



CAMPO

Regional Incident Management Strategic Plan and Performance Assessment

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Overview

The Capital Area Metropolitan Planning Organization (CAMPO) Regional Incident Management Strategic Plan and Performance Assessment presents the results of a collaborative regional planning effort to improve Traffic Incident Management (TIM) in the CAMPO region.

Traffic incidents are defined as unplanned randomly occurring traffic events that adversely affect normal traffic operations. Traffic incidents are one of the largest contributors to congestion in the CAMPO Region and have been estimated to account for approximately one quarter of all delay nationwide. Traffic incidents also pose significant safety challenges by increasing the chances of secondary crashes and exposing first responders to the hazards of working near live traffic.

Goals of the CAMPO Regional Incident Management Strategic Plan and Performance Assessment

- Reduce the impacts of incidents to travelers in the Region, including reduced roadway clearance time, incident clearance time, and time to return to normal
- Reduce secondary crashes in the Region
- Provide accurate and timely traveler information to travelers throughout the Region

To reduce the impact of incidents and improve safety in the CAMPO Region, a group of state, regional, and local transportation and public safety officials from Central Texas developed the CAMPO Regional Incident Management Strategic Plan and Performance Assessment. The plan builds on several successful TIM programs that currently exist in the Region and identifies new programs and strategies to continue improving TIM in Central Texas. Over 50 stakeholders from 20 different public and private sector agencies provided input into the plan through stakeholder interviews, project workshops, and document review.

Findings

The CAMPO Region has made significant strides already to improve TIM processes and facilitate regional collaboration. For example, TIM stakeholders gather bimonthly as part of the AIMHigh (Austin Incident Management for Highways) Regional Incident Management Task Force to conduct after-action reviews for major incidents and raise awareness of major projects that affect the Region. The Texas Department of Transportation (TxDOT) operates a recently expanded safety service patrol program known as Highway Emergency Response Operator (HERO) that can clear disabled vehicles from travel lanes, provide traffic control at incidents, and assist stranded motorists. Multiple transportation and public safety agencies in the Region including TxDOT, Capital Metropolitan Transportation Authority, Travis County Sheriff, and the City of Austin Police and Fire Departments have formed a partnership to operate the Combined Transportation, Emergency and Communications Center (CTECC) located in Austin. Having traffic management, transit dispatch and public safety dispatch operators at one location gives CTECC the ability to manage incidents across jurisdictional boundaries to improve safety and reduce congestion in the Region.

Despite the TIM progress that has been made in the CAMPO Region, major challenges still exist. For instance, quicker clearance times in the Region would reduce congestion and improve safety. Abandoned vehicles often remain on the shoulders of freeways for an extended period of time, posing a safety hazard and distraction to drivers. Incident clearance times could be reduced by streamlining towing dispatch and hazardous material spill cleanup across the Region. Sharing resources and data (such as traffic camera feeds) across agencies would better equip operators and responders for TIM procedures. Increased opportunities for ongoing interdisciplinary TIM training could improve implementation of TIM best practices through education and relationship building across agencies. These are just a few of the opportunities in the Region where increased investment in TIM programs and projects could ultimately lead to benefits such as reduced congestion, increased safety, and greater reliability of the transportation system.

Recommendations

The CAMPO Regional Incident Management Strategic Plan and Performance Assessment includes 29 recommendations to improve TIM in the CAMPO Region, as shown in **Figure 1**. These recommendations fall into one of seven categories: Policy, Communication and Coordination, Infrastructure, Response and Clearance, Training, Data and Performance Measures, and Public Engagement. (See **Chapter 4** of this report for more information about each of these recommendations.)

To assist in prioritizing the TIM recommendations, a cost-benefit analysis was performed on selected recommendations that were conducive to quantitative analysis. Guidance was also provided on potential funding to implement the recommendations. Recommended performance metrics to track the Region's progress towards improving TIM were developed, which include:

- Roadway Clearance Time
- Incident Clearance Time
- Number and Severity of Secondary Crashes
- Survey of Traveler Information Satisfaction
- Incident Influence Time (Time to Return to Normal Flow)
- Percentage of Responders/Operators who have received TIM Training
- Rates of Injury or Fatality of First Responders on Incident Scene








	RECOMMENDATIONS
POLICY 	Develop Regional Open Roads Policy
	Develop a standardized HAZMAT and non-HAZMAT clean-up policy for the Region
	Create a position for a Regional TIM Coordinator
COMMUNICATION & COORDINATION 	Develop standard operating procedures for TMC coordination throughout the Region
	Develop platform for shared viewing of all cameras and DMS throughout the Region
	Develop a regional repository for incident status available to all CAMPO agencies
	Expand sharing of computer-aided dispatch (CAD) data throughout the Region
INFRASTRUCTURE 	Expand freeway lighting coverage
	Expand CCTV camera coverage on freeways
	Expand DMS coverage on freeways
	Deploy DMS on state routes in rural areas at key decision points in the CAMPO Region
	Expand arterial DMS coverage in the City of Austin
	Expand traffic signal preemption for emergency vehicles
RESPONSE & CLEARANCE 	Expand HERO service patrol coverage to additional freeways
	Expand HERO service patrol coverage to regional arterials
	Implement rapid clear no-cost towing on freeways
	Implement rapid clear no-cost towing on regional arterials
	Implement centralized location-based towing dispatch throughout the Region
	Implement heavy-tow program throughout the Region
	Procure advanced crash investigation equipment for law enforcement throughout the Region
TRAINING 	Support continued regional interdisciplinary TIM training
	Educate first responder agencies about capabilities of HERO service patrol vehicles
	Provide training for advanced crash investigation equipment to law enforcement throughout the Region
DATA & PERFORMANCE MEASURES 	Standardize regional TIM data collection, data visualization, and performance measures
	Share regional TIM performance data between public agencies in data dashboard
PUBLIC ENGAGEMENT 	Share regional TIM performance data with media and public in annual report and data dashboard
	Increase knowledge and support of HERO through public education efforts
	Raise awareness of statewide Steer It, Clear It law
	Improve traveler information quality through increased coordination with private sector providers

Figure 1 – Recommendations
 (See Figure 11 in Chapter 4 for additional detail on recommendations.)

Next Steps

The CAMPO Regional Incident Management Strategic Plan and Performance Assessment developed a total of 29 recommendations to improve TIM in the CAMPO Region.

Implementation of these recommendations will be led by CAMPO, TxDOT, municipalities or other agencies as discussed in Chapter 4.

To accelerate implementation of several recommendations that are expected to yield a high benefit-cost ratio and serve as foundation programs for other TIM activities, it is recommended that CAMPO take a leadership role to implement six key policies and programs in the near-term:

- **Develop a Regional Open Roads Policy.** Develop a Regional Open Roads Policy for review and approval by local law enforcement, first responder, and traffic management agencies throughout the Region.
- **Develop a Standardized HAZMAT and Non-HAZMAT Clean-up Policy for the Region.** Research national best practices and assemble stakeholder input to develop regional standards for the cleanup of incidents involving HAZMAT and non-HAZMAT spills.
- **Develop a Framework for a Regional Rapid Clear Towing Program.** Investigate the benefits to the Region of providing rapid clear towing for incident management, research possible funding mechanisms for such a program, and recommend a program implementation strategy.
- **Develop a Framework for a Regional Heavy Tow Program.** Collaborate with CAMPO, TxDOT, and local agencies in the CAMPO Region to develop a framework for a regionally administered heavy wrecker towing service available for use by any agency responding to major incidents on freeways.
- **Develop a Standardized Data Collection and Performance Measures Framework for the Region.** Assess data needs of specific agencies and develop a framework for integrating data sources so that TIM data can be collected and shared regionally to track performance.
- **Develop a Regional State of Traffic Incident Management Report.** Analyze existing TIM data from across the CAMPO Region and compare this data to established regional performance goals in a “State of TIM” report written for a public audience.

As the Region continues to work towards improved TIM in Central Texas, interdisciplinary collaboration is crucial. The extensive stakeholder involvement in the creation of the CAMPO Regional Incident Management Strategic Plan and Performance Assessment is a testament to the fact that incident management does not rest on any one person’s or one agency’s shoulders. Successful implementation of the recommendations in the plan will depend on the Region’s ability to continue to work together towards common goals such as reduced congestion and improved safety. Fortunately, stakeholders in the CAMPO Region have a strong foundation of TIM coordination and cooperation to build upon.

CHAPTER 1

INTRODUCTION

1 | INTRODUCTION

Overview

Over the past three decades the six-county Capital Area Metropolitan Planning Organization (CAMPO) Region has roughly tripled in population. While Central Texans may not always agree on the benefits of growth, nearly all agree that rapid growth has created serious transportation and mobility challenges for the Region. Traffic congestion and the resulting unreliability it creates in the transportation system can lead to frustration, lost productivity, and an overall decline in quality of life.

One of the greatest contributors to traffic congestion in the CAMPO Region are traffic incidents. **Traffic incidents are defined by the Institute of Transportation Engineers (ITE) as unplanned randomly occurring traffic events that adversely affects normal traffic operations.** With the road network already stretched beyond capacity, traffic incidents that unexpectedly close a road, block a lane, or cause traffic to slow down due to a distraction on the side of the road can have catastrophic effects on traffic flow. Traffic incidents also present serious safety challenges. Crash victims and first responders are extremely vulnerable while in the roadway during an incident. The chances of a secondary crash also escalate for every minute the traffic incident remains.

As community leaders struggle to find the funding necessary for the transportation infrastructure to keep pace with rapid growth of the Region, they have looked for other solutions that can help improve the safety, reliability, and efficiency of the transportation system. Improved Traffic Incident Management (TIM) is one of the most effective ways to decrease congestion resulting from unexpected incidents, and is a relatively low-cost way to decrease overall congestion. **Traffic incident management strategies allow transportation and public safety agencies to identify incidents more quickly, clear travel lanes faster, manage traffic around incident scenes more effectively, and provide advanced notice to travelers to help them avoid congestion due to traffic incidents.**

The CAMPO Regional Incident Management Strategic Plan and Performance Assessment presents the results of a collaborative regional planning effort that involved state, regional, and local transportation and public safety officials from the Central Texas Region. The plan identifies recommendations to improve incident management capabilities and reduce the impact of incidents in the CAMPO Region. The plan also identifies performance metrics that can be used to track the Region's progress towards improved incident management and provides guidance for potential sources of funding.

Traffic Incident Management Saves Lives, Time and Money

Every minute of incident delay multiplies traffic queues by a factor of 4.

The likelihood of a secondary crash increases by 2.8% for each minute the primary incident continues to be a hazard.

Faster response time has a well-documented relationship to the increased likelihood of crash survival.

In the CAMPO Region, traffic congestion and major construction programs that reduce capacity greatly increase the need to reduce roadway clearance times and preserve the capacity of roadways.

Data Sources: FHWA

Study Goals and Objectives

CAMPO, in coordination with the Study Steering Committee and project stakeholders, identified three goals for the CAMPO Regional Incident Management Strategic Plan and Performance Assessment. The goals focused on reducing the impacts of incidents to travelers in the CAMPO Region, reducing secondary crashes in the Region, and providing accurate and timely traveler information so that travelers can make informed travel choices. Ultimately, the Region would like to prevent traffic incidents from occurring but the reality is events such as crashes, disabled vehicles, and debris blocking lanes will continue to impact the surface transportation system for the foreseeable future. Achieving the goals set in the CAMPO Regional Incident Management Strategic Plan and Performance Assessment will help minimize the impact of these incidents when they do occur.

Goals of the CAMPO Regional Incident Management Strategic Plan and Performance Assessment

- Reduce the impacts of incidents to travelers in the Region, including reduced roadway clearance time, incident clearance time, and time to return to normal
- Reduce secondary crashes in the Region
- Provide accurate and timely traveler information to travelers throughout the Region



To achieve the goals, five objectives were identified for the CAMPO Regional Incident Management Strategic Plan and Performance Assessment. The objectives focus on expanding the existing TIM efforts currently underway in the CAMPO Region as well as identifying new programs and strategies to improve TIM. As noted in Chapter 3, the CAMPO Region has established many successful TIM programs and strategies that should continue to be supported. But as discussed in Chapter 4, there are still many new opportunities to invest in new TIM programs and strategies that can further reduce the impacts of incidents on the surface transportation system. Objectives also focus on developing potential projects that can be included in CAMPO's annual call for projects and identifying potential sources of funding to support new and ongoing programs and projects. Finally, stakeholders noted the importance of raising awareness of the benefits of TIM with both decision makers and the public. TIM is considered one of the most effective and low-cost tools to reduce congestion and improve safety, and it is important that the benefits of TIM are clearly understood when determining how best to invest funding in transportation improvements.

Objectives of the CAMPO Regional Incident Management Strategic Plan and Performance Assessment

- Identify opportunities to expand existing TIM programs and strategies
- Identify new TIM programs and strategies for implementation
- Develop projects to include in CAMPO's annual call for projects
- Identify sources of funding for TIM programs and projects
- Raise awareness of the benefits of improved TIM and increase support for investment in TIM programs and projects



Study Structure and Input

The Capital Area Metropolitan Planning Organization (CAMPO) is the Metropolitan Planning Organization (MPO) for Bastrop, Burnet, Caldwell, Hays, Travis, and Williamson Counties. The Region includes the urban core along the I-35 corridor, as well as rural counties to the east and west, as shown in **Figure 2**. CAMPO develops the 20-plus-year Regional Transportation Plan and the four-year Transportation Improvement Program planning document.

The focus of the CAMPO Regional Incident Management Strategic Plan and Performance Assessment was on the entire six-county CAMPO region, including freeways, state routes and arterials. Traffic incidents generally have the most detrimental impacts when they occur on the freeways that are at or near capacity. Much focus was placed on such freeways, but stakeholders also realized that state routes with limited alternatives and regional arterials, which carry most of the region's traffic and connect cities in urban areas, also are severely impacted by traffic incidents.

To provide oversight and guidance to the study, CAMPO created a Study Steering Committee comprised of representatives from eight agencies representing state, regional, county and municipal governments. The Study Steering Committee met throughout the project and provide the project team with guidance and review. Agencies participating in the Study Steering Committee included:

- CAMPO
- Bastrop County
- Central Texas Regional Mobility Authority (CTRMA)
- City of Austin
- City of Round Rock
- Hays County
- Travis County
- Texas Department of Transportation (TxDOT) Austin District

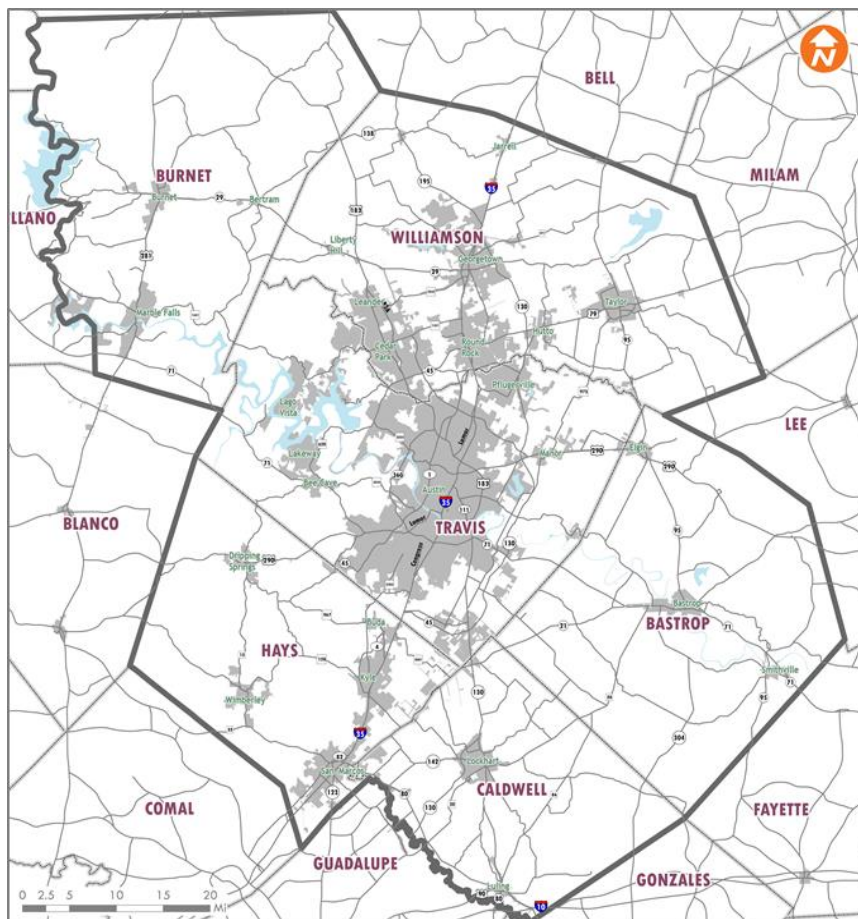


Figure 2 – CAMPO Region

Development of the plan included involvement from 56 stakeholders representing 20 different public agencies and private service providers in the CAMPO Region with a stake in incident management. Participants included transportation, public safety, and tolling representatives from the public sector and towing representatives from the private sector. Stakeholders participated in the plan through individual agency interviews, attendance at stakeholder workshops, and review of the Draft CAMPO Regional Incident Management Strategic Plan and Performance Assessment report. The agencies and groups that participated in development of the plan are shown in **Table 1**.

