

April 23, 2013

TO: Members of the MAG Intelligent Transportation Systems Committee
FROM: Catherine Hollow, City of Tempe, Vice Chair
SUBJECT: MEETING NOTIFICATION AND TRANSMITTAL OF TENTATIVE AGENDA

Wednesday, May 1, 2013- **10:00 a.m.**
MAG Office Building, 2nd Floor, Ironwood Room
302 North First Avenue, Phoenix

The ITS Committee has been scheduled at the time and place noted above. Committee members or their proxies may attend **in person or by video conference or by telephone conference call**. Those attending by telephone conference call please contact MAG offices for conference call instructions.

Please park in the garage under the MAG building, bring your ticket, parking will be validated. For those using transit, Valley Metro/RPTA will provide transit tickets for your trip. For those using bicycles, please lock your bicycle in the bike rack in the garage.

In 1996, the Regional Council approved a simple majority quorum for all MAG advisory committees. If the ITS Committee does not meet the quorum requirement, members who have arrived at the meeting will be instructed a legal meeting cannot occur and subsequently be dismissed. Your attendance at the meeting is strongly encouraged.

Pursuant to Title II of the Americans with Disabilities Act (ADA), MAG does not discriminate on the basis of disability in admissions to or participation in its public meetings. Persons with a disability may request a reasonable accommodation, such as a sign language interpreter, by contacting Jason Stephens at the MAG office. Requests should be made as early as possible to allow time to arrange the accommodation.

If you have any questions regarding the meeting, please contact Sarath Joshua at (602) 254-6300.

TENTATIVE AGENDA

	<u>COMMITTEE ACTION REQUESTED</u>
1. <u>Call to Order</u>	
2. <u>Approval of the March 27, 2013 Meeting Minutes</u>	2. Review and approve minutes of the meeting held on March 27, 2013.

3. Call to Audience

An opportunity will be provided to members of the public to address the ITS Committee on items not scheduled on the agenda that fall under the jurisdiction of MAG, or on items on the agenda for discussion but not for action. Members of the public will be requested not to exceed a three minute time period for their comments. A total of 15 minutes will be provided for the Call to the Audience agenda item, unless the ITS Committee requests an exception to this limit. Please note that those wishing to comment on action agenda items will be given an opportunity when the item is heard.

4. Program Managers Report

The following items will be discussed:

- TSOP Update
- MAG Planning Area update

5. RCN Update and Mapping Software

Members of the MAG Technology Advisory Group and the RCN Working Group have identified the need for developing and maintaining a map of optical fiber resources in the MAG region. This would be valuable information resource for planning the expansion of RCN to member agencies that are currently not on the network.

6. Action Plan for Improved Operations on I-10 and I-17

At the last meeting the committee received a draft action plan developed by the AZTech ICM Working Group. The plan has since be revised to incorporate comments from committee members. (Attachment One). The committee will discuss and possibly take action to recommend the final plan to be included in MAG studies.

3. For information and discussion.

4. For information and discussion.

5. For information and discussion.

6. For information, discussion and possible action.

7. Emergency Vehicle Preemption (EVP) Study

This study is included in the Draft MAG Work Program for FY 2014, based on the recommendation of the committee. A draft scope of work was discussed at the March 2013 meeting. Comments provided by committee members have been incorporated in the draft final scope of work (See Attachment Two).

8. MAG Regional ITS Architecture Update Project

This project has developed an updated version of the Regional ITS Architecture, incorporating the changes to ITS infrastructure since the 2010 update. The new version has been developed to make it compatible with the version 7.0 of the National ITS Architecture. Agencies currently listed in the RIA have all been requested to review and provide comments. The consultant will review the next steps.

9. Reports by Committee Members

Members will be provided an opportunity to share information related to ongoing ITS activities in their jurisdictions.

10. Request for Future Agenda Items

Topics or issues of interest that the ITS Committee would like to have considered for discussion at a future meeting will be requested.

11. Next Meeting Date and Place

The next committee meeting is scheduled to be held at 10:00 a.m. on Wednesday, June 5, 2013. It will be held in the Ironwood Room on the 2nd Floor of the MAG office building.

Adjournment

7. For information, discussion and possible action to recommend the draft final scope of work for the EVP study.

8. For information and discussion.

9. For information and discussion.

10. For information and discussion.

**DRAFT MINUTES OF THE
MARICOPA ASSOCIATION OF GOVERNMENTS
INTELLIGENT TRANSPORTATION SYSTEMS COMMITTEE**

March 27, 2013

MAG Ironwood Room, 2nd Floor
302 North First Avenue
Phoenix, Arizona

MEMBERS ATTENDING

- | | |
|---|---|
| + Reza Karimvand, ADOT | Luke Albert, City of Goodyear |
| + Soyoung Ahn, ASU | Faisal Saleem for Nicolaas Swart, Maricopa County |
| Jeff Brannan for Chris Hamilton, City of Avondale | Avery Rhodes, City of Mesa |
| + Thomas Chlebanowski, Town of Buckeye | Ron Amaya, City of Peoria |
| Mike Mah, City of Chandler | Marshall Riegel, City of Phoenix |
| Captain Burley Copeland, DPS | + Bill Birdwell, Town of Queen Creek |
| Jorge Gastelum, City of El Mirage | **Steve Ramsey, City of Scottsdale |
| **Jennifer Brown, FHWA | Albert Gacia for Jason Mahkovtz, City of Surprise |
| Erik Guderian, Town of Gilbert | Catherine Hollow, City of Tempe |
| Allan Galicia for Debbie Albert, City of Glendale | Ratna Korepella, RPTA |

OTHERS PRESENT

- | | |
|--|--------------------------|
| Bruce Littleton, City of Phoenix | Paul Porell |
| Rick White, Schneider Electric/Telvent | Arnab Gupta, PB Inc |
| Mohammad Rehman, URS | Jay Yenerich, PB Inc |
| David Riley, UCG Inc | Darron Henderson, PB Inc |
| Keith Winney, UCG Inc. | Bo Gao, Stanley Inc |
| Jim Messerly, Dutch Works | Dan Hartig, Ayres Inc |
| Saroja Devarakonga, HDR | Deanna Haase, KHA |
| John Prowse, Lee | Lisa Burgess, KHA |
| Joey Paskey, Atkins | Torrin Smith, Transcore |
| Doug McCants, Atkins | Jeff Jenq, OZ |
| Sandra Thoms, Jacobs | Don Wiltshire, YSMA LLC |
| Monique de los Rios-Urban, MAG | Ryan Gish, MAG |
| Margaret Boone, MAG | Sarath Joshua, MAG |
| Kiran Guntupalli, MAG | |
| Leo Luo, MAG | |

- + Not present
** Teleconference

1. Call to Order

Vice Chair Catherine Hollow called the meeting to order at 10:01 a.m.

2. Approval of the March 6, 2013 Meeting Minutes
Marshall Riegel moved, Erik Guderian seconded and it was unanimously carried to approve the minutes of the meeting held on March 6, 2013.

3. Call to Audience
Vice Chair Catherine Hollow made a call to the audience providing an opportunity for any members of the public to address the ITS Committee. No comments were received.

4. Program Manager's Report
Sarath Joshua addressed the following items in his report:
 - TSOP Update
A total of ten (10) projects programmed for FY 2013. Seven (7) has been launched, the remaining three (2) will be launched in the next few weeks.

 - RCN Update
Ryan Gish from MAG mentioned that the RCN switch upgrade has been completed. Camera Cameleon updates will be conducted at Tempe, Peoria and Glendale in the next few weeks. Additional 911 dispatch centers are added to the RCN network. Audrey Skidmore mentioned that a high-level fiber mapping project was discussed at MAG TAG. MAG TAG is interested in working with ITS Committee to gather input for this project. The main purpose of the project is to find opportunity in establishing low cost connections. Since the fiber network is considered protected infrastructure, no detailed information about the communication links will be shared. Committee members were asked to provide their input to Sarath Joshua or Audrey Skidmore.

 - MAG Planning Area Change
MAG Regional Council will take actions on expanding the MAG Planning Area. If approved, several new towns and cities will be joining MAG. They will have the options of appointing staff for various MAG committees once joining MAG.

5. Action Plan for Improving Operations on I-10 and I-17
Vice Chair Catherine Hollow mentioned that the ITS Committee had assigned a task to the AZTech ICM Working Group to produce a Draft ICM Action Plan for improving operations on I-10 and I-17. Lisa Burgess (of KHA) helped prepare this draft under contract to MCDOT. She distributed the draft action plan and briefly went through the document. The high-level strategies and cost estimates were also presented. Faisal Saleem commented that adding REACT to the strategies could help improve operations by providing field observations to the TMCs. Sarath Joshua added that the finalized plan would provide input to the MAG Central Phoenix Framework Study and the MAG Managed Lanes Study. Funding would be made available to demonstrate the benefits of improved operations by FY 2015. The demonstration of value of ITS and operations will also lead to significant input for the next generation of the RTP. Committee members were encouraged to provide comments on the Draft ICM Action Plan. This document will also be provided to the two MAG studies for review. The committee is expected to take action on the Final ICM Action Plan at the May meeting. Marshall Riegel asked if performance measures are included in the plan. Lisa mentioned that detailed performance measures have not been identified. In response to Marshall's question, Sarath Joshua

invited Monique de los Rios-Urban from MAG to demonstrate the draft MAG Performance Measurement website. She also mentioned that the private arterial data is currently under MAG quality control process. Once completed, MAG will make performance measures related to arterials available on the website. Monique confirmed with Sarath that MAG is currently working with both Nokia Data and Inrix Data. Lisa Burgess from KHA asked if the website allows selection of specific dates to check the performance of the freeways. Monique mentioned that right now the information on the website is an average over a year although MAG received data in 5-minute intervals from 2009-2012. The website address is <http://performance.azmag.gov/>.

