

March 25, 2015

TO: Members of the MAG Intelligent Transportation Systems Committee

FROM: Catherine Hollow, City of Tempe, Chair

SUBJECT: MEETING NOTIFICATION AND TRANSMITTAL OF TENTATIVE AGENDA

Wednesday, April 1, 2015- **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>
<p>1. <u>Call to Order</u></p> <p>For the April 1, 2015 meeting, the quorum requirement is 10 committee members.</p>	
<p>2. <u>Approval of the February 4, 2015 ITS Committee Meeting Minutes</u></p>	<p>2. Review and approve minutes of the meeting held on February 4, 2015.</p>
<p>3. <u>Call to Audience</u></p> <p>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.</p>	<p>3. For information and discussion.</p>
<p>4. <u>Program Managers Report</u></p> <p>The following items will be discussed:</p> <ul style="list-style-type: none">• Status of TSOP Projects• Letters of Interest for Vice Chair• Status Report on the RCN	<p>4. For information and discussion.</p>
<p>5. <u>FHWA Grant for ICM Deployment Planning for I-10 Corridor</u></p> <p>The Federal Highway Administration has recently informed MAG of a grant award for Integrated Corridor Management (ICM) Deployment Planning in the I-10 corridor. A total of 13 sites across the nation have been selected for such awards, through a competitive proposal process. An overview of the ICM planning activities funded by the grant and next steps will be provided (See Attachment One).</p>	<p>5. For information and discussion.</p>

6. Systems Management and Operations Plan

During the MAG review and approval of funds for the expansion of the Freeway Management System (FMS), the committee recommended a MAG study to produce a guidance document to support long-range planning and to identify future investments required in technology infrastructure and for efficient management and operation of the freeway and arterial systems. This idea of a MAG study was further endorsed by the Transportation Review Committee and the Management Committee. It is anticipated that the study would produce the region's Systems Management and Operations Plan. The Plan would help identify and prioritize both infrastructure and operating resource needs that are driven by system performance metrics such as safety, congestion and reliability.

A draft scope of work for this study was presented in January. A further refined draft is provided as Attachment Two. New paradigms for both funding, planning and operating of key transportation facilities will be explored in this study.

The finalized scope of work, based on review comments by the committee, will serve as the basis for this study included in the FY2016 Draft MAG Unified Planning Work Program.

7. Next Cycle of TIP Arterial ITS Project Applications

In August 2015, MAG is planning to issue a call for projects for programming new projects in the FY2016-2020 Transportation Improvement Program (TIP). This will include new arterial ITS projects in FY2018 and FY2019. Approximately, \$3.5million in CMAQ will be available in each year for qualifying ITS projects.

The committee will: (a) Review project programming priorities as stated in the 2012

6. For information and discussion.

7. For information and discussion.

ITS Strategic Plan; (b) Review how priorities were applied during the previous programming cycle; and (c) Discuss next steps to prepare for the TIP call for projects.

8. Reports by Committee Members

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

9. Request for Future Agenda Items

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

10. Next Meeting Date and Place

The next meeting is scheduled to be held at 10:00 a.m. on Wednesday, May 6, 2015. It will be held in the Ironwood Room on the 2nd Floor of the MAG office building.

Adjournment

8. For information and discussion.

9. For information and discussion.

10. For information.

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

February 4, 2015
MAG Ironwood Room, 2nd Floor
302 North First Avenue
Phoenix, Arizona

MEMBERS ATTENDING

- | | |
|--|---|
| * Reza Karimvand, ADOT | # Faisal Saleem for Nicolaas Swart,
Maricopa County |
| * Yingyan Lou, ASU
Chris Hamilton, City of Avondale
Chris Lemka, City of Buckeye | Avery Rhodes, City of Mesa |
| # Mike Mah, City of Chandler | # Ron Amaya, City of Peoria |
| * Captain Burley Copeland, DPS
Bryce Christo, City of El Mirage | * Marshall Riegel, City of Phoenix |
| * Toni Whitfield, FHWA
Leslie Bubke, Town of Gilbert | * Steve Ramsey, City of Scottsdale
Albert Garcia, City of Surprise |
| * Debbie Albert, City of Glendale
Luke Albert, City of Goodyear | Catherine Hollow, City of Tempe
Amanda Luecker, Valley Metro |

