County	$ 200,000	$ 100,000	$ 200,000	$ 100,000	$ -	$ -	$ -	$ 200,000	$ -	$ -	$ -	$ -
Southern Corridor	SIG SOUTH CHAT	Chatham County	$ 250,000	$ 100,000	$ -	$ 250,000	$ 100,000	$ -	$ -	$ -	$ 250,000	$ -	$ -	$ -
Other Signals	SIG CHAT OTH	Chatham County	$ 250,000	$ 100,000	$ -	$ -	$ -	$ 250,000	$ 100,000	$ -	$ -	$ -	$ 250,000	$ -
Pooler	SIG POOLER	City of Pooler	$ 100,000	$ 20,000	$ -	$ -	$ -	$ 100,000	$ 20,000	$ -	$ -	$ -	$ 100,000	$ -
	SIG POOLER AIRP	City of Pooler	$ 35,000	$ 100,000	$ 35,000	$ 100,000	$ -	$ -	$ -	$ 35,000	$ -	$ -	$ -	$ -
	SIG CHAT UPGRAI	Chatham County	$ 30,000	$ 100,000	$ 30,000	$ 100,000	$ -	$ -	$ -	$ 30,000	$ -	$ -	$ -	$ -
Communications	Project Name	Owner	Engineering	Construction	Year 1 Costs	Year 2 Costs	Year 3 Costs	Year 4 Costs	Year 5 Costs	Year 1 Costs	Year 2 Costs	Year 3 Costs	Year 4 Costs	Year 5 Costs
Regional Communications Pla	COM REG 1	City of Savannah	$ 180,000	$ -	$ 180,000	$ -	$ -	$ -	$ -	$ 180,000	$ -	$ -	$ -	$ -
37th Street System Com Upgr	COM 37TH UP1	City of Savannah	$ 13,500	$ 121,500	$ 13,500	$ 121,500	$ -	$ -	$ -	$ 13,500	$ -	$ -	$ -	$ -
Broughton Street / Liberty Stre	COM C5 1	City of Savannah	$ 18,500	$ 166,500	$ 18,500	$ 166,500	$ -	$ -	$ -	$ 18,500	$ -	$ -	$ -	$ -
Airways Avenue System Upgra	COM	City of Savannah	$ 19,000	$ 171,000	$ 19,000	$ 171,000	$ -	$ -	$ -	$ 19,000	$ -	$ -	$ -	$ -
I-95 Interchange	COM GDOT 95	GDOT	$ 100,000	$ 500,000	$ -	$ 100,000	$ 500,000	$ -	$ -	$ -	$ 100,000	$ -	$ -	$ -
Communications Gap State	COM GAP GDOT	GDOT	$ 50,000	$ 250,000	$ -	$ -	$ 50,000	$ 250,000	$ -	$ -	$ -	$ 50,000	$ -	$ -
Communications Gap Chathar	COM GAP CHT	Chatham County	$ 50,000	$ 250,000	$ -	$ -	$ 50,000	$ 250,000	$ -	$ -	$ -	$ 50,000	$ -	$ -
TMC/Integration	Project Name	Owner	Engineering	Construction	Year 1 Costs	Year 2 Costs	Year 3 Costs	Year 4 Costs	Year 5 Costs	Year 1 Costs	Year 2 Costs	Year 3 Costs	Year 4 Costs	Year 5 Costs
Savannah TMC Needs and Rec	TMC SV 1	City of Savannah	$ 50,000	$ -	$ 50,000	$ -	$ -	$ -	$ -	$ 50,000	$ -	$ -	$ -	$ -
Savannah TMC Upgrade 1	TMC SV 2	City of Savannah	$ 50,000	$ 500,000	$ -	$ 50,000	$ 500,000	$ -	$ -	$ -	$ 50,000	$ -	$ -	$ -
Chatham TR TMC Needs and F	TMC CT 1	Chatham County Traffic	$ 50,000	$ -	$ -	$ 50,000	$ -	$ -	$ -	$ -	$ 50,000	$ -	$ -	$ -
Chatham TMC Upgrade 1	TMC CT 2	Chatham County Traffic	$ 50,000	$ 500,000	$ -	$ 50,000	$ 500,000	$ -	$ -	$ -	$ 50,000	$ -	$ -	$ -
GDOT Regional TMC Impleme	TMC GDOT 1	Georgia DOT	$ -	$ 20,000	$ 20,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pooler TMC Needs and Requir	TMC PL 1	City of Pooler	$ 20,000	$ -	$ -	$ 20,000	$ -	$ -	$ -	$ -	$ 20,000	$ -	$ -	$ -
Pooler TMC Initial Implement	TMC PL 2	City of Pooler	$ 30,000	$ 70,000	$ -	$ -	$ 30,000	$ 70,000	$ -	$ -	$ -	$ 30,000	$ -	$ -
CT Dispatch Management Stuc	TMC CT 1	Chatham Area Transit	$ 50,000	$ -	$ -	$ -	$ 50,000	$ -	$ -	$ -	$ -	$ 50,000	$ -	$ -
Regional TMC Integration Stuc	TMC REG 1	CORE (Initially)	$ 100,000	$ -	$ -	$ -	$ -	$ 100,000	$ -	$ -	$ -	$ -	$ 100,000	$ -
Regional TMC Implementatior	TMC REG 2	CORE (Initially)	$ 250,000	$ 600,000	$ -	$ -	$ -	$ 250,000	$ 600,000	$ -	$ -	$ -	$ 250,000	$ -
Other	Project Name	Owner	Engineering	Construction	Year 1 Costs	Year 2 Costs	Year 3 Costs	Year 4 Costs	Year 5 Costs	Year 1 Costs	Year 2 Costs	Year 3 Costs	Year 4 Costs	Year 5 Costs
Regional ITS Architecture	OTH Arch 1	CORE MPO	$ 50,000	$ -	$ 50,000	$ -	$ -	$ -	$ -	$ 50,000	$ -	$ -	$ -	$ -
Parking Management Study	OTH PM 1	City of Savannah	$ 100,000	$ -	$ 100,000	$ -	$ -	$ -	$ -	$ 100,000	$ -	$ -	$ -	$ -
Parking Management System	OTH PM 2	City of Savannah	$ 50,000	$ 250,000	$ -	$ 50,000	$ 250,000	$ -	$ -	$ -	$ 50,000	$ -	$ -	$ -
Enhanced Traveler Informatio	OTH TI 1	City of Savannah	$ 100,000	$ 400,000	$ -	$ -	$ 100,000	$ 400,000	$ -	$ -	$ -	$ 100,000	$ -	$ -
WIM monitoring system	OTH WIM 1	Georgia DOT	$ 250,000	$ 1,000,000	$ -	$ -	$ -	$ 250,000	$ 1,000,000	$ -	$ -	$ -	$ 250,000	$ -
ITS Improvements on I-95	OTH I95 ITS	GDOT	$ 100,000	$ 900,000	$ -	$ -	$ 100,000	$ 900,000	$ -	$ -	$ -	$ 100,000	$ -	$ -

8 Appendix B – Signal Upgrade Projects

Owner		Cost	Year
City of Savannah	Engineering (study and design)	$ 60,000	1
Project Name	Construction	$ -	1
37th Street System Study	Total	$ 60,000	
Project Number	Potential funding source		
SIG 37TH 1			
Description			

Per City of Savannah 2014 inventory information the group of signals listed below are operating in "fixed time" system with no detection (actuation) in City of Savannah System 1. Four other intersections in system 1 are operating with detectors (actuated or semi-actuated). B242

Fixed time signals grouped for Sig #1:
37th Street @ Abercorn Street
37th Street @ Barnard Street
37th Street @ Bull Street
37th Street @ Drayton Street
37th Street @ East Broad Street
37th Street @ Habersham Street
37th Street @ Montgomery Street
37th Street @ Price Street
37th Street @ Whitaker Street

Owner		Cost	Year
City of Savannah	Engineering (study and design)	$ 20,000	1
Project Name	Construction	$ 180,000	1
37th Street Signal Upgrades - Part I	Total	$ 200,000	
Project Number	**Potential funding source**		
SIG 37TH UP1			
Description			

Per City of Savannah 2014 inventory information the group of signals listed below are operating on a "fixed time" system with no detection (actuation). This project would consist of installing detector loops to provide for more efficient intersection operation and shorter wait time. This increased efficiency would reduce motorists delay and idling time of vehicles which would also provide air quality benefits. As a part of the installation of the new in pavement loop detection the following would be needed and included in the project:

- In-pavement detector loops
- In-ground installation of pull-boxes for detector loop termination
- Conduit installation to connect pull-boxes to poles and signal cabinet
- Shielded cable to connect detector loops from pull-box to pull-box and the signal cabinet
- Modification to signal cabinet to include detector units that will allow the traffic signal controller to communicate with the installed in-pavement detector loops

For a listed intersection to operate with detection in lieu of fixed time operation an estimated eight loop installations, six pull boxes, cabinet modifications, approximately 1,500 feet of shielded cabling, and associated traffic engineering would be required.