Table 1 – CAMPO Regional Incident Management Strategic Plan Stakeholders

State	Regional and County	Municipal
Texas Department of Public Safety	AIM High Regional Incident Management Group	City of Austin Fire Department
TxDOT Austin District including: Traffic Operations Serco HERO Patrol Serco TMC Operations	Bastrop County	City of Austin Police Department
TxDOT Toll Operations Division	CAMPO Technical Advisory Committee	City of Austin Transportation Department
TxDOT Traffic Operations Division (Including Statewide TIM Coordinator)	Combined Transportation, Emergency & Communications Center (CTECC)	City of Kyle Police Department
	CTRMA	City of Round Rock Transportation Department
	Travis County Transportation & Natural Resources	City of San Marcos Transportation Division
	Travis County Sheriff's Office	
Other		
AutoReturn	Circuit of the Americas	Texas A&M Transportation Institute

In addition to individual interviews with stakeholders, three stakeholder workshops were conducted in February, April, and May 2018. Workshops focused on the development of TIM recommendations, review of the cost-benefit analysis, and development of performance metrics. Presentations on the CAMPO Regional Incident Management Strategic Plan and Performance Assessment were also given to the Austin-area Incident Management for Highways (AIMHigh) Regional Incident Management Task Force, as well as to the CAMPO Technical Advisory Committee (TAC) and CAMPO Transportation Policy Board.

CHAPTER 2

NEED FOR TRAFFIC INCIDENT MANAGEMENT IN THE REGION

2 | NEED FOR TRAFFIC INCIDENT MANAGEMENT IN THE REGION

Approximately 2 million people live in CAMPO's six-county region. As the population has grown rapidly over the last several decades, new strains on the regional transportation network have emerged. In 1982 the average automobile commuter in the region experienced 16 hours of traffic delay per year; by 2014 that average commuter delay had increased to 52 hours per year, or roughly one hour per week. For 2014, the Urban Mobility Scorecard prepared by the Texas A&M Transportation Institute estimated a total annual traffic congestion cost of \$1.14 billion to commuters in the CAMPO Region. Per auto commuter, this value translated to an annual cost of \$1,159.

Prevalent traffic congestion in the CAMPO Region degrades both the safety and reliability of the regional transportation network. While limited roadway capacity is the largest contributor to traffic congestion in the United States, traffic incidents are the second largest contributing factor. The Federal Highway Administration (FHWA) estimates that traffic incidents are responsible for one quarter of the traffic congestion experienced across the country.

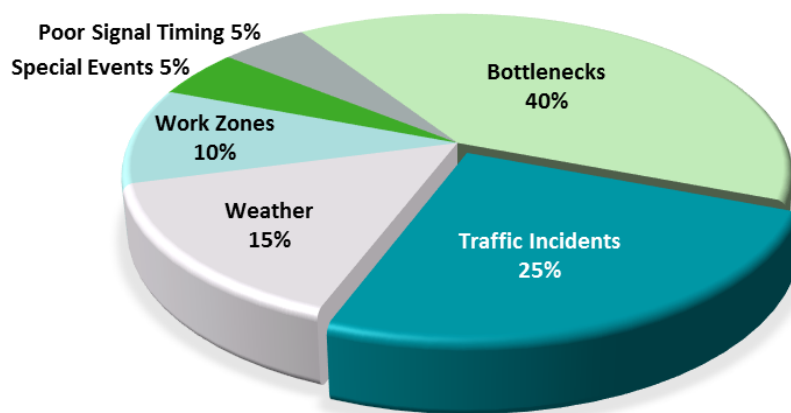


Figure 3 – FHWA Sources of Congestion

TIM strategies aim to reduce the amount of congestion caused by traffic incidents and the risk of secondary crashes. Many of these strategies focus on improving aspects of incident detection and response, or on reducing the duration or traffic impact of individual incidents. The Austin-area Incident Management for Highways (AIMHigh), a task force of agencies involved with incident management in Central Texas, identified TIM as one of the most effective tools for reducing delay and enhancing safety in their 2010 AIMHigh Strategic Plan.

What is Traffic Incident Management (TIM)?

The AIMHigh Strategic Plan from 2010 explains that “traffic incident management (TIM) is a systematic, planned, and coordinated approach to detect, respond to, and remove traffic incidents and restore traffic capacity as safely and quickly as possible. Involving law enforcement, fire and rescue, emergency medical services, transportation, towing and recovery, and other personnel—TIM is considered to be one of the most effective tools for reducing delay and enhancing safety.”

Often, TIM strategies are much more cost-effective than congestion-reducing alternatives that involve building additional roadway capacity. As available funding for capacity improvements continues to be strained, low-cost congestion mitigation strategies such as TIM become more valuable.

Reviewing traffic incident data from across the state provides a snapshot of the opportunities for TIM improvement in the Austin area. TxDOT logs incident clearance times for collisions and disabled vehicles across the state. District-wide average clearance times for the six major districts are shown in **Figure 4** for the month of July 2018. Incident clearance time is a measure of the average time (in minutes) from incident detection to clearance for collisions (plus overturns & fires) and disabled vehicles (plus stalls & abandoned vehicles). Incidents included in this dataset for the TxDOT Austin District occurred along HERO-patrolled roadways and were tracked by Lonestar.

The Austin District tracks and reports all stalled or abandoned vehicles on the roadway, including those that are not blocking a travel lane and are left on the shoulder, while some districts only report vehicles that are blocking a travel lane. Despite the variations in reporting methods across Districts (as shown in **Figure 4** by the differences in total numbers of reported collisions and disabled vehicles), it is apparent that the 11-county TxDOT Austin District (which includes the six counties in the CAMPO Region) can improve the time to remove collisions and disabled vehicles from the roadway. It is worth noting that the Houston District, where the SafeClear towing program (recently rebranded as “Tow and Go”) is implemented, has the lowest average clearance times, despite the highest number of reported collisions and disabled vehicles.

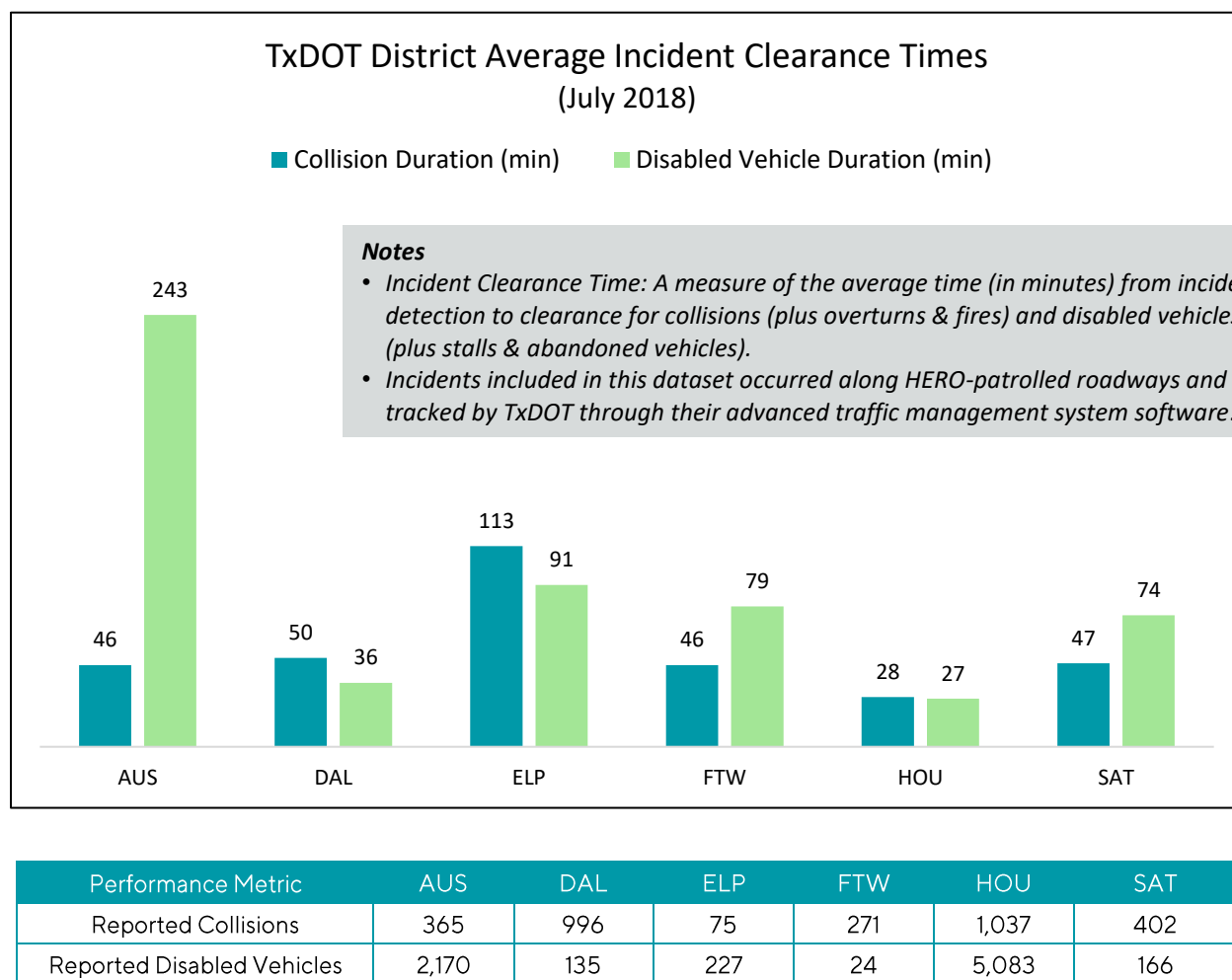


Figure 4 – TxDOT District Average Incident Clearance Times

CHAPTER 3

EXISTING TRAFFIC INCIDENT MANAGEMENT ACTIVITIES IN THE REGION

3 | EXISTING TIM ACTIVITIES IN THE REGION

While there is a strong need to improve TIM in the CAMPO Region, much has already been accomplished. Legislation that supports key TIM activities is in place, regional collaboration to support TIM exists throughout the region, and programs such as the TxDOT HERO Safety Service Patrol directly support the goals of the TIM program. Locally many cities have implemented systems that can be used for improved incident management such as centrally controlled traffic signal systems that can allow traffic signal timing to be adjusted in response to incidents.

Rather than starting from a clean slate, the CAMPO Regional Incident Management Strategic Plan and Performance Assessment effort seeks to build on current TIM successes in the Region. The recommendations in this report support the TIM initiatives that stakeholders are already pursuing, like creating standardized performance measures, deploying additional Intelligent Transportation Systems (ITS) technologies on regional freeways and arterials, implementing heavy tow contracts for major incidents, and conducting interdisciplinary TIM training for transportation agencies and emergency responders.



Figure 5 – CTECC is an excellent example of state, county and municipal cooperation that has led to improved TIM in the CAMPO Region.

A summary of some of the key TIM successes in the CAMPO Region is presented in **Figure 6** on the following page and described in more detail below. Agencies in the CAMPO Region continue to seek innovative means to improve safety of travelers and reduce congestion related to incidents. The list of successes represents only a fraction of the good things that have been done in the Region and will grow each year as agencies continue to implement innovative strategies and programs to improve TIM.

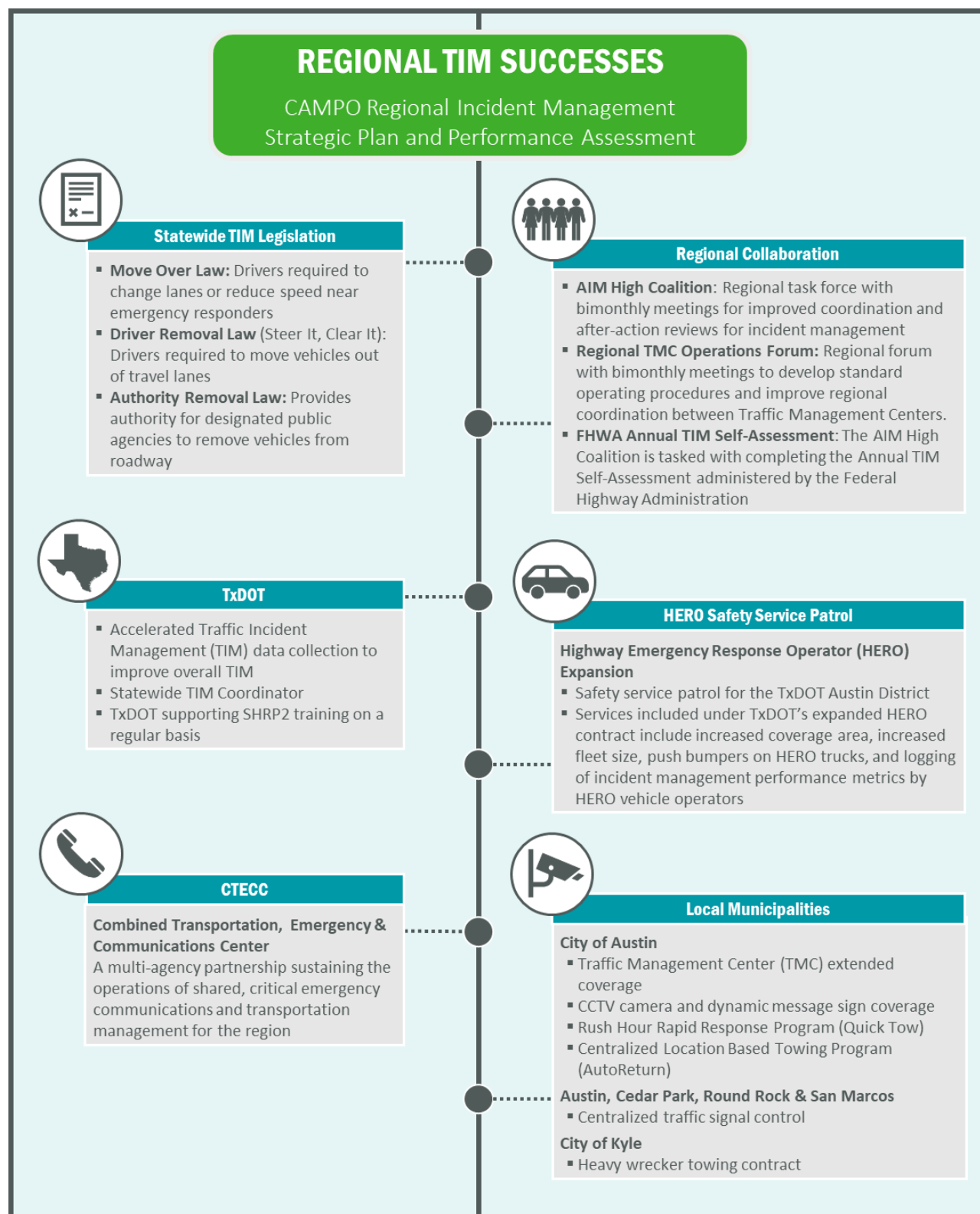


Figure 6 – TIM Successes in the CAMPO Region

Statewide TIM Legislation

Traffic incident management programs and projects in the CAMPO Region must operate within the umbrella of statewide policy. Fortunately, legislation in Texas scores well on a national scale for following best practices to support incident management efforts.