OTHERS PRESENT

- | | |
|--------------------------------|------------------------|
| John Hoang, City of Tempe | Dan Hartig, Ayres |
| David Lucas, City of Tempe | Doug McCants, Horrocks |
| Simon Ramos, MCDOT | Arnab Gupta, PB |
| LeShawn Charlton, MCDOT | Corey Steele, Strand |
| Dave Riley, United Civil Group | Margaret Boone, MAG |
| Jeff Jenq, OZ Engineering | Ryan Gish, MAG |
| Dave Chambers, TransCore | Micah Henry, MAG |
| Deanna Haase, Kimley-Horn | Sarath Joshua, MAG |
| Tim Wolfe, Dibble | Eric Nava, MAG |
| Mike Manthey, Parsons | |
| Juan Davila, Parsons | |

- * Not present or represented by proxy
- # Participated by teleconference
- + Participated by videoconference

1. Call to Order
Chair Catherine Hollow called the meeting to order at 10:00 a.m.

2. Approval of the January 7, 2015 ITS and TAG Joint Meeting Minutes
Chair Hollow requested approval of the meeting minutes from the January 7th ITS and TAG Committees joint meeting. **Chris Lemka from City of Buckeye moved, Bryce Christo from City of El Mirage seconded and it was unanimously carried to approve the minutes of the meeting held on January 7, 2015.**

3. Approval of the January 7, 2015 Meeting Minutes
Chair Hollow requested approval of the meeting minutes from the January 7th ITS

Committee meeting. **Albert Garcia from City of Surprise moved, Leslie Bubke from Town of Gilbert seconded and it was unanimously carried to approve the minutes of the meeting held on January 7, 2015.**

4. Call to Audience

Chair 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.

5. Program Manager's Report

Chair Hollow invited Sarath Joshua from MAG to present the Program Manager's Report. Mr. Joshua addressed the following items in his report:

➤ Current Status of TSOP Projects:

Of a total of 11 TSOP projects, nine have been completed and two projects are on-going. The two ICM projects on I-10 in Phoenix are in the final stages and scheduled to be completed by March 2015. This will conclude the efforts on all 2014 projects. The FY2015 TSOP projects are being prepared for initiation. There are 11 projects for a total cost of \$303,000. Scopes for the task orders are set to be completed and confirmed by member agencies by February 2015. The scopes will be sent to participating consultants for fee proposals and the TSOP projects will be initiated in February to be completed by June 2015. The Synchro training workshop is scheduled for June 9th through June 11th to avoid conflicts with the ITE/IMSA Spring Conference.

➤ Status Report on the Regional Community Network (RCN)

Sarath Joshua requested that Ryan Gish from MAG provide an update on the latest RCN developments. Mr. Gish thanked the ITS Committee members and their staff for approving the RCN no-cost Addition for law enforcement video and assistance in implementation. MAG staff will be conducting inventory checks on the outlying equipment to confirm IDs for the replacement parts. MAG staff will also be establishing wireless links for Queen Creek, Avondale, and Goodyear. There is also potential for a link to the Salt River Indian Community. The wireless links are interim solutions until the fiber plant is installed. Regarding the fiber mapping website, MAG staff is still soliciting conduit and fiber information from the member agencies. It is anticipated that the website will go live soon. The video management software pilot project has been in place for more than a year. MAG staff is assessing the success and challenges of that project with a survey. The initial review is that the software has been a great success in sharing video with the participating agencies.

➤ TIP Programming Cycle

The next cycle for TIP programming will begin in the July/August time frame. MAG staff is reviewing funding availability for arterial ITS projects. It is anticipated that approximately \$3.5M will be available for programming projects in FY2018 and another \$3.5M available for projects in FY2019. At the discretion of the ITS Committee, it is anticipated that both years will be programmed at the same time, so there will be a single call for projects. As programming for the TIP is not done annually, the opportunity in Fall 2015 (FY16) will be the last one as there is no defined funding source for future cycles of programming for arterial ITS.

