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# **MAG Regional Concept of Transportation Operations**

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## **Technical Memorandum No. 1**

- Vision, Mission, and Summary of Existing Regional Policies and Practices in Transportation Operations

*Prepared by:*



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091452002

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# 1. INTRODUCTION

## 1.1 Project Overview

The purpose of this project is to develop a Regional Concept of Transportation Operations (RCTO) for the Phoenix metropolitan area. The need for developing a comprehensive RCTO was recognized during the development of the Maricopa Association of Governments (MAG) Intelligent Transportation Systems (ITS) Strategic Plan Update, completed in April 2001. The basic framework for developing an RCTO was established in the Plan.

This project will involve a review of existing infrastructure, resources, policies, and practices in surface transportation operations. It is anticipated that the RCTO will lead to the establishment of a framework and institutional agreements that will foster a higher degree of integration and coordination among agencies responsible for transportation operations in the region. The project is expected to lead to an action plan that can produce both short-term results as well as recommend longer-term strategies for the region.

Objectives of the RCTO are to:

- Enhance regional mobility through improved regional transportation operations;
- Establish criteria to measure transportation system performance;
- Document existing and possible improvements to institutional arrangements; and
- Identify goals for transportation system operations.

## 1.2 Purpose

The purpose of Technical Memorandum No. 1 is to present the results of Task 1: Establish Mission and Vision for ITS Concept of Operations, and Task 2: Document Existing Policies and Practices in the Region.

Specifically, this deliverable contains:

- Vision and Mission Statement for the RCTO project;
- An inventory of current policies, procedures, and practices related to transportation operations in the region. The inventory includes:
  - A review of the practice of signal priority/preemption systems for emergency vehicles;
  - A review of any existing or planned local policies on transit priority;
  - A review of policies, practices, and procedures pertaining to transportation operations (freeway and arterial operations);
  - A review of the chain of command for existing operational procedures and practices for the Arizona Department of Transportation (ADOT), Department of Public Safety (DPS), and all MAG member agencies;
  - A description of existing institutional frameworks for the coordination of regional transportation operations and management;
  - A description of existing institutional frameworks for the regional coordination of emergency management; and
  - Review of current annual funding amounts and sources that are used to support transportation operations in the MAG Region.

## 2. VISION AND MISSION

### 2.1 Background

The purpose of the Vision and Mission is to illustrate the objectives and goals of the RCTO. Members of the RCTO Stakeholders Group sought a tool that would help them educate department managers, elected officials, and members of the public about the vital role of transportation operations as the foundation to a safe and reliable surface transportation system.

### 2.2 Vision

The stakeholders in the MAG Region envision a safe, reliable, efficient, and seamless surface transportation system. This is presented in **Figure 1**.

### 2.3 Mission

A mission statement serves to identify steps that need to be accomplished in order to achieve the vision. In the MAG Region, a safe, reliable, efficient, and seamless surface transportation system will be achieved by:

- Identifying and securing funding sources;
- Actively managing and operating multimodal transportation systems;
- A high degree of information sharing, integration, and coordination;
- Defining and agreeing to appropriate roles and responsibilities;
- Establishing and implementing applicable policies, procedures, and practices;
- Dedicating and training human resources; and
- Continuous improvement of performance against customer driven indicators.

**Figure 1 – MAG Region Vision and Mission**

(REPLACE THIS PAGE WITH THE VISION AND MISSION GRAPHIC)

### **3. INVENTORY OF EXISTING POLICIES, PROCEDURES, AND PRACTICES IN THE MAG REGION**

The objective of the inventory process was to collect and document current policies, procedures, and practices related to transportation operations from the eleven MAG member agencies with freeway interchanges within their jurisdictional boundaries. These included cities, Maricopa County, and the Arizona Department of Transportation (ADOT). The Arizona Department of Public Safety (DPS) was also included in the inventory process.

#### **3.1 Summary of Inventory Process**

Inventory interviews were conducted in September and early October 2002. The primary objective of the interviews was to determine if the agency had written policies, procedures, or practices for a specific transportation operations component. Policies are written goals and intentions of the agency for a particular aspect of transportation operations. Policies could be in the form of state laws, codes, statutes, city council resolutions, or documents produced by the department or agency. Procedures are the defined series of steps used by the agencies to implement an aspect of transportation operations.