FHWA published an article in 2008 called *Traffic Incident Management Quick Clearance Laws: A National Review of Best Practices*

(<https://ops.fhwa.dot.gov/publications/fhwahop09005/index.htm>). The article commends Texas for implementing the following policy best practices that support incident management:

- The Move Over Law which requires drivers to change lanes or reduce speed near emergency responders.
- The Driver Removal Law (also known as “Steer It, Clear It”) which requires drivers to move vehicles out of travel lanes.
- The Authority Removal Law which provides authority for designated public agencies to remove vehicles from the roadway.

Regional Collaboration

When a traffic incident occurs, it is no single agency’s responsibility to manage and clear it. TIM is a collaborative effort, where the responsibilities of municipal transportation, fire, and police departments intersect with county, regional and statewide transportation agencies as well as private towing companies. Regional collaboration can therefore be considered the cornerstone of TIM. Project recommendations for resource sharing, policy updates, or data collection rise and fall with a Region’s ability to work together towards common goals of safety, mobility, and high-quality traveler information.

As noted previously, AIMHigh is a regional task force of stakeholders that has been meeting since 2004 for the improvement of incident management in the Austin area. AIMHigh provides the opportunity for improved regional coordination and after-action reviews for incident management. Commonly participating agencies include TxDOT Austin District, TxDOT HERO Safety Service Patrol, CTRMA, City of Austin (Transportation, Police and Fire), City of Round Rock (Transportation and Police), City of San Marcos (Transportation), City of Cedar Park (Transportation), and the Travis County Sheriff’s Office.

Many regional coordination efforts deal specifically with Traffic Management Center (TMC) operations. To discuss these initiatives, a Regional TMC Operations Forum has been formed that meets bi-monthly in the CAMPO Region. The Regional TMC Operations Forum operates as an independent working group to develop standard operating procedures (SOPs) and potentially share resources that to help manage traffic and incidents with increasing effectiveness. Participants include representatives from CTECC, TxDOT Austin District, TxDOT Toll Division, CTRMA, City of Austin, City of Round Rock, and City of San Marcos.

Texas Department of Transportation

In addition to operating the HERO patrol program and the TxDOT regional TMC at CTECC, TxDOT supports incident management efforts in a variety of other ways.

In 2018 TxDOT created the role of Statewide TIM Coordinator. This new role is focused on the improvement of incident management and provision of training opportunities throughout the state. The first Statewide TIM Coordinator, David McDonald, has been heavily involved in the development of the CAMPO Regional Incident Management Strategic Plan and Performance Assessment through stakeholder workshops and interviews, both in his former role with the Austin Police Department and as the TxDOT Statewide TIM Coordinator. The Statewide TIM Coordinator participates in regional incident management forums across the state and helps support TIM improvements, including coordinating training opportunities.



Figure 7 – TxDOT Sponsored SHRP2 TIM Train the Trainer Class

For example, a Strategic Highway Research Program 2 (SHRP2) TIM Train the Trainer class was offered on April 18, 2018, for stakeholders in the CAMPO Region, and TxDOT will continue to support SHRP2 TIM training on a regular basis. The SHRP2 TIM training program (developed by FHWA) uses tabletop exercises to educate first responders and traffic operators about TIM best practices. One benefit of SHRP2 training is the networking across agencies that occurs at the sessions. When incident management personnel have relationships with one another, safety and efficiency at the incident scene are improved.

In addition to the Train the Trainer class (which educates personnel so that they are qualified to go back to their agencies and train others), the four-hour SHRP2 Basic TIM Training course could be offered regularly in the CAMPO Region for transportation and emergency response personnel. The TxDOT Statewide TIM Coordinator will continue to research and develop TIM training opportunities statewide.

One challenge TxDOT faces is the ability to collect traffic and incident data and monitor performance in a standardized way across TxDOT Districts. Another challenge is how to collect data on roads not covered by TxDOT's Freeway Management System. In response to these needs, TxDOT is focusing on the development of standardized data collection and performance monitoring processes to accelerate their ability to collect and monitor system performance, including incident management operations.

In 2014 TxDOT completed a report known as *Traffic Incident Management Plan: State of the Practice*. This plan documented existing and planned traffic incident management efforts in the

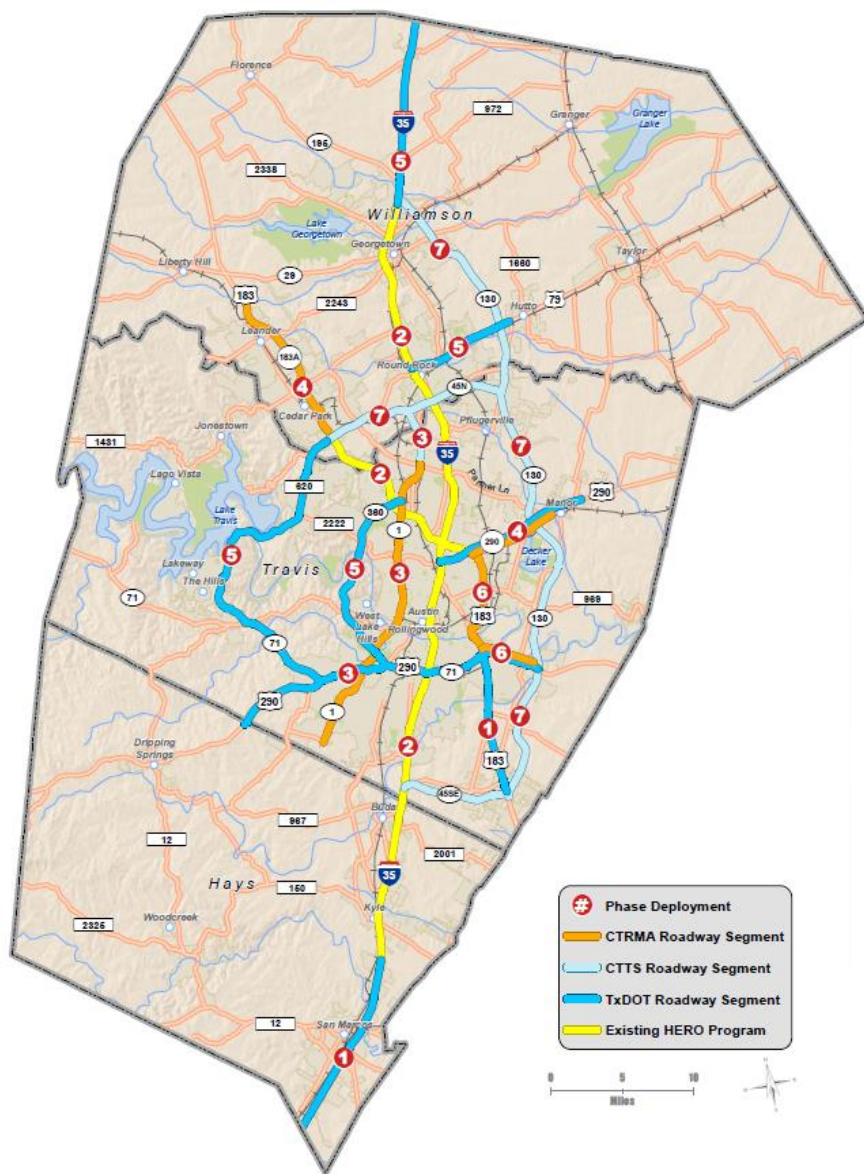
Austin Region and produced a list of 14 project recommendations for the Region. Some of these recommendations, like upgrading Lonestar to efficiently log incident information and expanding the HERO program, have already been implemented. Other recommendations, like establishing TIM performance measures for the Region, are further developed by the CAMPO Regional Incident Management Strategic Plan and Performance Assessment.

HERO Safety Service Patrol

Safety service patrol programs are a relatively low-cost traffic incident management strategy that provides assistance to stranded motorists, while also improving safety and mobility for the rest of road users during an incident. The HERO service patrol program has been operating for years in the TxDOT Austin District. Originally established by TxDOT, the program was funded by CAMPO and operated by CTRMA for several years before returning to TxDOT. The program was discontinued by TxDOT in February 2008 but re-instituted in 2010.

Figure 8 - HERO Safety Service Patrol Expansion Phasing

Phase	Total Miles
1	22.7
2	68.7
3	46.9
4	28.1
5	53.6
6	18.7
7	71.0



The goal of the HERO program is to improve safety and keep traffic flowing along 138 miles of I-35, US 183, US 290, SH 71, and Loop 1 (MoPac) in the greater Austin area. HERO trucks operate from 5 AM to 9 PM Monday through Friday and from 7 AM to 7 PM Saturday and Sunday. Example HERO services include relocating disabled vehicles to safety, providing traffic and lane control at crash scenes, changing flat tires, and assisting first responders at crash scenes. TxDOT is also operating HERO services during scheduled overnight full freeway closures due to construction on I-35.

In 2017 TxDOT launched a new HERO contract with enhanced incident management capabilities. The new program has an expanded coverage area, as shown in **Figure 8**, and an increased fleet size, with vehicles equipped with push bumpers and arrow boards. HERO vehicle operators have also begun to log incidents in an online database to improve incident tracking and performance monitoring.

CTECC

TMCs are an integral piece of incident management operations in urban areas. From their TMC workstations, operators can detect traffic incidents, monitor traffic conditions using CCTV cameras, post messages to dynamic message signs (DMS) about heavy traffic or alternate routes, and dispatch service patrol vehicles or emergency services.

The Combined Transportation, Emergency & Communications Center (CTECC) is located on Old Manor Road in Austin. CTECC is a centralized public safety facility sustaining the operations of shared, critical emergency communications and transportation management for the region. Functionality includes public safety dispatch, transit dispatch, and TxDOT TMC operations.

As a partnership between multiple agencies in the Region, CTECC is uniquely equipped to manage incidents whose impacts span multiple jurisdictions. Agencies in partnership at CTECC include TxDOT TMC, Travis County Sheriff, City of Austin Police and Fire, and the Capital Metropolitan Transportation Authority. In 2018 the City of Austin TMC (located at a separate facility on Toomey Road) plans to locate TMC operators in CTECC for increased coordination.

CTECC also supports incident management efforts by providing space for regional 9-1-1 operators and dispatch personnel from the City of Austin Police and Fire Departments. TxDOT houses their TMC and HERO Safety Service Patrol Program dispatchers at CTECC, and the AIMHigh bimonthly meetings occur in the CTECC Emergency Operations Center room.

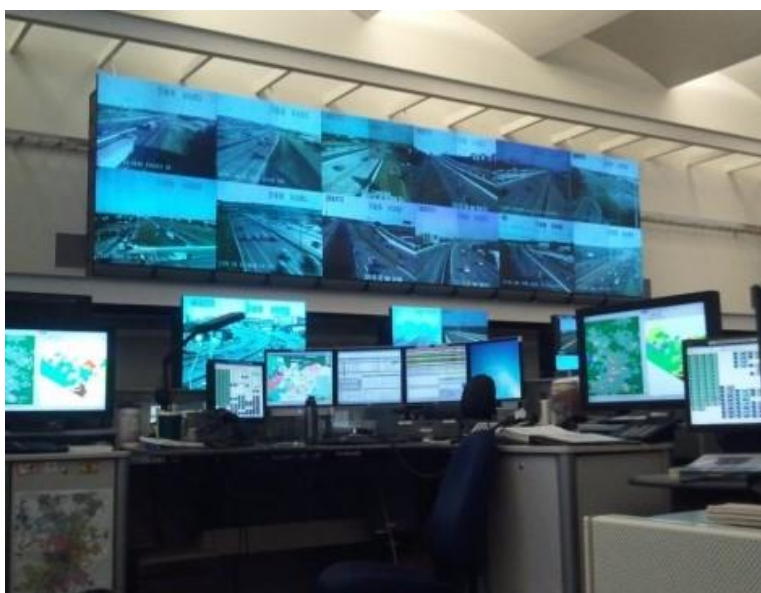


Figure 9 – Traffic management operators at CTECC use CCTV cameras, DMS and other transportation technologies to promote safety and mobility in the Region.

Municipalities

In addition to regional incident management measures, many programs and transportation technologies implemented by local municipalities also support TIM in the CAMPO Region. Some examples include:

Extended TMC Coverage. The City of Austin extended TMC coverage hours from standard business hours to 6 AM to 8 PM Monday through Friday. Weekends are covered with slightly shorter hours but coverage is extended on weekends when special events will impact traffic. This extended coverage has increased the availability of City of Austin TMC operators to change signal timings to response to incidents, especially along frontage roads for major incidents along freeway facilities.

Intelligent Transportation Systems (ITS). Municipal agencies throughout the CAMPO Region, including the City of Austin, City of Cedar Park, City of Round Rock, and the City of San Marcos, use a variety of ITS devices to monitor and manage traffic. Devices deployed by various cities include CCTV cameras, DMS, and Bluetooth vehicle sensors to monitor traffic and provide traveler information from TMCs.

Rush Hour Rapid Response Program. The City of Austin operates the Rush Hour Rapid Response Program (also known as “Quick Tow”). Within this program, disabled vehicles on a limited number of roadways within Austin can receive a free tow off the roadway to a place of safety during the AM and PM peak hours. The Rush Hour Rapid Response program benefits not only the owner of the disabled vehicle, but also the rest of the traveling public because it results in quicker clearance of the roadway for improved safety and reduced travel delays. The Rush Hour Rapid Response program also benefits the Region by removing vehicles from the shoulder where they can be a distraction to drivers and may impede the use of an emergency lane.

Location-based Towing Dispatch. The City of Austin has a contract with a third-party service to dispatch towing services based on proximity to the incident. This service has reduced average response times for vehicle collision and disabled vehicle towing calls from an average of 16 minutes to less than eight minutes. Other municipalities in the CAMPO Region are considering the implementation of a similar location-based dispatch service.

Centralized Traffic Signal Control. Operators at the following municipal TMC can implement signal timing changes remotely to help manage incidents in the City of Austin, City of Cedar Park, City of Round Rock and City of San Marcos. Centralized traffic signal control allows cities to implement traffic signal plans quickly in response to traffic incidents and other unplanned events that impact traffic.

Heavy Tow Program. The City of Kyle has a separate towing contract for heavy wreckers, primarily for incidents on I-35. This contract through the City of Kyle Police Department improves clearance times for major incidents involving commercial or other large vehicles, which leads to improved safety and mobility through the City of Kyle.



Figure 10 – Increased TMC capabilities such as CCTV cameras, DMS, and centralized signal control have improved the capability of cities to manage traffic during incidents.

CHAPTER 4

RECOMMENDATIONS

4 | RECOMMENDATIONS

The recommendations generated by the CAMPO Regional Incident Management Strategic Plan and Performance Assessment are tailored to the specific needs of the region. The list of recommendations in this chapter began with a review of national TIM best practices and grew and changed over the course of an extensive regional stakeholder engagement process.

Over 50 individuals from 21 different agencies in the Region provided feedback by participating in stakeholder interviews, attending project workshops, reviewing the draft report, or serving on the Study Steering Committee. Each of the recommendations in this chapter is informed and vetted by numerous incident management stakeholders in the CAMPO Region.

Recommendations have been organized into one of the following seven categories.