Fixed time signals grouped for Sig #2:
37th Street @ Abercorn Street
37th Street @ Barnard Street
37th Street @ Bull Street
37th Street @ Drayton Street
37th Street @ East Broad Street
37th Street @ Habersham Street

Owner		Cost	Year
City of Savannah	Engineering (study and design)	$ 10,000	1
Project Name	Construction	$ 100,000	1
37th Street Signal Upgrades - Part II	Total	$ 110,000	
Project Number	Potential funding source		
SIG 37TH UP2			
Description			

Per City of Savannah 2014 inventory information the group of signals listed below are operating on a "fixed time" system with no detection (actuation). This project would consist of installing detector loops to provide for more efficient intersection operation and shorter wait time. This increased efficiency would reduce motorists delay and idling time of vehicles which would also provide air quality benefits. As a part of the installation of the new in pavement loop detection the following would be needed and included in the project:

- In-pavement detector loops
- In-ground installation of pull-boxes for detector loop termination
- Conduit installation to connect pull-boxes to poles and signal cabinet
- Shielded cable to connect detector loops from pull-box to pull-box and the signal cabinet
- Modification to signal cabinet to include detector units that will allow the traffic signal controller to communicate with the installed in-pavement detector loops

For a listed intersection to operate with detection in lieu of fixed time operation an estimated eight loop installations, six pull boxes, cabinet modifications, approximately 1,500 feet of shielded cabling, and associated traffic engineering would be required.

Fixed time signals grouped for Sig #1:
37th Street @ Abercorn Street
37th Street @ Barnard Street
37th Street @ Bull Street
37th Street @ Drayton Street
37th Street @ East Broad Street
37th Street @ Habersham Street
37th Street @ Montgomery Street
37th Street @ Price Street
37th Street @ Whitaker Street

Owner		Cost	Year
City of Savannah	Engineering (study and design)	$ 100,000	2
Project Name	Construction	$ -	2
Abercorn Street system study	Total	$ 100,000	
Project Number	**Potential funding source**		
SIG AB 1			
Description			

This project would involve optimizing the coordination timing of the corridor. System 2 has twenty three signals in the system. The signals in this system already operate under fiber optic communication and are all fully actuated. The System 2 signals grouped for this project are listed in the table below.

Intersection	Operation	Com	System
Abercorn St. (SR 204) @ Apache Ave.	Actuated	D	2
Abercorn St. (SR 204) @ Arts Dr.	Actuated	D	2
Abercorn St. (SR 204) @ Deerfield Rd.	Actuated	D	2
Abercorn St. (SR 204) @ Eisenhower Dr.	Actuated	D	2
Abercorn St. (SR 204) @ Jackson Blvd.	Actuated	D	2
Abercorn St. (SR 204) @ Janet Dr.	Actuated	D	2
Abercorn St. (SR 204) @ Largo Dr.	Actuated	D	2
Abercorn St. (SR 204) @ Lee Blvd.	Actuated	D	2
Abercorn St. (SR 204) @ Mall Blvd.	Actuated	D	2
Abercorn St. (SR 204) @ Mercy Blvd.	Actuated	D	2
Abercorn St. (SR 204) @ Montgomery Cross (SR 204sp)	Actuated	D	2
Abercorn St. (SR 204) @ Rio Rd.	Actuated	D	2
Abercorn St. (SR 204) @ Science Dr.	Actuated	D	2
Abercorn St. (SR 204) @ Stephenson Ave.	Actuated	D	2
Abercorn St. (SR 204) @ Television Circle	Actuated	D	2
Abercorn St. (SR 204) @ Tibet Ave.	Actuated	D	2
Abercorn St. (SR 204) @Tri Kell (Oglethorpe Plaza)	Actuated	D	2
Abercorn St. (SR 204) @ Truman Pkwy.	Actuated	D	2
Abercorn St. (SR 204) @ White Bluff Connector	Actuated	D	2
Abercorn St. (SR 204) @ White Bluff Rd.	Actuated	D	2
Abercorn St. (SR 204) @ Wilshire Blvd.	Actuated	D	2
Apache Ave. @ Fulton Rd.	Actuated	D	2
White Bluff Rd. @ Mall Way	Actuated	D	2

D- Direct Connect (Fiber Optic)

Owner		Cost	Year
City of Savannah	Engineering (study and design)	$ 100,000	2
Project Name	Construction	$ -	2
Anderson/Henry Street System Study	Total	$ 100,000	
Project Number	Potential funding source		
SIG AH 1			
Description			

This project would involve optimizing the coordination timing of the corridor. System 3 has twelve signals in the system. The signals in this system already operate under fiber optic communication and have mixed operations ranging from fixed time to fully actuated operation. Both Anderson Street and Henry Street are one-way pairs and fixed time intersections can function efficiently and are not recommended to be actuated at this time. The System 3 signals grouped for this project are listed in the table below.

Intersection	Operation	Com	System
Anderson St. @ Abercorn St.	Fixed Timing	D	3
Anderson St. @ Barnard St.	Semi-actuated	D	3
Anderson St. @ Bull St.	Semi-actuated	D	3
Anderson St. @ Drayton St.	Fixed Timing	D	3
Anderson St. @ East Broad St.	Fixed Timing	D	3
Anderson St. @ Habersham St.	Semi-actuated	D	3
Anderson St. @ Harmon St.	Semi-actuated	D	3
Anderson St. @ MLK Blvd.	Fixed Timing	D	3
Anderson St. @ Montgomery St.	Fixed Timing	D	3
Anderson St. @ Price St.	Fixed Timing	D	3
Anderson St. @ Waters Ave.	Fixed Timing	D	3
Anderson St. @ Whitaker St.	Fixed Timing	D	3
Henry St. @ Abercorn St.	Fixed Timing	D	3
Henry St. @ Barnard St.	Semi-actuated	D	3
Henry St. @ Bull St.	Semi-actuated	D	3
Henry St. @ Drayton St.	Fixed Timing	D	3
Henry St. @ East Broad St.	Fixed Timing	D	3
Henry St. @ Habersham St.	Semi-actuated	D	3
Henry St. @ Harmon St.	Semi-actuated	D	3
Henry St. @ MLK Blvd.	Fixed Timing	D	3
Henry St. @ Montgomery St.	Fixed Timing	D	3
Henry St. @ Price St.	Fixed Timing	D	3
Henry St. @ Waters Ave.	Fixed Timing	D	3
Henry St. @ Whitaker St.	Fixed Timing	D	3

D- Direct connected (Fiber Optic)

Owner		Cost	Year
City of Savannah	Engineering (study and design)	$ 50,000	2
Project Name	Construction	$ -	2
Broughton Street system study	Total	$ 50,000	
Project Number	Potential funding source		
SIG BR 1			
Description			

This project would involve optimizing the coordination timing of the corridor. System 4 has twelve signals in the system. The signals in this system already operate under fiber optic communication and are all actuated. The System 4 signals grouped for this project are listed in the table below.

