

October 15, 2013

TO: Members of the MAG Transportation Safety Committee

FROM: Renate Ehm, City of Mesa, Chair

SUBJECT: SPECIAL MEETING NOTIFICATION AND TRANSMITTAL OF TENTATIVE AGENDA

Tuesday, October 22, 2013 10:00 a.m.
MAG Office Building, 2nd Floor, Ironwood Room
302 North First Avenue, Phoenix

A meeting of the MAG Transportation Safety Committee will be held at the time and place noted above. Committee members or their proxies may attend **in person, via videoconference or by telephone conference call**. Those attending video conference must notify the MAG site three business days prior to the meeting. 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 Transportation Safety 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 October 22, 2013 meeting, the quorum requirement is 11 committee members.

2. Approval of September 24, 2013, Meeting Minutes

3. Call to Audience

An opportunity will be provided to members of the public to address the Transportation Safety 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 members request an exception to this limit. Please note that those wishing to comment on action agenda items will be given an opportunity at the time the item is heard.

4. Program Managers Report

The following items will be addressed:

- Strategic Transportation Safety Plan
- AZ SHSP Update
- Need to establish guidelines for Transportation Alternatives - Safe Routes to School Projects - Working Group assignment

5. FY 2014-2017 HSIP Second Call for Projects

At the September 24, 2013, meeting the committee discussed programming the remaining HSIP funds for FY 2014-2017. The funds still available for programming are as follows: FY 2014 - \$360,592, FY 2015 - \$1,256,932, FY 2016 - \$1,000,793, FY 2017 - \$372,630. The committee recommended a second call for projects to program the remaining HSIP funds for local agency safety improvement projects, and any remaining HSIP funds to be utilized for safety planning projects identified through the ongoing Strategic

2. Review and approve minutes of the meeting held on September 24, 2013.

3. For information.

4. For information and discussion.

5. For information, discussion and possible action to recommend approval of a list of safety projects to be funded with the remaining HSIP funds available in FY 2014-2017.

Transportation Safety Plan. The second call for projects was issued on October 2, 2013, with applications due by Noon on October 18, 2013. All project applications will be distributed, via email, to the committee on October 18, 2013. Copies of applications will also be made available at the meeting. The committee will discuss the merits of proposed projects and generate a recommendation.

6. Network Screening Methodology, Road Safety Assessments, and the Statewide HSIP

At the September 24, 2013 meeting the committee discussed ways to improve the RSA program. In past meetings the committee discussed the need to fund DCRs at previous RSA sites, in an effort to assist local agencies develop viable safety projects that could effectively compete for statewide HSIP. In order to facilitate this discussion, a list of the Top 500 intersections for crash risk was provided as a potential strategy to focus the RSA program on sites with high crash risk. This list was generated utilizing the MAG Network Screening Methodology (NSM) adopted by the committee in 2009. A full description of this methodology is provided in Attachment One. Since the committee could not agree to the reasoning behind using the NSM, a Working Group was formed to review the NSM and how it could help recommending RSA sites and ultimately help transform RSA recommendations into viable projects that could compete for statewide HSIP funding. The recommendations of the Working Group will be presented.

7. Reports by Committee Members on Transportation Safety Activities

Members will be requested to report agency activities or current issues that are related to transportation safety.

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

The next meeting is scheduled to be held at 9:30 a.m. on Tuesday, November 19, 2013. It will be held in the Ironwood Room on the 2nd Floor of the MAG office building. The STSP TSSG Meeting will be held immediately after this meeting, also in the Ironwood Room.

Adjournment

8. For information and discussion.

9. For information and discussion.

MINUTES OF
MARICOPA ASSOCIATION OF GOVERNMENTS
TRANSPORTATION SAFETY COMMITTEE

September 24, 2013
Maricopa Association of Governments
Ironwood Room, Suite 200
302 N. 1st Ave,
Phoenix, AZ 85003

MEMBERS ATTENDING

+Linda Gorman, AAA Arizona	+Hugh Bigalk, City of Goodyear
Tom Burch, AARP	Nicolaas Swart, Maricopa County
Mark Poppe for Kohinoor Kar, ADOT	Renate Ehm (Chair), City of Mesa
Shane Kiesow, City of Apache Junction	*Jeremy Knapp, Town of Paradise Valley
Dana Chamberlin, City of Avondale	+Mannar Tamirisa for Jamal Rahimi, City
*Thomas Chlebanowski, Town of Buckeye	of Peoria
Martin Johnson, City of Chandler	Kerry Wilcoxon, City of Phoenix
Jorge Gastelum, City of El Mirage	George Williams, City of Scottsdale
Kelly LaRosa, FHWA	Nuning Lemka for Jason Mahkovtz, City
Mike Gillespie, Town of Gilbert	of Surprise
Chris Lemka, City of Glendale	+Julian Dresang, City of Tempe
*Alberto Gutier, GOHS	Sam Diggins for Gardner Tabon, RPTA