If there were no written policies or procedures, the interviewer determined whether unwritten practices were followed. Practices are defined as activities that are routinely undertaken, but for which there is no formal written document that directly describes the activities. Finally, if no typical practices were followed, the interviewer asked if the agency thought that policies or procedures were needed.

##### **3.1.1 Agencies Contacted**

Representatives from ADOT, DPS, the Maricopa County Department of Transportation (MCDOT), Rural/Metro, and from each of the cities and towns with freeway interchanges within their jurisdictional boundaries were contacted and interviewed during the inventory.

Desired interview participants were contacted by telephone to set an appointment for the interview. During the telephone conversation, the general purpose and objectives of the inventory were discussed, along with the desire to obtain written policies and procedures. On the day of the interview, written policies and procedures were collected. For those agencies that were interviewed by telephone, a request was made to have available documentation mailed, e-mailed, or faxed. Names of the persons interviewed are as follows:

##### **Arizona Department of Transportation (ADOT)**

- Tim Wolfe, Assistant State Engineer, Transportation Technology Group

##### **Arizona Department of Public Safety (DPS)**

- Terry Conner, Bureau Commander

**City of Chandler**

- Mike Mah, Traffic Engineering
- Edward Upshaw, Police Department
- Jeff Clark, Fire Department

**Town of Gilbert**

- Bruce Ward, Traffic Engineering
- Mike Sutton, Traffic Engineering

**City of Glendale**

- Jim Book, Traffic Engineering
- Jerry Whipple, Traffic Engineering
- Julie Sada, Police Department, Training Coordinator
- Sherrie Clark, 911 Coordinator
- Jim Higgins, Fire Department

**City of Goodyear**

- Chuck Hydeman, Traffic Engineering
- Mark Brown, Police Department
- Mark Gaillard, Fire Department

**Maricopa County Department of Transportation**

- Yogesh Mantri, Traffic Engineering
- Barbara Hauser, Incident Management

**Maricopa County Sheriff's Office**

- Robert Parrish, District Commander, District 2

**City of Mesa**

- Alan Sanderson, Traffic Engineering
- Jan Siedler, Traffic Engineering
- Arthur Dock, Traffic Engineering
- Lance Rogers, Police Department
- Cliff Puckett, Fire Department

**City of Peoria**

- Scott Nodes, Traffic Engineering
- Ron Amaya, Traffic Engineering
- Lloyd Pethound, Police Department

- Larry Rooney, Fire Department
- Mike Fusco, Safety and Emergency Management

#### **City of Phoenix**

- Joel Havris, Traffic Engineering
- John Morgan, Traffic Engineering
- Mike Debennedetto, Police Department
- Kevin Riley, Fire Department
- Marcus Aurelius, Emergency Management
- Bob Ciotti, Transit (Bus)
- Rick Brown, Transit (Light Rail)

#### **City of Scottsdale**

- Bruce Dressel, Traffic Engineering
- Mike Rosenberger, Police Department
- Jim Ford, Rural/Metro

#### **City of Tempe**

- Jim Decker, Traffic Engineering
- Kevin Kotsur, Police Department
- Jay Spradling, Police Department
- Jim Gaintner, Fire Department

#### **3.1.2 *Transportation Operations Components Discussed***

The interviews sought to collect and compile policies, procedures, and practices related to surface transportation operations. Specifically, questions were asked about policies, procedures, and practices pertaining to:

- Variable Message Signs (VMS);
- Closed-Circuit Television Cameras (CCTV);
- Ramp Metering;
- Freeway Interchanges;
- Planned Event Management;
- Incident Management;
- Travel Information Systems;
- Traffic Signal Systems;
- Emergency Vehicle Preemption;
- Transit Signal Priority;
- Highway/Rail Intersections;
- Data Archiving Systems; and
- Operations Centers.

### 3.1.3 Interview Questions

The following are examples of the questions that were asked of each of the agencies interviewed; however, the questions were tailored to individual agencies. For example, the fire department was not asked about ramp metering operations.

#### **Department Overview and Operations Center (TMC)**

- Please provide the number of current and near-term staff of those in your department.
- Please describe the roles and responsibilities of the Traffic Management Center (TMC). Do you have standard operating procedures documented?
- Please provide information on levels of funding of your department for transportation operations functions.

