Alabama Department of Transportation

Intelligent Transportation Systems

Strategic Business Plan

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Prepared by: Gresham Smith and Partners

GRESHAM
SMITH AND
PARTNERS

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1. Introduction

The Alabama Department of Transportation (ALDOT) has been installing Intelligent Transportation System (ITS) devices throughout the state for a number of years. At present, the ALDOT ITS Program is rapidly expanding and is now actively operating and maintaining multiple Transportation Management Centers (TMCs) and associated ITS elements. With the continued growth of the ITS Program, it has become clearly evident an ITS Strategic Business Plan is needed to ensure effective implementation and execution of the long-range vision and goals of the program.

This ITS Strategic Business Plan will serve as the roadmap for the necessary actions and priorities to appropriately guide the ITS program over the next five years. Previous planning efforts, such as the recently completed Alabama Statewide ITS Architecture document, describe the "big picture" for future ITS deployments in terms of needs to be addressed, overall functions and services to be provided, and standards to be used to ensure an overall integrated system. While that effort and document provides a foundation, it does not specify *how* ALDOT will implement the ITS Program from a business and financial perspective. This ITS Strategic Business Plan document is purposed to close that gap, focusing in on the specific actions required to implement the vision, mission, goals and objectives of the ITS Program. It is intended to lay out specific priorities, roles, and responsibilities in accomplishing said objectives. In addition, the Financial Plan portion of this document will summarize and document the funding requirements associated with those actions.

Vision, Mission, Goals and Objectives

The ITS Strategic Business Plan should be aligned with and support the vision, mission, goals and objectives of the state's ITS Program. ALDOT has long recognized the importance of ITS. This is demonstrated by the increasing level of ITS deployment in the state and the ITS projects and programs currently underway or planned for the near future. In the current Alabama Statewide Transportation Plan (SWTP),[1] the following assessment of ITS needs is made:

"ITS offers operational benefits without the magnitude of cost or the right of way required for capacity improvements. Technologies such as electronic screening of commercial vehicles, which uses in-vehicle transponders to communicate to weigh stations and pre-screen trucks for safety records and proper credentials, can reduce congestion at inspection stations, improve travel time for commercial vehicles, and help the trucking industry and regulating agencies reduce costs and improve safety and security. ALDOT should continue to support the implementation of this technology by supporting local and regional ITS plans. The development of a statewide plan would also unify efforts throughout the state and allow for an integrated system that would best serve the traveling public."

ITS is referenced in the SWTP when assessing the state's emergency evacuation needs:

"ITS technologies can also improve operations during emergency evacuations. The implementation of ITS technologies can help traffic controllers obtain data on and keep evacuees informed of traffic conditions. During past evacuations, ALDOT employed some ITS technologies such as Variable Message Signing (VMS) and Highway Advisory Radio (HAR). These efforts should be sustained for future efforts. Alabama should also continue efforts to coordinate with neighboring states to ensure seamless evacuation procedures."

[1] Alabama Statewide Transportation Plan, June 2008.

Also included in the SWTP, the following recommendation is made:

"The Department should move forward with current and planned programs to implement ITS technologies. Using ITS technologies will be important in the monitoring of traffic operations and providing motorists with information about road conditions. ITS monitoring can alert authorities about traffic accidents, helping to quicken response and return to normal operations."

During the recent development of the Statewide ITS Architecture[2], the vision, mission, goals and objectives of the ITS Program were established.

1.1.1 Vision

ALDOT ITS Program Vision Statement: "To seek innovative solutions and apply new technologies in ITS to maximize the safety and mobility of the transportation system in Alabama."

1.1.2 Mission

ALDOT ITS Program Mission Statement: "To use ITS technologies as a cost-effective and efficient means to improve safety and maximize the overall performance of the transportation system in Alabama in order to provide quality services to the motoring public, commercial interests, and partnering agencies."

1.1.3 Goals and Objectives

In developing the ITS Strategic Business Plan, it is important to consider the goals and objectives of ALDOT and ITS Stakeholders throughout the state. The following goals and objectives were developed for the ITS Program, highlighting improved system performance as the focal point. All ITS projects in the state should be designed and implemented in an effort to achieve these goals and objectives.

- Improve safety
  - Reduce traffic fatalities and serious injuries;
  - Enhance traffic incident management processes to detect, verify, respond to, and clear traffic incidents safely and quickly;
  - Reduce secondary crashes; and
  - Enhance emergency transportation operations to better manage the transportation system during and after natural or man-made disasters and emergencies.
- Improve and preserve infrastructure condition
  - Maintain infrastructure assets in a state of good repair; and
  - Provide maintenance activities needed to support mobility and future connected vehicles.
- Reduce traffic congestion
  - mReduce both recurring traffic congestion and non-recurring traffic congestion caused by work zones, traffic incidents, and special events; and
  - Reduce energy consumption and negative environmental impacts caused by traffic congestion.
- Improve system reliability and efficiency
- Facilitate freight movement

[2] Alabama Statewide Intelligent Transportation Systems Architecture, October 12, 2014.

- Support economic vitality
- Improve customer service
  - Provide real-time, accurate traveler information to the public; and
  - Enhance coordination and communication between partnering agencies.

2. High Level Deployment Strategy

Given the current and expected budget constraints over the next few years, the ALDOT ITS deployment strategy is to rely heavily on Transportation Systems Management and Operations (TSM&O) strategies which offer more cost-effective, expedient, and less invasive solutions for congestion and safety problems than large-scale capital expansion projects. The national average timeframe for a major capital project is 12 years from planning to completion, with a benefit/cost ratio of 2:1. Capacity management projects using TSM&O strategies average only two years with a benefit/cost ratio of 9:1. While capacity management projects may not always be the ultimate solution, such projects can provide shorter term improvements until the ultimate solution is completed.

TSM&O offers the potential to provide an integrated program that is focused on optimizing the performance of existing infrastructure through the implementation of specific systems and services to preserve capacity and improve reliability and safety. The TSM&O activities focus on a set of well-known strategies, such as incident management, traffic signal timing, ramp metering, road weather management, and work zone management, among others.

Utilizing technology solutions instead of applying traditional capacity enhancements, such as roadway widening, results in lower capital and maintenance costs. Technologies, operating practices, programs, and strategies provide methods to realize maximum efficiency of existing roadway, typically for relatively modest costs with low environmental impacts. Operational improvements may be built within existing right-of-way providing the opportunity to restore roadway capacity previously lost to congestion and incidents.

An effective TSM&O program encompasses a wide variety of functions and operations solutions spanning planning and development, construction, system operations, and maintenance. The following figure graphically depicts this relationship.

Figure 1 Relationship of TSM&O functions and operations solutions[3]

The effective implementation of TSM&O strategies will result in:

- Improved safety;
- Improved travel time reliability;
- Increased capacity management on limited-access facilities and arterials;
- Cost savings;
- Real-time traveler information for all modes;
- Rapid incident response;
- Better traffic flow through work zones; and
- Synergies through improved interagency coordination.

This will be accomplished through:

- Integration of planning and operations;
- High level communication and coordination with emergency responders and local transit, freight, and traffic entities;
- Maximized efficiency of existing infrastructure; and
- Maximized effectiveness of tools and data for mobility and safety outcomes.

[3] Florida Department of Transportation (FDOT) TSM&O Strategic Plan, December 13, 2013.

3. Recent ITS Program Activities and Advancements

Even without an established ITS Strategic Business Plan in place, ALDOT has made significant advances over the last few years in proceeding with the development and implementation of some key actions necessary to move the ITS Program forward. In 2014, the following action items either have been completed or are currently in process:

- Deploy a Statewide Advanced Traffic Management System (ATMS) software (algo);
- Develop a Statewide ITS Architecture;
- Develop ITS Performance Measures;
- Develop TMC Standard Operating Procedures;
- Develop Traffic Incident Management (TIM) Guidelines;
- Expand TMC operations to additional regional areas (consider a statewide facility);
- Utilize contract services to expand ITS forces; and
- Develop an ITS Strategic Business Plan (*this document*).

The previous action item list also included the following tasks that have not yet been completed but will be carried forward as recommended action items in this ITS Strategic Business Plan:

- Consider an ITS network segregated from the current agency wide Information Technology (IT) network;
- Assign dedicated staffing to the ITS Program;
- Develop standards and specifications for ITS deployments and devices;
- Expand the Alabama Service Assistance Patrol (ASAP) Program;
- Implement 511 (meet 2014 CFR 511 Requirements);
- Standardize Statewide Systems; and
- Develop a certified training program for construction, maintenance and operations activities.