OTHERS PRESENT

Sarath Joshua, MAG	Susan Herbel, Cambridge Systematics
Margaret Boone, MAG	Matt Tsark, Strand Associates, Inc.
Kiran Guntupalli, MAG	Marta Gerber, Baker
Maria Deeb, City of Mesa	

+ Teleconference
Videoconference
* Not present

1. Call to Order
Chair Renate Ehm called the meeting to order at 8:33 a.m.
2. Approval of August 20, 2013 Meeting Minutes
Chair Renate Ehm called for a motion to approve the August 20, 2013 minutes. Chris Lemka moved, Shane Kiesow seconded and the motion passed unanimously.
3. Call to Audience
Chair Renate Ehm made a call to the audience providing an opportunity to members of the public to address the Transportation Safety Committee. None requested.

4. Program Manager's Report

- Strategic Transportation Safety Plan
 - Technical Memorandum #1 on STSP Website
 - Provide Comments to mboone@azmag.gov by 9/26/2013
 - Visioning Workshop to begin immediately after this meeting
 - Review State of Transportation Safety in the Region
 - Develop a Transportation Safety Vision for the Region
 - Arizona State SHSP
 - September: Second Round Task Force Meetings
 - Safety Summit scheduled from 8 a.m. to 5 p.m. 11/ 6/ 2013
 - Encouraged to attend even if not participating in a Task Force
- Transportation Safety Planning Projects for FY2015 MAG Work Program
 - New activities/projects/programs for FY15 – July' 14-June' 15
 - Current & Past Projects/Activities Supported with Planning Funds
 - MAG Road Safety Assessment Program
 - Regional School Crossing Guard Training Workshops
 - Strategic Transportation Safety Plan (STSP) Update
 - Study: Effectiveness of Non-Engineering Safety Programs
 - Potential Projects
 - Establish regionally relevant CMFs – May be a huge undertaking
 - Send your project ideas to Margaret by the end of October
 - Work Program development begins in January 2014
- Funding Large Safety Projects with Statewide HSIP Funds
 - Arizona receives nearly \$32m/yr in HSIP
 - Nearly 25% is suballocated to MPOs & COGs, rest goes to ADOT
 - All un/underutilized balances are automatically spent on the state system – state may spend as much as 80% of all HSIP
 - Over the last 10-yrs: MAG Planning Area represents 47-53% of ALL road deaths & 66-71% of ALL road injuries in AZ
 - MAG region receives 6 % of HSIP
 - Current approach – each city project competes with statewide projects - on a first come first served process at ADOT
 - Need a unified approach >> A formal MAG recommendation to ADOT for large road safety projects >> Working Group Activity
- MAG Quorum Changes

5. Programming Remaining FY2014-17 HSIP Funds

Sarath Joshua noted that with first call for projects MAG received six project applications from four local agencies and that the list recommended by the TSC has gone to the TRC, MC and due to be on the RC agenda for approval. Mr. Joshua also stated that MAG contacted ADOT for the status of eligibility determination to find out that ADOT had only received two applications; this information was communicated to the four local agencies for follow up. Chris Lemka stated that in following up with ADOT that the various projects have been given to different project managers which may be the reason for the confusion. Mr. Joshua then stated the funding amounts remaining to be programmed for each fiscal year and that MAG needs input from the committee on how the funds should

be programmed and asked that the committee consider a second call for projects to program FY14 & 15 and to utilize some of the FY16 & 17 for projects which result from initiatives from the STSP. Mark Poppe from ADOT clarified that the FY14 funding would need to be obligated by September 2014 and could be used for design or safety planning efforts. Mr. Joshua noted that the projects the committee should consider for FY14-15 are those we know are eligible for the funding and that do not require extensive clearances. Renate Ehm asked for feedback from agencies that have projects that can be considered for the short term year programming; Scottsdale, Avondale, and Mesa all indicated projects they will be submitting that could be suitable for the short timeframe of the FY14-15 funds. Ms. Ehm mentioned that Mesa, in conjunction with several other agencies, intend to submit an application for a new crash data analysis software. Kerry Wilcoxon asked for clarification on the eligibility of such a request since there would be no Cost-Benefit ratio for this type of activity. Kelly LaRosa stated that since the crash data analysis system would ultimately be used to assist local agencies with determining high crash risk locations and thereby identify possible safety improvements that this type of activity meets the intent of the HSIP funding. Input from the committee discussion indicated support of opening the second call for projects to include applications for all available funding for FY2014-17 and then entertaining the use of any remaining funds for initiatives resulting from the STSP. Sarath Joshua assured that even if all of the available HSIP funding is programmed through the second call for projects, MAG will be looking at other funding mechanisms to fund safety improvement initiatives that would come out of the STSP. This would include the MAG Work Program, RTP funds, or possibly non-federal regional funds.