#### **Incident Management**

- Are there written policies or procedures that establish the requirements for responding to and managing incidents in your jurisdiction?
- How is your agency informed of an incident?
- What are your roles and responsibilities relating to incident management? Is documentation available?
- Is there a documented framework for coordination with other agencies? With what other agencies do you coordinate incident management activities?

#### **Planned Event Management**

- Are there written policies, procedures, or laws that establish the requirements for managing special events? Work zones?
- Please describe levels of coordination with other agencies and jurisdictions with reference to special events and work zones. Is documentation available?

#### **Traffic Signals and Freeway Interchanges**

- Please describe typical operations and your agency's roles and responsibilities with respect to traffic signal operations. Does your agency have documentation pertaining to signal phasing, timing, or cycle length?
- Please describe the practices associated with the management of emergency vehicle preemption. Is documentation available that relates to how the system is implemented (parameters, etc.)?
- Please describe any issues associated with freeway/arterial interchanges. What works, what doesn't, what can be improved?

#### **ITS Field Equipment and Systems**

- Are there any written policies, procedures, or laws that establish the requirements for the operation of dynamic message signs (DMS) in your jurisdiction?
- Are there any written policies/procedures that establish the requirements for the operation of CCTV cameras in your jurisdiction?

- Does your jurisdiction utilize a data archiving system? Is there any available documentation that relates to the archiving of information?
- What are the roles and responsibilities of your department in the operation of the travel information system?

### 3.2 Inventory Report Card

The results of the inventory are presented in the form of a report card covering each of the transportation operational components. The report card displays each of the agencies surveyed, and the agencies status as it relates to policies and practices for each of the transportation operations components.

#### 3.2.1 Cell Matrix Description

Based on interview results, the matrices were used to map documented policies or procedures, undocumented practices, procedures under development, and needed policies to each of the interviewed agencies and transportation operations components.

**Table 1** shows the inventory status report matrices. For each matrix, cells containing a symbol indicate the transportation operations components that correspond to the policy, procedure, or practice. The symbol type indicates the status of that policy, procedure, or practice (see legend).

Cells in the matrix that are blank identify operational components that do not apply to the policy, procedure, practice, or agency.

**Table 2** shows a listing of documented policies and practices from agencies in the MAG Region.

Table 1 – Report Card of Existing Policies and Practices

<ul style="list-style-type: none"> <li>● Documented Policy or Procedure</li> <li>◐ Undocumented Practice</li> <li>○ No Existing Policy/Practice, but potential need exists</li> <li>- Not Applicable</li> </ul>	ADOT	Arizona DPS																														
		Chandler			Gilbert			Glendale			Goodyear			Maricopa County		Mesa			Peoria			Phoenix				Rural Metro	Scottsdale		Tempe			
		Traffic	Police	Fire	Traffic	Police	Fire	Traffic	Police	Fire	Traffic	Police	Fire	Traffic	Sheriff	Traffic	Police	Fire	Traffic	Police	Fire	Traffic	Police	Fire	Transit	Fire	Traffic	Police	Traffic	Police	Fire	
Variable Message	●	-	-	-	-	-	-	-	○	-	-	-	-	-	-	◐	-	-	○	-	-	●	-	-	-	-	●	◐	-	-	-	
CCTV Cameras	●	●	●	-	-	-	-	○	○	-	-	○	-	-	-	◐	-	-	○	-	-	●	-	-	○	-	◐	-	◐	-	-	
Ramp Metering	◐	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Freeway Interchange Signal Coordination	◐	-	◐	-	-	-	-	-	◐	-	-	◐	-	-	-	◐	-	-	◐	-	-	◐	-	-	-	-	◐	-	◐	-	-	
Planned Events	◐	●	◐	◐	●	◐	●	-	○	●	●	●	◐	-	●	◐	◐	●	●	-	●	-	◐	◐	●	-	◐	◐	◐	◐	-	
Incident Management																																
Inter-jurisdictional Coordination	●	●	○	●	●	●	●	-	◐	●	●	◐	●	●	●	●	○	●	●	-	●	●	○	●	●	-	●	◐	◐	○	●	●
Agency Roles and Responsibilities	●	●	○	●	●	●	●	●	○	●	●	○	●	●		●	○	●	●	○	●	●	●	●	●	●	◐	●	●	○	●	●
Diversion Plans	●	◐	-	◐	-	◐	-	-	◐	◐	-	◐	◐	-	●	◐	○	◐	-	-	◐	-	○	◐	-	-	○	◐	◐	◐	-	-
Travel Information	●	-	○	-	-	-	-	-	◐	-	-	-	-	-	◐	-	○	-	-	-	-	-	○	-	-	-	○	-	○	-	-	-
Traffic Signal Systems																																
Timing/Phasing	●	-	◐	-	-	-	-	-	◐	-	-	◐	-	-	◐	-	-	◐	-	-	◐	-	-	-	-	◐	-	◐	-	-	-	
Emergency Vehicle Preemption	●	-	◐	-	◐	-	◐	-	◐	-	◐	◐	◐	○	-	◐	-	◐	◐	-	◐	○	-	◐	-	◐	◐	-	◐	-	◐	
Transit Priority	-	-	○	-	-	-	-	○	○	-	-	-	-	○	-	○	-	-	○	-	-	○	-	-	○	-	○	-	○	-	-	
Highway/Rail Int.	●	-	○	-	-	-	-	-	○	-	-	○	-	-	○	-	-	○	-	-	○	-	-	-	-	-	-	-	○	-	-	
Data Archiving	●	-	○	-	-	-	-	-	○	-	-	◐	-	-	○	-	-	-	-	-	-	-	○	-	-	-	◐	-	○	-	-	
Operations Centers	●	●	◐	●	●	●	●	-	○	●	-	●	-	-	◐	●	◐	●	●	○	●	●	◐	●	●	?	-	◐	-	◐	●	

