

October 30, 2014

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, November 5, 2014- **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

COMMITTEE ACTION REQUESTED

1. Call to Order

For the November 5, 2014 meeting, the quorum requirement is 10 committee members.

2. Approval of the October 7, 2014 Meeting Minutes

2. Review and approve minutes of the meeting held on October 7, 2014.

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.

3. For information and discussion.

4. Program Managers Report

The following items will be discussed:

- Status of TSOP Projects
- Media Event on the Pilot Project to Co-locate a DPS Officer at the TOC
- SHRP2 Pilot Project - An Enhanced Simulation Model with Reliability
- Status Report on the RCN

4. For information and discussion.

5. SPINE Near-Term Improvements

In May 2013, the committee recommended an Action Plan for improved operations on the I-10/I-17 corridor. This Plan was titled the ICM Action Plan and identified a list of ICM strategies and projects across the region. This Plan was presented to the I-10/I-

5. For information and discussion.

17 Spine Study Management Team and in December 2013, a version of the Plan limited to the I-10/I-17 corridor was approved to be implemented by Arizona DOT. The Plan includes projects for the agencies: Arizona DOT, Maricopa County, City of Phoenix, City of Chandler, City of Tempe and City of Avondale.

In preparation for implementation, project descriptions have been further refined along with detailed cost breakdowns for both capital and operations (See Attachment One). The Arizona DOT has initiated steps to implement these projects. These are being launched as 3-year pilot projects. The performance measurement and reporting will be carried out by MAG staff. A Technical Advisory Group consisting of committee members and MAG staff will be established to provide oversight for these projects and to ensure that the overall goals are being met.

6. 2012 ITS Strategic Plan

In December 2012, the MAG Regional Council approved an updated ITS Strategic Plan that was developed by the committee. The previous ITS Strategic Plan was developed in 2001. A number of member agencies have recently expressed their desire to better understand the role of MAG in regional planning and more particularly in regional ITS planning. An overview of the MAG planning process and the 2012 ITS Strategic Plan will be provided by staff (See Attachment Two).

7. Reports by Committee Members

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

6. For information and discussion.

7. For information and discussion.

8. 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.

9. Next Meeting Date and Place

The next meeting is scheduled to be held at 10:00 a.m. on Wednesday, December 3, 2014. 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.

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

October 7, 2014

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

MEMBERS ATTENDING

# Reza Karimvand, ADOT	Paul Porell for Nicolaas Swart,
* Chris Hamilton, City of Avondale	Maricopa County
# Chris Lemka, City of Buckeye	Avery Rhodes, City of Mesa
# Mike Mah, City of Chandler	Ron Amaya, City of Peoria
Captain Burley Copeland, DPS	Bruce Littleton for Marshall Riegel,
Bryce Christo, City of El Mirage	City of Phoenix
# Toni Whitfield, FHWA	Camila Weckerly for Mohamed
Leslie Bubke, Town of Gilbert	Youssef, Town of Queen Creek
Allan Galicia, for Debbie Albert, City of Glendale	Steve Ramsey, City of Scottsdale
* Luke Albert, City of Goodyear	Albert Garcia, City of Surprise
Rob Dolson, City of Maricopa	Catherine Hollow, City of Tempe
	Amanda Luecker, Valley Metro

OTHERS PRESENT

Joey Paskey, Atkins	Tim Wolfe, Dibble
Deanna Haase, KHA	Saroja Devarakonda, HDR
Jeff Jenq, OZ Engineering	Stephen Doubek, PB
Jothan Samuelson, Wilson	Margaret Boone, MAG
Don Wiltshire, YSMA	Ryan Gish, MAG
Radu Nan, Kittelson	Micah Henry, MAG
Aaron Felix, City of Maricopa	Sarath Joshua, MAG
Sara Simpson, UCG	Eric Nava, MAG
Sheina Hughes, Stantec	

- * 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. Introductions were conducted.
2. Approval of the September 3, 2014 Meeting Minutes
Reza Karimvand from ADOT moved, Albert Garcia from Surprise seconded and it was unanimously carried to approve the minutes of the meeting held on September 3, 2014.
3. 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.

4. Program Manager's Report

Mr. Sarath Joshua from MAG addressed the following items in his report:

➤ Current Status of TSOP Projects:

A total of 11 TSOP projects, five have been completed, six projects are underway. These projects are scheduled to be completed by January 2015.

➤ Status Report on the Regional Community Network (RCN)

Sarath Joshua requested that Ryan Gish from MAG provide an update on the RCN Working Group and latest RCN developments. Mr. Gish detailed the Working Group's discussion regarding network updates, including firmware updates on the RCN switches throughout the MAG region. The core switches are complete. Some of the outlying switches were completed remotely, but others will require a site visit, scheduled for later this month. Mr. Gish will be coordinated with those local agencies affected by the updates.

MAG has been coordinating with City of Tempe staff to kick-off the Network Assessment and Services Project. The consultant providing this work is TransCore under the ITS On-Call contract. The earlier tasks that included City of Chandler were successful. Following Tempe, MAG staff will be working with Gilbert and Surprise.

Mr. Gish reported on the Video Management Software Pilot. MAG staff has been working with the local TMCs to test video-sharing capabilities, including Mesa, Gilbert, Chandler, and Tempe. These agencies are also capable of viewing ADOT camera images. MAG staff will be working with West Valley agencies for video-sharing with the intent on success prior to the scheduled mega event, the Super Bowl.

Regarding the Regional Fiber Mapping Project, MAG solicited conduit and fiber information to be included in the project for those that would like to be involved. The project goal is to receive information and include it on the website by the end of the year.

➤ Highlights from ITS Arizona Conference

Sarath Joshua highlighted several of the themes of the conference including USDOT Vision of Connected Vehicles. He referred to a study report by AASHTO titled the National Footprint Analysis, identifying infrastructure needs. The study provides a road map for local agencies with regards to deploying necessary infrastructure for connected vehicle needs. USDOT has also solicited local agency input into the Guidance document for connected vehicles and urban deployments. Mr. Joshua provided the report's title, index, and executive summary to the committee, along with the challenges for local agencies for full implementation.

Reza Karimvand stated that he and Faisal Saleem presented at the conference on connected vehicles, along with several other local experts. Mr. Karimvand and Mr. Saleem have been involved with connected vehicle efforts for almost a year. They provided a brief overview and stated that they will be attending a related meeting in December in Irvine, California. Regarding MCDOT's

connected vehicle study in Anthem, three miles of I-17 were added to the test site, with approval from FHWA. The project is being referred to as Arizona Connected Vehicle in cooperation with MCDOT Smart Drive.

➤ **Arterial ITS Infrastructure Needs**

Sarath Joshua discussed a recent effort by MAG to identify of arterial ITS infrastructure needs in the future. MAG requested these estimates from ITS Committee members in order to generate an estimate for the total funds needed for ITS projects planned between 2018 and 2027.

Mr. Joshua provided a summary of the estimates, grouping the projects into three categories: Signal System Improvements, Strategic Planning and Studies, and Infrastructure related to Fiber Optic & CCTV/DMS. The total estimated cost of the projects is \$106.4M, with about 35% for signal system improvements, 0.5% for strategic planning, and 65% for infrastructure. Mr. Joshua will provide this information to committee members via email.

5. Review of Proposed FY2015 Projects

Chair Hollow identified the summary sheet for the proposed projects. She invited Sarath Joshua to lead the discussion of the presentation of projects to the committee. A project ranking sheet was distributed to the committee to document the selection process. Committee members were invited to present the project, providing a brief overview of the description, study area, and participating agencies. Concluding the presentations, committee members will assign a rank to each project. The rankings will be compiled and the top-ranked projects will receive funding through the MAG On-Call contract based on available funds. The projects identified for funding will require ITS Committee action for approval.

Chair Hollow invited Bryce Christo with El Mirage to present the Dysart Road project to the committee. Mr. Christo presented the proposal for traffic signal timing refinement at four locations that are outside of the current project work areas within the city. The objectives of the project is to get new turning movement counts, review the delays experienced at the intersections, and develop a SYNCHRO model for the city. Sarath Joshua identified the need for an implementation task to incorporate the results of the study into operations.

Chair Hollow invited Allan Galicia with Glendale in association with ADOT to present the 59th Avenue project. Mr. Galicia presented the proposal for 59th Avenue from Deer Valley Road to Union Hills Drive and includes 7 intersections. The objective of the project is to develop new signal timing plans for the corridor to account for the new development in the area. Mr. Galicia expressed the need for this effort and presented a complaint from a motorist the city recently received.

Chair Hollow invited Rob Dolson with City of Maricopa to present the Porter Road Corridor project. Mr. Dolson presented the proposal for Porter Road for seven intersections. The objective of the project is to conduct turning movement counts and develop and implement new signal timings to coordinate the corridor. This will help alleviate traffic that has increased with development and new schools in the corridor.

Chair Hollow invited Paul Porell with MCDOT to present the MC-85 project. Mr. Porell

identified the objectives of the project, including retiming 8 intersections using new turning movement counts and model development. The corridor is currently under construction for new communications for the County, providing the opportunity to coordinate the signals.

Chair Hollow invited Ron Amaya with City of Peoria in association with Glendale and ADOT. Mr. Amaya presented the proposal for Union Hills Drive from 55th Ave. to 91st Ave., incorporating 14 intersections. Four intersections are in Peoria, nine are in Glendale, and one is a TI controlled by ADOT. The objectives of the project are to develop a model using new turning movement counts and incorporate the proposed signal timings along the corridor.

Chair Hollow invited Bruce Littleton with City of Phoenix in association with MCDOT and ADOT to present the I-10 ICM project. Mr. Littleton presented the proposal for the I-10 ICM project, involving 118 intersections. The objectives of the project include continuing the ICM effort from the past 3 years to implement traffic signal timings for non-recurring events involving closures of the freeway. The changes will be conducted for detour routes identified in the previous ICM projects. Reza Karimvand identified the importance of this project with regards to ICM on a regional basis.

Chair Hollow invited Camila Weckerly with Town of Queen Creek to present the modeling project. Ms. Weckerly presented the proposal for the city-wide modeling effort. The objectives include developing traffic signal timing plans from the model for implementation in the two primary corridors: Ellsworth and Ocotillo. This optimization effort will help alleviate the congestion in the region associated with new development.

Chair Hollow invited Albert Garcia with City of Surprise to present the Bell Rd. project. Mr. Garcia presented the proposal for Bell Road from Grand Ave. to Loop 303, incorporating 10 intersections. The objectives of the project include developing week day traffic signal timings for AM, midday, and PM periods, using modeling and new turning movement counts. The current plans are no longer effective as the last optimization effort was conducted in 2009. The benefits for this project include coordinating with the Bell Road Adaptive Signal Timing project to provide evaluation of the deployment.

Chair Hollow presented two proposals for City of Tempe along Mill Avenue. The first project is the priority for Tempe and includes 8 intersections on Mill, from Curry to University. The second project includes 10 intersections on Mill, from University to Baseline. The objectives of the projects include using turning movement counts to update the model and develop new signal timings for implementation. Coordination of the corridor will help alleviate congestion due to new development in the area. Sarath Joshua identified the correction in the spreadsheet with regards to the Tempe project. The estimated cost of the project is \$30,000.

Chair Hollow invited Reza Karimvand to present the ADOT projects to the committee. Mr. Karimvand presented the proposals for the four projects, three involving I-17 in Phoenix and one involving I-10 in Chandler. He identified the need for the projects based on the high Average Daily Traffic. The objectives of the projects are to optimize the signals across the interstates. Allan Galicia asked whether the intersections in the projects were for isolated TIs. Mr. Karimvand stated that the projects include adjacent

intersections in the identified cities.

The MAG ITS Committee discussed the estimated costs for the individual projects and concluded that in future TSOP programs a single estimated cost will be developed between MAG and member agencies and this single estimated cost will be provided for the ranking process.

Chair Hollow called upon committee members to rank the projects from 1 to 14 and submit them to MAG staff for compiling the rankings. MAG ITS Committee members submitted rankings and MAG staff compiled the results. Sarath Joshua identified the rankings of the projects. The projects were ranked as follows:

1. Phoenix (with ADOT and MCDOT) – I-10 ICM
2. Glendale (with ADOT) – 59th Avenue
3. MCDOT – MC-85
4. Peoria (with Glendale and ADOT) – Union Hills Drive
5. Tempe – Priority 1: Mill Avenue (Curry to University)
6. Surprise – Bell Road
7. El Mirage – Dysart Road
8. Queen Creek – City Model Update
9. City of Maricopa – Porter Road
10. Tempe – Priority 2: Mill Avenue (University to Baseline)
11. ADOT (with Phoenix) – Project 1: I-17 Crossings (Buckeye to Bethany Home)
12. ADOT (with Chandler) – Project 4: I-10 Crossings (Ray to Chandler)
13. ADOT (with Phoenix) – Project 2: I-17 Crossings (Glendale to Cactus)
14. ADOT (with Phoenix) – Project 3: I-17 Crossings (Thunderbird to Union Hills)

Sarath Joshua identified two additional projects that needed to be funded. The first project is Before and After Study Evaluations for 3 corridors for \$30,000 and the second project is for regional training workshop for the SYNCHRO modeling software for \$12,000. The overall budget of \$300,000 includes these two projects, leaving \$258,000 for TSOP projects to be programmed. The top nine projects tally to an accumulative \$261,000, \$3,000 an excess of what is available in the current program. Mr. Joshua stated that the addition \$3,000 can be made up through savings in the current cycle of projects. Based on the rankings, project estimated costs, and total available funding for TSOP projects, Mr. Joshua suggested that the top nine ranked projects be recommended for the next cycle of TSOP projects.