6. 2013-2016 MAG ITS On-Call Consultant Qualification

Sarath Joshua provided the background information on MAG ITS and Safety On-Call contracts. He mentioned that a total of 27 proposals were received. The review panel is composed of volunteers of the ITS Committee and MAG staff. The panel made recommendations of consultant selections to all the seven (7) ITS areas. **Marshall Riegel moved, Mike Mah seconded and it was unanimously carried to approve the recommendations of the consultant selections by the review panel.** Sarath mentioned that the recommendations will be presented to the MAG Management Committee and Regional Council for action in the following month.

7. Reports by Committee Members

Marshall Riegel from Phoenix asked if there is a status update on the newly programmed design projects. Sarath Joshua mentioned that he will check with MAG TIP programming group and provide committee members with the latest updates.

8. Request for Future Agenda Items

Vice Chair Catherine Hollow confirmed with Sarath Joshua that the committee will discuss the EVP Scope in the next meeting.

9. Next Meeting Date and Place

Next meeting will be held at 10:00 a.m. on Wednesday, May 1, 2013, in the Ironwood Room (2nd floor) at MAG.

Adjournment

Vice Chair Catherine Hollow adjourned the meeting at 10:55 a.m.

Integrated Corridor Management Action Plan

DRAFT FINAL REPORT

Reviewed and Approved by::

MAG ITS Committee

Prepared by:

AZTech Strategy Task Force

May 1, 2013

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1. ACKNOWLEDGEMENTS

The content of this Draft Final ICM Action Plan has been reviewed by the MAG ITS Committee.

The development of the Draft ICM Action Plan was assigned by the MAG ITS Committee to the AZTech ICM Working Group. The following agencies and individuals contributed to its development effort. Technical assistance was provided by Kimley-Horn and Associates.

Arizona DOT – Reza Karimvand and Chaun Hill

Arizona DPS – Captain Jeff King

City of Avondale – Chris Hamilton

City of Chandler – Mike Mah

City of Phoenix – Bruce Littleton and Marshall Riegel

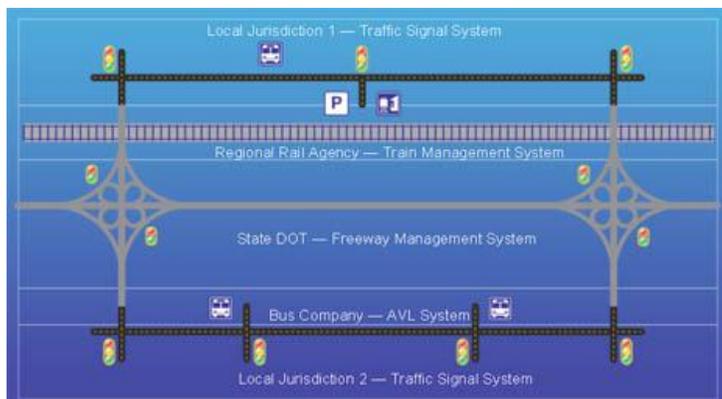
City of Tempe – Catherine Hollow

Maricopa County – Nicolaas Swart and Faisal Saleem

Maricopa Association of Governments – Sarath Joshua, Margaret Boone and Leo Luo

2. ACTION PLAN SUMMARY

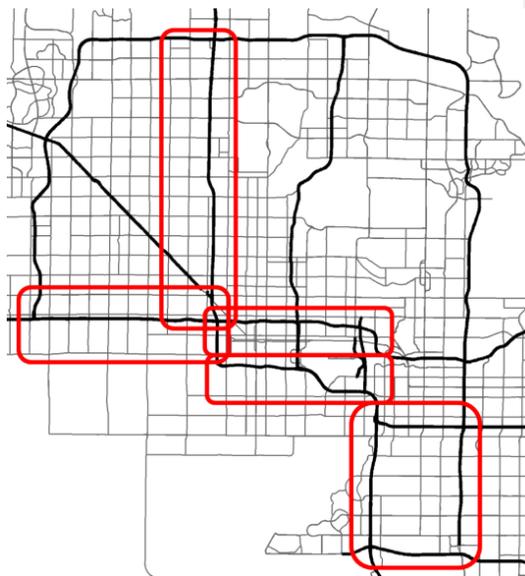
Integrated Corridor Management (ICM) is the ability to actively manage the transportation network through enhanced operational strategies, use infrastructure and systems to implement and manage strategies in real-time, and balance network demand across freeway, arterial and transit networks. The figure below depicts a schematic of the systems that an ICM concept would help coordinate operations to mitigate address day-to-day congestion as well as extreme conditions caused by a freeway closure:



Source: USDOT RITA Integrated Corridor Management Website

This ICM Action Plan represents the collective efforts of the MAG ITS Committee to identify key operational improvements, ITS infrastructure needs, priorities and responsibilities to advance ICM in the region. The primary purpose of this Action Plan is to present a near-term approach to be implemented and demonstrate measurable benefits by 2015. This near-term approach is part of a longer-term overall regional ICM goal that focuses on improved operations, enhanced coordination, and innovative traffic management partnerships and strategies. This Action Plan intends to focus on the near-term and actionable steps to be able to measure benefits within the next two years.

Four specific areas of consideration for implementing ICM strategies follow the Central Phoenix “spine” of I-17 and I-10. The I-10 West and I-17 corridors are of primary importance, although the East Valley corridor area is positioned appropriately for ICM with parallel arterials and freeway-to-freeway detour options. The Central Corridors area of the metropolitan region is an important gateway to be considered, however there are additional challenges associated with this segment of the freeway network due to the complexity of traffic patterns in the AM and PM peak periods. For the Central Corridors area, the focus of ICM near-term implementation will be on enhancing freeway infrastructure and services to support traffic movement.



These focus areas for ICM strategies defined in this metropolitan region are corridor segments of the freeway network that have the following characteristics:

- Heavy recurrent congestion in AM and PM peak periods
- Substantial delays impacting Valleywide traffic when incidents cause lane closures or full freeway closures
- Limited traffic rerouting options for some freeways which places a strong emphasis on improved freeway/arterial coordination for emergency re-routing
- Some existing traffic management or surveillance capabilities on parallel arterials

There is recognition that actual strategies developed as part of an ICM program, including diversion routes and operational capabilities for those routes, will need to consider areas that should not introduce high volumes of traffic, such as:

- Downtown context-sensitive or complete street areas
- School zones or safe routes to school paths
- Streets with a minimum lane capacity capable of holding freeway-level traffic
- Reversible lane turning restrictions based on peak period time of day usage (7th Avenue and 7th Street)
- Existing or planned METRO Light Rail routes
- Active arterial work zones
- Other areas to be defined

Preliminary strategies for ICM in the Phoenix metropolitan area, with a focus on the I-10 and I-17 corridors, include a combination of initiatives. Freeway initiatives and strategies focus on upgrading ADOT Freeway Management System (FMS) equipment, expanding freeway incident response capabilities, and additional staff and training at the ADOT Traffic Operations Center to support enhanced freeway operations. Arterial strategies focus on the Cities of Phoenix, Tempe, Chandler and Avondale, and Maricopa County, and support active monitoring and management of arterials in the I-10 and I-17 corridors to be able to handle significant volumes of traffic diverting from the freeway. Arterial strategies include additional ITS infrastructure to support real-time monitoring and management on key arterials adjacent to freeway corridors and also include signal operations and management. There are also several regional initiatives; while the focus of the ICM is on the I-10 and I-17 corridors, enhancements to regional systems (traveler information, connectivity) and Arizona Department of Public Safety officers located at the TOC will have benefits that extend beyond the initial ICM corridors.

Planning level costs have been identified for the freeway, arterial and regional ICM improvements. More detailed cost estimates would need to be developed through a formal Design Concept process and preliminary engineering. Costs contained in this proposal represent a rough order of magnitude for infrastructure and systems, staff resources and training, implementation and operations. With improvements targeted for 2015, costs also include a three-year operating period for a cost horizon of 2018.

A summary of the strategies, costs and anticipated benefits are included in the table below:

Recommended ICM Strategy	Benefit from Existing Capabilities	Costs
Freeway ICM Enhancements		\$10,869,000
Upgrade and enhance ADOT FMS infrastructure that is approaching its end-of-lifecycle, including DMS, CCTV and detection. Implement active ramp metering strategy to more effectively meter traffic onto the freeway to minimize freeway congestion points and also to be adjusted for faster freeway access when ramp traffic backs up onto arterials to relieve arterial congestion.	Robust and reliable technology tools will be able to support more active corridor traffic management; newer devices will experience fewer maintenance issues. The benefits of more active ramp metering includes improved progression of traffic from on-ramps, improved safety for merging traffic through coordinated and active metering applications, which improves arterial safety and progression, as well as improves safety of traffic merging on to freeway from the on ramps.	\$1,904,000
Enhance current freeway incident response capabilities through incentive programs for towing, additional Freeway Service Patrol on I-10, and additional ALERT vehicles and resources.	This strategy expands FSP presence on freeways during peak hours to expedite removal of stalled vehicles. Additional ALERT teams will provide faster response to freeway closures and incidents. New programs will create incentives for tow operators to be on-call for heavy-tow requirements, helping to expedite incident clearance and restoring freeway travel lanes. Collectively these will reduce the impacts of incidents on freeway mobility, and improve safety for responders and travelers.	\$7,120,000
Add TOC operations staff with engineering background to be able to determine strategy adjustments or modifications. This will also include ADOT traffic signal operations to support ICM strategies. Provide training to TOC operations staff on new operational approaches, strategies and multi-agency operations.	New capabilities will provide more proactive and responsive freeway management strategies. Additional training and staff with specific operations expertise will support use of new strategies, expanded roles with signal operations, and coordination needs.	\$1,845,000
Arterial ICM Enhancements		\$13,030,500
Deploy real-time CCTV monitoring capability on parallel I-10 arterials (McDowell, Thomas, Indian School, Van Buren, Buckeye, MC85) and I-17 arterials (19 th Avenue, 7 th Avenue, 35 th Avenue, 43 rd Avenue) to enable City TMC staff to monitoring of arterial traffic conditions. Implement communications from the Phoenix TMC to partnering traffic management and incident management agencies to allow them to monitor real-time traffic conditions.	This strategy provides a complete and real-time visual for traffic management and incident management agencies to see impact of congestion and effects of operational strategies.	\$9,710,000