6. MAG Transportation Alternatives Program: Non-Infrastructure SRTS

Margaret Boone stated that with the MAP-21 legislation, SRTS, Transportation Enhancements and Recreational Trails programs were consolidated into Transportation Alternatives Program, and that the MAG Planning Area has been allocated \$4.4M/year for programming, of which \$400,000 has been set aside for SRTS non-infrastructure projects. Ms. Boone stated that the Transportation Safety Committee will provide oversight on the types of projects, criteria for evaluation, review and recommendation of non-infrastructure SRTS programs. Ms. Boone outlined the types of projects the committee has entertained in the past, those that the committee might want to consider in the new TA program, as well as the schedule for programming the SRTS non-infrastructure projects. Ms. Boone requested volunteers for a work group to convene in October to discuss the items that the committee will need to consider for programming the non-infrastructure TA programs for a recommendation to the committee at the November TSC regular meeting in anticipation of a January 2014 call for projects.

7. MAG Road Safety Assessment Program Criteria and Call for Projects

Sarath Joshua stated that MAG has gone through two cycles of RSA programs and that MAG is preparing to issue another call for RSA projects, possibly based on a list of the top 500 crash risk intersections using nominations from local agencies. Mr. Joshua mentioned that if there are RSA's conducted at sites that do not rank very high, trying to move those projects forward to a safety improvement project could be very difficult. Mr. Joshua explained that MAG staff has generated the list of the Top 500 locations, using the Network Screening Methodology that has been adopted by the committee, in an effort to re-focus the program on crash risk. Kerry Wilcoxon expressed concern with limiting

RSAs to the Top 500 list and that local agencies may still benefit from what they learn from the RSA. Martin Johnson asked if those locations with 1 or 2 crashes made the list due to crash severity. Sarah Joshua briefly explained the Network Screening Methodology which includes factors of Crash Frequency, Crash Severity, and Crash Type, with Crash Severity weighted heavily. This method was applied to each crash location in generating the list. Mr. Johnson expressed concern that a crash site that only has one crash may not establish a correctable pattern where as one ranked at 501 may have multiple crashes to establish that pattern. Mr. Joshua added that locations with high frequency but low severity would have a hard time competing for safety funding. Kerry Wilcoxon stated another benefit of the RSAs is that agencies have a tool to take an unbiased look at locations they have identified for safety improvements and limiting it to a list of locations would limit agencies ability to take advantage of the valuable program. Based on the discussion, Mr. Joshua stated that the next call for projects would consider locations nominated by local agencies even if they fall outside of the Top 500 list but that it should be identified where the location ranks on the list in order to be able to track the effectiveness of the RSA program.

8. Reports by Committee Members

Chair Renate Ehm asked to forgo reports by committee members. No objections were heard.

9. Next Meeting

Chair Renate Ehm stated that the next meeting is scheduled for Tuesday, November 19th noting the early starting time at 9:30 AM to be followed by the STSP TSSG meeting to be held at 10:30 AM.

10. Adjournment

Chair Renate Ehm adjourned the meeting at 9:38 AM

Network Screening Methodology for Intersections

Introduction

Improving intersection safety is identified in the MAG Strategic Transportation Safety Plan as a regional priority. Recent crash statistics for the region show that 60 percent of traffic related injuries and 40 percent of fatalities are caused by crashes at intersections. In order to target specific locations for road safety improvements it is necessary to screen the region's road network and identify and rank high risk locations. A methodology that helps perform a network screening based on crash risk has been adopted by MAG for this purpose. A network screening approach that is based purely on crash frequency tends to be biased in favor of intersections with high volumes as they will have higher numbers of crashes. Similarly, a network screening that applies weights for different crash severities tend to bias the outcome in favor of location with a high crash high severity. At the 2009 TRB¹ annual meeting a paper on a network screening methodology, based on research work done by the Wisconsin DOT, was presented. This method, with a slight modification, has been adopted for use in the MAG region, and is referred to as the Network Screening Methodology (NSM-I) for Intersections. As recommended in the TRB paper the analysis period was kept to the three most recent years for which crash data are available.