Chair Hollow requested a motion from the Committee to recommend approval of projects ranked 1 through 9, along with the Before and After Study Evaluations and SYNCRHO training workshop to be funded by the FY2015 TSOP program. **Paul Porell from MCDOT moved, Leslie Bubke from Gilbert seconded and it was unanimously carried to approve projects ranked 1 through 9, along with the Before and After Study Evaluations and SYNCRHO training workshop to be funded by the FY2015 TSOP program.**

6. Reports by Committee Members

Chair Hollow called on members to report items of interest to the committee.

Allan Galicia with Glendale provided the Committee with an update to Glendale's TMC

upgrade. The upgrade is almost complete and the first trial run is scheduled for the planned football game on October 26th. The goal is to have complete functionality prior to the subsequent home game, working towards the planned mega event, the Super Bowl.

Paul Porell with MCDOT stated that the ITS Arizona Conference included Mark Taylor, an employee of Utah Department of Transportation. MCDOT hosted Mr. Taylor following the conference and he presented a more in depth review of UDOT's efforts at implementing changes to traffic signal operations and maintenance based on the recently establish program involving automated traffic signal performance measures. Mr. Taylor presented the Purdue Coordination Diagrams as a means to identifying malfunctioning hardware in the field, arrivals on green vs. arrivals on red, and numerous other metrics. The discussion included the opportunity to implement a similar program in the Phoenix metropolitan area. MCDOT is developing an additional task to the improvement program for the RADS that includes the exploration of other members of AZTech in implementing the performance measures that UDOT has provided.

Amanda Luecker with Valley Metro detailed the implementation of transit signal priority project on Scottsdale Road and Rural Road, from Chandler Mall to the City of Scottsdale Air Park. In lieu of the planned Link route on Scottsdale Road, Valley Metro is implementing TSP on the corridor to help with travel times. Infrastructure has already been deployed and outreach is on-going.

Bruce Littleton with Phoenix stated that he is coordinating with Ryan Gish and MAG staff to develop connections via the RCN to share video prior to the planned mega event, the Super Bowl.

Reza Karimvand with ADOT stated that Phase 2 for the Travel Times Project was launched, including 70 total travel times. The final phase is expected to be in place by December 2015.

7. Request for Future Agenda Items
There were no requests for future agenda items.
8. Next Meeting Date and Place
Next meeting date was announced at 10:00 a.m. on Wednesday, November 5, 2014, in the Ironwood Room (2nd floor) at MAG.
9. Adjournment
Chair Catherine Hollow adjourned the meeting at 11:40 a.m.

I-10/I-17 SPINE
Intelligent Transportation Systems Projects

SUMMARY BY AGENCY			
AGENCY	OPERATIONS	CAPITAL	TOTAL
ADOT	\$ 12,162,813	\$ 8,642,500	\$ 20,805,313
MCDOT	\$ 2,253,306	\$ 2,056,500	\$ 4,309,806
PHOENIX	\$ 2,155,398	\$ 13,682,000	\$ 15,837,398
CHANDLER	\$ -	\$ 1,410,000	\$ 1,410,000
TEMPE	\$ 509,233	\$ 3,847,500	\$ 4,356,733
AVONDALE	\$ 539,233	\$ 1,188,000	\$ 1,727,233
Totals	\$ 17,619,983	\$ 30,826,500	\$ 48,446,483

Yrs 4 - 10 Summary	
AGENCY	TOTAL
ADOT	\$ 23,663,878
MCDOT	\$ 6,403,513
PHOENIX	\$ 5,695,932
CHANDLER	\$ -
TEMPE	\$ 1,299,322
AVONDALE	\$ 1,369,322
Totals	\$ 38,431,967

AGENCY	ANNUAL COSTS BY AGENCY									
	CAPITAL		Operations: Annual Costs						Capital + Ops	
	Design	Construction	Total	Yr. 1	Yr. 2	Yr. 3	Yrs. 1-3	Total		
ADOT	\$ 691,400	\$ 7,951,100	\$ 8,642,500	\$ 5,425,000	\$ 3,362,500	\$ 3,375,313	\$ 12,162,813	\$ 20,805,313		
MCDOT	\$ 139,000	\$ 1,917,500	\$ 2,056,500	\$ 960,968	\$ 642,713	\$ 649,626	\$ 2,253,307	\$ 4,309,807		
PHOENIX	\$ 907,000	\$ 12,775,000	\$ 13,682,000	\$ 700,800	\$ 718,320	\$ 736,278	\$ 2,155,398	\$ 15,837,398		
CHANDLER	\$ 100,000	\$ 1,310,000	\$ 1,410,000	\$ -	\$ -	\$ -	\$ -	\$ 1,410,000		
TEMPE	\$ 285,000	\$ 3,562,500	\$ 3,847,500	\$ 166,800	\$ 169,720	\$ 172,713	\$ 509,233	\$ 4,356,733		
AVONDALE	\$ 88,000	\$ 1,100,000	\$ 1,188,000	\$ 176,800	\$ 179,720	\$ 182,713	\$ 539,233	\$ 1,727,233		
Totals	\$ 2,210,400	\$ 28,616,100	\$ 30,826,500	\$ 7,430,368	\$ 5,072,973	\$ 5,116,643	\$ 17,619,984	\$ 48,446,484		

Note: Capital costs include 3 years of ongoing cost for MCDOT at \$60k/year and for Chandler at \$20k/yr.

Intelligent Transportation Systems - ADOT CAP

I-10/I-17 SPINE PROJECTS -CAPITAL

ADOT PROJECTS	PROJECT #	TOTAL	Contingency (15%)	Design (10%)	Program Management	Supported 3 Yr Ongoing Cost	GRAND TOTAL	Agreements (IGA)
Signal and Ramp Meter Coordination		\$ 1,040,000	\$ 156,000	\$ 104,000	ADOT	None requested	\$ 1,300,000	Workstation
Adaptive Ramp Metering System		\$ 1,260,000	\$ 189,000	\$ 126,000	ADOT	None requested	\$ 1,575,000	
Variable Speed Limit System		\$ 1,740,000	\$ 261,000	\$ 174,000	ADOT	None requested	\$ 2,175,000	
Upgrade Communications to Fiber Optic		\$ 120,000	\$ 18,000	\$ 12,000	ADOT	None requested	\$ 150,000	
Retrofit/Upgrade Existing DMS		\$ 2,400,000	\$ 360,000	\$ 240,000	ADOT	None requested	\$ 3,000,000	
Install Additional Detector Stations		\$ 170,000	\$ 25,500	\$ 17,000	ADOT	None requested	\$ 212,500	
Signal Timing		\$ 184,000	\$ 27,600	\$ 18,400	ADOT	None requested	\$ 230,000	
		\$ 6,914,000	\$ 1,037,100	\$ 691,400			\$ 8,642,500	

ADOT PROJECTS - Description	Project Limits	Project Function
Signal and Ramp Meter Coordination	TI's on I-10 from SR101L to Pecos Stack TI's on I-17 from SR101L to I-10 Split	Coordinate interchange traffic signal timing with ramp meter timing to effectively manage traffic demand. Implement centralized software system and coordinate ramp signal with traffic signal at the interchange.
Adaptive Ramp Metering System	Spine Operational Area, connect 70 ramp meters, relocate 9, and remove 3.	Coordinate ramp meter operation to minimize freeway congestion. Implement centralized software system and connect existing ramp meters to adaptive system to be more responsive to changes in traffic demand over the course of each day.
Variable Speed Limit System	Install 22 signs in pairs at 11 stations throughout the Broadway curve area.	Reduce speed limits during congestion to reduce crashes and to improve reliability of the system. Implement centralized software system and install variable speed limit signs to post realistic speed limits during periods of congestion to induce more homogenous speeds.
Upgrade Communications to Fiber Optic	I-10 from the I-17 Split to SR143	Install 4 miles of fiber optic cable to upgrade communications along I-10 where only limited fiber was originally installed.
Retrofit/Upgrade Existing DMS	I-10, SR101L Agua Fria to SR 202L Santan I-17, SR101L (North Stack) to I-10 Split	Provide upgrades to 30 existing DMS to support regional Integrated Corridor Management needs and to reduce current annual operation and maintenance costs.
Install Additional Detector Stations	I-17 NB at Thomas Road I-17 SB at Van Buren Street I-10 Broadway Curve (6 locations)	Provide detection at the source of congestion (bottlenecks) so Adaptive Ramp Metering System can adjust metering rates accordingly and to provide information for the Variable Speed Limit Sign System along the Broadway Curve.
Signal Timing	I-10 TI's, SR101L Agua Fria to SR202L Santan I-17 TI's, SR101L to I-10 Split	Retime TI intersection signals to support integration of ramp meter to the signalized intersection.

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Intelligent Transportation Systems - MCDOT OPS

I-10/I-17 SPINE - OPERATIONS PROJECTS (Year 2015 - 2018 Operations)

MCDOT PROJECTS	PROJECT#	TOTAL COST	Contingency (15%)	Design (10%)	Management	GRAND TOTAL	Agreements (IGA)
MCDOT TMC Operation Hours Expansion: FTE		\$ 437,837	N/A	N/A	MCDOT	\$ 437,837	None
REACT Expansion		\$ 815,469	N/A	N/A	MCDOT	\$ 815,469	Phoenix and other Agencies All arterial stakeholders
Maintenance Staff Contract		\$ 1,000,000	N/A	N/A	MCDOT	\$ 1,000,000	
						\$ 2,253,306	

PROJECT COST BREAKDOWN

PROJECT	UNITS	UNIT COST	3 YEAR COST	Strategy	Yr 4- Yr 10 Costs
MCDOT TMC Operation Hours Expansion: FTE				Expand operating hours of MCDOT TMC to provide after-hours arterial traffic management, traveler information and incident management coordination to support REACT. This will add one additional shift Monday through Friday.	\$ 1,157,045
FTE - 3 Yr cost assumes 2.5% COLA	2	\$ 71,179	\$ 437,837		
		Total	\$ 437,837		\$ 1,157,045
REACT Expansion				Enhance current arterial traffic incident response and management capabilities through REACT service agreement for arterial emergency traffic management support along the detour routes along the Spine Operational Area. Three REACT trucks are proposed in Year 1 and three truck in Year 5	
FTE - 3 Yr cost assumes 2.5% COLA	2	\$ 69,706	\$ 391,869		\$ 1,035,568
REACT Support Standby Pay	4	\$ 16,550	\$ 198,600		\$ 463,400
REACT trucks, equipment, signs	3	\$ 75,000	\$ 225,000		\$ 247,500
		Total	\$ 815,469		\$ 1,746,468
Maintenance Staff Contract				Year (0-3): \$300,000 per year, Year (4-10): \$500,000 Per year	
Maintenance Cost	1	\$ 300,000	\$ 900,000		\$ 3,500,000
Maintenance Contracts Development	1	\$ 100,000	\$ 100,000		\$ 100,000
		Total	\$ 1,000,000		\$ 3,500,000
		3 Yr Total	\$ 2,253,306		\$ 6,403,513
		7 Yr Total			\$ 2,253,307.5

STARTUP/YR 1	YR 2	YR3	COST BY YEARS
\$ 142,357.2	\$ 145,916.0	\$ 149,564.0	\$ 437,837.2
\$ 127,411.3	\$ 130,597.0	\$ 133,862.0	\$ 391,870.3
\$ 66,200.0	\$ 66,200.0	\$ 66,200.0	\$ 198,600.0
\$ 225,000.0			\$ 225,000.0
\$ 300,000.0	\$ 300,000.0	\$ 300,000.0	\$ 900,000.0
\$ 100,000.0			\$ 100,000.0
\$ 960,968.5	\$ 642,713.0	\$ 649,626.0	\$ 2,253,307.5

Intelligent Transportation Systems - MCDOT CAP

I-10/I-17 SPINE PROJECTS -CAPITAL

MCDOT PROJECTS	PROJECT #	TOTAL	Contingency (15%)	Design (10%)	Program Mgt (10%)	Supported 3 Yr Ongoing Cost	GRAND TOTAL	Agreements (IGA)
Regional Traveler Information Expansion		\$ 500,000	\$ 75,000	\$ 50,000	\$ 50,000	None requested	\$ 675,000	
Regional Archived Data System (RADS) Expansion		\$ 500,000	\$ 75,000	\$ 50,000	\$ 50,000	\$ 150,000	\$ 825,000	
Video Distribution System Enhancement		\$ 190,000	\$ 28,500	\$ 19,000	\$ 19,000	\$ 30,000	\$ 286,500	
Probe Data Expansion		\$ 200,000	\$ 30,000	\$ 20,000	\$ 20,000	None requested	\$ 270,000	
		\$ 1,390,000	\$ 208,500	\$ 139,000	\$ 139,000		\$2,056,500	

MCDOT PROJECTS - Description	Project Limits	Project Function
Regional Traveler Information Expansion	Spine Operational Area	Implement additional traveler information capabilities including arterial travel time for the Spine Operational Area dissemination methods include DMS, 511, and social media. It will support wide area/corridor alerts. Includes enhancements to 511 and other en-route notifications directly to travelers.
Regional Archived Data System (RADS) Expansion	Spine Operational Area	This strategy benefits agencies with real-time and historical data 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.
Video Distribution System Enhancement	Spine Operational Area	This strategy benefits agencies with real-time situational awareness primarily for first responders through web based video sharing. It supports agencies to implement alternate traffic and transit routing decisions.
Probe Data Expansion	Spine Operational Area	Additional probe data will be acquired from a third party for the Spine Operational area. The probe data will provide speed data on arterials and arterial travel times will derived from this data.