Arterial ICM Enhancements		
Develop traffic signal timing plans for diversions, develop operational strategies for manual operations if conditions warrant. Recommended to leverage MAG's Traffic Signal Optimization Program. Develop multi-agency operations strategies and implement joint operations strategies among ADOT, MCDOT, Phoenix, and Avondale management centers to allow agencies to implement signal operations during after-hours. Designate authorities, roles and responsibilities through a formal agreement and operations plan.	This strategy elevates the current capability of arterial management agencies to actively manage arterial operations from local TMCs, and develops new operations plans to allow for shared operations and expanded arterial management coverage hours. This strategy provides direct benefit to travelers, and leverages agency resources for effective arterial management.	\$1,260,000
Enhance current arterial traffic incident response and management capabilities through REACT service agreement with the City of Phoenix for arterial traffic management support to Phoenix Police.	Provides specially-trained arterial incident response teams to support law enforcement during traffic detours. Includes electronic sign-boards mounted on trucks. Available for dispatch 24/7. REACT benefits include improving traffic safety and mobility for travelers during emergency re-routes, and allowing law enforcement to focus their resources on incident management. REACT staff in the field will provide a direct link to operations staff at the MCDOT TMC.	\$929,000
Expand operating hours of MCDOT TMC to support after-hours arterial traffic management support and REACT coordination. Expand resources at Tempe and Avondale TMC to monitor and manage arterials.	This strategy provides the needed staff resources and training to support active arterial management by local agencies. It leverages MCDOT staff and system capabilities with REACT and TMC coordination to be able to support after-hours arterial operations during emergency reroutes onto arterials. Training will provide consistent operational strategies, lines of communication, and consistent processes for coordinating with agencies, the media, and law enforcement.	\$1,131,500
Regional ICM Enhancements		\$7,735,000
Add three AZDPS officers to staff the ADOT TOC to provide a direct link between on-scene incident management and traffic management.	Sworn officer presence in the ADOT TOC will provide decision-support and real-time tactical decision making capabilities during major freeway incidents and closures. This benefits AZDPS incident operations as well as ADOT TOC operations to be collocated for decision making and strategy implementation.	\$3,645,000
Develop diversion/response plans for closure scenarios on I-10, including signal operations, signing, operational responsibility, law enforcement coordination, traveler information, and agency notifications.	Pre-planned strategies will benefit agencies and travelers. A key benefit is that these plans will identify known constraints and issues on corridors, notification processes, and tactics for communicating among agencies and to travelers.	\$50,000

Regional ICM Enhancements		
Upgrade regional systems (RCN, RADS and VDS) to be able to share video and data with law enforcement, traffic management and transit operations. Accelerate planned agency connections to these systems where needed. Enhance software systems to provide more precise and automated notifications to affected agencies. This includes HCRS Area of Influence and RADS.	This strategy benefits agencies with real-time data and video to be able to implement alternate traffic and transit routing decisions. An additional benefit is the automation of alerts and notifications, which will be sent to traffic management, law enforcement, responders and other affected stakeholders	\$3,340,000
Implement additional traveler information capabilities to support wide area/corridor alerts. May include highway advisory radio for arterials, enhancements to 511 and other en-route notifications directly to travelers.	This strategy benefits the traveling public by providing up-to-date information through a variety of mechanisms, and provides the added capability of location-specific alerts to effectively guide travelers through emergency re-routes on arterials.	\$700,000
Contingency/Design/Program Management		\$10,110,500
Total ICM Cost (planning level estimate for 5 year program)		\$41,745,000

3. WHY INTEGRATED CORRIDOR MANAGEMENT

There are several principles driving the need for a more integrated operations strategy in the MAG region:

- Basic freeway footprint will remain the same – there are limited opportunities for expansion to address short-term or longer-term capacity needs.
- Must shift to a mobility focus as a key strategy to maximize capacity.
- ICM seeks to balance capacity and demand across multiple modes within a network.
- Can be accomplished through phased implementation, but will require capital financial investment and institutional partnerships to fully realize ICM strategies and benefits.
- ICM was identified as a regional priority and a funding priority in the MAG 2012 ITS Strategic Plan.
- Must demonstrate significant operational improvements by 2015 to position ICM investment as part of the next Regional Transportation Plan.

There is a need for a more focused investment in ICM and mobility strategies and improved operations to support active corridor management for Phoenix area freeway/arterial networks. In order for the region to be successful in ICM implementation, the individual improvements in geographical areas of the region or to existing operations of regional activities need to be completed. There are existing freeway and arterial infrastructure and systems capabilities in the Phoenix metro region and ICM will leverage and enhance those capabilities to more proactively manage traffic, particularly during major freeway closures. A phased approach to implementing ICM is needed and will identify near-term and longer term operational improvements toward an ultimate vision of ICM in and for the Phoenix metro region.

4. BACKGROUND ON ICM AND ICM CONCEPTS IN THE MAG REGION

Federal ICM Programs

The USDOT selected eight "Pioneer Sites" to act as critical partners in the development, deployment and evaluation of ICM strategies designed to help manage congestion in some of the nation's busiest urban corridors as part of its 7 year ICM Initiative. The table below provides a snapshot of the eight USDOT ICM Pioneer Sites and the existing infrastructure assets they have to integrated on some level through their ICM program.

Pioneer Site Location	Corridor Assets to Be Integrated with ICM													
	HOV	Freeway	Arterial	Bus	Rail	Tolling	Value Pricing	Real-Time Control	Fixed Route	Express Buses	Bus Rapid Transit	Commuter Rail	Light Rail	Subway/Heavy Rail
Dallas, Texas	◆	◆	◆	◆	◆								◆	
Houston, Texas	◆	◆	◆	◆	◆	◆								
Minneapolis, Minnesota	◆	◆	◆	◆	◆					◆				
Montgomery County, Maryland	◆		◆	◆	◆						◆		◆	
Oakland, California	◆	◆	◆	◆	◆	◆							◆	
San Antonio, Texas			◆	◆	◆									
San Diego, California	◆	◆	◆	◆	◆	◆								
Seattle, Washington	◆		◆	◆	◆						◆		◆	



Preliminary measures of the Pioneer sites suggest that the benefits of ICM strategies are greatest under the worst traffic conditions due to heavy demand and/or incidents. Mode shift to transit in the presence of a major incident, travel time reductions due to faster throughput on arterial detours, and reduced congestion as a result of incidents due to advanced warning to travelers, and increased safety and reduced secondary incidents all have been benefits seen in the Pioneer sites. From these initial Pioneer sites, Dallas and San Diego were selected for more detailed ICM modeling and demonstration.

Comment [SJ1]: This is not relevant to this ICM plan

History of ICM Planning in the Phoenix Metropolitan Area

MCDOT initially developed the concept and submitted a proposal for federal funding as a Pioneer site through the USDOT ICM program. In 2007, ADOT and MAG followed this initial effort with a formal Concept of Operations proposal for ICM strategies for the I-10 corridor as part of the Congestion Management/Urban Partnership competitive grant process. The latter proposal focused on I-10 during its lane reconfiguration/reconstruction in the West Valley. Although not selected, several of the identified infrastructure elements from this proposal initiatives for I-10 and the cities of Phoenix, Goodyear, Avondale and Maricopa County have been or will be implemented, or are in the planning stages. Without significant infusion of additional federal funding, the MAG region proceeded to implement agreed that ICM would need to be implemented on an incremental basis through TIP program funding.

Current Initiatives and Projects Related to ICM in the Phoenix Metropolitan Area

Current initiatives working toward ICM in the Phoenix metropolitan area which provide basis/foundation for further investment are identified below:

- MAG region's recently adopted 2012 ITS Strategic Plan identifies ICM as a key focus area, with a target of 25% arterial ITS funding (to be programmed through the MAG TIP programming process).

- ADOT's Freeway Management System is a foundation for ICM and enhanced freeway corridor management. ADOT recognizes the disruptive influence of diverted traffic on the arterial network when incidents/events occur that restrict lanes on the freeway.
- The MAG TSOP project that is currently developing the Concept of Operations using the Dynus-T model and developing IGAs essential for implementing the Concept for traffic management during freeway closures on I-10
- Real-time data sharing through AZTech center-to-center protocol
- Connectivity supported by the MAG Regional Community Network (RCN – regional fiber network connecting transportation agencies around the Valley) ~~are initiatives that support a regional ICM program.~~
- TIM Coalition and enhanced coordination among law enforcement/public safety and law enforcement/transportation management for freeway incidents.
- ADOT freeway alternate routing program recently initiated freeway-to-freeway suggested detours to major congestion locations.
- Scottsdale/ADOT/AZDPS/MCDOT Loop 101 ICM is a freeway/arterial coordination and enhanced arterial management pilot project to manage diverted freeway traffic during incidents on L101 in North East valley.
- MAG Dynus-T modeling tool and capability to test operational strategies on I-10 and other corridors through lane restrictions.
- Adaptive signal control systems planned to be tested across jurisdictional boundaries, beginning with Bell Road. This demonstrates partnerships among agencies to examine adaptive traffic control across jurisdictional boundaries, with multiple traffic control systems, and freeway interfaces (L101, I-17, SR51).
- Almost half of the proposed ITS projects in the region for TIP funding 2015-2017 influence/enhance the corridor areas in this action plan.

These local initiatives highlight that and the region is well-poised to benefit greatly from additional funding to support focused ICM projects along specific corridors. Ultimately, these strategies will have a measurable impact on Valley travelers in improving safety and reducing delay as a result of significant congestion or a major freeway closure.