- **Policy.** The creation of formal policies is necessary to establish agreement across agencies for the implementation of some TIM strategies, like HAZMAT spill cleanup. Formal documentation can also protect effective TIM processes against falling out of practice with changes in agency leadership.
- **Communication and Coordination.** Streamlining communication between agencies increases the rapidity with which incidents are detected, managed, and cleared. Communication and coordination TIM recommendations deal with establishing standard processes to improve regional collaboration.
- **Infrastructure.** CCTV cameras and DMS deployed in the field enable TMC operators to detect incidents, dispatch safety service patrol vehicles, and manage traffic. Through the development of the CAMPO Regional Incident Management Strategic Plan and Performance Assessment, stakeholders identified needs for additional infrastructure beyond what is currently deployed in the CAMPO Region, and a cost-benefit analysis was performed to analyze the anticipated return on investment for many of these deployments in the CAMPO Region.
- **Response and Clearance Procedures.** Reducing the time that it takes to respond to and clear incidents in the CAMPO Region is one of the primary goals of this project, because of the resulting safety and mobility benefits for the Region. Many cost-effective solutions are available to assist regional agencies with this goal, like location-based tow dispatch and rapid clear no-cost towing on major roadways.
- **Training.** TIM training can be a standard component of job training. For example, everyone from cadets to supervisors at the Austin Police Department receives basic training to assist stranded motorists with a priority to clear the road as fast as possible to minimize safety hazards. Periodic interdisciplinary TIM training is also a beneficial exercise that educates personnel about other agencies' processes and priorities, and builds relationships across agencies that improve incident response procedures.
- **Data and Performance Measures.** Collecting and sharing TIM-related data for the CAMPO Region can help individual agencies track incremental progress and allocate funding to strategies that demonstrate effectiveness. The ability to share regional TIM performance measures broadly with the public can also help to garner widespread support for TIM strategies.
- **Public Engagement.** Communicating accurate, timely traffic and incident information to the public allows travelers to make informed decisions and potentially change their travel plans. Public education campaigns can also be conducted to increase awareness of public services like the HERO Safety Service Patrol.

The full list of recommendations is included in **Figure 11** on the following page. For each recommendation, the following corresponding elements are including.

Projected Timeframe. Identifies whether a project can likely be completed in the near term or has a longer implementation horizon.

Estimated Score. Provides an estimated score in the categories related to cost, ease of implementation, and benefit-cost ratio. While there is no uniform scoring method to perfectly compare the wide variety of recommendations, these high-level scores have been based on engineering judgment and knowledge of the CAMPO Region. Scoring is assigned as follows:

- **Low Cost of Implementation.** Projects with a low expected cost receive a high score.
- **Ease of Implementation.** Projects requiring minimal interagency coordination receive a high score.
- **Benefit-Cost Ratio.** Projects with a high expected benefit-cost ratio receive a high score. Note that an in-depth cost-benefit analysis was performed for a subset of infrastructure and response and clearance strategies that were conducive to quantitative evaluation (see the *Cost-Benefit Analysis* section of this chapter for more information about the calculation of these ratios).

Lead Agency. Identifies the most likely agency or agencies to spearhead strategy implementation.

Following the full list in **Figure 11**, a more detailed description of each recommendation is provided in this chapter.

CAMPO REGIONAL INCIDENT MANAGEMENT STRATEGIC PLAN AND PERFORMANCE ASSESSMENT








	RECOMMENDATION	PROJECTED IMPLEMENTATION TIME FRAME			ESTIMATED SCORE (●●●●● = Best)			LEAD AGENCY
		FY 2019 SHORT-TERM (0-4 YEARS)	MID-TERM (5-10 YEARS)	LONG-TERM (10+ YEARS)	LOW COST OF IMPLEMENTATION	EASE OF IMPLEMENTATION	BENEFIT-COST RATIO	
<div>POLICY</div> <div></div>	Develop Regional Open Roads Policy	<div><div></div><div></div><div></div><div></div><div></div></div>			●●●●●	●●●○○	●●●●●	CAMPO
	Develop a standardized HAZMAT and non-HAZMAT clean-up policy for the Region	<div><div></div><div></div><div></div><div></div><div></div></div>			●●●●●	●●●○○	●●●●●	CAMPO
	Create a position for a Regional TIM Coordinator	<div><div></div><div></div><div></div><div></div><div></div></div>			●●●●○	●●●●○	●●●●○	CAMPO or TxDOT
<div>COMMUNICATION & COORDINATION</div> <div></div>	Develop standard operating procedures for TMC coordination throughout the Region	<div><div></div><div></div><div></div><div></div><div></div></div>			●●●●●	●●●●○	●●●●○	TxDOT, CTRMA, or Municipalities
	Develop platform for shared viewing of all cameras and DMS throughout the Region	<div><div></div><div></div><div></div><div></div><div></div></div>			●●●○○	●●○○○	●●●○○	TxDOT or CAMPO
	Develop a regional repository for incident status available to all CAMPO agencies	<div><div></div><div></div><div></div><div></div><div></div></div>			●●○○○	●○○○○	●●●○○	TxDOT or CAMPO
	Expand sharing of computer-aided dispatch (CAD) data throughout the Region	<div><div></div><div></div><div></div><div></div><div></div></div>			●●●○○	●●●○○	●●●○○	Transportation and Public Safety Agencies
<div>INFRASTRUCTURE</div> <div></div>	Expand freeway lighting coverage	<div><div></div><div></div><div></div><div></div><div></div></div>			●○○○○	●●●●○	●●●●●	TxDOT
	Expand CCTV camera coverage on freeways	<div><div></div><div></div><div></div><div></div><div></div></div>			●○○○○	●●●○○	●●●●○	TxDOT
	Expand DMS coverage on freeways	<div><div></div><div></div><div></div><div></div><div></div></div>			●○○○○	●●●○○	●●●●○	TxDOT
	Deploy DMS on state routes in rural areas at key decision points in the CAMPO Region	<div><div></div><div></div><div></div><div></div><div></div></div>			●○○○○	●●○○○	●●●○○	TxDOT
	Expand arterial DMS coverage in the City of Austin	<div><div></div><div></div><div></div><div></div><div></div></div>			●●○○○	●●●●○	●●●○○	City of Austin
	Expand traffic signal preemption for emergency vehicles	<div><div></div><div></div><div></div><div></div><div></div></div>			●●○○○	●●●●○	●●●●○	Regional Municipalities
<div>RESPONSE & CLEARANCE</div> <div></div>	Expand HERO service patrol coverage to additional freeways	<div><div></div><div></div><div></div><div></div><div></div></div>			●●○○○	●●●●○	●●●○○	TxDOT
	Expand HERO service patrol coverage to regional arterials	<div><div></div><div></div><div></div><div></div><div></div></div>			●●○○○	●●●●○	●●●●○	TxDOT and Regional Municipalities
	Implement rapid clear no-cost towing on freeways	<div><div></div><div></div><div></div><div></div><div></div></div>			●●●○○	●○○○○	●●●●●	CAMPO or Regional Municipalities
	Implement rapid clear no-cost towing on regional arterials	<div><div></div><div></div><div></div><div></div><div></div></div>			●●●○○	●○○○○	●●●●●	CAMPO or Regional Municipalities
	Implement centralized location-based towing dispatch throughout the Region	<div><div></div><div></div><div></div><div></div><div></div></div>			●●●●○	●○○○○	●●●●○	CAMPO or Regional Municipalities
	Implement heavy-tow program throughout the Region	<div><div></div><div></div><div></div><div></div><div></div></div>			●●●○○	●●○○○	●●●●○	CAMPO, TxDOT, or Regional Municipalities
	Procure advanced crash investigation equipment for law enforcement throughout the Region	<div><div></div><div></div><div></div><div></div><div></div></div>			●●●○○	●●●●○	●●●○○	CAMPO, TxDOT, or DPS
<div>TRAINING</div> <div></div>	Support continued regional interdisciplinary TIM training	<div><div></div><div></div><div></div><div></div><div></div></div>			●●●●●	●●●●●	●●●●●	CAMPO or TxDOT
	Educate first responder agencies about capabilities of HERO service patrol vehicles	<div><div></div><div></div><div></div><div></div><div></div></div>			●●●●○	●●●●○	●●●●○	TxDOT
	Provide training for advanced crash investigation equipment to law enforcement throughout the Region	<div><div></div><div></div><div></div><div></div><div></div></div>			●●●●○	●●●●○	●●●○○	CAMPO, TxDOT, or DPS
<div>DATA & PERFORMANCE MEASURES</div> <div></div>	Standardize regional TIM data collection, data visualization, and performance measures	<div><div></div><div></div><div></div><div></div><div></div></div>			●●●○○	●○○○○	●●●●○	TxDOT or CAMPO
	Share regional TIM performance data between public agencies in data dashboard	<div><div></div><div></div><div></div><div></div><div></div></div>			●●●○○	●●●○○	●●●●○	TxDOT or CAMPO
<div>PUBLIC ENGAGEMENT</div> <div></div>	Share regional TIM performance data with media and public in annual report and data dashboard	<div><div></div><div></div><div></div><div></div><div></div></div>			●●●○○	●●●○○	●●●○○	CAMPO and TxDOT
	Increase knowledge and support of HERO through public education efforts	<div><div></div><div></div><div></div><div></div><div></div></div>			●●●●○	●●●●●	●●●○○	TxDOT and CAMPO
	Raise awareness of statewide Steer It, Clear It law	<div><div></div><div></div><div></div><div></div><div></div></div>			●●●●○	●●●●○	●●●●●	TxDOT and CAMPO
	Improve traveler information quality through increased coordination with private sector providers	<div><div></div><div></div><div></div><div></div><div></div></div>			●●●●○	●●●○○	●●●●○	Transportation Agencies

Figure 11 – Summary of Regional Incident Management Recommendations



Policy Recommendations

As noted in Chapter 3, Texas has a set of statewide policies that are supportive of successful TIM operations, including the Move Over Law, the Driver Removal Law, and the Authority Removal Law. During the development of the CAMPO Regional Incident Management Strategic Plan and Performance Assessment, stakeholders identified additional policies that could be implemented at a regional scale to allow agencies to manage incidents more safely and efficiently. These policies are described in the following table.

Table 2 – Policy Recommendations

Recommendation	Description	Lead Agency
Develop Regional Open Roads Policy	<p>Open Roads policies establish an understanding among member agencies that clearing the roadway for safety and mobility is a high priority, and that procedures, standards, and training will be updated accordingly. Open Roads policies may include agreed upon region-wide performance goals, data collection methods, and responsibilities.</p> <p>Example policies include:</p> <ul style="list-style-type: none"> ▪ Joint Operations Policy Statement (JOPS) established by the Washington State Patrol and the Washington State Department of Transportation in 2006; ▪ State of Florida Open Roads Policy established by the Florida Highway Patrol and the Florida Department of Transportation in 2002; and ▪ Interagency Freeway Incident Clearance Policy Statement established by transportation and enforcement agencies in southeastern Wisconsin in 2002. 	CAMPO
Develop standardized HAZMAT and non-HAZMAT clean-up policy for the Region	<p>Stakeholders identified the need for standardized policies for HAZMAT and non-hazardous spills on area roadways as a key part of incident management. Based on national best practices and a review of existing legislation, the development and adoption of these policies would have operational and environmental benefits for the CAMPO Region.</p>	CAMPO
Create a position for a Regional TIM Coordinator	<p>The initiation of the Statewide TIM Coordinator role by TxDOT in early 2018 provided new opportunities for focused TIM training and coordination in the region. The creation of a TIM Coordinator Position for the CAMPO Region specifically would enhance regional incident management coordination and could guide the continued efforts of the AIMHigh task force. This role would likely be housed within TxDOT, CAMPO, or DPS.</p>	CAMPO or TxDOT



Communication and Coordination Recommendations

It is a commonly acknowledged reality in the field of TIM that traffic incidents occur with no regard to jurisdictional boundaries. A major incident that occurs on I-35 in south Round Rock, for example, might be first detected by a HERO safety service patrol vehicle and reported to TxDOT TMC operators at CTECC, who will monitor the incident using CCTV cameras and possibly post messages about incident-related delays to TxDOT DMS along the freeway. At the same time, CTECC operators may reach out to operators at the City of Round Rock TMC so they can remotely adjust signal timings along frontage roads to account for the increased traffic being diverted from the freeway onto the frontage roads. The City of Round Rock Police and Fire Departments would likely have responded to the incident, unless City of Austin or Pflugerville responders happened to be closer to the incident at the time it occurred.

Incident management is clearly complex and requires timely, reliable processes to be in place to promote traveler and responder safety and clear the road as quickly as possible. The ability to share resources, such as access to CCTV camera feeds, or to have established standard operating procedures for how one agency contacts another with TIM-related needs, can save invaluable minutes during and following an incident. The following table contains specific TIM-related communication and coordination recommendations for the CAMPO Region.

Table 3 – Communication and Coordination Recommendations

Recommendation	Description	Lead Agency
Develop standard operating procedures for TMC coordination throughout the Region <i>(In progress in the Region)</i>	Stakeholders identified the need to establish standard communication methods and points of contact among TMCs for improved incident management coordination. The existing Regional TMC Operator Forum, with support from other member agencies of AIMHigh, could work to establish these protocols and guidelines.	TxDOT, CTRMA, or Municipalities
Develop platform for shared viewing of all cameras and DMS throughout the Region <i>(In progress in the Region)</i>	A web-based platform for regional sharing of camera feeds and DMS messages would allow local agencies to monitor traffic and manage incidents more effectively, especially in instances where impacts from incidents cross jurisdictional boundaries.	TxDOT or CAMPO
Develop a regional repository for incident status available to all CAMPO agencies	Stakeholders expressed the desire for a database with incident statuses that could be accessed by agencies across the region. For example, the City of San Marcos would benefit from being able to view the status of incidents along I-35 and communicate information about delays to northbound travelers as they approach the Austin metropolitan area.	TxDOT or CAMPO
Expand sharing of computer-aided dispatch (CAD) data throughout the Region <i>(In progress in the Region)</i>	The collection and dissemination of computer-aided dispatch data could be reviewed for improvements that would enhance incident management by local agencies.	Transportation and Public Safety Agencies



Infrastructure Recommendations

As is evident throughout the CAMPO Regional Incident Management Strategic Plan and Performance Assessment, infrastructure and technology alone are not the answer to our incident management challenges. Regional agencies must steward material assets by combining them with effective communication processes, training opportunities, and performance monitoring to maximize their effectiveness. Nonetheless, infrastructure such as CCTV cameras and DMS are key elements of incident management and greatly enhance agencies' abilities to monitor the incident scene and communicate with travelers. Installation and maintenance of adequate lighting on freeways was also cited by stakeholders (particularly the cities of Kyle and Round Rock along I-35) as a critical need for the prevention of secondary crashes when disabled vehicles are present along the freeway at night. The following table contains TIM related infrastructure recommendations for the CAMPO Region.

Table 4 – Infrastructure Recommendations

Recommendation	Description	Lead Agency
Expand freeway lighting coverage	Stakeholders cited lack of freeway lighting as a significant cause of secondary crashes, especially in the City of Kyle and the City of Round Rock. Installing additional freeway lighting and securing funding to keep lights operational improves safety along major corridors, especially for disabled vehicles.	TxDOT
Expand CCTV camera coverage on freeways <i>(In progress in the Region)</i>	The TxDOT Austin District has identified locations for new CCTV freeway coverage in the ITS Master Plan. Additional CCTV cameras would improve CTECC's incident verification capabilities and would allow operators to assist in coordinating emergency response efforts on a larger portion of the Regional freeway network.	TxDOT
Expand DMS coverage on freeways <i>(In progress in the Region)</i>	The TxDOT Austin District has identified locations for expanded freeway DMS coverage in the ITS Master Plan. Additional DMS will allow TxDOT to more effectively share incident-related traveler information and other updates to motorists traveling on TxDOT freeways.	TxDOT
Deploy DMS on state routes in rural areas at key decision points in the CAMPO Region <i>(In progress in the Region)</i>	The TxDOT Austin District has identified locations for rural DMS in the ITS Master Plan. The installation of these signs would allow drivers approaching the Austin metropolitan region to make informed travel decisions based on real-time traffic conditions and incident information.	TxDOT
Expand arterial DMS coverage in the City of Austin <i>(In progress in the Region)</i>	As of early 2018, the City of Austin has a system of 12 arterial DMS. The City has funding to deploy additional signs at selected decision points to assist with traffic management and traveler information.	City of Austin and TxDOT
Expand traffic signal preemption for emergency vehicles <i>(In progress in the Region)</i>	The City of Austin has deployed emergency vehicle preemption technology at some of its signals and plans to expand the deployment. Other municipalities in the Region have also expressed interest. The technology gives signal priority to emergency responders, thereby reducing incident response time on arterial roads.	Regional Municipalities



Response and Clearance Recommendations

Agencies in the CAMPO Region have many processes in place to quickly and safely respond to and clear traffic incidents. The HERO Safety Service Patrol program expanded its hours, coverage area, and capabilities in 2017. The Regional TMC Operators Forum meets regularly to discuss standard operations procedures and resource sharing. The City of Austin uses a third-party service for location-based tow dispatch to reduce towing response times for faster roadway incident clearance. There are many other examples of current initiatives underway to continually refine and improve TIM processes, as discussed in Chapter 3.