**Table 2 – Existing Documented Policies and Procedures for Agencies in the MAG Region**

Agency or Municipality	Transportation Operations Component											
	Incident Management	Planned Event Management	Freeway Interchanges	Variable Message Signs	Closed-Circuit Television	Data Archiving Systems	Travel Information Systems	Traffic Signal Systems Operations	Emergency Vehicle Signal Preemption	Transit Signal Priority	Ramp Metering	Arterial-Highway Rail Intersections
<b>Arizona Department of Public Safety</b>												
<b>Arizona Department of Transportation</b>												
ADOT, Traffic Operations Center, Operations Manual	●	●		●	●		●					
ADOT, Statewide Alternate Route Plan	●											
ADOT, Traffic Engineering, Policies, and Guidelines, and Procedures		●						●				
ADOT, Arizona Statewide Roadway Incident Management Plan	●											
<b>Chandler</b>												
Resolution No. 3507 A Resolution of the City Council of the City of Chandler, Arizona, Establishing a Policy on the Use of Camera and Video Technology for the Purpose of Traffic Monitoring.					●							
Chandler Police Department General Orders, F-13 Unusual Occurrences and Emergency Operations Incident Command System.	●											
Chandler Police Department General Orders, F-20 Traffic	●											
Chandler Police Department General Orders, F-20 Traffic, F-21 Traffic Accident Investigation	●											



**Table 2 – Existing Documented Policies and Procedures for Agencies in the MAG Region (continued)**

Agency or Municipality	Transportation Operations Component											
	Incident Management	Planned Event Management	Freeway Interchanges	Variable Message Signs	Closed-Circuit Television	Data Archiving Systems	Travel Information Systems	Traffic Signal Systems Operations	Emergency Vehicle Signal Preemption	Transit Signal Priority	Ramp Metering	Arterial-Highway Rail Intersections
<b>Gilbert</b>												
<b>Glendale</b>												
Glendale Police Department Incident Command System	●											
Glendale Police Department Emergency Operations Plan	●											
Glendale Police Department Contingency Plan	●											
<b>Goodyear</b>												
City of Goodyear Incident Management Manual	●											
<b>Maricopa County (Includes Department of Transportation and Sheriff's Office)</b>												
Maricopa Department of Emergency Management, Maricopa County Emergency Operations Plan	●											
Intergovernmental Agreement between Maricopa County, ADOT, and the Cities of El Mirage, Glendale, Peoria, and Phoenix for Emergency Management Traffic Management Mutual Aid – Draft	●											
MCDOT, Traffic Engineering Division, Policy/Procedure Guideline, Fire Station Control Policy								●				