5. RECOMMENDED ICM STRATEGIES

REGIONAL

There are a number of regional systems and programs in the Phoenix metropolitan area that if enhanced in very specific ways could support a regional ICM program while at the same time having measurable impacts to specific corridors. The following table describes the regional strategies that are recommended for inclusion in the near-term action plan:

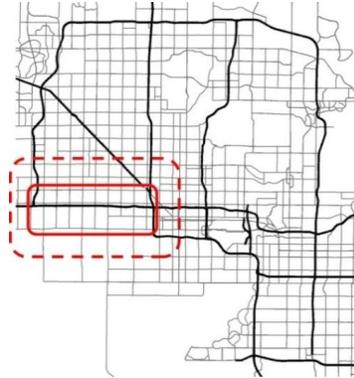
AGENCY	INFRASTRUCTURE STRATEGIES	COST CONSIDERATION	HIGH-LEVEL COSTS
ADOT	1. FMS ongoing operations and maintenance	1. Ongoing maintenance	1. \$100,000/year
DPS	2. Fatal team equipment upgrade	2. Equipment upgrade	2. \$70,000
MCDOT	3. Regional broadcast system (HAR or other radio system)	3. Regional system	3. \$500,000
AGENCY	STAFF STRATEGIES	COST CONSIDERATION	HIGH-LEVEL COSTS
ADOT	4. Additional ALERT support regionwide – to include personnel, vehicles, and equipment 5. Additional TOC supervisor/operator (TE) 6. Staff training on ICM/Active Management 7. Additional PIO support 8. Additional maintenance staff	4. 1 additional person 5. 3 FTE 6. Training program 7. 1 FTE 8. 2 FTE	4. \$500,000 5. \$60,000/FTE/year 6. \$45,000 7. \$40,000/FTE/year 8. \$70,000/FTE/year
DPS	9. Staff for ADOT TOC 10. TIM/crash training 11. Additional FSP support regionwide – to include personnel, vehicles, and equipment 12. Quick Clearance Tow Incentive program	9. 3 sworn officers + 1 sergeant 10. 5 training courses for DPS unit and local PD 11. 1 additional person 12. Establish new program	9. \$450,000 (year 1) and \$425,000/year recurring 10. \$45,000/year 11. Increased funding by \$1.3M (year 1) and \$1M/year recurring 12. \$250,000/year
MCDOT	13. Additional REACT support regionwide – to include personnel, vehicles, and equipment 14. Maintenance contract to support individual agency infrastructure (telecommunications/networking) 15. Additional TMC staff	13. 3 teams of 2 people each = 6 total people 14. Maintenance contract 15. 2 FTE	13. REACT Truck: \$70,000/truck includes DMS and communications equipment REACT Technician Full Time Position Salary: \$25.00/hr Full time and part-time Overtime: \$36.00/hr (Daytime team - estimated overtime @ 2 hrs per week per full time team member and 8 hours per week part-time) Part-time standby per week: \$2.00/hour * 16 hrs per day * 7days * 2 responders 14. \$500,000/year 15. \$60,000/FTE/year 16. \$200,000/license
Phoenix	16. Event Management Module add-on to existing central control system (purchase of additional modules to support event/incident management – two needed, ADOT and Phoenix)	16. TranSuite Event Management Module (2 licenses)	16. \$200,000/license
AGENCY	SYSTEMS STRATEGIES	COST CONSIDERATION	HIGH-LEVEL COSTS
ADOT	17. Automate alternate route plan 18. Enhanced traveler information (media relationships, private sector partnerships, etc.) 19. HCRS link to Blue Staking system for local system permitting access – individual access to individual agency systems	17. System upgrade 18. Enhanced traveler information services 19. Automate link to Blue Stake system	17. \$50,000 18. \$100,000 19. \$50,000
DPS	20. Access to VDS from vehicles	20. No cost	20. \$0
MCDOT	21. Enhance RADS for additional data collection / dissemination, includes enhanced AOI system for any public agency representative to access and use 22. Enhance VDS for viewing ADOT, MCDOT and all arterial agency streaming video 23. Expand Traffic.com data agreement	21. RADS upgrade 22. VDS upgrade 23. Extend existing contract to 5 years	21. \$300,000/year 1 and \$50,000/year thereafter to support RADS enhancements for travel time and arterials 22. \$150,000/year 1 and \$10,000/year thereafter 23. \$200,000
TOTAL REGIONAL COST:			\$19,000,000

Comment [SJ2]: It must be clearly stated somewhere in this Plan whether these funds for TMC staffing will be an on-going annual cost to be funded by MAG for the duration of the RTP beyond the 5-yrs estimated

Comment [SJ3]: It must be clearly stated somewhere in this Plan whether these funds for TMC staffing will be an on-going annual cost to be funded by MAG for the duration of the RTP beyond the 5-yrs estimated

I-10 WEST

Several freeway corridors could benefit from ICM strategy implementation, but I-10 provides the most significant near-term opportunity to realize benefits of ICM by 2015. There will be some ICM operational pilots occurring on Loop 101 with a Scottsdale/ADOT/AZDPS/MCDOT partnership and these will assist in determining some key infrastructure and operational needs for I-10. This corridor is regularly heavily congested being a primary interstate truck route as well as the only access to Phoenix and other areas of the metro area for those living in the West and South West Valley.



Capabilities along the corridor include:

- Full FMS capabilities including CCTV cameras every mile, DMS every three miles, mainline detection every half mile at ramp locations, ramp metering activated by time of day, and fiber communications on both sides of freeway.
- Phoenix TMC has direct communication connection to their signals adjacent to ADOT's freeway interchange signals in their jurisdiction.
- Arterial signals wirelessly connected to Phoenix TMC and Avondale TMC with locally defined signal timing plans.
- Avondale controls traffic signals in Tolleson jurisdiction. Avondale only maintains traffic signals within the City of Tolleson. Control of these signals remains with the City of Tolleson. Tolleson is currently modifying traffic signals along 99th Avenue between Buckeye Road (MC85) and I-10 to provide synchronization specific to peak AM and PM traffic flows.
- Phoenix traffic signal project will develop pre-set detour traffic signal timing capabilities along parallel corridors to I-10 north and south of freeway.
- Some CCTV surveillance of arterial intersections.
- No arterial traveler information signs or systems to support corridor.

Characteristics of freeway and arterials in corridor to consider for ICM implementation:

- Multiple east-west parallel arterial routes to I-10.
- Wide shoulder/median space.
- Arterial system crosses four jurisdictions – Maricopa County, City of Phoenix, City of Avondale, City of Tolleson.
- Most arterial parallel routes have multiple lanes in each direction.
- MC-85 is in an area of influence corridor and can be used for detouring traffic.
- Limited east/west freeway alternates (particularly in the west valley) – requires focus on balancing heavy demand and alternate routing to arterial network.
- Tolleson downtown redevelopment involving the Van Buren Complete Street between 99th Avenue and 83rd Avenue in Tolleson limits that corridor from being used in that segment in ICM planning – plan for Buckeye Road only in that area to be used instead.
- Future Loop 202 alignment crosses corridor.
- Future light rail expansion plans in corridor.

Existing traffic characteristics along corridor:

- Incidents on I-10 that cause lane restrictions or closures significantly impact traffic throughput and safety, and can overwhelm adjacent arterials.
- Heavily traveled freeway segment in the metro area.
- Prone to recurring congestion during peak travel hours.

Comment [S14]: Input from Paul Gilmore, City Engineer for Tolleson

Comment [S15]: Input from Paul Gilmore, City Engineer for Tolleson

- Heavy long-haul truck traffic along entire corridor.
- Important gateway for freight/goods movement.
- Key link within the region – west valley, downtown, airport, east valley.

With ICM implemented along this corridor, FMS will have the capability to inform travelers of incidents and provide alternate options for other freeways; however, traffic will likely divert to adjacent arterials. Arterial management agencies will be able to monitor conditions in real-time through detection and surveillance, will have pre-set signal timing plans to implement, and traffic will be routed off the freeway through ADOT off ramp signals and the adjacent parallel arterial network until they can be put back on the freeway. Strategies for notifying motorists of detour routes will include blank-out signs at strategic intersections as well as REACT support on identified arterial diversion routes. Signal management strategies will enable ADOT, MCDOT and/or city traffic management center operators to adjust timing to better accommodate the heavy volumes. Agencies will be exploring shared operations strategies to allow for system management and coverage beyond business hours; Maricopa County DOT and the cities of Phoenix and Avondale will develop concepts and strategies to allow for implementing coordinated arterial management strategies and joint implementation for multi-jurisdictional corridors. Agreements will facilitate multi-agency signal operations strategies. Arterial strategies will need to take into account restrictions on Van Buren, as well as coordination with Tolleson signals, which are not currently linked to a central traffic signal management system.

Enhanced public safety coordination between DPS, local law enforcement agencies, and support teams (such as ALERT, REACT, and FSP) will facilitate coordinated response and management of the incident and subsequent congestion. AZDPS officers at the ADOT TOC will be able to provide a direct link between field response and TOC operations. Having AZDPS and ADOT operators co-located allows for direct face-to-face communications between decision makers that have the ability to see beyond the immediate incident area. This allows for improved operations and decision making of both AZDPS and ADOT field staff. Operational process for arterials will be elevated in order to provide this type of real-time active management and coordinated of freeway traffic onto arterial routes. Key decisions will need to be made on specific diversion/response plans and operational procedures will need to support implementation of pre-set as well as quick action responses. Advanced notification of lane restrictions will be important to provide to travelers outside of specific corridor limits and within the corridor influence area that may provide freeway-to-freeway alternate options such as Loop 101 or I-17 to bypass I-10 congestion. Notifications will be issued to key arterial management agencies, transit operations and media, some of which is already occurring today.