Intersection Safety Network Screening Methodology

The first step in the application of NSM-I is the identification of the complete list of intersections, number of crashes by crash severity (KABCO scale), number of vehicles involved in each crash, collision manner, number of pedestrian involved and the number of bicyclists involved. Only the crashes that are identified in ALISS as "intersection related" will be analyzed in the NSM-I. Since ALISS data cannot be edited by any entity other than Arizona DOT, none of ALISS data will be corrected for errors prior to analysis. In other words, all crash data are assumed to be 100 percent accurate.

The NSM-I generates a composite intersection ranking based on four crash attributes: (a) Crash Frequency (CF), (b) Crash Severity (CS), (c) Crash Type (CT) and (d) Crash Rate (CR). The fourth factor CR was not included in the Wisconsin DOT methodology. The MAG Transportation Safety Committee determined it was necessary to include crash rates in the network screening analysis.

¹Qin X., Laracuante L., Noyce D.A., Chitturi M. *Systemwide Intersection Safety Prioritization Development and Assessment*. In TRB 2009 Annual Meeting, Washington, D.C.

Crash Frequency (CF)

The total number of crashes that occurred during the period of analysis, or crash frequency, at each intersection is first summarized. The Crash Frequency Score or **CF Score** for any intersection is the ratio of, the crash frequency at the intersection to the highest intersection crash frequency for the region, for the same period of analysis.

CF Score for Intersection i

= (Total number of crashes at Intersection i/ Highest number of crashes recorded for any intersection in the analysis area)

Crash Severity (CS)

Every crash is assigned a crash severity (KABCO scale) based on the highest resulting injury from the crash. The equivalent sum of all crash severities, or CS value, for an intersection can be generated by the application of the KABCO weight scale shown in Table 1. An intersection's CS value is calculated as the sum of the products of the total number of crashes of a particular severity multiplied by the weight associated with that crash severity. The **Crash Severity Score** for an intersection is the ratio between CS value for the intersection to the maximum CS value for the network being analyzed.

CRASH SEVERITY	WEIGHT
Fatal Crash(K)	1,450
Incapacitating (A)	100
Non-Incapacitating (B)	20
Possible Injury (C)	11
PDO (O)	1
Unknown	1

Table 1. Crash Severity Weights

Crash Type (CT)

The ALISS database provides information on the Crash Type or Collision Manner for each recorded crash – such as rear-end, right angle, head-on etc. Campbell and Knapp² have described a procedure for calculating the average crash cost per vehicle/pedestrian/bicyclist for different types of collision manner. This method is utilized in the Wisconsin DOT methodology. Table 2 lists the estimated crash cost by crash severity provided by FHWA, same as that used by ADOT.

Table 2: Crash Cost by Injury Severity

Crash Severity	\$ Value
Fatal Crash(K)	\$5,800,000
Incapacitating (A)	\$400,000
Non-Incapacitating (B)	\$80,000
Possible Injury (C)	\$42,000
PDO (O)	\$4,000
Unknown	\$4,000

These crash costs were used to calculate the average cost per vehicle, pedestrian or bicyclist that is involved in any crash of any particular Crash Type or Collision Manner. This calculation requires a detailed examination of crashes, with the number of vehicles, pedestrians and bicyclists involved in each. All intersection related crashes in the database were queried for the number of crashes by injury severity, number of units involved in the crashes and by collision manner. Table 3 shows the results, as the cost per each vehicle/pedestrian/bicyclist involved in any crash of a particular collision manner.

²Campbell J.R., Knapp K., *Alternative Crash Severity Ranking Measures and the Implication on Crash Severity Ranking Procedures*. Proceedings of the Mid-Continent Transportation Research Symposium, Ames, Iowa, 2005

Table 3. Crash Costs by Crash Type per Vehicle / Pedestrian /Bicyclist.