**Table 2 – Existing Documented Policies and Procedures for Agencies in the MAG Region (continued)**

Agency or Municipality	Transportation Operations Component											
	Incident Management	Planned Event Management	Freeway Interchanges	Variable Message Signs	Closed-Circuit Television	Data Archiving Systems	Travel Information Systems	Traffic Signal Systems Operations	Emergency Vehicle Signal Preemption	Transit Signal Priority	Ramp Metering	Arterial-Highway Rail Intersections
<b>Mesa</b>												
Mesa Fire Department, Emergency Medical Dispatch, Program Overview	●											
Mesa Police Department, Emergency Operations Supplement Manual, Incident Command System Disaster Scene Duties	●											
City of Mesa, Traffic Signal Policy, Vehicle Change Interval, Revised 11/14/2000								●				
Proposed Code Assignment List for Emergency Vehicle Preemption Devices, 2002 (unofficial document)									●			
<b>Phoenix</b>												
Phoenix Street Transportation Department, Guidelines for Variable Message Sign Usage				●								
City of Phoenix, Emergency Operations Center Standard Operating Procedures	●											
City of Phoenix Barricade Manual*		●										
City of Phoenix, Major Emergency Response and Recovery Plan	●											
Light Rail Operations and Maintenance Manual												



**Table 2 – Existing Documented Policies and Procedures for Agencies in the MAG Region (continued)**

Agency or Municipality	Transportation Operations Component											
	Incident Management	Planned Event Management	Freeway Interchanges	Variable Message Signs	Closed-Circuit Television	Data Archiving Systems	Travel Information Systems	Traffic Signal Systems Operations	Emergency Vehicle Signal Preemption	Transit Signal Priority	Ramp Metering	Arterial-Highway Rail Intersections
<b>Peoria</b>												
City of Peoria, Police Department Policies and Procedures	●											
City of Peoria Emergency Operations Plan	●											
<b>Rural Metro</b>												
<b>Scottsdale</b>												
Scottsdale Transportation Department, Guidelines for Dynamic Message Sign Usage						●						
<b>Tempe</b>												
City of Tempe Emergency Operations Plan	●											
Other Policies in use by Local Agencies and Municipalities												
U.S. Department of Transportation, Federal Highway Administration, Manual On Uniform Traffic Control Devices	●	●										
<ul style="list-style-type: none"> <li>▪ Chapter 6I, Control of Traffic Through Traffic Incident Management Areas, Proposed Revision No. 2</li> </ul>	●	●										



**Table 2 – Existing Documented Policies and Procedures for Agencies in the MAG Region (continued)**

Agency or Municipality	Transportation Operations Component											
	Incident Management	Planned Event Management	Freeway Interchanges	Variable Message Signs	Closed-Circuit Television	Data Archiving Systems	Travel Information Systems	Traffic Signal Systems Operations	Emergency Vehicle Signal Preemption	Transit Signal Priority	Ramp Metering	Arterial-Highway Rail Intersections
<b>Regional Agreements and Policies</b>												
Phoenix Fire Department, Phoenix Regional Standard Operating Procedures	●											
Automatic Aid Agreement for Fire Protection and other Emergency Services	●											

\* The Phoenix Barricade Manual is used by several agencies in the MAG Region including Glendale, Goodyear, and Peoria.

### 3.3 Review of Emergency Vehicle Signal Preemption

Emergency vehicle signal preemption is used at intersections for emergency vehicles for the following reasons:

- **Reducing response time to emergencies** – Signal preemption systems save lives by improving the response time of the emergency vehicles. For instance, a heart attack victim's chance of survival is 42% if they are treated within the first four minutes of onset. After four minutes, the figure drops to 7%. After implementing a system, Houston, Texas reported a 17% drop in emergency vehicle response time. Emergency vehicle preemption also can increase the area that emergency vehicles can cover in required response times, resulting in cost-savings to the municipality.
- **Reducing accidents involving emergency vehicles at intersections** – From the mid 1980's through 1994, 6,550 fatalities and over 182,000 accidents occurred that involved emergency vehicles, resulting in hundreds of millions of dollars paid out in accident settlements by cities, states and federal agencies. Accidents involving emergency vehicles can be significantly reduced through the use of emergency vehicle preemption systems. St. Paul, Minnesota experienced a 71% decrease in emergency vehicle accidents over a 14-year period after implementing emergency vehicle signal preemption. By reducing emergency vehicle related crashes, the legal liability of the agencies when motorists are injured dramatically decreases.

There are three means of signal preemption from emergency vehicles: mobile radio, siren sensor, and modulated strobe light, which is the system most commonly implemented in the MAG Region. In addition, GPS-based systems have been developed; however, ADOT only permits the installation of optical-based or sound-based systems to be installed on traffic signals on state highways. GPS-based systems are currently not approved for use.