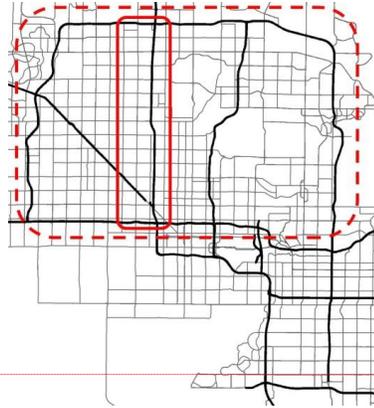
The following table describes the I-10 West focused strategies that are recommended for inclusion in the near-term action plan:

AREA	LIMITS	JUSTIFICATION	SHORT TERM ACTIVITIES/FUNCTIONS
CORRIDOR	Along: <ul style="list-style-type: none"> I-10 (Papago) From: <ul style="list-style-type: none"> Loop 101 (Agua Fria) To: <ul style="list-style-type: none"> I-17 (Black Canyon) 	Only arterial detours available within corridor limits	<ul style="list-style-type: none"> Traffic signal connectivity Signal control sharing Detour (pre-set) timing plans FMS build-out and wireless connectivity Arterial surveillance and routing capability
INFLUENCE	<ul style="list-style-type: none"> McDowell Road Thomas Road Indian School Road Van Buren Street Buckeye Road Lower Buckeye Road 	Traffic could potentially be detoured through arterial network	<ul style="list-style-type: none"> TMC control and staffing to support VDS enhancement AOI enhancement Cam Cam access maintenance Support team enhancement (REACT, FSP, ALERT) (if desired) Additional enhancements to TMC designated to be central backup to all TMCs – system links and control capability as well as staffing to support
AGENCY	INFRASTRUCTURE STRATEGIES	COST CONSIDERATION	HIGH-LEVEL COSTS
ADOT	<ol style="list-style-type: none"> 1. Replace DMS older than 10 years 2. Add confidence cameras at each DMS location 3. Replace CCTV (10+ years) 4. Wireless connection to all signals at interchanges and ramps 5. Upgrade detection 	<ol style="list-style-type: none"> 1. 2 DMS 2. 6 DMS 3. 9 CCTV 4. 10 signals 5. 10 detector locations 	<ol style="list-style-type: none"> 1. \$150,000 per location 2. \$2,000 per location 3. \$10,000 per location 4. \$2,000 per location 5. \$5,000 per location
DPS	<ol style="list-style-type: none"> 6. Provide Dispatch radio to Phoenix TMC 	<ol style="list-style-type: none"> 6. 1 Dispatch radio 	<ol style="list-style-type: none"> 6. \$500 per radio
Phoenix	<ol style="list-style-type: none"> 7. Signal connections, visual coverage, detour infrastructure (all six routes for signals, McDowell, and Van Buren for CCTV and signs) 8. Upgrade detection 	<ol style="list-style-type: none"> 7. 95 signals 100 cameras 360 blank out signs 8. 95 intersections 	<ol style="list-style-type: none"> 7. \$0 \$6,000 per CCTV location \$5,000 per sign location 8. \$20,000 per intersection
Avondale	<ol style="list-style-type: none"> 9. Signal connections, visual coverage 10. Upgrade detection 	<ol style="list-style-type: none"> 9. 20 signals 20 cameras 10. 20 intersections 	<ol style="list-style-type: none"> 9. \$0 \$6,000 per CCTV location 10. \$20,000 per intersection
AGENCY	STAFF STRATEGIES	COST CONSIDERATION	HIGH-LEVEL COSTS
Phoenix	<ol style="list-style-type: none"> 11. Additional TMC staff 	<ol style="list-style-type: none"> 11. None 	<ol style="list-style-type: none"> 11. \$0 – as will be defined by COP ITS Strategic Plan – most likely reallocation of resources
Avondale	<ol style="list-style-type: none"> 12. TMC staff 	<ol style="list-style-type: none"> 12. 1 FTE 	<ol style="list-style-type: none"> 12. \$60,000/FTE/year
AGENCY	SYSTEMS STRATEGIES	COST CONSIDERATION	HIGH-LEVEL COSTS
ADOT	<ol style="list-style-type: none"> 13. Active distribution list for CAD alerts to local agencies transportation, public safety, and transit dispatch 14. Maintain Cam Cam – uptime prioritized 	<ol style="list-style-type: none"> 13. No cost 14. No cost 	<ol style="list-style-type: none"> 13. \$0 14. \$0
Phoenix	<ol style="list-style-type: none"> 15. Link to ADOT to allow control of signal system 16. Detour timing plans to select from along each corridor 17. Provide link to transit dispatch to view arterial CCTV 18. Create and maintain local AOI subscription 19. Identify and provide access to two ADOT fiber strands for COP use on Loop 101 (from I-10 to 31st Ave) and on I-10 from 101 to Pecos Rd/202 	<ol style="list-style-type: none"> 15. No cost 16. No cost (currently under contract) 17. No cost 18. No cost 19. Cost of conduit and minor fiber 	<ol style="list-style-type: none"> 15. \$0 16. \$0 17. \$0 18. \$0 19. \$100,000

AGENCY	SYSTEMS STRATEGIES	COST CONSIDERATION	HIGH-LEVEL COSTS
Avondale	20. Link to MCDOT to allow control of signal system 21. Detour timing plans to select from along each corridor 22. Provide link to transit dispatch to view arterial CCTV 23. Create and maintain local AOI subscription	20. No cost 21. 2 corridors timing plans – 12 intersections total 22. No cost 23. No cost	20. \$0 21. \$5,000 per signalized intersection for timing plans – full process 22. \$0 23. \$0
AGENCY	AGREEMENTS/ROLES/RESPONSIBILITIES STRATEGIES	COST CONSIDERATION	HIGH-LEVEL COSTS
ADOT	24. Take signal control of ramp interchanges during incidents after City TMC hours 25. Identify local alternates that could be posted on ADOT DMS 26. SOP for TOC operators to utilize distribution lists 27. SOP for TOC operators to post alternates on DMS	24. No cost 25. No cost 26. No cost 27. No cost	24. \$0 25. \$0 26. \$0 27. \$0
DPS	28. Connection with REACT to support	28. No cost	28. \$0
MCDOT	29. Signal control operation of arterials after City TMC hours 30. Local public safety connection with REACT to support	29. No cost 30. No cost	29. \$0 30. \$0
Phoenix	31. COP to control ADOT freeway interchange signalized intersections during non-incident hours and during incidents while COP TMC is operational 32. Identify local alternates that could be posted on ADOT DMS 33. SOP for TMC operators to allow alternates to be posted on ADOT DMS (if allowed) 34. SOP for TMC operators to choose detour plans	31. Permissions and connection (minor to no cost) 32. No cost 33. No cost 34. No cost	31. \$0 32. \$0 33. \$0 34. \$0
Avondale	35. Identify local alternates that could be posted on ADOT DMS	35. No cost	35. \$0
TOTAL I-10 WEST COST:			\$5,750,000

I-17 CORRIDOR

This corridor is a heavily congested truck route from the northern Arizona as well as a primary inner-city Phoenix access path for Valley travelers. Lane closures in this segment of freeway cause major delays and the main freeway-to-freeway detour paths may not be convenient for all travelers, although there are many parallel arterial routes available along this corridor.



Capabilities along the corridor include:

- Full FMS capabilities including CCTV cameras every mile, DMS every three miles, **mainline detection every half mile at ramp locations**, ramp metering activated by time of day, and fiber communications on both sides of freeway.
- Phoenix TMC has direct communications connection to their signals adjacent to ADOT's freeway interchange signals.
- Arterial signals wirelessly connected to Phoenix TMC with locally defined signal timing plans.
- Some CCTV surveillance of arterial intersections in southern area of corridor.
- No arterial traveler information signs or systems to support corridor.

Comment [SJ6]: FMS mainline detection is at one-mile spacing. What does this half mile spacing adjacent to ramps refer to?

Characteristics of freeway and arterials in corridor to consider for ICM implementation:

- ~~Adjacent land uses limit expansion of travel lanes.~~
- Frontage road parallel to and on both sides of I-17.
- Multiple north-south parallel arterial routes to I-17.
- Short on-ramp queuing space onto I-17.
- SR51 could provide an alternate for some travelers.
- Very little shoulder/median space along I-17 in certain segments.
- Arterial system is entirely contained within one jurisdiction – City of Phoenix.
- Multiple arterial parallel routes with multiple lanes in each direction.
- US-60 (Grand Avenue) has traffic signal synchronization and can be utilized to route traffic.
- Freeway-to-freeway rerouting a potential option for traffic, although may only be used by long-haul traffic rather than local traffic.

Comment [SJ7]: Not an ICM strategy

Existing traffic characteristics along corridor:

- Heavy congestion in southern half of corridor generally southbound in AM peak and northbound in PM peak.
- Heavy long-haul truck traffic along entire corridor.
- Bell Road, McDowell Road, in particular, as well as other major East-West major arterials that cross the I-17 corridor have heavy east-west arterial traffic in peak periods.

With ICM implemented along this corridor, FMS will have the capability to inform travelers of incidents and provide alternate options for using arterials. Arterial management agencies will be able to monitor conditions in real-time through detection and surveillance, will have pre-set signal timing plans to implement, and traffic will be routed off the freeway through ADOT off ramp signals and the adjacent parallel arterial network until they can be put back on the freeway. Enhanced public safety coordination between DPS, local law enforcement, and support teams (such as ALERT, REACT, and FSP) will facilitate coordinated response and management of the incident and subsequent congestion. Operational procedures will need to be developed in order to handle the frontage roads because those could cause major backups back onto freeway via off-ramps. Operational process for arterials will be elevated in order

to provide this type of real-time active management and coordinated of freeway traffic onto arterial routes. Strategies for notifying motorists of detour routes will include blank-out signs at strategic intersections as well as REACT support on identified arterial diversion routes. Signal management strategies will enable ADOT, MCDOT and/or city traffic management center operators to adjust timing to better accommodate the heavy volumes. Agencies will be exploring shared operations strategies to allow for system management and coverage beyond business hours; Maricopa County DOT and City of Phoenix will develop concepts and strategies to allow for implementing coordinated arterial management strategies and joint implementation for multi-jurisdictional corridors.