Intelligent Transportation Systems - PHX CAP

I-10/I-17 SPINE PROJECTS -CAPITAL

PHOENIX PROJECTS	PROJECT #	TOTAL	Contingency (15%)	Design (10%)	Program Mgt (10%)	Supported 3 Yr Ongoing Cost	GRAND TOTAL	Agreements (IGA) IGA w/MCDOT for Workstation
TransSuite Module Licensing, Integration, and Workstation for MCDOT		\$ 230,000	\$ 34,500	\$ -	\$ 23,000	None requested	287,500	
I-17 (L101 to I-10) and I-10 West CCTV monitoring coverage		\$ 870,000	\$ 130,500	\$ 87,000	\$ 87,000	None requested	1,174,500	
I-17 (L101 to I-10) and I-10 West Traveler information signs including DMS and blank out detour signing		\$ 3,800,000	\$ 570,000	\$ 380,000	\$ 380,000	None requested	5,130,000	
I-17 (L101 to I-10) and I-10 West diversion arterials detection installation		\$ 4,300,000	\$ 645,000	\$ 430,000	\$ 430,000	None requested	5,805,000	
Installing fiber connections on diversion routes		\$ 100,000	\$ 15,000	\$ 10,000	\$ 10,000	None requested	135,000	
Consultant support for detour plans and signal timing.		\$ 950,000	\$ 120,000	\$ -	\$ 80,000	None requested	1,150,000	
		\$ 10,250,000	\$ 1,515,000	\$ 907,000	\$ 1,010,000		13,682,000	

PHOENIX PROJECTS - Description	Project Limits	Project Function
Purchase of TransSuite Event Module & Licensing, integration into existing TransSuite At COP, and purchase and install Workstation for MCDOT for after hours support	Citywide, only one license needed regardless of project limits	To allow COP TMC or MCDOT to implement pre-defined incident management plans in response to ICM needs based on Spine traffic requirements
Install CCTV cameras on up to 3 parallel arterial routes along each of I-10 and I-17.	I-17 from L101 to I-10 along 7th Ave, 19th Ave and 35th Ave I-10 from L101 to SR 202 along McDowell Rd., Thomas Rd, Indian School Rd, Van Buren St, Broadway Rd., Baseline Rd., 48th St., Buckeye Rd.	The CCTV cameras will allow COP TMC staff as well as ADOT, MCDOT, other partner agencies and public safety personnel to, in real time, observe roadway conditions and make any necessary changes in response to traffic pattern conditions to alleviate potential or developing bottlenecks. This ability can allow for public safety and first responders to concentrate on events and any other secondary or tertiary events developing.
Install DMS and/or blank out signs on primary detour routes for parallel arterial routes to trailblaze detours off of and back to I-10 and I-17.	Detour routes on parallel arterials along I-17 from L101 to I-10. Detour routes on parallel arterials along I-10 from L101 to SR 202.	The dynamic detour signing will direct detoured traffic from the end of the off ramp coming from the freeway along the detour route and back to the on ramp leading to the freeway. The trailblazing will provide traveler information in aiding the traveling public, particularly those unfamiliar with the local streets network, to traverse the optimized detour route and ensure that egress and ingress back to the freeway occurs in an orderly and efficient manner.
Install detection at all major intersections along the detour routes	Parallel arterials to I-17 from L101 to I-10 Parallel arterials to I-10 from L101 to SR 202	Detection will acquire necessary data to provide measures of effectiveness so that TMC Operators both in Phoenix and partner Agencies will have real time feedback of the detour operations. The data can be stored to serve as historical data of roadway and intersection conditions allowing for "before and after" studies to refine and improve signal, roadway, and detour operations.
Install fiber connections on diversion routes	Adjacent arterial intersections along I-17 from L101 to I-10 at each interchange. Adjacent arterial intersections along I-10 from L101 to SR 202 at each interchange	Utilizing ADOT fiber (designated fiber strands allocated for COP use) along the freeway, interconnect the proposed COP CCTV's, DMS, and signals at the arterials back to the COP TMC by adding branch fiber between freeway and adjacent intersection to ensure sufficient bandwidth and reliability for all the devices.
Consultant support for detour plans and signal timing along the 150 + miles of arterials paralleling the 48 miles of the Spine Operational Area within the City of Phoenix	Detour routes on parallel arterials along I-17 from L101 to I-10. Detour routes on parallel arterials along I-10 from L101 to SR 202.	As was done for the TSOP project along I-10 from 35th Ave to 83rd Ave., a consultant will be utilized to assist in the development of the detour plans to identify the detour, recourses needed (police officers, cones, barricades, etc.), and the development of the related traffic signal plans.

Intelligent Transportation Systems - CHANDLER CAP

I-10/I-17 SPINE PROJECTS -CAPITAL

CHANDLER PROJECTS	PROJECT #	TOTAL	(15%)	Design (10%)	(10%)	Ongoing Cost	GRAND TOTAL	Agreements (IGA)
I-10 Alt. Routes - ITS Infrastructure Improvements		\$ 1,000,000	\$ 150,000	\$ 100,000	\$ 100,000	\$ 60,000	\$ 1,410,000	
		\$ 1,000,000	\$ 150,000	\$ 100,000	\$ 100,000	\$ 60,000	\$ 1,410,000	

CHANDLER PROJECTS - Description	Project Limits	Project Function
I-10 Alternative Routes - ITS Infrastructure Improvements	Arterials in Chandler parallel to I-10 in the Spine Operational Area	Provide additional ITS devices along the parallel routes to provide detection and monitoring of conditions along the alternate routes and provide guidance to traffic diverted from I-10.

Intelligent Transportation Systems - TEMPE CAP

I-10/I-17 SPINE PROJECTS -CAPITAL

TEMPE PROJECTS	PROJECT #	TOTAL	Contingency (15%)	Design (10%)	Program Migt (10%)	Supported 3 Yr Ongoing Cost	GRAND TOTAL	Agreements (IGA)
Install DMS and Wireless Comm		\$ 450,000	\$ 67,500	\$ 45,000	\$ 45,000	None requested	607,500	
Install CCTV and Wireless Comm		\$ 150,000	\$ 22,500	\$ 15,000	\$ 15,000	None requested	207,500	
Rebuild Signals at Warner/I-10 and University/SR143		\$ 700,000	\$ 105,000	\$ 70,000	\$ 70,000	None requested	945,000	
Fiber Optic Installation		\$ 1,000,000	\$ 150,000	\$ 100,000	\$ 100,000	None requested	1,350,000	
Install detection at signals along parallel arterial routes		\$ 400,000	\$ 60,000	\$ 40,000	\$ 40,000	None requested	540,000	
Consultant support for detour plans and signal timing		\$ 150,000	\$ 22,500	\$ 15,000	\$ 15,000	None requested	202,500	
		\$ 2,850,000	\$ 427,500	\$ 285,000	\$ 285,000		3,847,500	

TEMPE PROJECTS - Description	Project Limits	Project Function
Install DMS and Wireless Comm	Arterials parallel to I-10 in Tempe in the Spine Operational Area	Provide travelers with information regarding closures, alternate routes, and travel times. Wireless radios will provide communication back to Tempe TMC.
Install CCTV and Wireless Comm	Arterials parallel to I-10 in Tempe in the Spine Operational Area	The CCTV cameras will allow COT TMC staff as well as ADOT, MCDOT, other partner agencies and public safety personnel to observe roadway conditions. TMC staff can make any necessary changes in response to traffic pattern conditions to alleviate potential or developing bottlenecks.
Rebuild Signals at Warner/I-10 and University/SR143	Specific Location as noted	Signal equipment and wiring needs to be replaced to upgrade signals to current standards. This will allow for the signals to be part of the traffic management system in the City.
Fiber Optic Installation	Arterials parallel to I-10 in Tempe in the Spine Operational Area	The installation of fiber optic lines will provide high speed communication for data and video transmittal to the TMC.
Install detection at signals along parallel arterial routes	Arterials parallel to I-10 in Tempe in the Spine Operational Area	Detection will acquire necessary data to provide measures of effectiveness so that TMC Operators will have real time feedback of the detour operations. The data can be stored to provide for "before and after" studies to refine and improve signal, roadway, and detour operations.
Consultant support for detour plans and signal timing	Arterials parallel to I-10 in Tempe in the Spine Operational Area	A consultant will be utilized to assist in the development of the detour plans to identify the detour, and the development of the related traffic signal plans.

Intelligent Transportation Systems - AVONDALE OPS

I-10/I-17 SPINE - OPERATIONS PROJECTS (Year 2015 - 2018 Operations)

AVONDALE PROJECTS	PROJECT#	TOTAL COST	Contingency (15%)	Design (10%)	Program Management	GRAND TOTAL	Agreements (IGA)
Avondale TMC Operations, add one FTE		\$ 359,233	N/A	N/A	Avondale	\$ 359,233	None
Maintenance Costs		\$ 180,000	N/A	N/A	Avondale	\$ 180,000	
						\$ 539,233	

PROJECT COST BREAKDOWN

PROJECT	UNITS	UNIT COST	3 YEAR COST	Strategy	Yr 4 - Yr 10 Costs
Avondale TMC Operations, add one FTE					
FTE - 3 Yr cost assumes 2.5% COLA	1	\$ 116,800	\$ 359,233	To provide extended coverage hours.	\$ 949,322
		Total	\$ 359,233		\$ 949,322
Maintenance Costs					
Annual ITS device maintenance	1	\$ 60,000	\$ 180,000	Maintenance of ITS devices in the Spine Operational Area	\$ 420,000
		Total	\$ 180,000		\$ 420,000
		3 Yr Total	\$ 539,233		\$ 1,369,322
		7 Yr Total			\$ 1,827,130

STARTUP/YR 1	YR 2	YR3
\$ 116,800.0	\$ 119,720.0	\$ 122,713.0
\$ 60,000.0	\$ 60,000.0	\$ 60,000.0
\$ 176,800.0	\$ 179,720.0	\$ 182,713.0
\$ 359,233.0	\$ 539,233.0	\$ 539,233.0

Intelligent Transportation Systems - AVONDALE CAP

I-10/I-17 SPINE PROJECTS -CAPITAL

AVONDALE PROJECTS	PROJECT #	TOTAL	Contingency (15%)	Design (10%)	Program Mgt (10%)	Supported 3 Yr Ongoing Cost	GRAND TOTAL	Agreements (IGA)
Video Management Software		\$ 50,000	\$ 7,500	\$ 5,000	\$ 5,000	None requested	\$ 67,500	
ATMS Software Upgrade		\$ 250,000	\$ 37,500	\$ 25,000	\$ 25,000	None requested	\$ 337,500	
Expand CCTV Coverage		\$ 120,000	\$ 18,000	\$ 12,000	\$ 12,000	None requested	\$ 162,000	
Corridor Timing Plans		\$ 60,000	\$ 9,000	\$ 6,000	\$ 6,000	None requested	\$ 81,000	
Upgrade Detection		\$ 400,000	\$ 60,000	\$ 40,000	\$ 40,000	None requested	\$ 540,000	
		\$ 880,000	\$ 132,000	\$ 88,000	\$ 88,000		\$ 1,188,000	

AVONDALE PROJECTS - Description	Project Limits	Project Function
Purchase Video Management software to expand City staff capabilities at the TMC. Currently TMC is limited to 8 inputs.	Citywide, only one license needed regardless of project limits.	To allow COA TMC to view additional intersections concurrently. This would improve COA TMC effectiveness during an ICM event.
Purchase of ATMS software upgrade that is compatible with ADOT/MCDOT software. Integration for MCDOT for after hours support.	Citywide, only one license needed regardless of project limits.	To allow COA TMC or MCDOT to implement pre-defined plans in response to ICM needs based on Spine traffic requirements.
install CCTV camera at 107th Ave and Van Buren St, including communication.	107th Ave is the only intersection within the study limits not currently connected to the City's network.	The CCTV cameras will allow COA TMC staff as well as ADOT, MCDOT, other partner agencies and public safety personnel to, in real time, observe roadway conditions and make any necessary changes in response to traffic pattern conditions to alleviate potential or developing bottlenecks. This ability can allow for public safety and first responders to concentrate on events and any other secondary or tertiary events developing.
Consultant support for signal timing plans	Detour routes on parallel arterials along I-10	Provide timing plans that can be implemented to manage traffic being diverted from I-10 through Avondale.
Upgrade detection	Various intersections within the project area.	Increases flexibility at TMC's with detection. Also, allows trouble shooting remotely.