Intersection	Operation	Com	System
Bay St. @ Abercorn St.	Actuated	D	4
Bay St. @ Barnard St.	Actuated	D	4
Bay St. @ Bull St.	Semi-actuated	D	4
Bay St. @ Drayton St.	Semi-actuated	D	4
Bay St. @ Houston St.	Semi-actuated	D	4
Bay St. @ Jefferson St.	Actuated	D	4
Bay St. @ Lincoln St.	Actuated	D	4
Bay St. @ Montgomery St.	Actuated	D	4
Bay St. @ Whitaker St.	Semi-actuated	D	4
Bay St. (SR 25 Conn.) @ East Broad St.	Actuated	D	4
Bay St. (SR 25 Conn.) @ Fahm St.	Actuated	D	4
Bay St. (SR 25 Conn.) @ MLK Blvd. (SR 25 Conn.)	Semi-actuated	D	4

D- Direct connected (Fiber Optic)

Owner		Cost	Year
City of Savannah	Engineering (study and design)	$ 50,000	1
Project Name	Construction	$ -	1
Broughton Street / Liberty Street / Oglethorpe Avenue System Study	Total	$ 50,000	
Project Number	Potential funding source		
SIG C5 1			
Description			

This project would involve optimizing the coordination timing of the corridor. System 5 has nineteen signals in the system. The signals in this system already operate under copper twisted pair communication and are all fully actuated. The System 5 signals grouped for this project are listed in the table below.

Intersection	Operation	Com	System
Broughton St. @ Abercorn St.	Fixed Time	C	5
Broughton St. @ Barnard St.	Fixed Time	C	5
Broughton St. @ Bull St.	Fixed Time	C	5
Broughton St. @ Drayton St.	Fixed Time	C	5
Broughton St. @ Jefferson St.	Fixed Time	C	5
Broughton St. @ Montgomery St.	Fixed Time	C	5
Broughton St. @ Price St.	Fixed Time	C	5
Broughton St. @ Whitaker St.	Fixed Time	C	5
Liberty St. @ Abercorn St.	Fixed Time	C	5
Liberty St. @ Drayton St.	Fixed Time	C	5
Liberty St. @ East Broad St.	Actuated	C	5
Liberty St. @ Habersham St.	Semi-actuated	C	5
Liberty St. @ Price St.	Fixed Time	C	5
Liberty St. @ Whitaker St.	Semi-actuated	C	5
Oglethorpe Ave. @ Abercorn St/Floyd St(fire station)	Fixed Time	C	5
Oglethorpe Ave. @ Drayton St.	Fixed Time	C	5
Oglethorpe Ave. @ Habersham St.	Semi-actuated	C	5
Oglethorpe Ave. @ Price St.	Fixed Time	C	5
Oglethorpe Ave. @ Whitaker St.	Fixed Time	C	5

Owner		Cost	Year
City of Savannah	Engineering (study and design)	$ 40,000	1
Project Name	Construction	$ -	1
DeRenne Ave System Study	Total	$ 40,000	
Project Number	Potential funding source		
SIG DA 1			

Description

This project would involve optimizing the coordination timing of the corridor. System 7 has nine signals in the system. The signals in this system already operate under direct connect fiber optic communication and are all fully actuated. The System 7 signals grouped for this project are listed in the table below.

Intersection	Operation	Com	System
DeRenne Ave. (SR 21) @ Abercorn St.	Actuated	D	7
DeRenne Ave. @ Habersham St.	Actuated	D	7
DeRenne Ave. (SR 21) @ Montgomery St.	Actuated	D	7
DeRenne Ave. @ Paulsen St.	Actuated	D	7
DeRenne Ave. @ Reynolds St.	Actuated	D	7
DeRenne Ave. @ Truman Pkwy. NB	Actuated	D	7
DeRenne Ave. @ Truman Pkwy. SB	Actuated	D	7
DeRenne Ave. @ Waters Ave.	Actuated	D	7
DeRenne Ave. (SR 21) @ White Bluff Rd./Bull St.	Actuated	D	7
D- Direct connected (Fiber Optic)			

Owner		Cost	Year
City of Savannah	Engineering (study and design)	$ 60,000	1
Project Name	Construction	$ -	1
MLK Boulevard / Montgomery Street System Study - Part I	Total	$ 60,000	
Project Number	Potential funding source		
SIG MLK UP1			

Description

This project would involve optimizing the coordination timing of the corridor. System 11 has seventeen signals in the system. The signals in this system already operate under direct connect fiber optic communication and are a mixture of fixed time, semi-actuated, and fully actuated intersections. The System 11 signals grouped for this project are listed in the table below.

Intersection	Operation	Com	System
Liberty St. @ Montgomery St.	Fixed Time	D	11
MLK Blvd. @ Gwinnett St.	Actuated	D	11
MLK Blvd. @ Hall St.	Actuated	D	11
MLK Blvd. @ I-16 Off ramp/Gaston St.	Actuated	D	11
MLK Blvd. @ Jones St.	Actuated	D	11
MLK Blvd. @ Liberty St./Louisville Rd.	Semi-actuated	D	11
MLK Blvd. @ McDonough St. (Ped Crossing)	Semi-actuated	D	11
MLK Blvd. @ Taylor St./I-16 On ramp	Semi-actuated	D	11
MLK Blvd. (SR 25 Conn.) @ Broughton	Actuated	D	11
MLK Blvd. (SR 25 Conn.) @ Oglethorpe	Semi-actuated	D	11
Montgomery St. @ 52nd St.	Actuated	D	11
Montgomery St. @ 54th St.	Actuated	D	11
Montgomery St. @ 55th St.	Actuated	D	11
Montgomery St. @ Exchange St.	Actuated	D	11
Montgomery St. @ Gwinnett St.	Fixed Time	D	11
Montgomery St. @ Staley Ave.	Actuated	D	11
Oglethorpe Ave. @ Montgomery St.	Semi-actuated	D	11
D- Direct connected (Fiber Optic)			

Owner		Cost	Year
City of Savannah	Engineering (study and design)	$ 70,000	2
Project Name	Construction	$ -	2
MLK Boulevard / Montgomery Street System Study - Part II	Total	$ 70,000	
Project Number	Potential funding source		
SIG MLK UP2			

Description

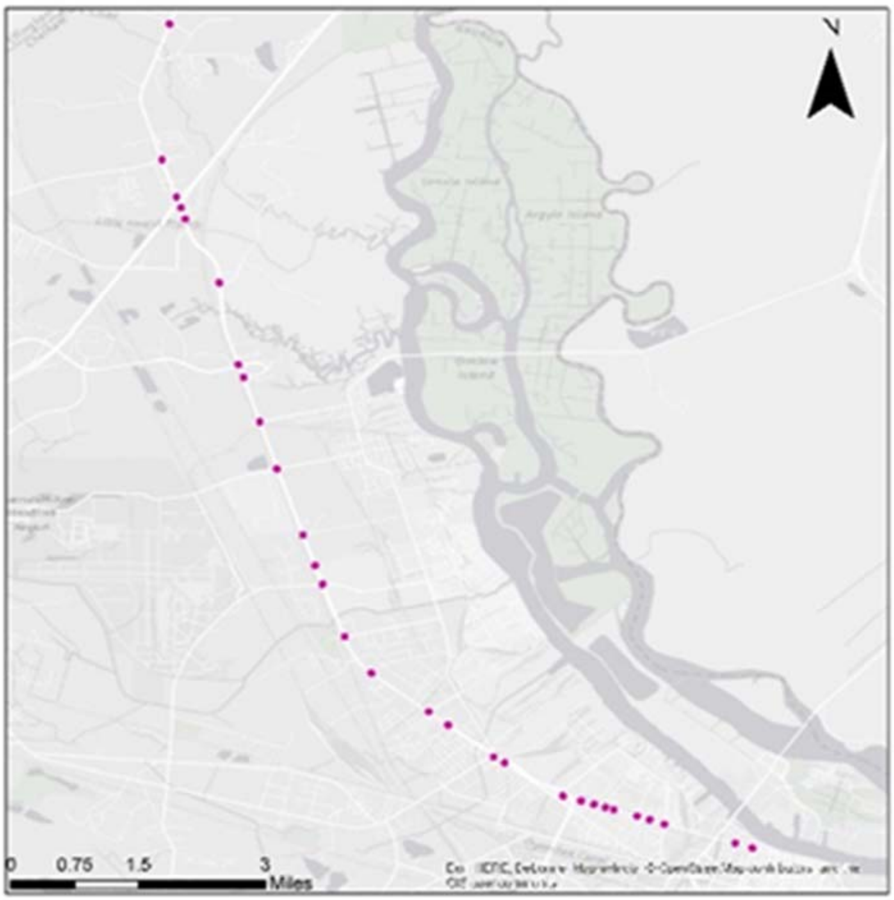
This project would involve optimizing the coordination timing of the corridor. System 15 has eighteen signals in the system. The signals in this system already operate under direct connect fiber optic communication and are a mixture of semi-actuated and fully actuated intersections. The System 15 signals grouped for this project are listed in the table below.

