TRAFFIC SIGNAL MANAGEMENT

Service Layer Brochure

ALDOT STATEWIDE TSMO MASTER PLAN

Traffic signals play an integral role in the transportation network, serving to enhance the operational efficiency of corridors. Traffic signals are also the most common form of traffic control. Traffic signal management is critical to the successful achievement of the ALDOT TSMO vision. Simply put, traffic signal management reduces congestion, reduces maintenance expenditures, and increases safety along the Alabama roadway network. Traffic signal management has proven to demonstrate benefit to cost ratios ranging from 17 to 62 for optimized traffic signals.

FHWA defines traffic signal management as "**organizing for the planning, maintenance, design, and operation of signalized intersections and traffic signal systems.**"

Traffic Signal Management

Alabama DOT uses traffic signal timing programs to safely and efficiently move people through an area. Traffic signal timing programs can be basic and localized to a single intersection or more sophisticated, such as various advanced signal timing programs. These systems require regular maintenance and frequent monitoring by ALDOT staff to maintain the efficiency of the signal system.

Uncoordinated Signal Timings

Uncoordinated signal timings work using minimum and maximum timers and detection data to serve movements at a single intersection based on their current demand. This signal timing works well when volumes are low or the signal spacing is large, but the lack of coordination in urban environments can lead to increased stops, congestion, and driver frustration.

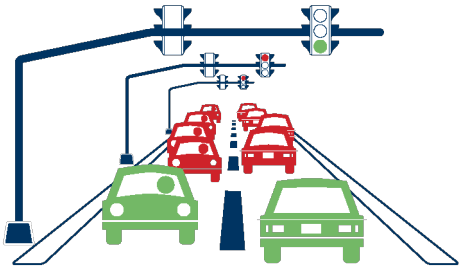
Advanced Signal Timings

Coordinated signal timings are timings which are programmed to coordinate different traffic patterns along the corridor throughout the day and week. The signal timing programs progress vehicles through a signalized corridor to reduce stops and delay to provide a safer and more reliable travel experience.

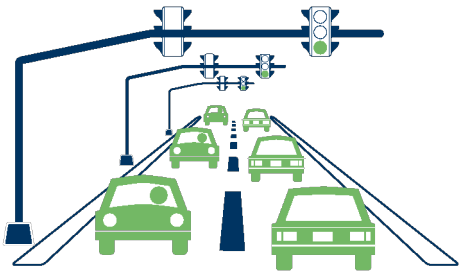
Adaptive Signal Timings

The adaptive signal system uses the real-time data from detectors to evaluate information and make adjustments to the coordinated signal timings for each cycle. Adaptive signal control is used when traffic patterns along a signalized corridor are variable and unpredictable due to special events, construction, or incidents.

Uncoordinated Signal Timing



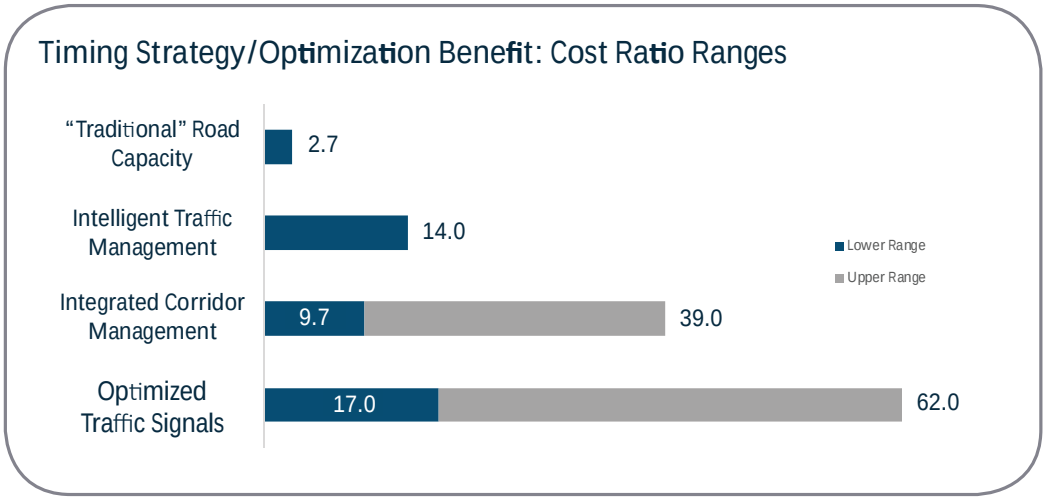
Coordinated Signal Timing



Operations with Great Returns!

Traffic patterns along major corridors change significantly throughout the day. Commuter traffic, school traffic, shopping traffic, and special event traffic all act differently from one another. Additionally, these patterns can change throughout the year, dwindling in the summer months when school is out and picking right back up in the fall and into the winter where shopping traffic can hit its peak. Developing signal timings that plan for or adjust to these changes in traffic flow have been shown time and time again to provide benefits far greater than their cost by saving the traveling public money on gas and freeing up their time.

Typical traffic signal timing strategies have been shown to provide benefit to cost ratios of between 9 and 62 while traditional capacity expansion (i.e. roadway widening) has an average ratio of 2.7. Investing in traffic signal timing types of strategies is far more effective and can be implemented much quicker than roadway expansion. There are also significant safety benefits which come from traffic signal management with fewer stops and consistent traffic flow. Although traffic signal management offers an efficient, cost effective method of enhancing safety and mobility, it is important to note that it is not expected to replace expansion in all scenarios. Traffic signal management provides a method to optimize the capacity of the existing infrastructure.