Faisal Saleem with MCDOT recognized Ryan Gish's effort in working with the member agencies along with LeShawn Charlton with MCDOT.

6. Emergency Vehicle Pre-emption Study

Chair Hollow invited Micah Henry with MAG and Jeff Janq with OZ Engineering to present on the Emergency Vehicle Pre-emption (EVP) Best Practices Study. The study includes five tasks with four accompanying tech memos detailing regional existing deployment, operations challenges, current technologies, best practices, and recommendations. Tech Memo No. 1 includes an overview of EVP technology, regional EVP inventory, and deployment challenges.

The general components of EVP technology include the optical emitter on the emergency vehicle, the optical detector mounted at the intersection, the confirmation light mounted on the signal mast arm, and the preemption detector card housed in the traffic signal controller cabinet. The study relies on information surveys conducted with member agency input to detail existing EVP systems. Key information collected included number of EVP-equipped intersections, EVP system vendor, signal phase during preemption, use of confirmation light, use of encoding, detection range settings, EVP system maintenance, system users, central management software, EVP usage data collection, and shared transit use.

During the investigation the project team documented the existing encoding challenges that exist between the MAG member agencies. Encoded systems will reject a request from an un-encoded ("open") transmitter. With competing vendors encoding has introduced a challenge for adjacent agencies using different systems. The City of Mesa has led the effort to define the East Valley regional encoding scheme shared by several agencies.

There are different preemption phase treatments used throughout the region. The signal indications vary between the jurisdictions and sometimes within the same jurisdiction. Confirmation lights are deployed sporadically throughout the region without uniform treatment. The major challenges of the existing EVP deployment in the region include incompatibility between the systems, two different preemption traffic signal phase scenarios are in use, confirmation light is not consistently present, usage data is underutilized, and on-going, recurring maintenance is a challenge for agencies with widespread deployment.

The forthcoming Tech Memo No. 2 includes an overview of current EVP technologies. This includes optical and radio-based systems, GPS-based systems, central/AVL-based systems, and connected vehicles. This will be distributed to the Project Technical Advisory Group (TAG) and then submitted to the ITS Committee for review and comment. Faisal Saleem with MCDOT commented on the need for standards as the available products are proprietary in nature. Committee members were requested to submit comments on the tech memo to MAG staff.

7. Developing Traffic Management Response Plans for Freeway Closures: I-10 West and US-60 Projects

Chair Hollow invited Eric Nava with MAG to present on the project involving the development of traffic management response plans for freeway closures. The Tempe

ICM projects were recently completed and the Phoenix ICM projects are expected to be completed at the end of March. As the I-10 West projects are still underway the focus of the presentation is on US-60.

The US-60 project through Tempe involves a hypothetical closure of the freeway in both the AM and PM peak periods. The AM closure in the westbound direction of US-60 occurs at the Hardy bridge crossing between Priest and Mill. The PM closure in the eastbound direction occurs between Rural and McClintock. The goal of the effort is to develop signal timing plans in anticipation of the dynamic change in vehicle demand throughout the affected study area. These divergent strategies include demand on arterials parallel to US-60, including Baseline, Southern, and Broadway.

The project included conducting field reviews and inventories, gathering existing traffic signal operations, identifying closure locations, modeling with DynusT, assessing the modeling results, configuring the volume demand, optimizing new signal timings, and evaluating the multiple scenarios. The project team explored the effects of a two-hour closure with diversions to the parallel arterials and tested scenarios with varying cycle lengths. The analysis of the AM closure scenario indicated that the preferred result of 180-second cycle lengths supports higher network volumes on Southern Avenue and 120-second cycle lengths for Baseline Road. The second preference was for 120-second cycle lengths on Southern Avenue. The analysis of the PM closure scenario indicated that the first preferred strategy was for 120-second cycle lengths on both Southern Avenue and Baseline Road. The second preferred strategy was for 150-second cycle lengths on both parallel arterials.