4. Program Needs and Priorities

Based on the vision and goals for the ITS Program, as well as feedback obtained during the development of the Statewide ITS Architecture, specific future actions and priorities for the program are grouped into one of three categories:

- Personnel, Policies, and Procedures
- Projects and Infrastructure
- TMC Operations

4.1 Personnel, Policies and Procedures

From an organizational standpoint, ALDOT has transitioned from a Divisional Structure to a Regional Structure as of late 2014. The five regions referenced in this document include North (Huntsville), West Central (Tuscaloosa), East Central (Birmingham), Southeast (Montgomery) and Southwest (Mobile).

The personnel, policy and procedure actions recommended in this ITS Strategic Business Plan should be considered a top priority. While additional infrastructure and projects are undeniably needed and should continue, the benefits from investing in those projects will not be fully realized if effective organization and processes are not in place to capitalize on the existing infrastructure and overall program.

4.1.1 Organization and Leadership

The ITS Program is a component of the statewide TSM&O program that already has some level of implementation in each of the five regions. There are various components of the ITS Program that should be consistent across the state and require statewide leadership to implement and manage that portion of the program. Transportation Management Center (TMC) operations and implementation of individual projects will be a regional function and require ITS leadership and staff within each respective region. Based on this operational concept of both statewide and regional leadership, the following organizational actions are needed:

- ***Identify a Statewide ITS Champion position:*** This position will be responsible for management and leadership of statewide related functions, such as serving on the ITS Advisory Committee, establishing and maintaining ITS Policies and Operating Procedures, Standard Specifications and Requirements, ITS Guidelines, Approved Products Lists, and other related ITS activities that should be consistent throughout the state. The Statewide ITS Champion will also be responsible for project management of statewide ITS projects and management of communication systems between regions, as well as ensuring all ITS projects in the state are following the systems engineering process. The Statewide ITS Champion position will most likely report to the State Maintenance Engineer.

Identify a Regional ITS Champion position for each of the five designated regions*:* The organizational structure and number of personnel under each Regional ITS Champion will vary by location. The specific responsibilities of each regional ITS team will include, but are not limited to, Program Management, Project Management, Device Maintenance, Operations, Incident Management, Network and Systems Management. The Regional ITS Champion will be responsible for the planning, design, construction, operations and maintenance of specific ITS Projects within the respective region. The number and type of staff needed by the Regional ITS Champion to fulfill the necessary duties will vary by region and be dependent on the size of the

ITS Program. Each Regional ITS Champion will also serve on the Statewide ITS Advisory Committee and coordinate directly with the Statewide ITS Champion.

An ITS Project Manager in each region will work directly for the Regional ITS Champion managing ITS projects within the region that are designed in-house by ALDOT staff as well as ITS projects designed by consultants. The ITS Project Manager will be responsible for ensuring projects remain on schedule, within budget, and in adherence with the ALDOT plans development process, standard specifications and design guidelines.

Though each Regional ITS Team will have specific responsibilities, it is important the operational structure operate seamlessly, avoiding strict geographical boundaries and ultimately focus on corridor management across the state. It will be the responsibility of each Regional ITS Champion to work closely with the Statewide ITS Champion to identify corridors that connect multiple regions/states and develop operational procedures and processes to manage the entire corridor in a manner that is most beneficial to the traveling public.

4.1.2 Staffing Strategy

A combination of different staffing strategies can be used to fill the ITS positions noted above. It is anticipated that upper management positions will be filled by full time ALDOT staff. ALDOT presently uses various staffing models to implement the ITS Program. Currently, the Regional Traffic Management Center (RTMC) operations staff is a mix of ALDOT staff located in the Mobile and Birmingham RTMCs and consultant contract staff located in the Montgomery RTMC. The maintenance staff is currently a mix of ALDOT staff and maintenance contractors.

A further evaluation is needed to determine the best long term strategy for each of the staff positions. While internal ALDOT staff are preferred for management level positions, there are potential benefits to utilizing a combination of staffing sources to provide the needed flexibility and expertise in lower-level staff positions.

It is recommended that each position type and staffing need be evaluated on a case by case basis to determine the most viable option while considering cost effectiveness, timing, availability of experienced personnel, and other factors specific to the position(s).

4.1.3 Policies and Procedures

ALDOT has made significant progress over the last few years in regards to implementing policies and procedures for the ITS program. The ITS Advisory Committee has emphasized the need to establish defined policies and procedures to guide ITS planning, implementation, operations and maintenance. The completed actions identified previously in Section 3 point to the success of those efforts.

Additional progress is needed as there are still key policies and procedures that need to be added or modified in order to ensure continued success of the ITS Program. These include:

Incorporating ITS into the Planning Process: ALDOT currently has an established planning process for identifying and prioritizing non-ITS projects. A similar ongoing process should be established for ITS specific projects. In addition, each proposed roadway and maintenance project should also be evaluated in the early planning stages to determine if the addition of ITS elements could improve the safety and / or efficiency of the project. The overall planning process should closely assess both the operations and maintenance of each facility considering all

available means to improve operations, including the possible use of ITS technologies. Often, the addition of ITS elements that account for only 3-5% of an overall roadway project's budget can still have a tremendous benefit/cost ratio allowing the DOT to realize the full benefit of the investment in additional capacity.

It is recommended that the Statewide ITS Champion work directly with the appropriate ALDOT management and planning staff to incorporate the appropriate steps into the regular project planning process.

Developing an ITS Project Priority Program: The decision of when and where to install ITS projects can be simple for some situations but more difficult for others. With tight budgets and limited funding, it is important to properly prioritize the dollars that are available for ITS implementations both on a regional and statewide level. An index formula should be created that can be used to determine the highest priorities.

It is recommended that an ITS Project Priority Program be developed that prioritizes both regional and statewide ITS projects based off a calculated index formula.

Collaborating with other ALDOT departments: In addition to formalizing the planning process for ITS projects, ITS staff at both the statewide and regional level should regularly communicate and coordinate with the Traffic Safety, Multimodal and Transportation Planning offices within ALDOT. Interaction and collaboration with these various groups should occur on a regular basis to ensure all ITS activities are embedded within all facets of the department.

It is recommended that both the Statewide ITS Champion and each Regional ITS Champion schedule regular coordination meetings with the offices defined above.

Developing Standard Details and Specifications for ITS Deployments and Devices: ALDOT currently has Standard Details and Specifications for most non-ITS related elements that are used during construction. Some project-specific ITS Special Provisions have been developed; however, standardized details and specifications are needed for ITS deployments and devices to assure there is consistency throughout the state. It is also important that the specifications for ITS equipment be functional in nature. As the technology changes quite rapidly, the standards and specifications should be developed in a manner to ensure new technology is considered.

It is recommended that ALDOT review the current ITS special provisions and modify as needed to incorporate into the ALDOT Standard Specifications. The typical special design details for ITS device installation should also be modified as needed to adhere to the standard specifications and be incorporated into ALDOT Standard Details.

Establishing an Approved/Qualified Product List (APL/QPL) for ITS Equipment: Once the standards and specifications are in place, an Approved/Qualified Product List should be established. As noted above, the technology for ITS equipment is constantly changing, and it is very difficult to evaluate new submittal types on a project by project basis and ensure the overall functional intent is still being met. In order to simply that process, it is beneficial to have an APL/QPL in place for the device types most often used in ITS deployments. (This also allows contractors to know in advance which devices are pre-approved.)

It is recommended that an APL/QPL be established for ITS devices.

Developing a Certified Training Program for ITS Construction, Operations and Maintenance: The construction, operations and maintenance of the ITS Program requires very specialized skills and training. There are a wide range of nationally developed training classes and certifications (United States Department of Transportation (USDOT), International Municipal Signal Association (IMSA), National Operations Center of Excellence, Institute of Transportation Engineers (ITE), etc.) available that can be used as resources for ensuring that all staff working on the ITS Program are properly trained.

It is recommended that a training program be developed specifically for Construction, Operations, and Maintenance positions within the ITS Program.