ITS Strategic Plan 2012



December 2012

ITS Strategic Plan

2012



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Acknowledgements

MAG Member Agencies

Apache Junction, City of

Arizona Department of Transportation

Avondale, City of

Buckeye, Town of

Carefree, Town of

Cave Creek, Town of

Chandler, City of

El Mirage, City of

Fort McDowell Yavapai Nation

Fountain Hills, Town of

Gila Bend, Town of

Gila River Indian Community

Gilbert, Town of

Glendale, City of

Goodyear, City of

Guadalupe, Town of

Litchfield Park, City of

Maricopa County

Mesa, City of

Paradise Valley, Town of

Peoria, City of

Phoenix, City of

Queen Creek, Town of

Salt River Pima-Maricopa Indian Community

Scottsdale, City of

Surprise, City of

Tempe, City of

Tolleson, City of

Wickenburg, Town of

Youngtown, Town of

***The following additional agencies provided input to the
ITS Strategic Plan as part of the MAG ITS Committee:***

Arizona Department of Public Safety

Valley Metro

ITS Strategic Plan

2012



Executive Summary

The MAG region is a relatively robust area in terms of deployment and integration of ITS technologies and systems. The 2001 MAG ITS Strategic Plan helped to guide and prioritize implementation of key systems to support traffic management and operations, traveler information, and traffic incident management.

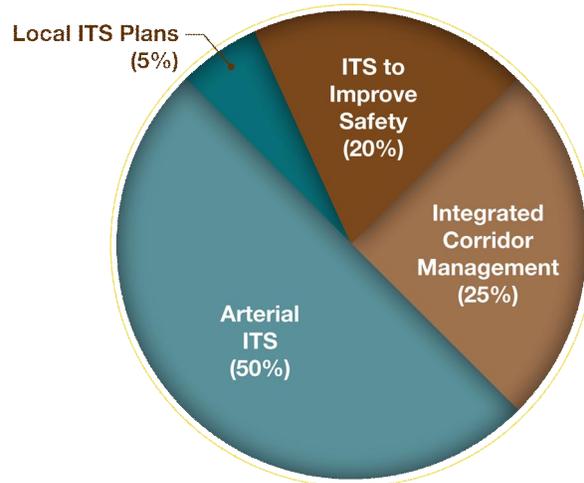
As the region looks ahead, there is a key focus on improving connectivity among systems and agencies, as well as developing a sustainable path for the region's investments in ITS for supporting a more integrated and coordinated multimodal transportation network. The MAG ITS Strategic Plan provides a framework, a set of regional ITS priorities and a strategy for focusing available funding toward achieving regional mobility and safety objectives, as well as continuing to support local agencies in deploying and enhancing their ITS programs.

The following represent the ITS goals for the MAG region:

- ⇒ Actively manage transportation systems with available tools and technologies to better respond to recurring and non-recurring congestion in a way that improves both mobility and safety for the region's travelers.
- ⇒ Operate and maintain our ITS infrastructure to maximize its effectiveness and impact on the transportation network, and provide adequate staff, training and funding resources to accomplish the required operations and management.
- ⇒ Plan and coordinate deployments, and collaborate on strategies that will help to balance demand across transportation modes in the region to maximize our available network capacity.
- ⇒ Leverage staff technical resources, regional systems and tools, and agency operations across the region to provide for more coordinated system management and operations.
- ⇒ Focus on new technology applications and operational improvements to enhance safety on our region's multi-modal transportation network.
- ⇒ Pursue cost-effective and technically feasible alternatives and partnerships to better leverage agency funding resources for ongoing system management and operations.
- ⇒ Provide the region's travelers with accurate and up to date information on the transportation network through a variety of systems and technologies.
- ⇒ Actively promote the benefits and impacts of ITS investments in the region to local decision makers and to the public.
- ⇒ Measure performance and report on the impact of ITS and regional operations strategies, and use outcomes of performance measures to better manage the transportation system.

MAG's ITS goals and focus on modal priorities and investment allocation goals directly support the MAG Regional Transportation Plan and the Congestion Management Plan.

As part of this MAG ITS Strategic Plan, an important objective is to establish regional and programmatic priorities to help direct regional investments in ITS infrastructure, through the MAG Transportation Improvement programming process, based on strategic regional goals and objectives. This regional investment strategy marks a focused effort within the MAG region to target the available funding resources toward important initiatives, including Integrated Corridor Management strategies, continued build-out and enhancement of arterial management capabilities as well as support for smaller agencies in the region in developing ITS plans to guide their growing programs.



Freeway and transit ITS, funded separately through the MAG Regional Transportation Plan, can align and coordinate future investments with the priorities identified with the Regional ITS Strategic Plan.

In addition to the federal Congestion Mitigation and Air Quality (CMAQ) funding through the MAG Transportation Improvement Program and available local funds, state and local agencies are encouraged to explore public-public and public-private partnering strategies for ITS projects and programs.

The MAG ITS Strategic Plan emphasizes a transition from “projects” to “programs”. An important regional objective is to expand Integrated Corridor Management strategies and principles which are aimed at balancing demand and capacity across freeway, arterial and multimodal transportation systems. The region needs to develop an Integrated Corridor Management strategy to guide the planning, implementation, integration and operation of local and regional ITS investments to work toward this goal. This may include evaluating future Freeway Management System investments and priorities to support enhanced real-time monitoring and operations strategies to support future Integrated Corridor Management and Active Traffic Management Strategies.

Monitoring, measuring and reporting on performance of the region’s transportation networks will be critical to ensuring operational strategies and ITS investments are having the desired impact on mobility, safety, and demand management. Key to an effective performance monitoring program will be a robust and comprehensive data set, as well as an agreed-upon set of metrics for freeways, arterials and transit. Performance monitoring goes beyond generating performance reports, and real-time performance data across modes can benefit freeway, arterial and transit operations to support better real-time strategy implementation.

The ITS Strategic Plan has been developed to allow for flexibility and innovation in how agencies in the MAG region plan for and implement ITS projects. Over time, certain factors could warrant an update to the Plan, such as a new Regional Transportation Plan, a shift in regional priorities, the need to re-evaluate funding allocation targets, specific policy direction that affects how ITS projects are prioritized, or changes to local or federal funding availability for ITS projects in the region. The MAG ITS Committee will periodically review the goals and strategies contained within the ITS Strategic Plan and recommend updates as appropriate for formal adoption by MAG.

ITS Strategic Plan 2012

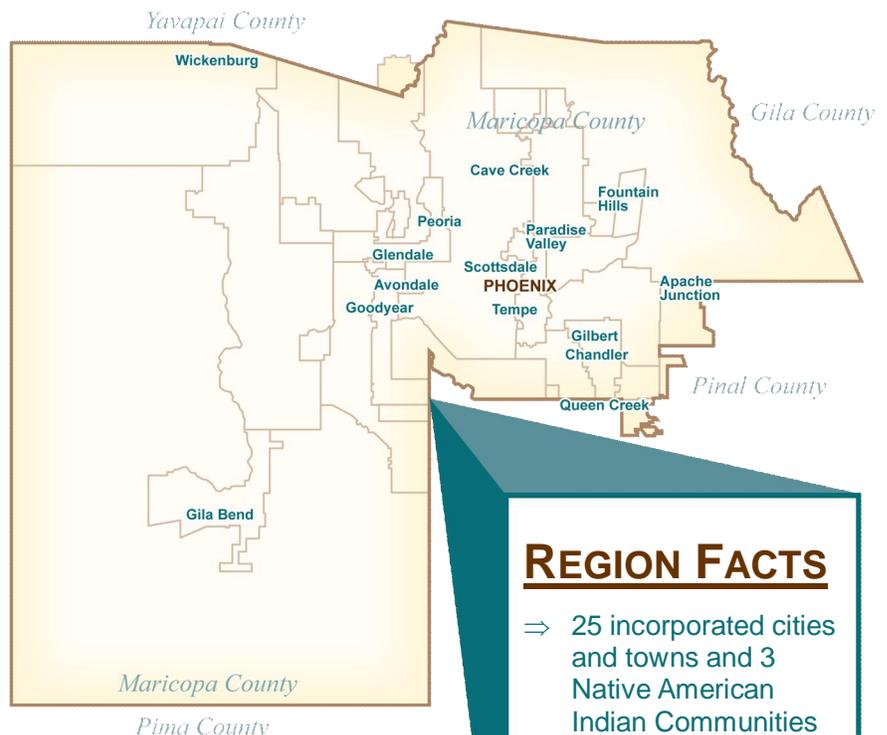


MAG Regional Overview

REGIONAL BACKGROUND

The Maricopa Association of Governments (MAG) is the metropolitan planning organization for the Phoenix metropolitan region that is made up of 31 member agencies, including the Arizona Department of Transportation (ADOT), Maricopa County, 25 cities and towns, three Native American communities and the Citizen’s Transportation Oversight Committee. The long-term planning for transportation infrastructure in the region (arterial, freeway and transit) and related funding decisions are made at MAG and are documented in the Regional Transportation Plan (RTP). Intelligent Transportation Systems, or ITS, collectively refers to advanced technology applications used for efficient traffic operations and management. The recommendations identified in this ITS Strategic Plan will guide regional investments in ITS, starting with the programming of projects in FY2015 - 2017. These regional ITS priorities also will be incorporated in the next update of the RTP.

The MAG region has grown from a population of 1.5 million people in 1980 to 3.8 million people in 2010. By 2030, the region is projected to grow to more than 6,000,000 people, essentially adding more than one million people per decade over the next 25 – 30 years. The transportation system as a whole has experienced significant growth, including an expanded freeway network, additional arterials, and transit services expanding to meet the demands of the region’s growing population and geographic expansion. With these population projections, the transportation network will need to accommodate almost double the daily trips compared to today.



REGION FACTS

- ⇒ 25 incorporated cities and towns and 3 Native American Indian Communities
- ⇒ 700 freeway/highway centerline miles
- ⇒ Arterials carry more than half of the total vehicle-miles-traveled in the region

Over the last two decades, the state, local agencies, transit and public safety agencies have been actively implementing management systems and infrastructure which have significantly enhanced the capability of agencies in the region to operate and manage the transportation system.

STRATEGIC DIRECTION FOR ITS IN THE MAG REGION

The MAG region is a relatively robust area in terms of deployment and integration of ITS technologies and systems. The 2001 MAG ITS Strategic Plan helped to guide and prioritize implementation of key systems to support traffic management and operations, traveler information, and traffic incident management.

As the region looks ahead, there is a key focus on improving connectivity among systems and agencies, as well as developing a sustainable path for the region's investments in ITS for supporting a more integrated and coordinated multimodal transportation network. Important objectives for the region's ITS program include the following:

- ⇒ Agencies need to collaborate on traffic management and operations strategies that will maximize available capacity and leverage the tools and systems that are available across freeway, arterial and transit networks and across jurisdictions;
- ⇒ Integrated Corridor Management (ICM) principles should be applied to different geographic areas to address unique freeway/arterial coordination issues, to improve safety and mobility during periods of recurring congestion, as well as to support traffic management during non-recurring congestion;
- ⇒ Available regional funding needs to be focused toward those strategies, systems and technology applications that can address issues with regional impact, while still helping to support local agencies in addressing their ITS program needs; and
- ⇒ Continued improvement of the data quality of the regional traffic data archive so that it can support real-time operations, mobility and safety analyses, and system performance monitoring.

MAG ITS Committee stakeholders identified the following needs as key priorities that should be incorporated into the goals and focus areas for the ITS Strategic Plan:

- ⇒ Operations and maintenance (O&M) of ITS systems and devices, and having adequate funding to support required O&M;
- ⇒ Build out communications infrastructure to provide the needed connectivity to current and future devices, as well as to enable agency-to-agency communications (i.e., migrate away from leased lines);
- ⇒ Focus device deployment, integration and coordination on those arterials that will have the highest impact on regional mobility;
- ⇒ Need to be able to actively measure benefits and effects of systems and ITS investments, and articulate these benefits to regional decision makers and officials;
- ⇒ Focus on expanding real-time traveler information capabilities; and
- ⇒ Need to focus on staff development, staff resources for sustaining a robust regional system, and providing technical staff with the appropriate training.

