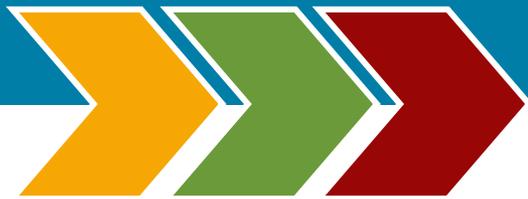


TECHNICAL REPORT

6

Transportation System

Management and Operations



May 2020



Prepared by:



Table of Contents

- 1 Transportation System Management Operations 1**
 - 1.1 Introduction..... 1**
 - 1.2 Work Zone Management (WZM) 1**
 - 1.3 Traffic Incident Management (TIM) 2**
 - 1.4 Connected and Automated Vehicles (CV/AV) Deployment..... 3**
 - 1.5 Management of Mobility, Reliability, and Efficiency 4**
 - 1.6 Multimodal Coordination 6**
 - 1.7 Background Plans and Studies 7**
 - 1.8 ITS Architecture..... 7**

1 Transportation System Management Operations

1.1 Introduction

This report documents some of the existing Transportation System Management Operations (TSMO) strategies currently in place in the Houma-Thibodaux area. It also displays potential TSMO strategies that could be implemented.

The main goal of deploying TSMO strategies is to manage existing roadway infrastructure more efficiently by using existing resources. The following strategies can be implemented as part of a TSMO strategic plan to reduce congestion and increase the safety and efficiency of the transportation system.

- Work Zone Management
- Traffic Incident Management
- Connected and Automated Vehicle Deployment
- Management of Mobility, Reliability, and Efficiency
- Multimodal Coordination
- Existing TSMO Strategies
- Background Plans and Studies
- ITS Architecture

1.2 Work Zone Management (WZM)

Work Zone Management involves organizing and operating areas impacted by road construction to minimize traffic delays and maintain safety for workers as well as travelers. Using WZM, traffic conditions are generally monitored using closed-circuit television (CCTV) cameras and controlled using dynamic message signs (DMS), Highway Advisory Radio, gates, and barriers.

As part of its TSMO strategies, the Iowa Department of Transportation evaluated the use of intelligent transportation system (ITS) as part of WZM. This included the use of speed sensors, travel-time sensors, queue detection trailers, and DMS. Between congestion and crash reductions, the smart work zone resulted in a benefit-cost ratio of over two to one, which includes the cost of new equipment. When excluding equipment cost, this ratio became nearly seven to one.

The use of TSMO in the Metropolitan Planning Area (MPA) to enhance WZM would provide the following opportunities:

Transportation System Management Operations

- Completing the Federal Highway Administration (FHWA) capability maturity model (CMM) framework for WZM.
- Using connected vehicle (CV) applications such as Work Zone Traveler Information to monitor and aggregate work zone data.
 - This allows the use of Incident Scene Work Zone Alerts for Drivers and Workers (INC-ZONE), a CV application that warns on-scene workers of vehicles with trajectories or speeds that pose a high risk to their safety.
 - It also warns drivers passing an incident zone if they need to slow down, stop, or change lanes.
- Coordinating work zone information with other groups such as traffic management centers (TMCs) and maintenance and construction centers; achieved in coordination with the Louisiana Department of Transportation and Development (LADOTD).
- Providing work zone speeds and delay status to motorists prior to motorists reaching work zones.
- Prioritizing smart work zone needs by using traffic management system (TMS) reports for areas with ITS gaps.
- Improving collaboration and communication regarding neighboring projects to coordinate closures.
- Discussing and allocating early in project development the funding for work zone ITS.

1.3 Traffic Incident Management (TIM)

The main goal of TIM is to detect, verify, respond to, and clear traffic incidents in a manner that provides the road user with the least disruption possible. The Houma-Thibodaux region already has a TIM system that detects incidents through roadside surveillance devices (e.g., CCTV). This system coordinates with:

- TMCs,
- maintenance and construction management centers,
- emergency management centers,
- rail operations, and
- event promoters.

This coordination helps traffic operations personnel respond appropriately to confirmed TMC decisions. These responses include modifications in traffic control strategy and resource

Transportation System Management Operations

coordination between center subsystems. Incident responses also include the use of Broadcast Traveler Information or Interactive Traveler Information to disseminate incident information to travelers. The LADOTD Houma TMC coordinates with the Houma Police Department and Louisiana State Police Troop C as part of emergency management. The coordination may also extend to tow trucks and other field service personnel depending on the situation.