Intersection	Operation	Com	System
Victory Dr. (SR 26) @ Abercorn St. (S	Actuated	D	15
Victory Dr. (SR 26) @ Barnard St.	Actuated	D	15
Victory Dr. (SR 26) @ Bee Rd.	Actuated	D	15
Victory Dr. (SR 26) @ Bull St.	Semi-actuated	D	15
Victory Dr. (SR 26) @ Crossroads Sho	Actuated	D	15
Victory Dr. @ Dixie Ave.	Actuated	D	15
Victory Dr. (SR 26) @ Habersham St.	Actuated	D	15
Victory Dr. (SR 26) @ MLK Blvd.	Actuated	D	15
Victory Dr. (SR 26) @ Montgomery St.	Actuated	D	15
Victory Dr. (SR 26) @ Paulsen St.	Actuated	D	15
Victory Dr. (SR 26) @ Price St./Chatha	Actuated	D	15
Victory Dr. (SR 26) @ Reynolds St.	Actuated	D	15
Victory Dr. (SR 26) @ Skidaway Rd.	Actuated	D	15
Victory Dr. (SR 26) @ Truman Pkwy. N	Actuated	D	15
Victory Dr. (SR 26) @ Truman Pkwy. S	Actuated	D	15
Victory Dr. (SR 26) @ Wallin St.	Actuated	D	15
Victory Dr. (SR 26) @ Waters Ave.	Actuated	D	15
Victory Dr. (SR 26) @ Whitaker St.	Actuated	D	15

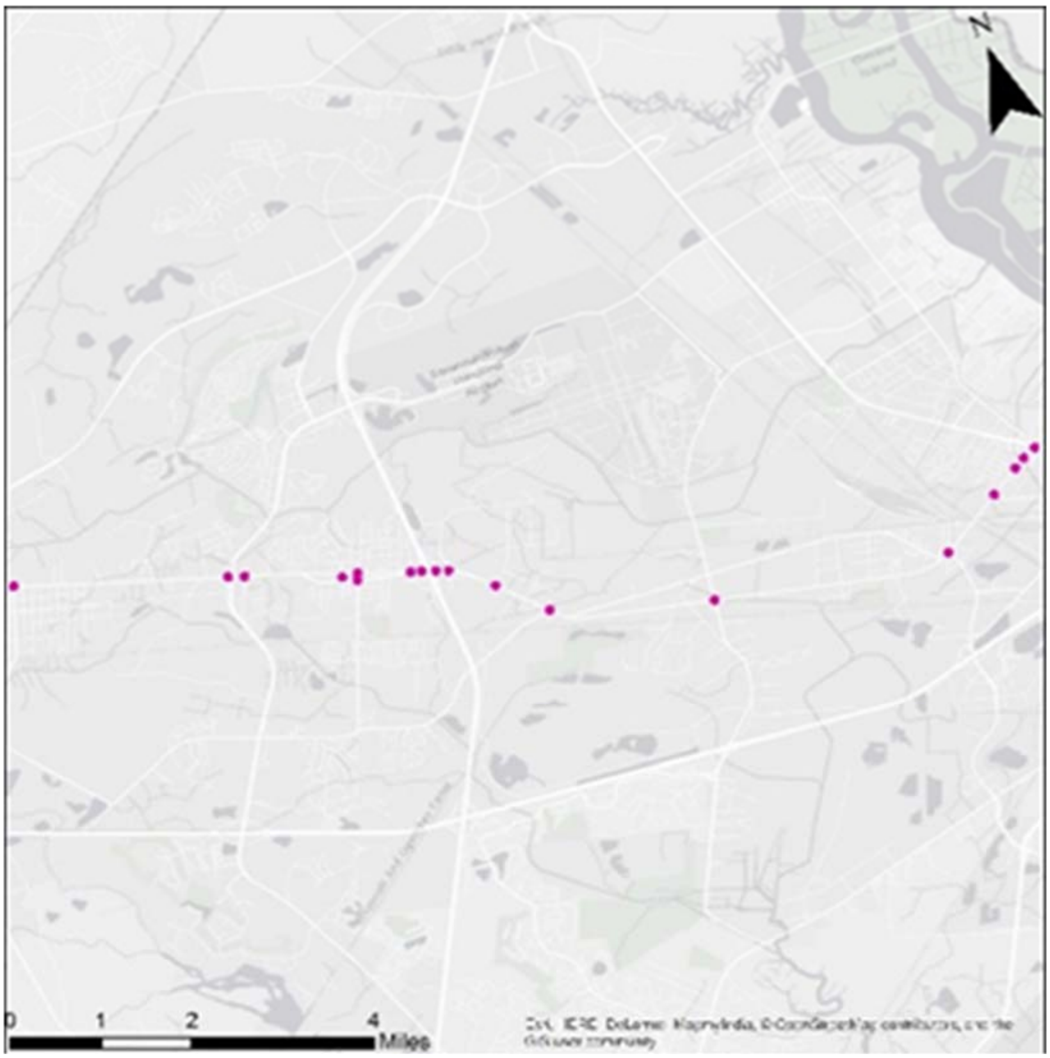
D- Direct connected (Fiber Optic)

Owner		Cost	Year
GDOT	Engineering (study and design)	$ 250,000	1
Project Name	Construction	$ 100,000	2
Southern Corridor/Victory Drive	Total	$ 350,000	
Project Number	Potential funding source		
SIG SOUTH	RTOP program		
Description			
GDOT RTOP program to improve and coordinate signal timing on the corridor. This project would involve optimizing the timing of the corridor and evaluating potential improvements at each intersections.			

Owner		Cost	Year
GDOT	Engineering (study and design)	$ 250,000	2
Project Name	Construction	$ 100,000	3
Northern Corridor/ GA 21 Bay Street	Total	$ 350,000	
Project Number	Potential funding source		
SIG NORTH	RTOP		
Description			
GDOT RTOP program to improve and coordinate signal timing on the corridor. This project would involve optimizing the timing of the corridor and evaluating potential improvements at each intersections.			



Owner		Cost	Year
GDOT	Engineering (study and design)	$ 250,000	3
Project Name	Construction	$ 100,000	4
Western Corridor/ US 80	Total	$ 350,000	
Project Number	Potential funding source		
SIG WEST	RTOP		
Description			
GDOT RTOP program to improve and coordinate signal timing on the corridor. This project would involve optimizing the timing of the corridor and evaluating potential improvements at each intersections.			