8. Reports by Committee Members
Chair Hollow called on members to report items of interest to the committee. Chair Hollow reminded the committee on the upcoming ITE/IMSA Spring Conference scheduled for February 24th through 26th.
9. Request for Future Agenda Items
Chair Hollow called on members to request future agenda items. There were no requests.
10. Next Meeting Date and Place
Next meeting date was announced at 10:00 a.m. on Wednesday, March 4, 2015, in the Ironwood Room (2nd floor) at MAG.
11. Adjournment
Chair Catherine Hollow adjourned the meeting at 11:25 a.m.

FHWA Integrated Corridor Management (ICM) Deployment Planning Grant

This is a planning grant awarded to MAG by the FHWA's Integrated Corridor Management (ICM) Program, to help advance the integrated approach to transportation systems management and operations. The grant totals \$200k plus a local match \$58.8k. MAG submitted one of the 33 proposals that competed for 13 grants awarded by the USDOT.

The objective of the Deployment Planning Grant program is to advance ICM planning, development, and deployment efforts. The USDOT has funded two large projects at ICM Pioneer Sites in San Diego and in Dallas. Many lessons have been learned from the work at these two Pioneer Sites. The USDOT wants to encourage other locations across the country to apply the knowledge and lessons learned, in developing ICM plans, gained from the two Pioneer Sites.

The specific purpose of these grants is to provide funding support for recipients' application of ICM Knowledge and Technology Transfer (KTT) products including: ICM Implementation Guidance; Analysis, Modeling, and Simulation (AMS) Guidance; Model System Engineering documents; and technology transfer activities such as technical support workshops and peer-to-peer support.



This grant funding will be applied toward planning for Integrated Corridor Management (ICM) along the I-10 corridor through the Phoenix metropolitan region. I-10 is the primary east-west highway corridor through the MAG region serving as the southernmost transcontinental highway connecting Southern California to Florida. The basic freeway footprint of I-10 will remain the same which means capacity needs must be addressed by operational and management strategies. Limited viable traffic rerouting options along some segments of I-10 places a strong emphasis on improved freeway/arterial coordination for emergency re-routing. The I-10/I-17 convergence area surrounding downtown Phoenix is an important gateway with 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 ICM planning, I-10 is viewed in three distinct segments, and those segment characteristics are described here.

Other key regional partners that will participate in this project: ADOT, DPS, City of Phoenix, Maricopa County, Valley Metro, City of Tempe and City of Chandler

CHAMPIONS FOR FHWA ICM DEPLOYMENT PLANNING GRANT		
Agency	ICM Involvement	Champion
Maricopa Association of Governments	Infrastructure, Operations and Safety Planning, Modeling	Sarath Joshua
Arizona Department of Transportation (ADOT)	Traffic Operations Center (TOC), ALERT freeway incident response teams, Public Information Officer (PIO)	Reza Karimvand
Arizona Department of Public Safety (AZDPS)	Dispatch, Field Officers for incident response and management, PIO	Captain Jeff King
Maricopa County Department of Transportation	Transportation Management Center (TMC), REACT arterial response teams, PIO	Nicolaas Swart
Valley Metro	Bus, Light Rail	Ratna Korepella
City of Phoenix	Transportation, Police, Fire, PIO	Bruce Littleton
City of Tempe	Transportation, Police, Fire, PIO	Catherine Hollow
City of Chandler	Transportation, Police, Fire, PIO	Mike Mah

MAG will apply this FHWA grant towards developing state-of-the-practice plans for implementing Integrated Corridor Management along the I-10 corridor through the Phoenix metro region, from Loop 101 freeway in the west valley to Loop 202 San Tan freeway in the east valley.

3/23/15

Systems Management and Operations Plan

Study Background:

Systems Management and Operations (SM&O) in the context of the Regional Transportation Plan refers to a regionally integrated approach that would continuously strive to optimize the performance of the multi-modal transportation system. This is accomplished through multi-modal, cross-jurisdictional systems and services. These systems need to be planned, designed, built and operated in a seamless manner to improve efficiency, safety and reliability of the transportation system.