Optical emergency vehicle preemption can be described as a three-step process:

- First, an emitter located on the emergency vehicle sends a signal to a detector mounted above the traffic signal. Because signal preemption could have a noticeable effect on the transportation network, agencies may require the emitting signal to be coded in order for the preempting vehicle to be positively identified as it preempts the traffic signal. Those vehicles that are not positively identified may or may not be granted preemption.
- Second, the detector receives and converts the signal into electronic impulses that are relayed to phase selection equipment located in the signal controller cabinet. The phasing selection equipment could process the signal in one of three ways:
  - Preemption is granted to only those vehicles whose unique codes, or vehicle ID's, have been confirmed as authorized emergency vehicles.
  - Preemption is granted to all vehicles regardless of vehicle identification or coding. All emergency vehicles can preempt the signal without regard to which city they belong to. A municipality will then only receive information about its own vehicles, and will not be able to obtain information about other cities vehicles as they preempt the signal.
  - If the city has not activated the coding features of the signal preemption system, all emergency vehicles equipped with transponders will be able to preempt the signal. No information will be obtained as to the identification of the preempting vehicle.

Finally, the phase selector directs the controller to provide a green light for the approaching emergency vehicle. This is done through the implementation of a separate timing plan, without

consideration for maintaining the existing timing plan such that coordination can be maintained between adjacent traffic signals. Once the vehicle passes through the intersection, the system requires the controller to transition out of and back into coordinated operation of the normal signal-timing plan.

Nearly every agency in the MAG Region has some degree of implementation of emergency vehicle signal systems. **Table 3** illustrates the status of emergency vehicle preemption for each of the interviewed MAG member agencies.

**Table 3 – Status of Emergency Vehicle Signal Preemption**

Jurisdiction	Level of Preemption Deployment	Manufacturer of Preemption Signal Equipment	Unique Coding/Vehicle Identification Required
ADOT	None	N/A	N/A
Chandler	100% Deployed Every new signal is required to have preemption.	3M Opticom	No
Gilbert	100% Deployed Every new signal is required to have preemption	Tomar	No
Glendale	Approximately 70% deployed Every new signal is required to have preemption	Tomar	No
Goodyear	Approximately 75% Deployed	3M Opticom	Yes; however only for their vehicles. Coding does not prohibit vehicles from other jurisdictions from preempting the signal.
Maricopa County	Few	3M Opticom	No
Mesa	Approximately 65% deployed	3M Opticom	Yes – requires positive ID of the vehicle, only City of Mesa codes preempt the signals. Working to open the process. Other jurisdictions do not preempt the signal.

**Table 3 – Status of Emergency Vehicle Signal Preemption (continued)**

<b>Jurisdiction</b>	<b>Level of Preemption Deployment</b>	<b>Manufacturer of Preemption Signal Equipment</b>	<b>Unique Coding/Vehicle Identification Required</b>
Peoria	Every new signal is required to have preemption	3M Opticom	No
Phoenix	Few – bond recently passed that will allow for the equipping of nearly 400 intersections	3M Opticom  Decision has not been made on which manufacturer will be used for new systems. Tests will be conducted in the upcoming months, and a decision will be made based upon compatibility results between the TOMAR and 3M Transponders and Receivers.	No; however, they will be using coding when the system is expanded. Expansion will most likely occur within the next 1½ years. Phoenix currently has some TOMAR emitters and some 3M emitters on their fire trucks.
Scottsdale	Approximately 40% deployed  Every new signal is required to have preemption	3M Opticom	No
Tempe	Approximately 75% deployed	3M Opticom	No – Tempe does code the emitter; however, they don't code the receiver.

### **3.4 Review of Transit Signal Priority**

Although the terminology transit signal priority and signal preemption are often used synonymously, they are in fact, very different processes. In contrast to signal preemption, transit signal priority attempts to maintain coordination with adjacent signalized intersections. Transit signal priority modifies the normal signal operation process while preemption interrupts the normal process. The objectives of transit signal priority are:

- Improved bus schedule adherence;
- Improved transit efficiency;
- Contribution to enhanced transit information; and
- Increased road network efficiency.