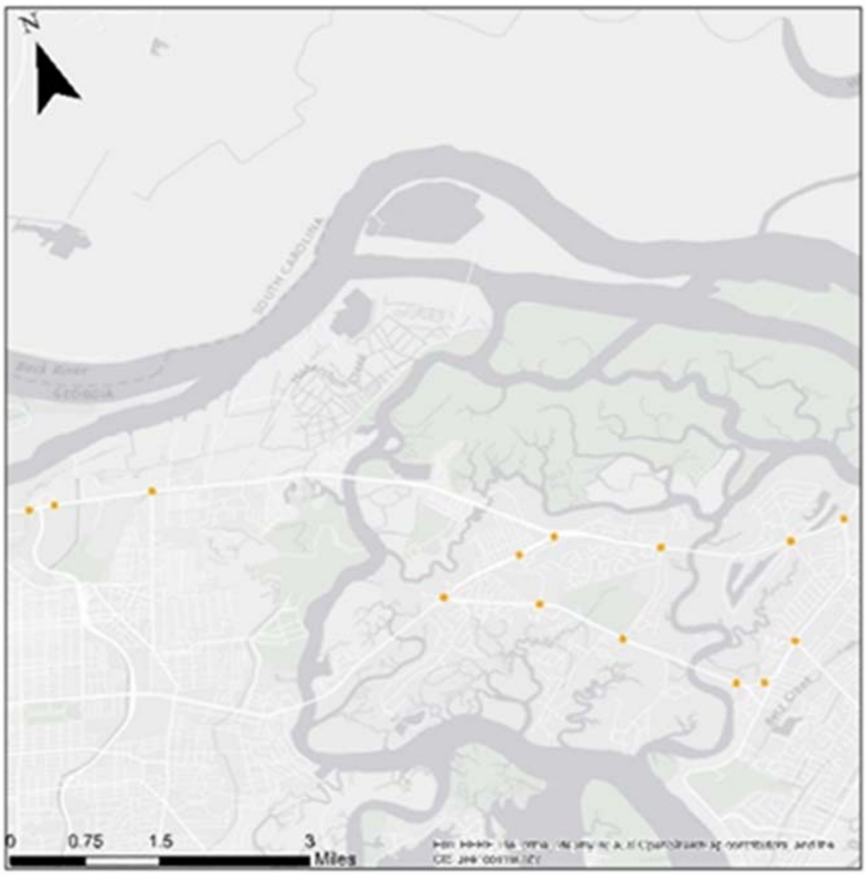


Owner		Cost	Year
GDOT	Engineering (study and design)	$ 100,000	3
Project Name	Construction	$ 50,000	4
GA 25	Total	$ 150,000	
Project Number	Potential funding source		
SIG GA 25	RTOP		

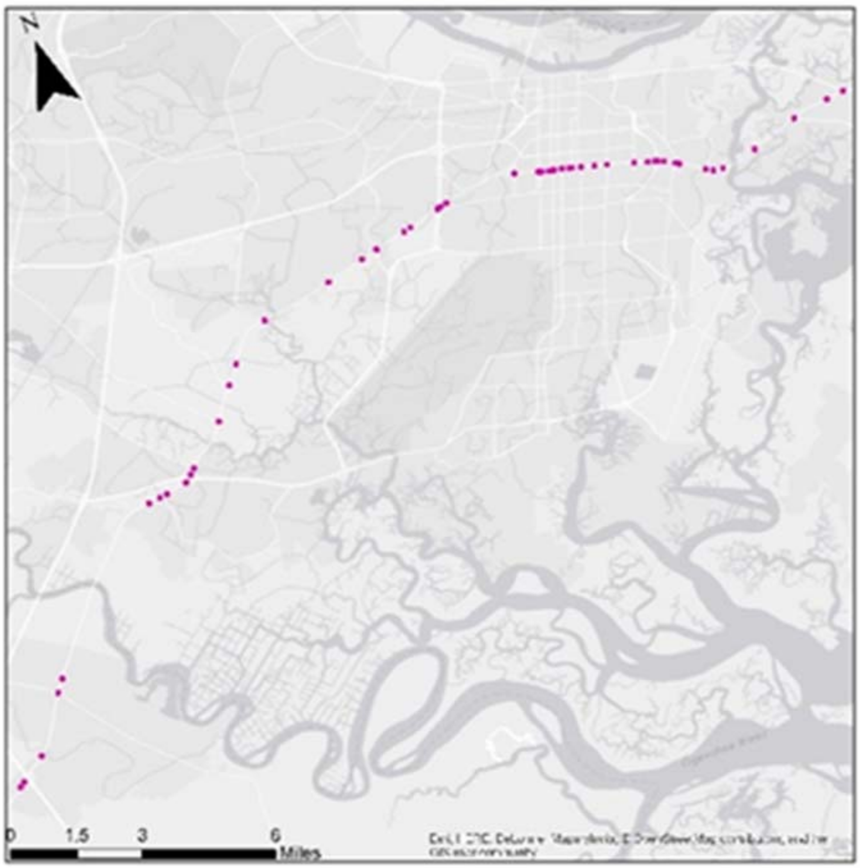
Description
After the northern corridor is running, update to include GA 25 in corridor. This project would involve optimizing the timing of the corridor and evaluating potential improvements at each intersections.

		Cost	Year
Owner			
GDOT	Engineering (study and design)	$ 100,000	4
Project Name	Construction	$ 50,000	5
GA 204/ Whitfield Avenue	Total	$ 150,000	
Project Number	**Potential funding source**		
SIG GA 204			
Description			
This project would involve optimizing the timing of the corridor and evaluating potential improvements at each intersections.			

Owner		Cost	Year
Chatham County	Engineering (study and design)	$ 200,000	1
Project Name	Construction	$ 100,000	2
Islands Expressway/Johnny Mercer	Total	$ 300,000	
Project Number	Potential funding source		
SIG ISLEX			
Description			
Coordinate and improve signals on the Islands Expressway and Johnny Mercer Boulevard. This project would involve optimizing the timing of the corridor and evaluating potential improvements to each intersections.			

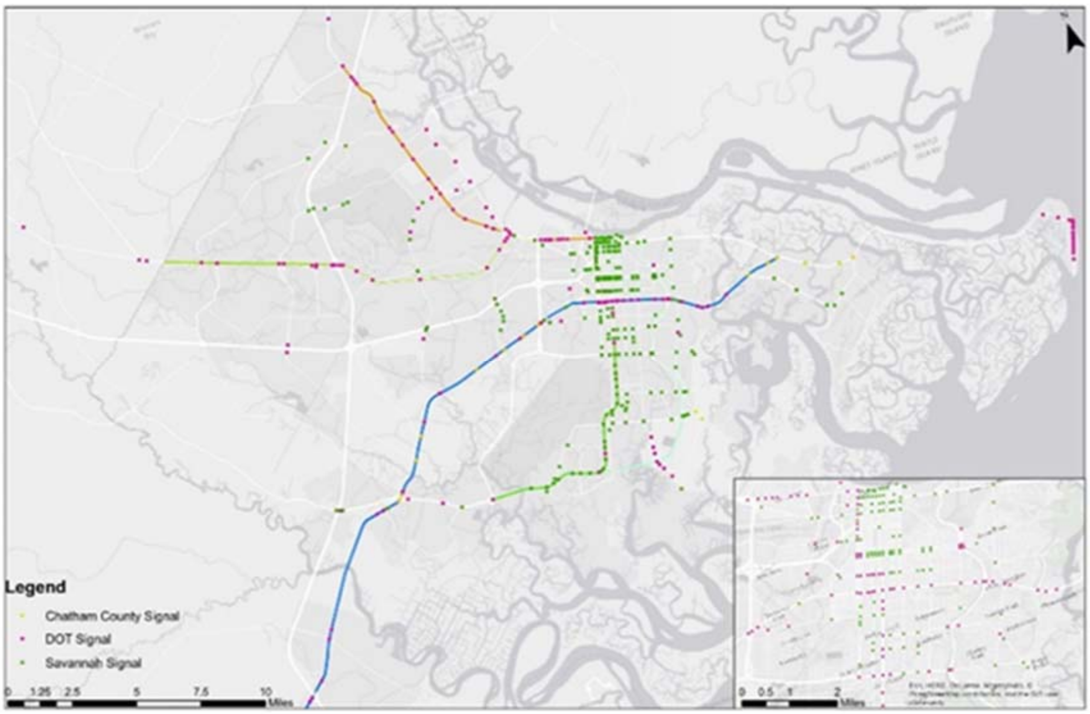


Owner		Cost	Year
Chatham County	Engineering (study and design)	$ 250,000	2
Project Name	Construction	$ 100,000	3
Southern Corridor	Total	$ 350,000	
Project Number	Potential funding source		
SIG SOUTH CHAT	RTOP		
Description			
Coordinate with GDOT's RTOP program on the southern corridor. The section will include US 17 from Chevis Road to Highway 80 at Tybrisa Street on Tybee. In addition, the signals on Johny Mercer will be included. This project would involve optimizing the timing of the corridor and evaluating potential improvements to each intersections. Ongoing operations coordinated with GDOT			



Owner		Cost	Year
Chatham County	Engineering (study and design)	$ 250,000	4
Project Name	Construction	$ 100,000	5
Other Signals	Total	$ 350,000	
Project Number	Potential funding source		
SIG CHAT OTH			

Description
This project would involve reviewing the remaining signals owned and operated by Chatham County. Each signal will be reviewed and optimizing, and potentially integrated into a nearby corridor. Evaluation will include potential improvements to each intersections.