ITS TECHNOLOGY APPLICATIONS ON THE FREEWAY NETWORK

The Arizona Department of Transportation builds, operates and maintains the regional freeway network. As part of this network, ADOT operates a Freeway Management System (FMS) currently covering approximately 150 miles of the Phoenix metropolitan area freeway system. The FMS supports traffic management, incident management and response, special event traffic management and traveler information. Components of ADOT's FMS include vehicle detection, closed-circuit television (CCTV) camera surveillance, dynamic message signs (DMS), ramp meters, and a fiber-optic/wireless communications network. The FMS fiber-optic communications paths also provide connectivity to local agency traffic management systems via the Regional Community Network (RCN).

ADOT's Traffic Operations Center (TOC) is staffed 24 hours per day, 365 days per year. A recent upgrade to the TOC supports improved traveler information, incident management coordination, and real-time monitoring capabilities. The 2003 MAG Regional Transportation Plan provided nearly \$143 million for expanding the FMS to cover nearly 224 miles. Current FMS plans indicate a complete build-out of the Phoenix FMS by 2023; however, evolving technology, new data collection methods and new regional priorities may result in the need to revise the FMS implementation schedule. This will be carried out by the MAG ITS Committee in partnership with ADOT considering future anticipated travel demand on the freeway network.

ADOT has been enhancing the FMS to better support traveler information (including additional travel time display signs on freeways) and reduce congestion due to traffic incidents through better regional coordination with the Traffic Incident Management (TIM) Coalition. A major improvement is the 2011 upgrade of the central control system that has provided the capability to control devices such as ramp meters. Other new initiatives for ADOT include managing all ADOT operated traffic signals at interchanges with a centralized signal control system, and developing an alternate routing plan for freeways.



ITS TECHNOLOGY APPLICATIONS ON THE ARTERIAL NETWORK

The MAG region is served by a robust arterial street network comprised of several key east-west and north-south arterial corridors that traverse multiple jurisdictions. ITS applications currently in use in the region to support arterial traffic operations and management include:

- ⇒ Vehicle detection – loops, video detection and some limited use of Bluetooth technology;
- ⇒ CCTV cameras on key routes and at some intersections;
- ⇒ Permanent arterial DMS;
- ⇒ Central traffic control and management systems operated from city, town and County traffic management centers;
- ⇒ Wireless and fiber telecommunications to enable real-time device operations and control; and
- ⇒ Agencies also have invested in innovative ITS infrastructure and systems including adaptive traffic signal control, arterial travel times on DMS, and Bus Rapid Transit.



A recent state-of-the-system survey completed by MAG noted the following about arterial ITS in the region:

- ⇒ Over 70% of the traffic signals in the region are operated from centralized signal management systems;
- ⇒ Agencies plan to double the number of CCTV on arterials and half of all cameras have shared control/viewing between at least two jurisdictions; and
- ⇒ 95% of agencies are planning for additional devices, additional staff resources, and regional connectivity.

Local agencies plan to double the number of CCTV on arterials, and the number of arterial DMS is expected to grow by 75%

ITS TECHNOLOGY APPLICATIONS IN PUBLIC TRANSIT

Public transit services (bus, RAPID, local circulators, light rail and LINK/Bus Rapid Transit) in the region are operated and managed by Phoenix Public Transit, Valley Metro, and local agencies including the Cities of Tempe and Glendale. These entities have been implementing technologies and systems to support transit operation for fixed route, rapid and local circulator buses. Phoenix Public Transit hosts the following ITS systems on behalf of the region:

- ⇒ Vehicle Management System (VMS);
- ⇒ Fare Collection System (FCS);
- ⇒ Radio Communications for bus and rail operations (VMS and RWC);
- ⇒ Route planning and schedule (HASTUS); and
- ⇒ Bus Stop Management (BSM).

Transit traveler information is provided through a variety of dissemination channels. Valley Metro hosts the www.valleymetro.org web site which includes route, schedule and fare information for bus and light rail services as well as an on-line trip planning tool. The trip planning application is updated every minute with current information from the VMS from Phoenix Public Transit servers. The Valley Metro call center also is equipped with VMS workstations to provide call center operators with current information about schedules and routes. There is a link from the www.az511.gov site to the Valley Metro web site, and the 511 phone system includes a transfer option to the transit customer service call center.

Phoenix Public Transit provides a Bus Operation Control Center, which monitors fleet movements and radio communication for region buses utilizing VMS and radio communications. Valley Metro operates a separate rail control center for light rail.

There are multiple operating garages for transit and each are equipped with VMS workstations and transmit data to Phoenix Public Transit servers. These workstations allow operators to monitor their assigned vehicles. The VMS system (software application, central servers and garage workstations) will complete an upgrade in December 2012.



PLANNING FOR OPERATIONS IN THE MAG REGION

Planning for Operations is a joint effort between operations and planning that encompasses the important institutional underpinnings needed for effective regional transportation systems management and operations. A framework developed by FHWA has helped to guide planning for operations and improved operations collaboration at the regional levels. Planning for operations includes three important aspects:

- ⇒ Regional transportation operations collaboration and coordination activity that facilitates Regional Transportation Systems Management and Operations;
- ⇒ Management and operations considerations within the context of the ongoing regional transportation planning and investment process; and
- ⇒ The opportunities to link regional operations collaboration and regional planning.

MAG encourages and supports these principles through its ITS program development, regional project prioritization strategies, and through the MAG ITS Committee decision-making process.

Key initiatives in the MAG region that support enhanced planning for operations are described below.

Regional Concept of Transportation Operations (RCTO)

The 2003 RCTO identified the need for traffic management and operations with a regional perspective; defined roles and responsibilities at three different levels of transportation operations; and set performance measures against goals. An update to this document will set a new bar and initiatives for the region's ITS development.

The RCTO was a first step in addressing operations priorities and initiatives at a regional level. The priorities and initiatives within the RCTO has helped to guide greater collaboration in the MAG region for traffic management and operations.

MAG's RCTO was nationally recognized as a benchmark in regional operations planning.



Regional Dynamic Traffic Assignment Model

The effectiveness of traffic management strategies can be difficult to evaluate before they are implemented, especially when these strategies have system-wide impacts. MAG has developed an important transportation simulation tool to support operations planning and in the evaluation of benefits of ITS applications in the MAG region. The Dynus-T Dynamic Traffic Assignment (DTA) model is a mesoscopic model that provides a cost-effective and efficient means of evaluating area-wide impacts. This tool will be used to support some of the analysis required for key operational initiatives, such as integrated corridor management strategies, incident impacts across a large area, or other multi-agency operations strategies.

REGIONAL SYSTEMS AND RESOURCES

There are several important regional systems and resources that are in place to help support agency information sharing, regional traveler information, as well as analysis and evaluations.

Highway Conditions Reporting System (HCRS)

The HCRS is ADOT's closure and restriction information system which consolidates planned event information, construction impacts and restrictions, and incident information. The information input to HCRS populates the public website (www.az511.gov) and the 511 phone system. Local agencies also can input local road impact and closure information into HCRS. However, none of the agencies operate on a 24-hour basis. A new feature allows agencies to select an Area of Influence to receive alerts about incidents or impacts on freeways and arterials that could impact their jurisdiction.

Regional Community Network (RCN)

The MAG RCN is planned to establish a fiber communications network through a topology of three sub-rings (West of I-17 Region, Northeast Region, and Southeast Region). The RCN links multiple agencies throughout the MAG region to facilitate the sharing of traffic management technologies, video conferencing capabilities, disaster recovery backups, and 9-1-1 communications. The first phase, funded by MAG, has been completed. This phase consists of fiber deployment and physical connection of 11 agencies utilizing mostly existing agency-owned fiber and the hardware/software to share information.

The RCN has linked 21 facilities thus far enabling participating agencies to utilize this fiber communications network to share traffic cameras, exchange data, video conferencing, and provide additional paths between 9-1-1 dispatch centers. The RCN will be extended to link local agencies in the West Valley and other parts of the region utilizing available capacity in the FMS fiber backbone.

AZTech™ Regional Archived Data System (RADS)

The AZTech™ RADS collects and stores traffic data, in a centralized archive data server located at the ADOT TOC, from the various systems in the MAG region. The primary data in RADS comes from the ADOT FMS, ADOT HCRS and Phoenix Fire Dispatch Center. The archive has the ability to store traffic signal information and traffic data, such as volumes and speeds. Plans are underway to add transit data to the RADS database. ADOT FMS data stored in RADS is used to calculate and display travel times on freeway DMS. Enhancements to the RADS system and servers have been recommended in the past by MCDOT as new arterial ITS improvement projects and have been programmed by MAG using Arterial ITS funds.

ADVANCING ITS IN THE REGION

The MAG region has had a strong focus on continued deployment and integration of ITS systems and technologies to support enhanced regional mobility and safety. Over the last two decades, the state, Maricopa County, local cities and transit agencies have made significant investments in infrastructure and systems for freeways, arterials and transit networks, as well as worked toward leveraging these investments toward a more collaborative regional operations strategies.

Key ITS achievements in the MAG region include:

- ⇒ Thirteen local agency traffic management and operations centers and one statewide 24/7 center operated by ADOT provide centralized points for monitoring and managing ITS and traffic control systems.
- ⇒ Travel times on Phoenix area freeways are available on a select number of dynamic message signs during morning and afternoon commute periods. ADOT plans to expand travel times to include additional signs and destinations in the near future. The City of Chandler provides arterial travel times, which was the first such application in the region for arterials.

- ⇒ The RCN establishes physical connectivity among transportation management and operations centers (and other entities) in the region, and the AZTech™ Center-to-Center network provides for the virtual connectivity to allow for data sharing among centers, shared CCTV camera viewing and control and shared DMS message posting (per established operational protocols). A concept has been prepared for transit data integration into the Center-to-Center system.
- ⇒ MAG's Traffic Signal Optimization Program (TSOP) provides funding for local agency corridor traffic signal timing and coordination activities. Since 2003, MAG has invested approximately \$1.5 million in the TSOP program which has improved signal operations, timing and coordination at more than 2,100 intersections throughout the region.

Over the last few years, there have been some key initiatives that are helping to advance important operations objectives in the MAG region. These have involved multiple agencies and partners, and build on key regional priorities for ITS and traffic management and operations.

Traffic Incident Management Coalition

A study by MAG indicated that more than 40% of the congestion on the region's freeway system is caused by non-recurring congestion. Improved freeway incident management has been identified as a key priority for the MAG region dating back to the original Strategic Plan in 2001.

Established in 2010 as a result of a Traffic Incident Management Workshop organized by the Federal Highway Administration (FHWA), MAG and AZTech™, the AZTech™ regional TIM Coalition is dedicated to collaborating for safer and more efficient management of incidents that occur on, or significantly impact, the region's roadways to meet the objectives of the National Unified Goal (NUG). Successful TIM procedures will decrease the length and effects of traffic incidents while improving the safety of motorists, crash victims and emergency responders.



The AZTech™ TIM Coalition is initially focused on improving processes and coordination to support freeway incidents, but there also is a focus on improving freeway-arterial coordination to support incident management.

Operations Action Plan

In 2009, FHWA identified Arizona and several other states as "Opportunity States", and encouraged the region to develop an Operations Vision and Action Plan to help shift the focus from a "build culture" to an "operations culture". Within the Plan are a number of vision statements that have related focus areas and action steps that incorporate numerous agency roles and responsibilities in being able to complete the action steps, none of which involve any regional decisions on transportation resource allocation.

The Opportunity State discussions were carried out as part of AZTech™ meetings, with participation from state and local agencies throughout the MAG region. Activities have included an Operations Summit and development of Transportation Performance Measures focused on traffic operations. A few of the performance measures that were not currently included in the MAG performance measures for the region will be included in future MAG reports on performance measures. This will result in an enhanced report on transportation performance measures produced by MAG.