SOURCE: Intelligent transportation systems. Capitol Research. Council of State Governments, April 2010: Transport for London, 2007; Intelligent transportation system benefits, costs, deployment, and lessons learned desk reference: 2011 update, US Department of Transportation, September 2011; Urban mobility plan, Seattle Department of Transportation, January 2008; McKinsey Global Institute analysis

Enhanced Capabilities

Coordinated Timings

Coordinating timings during peak and off-peak periods will reduce congestion, increase throughput, and increase safety. These timings can be fine tuned and updated more frequently under a traffic signal management program.

Preventative Maintenance

Routinely checking traffic signal equipment allows for equipment problems to be identified before they impact the flow of traffic.

Regular Reporting

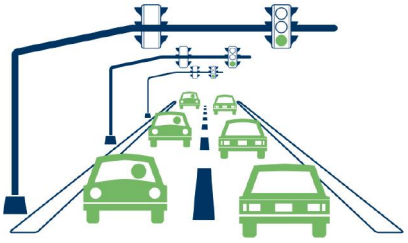
Reporting of performance metrics through the use of signal detector data, will better inform the public of the performance of the program, thus leading to more transparency and buy-in.

Adaptive Signal Systems

Increases the functionality of these systems through continued adjustment and fine tuning throughout the life cycle of the system.

Regional Traffic Operation Program (RTOP)

Regional Traffic Operation Programs (RTOP) depend on the collaboration of multiple agencies within a specific area to design, maintain, manage, and operate traffic signals. Often, traffic signals are managed at a local level by agencies that have limited jurisdictional authority which can lead to varying timings and approaches to traffic signal management along a given corridor. A regional approach to traffic signal management leverages multiple smaller agencies in order to jointly fund the program; undertake larger, more technologically advanced projects; achieve collaborative goals; and provide better results to the public.



Critical Elements of Regional Stakeholders

- Resource Integration, Allocation, and Management
- Information Documentation and Exchange
- Equipment Sharing
- Pooled Funding
- Personnel Training and Development
- Systems Integration
- Institutional Integration

FHWA estimates that there are more than **2,000** separate agencies responsible for managing traffic signals. Many of these agencies are responsible for fewer than **50** signals.

Creating Cooperation and Partnerships

Regional programs depend on cultures where all participants are willing and able to cooperate towards a mutually beneficial goal. Moving towards a culture that embraces cooperation will be a necessary change that will take time to grow. Finding leaders who can identify common issues across jurisdictional boundaries and seek all-encompassing solutions will be critical for the growth of a regional program. Bringing together stakeholders and creating an internal network of support, especially among public officials and senior leaders, will help the process of change occur efficiently. Early participants in the program must work together to overcome shared objectives which have visible benefits. As the benefits are observed by others, additional agencies will join the program which will grow the area that the program manages as well as the funding that the program has access to.

Partnerships, both formal and informal, have proven valuable to regional programs in the past and tend to create a sustainable force behind the effort. Effective leadership and management from a transportation agency level is required to drive these partnerships and change in the region. As these transportation agencies take on leadership positions in partnerships, shared goals and practices are developed and become part of the overall process and carry forward into the future. As these procedures are followed, a common thread emerges from the partnerships that is understood by senior leadership. As these partnerships begin to flourish, additional collaborative efforts will begin to spring forth and new technologies, methods, and procedures will begin to take root in the region. These in turn will generate additional partnerships which will entice additional collaborative efforts, creating a lasting cycle of innovation.

RTOP - Ready to Act!

Regional Traffic Operation Programs allow for the direct management of an agencies most critical signal systems. These often include high volume state routes, highly congested urban signal systems, and critical importance routes (i.e. evacuation routes, detour routes, major interchanges). Maintaining agencies work within defined boundaries but the value of the program comes from a uniform approach to signal management across these boundaries. That value is tested when emergencies require immediate attention from the program, such as in the situation described to the right.

These programs work just as well for more frequent, minor incidents that still have the ability to cause major congestion. Standardization of signal settings, familiarity with signal systems, remote and local access to adjust timings, and the ability to act quickly save time and money for the traveling public.

In 2017, a bridge segment along I-85, a major interstate highway in Atlanta, Georgia suffered a catastrophic failure and collapsed. Within minutes, detoured traffic overloaded the capacity on near-by surface streets and created massive delays for all movements. By the following morning, new timings were in place for the major detour routes and engineers were in the field observing traffic and adjusting timings as needed. There was no need to determine if an on-call contract had the right scope of work to allocate funding. There was no need for a group of engineers to become familiar with the signal system and update signal software or hardware. The Regional Traffic Operation Program was already in place and quick to react to the situation. The work that was put in prior to the bridge collapse paid extra dividends when it was needed.

RTOP Success

Regional Traffic Operation Programs are large and can seem difficult to start and maintain. The maintenance of the program is just as important as getting it started in the first place. The following items will help ALDOT maintain RTOPs that foster growth and will last far past the initial investment.

Leadership

Starts as a single leader willing to motivate and engage others and builds into a team that shares a common voice. Efforts to expand leadership from within should not be overlooked.

Training Program

Will help increase efficiency and maintain consistency throughout the region. Will allow and encourage resource sharing and growing the program from within.

Self Evaluation

Determining what works well and areas that need improvement are important. Focusing on results will help grow the program over time.

Funding Mechanisms

Properly identifying funding mechanisms will ensure that the program does not overstretch itself and fail to reach its goals.

Performance Measures

Well defined metrics will help clearly identify the goals and objectives of the program and ensure that all stakeholders are on the same page.

Public Involvement

Creating easy to understand material that explains the basics of timing strategies will help reduce the amount of complaints received. Encouraging feedback and working with the community will foster growth of the program.