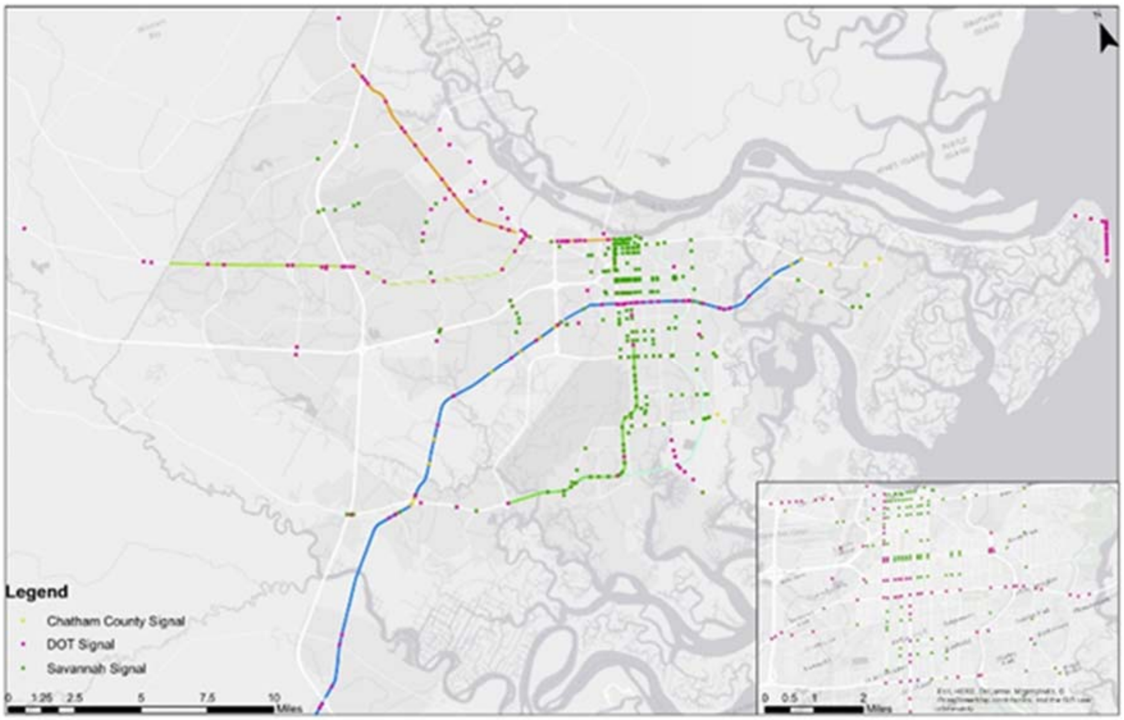
Owner		Cost	Year
City of Pooler	Engineering (study and design)	$ 100,000	4
Project Name	Construction	$ 20,000	5
Pooler	Total	$ 120,000	
Project Number	Potential funding source		
SIG POOLER			
Description			
This project would involve reviewing the remaining signals owned and operated by Chatham County. Each signal will be reviewed and optimizing, and potentially integrated into a nearby corridor. Evaluation will include potential improvements to each intersections. Improvements are expected to be minimal.			

Owner		Cost	Year
City of Pooler	Engineering (study and design)	$ 35,000	1
Project Name	Construction	$ 100,000	2
Pooler	Total	$ 135,000	
Project Number	Potential funding source		
SIG POOLER AIRPORT			
Description			
This project would involve reviewing the remaining signals owned and operated by Chatham County. Each signal will be reviewed and optimizing, and potentially integrated into a nearby corridor. Evaluation will include potential improvements to each intersections. Improvements are expected to be minimal.			

Owner		Cost	Year
Chatham County	Engineering (study and design)	$ 30,000	1
Project Name	Construction	$ 100,000	2
Upgrade All Signals to Min GDOT Stnd	Total	$ 130,000	
Project Number	Potential funding source		
SIG CHAT UPGRADE			

Description

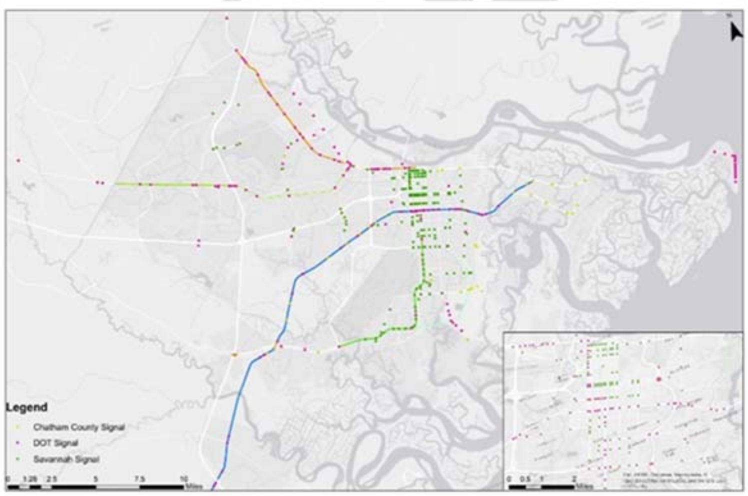
This project would involve reviewing the remaining signals owned and operated by Chatham County. Each signal will be reviewed and optimizing, and potentially integrated into a nearby corridor. Evaluation will include potential improvements to each intersections.



9 Appendix C – Communications Projects

Owner		Cost	Year
City of Savannah	Engineering (study and design)	$ 180,000	1
Project Name	Construction	$ -	1
Regional Communications Plan	Total	$ 180,000	
Project Number	Potential funding source		
COM REG 1			
Description			

This project is a regional plan to determine the best needs and critical links for a regional communications network. This network may be a hybrid system of wired and wireless. It will need to connect field devices to TMCs and TMCs to each other. Security and bandwidth needs will be determined. Robustness and survivability are critical components.



Owner		Cost	Year
City of Savannah	Engineering (study and design)	$ 13,500	1
Project Name	Construction	$ 121,500	2
37th Street System Com Upgrade	Total	$ 135,000	
Project Number	Potential funding source		
COM 37TH UP1			
Description			

This project would include upgrading the 37th Street coordinated system (System 1) communications from copper twisted pair cable to fiber optic communication cable using existing conduit. System appurtenances including fiber optic switches (14), splices, splice boxes (14), cabinet upgrades (14), and new fiber optic cable (7,000 ft) would be included. System 1 signals grouped for this project are listed in the table below.

Fixed time signals grouped for Sig #1:
37th Street @ Abercorn Street
37th Street @ Barnard Street
37th Street @ Bull Street
37th Street @ Drayton Street
37th Street @ East Broad Street
37th Street @ Habersham Street
37th Street @ Montgomery Street
37th Street @ Price Street
37th Street @ Whitaker Street

		Cost	Year
Owner		Cost	Year
City of Savannah	Engineering (study and design)	$ 18,500	1
Project Name	Construction	$ 166,500	2
Broughton Street / Liberty Street / Ogle	Total	$ 185,000	
Project Number	Potential funding source		
COM C5 1			
Description			

This project would include upgrading the Broughton Street system (corridor 5) communications from copper twisted pair cable to fiber optic communication cable using existing conduit. System appurtenances including fiber optic switches (19), splices, splice boxes (19), cabinet upgrades (19), and new fiber optic cable (7,000 ft) would be included. The System 5 signals grouped for this project are listed in the table below.