SAFETY AND EFFICIENCY BENEFITS OF ITS

The evaluation of the benefits of ITS investments is important to identify if the investment in ITS infrastructure is improving safety and mobility. Evaluation outcomes are also an important tool for communicating to local leaders and to the traveling public about how agencies are improving travel on the region's roadways. Some local benefits experienced as a result of improved operations through ITS include:

Arterial Operations Benefits:

Bell Road Traffic Signal Timing and ITS (2008-2010) – 25% westbound travel time reduction (5 minutes saved) ¹

Town of Gilbert Town-wide Retiming Project – 30% reduction in delay in the peak direction ²

Freeway Incident Management Benefits:

DPS Average Time to Remove Blockage from Travel Lanes – 49.8 min 2011 Q2 to 34.2 min 2011 Q4 (31% improvement) ³

Traveler Information Benefits:

ADOT DMS Travel Time Program – Users who changed their route based on travel time information provided went from 25.4% to almost 42% during the first year of the program. The increase is attributed to user confidence in the information provided. ⁴

Special Event Management Benefits:

Using real-time systems for vehicle ingress and egress (traveler information, signal operations and CCTV), agencies have been able to reduce the number of law enforcement officers in the field directing traffic such as in Scottsdale. ⁵

¹ Maricopa County DOT Bell Road 2010 Before and After Study

² Town of Gilbert 2011 Bi-Annual Signal Retiming Before-and-After Study

³ "TIM Performance Measures and Reducing Secondary Crashes," webinar presented by Capt. Jeff King, AZDPS, April 18-19, 2012

⁴ ADOT DMS Travel Time Pilot Project Evaluation, Final Report, April 2011

⁵ Anecdotal information from the City of Scottsdale, AZ

ITS Strategic Plan 2012



Previous Regional ITS Planning Efforts

CAREFUL PLANNING GUIDES ITS IMPLEMENTATION

The MAG region has been systematically planning and updating various ITS related plans for more than 10 years. Efforts to develop these plans have all have provided valuable guidance on ITS needs and priorities for the MAG region. Previous planning efforts by MAG and its partner agencies that have guided ITS implementation and operations in the region are shown in the table below.

Several local agencies in the MAG region have embarked on various ITS strategic or master plans over the last decade. These have been primarily focused on individual agency needs, recommended ITS infrastructure and deployment timeframes, and identifying how ITS could help to support other city/agency needs, such as law enforcement. Agencies have used these plans to help guide project development, Capital Improvement Program planning and programming, to provide support for MAG TIP funding requests and applications, as well as to help identify where ITS could be integrated with other capital improvements.

Regional ITS Planning Effort	Summary Description
ITS Strategic Plan (2001)	Identified needs for the MAG Region that could be addressed through ITS. Included a multi-year deployment plan and telecommunications plan to guide TIP project development and phasing.
Regional Concept of Transportation Operations (2003)	This was a comprehensive effort to plan for more effective and multi-agency operations in the MAG Region, and included three- and five-year goals. Initial performance metrics also were developed.
MAG Regional ITS Architecture (2001, 2009, 2010)	The 2001 Regional ITS Architecture (RIA) was updated in 2009 and 2010. This included capturing existing functional relationships as well as mapping out future desired capabilities. The MAG RIA is web-based and accessible by agencies to help support ITS project development and systems engineering.
Arterial Transportation Systems Management and Operations Survey (2011)	In 2011, MAG conducted a survey of the current state of arterial ITS implementation, operations, and plans for future deployment. This survey captured existing and planned infrastructure, current agency operating practices, and obtained input on future needs for arterial ITS in the region.
ITS Planning Guidelines for Smaller Jurisdictions (2012)	In 2012, MAG developed guidelines that could be readily utilized by smaller jurisdictions to plan, implement and operate ITS and traffic management infrastructure in these communities.

KEY FACTORS

Through these regional planning efforts and discussions at the MAG ITS Committee, a number of key factors for the region have emerged and are brought forward into this planning effort:

- ⇒ Deployment of ITS devices on freeways and arterials has progressed through local agency capital projects and MAG TIP funded projects.
- ⇒ Arterial traffic signal coordination, in particular across jurisdictional boundaries, continues to emerge as a priority as part of ITS planning processes in the region.
- ⇒ Freeway and arterial incident management, and coordination between law enforcement, emergency responders and traffic management were identified as priorities dating back to the initial 2001 ITS Plan.
- ⇒ Transit mobility through signal priority has been identified as part of each ITS plan.
- ⇒ ITS strategies for non-motorized modes (pedestrian and bike) remain one of the few priorities from the original ITS Strategic Plan that have not been addressed as part of a regional strategy.
- ⇒ ITS applications to support safety had not been specifically identified in previous regional ITS strategic plans, although safety benefits may be an outcome of several strategies.
- ⇒ Articulating the benefits of ITS, improved operations, and overall benefit of investing in ITS remains a challenge. This includes communicating these benefits to decision makers and local/regional officials, as well as to the public.

ITS Strategic Plan

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MAG Region ITS Goals and Strategic Priorities

ITS GOALS

The following ITS goals have been identified for the MAG region, and will provide a baseline for alignment with the MAG TIP prioritization process for ITS project investments:

- ⇒ Actively manage transportation systems with available tools and technologies to better respond to recurring and non-recurring congestion in a way that improves both mobility and safety for the region's travelers.
- ⇒ Operate and maintain our ITS infrastructure to maximize its effectiveness and impact on the transportation network, and provide adequate staff, training and funding resources to accomplish the required operations and management.
- ⇒ Plan and coordinate deployments, and collaborate on strategies that will help to balance demand across transportation modes in the region to maximize our available network capacity.
- ⇒ Leverage staff technical resources, regional systems and tools, and agency operations across the region to provide for more coordinated system management and operations.
- ⇒ Focus on new technology applications and operational improvements to enhance safety on our region's multi-modal transportation network.
- ⇒ Pursue cost-effective and technically feasible alternatives and partnerships to better leverage agency funding resources for ongoing system management and operations.
- ⇒ Provide the region's travelers with accurate and up to date information on the transportation network through a variety of systems and technologies.
- ⇒ Actively promote the benefits and impacts of ITS investments in the region to local decision makers and to the public.
- ⇒ Measure performance and report on the impact of ITS and regional operations strategies, and use outcomes of performance measures to better manage the transportation system.

ITS Strategic Plan

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ITS PRIORITIES

The following table summarizes the ITS priorities that have been identified for the MAG region. These priorities are intended to provide a framework within which agencies will develop and collaborate on ITS programs and opportunities.

Focus Areas	Modal Priorities
Freeways	<ol style="list-style-type: none"> 1. Integrate dynamic traffic management technologies and operational strategies with ADOT FMS to improve safety and travel time reliability. 2. Seek out new cost-efficient technologies and partnerships. 3. Improve coordination with local agencies and operational responses to freeway incidents. 4. Expand and enhance real-time traveler information systems.
Arterials	<ol style="list-style-type: none"> 1. Support agency needs to connect ITS devices for real-time operations and management. 2. Support multi-agency efforts to streamline resources needed to manage, operate and maintain the network. 3. Collaborate on operational strategies on multi-jurisdictional corridors and expand arterial data and video sharing across regional systems. 4. Expand and increase the availability of arterial traveler information available to users. 5. Support interagency partnerships among traffic management, public safety, emergency response, transit, and maintenance. 6. Enable multi-agency operations for integrated corridor management and improved travel time reliability.
Transit	<ol style="list-style-type: none"> 1. Seek out opportunities to leverage multi-modal and arterial operations data. 2. Enhance real-time transit traveler information region wide. 3. Partner with arterial management agencies for improved transit mobility. 4. Collaborate with freeway and arterial traffic tools to influence mode shift. 5. Create a safe and secure transit system for customers. 6. Collect comprehensive system wide information on boardings and alightings.
Safety	<ol style="list-style-type: none"> 1. Improve safety on freeway and arterials through appropriate use of ITS technology and active traffic management. 2. Evaluate safety impacts of technology on freeways and arterials.

ALIGNING ITS GOALS WITH THE REGIONAL TRANSPORTATION PLAN

The MAG Regional Transportation Plan identifies regional investments for improvements in the transportation network. ITS applications have a direct impact on transportation network efficiency and operations and therefore have an important link to the RTP.

A number of goals and objectives have been identified for the region in the RTP, and the items that can be directly linked to the ITS Strategic Plan are as follows:

MAG Regional Transportation Plan Goal	MAG ITS Strategic Plan Alignment
<p>System Preservation and Safety Transportation infrastructure that is properly maintained and safe, preserving past investments for the future.</p>	<ul style="list-style-type: none"> ⇒ The ITS Strategic Plan emphasizes the importance of operations and maintenance of technology investments. ⇒ Agencies are encouraged to incorporate lifecycle planning and replacement of outdated infrastructure to maintain reliability of traffic management equipment and systems. ⇒ Safety is a key part of the ITS goals for the region as well as the modal priorities.
<p>Access and Mobility Transportation systems and services that provide accessibility, mobility and modal choices for residents, businesses and the economic development of the region.</p>	<ul style="list-style-type: none"> ⇒ Emphasizes integration of systems across modes to promote balancing demand and capacity across freeways, arterials and transit systems. ⇒ Integrated corridor management strategies are a priority emphasis area.
<p>Sustaining the Environment Transportation improvements that help sustain our environment and quality of life.</p>	<ul style="list-style-type: none"> ⇒ The ITS Strategic Plan and project programming process supports the CMAQ process for evaluating projects based on reducing delay and air quality impacts.
<p>Accountability and Planning Transportation decisions that result in effective and efficient use of public resources and strong public support.</p>	<ul style="list-style-type: none"> ⇒ MAG TIP funding resources for ITS are targeted toward high priority focus areas for the MAG region. ⇒ MAG ITS Committee members provide input to project ranking and project priority to balance project requests geographically and among agencies.

ITS Strategic Plan 2012



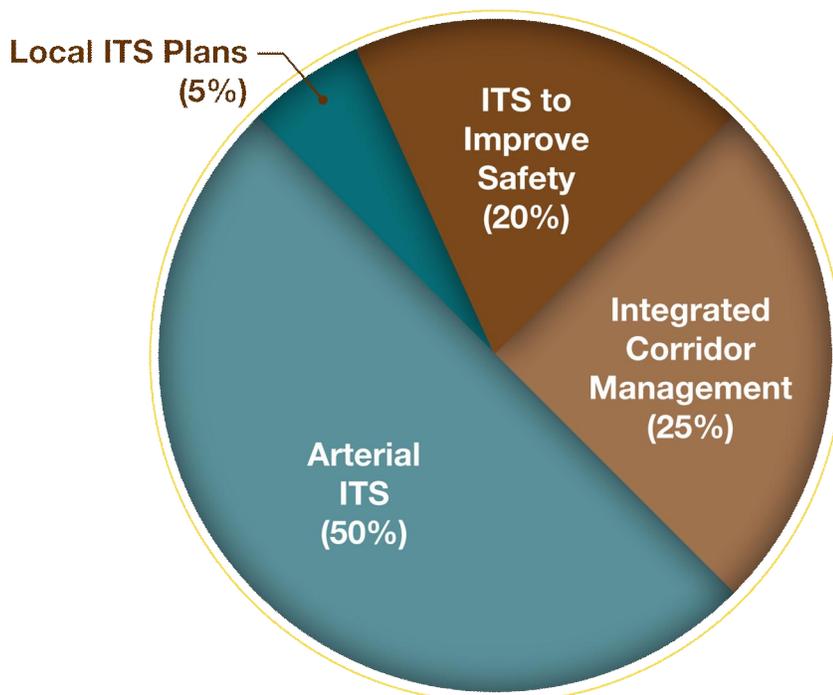
MAG Region's ITS Investment Priorities

REGIONAL ITS INVESTMENT STRATEGY

As part of this MAG ITS Strategic Plan, an important objective was to establish regional and programmatic priorities to help direct regional investments in ITS infrastructure, through the TIP programming process, based on strategic regional goals and objectives.

The TIP programming process since the 2001 ITS Strategic Plan has focused primarily on building ITS infrastructure that was desired by local agencies, that met all federal requirements for ITS, and that complied with the Regional ITS Architecture. By defining specific priorities for TIP funding allocation, along with a process to do so, it is envisioned that the region will be able to establish targets for the types of projects that are funded with regional TIP funds. These prioritization strategies are focusing ITS investments in strategic areas that are in addition to complying with CMAQ program funding requirements.

The following investment priorities are identified for the MAG region, and these targets and have been incorporated into the TIP programming process for ITS projects to be funded in FY 2015-2017. Future updates to this ITS Strategic Plan will review and potentially modify these targets.



This regional investment strategy marks a focused effort within the MAG Region to target the available federal funding resources toward important initiatives, including Integrated Corridor Management strategies, continued build out and enhancement of arterial management capabilities as well as support for smaller agencies in the region in developing ITS plans to guide their growing programs.

These resource investment priorities and allocations do not include freeway ITS or transit ITS. The freeway and transit programs are separately funded through the MAG RTP; the RTP establishes the priorities for program expansion as well as dedicates funding to support expansion and operations. Transit and freeway funding come from federal as well as local funding sources (through proposition 400).

The modal priorities and investment priorities are intended to provide guidance for future freeway management system planning and enhancements, as well as can be used to support transit ITS planning and implementation by Valley Metro and Phoenix Public Transit.

The MAG ITS Strategic Plan recognizes that the regional ITS program will continue to evolve over time and through incremental project development and implementation. Below is a summary of the types of projects envisioned for the different ITS Investment Priority areas.

By targeting available ITS funds toward high priority focus areas, the MAG region will be able to make effective use of funds to achieve important regional objectives.