Evaluating the ITS Network: The existing network used for the ITS Program should be closely evaluated to determine if it can meet the unique needs of an ITS system or if a separate network should be considered. While an ITS network has some of the same technical needs as a typical state computer network, there are also some inherent functional and operational differences as well as particular challenges an ITS network presents:

Bandwidth Needs: The use of real-time video significantly increases the bandwidth needs of an ITS system compared to other typical networks. The bandwidth needs are dependent on how many public users are viewing the streams at any given time; thus, the requirement will increase as more internal ALDOT, external stakeholders, and public users are provided access. A more detailed bandwidth study should be performed for ALDOT's current and future ITS needs. In addition, the configuration of the network should be evaluated to determine the impacts of unicast versus multicast streams of video.

Third Party Devices and Stakeholders: An ITS network not only accommodates hundreds of field access points and third party devices but many partner agencies, including local and state transportation agencies, first responders, the media and other DOT ITS Networks exchanging data on a real time basis. Each of the partner agencies have their own systems, procedures, and security levels that must be considered.

Maintenance and Upgrades: The operation and maintenance of the ITS portion of a network may not always align with those of a business network. For example, regular upgrades and updates of even common protocols and software may cause conflict between internal and external systems. The timing of updates and when they are needed or not needed is problematic on a shared network.

Future Connected Vehicle Technologies: Though the future network needs for the near term and long term advances and implementation of connected vehicle technologies is still uncertain, it will certainly place a higher demand on the network than the systems in place today.

It is recommended a third party assessment be performed on the existing ALDOT network to confirm the current and future needs of the ITS Network; to further evaluate the need for a separate network; or to identify solutions to potential issues that may be present with a combined network.

Expanding the ASAP Program –The Alabama Service Assistance Patrol (ASAP) Program is a tremendous benefit to the public. Currently, ALDOT operates the ASAP Program in the Birmingham Urbanized Area and Mobile Urbanized Area. ALDOT strives to reduce traffic delays and congestion on the interstate and state highway systems around metropolitan areas utilizing the TMCs and ASAP Programs. The ASAP patrol responds to a variety of incidents

ranging from removing debris in the roadway, providing assistance to disabled vehicles, and coordinating incident response with other emergency responders.

The ASAP Program is a free service provided to the traveling public and has become an integral and extremely successful part of ALDOT's freeway incident management efforts.

ALDOT should consider expanding the program to additional areas in both Birmingham and Mobile as well as deploy the program in Montgomery and all other metropolitan areas in the state. Additionally, the name of the program should be evaluated to determine if adding "Incident" or "Emergency Responder" terminology may be more appropriate.

4.2 Projects and Infrastructure

As noted in Section 2 of this ITS Strategic Business Plan, the deployment strategy for ALDOT should focus on TSM&O strategies offering the most cost-effective solutions to identified problems. The implementation strategy for projects and infrastructure needed to advance the ALDOT ITS Program will include three tiers of development:

- **Urban Areas**: Where traffic or safety needs warrant, full-scale ITS deployments will include complete Closed Circuit Television (CCTV) cameras surveillance coverage, vehicle detection technology installed every 1/3 to 1/2 mile, Digital Message Signs (DMS) located prior to major decision points, and other pertinent devices strategically placed based on the particular location. The ITS deployments in urban areas should be implemented in a manner to address both recurring and non-recurring congestion.

- **Rural Areas**: Where traffic or safety needs warrant, a minimum of surveillance, detection, and traveler information message dissemination should be installed at and in advance of each interchange. ITS deployments in rural areas should primarily address non-recurring congestion.

- **Regional Transportation Management Centers**: The goal is to have an RTMC in each of the five regions (Mobile, Montgomery, Birmingham, Tuscaloosa, and Huntsville). ALDOT will own, operate and maintain the RTMCs. Local agencies will be responsible for city-based Traffic Control Centers (TCCs) in select cities having sufficient traffic signal systems to warrant a separate TCC.

The specific field deployment projects anticipated for the next five years are outlined in the following tables. These tables contain ITS or ITS-related projects identified during the development of the recent Alabama Statewide ITS Architecture. The projects were derived from stakeholder feedback on transportation needs and priorities in the state while considering best practices in ITS applications and services.

Table 1: Future ALDOT ITS Projects and Priorities:

Priority is categorized as follows:

- Short term, Priority 1 (1-3 years)
- Medium term, Priority 2 (3-5 years)
- Long term, Priority 3 (5+ years)

Project Identifier	Project Name	Project Description	Location / Region	Priority
REC - ITS - 1	I-10 ITS Projects	• Project(s) to install ITS capabilities along I-10. Project(s) to include wireless and/or fiber optic communications, vehicle detection, surveillance cameras, and traveler information dissemination devices such as DMS, portable CMS, and HAR. • Includes ITS components or capability required for the reporting of real-time traffic and travel information along the Metropolitan Area Interstate system highways in compliance with CFR 511. • Projects will also include any necessary ATMS hardware, software and/or equipment upgrades at the Mobile TMC and other associated TMCs and TCCs.	Approx. 66 miles from the Mississippi state line to the Perdido River/Florida state line (ALL 66 MILE OF THIS CORRIDOR IS IN SOUTHWEST REGION)	1
REC - ITS - 2	I-20/59 ITS Projects	• Project(s) to install ITS capabilities along I-20/59. Project(s) to include wireless and/or fiber optic communications, vehicle detection, surveillance cameras, and traveler information dissemination devices such as DMS, portable CMS, and HAR. • Includes ITS components or capability required for the reporting of real-time traffic and travel information along the Metropolitan Area Interstate system highways in compliance with CFR 511. • Projects will also include any necessary ATMS hardware, software and/or equipment upgrades at the Mobile TMC and other associated TMCs and TCCs. • Also includes projects to install appropriate devices on I-359 in Tuscaloosa and I-459 in Birmingham and Trussville.	Approx. 130 miles from the Mississippi state line to Birmingham (100 MILES OF THIS CORRIDOR IS IN WEST CENTRAL REGION AND 30 MILES IS IN	1

			EAST CENTRAL REGION)	
REC - ITS - 3	I-20 ITS Projects	• Project(s) to install ITS capabilities along I-20. Project(s) to include wireless and/or fiber optic communications, vehicle detection, surveillance cameras, and traveler information dissemination devices such as DMS, portable CMS, and HAR. • Includes ITS components or capability required for the reporting of real-time traffic and travel information along the Metropolitan Area Interstate system highways in compliance with CFR 511. • Projects will also include any necessary ATMS hardware, software and/or equipment upgrades at the Mobile TMC and other associated TMCs and TCCs.	Approx. 84 miles from split of I-20/59 in Birmingham to the Georgia state line (ALL 84 MILES OF THIS CORRIDOR IS IN EAST CENTRAL REGION)	
REC - ITS - 4	I-59 ITS Projects	• Project(s) to install ITS capabilities along I-59. Project(s) to include wireless and/or fiber optic communications, vehicle detection, surveillance cameras, and traveler information dissemination devices such as DMS, portable CMS, and HAR. • Includes ITS components or capability required for the reporting of real-time traffic and travel information along the Metropolitan Area Interstate system highways in compliance with CFR 511. • Projects will also include any necessary ATMS hardware, software and/or equipment upgrades at the Birmingham TMC and other associated TMCs and TCCs. • Also includes projects to install appropriate devices on I-759 in Gadsden.	Approx. 111 miles from split of I-20/59 in Birmingham to the Georgia state line (60 MILES OF THIS CORRIDOR IS IN NORTH REGION AND 51 MILES IS IN EAST CENTRAL REGION)	1
REC - ITS - 5	I-65 ITS Projects	• Project(s) to install ITS capabilities along I-65. Project(s) to include wireless and/or fiber optic communications, vehicle detection, surveillance cameras, and traveler information dissemination devices such as DMS, portable CMS, and HAR. • Includes ITS components or capability required for the reporting of real-time traffic and travel information long the Metropolitan Area Interstate system highways in compliance with CFR 511.	Approx. 367 miles from I-10 in Mobile to the Tennessee state line (73 MILES OF THIS CORRIDOR IS	1