Restrictions to proposed detour routes are a consideration for this corridor as there are Light Rail construction activities and future operations on segments of 19th Avenue and current operations crossing 7th Avenue and along a major portion of Central Avenue. Both 7th Avenue and Central Avenue are not continuous north of Peoria Avenue. Detouring will need to incorporate segmented sections of arterials based on the location of the incident and the characteristics of the adjacent parallel routes. Key decisions will need to be made on specific diversion/response plans and operational procedures will need to support implementation of pre-set as well as quick action responses. Advanced notification of lane restrictions will be important for travelers en-route toward I-17 Valley wide within and outside of Loop 101, as far West as Goodyear and as far East as Mesa.

The following table describes the I-17 focused strategies that are recommended for inclusion in the near-term action plan:

AREA	LIMITS	JUSTIFICATION	SHORT TERM ACTIVITIES/FUNCTIONS
CORRIDOR	Along: <ul style="list-style-type: none"> I-17 (Black Canyon) From: <ul style="list-style-type: none"> I-10 (Papago) To: <ul style="list-style-type: none"> Loop 101 (Agua Fria/Pima Transition) Loop 101 (Agua Fria) 	Only arterial detours available within corridor limits	<ul style="list-style-type: none"> Traffic signal connectivity Signal control sharing Detour (pre-set) timing plans FMS build-out and wireless connectivity Arterial surveillance and routing capability TMC control and staffing to support VDS enhancement AOI enhancement Cam Cam access maintenance Support team enhancement (REACT, FSP, ALERT) (if desired) Additional enhancements to TMC designated to be central backup to all TMCs – system links and control capability as well as staffing to support
INFLUENCE	<ul style="list-style-type: none"> Loop 101 (Pima) I-10 (Papago) SR-51 (Piestewa) US-60 Bell Road McDowell Road 43rd Avenue 35th Avenue 19th Avenue 7th Avenue 	Traffic could potentially be detoured around Loop 101 system to bypass I-17 closures	
AGENCY	INFRASTRUCTURE STRATEGIES	COST CONSIDERATION	HIGH-LEVEL COSTS
ADOT	<ol style="list-style-type: none"> Replace DMS older than 10 years Add confidence cameras at each DMS location Replace CCTV TOC communication to all ADOT signals at interchanges and ramps Upgrade detection 	<ol style="list-style-type: none"> 4 DMS 7 DMS 2 CCTV 14 signals 14 detector locations 	<ol style="list-style-type: none"> \$150,000 per location \$2,000 per location \$10,000 per location \$2,000 per location \$5,000 per location
DPS	<ol style="list-style-type: none"> Provide Dispatch radio to Phoenix TMC 	<ol style="list-style-type: none"> 1 Dispatch radio 	<ol style="list-style-type: none"> \$500 per radio
Phoenix	<ol style="list-style-type: none"> Signal connections, visual coverage, detour infrastructure (43rd Ave, 35th Ave, 19th Ave, 7th Ave) Upgrade Detection 	<ol style="list-style-type: none"> 120 signals 45 cameras 400 blank out signs 120 intersections 	<ol style="list-style-type: none"> \$0 \$6,000 per CCTV location \$5,000 per sign location \$20,000 per intersection

Comment [SJ8]: Replacement of FMS devices at end of life cycle is currently funded. Justification will be required for any additional expenses.

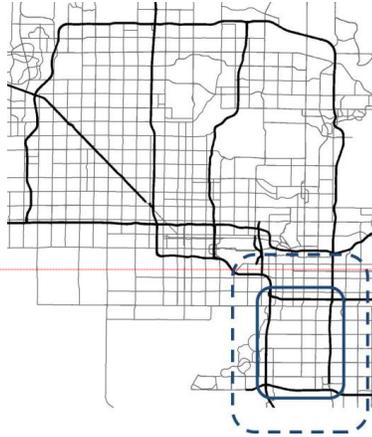
AGENCY	STAFF STRATEGIES	COST CONSIDERATION	HIGH-LEVEL COSTS
Phoenix	9. Additional TMC staff	9. None	9. \$0 – as will be defined by COP ITS Strategic Plan – most likely reallocation of resources
AGENCY	SYSTEMS STRATEGIES	COST CONSIDERATION	HIGH-LEVEL COSTS
ADOT	10. Active distribution list for CAD alerts to local agencies transportation, public safety, and transit dispatch 11. Maintain Cam Cam – uptime prioritized	10. No cost 11. No cost	10. \$0 11. \$0
Phoenix	12. Link to MCDOT to allow control of signal system 13. Detour timing plans to select from along each corridor 14. Provide link to transit dispatch to view arterial CCTV 15. Create and maintain local AOI subscription	12. No cost 13. 3 corridors timing plans – 120 signals 14. No cost 15. No cost	12. \$0 13. \$5,000 per signalized intersection for timing plans – for detour and other progressed signal timing plans 14. \$0 15. \$0
AGENCY	AGREEMENTS/ROLES/RESPONSIBILITIES STRATEGIES	COST CONSIDERATION	HIGH-LEVEL COSTS
ADOT	16. Take signal control of ramp interchanges during incidents after City TMC hours 17. Identify local alternates that could be posted on ADOT DMS 18. SOP for TOC operators to utilize distribution lists 19. SOP for TOC operators to post alternates on DMS	16. No cost 17. No cost 18. No cost 19. No cost	16. \$0 17. \$0 18. \$0 19. \$0
DPS	20. Connection with REACT to support	20. No cost	20. \$0
MCDOT	21. Signal control operation of arterials after City TMC hours 22. Local public safety connection with REACT to support	21. No cost 22. No cost	21. \$0 22. \$0
Phoenix	23. COP to control ADOT freeway interchange signalized intersections during non-incident hours and during incidents while COP TMC is operational 24. Identify local alternates that could be posted on ADOT DMS 25. SOP for TMC operators to allow alternates to be posted on ADOT DMS and SOP for TMC operators to choose detour plans	23. Permissions & connection (minor to no cost) 24. No cost 25. Consultant assistance for SOP development	23. \$0 24. \$0 25. \$200,000 Consultant assistance to develop SOP's for both ADOT and COP use
TOTAL I-17 CORRIDOR COST:			\$6,200,000

I-10 EAST AND LOOP 101 SOUTH

This East Valley corridor area is positioned appropriately for ICM implementation with parallel arterials and freeway-to-freeway detour options.

Capabilities along the corridor include:

- Full FMS capabilities along all freeways in corridor area including CCTV cameras every mile, DMS every three miles, **mainline detection every half mile at ramp** locations, ramp metering activated by time of day, and fiber communications on at least one side of each freeway.
- **Tempe TMC has direct fiber connection to freeway interchange signals that are part of the Tempe arterial signal system.**
- Arterial signals wirelessly connected to Tempe TMC and Chandler TMC in their respective jurisdictions with locally defined signal timing plans.
- Some existing CCTV surveillance of arterial intersections – future plans for additional surveillance in corridor influence area. Video monitoring cameras are viewable from the local TMCs to provide some surveillance of the arterial network.
- Some arterial traveler information signs/systems to support corridor including Bluetooth devices to support arterial traveler information and DMS strategically placed to support travel on Loop 101 and I-10 northbound.



Comment [SJ9]: See previous comment on mainline detection

Characteristics of freeway and arterials in corridor to consider for ICM implementation:

- Multiple east-west and north-south arterial routes to all freeways.
- Arterial system crosses three jurisdictions – Cities of Phoenix, Tempe and Chandler.
- Most arterial routes have multiple lanes in each direction.
- Some arterial routes are not contiguous – detour routes through those areas may need to avoid certain arterial segments in both jurisdictions.
- Freeway-to-freeway rerouting should be a primary strategy due to proximity of multiple freeways in corridor.

Existing traffic characteristics along corridor:

- Heavy congestion on I-10 and Loop 101 northbound in AM peak and southbound in PM peak.
- Heavy long-haul truck traffic along I-10.
- Incidents along US-60 have devastating impacts to traffic in East Valley.

With ICM implemented along this corridor, FMS will have the capability to inform travelers of incidents and provide alternate options for using arterials. Arterial management agencies will be able to monitor conditions in real-time through detection and surveillance, will have pre-set signal timing plans to implement, and traffic will be routed off the freeway through ADOT off ramp signals and through the adjacent arterial network until they can be put back on the freeway. Enhanced public safety coordination between DPS, local law enforcement, and support teams (such as ALERT, REACT, and FSP) will facilitate coordinated response and management of the incident and subsequent congestion. Operational process for arterials will be elevated in order to provide this type of real-time active management and coordinated of freeway traffic onto arterial routes.

Restrictions to proposed detour routes are a consideration for this corridor as 48th Street, Priest Drive, and others are not continuous in the corridor area. Detouring will need to incorporate segmented sections of

arterials based on the location of the incident and the characteristics of the adjacent parallel routes. Key decisions will need to be made on specific diversion/response plans and operational procedures will need to support implementation of pre-set as well as quick action responses. Advanced notification of lane restrictions will be important to provide coming from all directions on I-10 and I-17 for long-haul traveler route impacts.