During the development of the CAMPO Regional Incident Management Strategic Plan and Performance Assessment, stakeholders shared ideas and brainstormed about how to further improve response and clearance procedures in the Region.

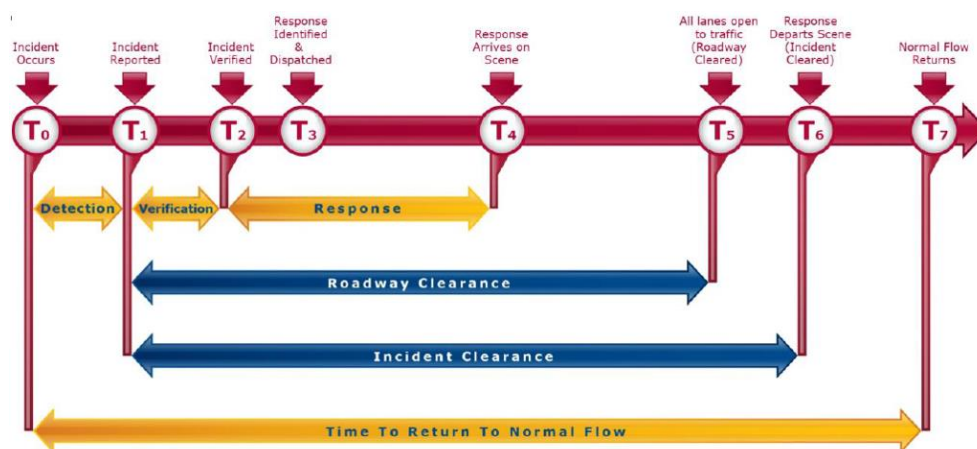


Figure 12 – Incident Timeline

Source: USDOT

As shown in **Figure 12**, the incident timeline is made up of many parts, including detection, verification, response, roadway and scene clearance, and the time for traffic to return to normal flow once the entire incident is cleared. The recommendations in **Table 5** deal specifically with reducing response and clearance times, while also improving traveler and responder safety.

Waiting for a tow truck with the proper equipment to remove a vehicle from the incident scene can often compound incident-related congestion and delay. Vehicle removal can be further delayed by negotiations to figure out who will cover the cost of the tow and whether a vehicle owner should be allowed to call their preferred towing service. The implementation of a no-cost towing program on major roadways, similar to the SafeClear program in Houston, is recommended to mitigate this challenge and reduce incident-related delays in the CAMPO Region.

Establishing a heavy tow program like the City of Kyle's existing heavy tow program would also be particularly helpful to the Region, to accelerate the clearance of major incidents like an overturned semi-trailer truck that have the potential to cause hours of delay. Continuing to fund and operate the existing HERO Safety Service Patrol program is another strategy with wide-reaching TIM-related benefits to the Region.

Table 5 – Response and Clearance Recommendations

Recommendation	Description	Lead Agency
Expand HERO service patrol coverage to additional freeways	Future expansion of the HERO service patrol could include additional miles of coverage on freeways to increase the impact this service has on reducing incident duration throughout the region.	TxDOT
Expand HERO service patrol coverage to regional arterials	Expansion of the HERO service patrol to regional arterials would allow for improved response to arterial incidents, many of which occur in locations without a road shoulder	TxDOT and Regional Municipalities
Implement rapid clear no-cost towing on additional freeways	The City of Austin has implemented the Rush Hour Rapid Response program, in which towing companies under contract with the City are required to provide towing off the roadway during specified peak times and geographic zones free of charge. Other municipalities in the CAMPO Region (especially along the I-35 corridor) could create similar requirements. Alternatively, municipalities could establish stricter performance targets in their towing contracts for peak hour clearance times.	CAMPO or Regional Municipalities
Implement rapid clear no-cost towing on regional arterials	As with the HERO program, expanding no-cost towing services to regional arterials would move disabled vehicles from the roadway more quickly, reducing incident impacts especially on regional arterials that do not have road shoulders. Clearance strategies could include expansion of the HERO program's coverage area, or equipping police cars with push bumpers to push disabled vehicles out of the street and into a parking lot. It should be noted that implementation of rapid clear no-cost towing on arterials in the City of Austin would require an ordinance change.	CAMPO or Regional Municipalities
Implement centralized location-based towing dispatch throughout the Region	Other municipalities in the CAMPO Region (especially along the I-35 corridor) could consider using a third-party service to dispatch towing services based on proximity to the incident. City of Austin currently uses such a system, and the City of Round Rock plans to begin use later this year.	CAMPO or Regional Municipalities
Implement heavy-tow program throughout the Region	Establishing a heavy tow program for use by agencies in the Region would allow for quicker clearance of major incidents.	CAMPO or TxDOT
Procure advanced crash investigation equipment for law enforcement throughout the Region	The use of photogrammetry equipment and potentially new state-of-the-art technology could reduce delay caused by investigations of fatal crashes. The Austin Police Department plans to begin using drones in 2018 to assist in crash investigations, with an anticipated resulting decrease in investigation time from 3-5 hours to 2 hours.	CAMPO, TxDOT, or DPS



Training Recommendations

Funding challenges, staff shortages, competing priorities, and personnel turnover make it difficult to maintain teams of responders, operators, and other TIM professionals who are highly trained in TIM best practices. Fortunately, agencies in the CAMPO Region recognize the value of agency-specific and interdisciplinary TIM training and are seeking to make it a priority. The new TxDOT Statewide TIM Coordinator has been tasked with helping to coordinate TIM training opportunities for the Region, and on April 18, 2018, a SHRP2 TIM Train the Trainer course was held that was well attended by CAMPO Region stakeholders. The following table contains additional TIM training recommendations supported by regional stakeholders.

Table 6 – Training Recommendations

Recommendation	Description	Lead Agency
Support continued regional interdisciplinary TIM training <i>(In progress in the CAMPO Region)</i>	Opportunities for interdisciplinary TIM training, with an emphasis on table-top and scenario-based training, will support local incident management efforts. Training classes that are recognized by FHWA or TCOLE are encouraged. “Train the Trainer” classes help to maximize the number of personnel that can receive the training in a given agency, and these classes should be offered within the region regularly.	CAMPO or TxDOT
Educate first responder agencies about capabilities of HERO service patrol vehicles	Leveraging the full abilities of the recently expanded HERO patrol program allows other incident management personnel on-scene to serve in their specialized roles. Presentations to the AIMHigh bimonthly task force or the distribution of informational brochures could help to spread the word about HERO capabilities.	TxDOT
Provide training for advanced crash investigation equipment for law enforcement throughout the Region	The use of photogrammetry equipment and potentially new state-of-the-art technology could reduce delay caused by investigations of fatal crashes. Proper training on the use of this equipment should increase the rate of adoption and efficiency of its use in the field.	CAMPO, TxDOT, or DPS



Data and Performance Measures Recommendations

Data collection and performance measurement are essential components of the systems engineering process, which verifies that implemented solutions meet identified needs. It is crucial for CAMPO Region stakeholders to develop methods and collect necessary data to gauge the effectiveness of various TIM strategies so that they can allocate investments and staff time accordingly.

The establishment of standardized performance measures for the Region was also identified as a recommendation in TxDOT's 2014 *Traffic Incident Management Plan: State of the Practice*. The following table describes the TIM data and performance measures recommendations identified by stakeholders as a part of this plan.

Table 7 – Data and Performance Measures Recommendations

Recommendation	Description	Lead Agency
Standardize regional TIM data collection, data visualization, and performance measures	Establishing standard data collection methods and region-wide performance goals will allow agencies to assess the impacts of various TIM strategies and measure the progress of the region as a whole.	TxDOT or CAMPO
Share regional TIM performance data between public agencies in data dashboard	Improved traffic data sharing among agencies in the CAMPO Region will improve the accuracy and timeliness of traveler information and incident detection.	TxDOT or CAMPO



Public Engagement Recommendations

While many of the TIM recommendations in the CAMPO Regional Incident Management Strategic Plan and Performance Assessment are internal to agencies and may not be immediately apparent to the public – like expanding traffic signal preemption for emergency vehicles to additional signals, or conducting TIM training sessions for emergency responders – there are many aspects of TIM that directly involve the public. The positive impacts of the HERO Safety Service Patrol, for example, will continue to grow with awareness of the program, so that more disabled motorists know to call HERO vehicles for assistance.

Table 8 – Public Engagement Recommendations

Recommendation	Description	Lead Agency
Share regional TIM performance data with media and public in annual report and data dashboard	The development of an annual report and web-based data dashboard for TIM performance measures would help local agencies to evaluate the impact of current TIM strategies and assess needs for additional projects, programs, or policies. Sharing performance data could also help to educate local decisionmakers whose support of TIM initiatives is critical to their success.	CAMPO and TxDOT
Increase knowledge and support of HERO through public education efforts	Increasing awareness of HERO patrol services among the public would likely result in more stranded drivers calling for HERO assistance rather than waiting to be detected by HERO drivers or TMC operators. This anticipated decrease in detection times could reduce roadway and incident clearance times and the rate of secondary crashes.	TxDOT and CAMPO
Raise awareness of statewide Steer It, Clear It law	Agencies should work to educate the public that they should move their vehicles to safety following an incident rather than “preserving the scene.” Methods for communication could include agency websites or DMS.	TxDOT and CAMPO
Improve traveler information quality through increased coordination with private sector providers <i>(In progress in the CAMPO Region)</i>	Partnerships with the private sector can provide agencies with real-time data and a large platform to disseminate traveler information. Examples include the WAZE Connected Citizens Program and INRIX traffic data.	Transportation Agencies Throughout Region

Cost-Benefit Analysis

Agencies in the CAMPO Region have many opportunities to improve quality of life and only limited funding to allocate to these pursuits. It is important for decision makers to have a high level of confidence that the strategies they choose to invest in will make a difference to the Region.

To help communicate the value of TIM strategies and to assist the Region with prioritization of recommendations, a cost-benefit analysis was performed. **Figure 11** at the beginning of Chapter 4 contains anticipated relative scores for the return on investment of the entire list of TIM recommendations from the CAMPO Regional Incident Management Strategic Plan and Performance Assessment. A more detailed analysis was performed for a subset of TIM recommendations for which quantitative analysis was possible with available data. Analysis methods included the use of nationally accepted ratios from FHWA for infrastructure deployments like CCTV cameras and DMS. For response strategies like HERO safety service patrol assists and rapid response towing, traffic modeling software like VISSIM was used to quantify the estimated benefits of the reduced time that lanes are blocked due to the incident. A summary of the quantitative cost-benefit analysis is presented in **Figure 13** and a more detailed description is provided in the **Appendix**.

Some recommendations are widely accepted to be cost-effective improvements but are less conducive to quantifying costs and benefits. Creating TIM-supportive policies or implementing TIM training opportunities are examples of strategies without an associated cost, and whose quantitative benefits are difficult to model. Other recommendations, such as developing a platform for sharing live camera video throughout the region, have a cost associated but the benefits are difficult to quantitatively measure with current models.

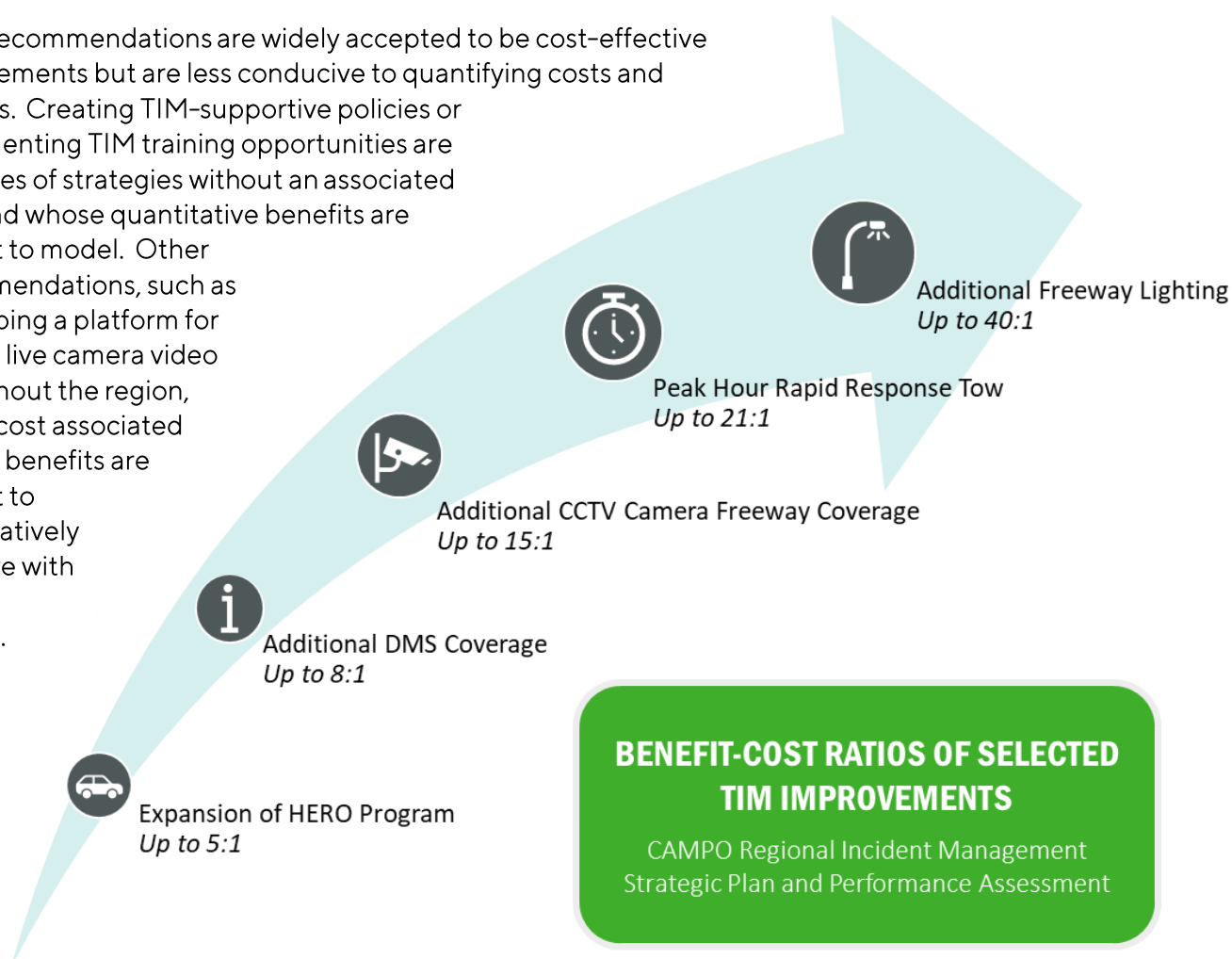


Figure 13 – Benefit-Cost Ratios of TIM Improvements Allowing Quantitative Analysis

It should be noted that the existing HERO Safety Service Patrol program is one of the highest performing TIM strategies, at a ratio of 34:1, but expansion of the HERO Safety Service Patrol program has a relatively lower ratio of 5:1. This difference is largely because the HERO program already operates on the high-volume corridors on which its services are most effective at reducing delay and improving TIM. As the Region's population increases and traffic volumes grow over time, benefit-cost ratios for various corridors could improve. For detailed documentation on the data sources, methodology, and results of the quantitative cost-benefit analysis please refer to the **Appendix**.

Optimization of Roadside Support Programs

As described in **Chapter 3**, the HERO Safety Service Patrol and Rush Hour Rapid Response towing programs operate separately from one another and are managed by separate agencies: HERO by TxDOT and Rush Hour Rapid Response by the City of Austin. As part of the CAMPO Regional Incident Management Strategic Plan and Performance Assessment, consideration was given to combining these programs as a means to optimize the two services.