		• Projects will also include any necessary ATMS hardware, software and/or equipment upgrades at the Mobile TMC and other associated TMCs and TCCs. • Also includes projects to install appropriate devices on I-165 in Mobile and I-565 in Huntsville.	NORTH REGION, 29 MILES IN WEST CENTRAL, 66 MILES IN EAST CENTRAL, 106 MILES IN SOUTHWEST , AND 92 MILES IN SOUTHEAST)	
REC - ITS - 6	I-85 ITS Projects	• Project(s) to install ITS capabilities along I-85. Project(s) to include wireless and/or fiber optic communications, vehicle detection, surveillance cameras, and traveler information dissemination devices such as DMS, portable CMS, and HAR. • Includes ITS components or capability required for the reporting of real-time traffic and travel information along the Metropolitan Area Interstate system highways in compliance with CFR 511. • Projects will also include any necessary ATMS hardware, software and/or equipment upgrades at the Montgomery TMC and other associated TMCs and TCCs.	Approx. 80 miles from I-65 in Montgomery to the Georgia state line (10 MILES OF THIS CORRIDOR IS IN EAST CENTRAL REGION AND 70 MILES IS IN SOUTHEAST REGION)	1
REC - ITS - 10	Birmingham Region, CFR 511- Real-Time Traveler Information Projects	ITS projects on high priority / heavily congested metropolitan corridors required for compliance with CFR 511, State-designated metropolitan area routes of significance. Recommended corridors include only state and U.S routes. **(A probe data project that meets CFR 511 has recently been advertised that will cover 1,100 centerline miles)**	Statewide	1
REC - ITS - 14	North Region, Detour and Emergency	Project(s) along parallel routes identified as detours and emergency alternate routes. Projects may include enhancements to existing traffic signals to include upgraded equipment, emergency traffic	Huntsville	1

	Alternate Routes ITS Project(s)	signal timing plans, and adaptive traffic signal timing, transit vehicle priority and emergency vehicle pre-emption enhancements as appropriate.		
REC - ITS - 15	Southwest Region, Detour and Emergency Alternate Routes ITS Project(s)	Project(s) along parallel routes identified as detours and emergency alternate routes. Projects may include enhancements to existing traffic signals to include upgraded equipment, emergency traffic signal timing plans, and adaptive traffic signal timing, transit vehicle priority and emergency vehicle pre-emption enhancements as appropriate.	Mobile	1
REC - ITS - 17	Southeast Region, Detour and Emergency Alternate Routes ITS Project(s)	Project(s) along parallel routes identified as detours and emergency alternate routes. Projects may include enhancements to existing traffic signals to include upgraded equipment, emergency traffic signal timing plans, and adaptive traffic signal timing, transit vehicle priority and emergency vehicle pre-emption enhancements as appropriate.	Montgomery	1
REC - ITS - 21	West Central Region, Detour and Emergency Alternate Routes ITS Project(s)	Project(s) along parallel routes identified as detours and emergency alternate routes. Projects may include enhancements to existing traffic signals to include upgraded equipment, emergency traffic signal timing plans, and adaptive traffic signal timing, transit vehicle priority and emergency vehicle pre-emption enhancements as appropriate.	Tuscaloosa	1
REC - ITS - 22	Other Detour and Emergency Alternate Routes ITS Projects	Project(s) along parallel routes identified as detours and emergency alternate routes. Projects may include enhancements to existing traffic signals to include upgraded equipment, emergency traffic signal timing plans, and adaptive traffic signal timing, transit vehicle priority and emergency vehicle pre-emption enhancements as appropriate. This project involves the use of ITS on diversion routes to shift traffic away from bottlenecks caused by congestion, incidents, or construction. In the short term, diversion routes from limited access highway to limited access highway will be developed. In the medium term, diversion routes from major arterial roadways to limited access highways will be defined. In the long term, diversion routes from	Various Locations Statewide	3

		limited access highway to major arterial roadway and major arterial roadway to major arterial roadway will be identified.		
REC - ITS - 23	TMC / EMA / Public Safety Integration	Sharing of ATMS incident data from ALDOT Regional TMC(s) with local or county EMAs and local police/fire/E-911 dispatch centers. CAD data from local police/fire/E-911 dispatch centers would be sent to the appropriate ALDOT TMC(s).	Various Locations Statewide	3
REC - ITS - 24	Communication Master Plan	This statewide project is proposed to develop a comprehensive statewide Master Plan to address various types of communication needs across the state. This plan should be developed in coordination with the Alabama Information Technology Services and consider the existing infrastructure already in place in the state. The plan should also address opportunities to meet the communications requirements of the regional ITS Architectures.	General / Statewide initiative	1
REC - ITS - 25	Upgrade Communication Backbone	This project will establish a permanent approach for the primary communication links between ALDOT Statewide TMC and the Regional ALDOT TMCs. As more ITS functionality is added to ALDOT's transportation system the demand on the communications infrastructure will increase.	General / Statewide initiative	1
REC - ITS - 26	Install Dynamic Message Signs	Install DMSs across Alabama. The potential locations include high volume roads, high accident roads, and in the vicinity of major attractions, airports, and parking facilities.	General / Statewide initiative	1
REC - ITS - 27	CCTV Monitoring and Surveillance	The candidate locations include high accident roads, major interchanges and roadway construction sites. CCTV will be also appropriate for rest areas for security purposes.	General / Statewide initiative	1
REC - ITS - 28	Vehicle Detection System	The candidate locations include high-volume locations or locations with high variability in traffic volume. Traffic detection systems should be placed at 1/2 mile spacing or between interchanges. Whenever possible, non-intrusive detectors should be used to equipment can be installed and maintained with minimal disruption to traffic flow.	General / Statewide initiative	1
REC - ITS - 29	Portable ATMS	The potential locations include construction work zones, routes leading to special events, airports, etc. when there is a need for temporary traffic control.	General / Statewide initiative	1
REC - ITS - 30	Railroad Crossing Control	The deployment of integrated train detection and traffic control is considered a cost effective, near-term deployment as a result of the	General / Statewide initiative	3

		ability to deploy individual systems in select areas, and the commercial availability of such systems.		
REC - ITS - 31	TMC Railroad Operations Coordination	This project will provide coordination between rail operations and traffic management centers.	General / Statewide initiative	3
REC - ITS - 32	ALDOT Maintenance, Construction and ASAP Vehicles AVL/GPS	Install AVL/GPS capability on additional ALDOT vehicles not already equipped for vehicle monitoring, real-time traffic monitoring, data collection, and input into decision support systems.	General / Statewide initiative	2
REC - ITS - 33	Emergency Vehicle Signal Preemption	This project will deploy signal preemption in corridors in urban areas with high density of emergency vehicle response vehicles (e.g. fire routes) and congested traffic conditions.	General / Statewide initiative	2
REC - ITS - 34	Commercial Vehicle Traveler Information Network	This project would expand the ALDOT's traveler information capabilities by providing specific information to truck operators via the internet and/or public kiosks at truck stops. The types of information might include road closures, incident, weather (i.e., fog, flooding), construction, and special permit routing.	General / Statewide initiative	3
REC - ITS - 35	Road Weather Information Systems	Deploy additional weather sensors to collect pavement, surface, and ambient temperature, wind speed and direction, pavement wet/dry, precipitation and relative humidity. Communication links with ALDOT sensors in rural areas will be installed.	General / Statewide initiative	1

Table 1 Future ALDOT ITS Projects and Priorities

Infrastructure

In addition to the individual field projects, the infrastructure needed to support the ITS program and facilitate the overall operations includes the communications, software and the ITS network.

Communications

Currently, ALDOT utilizes a combination of fiber optic, leased line, carrier Ethernet, and wireless communications to connect field devices, regional offices, and RTMCs throughout the state that make up the overall ITS communication network. In addition, an Internet Service Provider (ISP) is utilized to provide up to 500Mbps of internet bandwidth for dissemination of information to the traveling public. For example, the ALDOT homepage provides critical travel information to the public, including road conditions, construction work advisories, traffic information, and traffic video snapshots. The ISP also allows ALDOT staff to browse websites, send/receive emails, and transfer files to and from the internet. The RTMCs located in Birmingham, Mobile, and Montgomery and division offices in Tuscaloosa and Tuscumbia are interconnected by a combination of MetroEthernet and direct fiber connection to the ALDOT Central Office to access the ISP as described. The diagram shown below is provided to illustrate the connections between the ALDOT facilities. It is important to note that ALDOT is in the process of updating its network infrastructure in the coming months to provide a minimum of 50 Mbps of bandwidth for each office to communicate with the Central Office. The only exception is the Montgomery RTMC as it is connected directly to the Central Office by fiber optics cabling.

At the regional level, however, the existing ITS infrastructure and types of deployment strategies vary slightly. For example, the Montgomery ITS environment deploys fiber optic communications to the majority of the ITS field devices and utilizes wireless radios to connect some of the last mile locations that are not on the path of existing fiber optic cable installation. The robust communication system allows the RTMC to provide live traffic videos to first responders and partnering agencies. In addition, work is also underway to provide access to traffic videos to news media partners.