At the national level, many states and regions are moving towards a higher emphasis on improving how their transportation systems are managed and operated to address increasing demand rather than adding new road capacity. The Federal Highway Administration has identified initiatives for reducing traffic congestion through better operation of the road network. These initiatives are based on the idea that through improved operations the transportation system can be made to perform better and meet customer expectations regardless of the demands placed on it. As improved operations become an essential transportation planning goal and strategy, it will require rethinking of how related services are delivered by operating agencies to those customers who rely on the transportation system. The Federal Highway Administration has stated that, "Effectively addressing the congestion problem will hinge on the ability to reshape traditional transportation organizations into 21st century operations agencies using 21st century technologies". This study will address the need for organizational reshaping within the context of the regional transportation planning process.

The full spectrum of transportation technology infrastructure known as Intelligent Transportation Systems (ITS), together with skilled agency staff that utilize them serve as the foundation of SM&O programs. The MAG Regional Transportation Plan (RTP) has made substantial investments in this new layer of infrastructure at two levels – Freeway ITS and Arterial ITS. In addition to regional funds programmed at MAG for arterial ITS infrastructure, local agencies have made and continue to make significant investments in infrastructure and the actual operation of arterial streets. All Freeway ITS applications are collectively referred to as the Freeway Management System (FMS) and RTP funds were set aside to provide a certain amount of coverage of the freeway system. For Arterial ITS, RTP funds were allocated for the 20 year duration and later accelerated to the first 10 years that is currently expected to end in FY2019. Funds for Arterial ITS projects are programmed based on a technical evaluation process that is guided by the ITS Strategic Plan and other MAG and federal planning requirements. At present, RTP funds allocated for Arterial ITS have been programmed through

FY2017 with funds remaining for two more years of projects. RTP funds for the FMS have been programmed through FY2019, with remaining funds adequate for completion of the original planned FMS coverage.

A study to help guide future regional investments in the Freeway Management System (FMS) was initially recommended by the MAG ITS Committee along with the committee's recommendation of RTP funds for new FMS infrastructure, beyond FY2014. During the approval process, members of the Management Committee and the Transportation Review Committee endorsed and expressed much interest in the study and have requested that a detailed scope of work be presented to them prior to moving ahead with the study through the FY 2016 MAG Work Program.

Over the last 15 years, the MAG region has made significant investments in building ITS infrastructure required for improving SM&O. As a result, the region has some of the best ITS infrastructure in the nation. However, due to the emergence of better solutions and technology advances, a new approach is required to guide future regional investments in SM&O that would be performance based and linked to regional priorities. This MAG study is proposed, in response, to define the long-term vision for SM&O and develop a guidance document for reaching that vision, without being constrained by institutional barriers, practices or resource limitations. The study will assume that all future SM&O programs and proposed projects would be evaluated using performance-based criteria. The study will address local agency staff resources dedicated for traffic operations that is often critical for achieving higher levels of performance using SM&O infrastructure. Strategies will be recommended that would help ensure that adequate staff resources are planned for and are available, at the operating agencies, to gain the desired benefits from the regional investments in SM&O infrastructure. This may also require modifications to the current programming process to provide regional funds to support critical operations.

Study Goal:

The goal of this study is to produce an SM&O Plan that would guide the MAG region in making strategic investment decisions related to technology infrastructure components and resources essential for the efficient operation and management of the regional transportation system. A central feature of this Plan would be the establishment of a hierarchy of road facilities from an operations perspective. There could be significant overlap between the proposed road hierarchy and the federally designated NHS facilities. Considering the vast arterial street network in the region, and the limited resources available for SM&O, clearly points to the need for establishing a hierarchy of facilities that could be systematically targeted for SM&O improvements. The Plan will be based on a hierarchy of road facilities, possibly involving two tiers, as follows:

Tier 1 Facilities – All freeway corridors, including adjacent arterials required for fully integrated corridor operations (where applicable). All urban freeways are managed and operated by ADOT utilizing the Freeway Management System. Adjacent city arterials in these corridors are managed and operated by local agencies and serve as feeder routes and potential detour routes during freeway closures and periods of heavy traffic congestion.

Tier 2 Facilities - Strategic Arterial Road (StAR) Network – This could potentially consist of all major arterials classified based on regional priority, using criteria such as, integrated corridor routes (5★), gateway routes (4★), freight routes (3★), key transit routes(4★), etc.