The existing HERO Safety Service Patrol operated by TxDOT provides complimentary services to stranded motorists on many freeway and several arterial highway segments in the CAMPO Region. New vehicles added to the fleet in 2017 have added front-mounted push bumpers and illuminating arrow boards to increase the capability of the trucks to move vehicles or debris blocking travel lanes and provide advanced warning to drivers. The HERO operators also began receiving increased incident management training in 2017.

The existing City of Austin Rush Hour Rapid Response program was established by the Austin Police Department as a component of its general towing program. Tow truck operators that are on the rotation of companies available for the City to request for towing services generally must station a truck to respond to disabled vehicles during peak travel periods along a freeway in designated zones of the City. When responding to a disabled vehicle in one's zone, a tow truck operator must relocate the stalled vehicle to a place of safety away from the roadway. While the operator cannot charge the vehicle owner for the tow to a place of safety, the operator can charge for additional towing services should the owner of the disabled vehicle request them.

In some locations, the safety service patrol and towing programs are integrated into a joint effort operated by the same agency. This unification of programs can streamline coordination and operations and reduce overhead costs. Some examples include the Coordinated Highways Action Response Team (CHART) in Maryland and the California Department of Transportation (CalTrans) service patrol fleet composed of both service trucks and tow trucks.

In Texas, while both the North Central Texas Council of Governments (NCTCOG) and the Houston-Galveston Area Council (HGAC) offer freeway service patrols, in neither case are the patrol vehicles themselves capable of towing disabled vehicles from the roadway. Notably, however, HGAC's Motorist Assistance Program (MAP) is staffed by local law enforcement staff. As a result, the program may benefit from improved incident response times in situations where a tow is requested, since law enforcement is responsible for authorizing such a request.

While there have been discussions in the CAMPO Region about investigating the feasibility of a joint program, TIM stakeholders involved in the CAMPO Regional Incident Management

Strategic Plan and Performance Assessment did not identify a strong preference to unify the separate programs nor a clear lack of resources provided to either of the existing programs.

Based on the health and origin of current programs and discussions with stakeholders, the unification of the two programs is not currently recommended. A more detailed analysis of potential unification will be possible once the expanded HERO program has been in operation longer and a more robust set of HERO program response data is available.

Several considerations are recommended to improve the efficacy of a rapid clearance towing program along freeways within the region, regardless of whether the towing program is integrated into the HERO program:

Start Small. Benefit-cost ratios of freeway response programs can vary significantly depending on the traffic conditions and crash rates of a given facility. Choosing a congested corridor with higher crash rates to implement a rapid clearance towing program allows for the measurement of program performance and increased public awareness and support of the program.

Expand in Coordination with Other TIM Improvements. As additional CCTV cameras are implemented along freeways throughout the CAMPO Region, surveillance and dispatch capabilities of traffic managers will improve. Without these surveillance capabilities, towing service providers may not be dispatched to an incident as quickly. The existence of this additional TIM infrastructure will improve the efficacy of any towing program.

Clarify Roles and Responsibilities with Law Enforcement. If a freeway towing patrol is operated at a regional level without direct oversight from local law enforcement, agreements will need to be developed between these agencies to determine whether changes to local policies or special approvals are needed from law enforcement officers before disabled or damaged vehicles can be moved from the roadway to a point of safety.

Fully Subsidize the Program. In Houston, the SafeClear program has operated vehicle removal towing services, initially at no cost to the vehicle owner (when federal funding was available for the program) and at other times at a subsidized cost to the vehicle owner (\$50-\$60 per tow). The number of assists and incident clearance metrics were significantly worse when vehicle owners were required to pay for part of the tow, since many motorists refused service and preferred to wait for courtesy towing services to which they had subscribed or attempt to repair their vehicle on the side of the road. This refusal of service significantly increased delay and heightened safety risks to the involved motorists and towing operators. To ensure a rapid clearance towing program is embraced by the public, the service should be offered at no charge to the owners of disabled vehicles. The SafeClear program is funded by Surface Transportation Program (STP) funds, which are the same funds used in the CAMPO Region to fund the HERO safety service patrol program.

CHAPTER 5

PERFORMANCE MEASURES

5 | PERFORMANCE MEASURES

The CAMPO Regional Incident Management Strategic Plan and Performance Assessment developed three goals for TIM in the CAMPO Region: reduce the impact of traffic incidents to travelers, reduce secondary crashes, and provide accurate and timely traveler information. As the Region expands existing TIM programs and implements new TIM strategies and programs to achieve these goals, it is important that stakeholders are able to measure progress. TIM program performance measurement can allow the Region to demonstrate accountability, process efficiency, and improvements over time; improve communications; and support future planning.

“What gets measured gets done. What gets measured and reported gets done well.”

Unknown Source

The Federal Highway Administration defines performance measurement as the “use of statistical evidence to determine progress towards specific defined organizational objectives.” A robust performance measurement program will allow the Region to measure the impacts of programs and strategies toward achieving regional goals and inform decision on which programs to continue and expand based on impacts to performance. Performance measures can help justify funding expenditures and allow the Region to make the case for increased funding on programs that are shown to be effective. Reporting of performance measures on a Regional basis also improves accountability. When performance metric results are readily available for everyone to see, agencies pay close attention to the numbers and greater emphasis is often placed on improving those metrics that are most visible.

Key Considerations for Establishing TIM Performance Measures

In developing the regional performance measures, the CAMPO Regional Incident Management Strategic Plan and Performance Assessment took into account several key considerations to ensure that the Region was consistent with national practices and that performance measures provided a measure of the outcome of TIM strategies and programs.

The FHWA has developed a set of National TIM Program Objectives and related performance measures. These objectives and performance measures were adapted from the FHWA’s Traffic Incident Management Program-Level Performance Measurement Focus State Initiative, which was developed by transportation and law enforcement organizations from 11 states including Texas. These objectives and performance measures served as the foundation for the setting TIM performance measures in the CAMPO Region. Stakeholders in the CAMPO Region universally accepted the National TIM Program Objectives and adopted them into the performance measures set by CAMPO.

Table 9 – FHWA National TIM Program Objectives and Related Performance Measures

TIM Program Objective	Related Performance Measures
Reduce Roadway Clearance Time	Time between first recordable awareness of incident by a responsible agency and first confirmation that all lanes are available for traffic flow.
Reduce Incident Clearance Time	Time between first recordable awareness of incident by a responsible agency and time at which the last responder has left the scene.
Reduce the Number of Secondary Crashes	Number of unplanned crashes beginning with the time of detection of the primary incident where collision occurs either a) within the incident scene or b) within the queue, including the opposite direction, resulting from the original incident.

In developing performance measures for TIM in the CAMPO region, several key considerations were discussed with stakeholders to guide development. Stakeholders wanted to develop a set of performance measures that measured the outcome of what was done, were based on data that was currently or could be available in the near future, and most importantly performance measures that could be easily understood and were meaningful to stakeholders in the Region. The following guidelines were considered when developing the regional performance measures.

Outcomes Based Performance Measures. Output related performance measures measure what an organization does, such as the number of closed circuit television (CCTV) cameras installed or the number of miles covered by motorist assist patrols. Outcome performance measures, such as the time for traffic to return to normal flow, measure the results of what an organization does. Performance measures that focus on outcomes of incident management strategies to assess performance, rather than outputs, were selected where possible.

Availability. Good performance measures are based on accurate, reliable data. Performance measures that can be collected based on data that is currently available, or could be available in the near term, were selected where possible.

Relatability. Performance measures should be simple and understandable. Performance measures that can be defined in terms of totals (minutes, number of crashes, etc.), can be easily understood by decision makers and stakeholders, and appear to be meaningful to most stakeholders, were selected where possible.

Recommended Regional Performance Measures

A preliminary list of 18 performance measures was presented to stakeholders at the third CAMPO Regional Incident Management Strategic Plan and Performance Assessment workshop, conducted in May 2018. Stakeholders discussed the merits and feasibility of these performance measures, and narrowed the list down to seven high priority performance measures for implementation. The seven recommended regional performance measures directly support CAMPO's three regional incident management goals identified in this study and align with the National TIM Program Objectives. Data is generally available to implement these performance measures in the short-term on roads that are monitored by the TxDOT Traffic Management Center at CTECC. The challenges are to expand capability to collect information on freeways not monitored by TxDOT and expand capability to collect information on arterials.

Table 10 – Recommended TIM Performance Measures for the CAMPO Region

Performance Measure	Definition	Data Required
Roadway Clearance Time	Defined as the time between awareness of an incident and restoration of lanes to full operational status.	<ul style="list-style-type: none"> Time between first recordable awareness (detection/ notification/ verification) of incident by a responsible agency and first confirmation that all lanes are available for traffic flow
Incident Clearance Time	Defined as the time between awareness of an incident and removal of all evidence of the incident, including debris or remaining assets, from shoulders).	<ul style="list-style-type: none"> Time between first recordable awareness (detection/ notification/ verification) of incident by a responsible agency and time at which all evidence of incident is removed
Number and Severity of Secondary Crashes	Defined as unplanned incidents (starting at the time of detection) for which a response or intervention is taken, where a collision occurs either a) within the incident scene or b) within the queue (which could include the opposite direction) resulting from the original incidents.	<ul style="list-style-type: none"> Number of total incidents (regardless of primary or secondary) and severity (National Highway Transportation Safety Administration [NHTSA] classification) Number of secondary of incidents and severity (NHTSA classification)
Survey of Traveler Information Satisfaction	Defined as the response to various survey questions to the general public on the satisfaction of traveler information, travel times, and specific TIM programs such as HERO.	<ul style="list-style-type: none"> Website feedback Surveys conducted/focus groups Service patrol comment cards 1-800 feedback system calls 511 calls
Incident Influence Time (Time to Return to Normal Flow)	Defined as the duration between the time the incident OCCURS until the time it returns to normal flow.	<ul style="list-style-type: none"> Time between first recordable awareness (detection/ notification/ verification) of incident by a responsible agency and time at which an operator estimates traffic has returned to normal flow
Percentage of Responders/Operators who have received TIM Training	Defined as the number of first responder and transportation operators by agency who have received training.	<ul style="list-style-type: none"> Annual training numbers reported by first responder and transportation agencies receiving training
Rates of Injury or Fatality of First Responders on Incident Scene	Defined as the annual number of injuries and fatality by agency incurred while responding to or on scene of an incident.	<ul style="list-style-type: none"> Law enforcement reports

Performance Measure Implementation

The seven performance measures identified in the CAMPO Regional Incident Management Strategic Plan and Performance Assessment can be further developed into numeric targets in the future. The following next steps should be taken to develop the performance measure targets to track the effectiveness of TIM strategies in the CAMPO Region.

Collect Baseline Data. The first step to meet the data requirements listed in **Table 10** for the seven recommended performance measures is to begin collecting current data. Without being able to quantify the current state of TIM in the CAMPO Region, it will not be possible to track progress. A baseline provides the basis for future evaluation of the TIM program.

Methods for collecting the data can range from querying existing databases of crash records to collecting annual TIM training numbers from CAMPO Region agencies. The goal would be to eventually move all data into an automated system for further processing and storage.

Establish Performance Targets. Once a solid baseline is in place, the current performance measure can be compared to other similar programs to set a starting point for the TIM program targets for each of the performance measures. The establishment of performance targets can be in the form of specific numbers or timeframe for a given measure or a percentage of change.

Report Results. There are many means and methods to reach specific stakeholders and groups in the local community for outreach purposes. The recommended approach to report TIM performance data to the community is an initial report to establish the expected benefits to begin the program and then quarterly, semi-annual, or annual reports providing data and analysis to confirm the paybacks in dollars, time, and safety.

Continually Expand and Improve Program. It is important to note that many other performance measures that may not be tracked regionally should still be tracked locally and shared regionally to better understand effectiveness of incident management strategies. Additionally, periodic TIM reviews should reevaluate the list of TIM performance measures and consider others that could be added to the list.

CHAPTER 6

FUNDING STRATEGIES

6 | FUNDING STRATEGIES

As the Region continues to deepen interagency relationships in the strategic planning and tactical deployment of TIM strategies, the momentum generated for incident management should be harnessed to pursue funding for recommended TIM improvements.

“In order to establish, maintain, and improve TIM programs, adequate and ongoing resources to support operations are needed. Program administrators must not only understand the funding process at the Federal, state, and local levels, but they must also be able to identify specific sources of monetary support appropriate for TIM and successfully compete for these funds. It can be a significant challenge to obtain and maintain funding for TIM. To overcome this challenge, the **benefits of the existing TIM investments or efforts must be marketed internally and externally**. Additional funding cannot be viewed in isolation as a panacea to address TIM challenges; however, adequate funding can help to support incremental improvements in TIM efforts by providing program equipment, personnel, or further research.”

FHWA, Best Practices in Traffic Incident Management (2010)

Any move to expand TIM efforts should consider the variety of ways funding can be obtained to help implement TIM in the CAMPO Region. This chapter describes existing TIM funding sources and investigates several avenues for the pursuit of additional TIM funding beyond what is currently programmed by stakeholder agencies, including:

Legislative Concepts. This section describes how ballot initiatives and other legislative measures can be used to support the funding of TIM initiatives.

Eligible Federal Funding Sources. There are numerous federal funding sources that could be pursued for TIM funding in the CAMPO Region, including the Highway Safety Improvement Program, the Advanced Transportation and Congestion Management Technologies Deployment Grant, and the FEMA Grant Program.

Leveraging Motorist Assistance Programs. Sponsorship of safety service patrol programs by private sector companies such as State Farm can provide funding for a portion of the patrol program’s operating costs. 19 states are currently using this funding mechanism.

Private Sector Funding. Special interest foundations or corporate sponsorships may be a good source of TIM funding. While this is not a common funding model across the nation, the CAMPO Region could pursue private sector funding and be a pioneer in this domain.

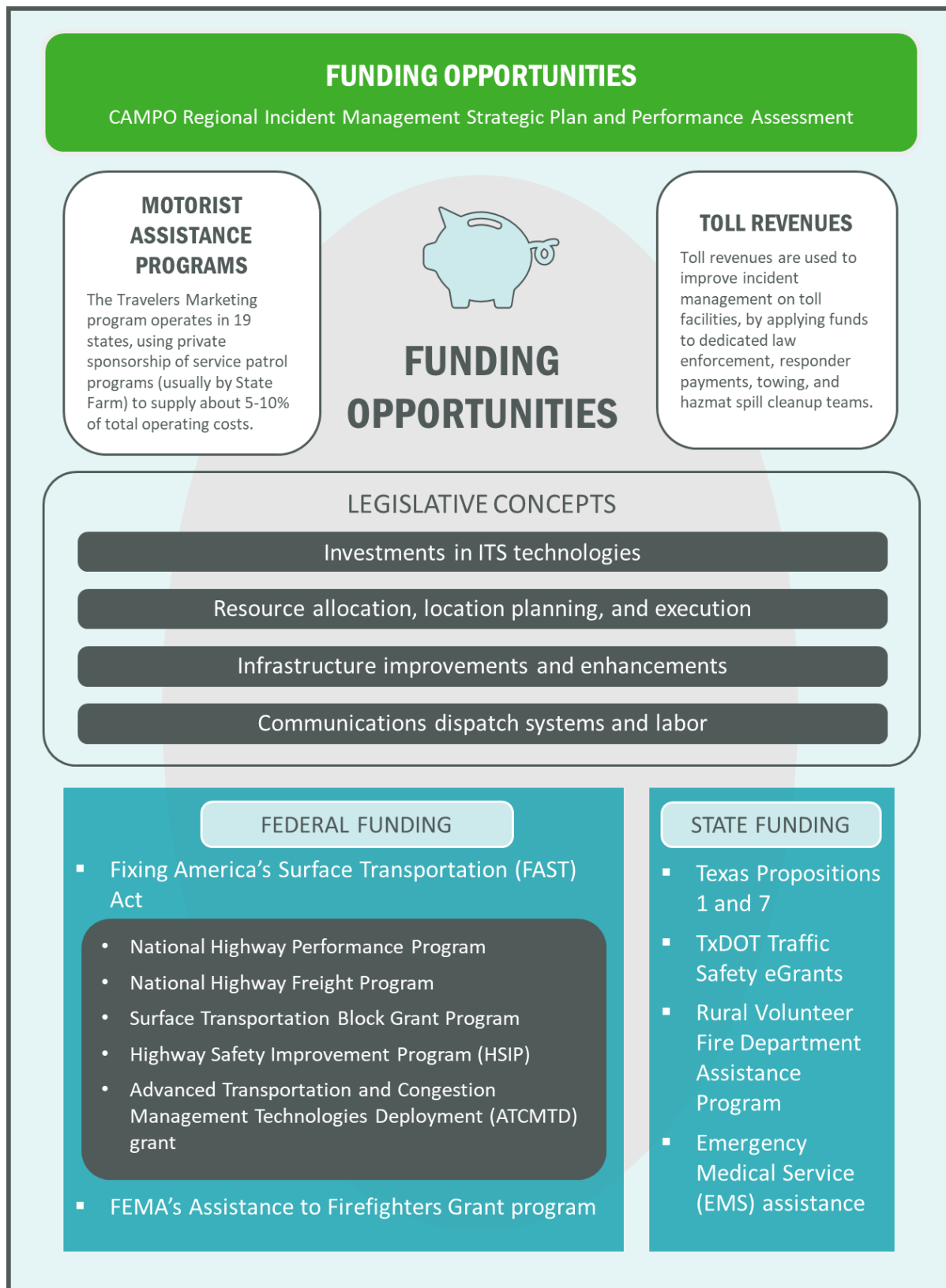


Figure 14 – Summary of Funding Opportunities

Legislative Concepts

Legislative support for TIM programming generally consists of passing state laws on driver removal, authority removal, and motorist-responder safety with a move-over or slow-down message. As noted in Chapter 3 of this report, Texas has a foundation of statewide legislation that is supportive of TIM operations. Statewide laws can also be supplemented by local ordinances, such as the Austin ordinance establishing its Rush Hour Rapid Response towing program.