Injury Severity	REAR END		ANGLE RIGHT ANGLE		SINGLE		SIDE SWIPE SAME DIRECTION		ANGLE OPPOSITE DIRECTION	
	Crashes	Units	Crashes	Units	Crashes	Units	Crashes	Units	Crashes	Units
O	23,133	48,912	17809	36534	4289	4289	7635	15535	12064	24845
C	6,488	14,405	5941	12632	532	532	702	1465	5035	10708
B	2,088	4,839	4249	9210	750	750	284	640	3971	8557
A	350	854	1183	2684	208	208	70	164	1189	2597
K	29	73	165	381	28	28	8	19	101	219
Unknown	0	0	0	0	0	0	0	0	0	0
	\$840,268,000	69,083	\$2,090,878,000	61,441	\$345,100,000	5,807	\$157,144,000	17,823	\$1,638,806,000	46,926
Cost Per Vehicle	\$12,163		\$34,031		\$59,428		\$8,817		\$34,923	

Injury Severity	REAR TO SIDE		SIDE SWIPE OPPOSITE DIRECTION		HEAD ON		OTHER & UNKNOWN		# of Pedestrians	# of Bicyclists
	Crashes	Units	Crashes	Units	Crashes	Units	Crashes	Units		
O	1731	3466	403	836	195	410	558	1206	108	312
C	75	152	50	108	79	180	100	222	411	700
B	18	36	44	106	90	200	116	271	660	1010
A			14	34	36	80	35	89	318	223
K			1	3	8	19	7	21	62	12
Unknown	0	0	0	0	0	0	0	0	24	63
	\$11,514,000	3,654	\$18,632,000	1,087	\$72,098,000	889	\$70,312,000	1,809	\$557,390,000	270,500,000
Cost Per Vehicle	\$3,151		\$17,141		\$81,100		\$38,868		\$352,110	\$116,595

Table 3: Crash Cost per Vehicle / Pedestrian /Bicyclist.

Table 4 Summary of Per Unit Crash Costs

Crash Type/Collision Manner	Cost per Vehicle / Pedestrian / Bicyclist
Rear End	\$ 12,163
Angle Right Angle	\$ 34,031
Single	\$ 59,428
Side Swipe Same Direction	\$ 8,817
Angle Opposite Direction	\$ 34,923
Rear To Side	\$ 3,151
Side Swipe Opposite Direction	\$ 17,141
Head On	\$ 81,100
Other & Unknown	\$ 38,868
Pedestrian Crashes	\$352,110
Bicyclist Crashes	\$116,595

The Crash Type (CT) Cost for an intersection is calculated by multiplying the number of units involved in a crash by the cost per vehicle/pedestrian/bicyclist for each type of collision manner, and summing the results.

$$\text{CT Cost} = \sum_{i=1}^n (N_i * CM_i)$$

N_i - Number of units (vehicles, pedestrians or bicyclists) involved in a crash of a specific Collision Manner

CM_i - Cost per Vehicle/Pedestrian/Bicyclist by Collision Manner (see Table 4)

n - Number of crashes at the intersection

The Crash Type Cost for an intersection is ratio between Crash Type Cost at a particular intersection to maximum of Crash Type Cost at all intersections in the region.

Crash Rate (CR)

The Wisconsin DOT methodology was modified by MAG by the addition of the Crash Rate, the fourth factor, as suggested by the MAG Transportation Safety Committee in October 2009. This factor is defined as follows:

CR value for intersection i
 = Average annual crash rate at intersection i for the analysis period / Maximum value of all average intersection crash rates for the region
 = CR / Max (CR)

The first application of this methodology was for identifying the 100 high crash risk intersections in the MAG region, using crash data for 2006, 2007 and 2008. There were over 17,000 specific intersection crash locations during this analysis period. The computation of CR values for this many intersections was deemed infeasible at this time due to lack of traffic volume data at these locations for each of the 3 analysis years. Therefore, the highest ranked 100 intersections were determined first based on interim intersection safety scores that were based ONLY on CF, CS and CT, with the weights 1/5, 3/5 and 1/5 respectively.

$$ISS = \left(\frac{1}{5} * \frac{CF}{\text{Max}(CF)}\right) + \left(\frac{3}{5} * \frac{CS}{\text{Max}(CS)}\right) + \left(\frac{1}{5} * \frac{CT}{\text{Max}(CT)}\right)$$

Next, the CR values were determined for these 100 intersections and applied in the final step to determine the Intersection Safety Score as described next.

Intersection Safety Score (ISS)

The final Intersection Safety Score (ISS) for an intersection is determined by combining all four scores, as shown in the formula below. Severity Index score CS is weighted higher in the final scoring process as the motive of the Network Screening process is to eliminate crashes with higher severity at intersections.

$$ISS = \left(\frac{1}{5} * \frac{CF}{\text{Max}(CF)}\right) + \left(\frac{2}{5} * \frac{CS}{\text{Max}(CS)}\right) + \left(\frac{1}{5} * \frac{CT}{\text{Max}(CT)}\right) + \left(\frac{1}{5} * \frac{CR}{\text{Max}(CR)}\right)$$