It is well acknowledged that urban freeway operations need to be coordinated with adjacent arterials, and also with other transportation modes such as transit and freight within the effective corridors. The institutional structure in the MAG region, and also in many other urban regions, with split ownership where the freeways are managed by the state DOT and adjacent arterials are managed by local agencies makes coordinated traffic management a challenging task. However, in many other fields, effective technology solutions have been instrumental in forging innovative coordination mechanisms to overcome similar barriers. This study will explore such solutions and also investigate feasible alternate institutional structures and business models for efficient delivery of services, based on current best practices.

The freeways are known to provide the safest and most efficient (from the perspective of moving goods and people) form of travel, and they play a key role in supporting the regional economy. Hence, maintaining efficient SM&O on freeway corridors would be a very high priority for the region. The principal arterials also play an important role in the regional economy. However, the SM&O goals for these facilities may vary even within a single jurisdiction. To establish consistent SM&O goals across the entire region, it would be necessary to identify Key Principal Arterials based on a set of criteria that would be identified and recommended by the study, to be reviewed and endorsed by MAG at the policy level.

The study will also develop the desired Regional Concept of SM&O for the year 2038, taking into account, as much as feasible, on-going research and development efforts such as the Connected Vehicle Technology, information and communication technology trends, and emerging practices in advanced traffic management and operations. The year 2038 has been selected to align this effort with the horizon year of the next anticipated RTP update.

Study Objectives:

The study objectives would be to:

1. Identify best urban SM&O practices – both US and international
 - a. identify the supporting institutional framework
 - b. identify alternate business models being used
2. Establish a tiered hierarchy or classification of road facilities for future SM&O investments
 - a. Develop suitable criteria for defining a tiered classification of facilities
 - b. Establish a process for periodic review and updating of facility classification prior to each programming cycle
3. Review current freeway and arterial infrastructure, their management and operations and compare with best practices, including:
 - a. Review current freeway and arterial infrastructure, and operations
 - b. Identify key areas/functions that needs to be improved
 - c. Identify new functions such as Integrated Corridor Management and Active Traffic Management
 - d. Key enablers such as better institutional support, resources, business processes
 - e. Perform a comprehensive evaluation of the life-cycle of current ITS technology infrastructure
 - f. Identify lessons learned
4. Define the 2038 Regional Concept of SM&O for managing the freeway and arterial corridor operations, based on the best available predictions of future technology evolution. Recommend a technology adoption strategy to help keep abreast of new developments such as probe vehicle data, private sector data, in-vehicle driver advisories, Connected Vehicle communications
5. Recommend a path forward for the next 20 years to reach the desired 2038 Concept of Operations, as a phased implementation plan for 5, 10 and 15 years.
6. Recommend a process for data collection, independent performance measurement and reporting
7. Recommend a framework for inter-agency oversight and an annual performance review

Task 1: Best Practices in Urban Transportation Systems Management & Operations

A best practices review will be conducted to identify and document the SM&O best practices, both in USA and internationally, in freeway and arterial operations. A minimum of 15 urban regions will be reviewed, with at least 10 of these from the USA.

Some of the questions that will be explored during this review are:

How are other major urban regions organized, both institutionally and financially, to manage and operate their urban transportation system? – This review should include at least 3 urban regions similar to the MAG region in facility ownership.

How are the reviewed major urban regions organized to coordinate freeway operations with adjacent arterial facilities owned by local agencies?

How are transportation systems operations and management functions staffed and funded at the regional and local levels?

What is the level of coordination with law enforcement and other stakeholder agencies during major incidents?

How much of the traffic operations functions are automated and how are such systems staffed?

What decision support and analytical tools are being used to help refine operations?

Staffing – qualifications, training and certification requirements, position descriptions and salary ranges.

How is performance measurement carried out? What metrics are used? How independent or transparent is the process? Are periodic or ongoing web-based performance reports provided?

Data sharing with the MPOs for performance measurement – What is the process for quality control of data?

What is the oversight process for key technology investment decisions? Is there an established technical oversight process that involve a panel of experts?

What is the current strategy/decision process for the adoption of appropriate new technologies to replace old technologies? Considerations of equipment life-cycle, annual maintenance cost, system reliability degradation.