Legislation. There is no identifiable existing legislation in the United States that directs funding to specific traffic operations or TIM functions. In states where ballot initiatives are used for local sales tax increases or bond initiatives to fund transportation, they are largely for investment in roadway or transit capital improvements, not operations or TIM. Therefore, it is often necessary to identify alternative funding sources to fund TIM programs. The specific types of TIM improvements that legislation could direct funding to include:

- Investment in ITS technologies;
- Resource allocation/location planning and execution;
- Infrastructure improvements and enhancements; or
- Communications and dispatch systems and labor.

Ballot Initiatives. One noteworthy national trend in recent years is ballot initiatives for transportation bonds and local transportation-focused sales tax increases. The American Road and Transportation Builders Association (ARTBA) tracks the initiatives and has reported more than 65% of ballot initiatives have passed in recent years. In 2017, there were over 249 transportation-related ballot initiatives, and 213 (over 85%) passed, for a total of \$8.1 billion in state and local funds approved. In addition, ARTBA reports that 2017 included over 140 transportation funding measures in 38 states. 29 funding measures passed in legislatures in 23 states, for over \$69 billion in new transportation revenue through legislation.

Most initiatives state that funding must be used for transportation infrastructure (capital expenditures), and some allow for maintenance. A review of the descriptions and limitations of many of the 2017 initiatives indicates the majority are clearly dedicated for transportation construction and maintenance, which may not allow for TIM funding. However, several initiatives could potentially be used for TIM programs, since the initiative had a stated objectives of congestion mitigation.

Voters in Austin have shown that they are willing to invest in improved mobility. The voter-approved 2016 Mobility Bond Program focused on regional mobility, corridor mobility, and local mobility projects to create a more robust transportation system. Some 95 local projects were included in the \$720 million bond investment. While this bond program does not designate funds for TIM or operations, a future ballot measure could potentially provide a revenue stream for TIM programming.

Eligible Federal and State Funding Sources

Federal Aid Highway funding that can be used in the CAMPO Region for incident management-related projects and programs is summarized in **Table 11**. Also included in this list is funding from Texas Propositions 1 and 7, which authorized constitutional amendments for transportation funding in Texas and provided approximately \$110M in CAMPO funding in 2018. In addition to the funding summarized in **Table 11**, several other potential funding sources are also described below.

Table 11 – Federal and State Funding Sources

Funding Program	Estimated Annual Amount	Funding Region	Funding Category
National Highway Performance Program	\$2.18B	State of Texas	Federal
National Highway Freight Program	\$110M	State of Texas	Federal
Highway Safety Improvement Program	\$13M	TxDOT Austin District	Federal
Surface Transportation Block Grant Program	\$32M	CAMPO Region	Federal
Texas Propositions 1 and 7	\$110M	CAMPO Region	State

Data Sources: FHWA, CAMPO, and TxDOT

Highway Safety Improvement Program. Access to Highway Safety Improvement Program (HSIP) federal funding sources is a state-by-state decision, but states including Tennessee, Pennsylvania, and Ohio have leveraged HSIP funding specifically for TIM activities, since they help mitigate highway safety issues.

23 U.S. Code § 148 specifies the types of projects that qualify for HSIP funds, most of which are infrastructure related. HSIP funding must be tied to the goals of the State Strategic Highway Safety Plan, and address not only engineering, but also management, operations, education, enforcement, and emergency service elements. Examples of HSIP-permitted non-infrastructure inclusions that are eligible for FAST Act funding and support TIM initiatives include the following.

- Collection, analysis, and improvement of safety data;
- Road safety audits, a formal safety performance examination of existing or future highways by an independent multidisciplinary audit team;
- Transportation safety planning; and
- Planning integrated, interoperable emergency communications equipment, operational activities, and traffic enforcement activities (including police assistance) relating to work zone safety.

Advanced Transportation & Congestion Management Technologies Deployment Grant. One of the newer funding sources under the FAST Act is a \$60M annual allocation called “Advanced Transportation and Congestion Management Technologies Deployment” grants. A TIM-related program would qualify for consideration, but none has yet been awarded specifically to a

targeted TIM program. According to the USDOT, which reviews potential projects in the spring of each year, some of the expected benefits of programs and projects funded by the grant include reduced traffic-related fatalities and injuries, reduced traffic congestion, and improved travel time reliability. All of these benefits could be further realized through improved TIM.

FEMA Grant Program. Though not expressly a source of highway funding, FEMA's Assistance to Firefighters Grant (AFG) program can provide fire departments and nonaffiliated emergency medical service organizations with equipment, protective gear, emergency vehicles, training, and other resources necessary for protecting the public and emergency personnel from fire and related hazards, according to FEMA. In the 2016 grant year, the Austin Fire Department received \$58,875 and San Marcos received \$365,400 for equipment.

The Staffing for Adequate Fire and Emergency Response Grants (SAFER) grants specifically assist in increasing the number of firefighters. In 2016, the Leander Fire Department received \$1,408,502 and the Pflugerville Fire Department received \$1,450,237 for hiring, according to the SAFER website (<https://www.fema.gov/staffing-adequate-fire-emergency-response-grants-grantee-award-year-2016>).

Additional Funding Sources. There are several other funding opportunities identified by this plan that could be leveraged to support TIM projects and programs.

The State of Texas coordinates grants for rural fire service training and equipment through the Rural Volunteer Fire Department Assistance Program as part of the Texas Forest Service. (<http://texasforestservice.tamu.edu/RuralVFDAssistanceProgram/>)

Emergency medical service (EMS) assistance is coordinated through the Office of EMS/Trauma Systems, Department of State Health Services, in the form of grants, training funds, and other funding streams. (<https://www.dshs.texas.gov/emstraumasystems/efunding.shtm>)

Education and outreach activities aimed at both responders and motorists may find a funding source in the TxDOT Traffic Safety eGrants program, which focuses spending in a variety of areas to reduce traffic deaths. (<https://www.txdot.gov/government/funding/egrants.html>)

Leveraging Safety Service Patrol Programs

Another possible source of incident management funding is contracting a company to partially subsidize the HERO program. Arrangements are largely driven by the sponsorship value to the business and the contracting agency.

FHWA's Office of Transportation Operations addressed the issue of motorist assistance patrols in April of 2008 (HOTO-1, April 23, 2008), when it presented options to include:

- Joint funding by state DOT and MPO;
- Police or other dispatch and administrative cost sharing;
- Public/private partnership with a sponsor private sector partner(s);
- Selection of sponsors with a strong commitment to highway safety and customer service (such as the State Farm Assist Patrol Program) to maintain agency integrity; and
- Logos of sponsoring government agencies along with a sponsor business.

The motorist assistance program operated by Travelers Marketing is now in 19 states: Colorado, Connecticut, Florida, Georgia, Illinois, Indiana, Kansas, Louisiana, Maine, Maryland, Massachusetts, Nevada, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, and Wisconsin. All but Massachusetts are under State Farm sponsorship. These sponsorships typically supply about 5–10% of operating costs for the patrol program.

Private Sector Funding

Private sector funding normally comes from corporate sources directly, or through charitable foundations. Likewise, community foundations will often fund specific programming on an ad hoc or sustaining basis. Special interest foundations may fund only a specific type of program or activity, and are the third most likely source.

Community foundations often fund programs that support safety initiatives. For example, the Firehouse Subs Public Safety Foundation (<https://firehousesubsfoundation.org>) has given more than \$33 million in 46 different states (including Puerto Rico and Canada) to more than 3,300 organizations. In 2017, the foundation funded 359 sets of bunker gear, 134 thermal imaging cameras, 664 AED units, 20 ATVs, 104 extrication tools and 268 bulletproof vests, for example. The organization is an outgrowth of a business begun by firefighters, with a shared vision for better, safer, response.

While there is little evidence that foundations or other private funding is being used successfully for TIM programs in other regions, CAMPO could be a leader in this advancement. The Texas Association of Non-Profit Organizations (TANO) could be a starting point for further grant exploration.

Creation of a non-profit organization dedicated to traffic safety and incident management may be a way to attract additional funding if the appropriate agency to create such a non-profit can be identified. A non-profit organization would permit donations from a variety of sources. Iowa DOT is now considering financial support for a TIM training facility through donations to a 501(c)(3) organization. Improved interagency TIM coordination is an added benefit, since the non-profit organizations will likely be comprised of a board of emergency responders with a vested interest in its overall success.

Summary of Funding Strategies

Funding is a means of providing growth opportunities. The U.S. Fire Administration offers advice that is applicable to all responder and support agencies.

“There are a variety of private-funding sources available through nonprofit foundations and corporate-giving programs that may apply to emergency medical services (EMS) and fire services. Typically, these are onetime grants. Sometimes, the funding is multiyear. Virtually none are for continued support of general operating expenses. However, private foundations and corporations are an excellent source of revenue providing grants for program planning, seed money for start-up costs, management and technical assistance, facility and equipment funding, and program-related investments. Private organizations are also a good source for in-kind donations of materials and services, and low-interest loans.”

U.S. Fire Administration Funding Alternatives for Emergency Medical and Fire Services FA-331/April 2012

Most TIM programs are nearly totally dependent on local and state government tax dollars, or administration of federal tax dollars. TIM programs compete with planning, design, construction, and maintenance funding through DOTs, and competes with individual emergency services for funds.

The CAMPO Region is not alone in its interest in expanding funding for TIM services. There is no evidence of any locality, planning region, or state that is a clear leader in diversification of creative financing with a “silver bullet” solution. Successfully funded TIM programs are those with clear champions, well-defined business processes, and a culture of operations.

The MPO leadership model makes sense from a programmatic standpoint, but may not be the best structure to receive increased investment. MPOs by regulation are not permitted to raise public funds through taxation. Partner investments can be coordinated under the structure, but receipt of funds may be limited, dependent on investor preferences.

The CAMPO Region can support its TIM efforts most effectively by continuing to engage the community in a cooperative search for appropriate funding streams, with shared mobility and safety benefits.

CHAPTER 7

NEXT STEPS

7 | NEXT STEPS

Agencies in the CAMPO Region have made significant strides towards improving TIM in recent years. While much has been accomplished, there remain significant opportunities to improve TIM and reduce the impacts of traffic incidents in the Region. As the CAMPO Region continues to grow in population and the road network becomes increasingly stretched beyond capacity, the need to quickly and safely clear incidents becomes even greater in order to reduce congestion and improve the safety and reliability of the transportation network.

The CAMPO Regional Incident Management Strategic Plan and Performance Assessment developed a total of 29 recommendations to improve TIM in the CAMPO Region. Implementation of these recommendations will be led by CAMPO, TxDOT, municipalities or other agencies as discussed in Chapter 4. To accelerate implementation of several recommendations that are expected to yield a high benefit-cost ratio and serve as foundation programs for other TIM activities, it is recommended that CAMPO take a leadership role to implement six key policies and programs in the near-term. These policies and programs are described below.

- **Develop a Regional Open Roads Policy.** Develop a Regional Open Roads Policy for review and approval by local law enforcement, first responder, and traffic management agencies throughout the Region.
- **Develop a Standardized HAZMAT and Non-HAZMAT Clean-up Policy for the Region.** Research national best practices and assemble stakeholder input to develop regional standards for the cleanup of incidents involving HAZMAT and non-HAZMAT spills.
- **Develop a Framework for a Regional Rapid Clear Towing Program.** Investigate the benefits to the Region of providing rapid clear towing for incident management, research possible funding mechanisms for such a program, and recommend a program implementation strategy.
- **Develop a Framework for a Regional Heavy Tow Program.** Collaborate with CAMPO, TxDOT, and local agencies in the CAMPO Region to develop a framework for a regionally administered heavy wrecker towing service available for use by any agency responding to major incidents on freeways.
- **Develop a Standardized Data Collection and Performance Measures Framework for the Region.** Assess data needs of specific agencies and develop a framework for integrating data sources so that TIM data can be collected and shared regionally to track performance.
- **Develop a Regional State of Traffic Incident Management Report.** Analyze existing TIM data from across the CAMPO Region and compare this data to established regional performance goals in a “State of TIM” report written for a public audience.

Any successful TIM program will rely on coordination and cooperation between transportation and public safety agencies. In the CAMPO Region, stakeholders have continuously demonstrated a strong preference towards regional cooperation. Efforts such as the AIMHigh Regional Incident Management Task Force, the Regional TMC Operations Forum, implementation and operation of CTECC, and most recently the development of CAMPO Regional Incident Management Strategic Plan and Performance Assessment have proven stakeholders in the CAMPO Region are very willing to work towards common goals related to TIM. Continued cooperation in the CAMPO Region and a focus on implementation of the recommendations identified in this plan will allow the Region to realize the full benefits of TIM, including reduced congestion, increased safety, and improved reliability for travelers throughout Central Texas.

APPENDIX

COST-BENEFIT ANALYSIS

APPENDIX | COST-BENEFIT ANALYSIS

As discussed in **Chapter 4**, a cost-benefit analysis was performed for a subset of recommendations presented in the CAMPO Regional Incident Management Strategic Plan and Performance Assessment. The cost-benefit analysis focused on projects for which quantitative data was available and whose analysis methods were approved by the Study Steering Committee. The results of this analysis inform the “Estimated Scores” in **Figure 11** for these strategies.

VISSIM software was used to develop a quantitative traffic model to assess costs and benefits related to non-recurring traffic incidents and subsequent incident management efforts. Confidence levels and assumptions are recorded in this Appendix for each strategy. Confidence levels reflect the level of faith in the analysis methodology and accuracy of available data, based on the following guidelines:

- **High** confidence levels were recorded for analysis methods that included data specific to the CAMPO Region, such as crash data and HERO patrol assists.
- **Medium** confidence levels were recorded for methods that were based on accepted national or statewide standard values.
- **Low** confidence levels were recorded for methods that relied upon assumptions and qualitative information from stakeholder interviews, in lieu of available local data.

Benefit-cost results can be found in the **Table 12** on the following page.

This Appendix provides more information about the methodology and corridor-by-corridor results for each analysis

HERO FREEWAY SAFETY SERVICE PATROL

Cost-benefit analysis was performed for the existing HERO program, as well as for possible expansion of the program to arterials and additional freeways in the Region.

Existing HERO Program

The HERO program provides direct assistance to stranded motorists within the CAMPO region, and as of 2018 this assistance is provided along 138 miles of roadway. The HERO program assists with traffic incident management by reducing the amount of time that vehicles are stranded in a travel lane or on the shoulder of a road.