The following table describes the East Valley freeway focused strategies that are recommended for inclusion in the near-term action plan:

AREA	LIMITS	JUSTIFICATION	SHORT TERM ACTIVITIES/FUNCTIONS
CORRIDOR	Along: <ul style="list-style-type: none"> I-10 (Papago) Loop 101 (Price) From: <ul style="list-style-type: none"> US-60 (Superstition) / I-10 (Papago) To: <ul style="list-style-type: none"> Loop 202 (Santan) / Loop 101 (Price) 	Freeway-to-freeway detours accessible in this corridor and parallel arterial routes available	<ul style="list-style-type: none"> Traffic signal connectivity Signal control sharing Detour (pre-set) timing plans FMS build-out and wireless connectivity Arterial surveillance and routing capability TMC control and staffing to support VDS enhancement
INFLUENCE	<ul style="list-style-type: none"> Broadway Road Southern Avenue Baseline Road Elliott Road Warner Road Ray Road Queen Creek Road 48th Street Short Segments of Priest / Kyrene Rural Road McClintock Road Dobson Road Alma School Road SR-87 	Traffic could potentially be detoured around freeway system or along parallel arterials to bypass freeway closures anywhere within corridor limits	<ul style="list-style-type: none"> AOI enhancement Cam Cam access maintenance Support team enhancement (REACT, FSP, ALERT) (if desired) Additional enhancements to TMC designated to be central backup to all TMCs – system links and control capability as well as staffing to support
AGENCY	INFRASTRUCTURE STRATEGIES	COST CONSIDERATION	HIGH-LEVEL COSTS
ADOT	1. FMS enhancements in area – upgrade CCTV, ramp meter connections, connection to traffic signals	1. FMS enhancements	1. \$200,000
DPS	2. Provide Dispatch radio to Tempe TMC and Chandler TMC	2. 2 Dispatch radios	2. \$500 per radio
Tempe	3. Signal connections, signal synchro, visual coverage, detour infrastructure	3. 50 wireless connections to ITS infrastructure 20 CCTV	3. \$2,000 per location \$6,000 per CCTV location
Chandler	4. Minor upgrades to corridor infrastructure	4. No cost	4. \$0
AGENCY	STAFF STRATEGIES	COST CONSIDERATION	HIGH-LEVEL COSTS
Tempe	5. Additional TMC staff	5. 1 FTE	5. \$70,000/FTE/year
AGENCY	SYSTEMS STRATEGIES	COST CONSIDERATION	HIGH-LEVEL COSTS
ADOT	6. Active distribution list for CAD alerts to local agencies transportation, public safety, and transit dispatch 7. Maintain Cam Cam – uptime prioritized	6. No cost 7. No cost	6. \$0 7. \$0
Tempe	8. Link to MCDOT to allow control of signal system (if allowed) 9. Detour timing plans to select from along each corridor 10. Provide link to transit dispatch to view arterial CCTV 11. Create and maintain local AOI subscription	8. No cost 9. 8 corridors timing plans – 40 signals total 10. No cost 11. No cost	8. \$0 9. \$5,000 per signalized intersection for timing plans – full process 10. \$0 11. \$0

Comment [SJ10]: Exists now

Comment [SJ11]: FMS on these freeway segments is fully funded and mostly in place except for L202 Santan. Wireless connectivity needs to be defined for what purpose.

Comment [SJ12]: Needs to be defined for what function/purpose

Comment [SJ13]: It must be clearly stated somewhere in this Plan whether these funds for TMC staffing will be an on-going annual cost to be funded by MAG for the duration of the RTP beyond the 5-yr's estimated

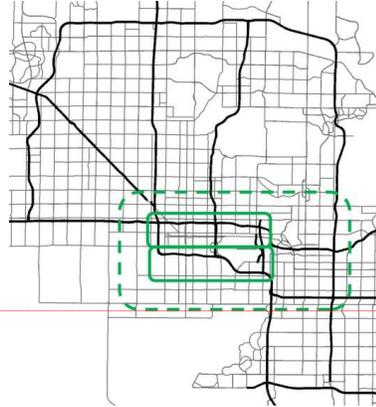
AGENCY	SYSTEMS STRATEGIES	COST CONSIDERATION	HIGH-LEVEL COSTS
Chandler	12. Detour timing plans to select from along each corridor 13. Provide link to transit dispatch to view arterial CCTV 14. Create and maintain local AOI subscription	12. 6 corridors timing plans – 20 signals total 13. No cost 14. No cost	12. \$0 13. \$5,000 per signalized intersection for timing plans – full process 14. \$0
AGENCY	AGREEMENTS/ROLES/RESPONSIBILITIES STRATEGIES	COST CONSIDERATION	HIGH-LEVEL COSTS
ADOT	15. Take signal control of ramp interchanges during incidents after City TMC hours 16. Identify local alternates that could be posted on ADOT DMS 17. SOP for TOC operators to utilize distribution lists 18. SOP for TOC operators to post alternates on DMS	15. No cost 16. No cost 17. No cost 18. No cost	15. \$0 16. \$0 17. \$0 18. \$0
DPS	19. Connection with REACT to support	19. No cost	19. \$0
MCDOT	20. Signal control operation of arterials after City TMC hours 21. Local public safety connection with REACT to support	20. No cost 21. No cost	20. \$0 21. \$0
Tempe	22. ADOT signal control operation of arterials after hours 23. Take signal control of ramp interchanges during incidents 24. Identify local alternates that could be posted on ADOT DMS 25. SOP for TMC operators to allow alternates to be posted on ADOT DMS (if allowed) 26. SOP for TMC operators to choose detour plans	22. RCN permissions connection 23. Minor communication upgrades 24. No cost 25. No cost 26. No cost	22. \$0 23. \$0 24. \$0 25. \$0 26. \$0
Chandler	27. Identify local alternates that could be posted on ADOT DMS (if allowed)	27. No cost	27. \$0
TOTAL I-10 EAST AND LOOP 101 SOUTH COST:			\$800,000

CENTRAL CORRIDORS

The Central Corridors area of the metropolitan region is an important gateway to be considered, however there are additional challenges associated with this segment of the freeway network due to the complexity of traffic patterns in the AM and PM peak periods.

Capabilities along the corridor include:

- Full FMS capabilities along all freeways in corridor area including CCTV cameras every mile, DMS every three miles, **mainline detection every half mile at ramp** locations, ramp metering activated by time of day, and fiber communications on at least one side of each freeway.



Comment [SJ14]: See previous comment

Characteristics of freeway and arterials in corridor to consider for ICM implementation:

- Multiple east-west and north-south arterial routes to all freeways – although not all are potential detour routes due to Phoenix downtown district area.
- Freeway-to-freeway rerouting should be a primary strategy due to proximity of multiple freeways in corridor.
- Separate corridor strategies should be identified in this area for I-10/Loop 202 and I-17/I-10 due to the complexity of detouring and specific capabilities based on where an incident occurs in the area.

Existing traffic characteristics along corridor:

- Heavy congestion in central corridor area in AM peak and southbound in PM peak.
- Heavy long-haul truck traffic along I-10 and I-17 and local traffic along Loop 202 and US-60.
- Incidents in this corridor area have devastating impacts to Valley traffic.

With ICM implemented along this corridor, FMS will have the capability to inform travelers of **freeway incidents** and provide alternate options for using alternate freeways in the area **as the arterials in the area are not yet viable options for detours. Arterial options are limited to corridors outside of freeway areas – arterial options within downtown Phoenix districts are not recommended.** 19th Avenue and 16th Street are key priorities for this corridor. Enhanced public safety coordination between DPS, and support teams (such as ALERT, REACT, and FSP) will facilitate coordinated response and management of the incident and subsequent congestion. AZDPS officers at the TOC will provide a direct link to responders in the field. Having AZDPS and ADOT operators co-located allows for direct face-to-face communications between decision makers that have the ability to see beyond the immediate incident area. This allows for coordinated management level control of both AZDPS and ADOT field staff. Regional enhancements outlined in the beginning of this action plan identify services such as ALERT, REACT, FSP, and other support teams, as well as towing incentive programs, will immediately impact this central corridors section. Incidents that occur in this corridor area affect Valleywide travel because most all freeways merge into or are feed from this area.

Comment [SJ15]: The highlighted text is totally confusing. ICM is based mostly n developing effective arterial detour options.

There is no specific table identified for this Central Corridors area because the strategies identified in the regional enhancements (ADOT and AZDPS) will be the only primary ICM near-term strategies that would be recommended for this specific section the remaining strategies would be long-term enhancements beyond the scope of this document.

INCORPORATING TRANSIT IN ICM

Transit plays a vital role in ICM and some strategies need to be included. Some of the strategies that should be explored are

1. Exchange of information between transit agencies, ADOT and cities in the ICM corridors. The main objective is to get good and timely information to the transit operations department. This will assist them to come up with an action plan during a freeway incident.
2. Inform motorists about options such as Light Rail, Express Bus/RAPID (peak hours), Local bus (off- peak hours) and Carpools in addition to information on alternate routes.
3. Provide information on where the nearest Park-and-Ride is to take transit and the availability of parking.
4. Inform motorists on travel time comparisons between using the HOV lanes vs. GP (General Purpose) lanes. This may help riders choose alternate options such as carpools and buses
5. Activate Traffic Signal Priority for buses when an incident occurs.

6. IMPLEMENTATION STRATEGY

The following steps are planned for implementing ICM in this region focusing on near-term improvements by the end of 2014 ~~2018~~ and measurable results by the end of 2015:

1. A formal Concept of Operations will be developed for the four corridor areas to identify:
 - o Specific operational needs and priorities;
 - o Roles and responsibilities (and change from current operating environment);
 - o Formalize gaps and what would be needed to address (arterial ITS, additional freeway technology infrastructure, operational processes, connectivity among agencies, transit, additional TIM focus to support ICM); and
 - o Model I-10 corridor under different operating environments using MAG model which will help to further identify gaps, potential benefits, and operations under the ‘full build out’ scenario.
2. Identify evaluation needs and performance reporting requirements for ICM strategies – to be led by MAG.
3. Develop preliminary design documentation – will support design/construction of additional infrastructure, identify funding requirements for freeway and arterial. Strategies for dissemination of traveler information must include components for smartphone technology and user-defined areas of influence for data “push” of traveler information. Use of subscription like services to keep travelers informed and updated very frequently must be established.
4. Specify software operating requirements – enhancements will be needed to ADOT FMS central system software as well as arterial management signal and other ITS infrastructure systems as well as transit management integration requirements.
5. Establish process by which to initiate construction in 2014/2015.
6. Establish plan to implement necessary staffing, training and resource needs (costs, skill sets, mechanisms for how to obtain needed resources and at which agency).

The following graphic shows the key elements of ICM and the relationships with agency and infrastructure/systems anticipated as a result of implementing ICM strategies outlined in this plan:

Comment [SJ16]: Any proposed devices or applications that may interfere with the driving task to create an increased risk of crash should not be in violation of federal guidelines and policies for in-vehicle messaging.