Intersection	Operation	Com	System
Broughton St. @ Abercorn St.	Fixed Time	C	5
Broughton St. @ Barnard St.	Fixed Time	C	5
Broughton St. @ Bull St.	Fixed Time	C	5
Broughton St. @ Drayton St.	Fixed Time	C	5
Broughton St. @ Jefferson St.	Fixed Time	C	5
Broughton St. @ Montgomery St.	Fixed Time	C	5
Broughton St. @ Price St.	Fixed Time	C	5
Broughton St. @ Whitaker St.	Fixed Time	C	5
Liberty St. @ Abercorn St.	Fixed Time	C	5
Liberty St. @ Drayton St.	Fixed Time	C	5
Liberty St. @ East Broad St.	Actuated	C	5
Liberty St. @ Habersham St.	Semi-actuated	C	5
Liberty St. @ Price St.	Fixed Time	C	5
Liberty St. @ Whitaker St.	Semi-actuated	C	5
Oglethorpe Ave. @ Abercorn St/Floyd St(fire station)	Fixed Time	C	5
Oglethorpe Ave. @ Drayton St.	Fixed Time	C	5
Oglethorpe Ave. @ Habersham St.	Semi-actuated	C	5
Oglethorpe Ave. @ Price St.	Fixed Time	C	5
Oglethorpe Ave. @ Whitaker St.	Fixed Time	C	5

C- Copper twisted pair

Owner		Cost	Year
City of Savannah	Engineering (study and design)	$ 19,000	1
Project Name	Construction	$ 171,000	2
Airways Avenue System Upgrade	Total	$ 190,000	
Project Number	Potential funding source		
COM			

Description

This project would include upgrading the Airways Ave. / Pooler Parkway system communications from time based communication to direct fiber optic communications. System appurtenances including fiber optic switches (7), splices, splice boxes (7), pull boxes (16), cabinet upgrades (7), and new conduit with fiber optic cable (9,000 ft) would be included. The System 19 signals grouped for this project are listed in the table below.

Intersection	Operation	Com	System
Airways Ave. @ Crossroads Pkwy.	Actuated	T	19
Airways Ave. @ Gulfstream Facility Driveway	Actuated	T	19
Airways Ave. @ Gulfstream Rd.	Actuated	T	19
Airways Ave. @ I-95 NB (SR 405)	Actuated	T	19
Airways Ave. @ I-95 SB (SR 405)	Actuated	T	19
Pooler Parkway @ Benton Blvd.	Actuated	T	19
Pooler Parkway @ Mill Creek Circle	Actuated	T	19

T- Time based coordination

Owner		Cost	Year
GDOT	Engineering (study and design)	$ 100,000	2
Project Name	Construction	$ 500,000	3
I-95 Interchange	Total	$ 600,000	
Project Number	Potential funding source		
COM GDOT 95			

Description

Design and install communications network in the I-95 and I-16 corridors as GDOT expands and installs ITS equipment. The communications network will both serve connectivity for field devices as well as addressing regional communications

Owner		Cost	Year
GDOT	Engineering (study and design)	$ 50,000	3
Project Name	Construction	$ 250,000	4
Communications Gap State	Total	$ 300,000	
Project Number	Potential funding source		
COM GAP GDOT			
Description			
Design and install communications network to both serve connectivity for stand alone field devices as well as addressing regional communications			

Owner		Cost	Year
Chatham County	Engineering (study and design)	$ 50,000	3
Project Name	Construction	$ 250,000	4
Communications Gap Chatham	Total	$ 300,000	
Project Number	Potential funding source		
COM GAP CHT			
Description			
Design and install communications network to both serve connectivity for stand alone field devices as well as addressing regional communications			

10 Appendix D – Traffic Management Center Projects

Owner		Cost	Year
City of Savannah	Engineering (study and design)	$ 50,000	1
Project Name	Construction		
Savannah TMC Needs and Requirements	Total	$ 50,000	
Project Number	**Potential funding source**		
TMC SV 1			

Description

This project will consist of an engineering study to identify the needs of the City of Savannah and the traffic engineering department. Based on these needs, an initial set of requirements will be developed that best address the type of TMC, its location, and the functions necessary.

Owner		Cost	Year
Chatham County Traffic	Engineering (study and design)	$ 50,000	2
Project Name	Construction		
Chatham TR TMC Needs and Requirements	Total	$ 50,000	
Project Number	**Potential funding source**		
TMC CT 1			

Description

This project will consist of an engineering study to identify the needs of Chatham County and the traffic engineering department. Based on these needs, an initial set of requirements will be developed that best address the type of TMC, its location, and the functions necessary.

Owner		Cost	Year
City of Savannah	Engineering (study and design)	$ 50,000	2
Project Name	Construction	$ 500,000	3
Savannah TMC Upgrade 1	Total	$ 550,000	
Project Number	**Potential funding source**		
TMC SV 2			

Description

This project will provide final design and construction of the next generation TMC for the City of Savannah. The project is currently assumed to involve construction of a room within an existing building and will also include necessary communications, hardware, and software to provide all required functionality.

Owner		Cost	Year
Chatham County Traffic	Engineering (study and design)	$ 50,000	2
Project Name	Construction		
Chatham TR TMC Needs and Requirements	Total	$ 50,000	
Project Number	Potential funding source		
TMC CT 1			

Description
This project will consist of an engineering study to identify the needs of Chatham County and the traffic engineering department. Based on these needs, an initial set of requirements will be developed that best address the type of TMC, its location, and the functions necessary.

Owner		Cost	Year
Chatham County Traffic	Engineering (study and design)	$ 50,000	2
Project Name	Construction	$ 500,000	3
Chatham TMC Upgrade 1	Total	$ 550,000	
Project Number	**Potential funding source**		
TMC CT 2			

Description

This project will provide final design and construction of the next generation TMC for Chatham County. The project is currently assumed to involve construction of a room within an existing building and will also include necessary communications, hardware, and software to provide all required functionality.

Owner		Cost	Year
Georgia DOT	Engineering (study and design)		
Project Name	Construction	$ 20,000	1
GDOT Regional TMC Implementation	Total	$ 20,000	
Project Number	**Potential funding source**		
TMC GDOT 1			

Description

Using the statewide Navigator system, GDOT will implement a regional TMC from their district office. The TMC will not require any building construction and will be included as part of the current statewide system. This does not include field devices.

Owner		Cost	Year
City of Pooler	Engineering (study and design)	$ 20,000	2
Project Name	Construction		
Pooler TMC Needs and Requirements	Total	$ 20,000	
Project Number	Potential funding source		
TMC PL 1	Include in other study?		
Description			

This project will consist of an engineering study to identify the needs of the City of Pooler and the traffic engineering department. Based on these needs, an initial set of requirements will be developed that best address the type of TMC, its location, and the functions necessary.

Owner		Cost	Year
City of Pooler	Engineering (study and design)	$ 30,000	3
Project Name	Construction	$ 70,000	4
Pooler TMC Initial Implementation	Total	$ 100,000	
Project Number	Potential funding source		
TMC PL 2			
Description			

This project will provide final design and construction of the next generation TMC for the City of Pooler The project is currently assumed to **not** involve construction of a room or building but will include necessary communications, hardware, and software to provide all required functionality.

Owner		Cost	Year
Chatham County Traffic	Engineering (study and design)	$ 50,000	2
Project Name	Construction		
Chatham TR TMC Needs and Requirements	Total	$ 50,000	
Project Number	**Potential funding source**		
TMC CT 1			

Description

This project will consist of an engineering study to identify the needs of Chatham County and the traffic engineering department. Based on these needs, an initial set of requirements will be developed that best address the type of TMC, its location, and the functions necessary.

Owner		Cost	Year
CORE (Initially)	Engineering (study and design)	$ 100,000	4
Project Name	Construction	$ -	5
Regional TMC Integration Study	Total	$ 100,000	
Project Number	**Potential funding source**		
TMC REG 1			

Description

This study will examine how the region should integrate the various TMCs. This will likely include integration with the statewide 511 system, with the additional possibility of creating a more regional traveler information system. A physical TMC may not be required, if a more virtual integration is possible. This study should also examine areas where TMCs can serve as backup locations for other TMCs within the region.