In late 2017, new contract language expanded HERO’s capabilities and geographic scope. As a result, HERO operators are now trained to assist in incident management activities related to vehicle collisions. The geographic scope of services was also expanded. HERO now currently operates on portions of I-35, Texas Loop 1 (MoPac), US Highway 183, Texas State Highway 71, and US Highway 290. HERO vehicles also patrol smaller arterial roadway segments of US Highway 183 and Texas State Highway 71.

Table 12 – Benefit-Cost Ratios for TIM Recommendations Allowing Quantitative Analysis

Strategy		Benefit-Cost Ratio		Data Confidence Level
		Analysis Corridor with Lowest Ratio	Analysis Corridor with Highest Ratio	
Existing HERO Program		N/A	34	High
HERO Program Expansion	Additional Freeways	2	3	Medium
	Regional Arterials	1	5	Low
Peak Hour Rapid Response Tow	Additional Freeways	2	20	High
	Regional Arterials	< 1	21	Medium
DMS	Additional Freeways	< 1	8	Low
	Regional Arterials	< 1	3	Low
	Rural Decision Points	2	4	Low
Additional Freeway Lighting		N/A	40	Medium
CCTV Camera Freeway Coverage		2	15	Medium
Prescribed Traffic Bypass of I-35 via SH 130		N/A	12	Low

Cost-benefit analysis results of the HERO program are calculated using incident response data from both before and after the expansion of the HERO program that occurred in late 2017. Results do not consider costs or benefits associated with arterial HERO program operations. From this analysis and preliminary 2018 data, it appears that the benefit-cost performance of the overall program has improved since the new contract took effect.

HERO Program Expansion to Additional Freeways

The HERO program is planned to contain additional phased expansions to other freeway facilities within the CAMPO Region, including State Highway 130, State Route 183A, State Route 290, State Route 45, and an additional segment of State Loop 1. Based upon existing crash rates and traffic volumes along these facilities and discussions with CAMPO and the Study Steering Committee, the existing HERO program characteristics were applied as a test fit to these roadways to determine whether a geographic expansion of the program might yield a positive benefit-cost ratio. Notably, the FHWA TIM-BC Tool requires a minimum hourly volume input of 500 vehicles per hour per lane to produce analysis results. Most segments of other freeway

facilities in the region have peak period hourly volumes that fail to reach this minimum hourly volume threshold, so these facilities were not analyzed.

Several facilities that are not yet covered by HERO patrol met the minimum hourly volume thresholds specified by the tool. The portion of State Loop 1 (north of Parmer Lane) and the portion of State Highway 45 (between State Loop 1 and State Highway 130) currently have hourly per-lane volumes that exceed analysis minimums in both peak periods and off-peak periods. The portion of State Highway 130 between the Travis/Caldwell County Lane and the northern terminus at I-35 in Georgetown currently have hourly per-lane volumes that generally exceed analysis minimums in both peak periods, but not in the off-peak periods. In several cases, volumes less than 5% below the minimum threshold were rounded up to the minimum value to make the analysis possible.

Two HERO patrol expansion options were analyzed individually to determine a benefit-cost ratio associated with the extension of service: a combination State Loop 1/State Highway 45 service expansion and a State Highway 130 service expansion.

HERO Program Expansion to Regional Arterials

Currently, the HERO program operates mostly on freeways within the CAMPO Region. Of the 138 miles of roadway currently in HERO coverage, however, approximately 26 miles of the HERO network are on arterial roadways within the region. Existing arterial roadways serviced by the HERO patrol include portions of US 183, US 290, and Texas SH 71. Future expansion plans for the program show that the service patrol will include additional arterial facilities such as FM 620, Texas Loop 360, and a portion of US 79 in subsequent phases of program expansion. To test the benefit-cost ratio of an arterial service patrol in the CAMPO Region, existing HERO program characteristics as well as roadway-specific volume and crash data were applied as a test fit to determine for which types of arterial roadways a service patrol might yield a positive benefit-cost ratio.

Since no FHWA tools exist to examine the effects of incidents on traffic for non-freeway facilities, effects were calculated by creating generic traffic models using VISSIM software for three road types: rural highways, regional connectors, and urban through routes. Two road segments of each road type (selected based on discussions with CAMPO and the Study Steering Committee) were analyzed during peak traffic hours of 6 to 9 AM and 4 to 7 PM. The generic nature of the models was required since modeling each individual roadway to be studied according to each one's specific geometric and traffic characteristics was not within the scope of this study. Results are intended to provide order-of-magnitude level insight on the potential cost-effectiveness of an arterial service patrol on each test fit roadway.

A summary of benefit-cost results for HERO expansion to regional arterials is as follows:

- Both rural highway segments that were analyzed with a HERO-style service patrol yielded program benefit-cost ratios that were less than 1 (breakeven performance). As a result, arterial service patrols are not recommended for rural highways within the region.
- When regional connectors were analyzed, conditions along Texas Loop 360 yielded a service patrol program benefit-cost ratio greater than 1, while conditions along the northern portion of FM 620 yielded a service patrol program benefit-cost ratio less than 1.

- Both urban through routes analyzed (Lamar Blvd from US 290 to US 183, and FM 1431 from US 183 to I-35) for arterial service patrol performance yielded benefit-cost ratios well above breakeven performance.

PEAK HOUR RAPID RESPONSE TOWING

Cost-benefit analysis was performed for the implementation of peak hour rapid response towing on arterials and additional freeways in the Region.

Freeway Expansion

In order to be eligible for the City of Austin's towing contract, towing companies must agree to provide towing services to remove disabled vehicles from the roadway free of charge during peak hour "zone times" (6–9 a.m. and 4–7 p.m.) along some of the freeways that pass through the city. This service relocates vehicles from travel lanes or shoulders on the freeway to nearby parking lots where they no longer impact traffic flow, thereby reducing associated delays and risks of secondary incidents. The program uses location-based dispatch and performance measurement to ensure prompt response times from towing service providers.

Currently this program is available only within the City of Austin. A similar program could be applied at a regional level, however, if a funding scheme were determined to subsidize the cost of the program. Similar programs elsewhere in Texas have either completely subsidized the cost of these tows or else have partially subsidized the cost, leaving the rest of the cost to be covered by owners of the towed vehicles.

The existing Austin Rush Hour Rapid Response program was analyzed, and a potential program was analyzed at a per-assist level for several other test fit freeway segments representative of those throughout the CAMPO Region. The benefit-cost ratio assumes full subsidization of towing costs. The benefit-cost ratios would improve further if vehicle owners paid for part of the cost of each tow.

Arterial Deployment

In order to be eligible for the City of Austin's towing contract, towing companies must agree to provide towing services to remove disabled vehicles from certain freeway segments free of charge during peak hour "zone times" (6–9 a.m. and 4–7 p.m.). This service relocates vehicles from travel lanes or shoulders on the freeway to nearby parking lots where they no longer impact traffic flow, thereby reducing associated delays and risks of secondary incidents. The program uses location-based dispatch and performance measurement to ensure prompt response times from towing service providers.

While this program is currently only available on freeways and freeway frontage roads within the City of Austin, such a program could be expanded to other key arterials throughout the CAMPO Region if a funding scheme were determined to subsidize the cost of the program. Similar programs elsewhere in Texas have either completely subsidized the cost of these tows or else have partially subsidized the cost, leaving the rest of the cost to be covered by owners of the towed vehicles.

Performance data from the existing Austin Rush Hour Rapid Response program was analyzed, and a potential peak hour no-cost arterial towing service program was analyzed at a per-assist

level for several other test fit arterial segments representative of those throughout the CAMPO Region. Since no FHWA tools exist to examine the effects of incidents on traffic for non-freeway facilities, effects were calculated by creating generic traffic models using VISSIM software for three road types: rural highways, regional connectors, and urban through routes. Two road segments of each road type were analyzed during peak traffic hours of 6–9 a.m. and 4–7 p.m. The generic nature of the models was required since modelling each individual roadway to be studied according to each one’s specific geometric and traffic characteristics was not within the scope of this study. Results are intended to provide order-of-magnitude level insight on the potential cost-effectiveness of an arterial service patrol on each test fit roadway.

The benefit-cost ratio assumes full subsidization of towing costs. The benefit-cost ratios would improve further if vehicle owners paid for part of the cost of each tow. Both rural highway segments that were analyzed yielded program benefit-cost ratios that were less than 1 (breakeven performance). As a result, no-cost arterial towing services are not recommended for rural highways within the region. By comparison, both urban through routes that were analyzed yielded program benefit-cost ratios greater than 10, suggesting that the CAMPO Region would benefit from a program that efficiently removed disabled vehicles from busy urban arterials.

DYNAMIC MESSAGE SIGNS

Cost-benefit analysis was performed for the implementation of dynamic message signs (DMS) on arterials and additional freeways in the Region, including installations at key rural decision points.

DMS on Additional Freeways

DMS are used for many purposes, including inclement weather messages, public service announcements, amber and silver alerts, work zone information, and detour routes. For this analysis, only the benefits of DMS specific to incident management were estimated, using the Wisconsin Department of Transportation’s (WisDOT) Transportation Systems Management and Operations Project Benefits Analysis tool (similar to the Federal Highway Administration’s TOPS-BC tool). It is important to note that if other benefits unrelated to TIM were also considered in this analysis, the resulting benefit-cost ratios would improve.

The WisDOT Project Benefits Analysis tool considers factors including the average number of traffic incidents per year on a study corridor where resulting driver decision would be affected by DMS, average incident duration, traffic volumes, and an estimate of the average travel time savings for a driver acting on the information posted on DMS. Several freeway corridors with DMS implementation planned as a part of the TxDOT Austin District ITS Master Plan were analyzed using this tool. Program costs include construction costs for the DMS units (annualized over the expected lifetime of the DMS unit), operating costs, and maintenance costs. Corridor costs were largely dependent upon the number of DMS units planned for installation in the ITS Master Plan for that corridor, so it was assumed that as the number of DMS units on a corridor increased, the percentage of travelers adjusting travel routes based on the DMS message also increased.

DMS on Regional Arterials

The existing TxDOT Austin District ITS Master Plan includes several DMS implementation projects along key arterial roadways within the CAMPO Region, including Loop 360, FM 620, and Parmer Lane. For this analysis, the benefits of proposed DMS specific to incident management were estimated, using the Wisconsin Department of Transportation's (WisDOT) Transportation Systems Management and Operations Project Benefits Analysis tool (similar to the Federal Highway Administration's TOPS-BC tool). It is important to note that if other benefits unrelated to TIM were also considered in this analysis, the resulting benefit-cost ratios would improve.

The WisDOT Project Benefits Analysis tool considers factors including the average number of traffic incidents per year on a study corridor where resulting driver decision would be affected by DMS, average incident duration, traffic volumes, and an estimate of the average travel time savings for a driver acting on the information posted on DMS. Several regional arterial corridors with DMS implementation planned as a part of the TxDOT Austin District ITS Master Plan were analyzed using this tool. Program costs include construction costs for the DMS units (annualized over the expected lifetime of the DMS unit), operating costs, and maintenance costs. Corridor costs were largely dependent upon the number of DMS units planned for installation in the ITS Master Plan for that corridor, so it was assumed that as the number of DMS units on a corridor increased, the percentage of travelers adjusting travel routes based on the DMS message also increased. Note that Parmer Lane shows a better benefit-cost ratio than the other study roads because the ITS Master Plan states that smaller, less expensive DMS units will be used on this road.

DMS at Rural Decision Points

During stakeholder discussions, TxDOT had expressed interest in investigating the impact that DMS units could have in communicating traveler information on roads leading into and out of Austin regarding unplanned road closures or major traffic incidents. These DMS units could be placed ahead of key decision points where routing choices were limited because of constricting elements of geography such as river crossings. The project team identified rural portions of US 290 and SH 71 as candidates for rural DMS implementation.

For this analysis, the benefits of proposed DMS specific to incident management were estimated, using the Wisconsin Department of Transportation's (WisDOT) Transportation Systems Management and Operations Project Benefits Analysis tool (similar to the Federal Highway Administration's TOPS-BC tool). It is important to note that if other benefits unrelated to TIM were also considered in this analysis, the resulting benefit-cost ratios would improve.

The WisDOT Project Benefits Analysis tool considers factors including the average number of traffic incidents per year on a study corridor where resulting driver decision would be affected by DMS, average incident duration, traffic volumes, and an estimate of the average travel time savings for a driver acting on the information posted on DMS. None of the rural test corridors featured planned DMS implementation as a part of the TxDOT Austin District ITS Master Plan, so program costs were calculated from those derived for another planned DMS unit implementation project along Texas Loop 360. Program costs include construction costs for the DMS units (annualized over the expected lifetime of the DMS unit), operating costs, and

maintenance costs. Because of the rural nature of these roads, benefit assumptions differ from the similar analyses completed for freeway and regional arterial DMS implementations.

ADDITIONAL FREEWAY LIGHTING

Additional freeway lighting was cited as a critical need by the City of Kyle Police Department during stakeholder interviews, for the prevention of secondary crashes with disabled vehicles on I-35 at night. (While the benefit-cost analysis for this project used historical data provided by the Kyle Police Department to estimate the general benefit-cost ratio for additional freeway lighting, the City of Round Rock also reported the need for additional lighting along I-35, and it is anticipated that other municipalities or counties in the CAMPO Region could have the same need.)

The project team and Study Steering Committee agreed that it is not sound logic to extrapolate purely from crash data that includes location and time of day whether lack of lighting was the primary factor in a secondary crash. For this reason, only crashes identified by the Kyle Police Department as strongly influenced by lack of lighting have been included in this analysis, and a factor of 50% was applied to calculated benefits because other factors besides lighting could have contributed to the fatal crashes, such as intoxicated driving.

CCTV CAMERA FREEWAY COVERAGE

While CCTV cameras do not play a direct role in many parts of incident response, they can help to hasten the detection of incidents as they happen, thereby reducing the overall duration of an incident. Cameras also allow traffic management personnel to maintain surveillance of the incident throughout the response, potentially allowing for improved coordination of response efforts.

The TxDOT Austin District ITS Master Plan includes CCTV installation plans for several freeway corridors that do not currently have CCTV coverage. These corridors are analyzed to determine potential benefits related to improved incident detection, and those benefits are compared to installation, operation, and maintenance costs for the CCTV cameras. In some cases, much of the benefits that CCTV could provide in terms of improved detection capability is negated by the existing presence of HERO patrol vehicles. In talks with CTECC staff, HERO vehicle operators generally detect an incident before CTECC personnel do, even if CCTV is present in the area of the incident. This analysis accounts for a reduced impact of CCTV implementation in locations where HERO already patrols the roadway. As a result, corridors that do not yet have HERO patrolling the roadway will show a higher benefit from CCTV implementation.

The FHWA TIM-BC Tool Shared Quick Clearance Agreements Module was used to complete this analysis. Regional Performance Measures

PRESCRIBED TRAFFIC BYPASS OF I-35 VIA SH 130

One potential application of DMS unit implementation on freeways would be using DMS to advise travelers to use a specific alternate, parallel route. In discussions with TxDOT, representatives from the traffic operations division and the toll operations division both expressed interest in developing a system of coordinated response following a major incident on I-35. This response would consist of the TxDOT Toll Operations Division temporarily waiving toll charges along SH 45 south and SH 130, and CTECC operators broadcasting information on DMS at approaches to the I-35/SH 130 decision points about the incident and available alternate route and waived tolls. Similar prescribed traffic bypasses have been executed in Houston in response to major hurricane events.

For this analysis, the benefits of DMS specific to travelers adjusting their route from I-35 to SH 130 were estimated, using the Wisconsin Department of Transportation's (WisDOT) Transportation Systems Management and Operations Project Benefits Analysis tool (similar to the Federal Highway Administration's TOPS-BC tool). It is important to note that if other benefits unrelated to TIM were also considered in this analysis, the resulting benefit-cost ratios would improve.

The WisDOT Project Benefits Analysis tool considers factors including the average number of traffic incidents per year on a study corridor where resulting driver decision would be affected by DMS, average incident duration, traffic volumes, and an estimate of the average travel time savings for a driver acting on the information posted on DMS. Program costs include construction costs for the DMS units (annualized over the expected lifetime of the DMS unit), operating costs, and maintenance costs.