The Mobile RTMC, on the other hand, incorporates other ITS components such as fog warning systems, traffic signal control systems, and tunnel control systems in addition to CCTV cameras and message signs. Fiber optic and wireless radios are deployed to connect the ITS field devices but communications is reliant on the MetroEthernet service to the ALDOT central office for information dissemination. The Mobile RTMC currently does not provide live traffic videos with the public, or partner agencies.

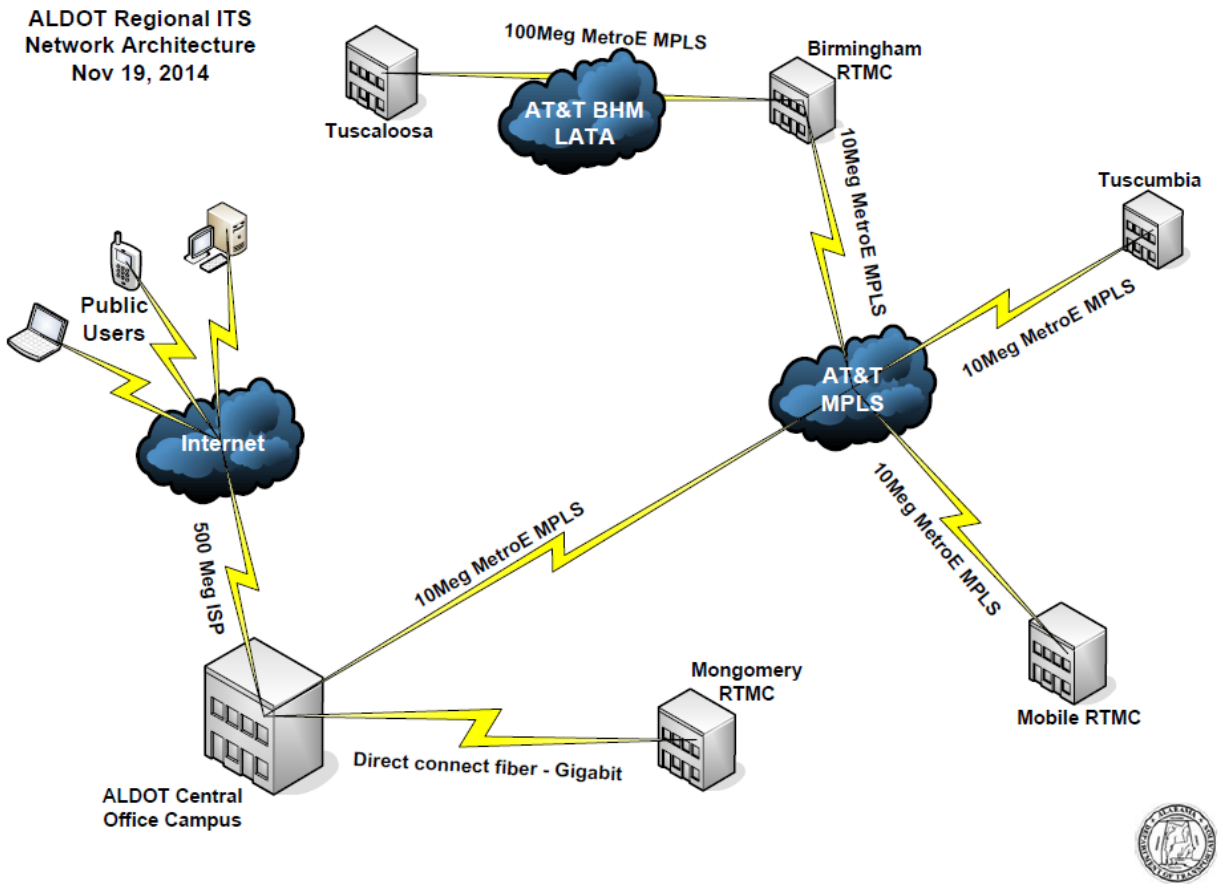

Figure 2 ALDOT Regional ITS Network Architecture, November 19, 2014

Looking into the future, the most stable and robust communications network would include a statewide fiber optic network connecting the RTMCs and major field deployments.

Software: algo ATMS

A new ATMS software package, algo ATMS, has recently been installed in Montgomery, Mobile and Birmingham, and is contracted for utilization statewide. Installation of the second phase of the algo ATMS in other regions is now underway. Via the algo ATMS, operators at the RTMCs are able to manage existing ITS equipment as well as collect and distribute traffic information using standard response plans. The algo ATMS software provides an integrated, browser based client to support RTMC activities and also has management and control modules for standard ITS devices, such as CCTV, DMS, vehicle detectors, and Roadway Weather Information System (RWIS) components. More specifically, the algo ATMS allows operators to communicate with and control all of the ITS devices seamlessly through one software application instead of utilizing multiple vendor software packages to control each type and brand of devices. The algo ATMS software is also a true event management, information dissemination and emergency response tracking system. Additionally, data and updates from the algo traffic website can be obtained through smart phone applications.

It is recommended that the algo ATMS continue to be installed at all remaining RTMCs throughout the state. Also, it is recommended that stakeholder systems such as Computer

Aided Dispatch (CAD) and 911 be integrated into this system. Additional enhancements to the software should be considered and evaluated as the overall ITS program continues to grow and expand.

Maintenance

ITS deployments require continual maintenance, including both preventive and response maintenance. Maintenance needs should be considered a normal part of the overall program, and sufficient staffing and resources should be dedicated to ensure the system is continuously operating at the highest levels possible. Currently, maintenance for the ITS program is provided primarily by ALDOT staff. As the system continues to grow, a significant increase in staff and expertise will be required.

It is recommended that ALDOT evaluate existing and future maintenance needs of the ITS Program and develop a maintenance action plan that utilizes both existing ALDOT staff and potential maintenance contract staff. A comprehensive maintenance training program will be needed to train both ALDOT staff and maintenance contract staff.

Evaluation of Technology Options

It is recommended that ALDOT continue to evaluate all available and emerging ITS technologies for possible implementation into the ITS Program. Potential options that should be considered include:

- *Ramp metering*
- *Managed lanes – free and toll*
- *Advanced safety warning systems*
- *Connected vehicle technologies*
- *Utilizing detection information from intersections*
- *Expanded 511, social media, alert notifications*
- *Smart work zone systems*

4.2 TMC Operations

ALDOT currently has RTMCs operating in Birmingham, Mobile, and Montgomery. The recently developed TMC Standard Operating Procedures Manual outlines the policies and procedures that should be consistently applied statewide.

It is recommended that ALDOT move forward with the following specific actions related to RTMC Operations over the next five years:

- ***Procure a Statewide RTMC operations contract to provide RTMC operations staff at existing and future RTMC locations. (Note: This action was just recently completed)***
- ***Evaluate each RTMC location to determine staffing needs and identify any necessary changes.***
- ***Implement a comprehensive RTMC Operations training program to ensure all operations statewide are consistent while meeting the overall needs and desires of ALDOT.***
- ***Upgrade all RTMCs throughout the state as needed on an ongoing basis.***
- ***Add new RTMC locations as warranted, likely in Huntsville and Tuscaloosa.***

5. Financial Plan

The previous sections of this ITS Strategic Business Plan have outlined the specific needs and priorities of the ALDOT ITS programs. The funding needs associated with those actions are outlined in this Financial Plan. The Financial Plan includes the following components:

- *Benefit/Cost of ITS:* The benefits of an ITS program are described in detail along with the anticipated benefit/cost ratios that can be expected for the investments made in the program.
- *Performance Reporting:* Regular and consistent reporting is necessary in order to monitor and communicate the overall performance of the ITS program.
- *Funding:* Funding sources available for and applicable to ITS programs are summarized in this section.
- *Five-Year Deployment Plan Costs*: Estimated costs for the prioritized projects over the next five years are summarized by region.

5.1 Benefit/Cost of ITS

Due to an increasingly competitive fiscal environment, ALDOT is requiring department managers more than ever to justify their programs and expenditures. ITS programs have not escaped this scrutiny and are routinely asked to rank their projects against traditional expansion and maintenance projects. This requirement can put ITS projects at a disadvantage since there is limited experience in performing benefit/cost analysis for ITS; and often, many of the established tools and data available for conducting benefit/cost analysis for traditional infrastructure projects are poorly suited to analyzing the specific performance measures, project timelines, benefits, and life-cycle costs associated with operational improvements.