Owner		Cost	Year
CORE (Initially)	Engineering (study and design)	$ 250,000	4
Project Name	Construction	$ 600,000	5
Regional TMC Implementation	Total	$ 850,000	
Project Number	**Potential funding source**		
TMC REG 2			

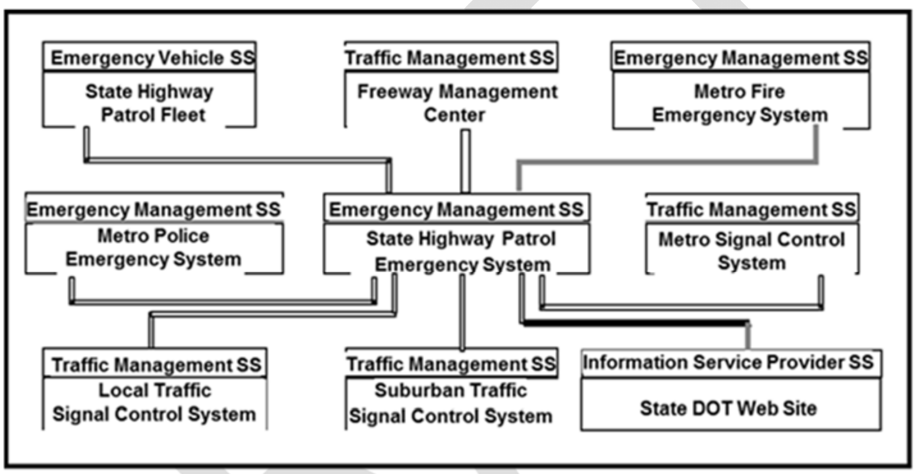
Description

This project is meant to address a variety of systems throughout the region. It is a contract mechanism to allow the various agencies to build and integrate backup systems as determined in TMC REG 1 study.

11 Appendix E – Other Projects

Owner		Cost	Year
CORE MPO	Engineering (study and design)	$ 50,000	1
Project Name	Construction	$ -	
Regional ITS Architecture	Total	$ 50,000	
Project Number	Potential funding source		
OTH Arch 1			
Description			

In order to receive federal ITS funding, a project must be considered as part of an ITS Architecture. Many of the projects in the Savannah area would be considered initially under the statewide ITS Architecture. As the region looks to expand the number of ITS projects, a regional ITS architecture will be more viable and expected from FHWA.



Federal Regional ITS Architecture Requirements
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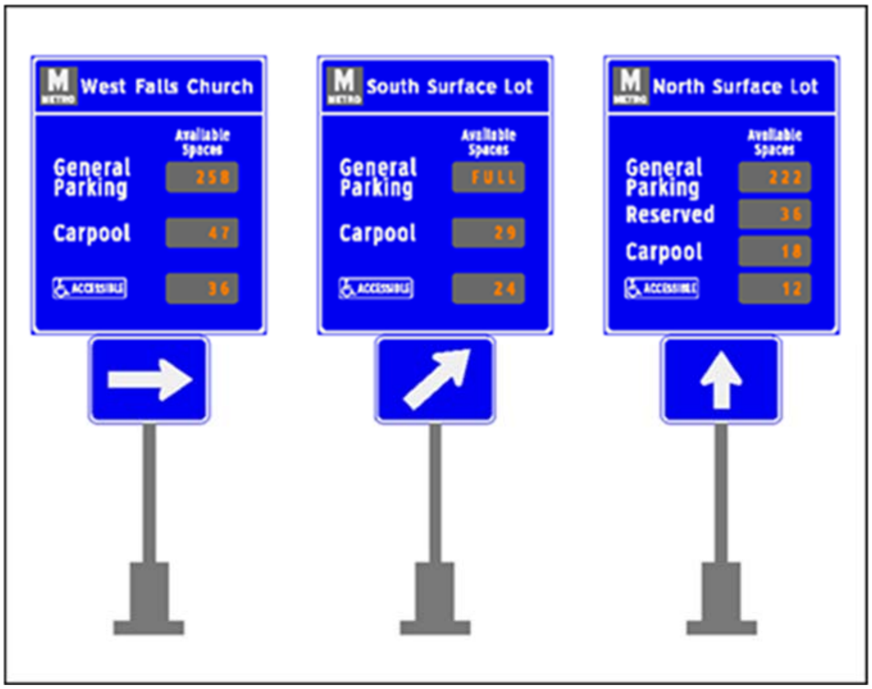
Owner		Cost	Year
City of Savannah	Engineering (study and design)	$ 100,000	1
Project Name	Construction	$ -	
Parking Management Study	Total	$ 100,000	
Project Number	Potential funding source		
OTH PM 1			
Description			

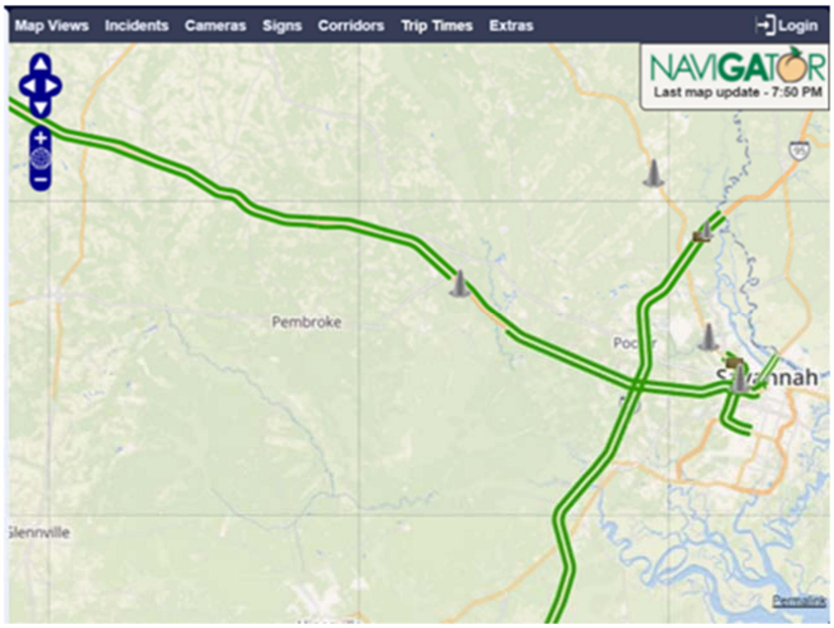
Parking in the downtown Savannah area is limited. There are many technologies and approaches that can be used to provide parking information to travelers. The first step is to identify what the parking needs really are. What the inventory is, what the demand is, and how to best communicate with drivers. Before any project can be identified, a study should be completed to define the problem and the needs.

Owner		Cost	Year
City of Savannah	Engineering (study and design)	$ 50,000	2
Project Name	Construction	$ 250,000	3
Parking Management System	Total	$ 300,000	
Project Number	Potential funding source		
OTH PM 2			
Description			

This project will take the recommendation for potential parking management systems, finish the design, and procure the initial system. Depending on the recommendations from the initial study, this may be a stand alone system, or part of the Savannah TMC.



Owner		Cost	Year
City of Savannah	Engineering (study and design)	$ 100,000	3
Project Name	Construction	$ 400,000	4
Enhanced Traveler Information System	Total	$ 500,000	
Project Number	Potential funding source		
OTH TI 1			
Description			
In task 1, it was noted that the City of Savannah has one DMS, but would like others. This project will identify locations of potential arterial DMS in the City of Savannah, as well as type and content. The project will then design and procure the individual signs. Content and other operational concerns should be addressed prior to this study. This will require the upgrade of the Savannah TMC be completed first.			



Owner		Cost	Year
Georgia DOT	Engineering (study and design)	$ 250,000	4
Project Name	Construction	$ 1,000,000	5
WIM monitoring system	Total	$ 1,250,000	
Project Number	Potential funding source		
OTH WIM 1			
Description			
This project will identify and design three WIM locations in the Savannah region that will monitor truck traffic. The systems will only be used for data collection and analysis - not for enforcement.			

Owner		Cost	Year
GDOT	Engineering (study and design)	$ 100,000	3
Project Name	Construction	$ 900,000	4
ITS Improvements on I-95	Total	$ 1,000,000	
Project Number	Potential funding source		
OTH I95 ITS			
Description			
This project will look at any improvements scheduleded on I-95 in Chatham County. This project will ensure that appropriate ITS equipment including cameras and communications will be designed and constructed.