ITS Investment Priority	Resource Allocation Goal	Example Projects for MAG TIP Funding
Arterial ITS Applications	50%	Includes traffic signals and traffic signal management systems, local traffic management centers and associated equipment, telecommunications, monitoring and detection,
Integrated Corridor Management	25%	Includes infrastructure and connectivity to support freeway/arterial coordination, multimodal integration and data sharing, inter-agency connectivity (transportation/transportation or transportation/public safety)
ITS Applications to Improve Safety	20%	Includes signal upgrades and enhancements that improve safety at intersections, pedestrian and crosswalk technologies, technologies to support warnings and alerts, technologies to support incident management
Local ITS Plans	5%	Includes funding to help local agencies develop or update their ITS strategic plans, implementation plans or deployment plans

The region's focus on ICM strategies is the result of the evolution of the region's transportation network and ITS program. ICM addresses a key need for the region to be more proactive in managing recurring and non-recurring congestion.

MAG began planning for an ICM program in 2007 in the west portion of the metropolitan area on I-10. This corridor segment is prone to daily congestion during AM and PM commute periods, and it carries a significant number of freight vehicles.

In the MAG region, ICM strategies will be used during periods of recurring congestion to:

- ⇒ Effectively balance demand among freeway, arterial and transit modes by managing available capacity across modes and implementing strategies that encourage mode shift;
- ⇒ Actively monitor demand on freeways, arterials and transit to be able to identify availability capacity; and
- ⇒ Collaborate to share information among agencies in real-time to be able to proactively implement traffic management strategies across the network.

ICM strategies also will be used in the MAG region to support more effective operations during incidents and other non-recurring events, including:

- ⇒ Implement technologies and systems that will support enhanced real-time monitoring and agency communications;
- ⇒ Support proactive freeway-arterial coordination and operations strategies; and
- ⇒ Inform travelers of conditions through a variety of means to support en-route decision making and traveler route decisions.

Integrated Corridor Management

Integrated Corridor Management Strategies will require new systems and approaches in the MAG region to support an enhanced capability across modal networks to implement strategies and communicate in real-time.

Through the investment priorities and CMP weighting criteria, arterial ITS projects that support ICM are strongly encouraged.

For freeways, although funding is allocated through the RTP for expansion of the FMS, to support the regional objective of more Integrated Corridor Management, future FMS expansion may be evaluated to identify how systems to support ICM and more active traffic management should be integrated into the current Freeway Management System.



RESOURCES AVAILABLE FOR ITS PLANNING AND IMPLEMENTATION

ITS projects in the MAG region are funded through a number of ways:

- ⇒ Federal CMAQ funding is used for freeway and arterial ITS projects. Local agencies submit ITS project applications for the TIP, and the MAG ITS Committee evaluates and recommends projects for inclusion in the approved TIP.
- ⇒ MAG Work Program funds specific ITS-related efforts including the Traffic Signal Optimization Program (TSOP) as well as special studies and evaluations that have a regional impact.
- ⇒ Agencies can use local funding to implement projects and as a match as required by CMAQ funding.

The following summarizes currently available (and anticipated) funding levels to support ITS in the MAG region.

Source of Funds	Application	Amount	Duration
TIP/RTP	Freeway ITS	\$76M (remaining)	2015 - 2026
TIP/RTP	Arterial ITS	\$ 6-7m/Yr	2015 - 2026 *
RTP	Transit ITS	TBD	
MAG Work Program	TSOP	\$400,000/Yr	
MAG Work Program	ITS Planning Studies	As needed	

*Historically, the MAG Region has been allocated between \$6-7M in ITS funding to support the arterial ITS program and local agency ITS projects. With the investment priority targets established for the Region, MAG encourages agencies to develop their projects to help support the ITS priorities and resource allocation goals.

In addition to traditional project applications through the MAG TIP, agencies in the MAG region are encouraged to explore public-public and public-private partnerships as a means of delivering ITS programs and services, as well as maximizing available funding.

AGENCY PARTNERSHIPS

Agencies in the MAG region have a long history of cooperating on operational strategies through the MAG ITS Committee and AZTech™ Committees. With the increased focus toward integrated corridor management, leveraging staff resources and expertise, as well as collaboration to support incident management on freeways and arterials, continued partnering among agencies in the Region is an integral component of the region's ITS program.

Future operational strategies and program delivery will require a focus on partnerships among agencies, as well as partnerships within agencies. Examples include:

- ⇒ Corridor signal timing strategies on multi-jurisdictional corridors;
- ⇒ Event traffic management planning and operations among freeway, arterial, transit, law enforcement and emergency response;
- ⇒ Multi-agency procurements and requirements development;
- ⇒ Utilization and expansion of regional programs and tools, including the RCN, HCRS and RADS platforms; and
- ⇒ Cooperative interagency operational agreements, such as shared operations or collocation of local agency TMC and law enforcement dispatch.

PUBLIC-PRIVATE PARTNERING OPPORTUNITIES

The private sector is most widely recognized for its role in partnering or supporting traveler information, although the private sector does participate as a partner in the ITS community on a variety of levels. From an ITS and system management/operations perspective, there are some emerging models that utilize the private sector in various roles, including traditional contracted relationships (fee for service or for product), sponsorship of services (i.e., freeway service patrol), ad-based sponsorships (traveler information systems or roadside signs), or trade relationships, such as exchanging right-of-way for use of private telecommunications infrastructure.

Examples of Public-Private Partnerships for ITS include:

- ⇒ **Telecommunications infrastructure agreements:** These are widely used in the MAG Region to allow for shared conduit or shared fibers to be able to support expansion of telecommunications infrastructure to support traffic management. In some cases, right-of-way may be granted from an agency to a telecommunications provider in exchange for fiber or conduit (or spare conduit).
- ⇒ **Contracted TMC operations:** Outsourcing TMC operational functions to a third party, usually under a contracted relationship. Can be performance based, and agency can specify specific operational parameters and expectations. Examples of this are typically found in statewide TMC/TOC facilities.
- ⇒ **Sponsorship of traveler information systems (511)** – There are growing examples of ad-based services on public agency 511 sites, and emerging models of sponsoring regional and statewide traveler information programs.
- ⇒ **Business-based Traveler Information Systems:** In larger urban areas, there is a growing trend for businesses along transit routes to install next-bus arrival screens for the benefit of their patrons. This is similar to the screens that were installed in the Sky Harbor Rental Car Center, except these screens show estimated transit vehicle arrival times along that route.

ITS APPLICATIONS FOR IMPROVING ROAD SAFETY

Safety is the top priority for all public agencies in the MAG region, and the region is committed to exploring and implementing cost-effective technology solutions that will also support increased safety for the region's travelers: drivers, pedestrians, transit users and bicyclists.

Examples of technology applications and systems to improve road safety include:

- ⇒ Technologies to support active traffic management on freeways, including variable speed limits, dynamic merge warning and dynamic ramp metering. These technologies help to advise and regulate vehicles during periods of heavy congestion;
- ⇒ Signal operations to reduce crash risks at intersections;
- ⇒ Pedestrian crosswalk enhancements, including countdown and audible alert capabilities, as well as technologies to support elderly and visually impaired pedestrians;
- ⇒ Bicycle and pedestrian detection systems as well as motorist warning signs;
- ⇒ Wrong-way ramp detection and warning systems; and
- ⇒ Enhanced security monitoring on transit vehicles and at transit stations.



EMERGING TECHNOLOGIES

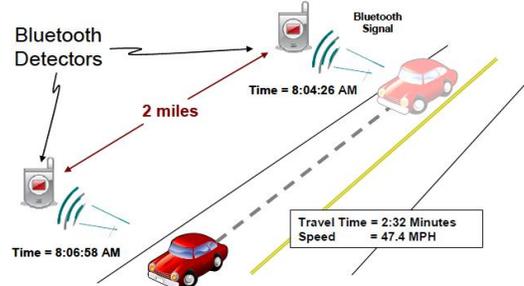
Agencies in the MAG region have a long history of testing and implementing innovative technology approaches to address mobility, safety, and real-time information sharing needs. Although there is no funding source at MAG for supporting ITS research projects, Arizona universities have performed ITS research and developed ITS applications. Their past successes are linked to the high level of support their research programs received from the Arizona DOT through the Arizona Transportation Research Center. An example university-developed application is RHODES adaptive traffic control; early phases of RHODES were jointly funded by MAG and ADOT.

Adaptive Signal Control Technology (ASCT)

These systems adjust traffic signal timings in real-time and based on current traffic conditions and capacity. Some agencies in the MAG region are already embarking on some adaptive strategies, and others are evaluating whether they are a cost-effective or feasible option to address specific operations needs.

New Data Collection Strategies

Bluetooth readers and third party probe data providers can provide speed information for segments of corridors that are not instrumented with agency-operated detection devices. Bluetooth readers pick up the anonymous MAC addresses emitted from Bluetooth-equipped mobile devices and can translate that information into segment speeds and travel times. The City of Chandler is utilizing Bluetooth to develop arterial travel times, the first such application for arterials in the MAG region.



Source: University of Maryland

Connected Vehicles and Connected Travelers

Although still very much in the research and testing phases, Connected Vehicles envisions utilizing the car and other mobile devices as important sources of data (weather, current traffic conditions, driver response to conditions, among others), as well as provide a platform to be able to communicate real-time alerts to the traveler. There is research underway through USDOT and other partners in the Connected Vehicle community, and agencies in the MAG region are among the early testers of vehicle-to-vehicle mobile communications and vehicle-to-roadside communications as part of the MCDOT SmartDrive™ program, which is funded by MCDOT, ADOT and federal research funds.

Active Traffic Management (ATM)

Active Traffic Management is an emerging approach to managing recurring and non-recurring congestion on heavily congested freeway corridors. An ATM strategy incorporates real-time detection, dynamic traffic management capabilities (including dynamic merge and dynamic ramp metering), variable speed limits and speed harmonization, dedicated travel time signs, and lane closure signs, and operational strategies such as hard shoulder running.

Washington State has launched its initial ATM program and others are in the planning stages in Minneapolis and Virginia. In Europe, ATM strategies have shown a 30 percent decrease in freeway injury collisions and a 22 percent increase in roadway capacity (source: Washington State DOT I-5 ATM Project, www.wsdot.wa.gov).



Source: UK Highways Agency

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Aligning ITS Priorities in the CMP Process

The Congestion Management Process (CMP) is a systematic approach, collaboratively developed and implemented throughout a metropolitan region, that provides for the safe and effective management and operation of new and existing transportation facilities through the use of demand reduction and operational management strategies. A CMP is a requirement of federal funding; federal requirements state that regions with more than 200,000 people, known as Transportation Management Areas (TMAs), must maintain a CMP and use it to inform transportation planning and decision-making.

MAG's CMP is intended to guide and complement the process used to prioritize projects, including ITS projects in the region.

MAG developed its *Performance Measurement Framework and Congestion Management Update* in 2010. Performance measures have been defined for freeway general purpose and High Occupancy Vehicle (HOV) lanes, arterial performance, transit performance and bicycle and pedestrian performance. These include access and mobility measures as well as safety measures. Congestion management strategies have been defined for the region which is consistent with the same goals and objectives of the original 2003 RTP, and the CMP process will continue to use the same congestion mitigation criteria in the assessment and evaluation of the projects submitted for consideration.

MAG's CMP objectives are to:

- ⇒ Reduce crash rates on the system;
- ⇒ Minimize delay and improve travel time;
- ⇒ Reduce travel time variability in all modes;
- ⇒ Minimize delay and improve travel time in freight corridors;
- ⇒ Improve system connectivity;
- ⇒ Develop and maintain a functional roadway hierarchy;
- ⇒ Minimize delay in HOV lanes;
- ⇒ Manage congestion on facilities used for bus service;
- ⇒ Promote travel demand management programs; and
- ⇒ Reduce emissions and fuel consumption through congestion management.

MAG's focus on modal priorities and investment allocation goals directly support the CMP Congestion Management Objectives to minimize delay, reduce crash rates, manage congestion on key corridors and improve system connectivity through integrated corridor management strategies.

A key facet of MAG’s congestion management activities is the updating of the TIP. For years where programming is occurring, MAG has an established process for ITS project applications, including a programming schedule, project evaluation process, and project selection process. This evaluation and selection process was updated in 2012 in conjunction with the update of the ITS Strategic Plan to reflect resource allocation goals and targets established by the MAG ITS Committee.

The following is intended to guide the process for ITS project programming through the MAG TIP:

- ⇒ Agencies are to develop project ideas, and collaborate with partner agencies on project ideas, that support the four priority areas of Arterial ITS, Integrated Corridor Management, ITS Projects to Improve Road Safety and Local ITS Plans;
- ⇒ Project applications submitted to MAG must first be evaluated against CMAQ Air Quality requirements; and
- ⇒ A CMP weighting criteria has been established for ITS projects submitted for TIP programming consideration.

The following weights will be applied to projects:

ITS Investment Priority	CMP Weight
Arterial ITS Applications	6.5
Integrated Corridor Management	6.5
ITS Applications to Improve Safety	5.5
Local ITS Plans	2.5

The combined CMAQ and CMP scores will result in a ranked list of projects for discussion at the MAG ITS Committee, which also will factor in the funding allocation targets.