In response to the needs of system operators to conduct these analyses, a number of initiatives have been undertaken in recent years at national, state, and regional levels to develop enhanced analysis tools, methodologies and information sources to support the conduct of benefit/cost analysis for many specific ITS applications and strategies. It often remains difficult, however, for practitioners to weed through the multiple information and guidance sources in order to understand and apply an appropriate methodology for meeting their own specific analysis needs. The following information summarizes the current state of knowledge in the benefits of ITS and what levels of benefit/cost can be expected from its use.

In general, there are many advantages to investments in ITS including:

- ***Quick to Implement*** – ITS and operations investments requiring minimal new rights-of-way or construction are subject to a categorical exclusion under the National Environmental Protection Act (NEPA). ITS projects can normally get underway fast, turning project dollars into improved traffic flow and increased safety quickly.
- ***Provide Short- and Long-Term Benefits*** – ITS and operations investments provide long-term operational benefits by reducing congestion and improving transportation safety. ITS technologies employed in work zones provide immediate benefits in congestion management and safety during construction.
- ***Maximizing current investments*** – ALDOT for many decades has been investing in right-of-way and infrastructure. ITS helps to get the maximum benefit from those investments and ensure their safest operation.
- ***Environmental Benefits*** – ITS and operations investments contribute to reduced emissions and fuel consumption.

When considering ITS and operations investment to support transportation programs, it's important for ALDOT to remember that these types of projects can be:

- Stand-alone deployments;
- Easily incorporated as elements within new infrastructure-oriented projects; and
- Employed to manage traffic impacts created by other projects, such as work zones.

The over-arching goal of ITS is to improve the effectiveness, efficiency, and safety of the transportation system. Effective deployment of ITS technologies depends in part on the knowledge of which technologies will most effectively address the issues of congestion, traveler comfort and convenience and safety. Thus, it is important to understand the benefits of both existing and emerging ITS technologies.

The benefits of ITS deployments are wide-ranging. To help quantify ITS benefits, various measures of effectiveness have been used. These measures represent the ways ITS programs improve traveler safety, traveler mobility, infrastructure efficiency, productivity of transportation providers, energy conservation and environmental protection. These measures often include:

- **Safety** –Typical measures include overall number of crashes, and changes in crash, injury, and fatality rates. Surrogate measures include vehicle speeds, speed variability or changes in the number of violations of traffic safety laws.
- **Mobility** – Typical measures include the amount of delay (in units of time) and the variability of travel time.
- **Capacity/Throughput** – Measured by the maximum number of persons or vehicles per hour at a point. Throughput is the number of persons, goods or vehicles traversing a roadway section per unit time.
- **Customer Satisfaction** – Measures related to satisfaction include amount of travel in various modes, mode choices and quality of service as well as volume of complaints and/or compliments received. Typical results reported for customer satisfaction with a product or service includes product awareness, expectations of benefits, product use, response, realization of benefits, and assessment of value.
- **Productivity** – Measures include operational efficiencies and cost savings.
- **Energy and Environment** – Measures of effectiveness include changes in emission levels and energy consumption. Specific measures for fuel use and emission levels include emission levels (kilograms or tons of pollutants for carbon monoxide (CO), oxides of nitrogen (NOx), hydrocarbons (HC) and volatile organic compounds (VOC); fuel use (liters or gallons); and fuel economy.

Based on documented experience in the Southeast and throughout the country, ITS deployments have the potential to offer the following benefits:

- Incident management systems potentially reduce incident duration by 40 percent and offer numerous other benefits, such as increased public support for DOT activities and goodwill.
- Smart work zones can reduce total delay through construction/maintenance projects by 41 - 75 percent.
- Arterial management systems can potentially reduce delays between 5 and 40 percent with the implementation of advanced control systems and traveler information dissemination.
- Freeway management systems can reduce the occurrence of crashes by up to 40 percent, increase capacity, and decrease overall travel times by up to 60 percent.

- Combined traveler information and incident management systems can increase peak period freeway speeds by 8 -13 percent, reduce crash rates, and improve trip time reliability by 1-22 percent.
- Freight management systems reduce costs to motor carriers by 35 percent with the implementation of the commercial vehicle information systems and networks.
- Transit management systems may reduce travel times by up to 50 percent and increased reliability by 35 percent with automatic vehicle location and transit signal priority implementation.
- Road weather information systems can reduce traveler delay and lower crash rates by 7-83 percent.

ITS for Maximizing Infrastructure Benefits

ITS can enhance the quality of life in most communities by improving traffic flow and decreasing delays. Table 2 identifies deployment-ready ITS investments for either stand-alone projects or technologies that can be incorporated into new or existing transportation infrastructure projects. The table includes a summary of the key benefits for each type of project, including an assessment of whether the safety, mobility, and energy and environment benefits are considered to be high, medium, or low. This assessment is based on the information contained in the Federal Highway Administration's (FHWA) ITS benefits database.

Table 2. ITS Upgrades for New, Rehabilitated or Existing Infrastructure

Category/Project	B/C Ratio/Other Metrics	Safety	Mobility	Energy/ Environment
Traffic Signal Optimization/ Retiming	17.1 to 62.1	High	High	High
Traffic Incident Management	Incident duration reduced 30-40%	High	High	High
Safety Service Patrols	2.1 to 42.1	High	High	High
Surveillance Detection	6.1	High	Med	Med
Road Weather Information Systems	2.1 to 10.1	High	High	Med
Electronic Toll Systems	2.1 to 3.1	Med	High	High
Open Road Tolling	Crash rates reduced by up to 49% Speeds increased up to 57%	High	High	High
Ramp Metering Systems	15.1	Low	High	Med
Commercial Vehicle Information Systems and Networks	3.1 to 5.1	Med	Med	Med
Electronic credentialing	1.1 to 50.1	Med	Med	Med
Electronic screening	2.1 to 12.1	Med	Med	Med

Bus Rapid Transit	2.1 to 10.1	Med	High	Med
Traffic Adaptive Signal Control	Improved travel time 6.11%	Med	High	High
Transit Signal Priority	Reduced transit delay 30-40% Improved travel time 2-16%	Med	High	Med
Traveler Information/Dynamic Message Signs	3% decrease in crashes	Low	High	Low
Parking Management Systems	Increase in transit mode share up to 6	Med	Med	Low
Transit Automated Vehicle Locator/Computer-Aided Dispatch	AVL improves on-time bus performance 9-58% CAD improves on-time bus performance up to 9%	Med	Med	Med
High Occupancy Toll Facilities	23% would pay $2 to save 10 minutes 59% would pay $2 to save 20 minutes	Med	High	Med
Work Zone Management Systems	2.1 to 42.1	High	Med	Med

Table 2 ITS Upgrades for New, Rehabilitated or Existing Infrastructure

While these technologies can be deployed independently, there are often good engineering, financial and political reasons to include them as elements of other capital projects. Coordinating project installation can leverage resources, minimize total amount of digging and repaving, and reduce the total time for deployment.

ITS for Mitigating Construction Impacts

Construction projects can have traffic impacts that reverberate across a state. As an agency launches numerous construction projects, it will be crucial to move vehicles through the work zones as efficiently as possible and to better manage traffic and inform the traveling public in the surrounding region. Smart work zones, traffic incident management strategies, and enhanced traveler information are among the ITS solutions that can improve safety for workers and the motoring public as well as mitigate traffic delay caused by road and bridge construction projects. Portable traffic management systems, dynamic message signs, dynamic lane merge systems, and variable speed limit systems are just a few examples of smart work zone technologies that can be deployed during major construction projects. Table 3 follows the same format as Table 2 and lists the significant benefits associated with integrating work zone management components with roadway and bridge construction projects. On average, the cost to deploy and operate smart work zone systems is 4-5 percent of total construction costs.

Category/Project	B/C Ratio/Other Metrics	Safety	Mobility	Energy/ Environment
Work Zone Management Systems	2.1 to 42.1	High	Med	Med
Smart Work Zones	System delays reduced by up to 50%	High	High	High
Traveler Information Dynamic Message Signs	Traffic backups reduced by up to 56%	High	High	Med
Dynamic Lane Merge Systems	Traffic queues decreased by up to 60% in frequency and length	High	High	High
Variable Speed Limit Systems	Reduced the average speed through the work zone by up to 5%	Med	High	Med
Portable Traffic Management Systems	Work zone traffic volumes increase 4.7%	Med	Med	Med
Surveillance Detection	6.1	High	High	Med
Traffic Incident Management	Incident duration reduced 30-40%	High	High	High
Safety Service Patrols	2.1 to 42.1	High	High	High
Surveillance Detection	6.1	High	Med	Med
Traveler Information Dynamic Message Signs	3% decrease in crashes	Low	High	Low

Table 3 ITS for Minimizing Road Construction Hazards and Delays

Key: Details on the ITS solutions presented in this table can be found in the supplemental background and appendix sections. **Source:** ITS Benefits and Costs databases (http://www.itsbenefits.its.dot.gov/ and http://www.itscosts.its.dot.gov/)

5.2 Performance Management Reporting

Several performance measures were identified in the ALDOT TMC Standard Operating Procedures Manual. The table below provides information on the performance measures currently being tracked by staff at the Montgomery RTMC.