Task 2: A Tiered Classification of Facilities for Strategic SM&O Investment

The execution of this task will result in a recommendation for a tiered hierarchy/classification for the road network that will serve as the basis for prioritizing future SM&O investments.

- a. Develop draft criteria for defining a tiered hierarchy/classification of road facilities
 - i. The criteria will address factors such as – all freeways and major arterials on NHS, freight corridors, transit corridors, performance with respect to road safety, performance with respect to reliability
- b. Review of draft criteria by MAG committees – TRC, MC, TPC and RC
- c. Apply the criteria and develop the initial tiered road hierarchy for the MAG region
- d. Establish a process for periodic review and updating of facility classification prior to each resource allocation/TIP programming cycle
- e.

The resulting classification of the road network will guide future decisions to allocate regional resources to either build or replace necessary ITS infrastructure, and to support staff resources necessary to operate the facilities at the desired level of SM&O identified in the Concept of Operations. All facility operating costs that would be funded regionally will be clearly identified. These costs could include the costs to operate sub-regional TMCs.

Task 3: Review of Freeway and Arterial Infrastructure and Operations

3.1 Review Infrastructure Coverage

This task will perform a review of the current infrastructure coverage, budget for expanding coverage and for staffing. The execution of this task will answer the following questions:

For Freeways:

What is the current FMS coverage in miles, and what additional coverage is currently planned and programmed? What criteria are currently used to arrive at prioritizing coverage expansion needs, and do they need to be revised?

How are costs associated with FMS infrastructure and operations currently funded? FMS infrastructure funded by the MAG RTP; FMS operations (Phoenix component) funded by ADOT & MAG

What are the basic infrastructure features and operations elements? Fiber-optic backbone, CCTV, ramp meters, DMS, Alert, FSP, Centralized ATMS for ramp meters and interchange traffic signals

What is the approximate division between statewide and MAG region responsibilities of TOC operations?

Identify the range of traffic management functions currently performed by FMS staff. Describe current FMS staffing, qualifications and expertise.

Assess how well the FMS is performing basic functions in comparison to other TMCs? Identify any key areas and functions that need to be improved. Identify key enablers such as better institutional support, resources, business process improvements.

What is the business case for supporting the current FMS operation? What are the likely benefits accrued and the estimated annual Return on Investment (ROI)?

For Arterials:

What is the current coverage of arterial traffic signal systems?

How are costs associated with arterial ITS applications and operations currently funded?

What are the basic Arterial ITS infrastructure features and operations elements? TMC, Fiber-optic communications backbone, CCTV, DMS, Centralized ATMS

Identify the range of traffic management functions currently performed by agency staff.

Identify any key areas and functions that need to be improved. Identify key enablers such as better institutional support, resources, business process improvements.

What is the business case for supporting the current TMC operation? What are the likely benefits accrued and the estimated annual Return on Investment (ROI)?

3.2 Current SM&O Functions and Concept of Operations

This task will clearly identify all freeway and arterial SM&O functions that are currently being performed. Many features of the current FMS concept is based on state-of-the-practice in mid-1990s and was developed accordingly. Since then many changes have occurred in technology, including some new functions carried out by the FMS. A similar summary of functions will be produced for arterials.

Develop a high level Concept of Operations that would describe all current aspects of the functions and operations of freeways and arterials. This will be limited to currently established

functions and will not include any new functions that are being studied and yet to be established.

3.3 Evaluation of the Life-Cycle of Current ITS Technology

Perform a comprehensive re-evaluation of the life-cycle of ITS technology elements currently being utilized on freeways and arterials. Identify what key technologies have proven to be effective so far and assess how much longer each particular technology is viable. Investigate if the functions supported by a specific technology is addressed by another more efficient technology or an established service provider with an efficient and more economical solution.

This task will also identify which ITS technology needs to be replaced.

This task would also include the following:

- Draw on Task 1 findings on the state of the practice review and produce a comparison of key functions

3.4 Lessons Learned

Identify lessons learned from the implementation of ITS infrastructure on freeways and arterials over the last 20 years.