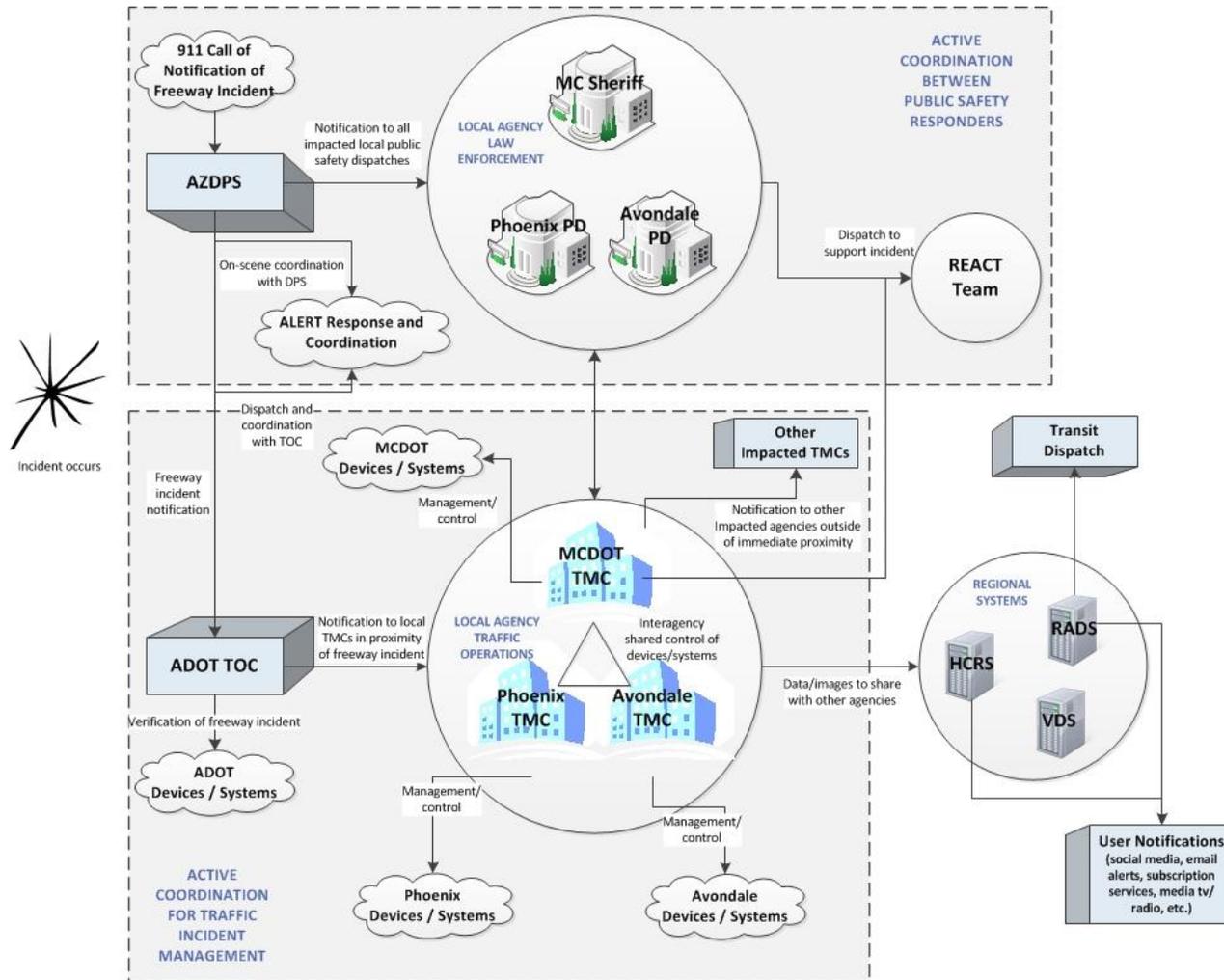


Figure: Phoenix Metro Area ICM Overview Graphic

7. IMPLEMENTATION TIMEFRAME

The partners are committed to swift implementation to initiate focused and immediate ICM operations. We recognize that within a short timeframe, strategies and tactics will focus on improved operations coordination, system enhancements, process enhancements, and infrastructure/devices that can be installed and connected with no environmental clearance requirements.

The following summarizes a proposed sequence of activities to achieve the 2015 results deadline target. Dates are shown as Calendar Year. If MAG approves this program, this sequence will be updated once more definitive timing for funding approval and authorization is available.

2013	Finalize ICM Concepts, Requirements, Infrastructure Needs and Costs, Staffing
2014 Q1-Q2	Develop Performance Monitoring Plan, baseline data collection
2014 Q1-Q2	Initiate procurement for additional incident response teams
2014 Q1-Q2	Finalize staff positions and initiate acquisition of needed staff (DPS, TOC/TMCs)
2014 Q3-Q4	Procure and install required devices for arterial corridor monitoring and connectivity
2014 Q3-Q4	Procure and install FMS upgrades
2014 Q3-Q4	Activate additional incident response teams
2014 Q3-Q4	Implement State/Local TIM Training for ICM
2014 Q3-Q4	Regional system enhancements, agency connectivity
2014 Q3-Q4	Develop arterial signal timing/operations plans
2014 Q3-Q4	Develop emergency re-route/diversions plans
2015 Q1-Q2	Finalize freeway/arterial corridor device upgrades, complete integration
2015 Q1-Q2	Finalize operational processes
2015 Q1-Q2	Staff training on new processes
2015 Q3-Q4	Implement process and initiate evaluation

8. PERFORMANCE MEASUREMENT

In order to identify success and define success, performance measurements must begin immediately so as to have actual “before” data in order to compare to “after” data to discern effects of changes whether positive or not. Measurements must be able to identify background congestion so that incident congestion can subtract out the “background” congestion in order to define that true picture of before and after for analyses to be performed to deliver meaningful data and report on successes. A performance measurement plan will include the agency roles and responsibilities in collecting, storing analyzing, and reporting on data that is applied to the final performance measures.

This section defines some methods for which to measure the performance of ICM-specific strategies applied to each of these corridors. The Performance Monitoring program will be led by MAG, and specific measures have not yet been finalized. Formal measures, as well as a formal performance measurement strategy and data strategy will be developed and carried out by MAG. Metrics are envisioned to include arterial performance, incident response and management, travel time and delay, and traveler information method uses. Some performance metrics that could be used to support ICM evaluation are already being tracked by the various response programs.

Emergency Vehicle Preemption (EVP) Study – Draft Final Scope of Work 05/01/13

Background

The goal of this study is to conduct a comprehensive review of the current Emergency Vehicle Preemption (EVP) practices, and to determine the best practices, and develop a recommended practice for the region to follow. The EVP operation at signalized intersections usually involves multiple departments within a local jurisdiction. In some instances multiple jurisdictions are involved. Technologies involved include the communications between emergency vehicles and traffic controllers, signal indications, confirmation indications and etc. The fundamental concept of intersection EVP is to implement a temporary traffic signal timing scheme that would provide a safer path to an approaching EMS vehicle. The manner in which the traffic signal timing is implemented allows for other vehicles at or near the intersection to clear the path of the EMS vehicle, preventing movements that would potentially conflict with an approaching EMS vehicle. The study will conduct a comprehensive review of the current EVP practices within the MAG region and across the country to generate relevant suggestions for improving how EVP is currently implemented in the MAG region. The study will also identify funding opportunities, technology options and improved coordination methods.

Task 1: Different Practices Related to EVP

Review and identify current practices related to EVP among different MAG member agencies in terms of definition of emergency vehicles, funding source, the roles of different departments within one jurisdiction, related laws/regulations and etc. The information to be collected should include the following:

Hardware

Brand of EVP (GTT, Tomar, other)

Is Coding used or not

Do they use a confirmation indication ("F" head, strobe, other)

Operations

Which departments are permitted to use EVP (fire, ambulance, PD, or transit) ? Is it considered a high, or low level priority?

What is the signal display (solid green in both directions, solid green in one direction only, green ball with left turn arrow) ?

Does the EVP operation cut off pedestrian walk signal phase?

Is EVP set to shut off after applying the hand brake of the emergency vehicle?

Who maintains which part of the EMS equipment related to EVP?

What is the estimated (or actual observed) number of actuations, durations, etc. If so, provide date ?

Financial

Which department within the local agency pays for emitter, receiver, discriminator card (this part

is for info only, as each jurisdiction can decide for themselves who pays for what.)

Task 2: Challenges and Shortcomings

Identify challenges and shortcomings related to operating EVP among jurisdictions within the region. This will include concerns by emergency vehicle operators, traffic management personnel and other road users.

Task 3: Summary of Current EVP Technologies

Technologies have involved over the years, so has EVP. This summary will provide information on new technologies in EVP operations and may help address some of the challenges agencies are facing. This task will also include a summary of the advantages/benefits and disadvantages/costs of moving to new technologies from the current EVP systems. The primary purpose of this summary would be to inform local agencies that may be purchasing their first EVP system or those with systems at the end of their life cycle, on the benefits and costs (both capital and maintenance) associated with different EVP systems.

Task 4: EVP Best Practices

This task will summarize some of the best practices, EVP policies, coordination efforts, and operation strategies, technologies within the region and across the country. It should include the analysis of the practices in terms of benefits in safety, mobility and others. This will also identify the best practices in managing liability and risk to agencies. This task will also explore current practices in establishing an EVP priority hierarchy for vehicles from Fire, police/MCSO, DPS and ambulances.

Task 5: Recommendations for Improving EVP

Identify opportunities to improve EVP at regional level. Often emergency vehicles respond to more than just one jurisdiction, supported by cross jurisdictional mutual aid agreements. Due to the complexity of the EVP operations and the number of agencies involved, improving EVP at regional level has a lot of challenges. This task should identify the challenges and summarize the opportunities in improving EVP operations within the MAG region as well as the steps needed to be taken.