Performance Measure Category	Performance Measures	Status of Tracking and Reporting
TMC Operational Measures	**Incident Duration** • Incident Occurred • Incident Reported • Incident Verified • Incident Dispatched • 1st Response Arrives • 1st Response Arrives • Police Arrives • Police Depart • Ambulance Arrives • Ambulance Depart • Fire Arrives • Fire Depart • Tow Arrives • Tow Depart • Coroner Arrives • Coroner Departs • Hazmat Arrives • Hazmat Departs • Incident Clearance • Roadway Clearance • Return to Normal Flow	• Incident duration performance measures are captured by algo Event Management. • Operations Reports capture the duration of crashes and disabled vehicle events (incident clearance time); and response time for accidents. • Response time is only provided for the first emergency 1st responder on the scene. • Data on arrival and departure times for each responder is captured in algo ATMS as it is entered by RTMC Operators, but is not readily available for reporting individually. • Response time may not be accurately reflected if responders were already on the scene when an incident was first detected and entered in the system.
	Incident Management • Total Number of Calls Received • Total Number of Incidents Managed • Agency Responsible for Reported Incident • Source of Detected Incident • Incident Severity/Level • Incident Location (Hot Spot)	• Information on the number, types, and locations of events managed by RTMC staff is available through the algo Event Management and Event Reports. • Other incident management characteristics are captured by algo Event Management as it is entered by RTMC Operators, but is not readily available for reporting individually.
	Travel Time • Travel Time • Posting of Travel Time information	• The number of travel time messages is available through algo Reporting. • The Operations Reports provide information on the number of

		different travel time messages displayed by each sign, • Travel times are not currently being measured or verified for accuracy.
	Traffic Data • Classification • Volume • Occupancy • Average Speed	• Traffic data is taken from the algo VDS Traffic Data Report. • Total monthly volume, average occupancy and average speed are provided in the Operations Reports for all VDS stations. • Average speed are provided for the BlueTOAD stations. • Vehicle classification is currently not being captured.
	Traveler Information Dissemination • DMS Messaging • HAR Messaging • Traffic Alert Messages	• The types and number of DMS messages is tracked through the algo Event Management Response Plan and Status Reporting • The number of ALDOT Road Conditions alerts is tracked by RTMC staff. • HARs are not currently being used.
ASAP Operational Measures	**Service**	• Not applicable.
	Resources	• Not applicable.
System Performance Measures	**Device Uptime** • DMS Status Report • CCTV Status Report • HAR Status Report • VDS Status Report	• Device uptime is available through algo Status Reporting for CCTV, DMS and VDS devices. • In some cases, information not available in algo on CCTV performance, has been retrieved from Wowza using the Camera Monitor Page status logs.
	Maintenance Monitoring • ATMS Software Issue Report • ATMS Software Downtime • Total Device Maintenance Calls • Device Maintenance Calls Open • Device Maintenance Calls Closed • DMS Repair Time • CCTV Repair Time • VDS Repair Time	• Maintenance monitoring is performed by RTMC staff, capturing the devices where maintenance issues are encountered each day. A daily log of maintenance issues is maintained, and is summarized in the Monthly Operations Reports. • Currently, no automated means are in place for tracking maintenance issues.
	Website/Customer Measures	• At this time, the only website performance measure being tracked is the number of ALDOT Road

	• Alert is generated via email • Alert is posted to website • Alert is posted to social media • Customer Survey (website) • Website Hits/Visits • Avg. Bandwidth	Conditions alerts that are generated by RTMC staff.

Table 4 Performance Measures Tracking and Reporting Matrix

It is recommended that ALDOT perform a benefit/cost analysis of the program to establish the baseline and then perform a follow up benefit/cost analysis each year after the annual report.

5.3 Funding

The funding sources for most ITS programs utilize a combination of federal, state and local funds. The ALDOT ITS Program to date has also utilized a combination of those sources. The current federal transportation authorization does not provide for any dedicated ITS funding sources; therefore, the funds must typically come from other categories that can also be used for planning and construction related activities. The currently available and applicable primary funding programs under the Moving Ahead for Progress in the 21st Century Act (MAP-21) are:

- National Highway Performance Program (NHPP);
- Surface Transportation Program (STP);
- Highway Safety Improvement Program (HSIP);
- Congestion Mitigation and Air Quality Improvement Program (CMAQ); and
- Metropolitan Planning Program.

ITS projects can be an eligible expenditure in any of these program areas. The table below shows the current guidelines for Federal share and matching requirements for selected programs and sub-programs. Certain regulations and exceptions apply to each program as described further in MAP-21 legislation and guidance.

Program	Federal Share (%)	Plus eligible for…				
		Sliding scale	100% for designated safety projects	Up to 100% for innovative delivery methods	100% for Workforce development	100% for ADHS projects
National Highway Performance Program	80/90	√	√	√	√	√

Surface Transportation Program	80/90	√	√	√	√	√
Highway Safety Improvement Program	90		√		√	
Railway-Highway Crossings	90					
Congestion Mitigation & Air Quality Improvement Program	80/90	√	√		√	
Metropolitan Transportation Planning	80	√		√		
State Planning & Research	80					
Transportation Alternatives Program	80/90	√				
Emergency Relief	80-100					
Projects of National & Regional Significance	80					
Highway Research & Development Program	80					
Technology & Innovation Deployment Program	80					
Training & Education	80					
Intelligent Transportation Systems Program	80					

Table 5 Federal Share for Selected Programs

ITS Additions to Roadway Projects

There should be a consistent process established to evaluate all roadway projects in the planning stages to determine if ITS elements are beneficial. This method of implementation is difficult to build a full ITS program along an entire corridor but is a very cost effective means in building out shorter segments of ITS.

Other Funding Options

In addition to the normal federal and state funding options, ALDOT should also evaluate and consider other alternative funding sources such as Public Private Partnerships (3P) or by offering potential sponsorship opportunities for DOT assets.

5.3 Five Year Deployment Plan Costs

The approximate costs of the proposed projects and the operations/maintenance activities over the next five years are summarized in the following table. The project descriptions refer to the projects outlined in Section 4.2 of this ITS Strategic Business Plan. Only projects listed as Priority one from Section 4.2 are included in the costs.

The following table shows the total five year costs and the annual average costs by region for the capital deployment projects. TMC operations and maintenance costs are shown on an annual basis as some regions will not be operating as quickly as others; thus, the five-year total operations and maintenance costs may vary.

It should be noted that this table assumes allocation of funding for all projects shown within the five-year timeframe. If funding is not available at the levels shown, some projects may be extended out beyond the five-year timeframe, thus reducing the initial five-year totals.