Task 4: 2038 Vision and Concept of System Management and Operations

This task will result in the establishment of the 2038 vision and concept of SM&O for the freeway-arterial operations in the MAG region, based on: (1) All infrastructure improvements identified in current MAG plans for this period; (2) Sound assumptions on the likely influence of emerging technological advances in areas related to mobility; (3) Other likely trends in travel behavior and travel patterns.

In addition to the coordination between freeways and arterials, the Concept of Operations would incorporate improvements that are likely to emerge over the 20 year period with varying degrees of certainty such as:

- Implementation of Active Traffic Management at appropriate locations in several phases. This will draw upon the current experience of ATM implementation in the US and network screening guidelines to identify the best potential ATM sites.
- Migration to new traffic data sources including detection technology, probe vehicles and private sector data sources.

- Refinements to Freeway-Arterial Operations for Integrated Corridor Management
- Desired freeway safety features such as a system to reduce wrong-way entry at ramps
- Relevant applications based on Vehicle-to-Vehicle (V2V) communications - ref. AASHTO CAV roadmap
- Relevant applications based on Vehicle-to-Infrastructure (V2I) communications - ref. AASHTO CAV roadmap

Identify key challenges (from today's perspective) to achieving the 2038 vision. Identify possible solutions for such challenges, including a more effective regional institutional framework to support traffic operations and management. The 2038 vision should not necessarily be constrained by the existing institutional structure of ownership and facility management.

- Staffing needs, funding requirements and tools for complex traffic operations – are the agencies adequately equipped with staff with the right skills

Task 5: Evolutionary Path for Reaching the 2038 Concept of Operations

Recommend an evolutionary path for reaching the 2038 vision or concept of freeway-arterial operations. This evolutionary path will define a realistic phased implementation plan, such as:

Phase 1 (2020 - 2024) – Implement Prop 400 FMS coverage; Implement ICM on I-10 and US-60 corridors. Establish virtual sub-regional TMCs. Initial implementation of Active Traffic Management (ATM) with Variable Speed Limits in the I-17 corridor. Real-time predictive simulation modeling to support traffic management.

Phase 2 (2025 - 2029) – Implement fully integrated traffic operations between all urban freeways and adjacent arterials. Implement Active Traffic Management with Variable Speed Limits on fwy segments that operate at level of service D or worse during AM or PM peak periods and experience high crash occurrence (based on 5-yr crash data and an established threshold).

Phase 3 (2030 - 2034) – Active Traffic Management implemented on all urban freeway segments that Broadcast of in-vehicle alerts.

Phase 4 (2035 - 2038) – TBD

It is anticipated that the evolutionary path forward may include the concepts:

Virtual Traffic Management Centers: These TMCs would not require a physical facility, are fully functional and cost effective.

Sub-regional Traffic Management Centers: Coordination of traffic management among many jurisdiction in a vast region may be best addressed through the establishment of a number of sub-regional TMCs. Institutional agreements would be required for sub-regional TMCs. It is conceivable that several sub-regional TMCs would perform traffic management functions across the entire MAG planning area (including areas of Pinal County within the MAG planning area).

Task 6: Data Collection, Performance Measurement and Reporting

Identify the need for coordination between freeways (ADOT) and arterials (local agencies) and MAG for gathering the data required for performance measurement. System performance will be reported at the MAG Performance Measurement website.

Establish the metrics and the methodology to be used to measure performance on the freeway-arterial corridor – TT reliability metrics; and the responsibilities for data collection, data analysis, reporting frequency.

A funding plan that would provide sufficient funds to support regional fwy operations.

10 yrs – phase out technology that has served its purpose

10 yrs – Recommend an institutional framework that would be supportive of integrated operations

Task 7: Recommend a Framework for Inter-Agency Oversight and Bi-Annual Performance Review

This task would recommend a framework for establishing a Technical Oversight Team that would include key stakeholder agencies. The purpose of the TOT would be to conduct periodic reviews (quarterly) of progress and possibly help resolve any issues.

A recommendation would also be provided for establishing the format for a bi-annual performance review of freeway-arterial corridor operations by several MAG committees, including TRC, MC and RC. System performance metrics will be based mostly on MAG performance monitoring reports.