Through the implementation of TSMO, the Pennsylvania Department of Transportation implemented Incident Response Management. This reduced incident response times by 8.7 minutes, incident clearance times by 8.3 minutes, and hours of delay by 547,000 hours per year, resulting in a monetary savings of \$6.5 million per year. Many organizations have also appointed local incident commanders who ensure the reliability of the TIM measures being implemented and take charge of the scene.

The following are opportunities in which TSMO can help in enhancing TIM:

- Completing FHWA CMM framework for TIM.
- Using CV applications such as Incident Scene Pre-Arrival Staging Guidance for Emergency Responders (RESP-STG), which provides input to responders on vehicle routing, staging, and secondary dispatch decisions that can really help in clearing traffic incidents.
- Establishing an incident review committee from the categories of first responders to grade incident operations and train staff accordingly.
- Using TMC data to inform data-driven, planning-level decisions.
- Using LADOTD's contracted service Motorist Assistance Patrol (MAP), which assists motorists by providing various services that help in restoring the Interstate to peak traffic capacity. (MAP patrol areas do not currently include the Houma-Thibodaux metropolitan region, but could in the event US 90 is upgraded to an Interstate.)
- Assigning a TIM coordinator to collaborate with LADOTD Houma TMC, city and state police departments, and MAP to share best practices.

1.4 Connected and Automated Vehicles (CV/AV) Deployment

The main goal of the CV/AV TSMO plan is to deploy CV/AV infrastructure in a progressive manner, using stages and proportional to the self-driving technology introduced by car manufacturers. Advancing the Houma-Thibodaux region's TSMO capabilities is critical with regard to the deployment of emerging transportation technologies such as CV/AVs. A strong TSMO program will help this region best leverage these technologies to the benefit of the road users.

Transportation System Management Operations

The use of CV/AV is currently not considered in the existing regional infrastructure. Many states have taken initiative in developing their own strategic CV/AV plan based on their respective needs, while few of them have considered CV/AVs as one of their TSMO business areas.

For example, the Michigan Department of Transportation (MDOT) has developed a strategic CV/AV program and established CV/AV contacts/ambassadors in each of the MDOT regions. Groundwork has been laid to integrate ITS, signals, and CV/AVs for operability, and MDOT's CV/AV group also coordinates with the TSMO data working group to determine relevant systems and data elements and opportunities for CV/AV data inclusion and use.

The following are opportunities in which TSMO can help in enhancing CV/AV technology:

- Developing a data collection and storage plan.
 - Data exchange and storage will be a key feature of efficient CV/AV technology.
- Establishing CV/AV contacts/ambassadors in each LADOTD regions in addition to subject-matter experts.
- Integrating a CV/AV systems unit with signals and ITS in the Houma-Thibodaux region.
- Obtaining direction from LADOTD management to have each work area work openly with the CV/AV group to share data, information, and interoperability.
- Coordinating with the TSMO data working group to identify relevant systems and data elements and opportunities for CV/AV data inclusion and use.

1.5 Management of Mobility, Reliability, and Efficiency

The use of TSMO strategies are is intended to maximize existing capacity and reduce recurring and non-recurring congestion. This is usually accomplished by reducing the frequency of congestion on the freeways and arterials in metro areas. Other ways of achieving this goal include the reduction of delays associated with various functional activities.

The LADOTD has developed programs and initiatives to address these challenges in recent years, but implementation of a TSMO program in the urbanized area could enhance and integrate these activities, improving safety and mobility in the region. The Houma-Thibodaux metropolitan area has a large population close to offshore industries and its location on hurricane evacuation routes makes it very important. The area contains a limited number of routes for normal and emergency evacuation traffic and a limited ability to expand its roadway capacity, which can point to congestion issues due to inefficient traffic control systems. There is a need to manage the area's transportation system efficiently to address all of these limitations.