As new funding sources become available, the updated CMP will play a greater role in the planning and programming of future transportation investments in the MAG region.

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Implementing the ITS Strategic Plan

MAG and the MAG ITS Committee have collectively developed a set of strategic priorities to guide ITS deployment, integration and operations in the region. The 2012 MAG ITS Strategic Plan marks an important shift from “projects” to “programs”.

This ITS Strategic Plan does not prescribe or recommend specific projects to be implemented, but rather establishes priorities and TIP funding allocation targets to help achieve regional objectives for ITS and system operations as well as continue to support local agency ITS program needs.

INTEGRATED CORRIDOR MANAGEMENT AND OPERATIONS

The MAG region has identified Integrated Corridor Management as an important priority. ICM strategies will support real-time system operations needs during non-recurring events (such as a major incident on the freeway which diverts traffic on to arterials) as well as to support day-to-day congestion management and mobility options for travelers in the region.

Many of the strategic ITS priorities point to a need for better real-time data, improved coordination and information sharing among agencies, as well as operational strategies that balance demand across modes and help to respond to real-time conditions on freeway, arterial and transit systems.

Steps toward this objective include:

- ⇒ Plan for Integrated Corridor Concepts—evaluate key corridors and unique issues that could be addressed through ICM strategies and develop specific plans to update and implement ITS equipment and the necessary institutional and operational relationships.
- ⇒ Identify ITS technology and infrastructure needs—utilize the TIP programming process to implement projects that help to achieve ICM goals.
- ⇒ Evaluate FMS needs to support ICM—assess infrastructure needs and evaluate priority of FMS improvements to incorporate ICM strategies.
- ⇒ Implement a Pilot Program—deploy, operate, test and evaluate ICM under recurring and non-recurring conditions, and report on performance.

Collectively, and over time, MAG member agencies can strategically develop, implement and integrate systems and projects to help support this important regional initiative while still addressing local ITS and system management needs.

In 2007, MAG developed a Concept of Operations for ICM for the I-10 Corridor west of downtown to Loop 303. This provided an initial step in defining a coordinated plan for multi-agency operations. The impetus for that Concept of Operations was a large-scale interstate widening project that would impact I-10 capacity for several years. Today, ICM concepts for I-10 may focus more on specific traffic incident management strategies, real-time monitoring and sharing of information with more robust arterial capabilities in the West Valley, as well as look to integrate multimodal operations into the overall corridor management plan.

Other corridors in the MAG region could also benefit from ICM, and each has their own unique operating requirements, attributes, constraints, and institutional considerations. A pilot program is underway looking at ICM strategies on the Loop 101 Pima freeway in the northeast part of the Valley. This effort includes coordination among ADOT and the City of Scottsdale to identify operational requirements and processes for diverting traffic on to arterials during a freeway incident or closure. Future ICM considerations in the region could include:

- ⇒ I-17 is a north-south freeway corridor through Phoenix with no available right-of-way to expand this freeway to add capacity; operational strategies would need to factor in parallel arterials such as 35th Avenue and 19th Avenue.
- ⇒ In the East Valley, US60 traverses through Phoenix, Tempe, Mesa, Maricopa County, Pinal County, and Apache Junction. Loop 202 to the north and south of this corridor could provide an alternate freeway option for some travelers.

EVALUATING SYSTEM PERFORMANCE

Continued improvement of operations and management, as well as identifying locations for high priority ITS investments, is dependent on a regional strategy for performance monitoring and reporting. MAG is responsible for reporting on regionwide transportation system performance. Performance measures relevant to traffic operations are currently incorporated in MAG system performance reports and additional measures recommended by the ITS Committee will be added in the future.

As the region moves toward a strategy focusing on ICM, coordinating performance monitoring and reporting across modes will be an integral part of that strategy; impacts of real-time operations as well as trend analysis will help to better inform regional ITS priorities and investment needs.

Freeway Performance Metrics

Freeway performance monitoring will help to better inform real-time operational strategies as well as target FMS funding and program enhancement/expansion priorities. There are a range of measures for freeway performance, including mobility, safety and travel time reliability metrics. A key activity for the MAG region is to define specific data needs and requirements, including data sources. ADOT's FMS detector data can support some metrics, but additional data types and sources could be explored for their feasibility to support required freeway performance monitoring.

Arterial Performance Metrics

Agencies in the region have been measuring and monitoring impacts of traffic signal timing and signal operations on throughput, delay and environmental impacts as part of specific projects and on specific corridors. MAG has implemented a required component for TSOP projects to include a before-and-after study. A regional strategy should consider a set of arterials that are representative of the MAG region, and define consistent metrics, data needs and potential data sources.

Real time data on arterials is a gap in the MAG region. This data is needed to support arterial mobility and travel time measures, as well as support safety analyses.

Transit Performance Metrics

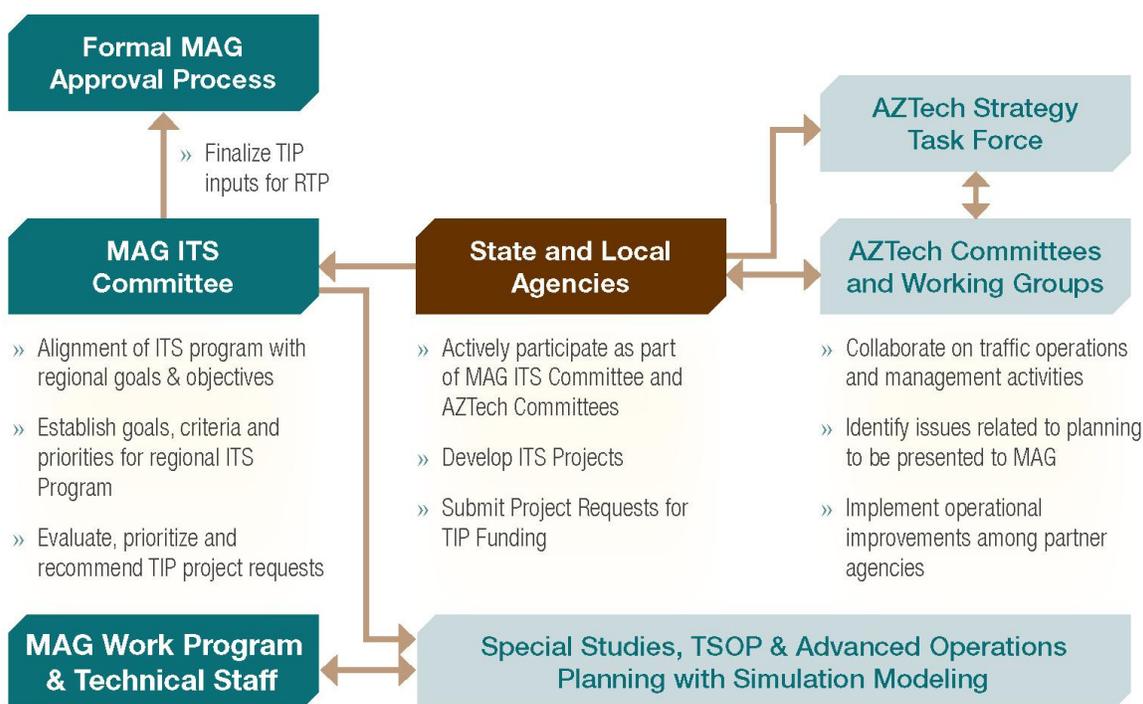
Transit agencies in the MAG region regularly use real-time data to assess schedule adherence and support traveler information notifications. Other operational data, such as boardings and alightings help transit agencies to determine where certain routes are over or under capacity and adjust operations and schedules over time.

Future real-time metrics could help to support ICM strategies by identifying transit usage, capacity and demand and be able to correlate that with arterial and freeway strategy implementation. Transit also could benefit from receiving real-time arterial and freeway performance data to help support their operations and routing.

IMPLEMENTATION ROLES AND RESPONSIBILITIES FOR ITS

Implementing ITS strategies within the framework and priorities provided by the MAG ITS Strategic Plan will be a collective effort among agencies in the MAG region. MAG is responsible for formal planning and project programming in the region. In this role, MAG serves as the regional forum for establishing funding priorities, balancing available funding and regional investments, as well as providing the accountability for achieving regional performance goals. MAG's ITS Committee is comprised of member agencies representing state and local transportation management and operations, transit operations and public safety (DPS). This group collectively reviews and prioritizes project requests submitted by agencies through the TIP programming process, as well as through the TSOP call for projects. The ITS Committee can formally request MAG to conduct studies or evaluations for issues that impact or could benefit the region's ITS program. Members of the ITS Committee also serve as project stakeholders for MAG ITS plans, studies and evaluations.

The graphic below shows the process whereby agencies in the region collaborate on and develop ITS projects to bring to the ITS TIP programming process.



State and Local Agencies

State and local agencies are responsible for operating and maintaining ITS infrastructure within their jurisdiction, and for coordinating with neighboring agencies on operational strategies that will help to support multijurisdictional corridor operations. Local agencies also are responsible for developing ITS project requests to submit to MAG through the TIP programming process and providing a required local match for CMAQ funding. State and local agencies are represented on the MAG ITS Committee to support collective decision making and ITS project prioritization.

AZTech™ Strategy Task Force, Committees and Working Groups

AZTech™ is a regional forum that focuses on operational discussions among state and local agencies, as well as the private sector. AZTech™ has established various committees and working groups that address issues such as traveler information, traffic incident management and traffic operations. Technical issues or collaboration on day-to-day operational activities are discussed and coordinated through these AZTech™ groups. Project ideas that are generated through AZTech™ committees can be brought forward by a lead agency for MAG TIP funding consideration.

ITS Strategic Plan

2012



Schedule and Process for Updating and Maintaining the ITS Strategic Plan

It will be important to periodically review the goals, priorities and strategies contained within the MAG ITS Strategic Plan. MAG will conduct a biannual review of the ITS Strategic Plan, and bring forth any potential changes to the MAG ITS Committee. The ITS Strategic Plan has been developed to allow for flexibility and innovation in how agencies in the region plan for and implement ITS projects. Over time, certain factors could warrant an update to the Plan, such as:

- ⇒ Shift in regional priorities or recommendations requiring a different approach to funding allocation or CMP weighting criteria;
- ⇒ Change in specific priorities reflected in the RTP;
- ⇒ New or modified recommendations for ITS implementation, operations or goals;
- ⇒ Specific policy direction that necessitates a change in how projects are prioritized, such as a future managed lanes strategy or formal active traffic management program in the MAG region; and
- ⇒ Changes to local or federal funding such that there are significant additional funds or a significant decrease in available funds, which could necessitate a different process and different priorities for ITS projects in the region.

In addition to the ITS Strategic Plan, MAG's Regional ITS Architecture (RIA) also is periodically reviewed and updated to ensure compliance with the most recent National ITS Architecture as well as capture new priorities that would need to be reflected. The RIA is reviewed annually for potential changes, and is updated on a biannual basis. The 2008 RIA update made substantial changes to reflect all existing ITS-related infrastructure as well as those programmed and planned future projects. The MAG RIA is planned to be updated and maintained on a regular basis beginning with the first update that was completed in 2010. It is available at the following link:

<http://azmag.gov/Projects/Project.asp?CMSID=1050&CMSID2=1063>

Changes that warrant an update to the RIA include:

- ⇒ Updated regional focus/needs;
- ⇒ New stakeholders;
- ⇒ New or updated planning efforts completed;
- ⇒ New technologies or initiatives implemented;
- ⇒ New funding availability to support new types of projects; and/or
- ⇒ Updated project priorities for each agency.

There is a formal change request process in place for updating the MAG RIA.

ITS Strategic Plan

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Acronym List

ADOT	Arizona Department of Transportation
ATCS	Adaptive Traffic Control Systems
AVL	Automated Vehicle Location
ATM	Active Traffic Management
BSM	Bus Stop Management System
CCTV	Closed-Circuit Television
CMAQ	Congestion Mitigation and Air Quality Improvement Program
CMP	Congestion Management Process
DMS	Dynamic Message Sign
DPS	Department of Public Safety
DTA	Dynamic Traffic Assignment
FCS	Fare Collection System
FHWA	Federal Highway Administration
FMS	Freeway Management System
HCRS	Highway Conditions Reporting System
HOV	High Occupancy Vehicle
ICM	Integrated Corridor Management
ITS	Intelligent Transportation Systems
MAG	Maricopa Association of Governments
MCDOT	Maricopa County Department of Transportation
OCC	Operations Control Center
RADS	Regional Archived Data System
RCN	Regional Community Network
RIA	Regional ITS Architecture
RTP	Regional Transportation Plan
TIM	Traffic Incident Management
TIP	Transportation Improvement Program
TMA	Transportation Management Area
TMC	Traffic Management Center
TOC	Traffic Operations Center
TSOP	Traffic Signal Optimization Program
USDOT	United States Department of Transportation
VMS	Vehicle Management System