ALDOT ITS PROGRAM - 5 YEAR BUSINESS PLAN

ITS Projects by Region - Estimated Costs

Prepared: 8/24/15

Projects	Total Project Cost	North Region %	North Region Cost	West Central Region %	West Central Region Cost	East Central Region %	East Central Region Cost	Southwest Region %	Southwest Region Cost	Southeast Region %	Southeast Region Cost
CAPITAL DEPLOYMENT PROJECTS											
REC-ITS-1 (I-10)	$ 6,170,166	0%	$ -	0%	$ -	0%	$ -	100%	$ 6,170,166.00	0%	$ -
REC-ITS-2 (I-20/I-59)	$ 7,962,946	0%	$ -	77%	$ 6,131,468	23%	$ 1,831,478	0%	$ -	0%	$ -
REC-ITS-3 (I-20)	$ 4,277,374	0%	$ -	0%	$ -	100%	$ 4,277,374	0%	$ -	0%	$ -
REC-ITS-4 (I-59)	$ 4,499,670	54%	$ 2,429,822	0%	$ -	46%	$ 2,069,848	0%	$ -	0%	$ -
REC-ITS-5 (I-65)	$ 11,962,818	20%	$ 2,392,564	8%	$ 957,025	18%	$ 2,153,307	29%	$ 3,469,217.22	25%	$ 2,990,705
REC-ITS-6 (I-85)	$ 5,449,618	0%	$ -	0%	$ -	12%	$ 653,954	0%	$ -	88%	$ 4,795,664
SUBTOTAL - INTERSTATE CAPITAL	**$ 40,322,592**		**$ 4,822,385**		**$ 7,088,494**		**$ 10,985,961**		**$ 9,639,383.22**		**$ 7,786,368**
REC-ITS-10 (Probe Data)	$ 750,000	12%	$ 90,000	18%	$ 135,000	27%	$ 202,500	24%	$ 180,000.00	19%	$ 142,500
REC-ITS-14/15/17/21 (Arterials - Alt Routes)	$ 4,000,000	12%	$ 480,000	18%	$ 720,000	27%	$ 1,080,000	24%	$ 960,000.00	19%	$ 760,000
REC-ITS-24 (Comm Plan)	$ 75,000	12%	$ 9,000	18%	$ 13,500	27%	$ 20,250	24%	$ 18,000.00	19%	$ 14,250
REC-ITS-25 (Upgrade Comm)	$ 5,000,000	12%	$ 600,000	18%	$ 900,000	27%	$ 1,350,000	24%	$ 1,200,000.00	19%	$ 950,000
TMC Upgrades	$ 9,500,000	5%	$ 500,000	5%	$ 500,000	53%	$ 5,000,000	0%	$ -	37%	$ 3,500,000
			$ -		$ -		$ -		$ -		$ -
SUBTOTAL - MISC. CAPITAL	**$ 19,325,000**		**$ 1,679,000**		**$ 2,268,500**		**$ 7,652,750**		**$ 2,358,000.00**		**$ 5,366,750**
TOTAL - 5 YEAR DEPLOYMENT	**$ 59,647,592**		**$ 6,501,385**		**$ 9,356,994**		**$ 18,638,711**		**$ 11,997,383.22**		**$ 13,153,118**
TOTAL CAPITAL - ANNUAL AVERAGE	**$ 11,929,518**		**$ 1,300,277**		**$ 1,871,399**		**$ 3,727,742**		**$ 2,399,476.64**		**$ 2,630,624**
OPERATIONS AND MAINTENANCE											
TMC Operations - Annual Cost	$ 2,700,000		$ 500,000		$ 500,000		$ 500,000		$ 600,000.00		$ 600,000
Maintenance/Annual Cost-10% of Deployment	$ 1,192,952		$ 130,028		$ 187,140		$ 372,774		$ 239,947.66		$ 263,062
			$ -		$ -		$ -		$ -		$ -
SUBTOTAL - ANNUAL O&M	**$ 3,892,952**		**$ 630,028**		**$ 687,140**		**$ 872,774**		**$ 839,947.66**		**$ 863,062**
TOTAL ANNUAL - CAPITAL + O&M	**$ 15,822,470**		**$ 1,930,305**		**$ 2,558,539**		**$ 4,600,516**		**$ 3,239,424.31**		**$ 3,493,686**

Assumptions:

Percentages are based on interstate miles

Table 6 ITS Projects by Region – Estimated Costs

6. ITS Public Relations Strategy and Plan

Effective communications and public information activities are critical to the success of any transportation program, particularly an ITS program. Roadway, bridge and other capital improvement projects are easily seen, understood and appreciated. Most ITS strategies and applications are not as easily seen, understood and appreciated as are traditional infrastructure projects, even though they typically support and contribute to the value and effectiveness of those systems. The advanced technologies employed in ITS programs and projects are usually designed to complement those traditional infrastructure systems by ensuring their more efficient and safer operation.

The challenge of communicating the impact and value of ITS investment is oftentimes as great inside a transportation agency as it is to external stakeholders and the traveling public. Benefits and costs include both quantitative and qualitative elements. These can be difficult to calculate and explain to all stakeholder groups, especially when considering the system-wide, long-term impacts of these unique investments. But the impacts and benefits of ITS investments are real, whether the benefits are realized by TMC operators who are able to quickly identify incidents, by medical responders who receive earlier notification of traffic accidents and are then able to remotely assess the situation and determine the best route to reach the victims, or by the traveling public who are informed of and congestion and delay so they can select alternate routes. These benefits occur day in and day out, 365 days a year, creating tremendous long-term benefits to the citizens, business and visitors throughout Alabama.

With this challenge and these benefits in mind, this section of the ITS Strategic Business Plan sets forth a program to inform and educate all stakeholders and beneficiaries of the ITS Program to encourage optimal use of the investments and a broader understanding of the value and impact of ITS.

The stakeholder and public information and education approach provides a framework to help ALDOT further capitalize on the goals and strategies outlined in this and other statewide plans. This plan is built upon the concept of achieving the Mission, Vision and Goals of the ITS Program using ITS defined as the electronics, communications or information processing systems used singly or integrated to improve the safety, efficiency, mobility, and cost benefits for surface transportation, as the product. The marketing communications goals, current conditions and audience analyses, key messages, strategies and tactics all point back to the Mission and Vision for a successful outcome.

Four communication and public information goals were developed to achieve the vision of the program:

1) Educate to Deploy;
2) Develop ITS Market;
3) Grow Partnerships; and
4) Lead the Way.

The **Key Messages and Benefits** should outline the most obvious benefits of using ITS in general, which includes:

- Saving lives
- Improving safety
- Increasing mobility
- Saving money

- Improving the environment
- Increasing satisfaction of people using the transportation system

For each of the identified audience groups, there are specific key messages and benefits. The benefits should be categorized by overall key benefit and by audience. These benefits will then be used in the specific communication tools.

The **Strategies and Tactics** make up the majority of the approach. The strategies and corresponding tactics are based on the overall communication goals and respond to the challenges and opportunities raised in the current conditions analysis. These strategies and tactics are aimed to reach the audiences identified, and communication of the key messages will be carried out in the implementation of these tactics.

Highlight of Goals, Strategies & Tactics
The four key communication and public information goals that follow include some priority communications strategies and tactics that ALDOT can begin to deploy right away.

Goal: Educate to Deploy
Stresses education as the most critical element.
Priority Strategies/Tactics:
- Document existing projects, work, analysis, and benefits
- Develop ITS communications "toolbox" and framework for outreach
- Continue existing outreach
- Provide ITS outreach and support to ALDOT, cities/counties, legislators
- Submit ITS articles to industry trade pubs/orgs

Goal: Develop ITS Market
Stresses communication of research of ITS- related products and introduction of ITS options.
Priority Strategies/Tactics:
- Secure ITS conference speaking engagements
- Support/leverage ALDOT Innovative Ideas
- Leverage/celebrate Gulf Region ITS (GRITS) and ITS 3C Summit Leadership and Successes

Goal: Grow Partnerships
Form new (and leverage existing) partnerships to advance ITS.
Priority Strategies/Tactics:
- Increase participation in GRITS and ITS America
- Promote public-public/public-private partnerships
- Launch/leverage professional organization partnerships

Goal: Lead the Way
Alabama is recognized as a national ITS leader for similar states.
Priority Strategies/Tactics:
- Populate and maintain ITS project databases
- Submit ITS nominations to national award programs
- Present/exhibit at national conferences

Below is a snapshot of the priority tactics to implement over the next two years. The goal, Educate to Deploy, is the major focus for the first two years of this approach. The strategies

and tactics completed under this goal set the stage for the remaining tactics. ALDOT should continuously evaluate the program's effectiveness to identify additional needs and opportunities. The many strategies and tactics developed and included in the Strategies/Tactics section may also be implemented by other organizations and agencies should opportunities present themselves.

Strategies and Tactics:

- Develop project press releases upon design, construction, and completion with support from ALDOT public relations and consultant staff.
- Continue to develop project and program brochures inclusive of major initiatives, grant awards and honors received.
- Develop submittals for regional, national and international industry award programs.
- Develop project websites for major projects.
- Work with ALDOT public affairs to develop videos, websites, and other social media pages as well as assist in providing updates.
- Develop a specific marketing plan for the ITS program.
- Engage ALDOT regions, areas and districts in educational and information gathering initiatives.
- Continue developing and enhancing performance measures reports to include more program and project details in addition to operational statistics.
- Utilize ALDOT Traffic website to highlight the aforementioned.
- Establish social media sites at a statewide and regional level to also highlight the aforementioned.