Transportation System Management Operations

The following are opportunities in which TSMO can help manage mobility, reliability, and efficiency:

- Completing FHWA CMM framework for road weather, planned special events, traffic signals, work zones, and TIM.
- Using CV applications such as Dynamic Speed Harmonization, which aims to recommend speeds in response to congestion, incidents, and road conditions to maximize throughput and reduce crashes.
- Using CV applications such as Weather Response Traffic Information, which uses CV data and communications systems to enhance the operation of variable speed limit systems and improve work zone safety during severe weather events.
- Using applications such as Emergency Communications and Evacuation during special events to address the needs of evacuees with and without special needs or their own transportation.
- Reviewing adverse weather planning documents with stakeholders to make updates as necessary.
- Deploying environmental sensors on and about roadways and collecting road and weather condition information.
 - The Houma-Thibodaux metropolitan area can also use sensor systems located on maintenance and construction vehicles to collect this data.
 - The data can be used in processing the information and making decisions on operations.
 - The LADOTD Houma TMC, LADOTD ITS Field Equipment, LADOTD ITS Section, and LADOTD Sub District 02 Traffic Operations can work together on integrating this road weather sensor technology into existing systems and technologies to share information quickly with stakeholders and improve traffic management during weather events.
- Implementing ITS in LADOTD District 02 to address extreme weather-related issues and leverage the strength of the systems to enhance operations during hurricane evacuations.
- Quantifying resiliency metrics associated with weather events to understand scope and potential countermeasures.
- Developing a budget of resources and business model for safety and reliability during adverse weather.

Transportation System Management Operations

- Developing a working group through TSMO collaboration activities to coordinate with responders and event planners to prepare for system unreliability.
- Integrating Traffic Information System Dashboard into existing LADOTD District 02 systems and technology.
- Collaborating with the public and event planners to encourage active transportation and transit to and from events.
- Using TMS reports to identify locations without communication and cross-reference with nearby projects to prioritize locations for adding communications.
- Integrating findings from Automated Traffic Signal Performance Measures with maintenance ticketing processes.
- Providing training and collaboration opportunities between LADOTD Sub District 02 Traffic Operations, Sub District 02 Traffic Signal System, and Houma Network Communication to extend benefits of dynamic signal timing improvements.

1.6 Multimodal Coordination

Communication between multiple traffic and transit agencies is important in improving multimodal service coordination. Traveler convenience at transit transfer points and clusters (a collection of stops, stations, or terminals where transfers can be made conveniently) can be increased with multimodal coordination between transit agencies, which helps improve operational efficiency. There is a need to establish two-way communication between multiple transit and traffic agencies in the Houma-Thibodaux region.

The following are opportunities in which TSMO can help in managing multimodal coordination:

- Ensuring interaction and integration between freight and transit, which are important modes of transportation.
- Using CV applications such as Freight-Specific Dynamic Travel Planning and Performance to enhance traveler information systems.
 - This application addresses specific needs such as wait times at ports, road closures, work zones, and route restriction, playing an important role in multimodal coordination.
 - Coordination among public transportation providers and travelers can be enabled with the Connection Protection application, which helps improve the probability of successful transit transfers.

Transportation System Management Operations

- Sharing transit transfer service information between multimodal transportation service providers and transit agencies.
 - LADOTD Sub District 02 Traffic Operations and the parish-wide transportation system in Houma-Thibodaux can coordinate this effort.
- Establishing a group that will identify potential operations-related multimodal performance measures.
- Identifying crash locations and/or corridors that necessitate high reliability (e.g., transit or freight corridors) to coordinate multiple modes in a better way.

1.7 Background Plans and Studies

There are a number of associated studies and procedures influencing the development of this report that have shaped it in a number of ways. Some of them are mentioned below:

- **Intradepartmental Agreements:** The LADOTD Houma office has numerous agreements between each of the stakeholder agencies with ITS systems so that information generated can be regularly exchanged prior to implementing relevant projects.
- **Standard Operating Procedures:** Interoperable ITS systems throughout the region have a goal of defining the roles and responsibilities of the participating stakeholders in the region and establishing the willingness of agencies to accept their roles and responsibilities. The roles and responsibilities include, but are not limited to, areas such as Arterial Management, Emergency Management, Incident Management, Transit Management, Traveler Information, and Maintenance and Construction.
- **ITS Deployment Study:** This study includes proposed ITS projects that have been identified as part of the regional ITS Architecture, along with their service and geographic scopes and the total cost.
- **Transportation Improvement Program (TIP):** There is no dedicated TSMO funding source in the associated TIP for the Houma-Thibodaux region.
- **TIM System:** This system includes incident detection capabilities that help in managing both planned and unexpected events and mitigating the impact to the transportation network.

1.8 ITS Architecture

The local ITS Architecture provides information on existing and planned operational transportation systems in a region. It also provides an opportunity to integrate other regional approaches to the technology use. The LADOTD Houma office has a great number of

Transportation System Management Operations

intradepartmental agreements, as well as agreements with other stakeholder organizations, by which the exchange of information occurs on a daily basis. This exchange of information is mainly based on needs either coming from one department or the other.