In the MAG Region, transit signal priority has not been deployed. None of the agencies contacted had any immediate plans to implement transit signal priority; however, many agencies are

discussing transit signal priority as part of the upcoming Light-Rail Transit Project and Bus Rapid Transit Program.

### **3.5 Existing Regional Organizational Framework for Coordination of Regional Transportation Operations and Management**

Several formal and informal organized functions or groups exist within the MAG Region that currently form the framework for coordination of transportation operations. These groups are discussed below.

- MAG ITS Committee;
- AZTech™ Executive Committee;
- AZTech™ East Valley Traffic Signal Groups;
- AZTech™ West Valley Traffic Signal Group; and
- Valley Area Traffic Engineers Committee (VATEC);

#### **3.5.1 MAG ITS Committee**

The MAG ITS Committee is made up of federal, state, and local transportation agencies in the Phoenix metropolitan region, and includes representation from Sky Harbor Airport, DPS, the Federal Highway Administration (FHWA), and Arizona State University (ASU). The primary role of the MAG ITS Committee is to plan all regional ITS infrastructure and recommend regional investments in ITS. The meetings of the Committee, which occur every month, also provide a formal avenue for inter-agency cooperation and coordination on matters pertaining to ITS and regional traffic management.

MAG will continue to have a long-term role in planning for operations. Other than its planning-level focus, the primary difference between the MAG ITS Committee and the other existing framework is the strong multimodal transportation orientation of the committee and this being the only group that is responsible for making recommendations on regional ITS infrastructure investments for the Phoenix metropolitan region.

#### **3.5.2 AZTech™**

AZTech™ is a voluntary consortium of federal, state, local agencies, and private sector partners within the Phoenix metropolitan area. Core members include transportation and transit agencies, fire departments, police departments, and emergency management agencies. AZTech™ also includes private sector partners that provide services related to advanced travel information systems (ATIS), transportation consultants, and public sector supporting agencies (for example, telecommunication departments and public information officers).

AZTech™ was initiated in 1996 as part of the ITS Model Deployment Initiative (MDI) project launched through a federal grant of \$7.5 million: Funding for all ITS projects and programs in the region currently come from either state or local agencies, or federal funding programmed through the MAG ITS planning process. There is no established formal link between AZTech™ Executive Committee and the regional transportation planning process. The MAG ITS Strategic Plan (April 2001) depicted the informal structure. It was anticipated that the AZTech™ Executive Committee will report periodically to the MAG Transportation Review Committee on matters pertaining to transportation operations;

however, this has not materialized to date. AZTech™ is a voluntary coalition, whose discussions fall under several elements of regional ITS operations, including:

- Maintaining telecommunication connectivity between traffic management centers;
- Implementing and maintaining an advanced traffic management system (ATMS) that facilitates cross-jurisdictional CCTV camera control, VMS messaging, and data exchange;
- Coordinating deployment of ITS infrastructure on Systematically-Managed Arterial (SMART) Corridors;
- Providing arterial roadway incident response through the Regional Emergency Action Coordination Team (REACT, currently a pilot project involving Glendale, Peoria, El Mirage and unincorporated County areas );
- Coordinating ATIS partnerships with the private sector; and
- Facilitating efforts in coordinated response for regional emergency management.

The stated objectives of the AZTech™ program are to:

- Integrate the existing ITS infrastructure into a regional system;
- Establish a regional integrated travel information system; and
- Expand the transportation management system for the Phoenix metropolitan area.

The AZTech™ Executive Committee meets every two months. Within the AZTech™ framework are two additional layers: Strategy Groups and Working Groups. Updates on the activities of these groups are provided at every Executive Committee meeting. MCDOT provides funding for administrative and technical support for the AZTech™ program, including Working Groups, Strategy Groups, and the Executive Committee. MCDOT, ADOT and local agency staff also supported the deployment and maintenance of equipment procured during the MDI, and provide guidance and oversight of the aforementioned regional responsibilities (regional software procurement, expansion of REACT, expanding ATIS partnerships, regional telecommunications, and others).

#### 3.5.2.1 Working Groups

The AZTech™ Working Groups typically have a defined focus and meet bi-monthly to discuss technical issues. There are three Working Groups that currently meet regularly:

- Technical Oversight Committee;
- Traffic Operations Working Group; and
- Incident Management Working Group.

The Technical Oversight Committee and the Traffic Operations Working Group have met every two months since 1996. The focus of the Technical Oversight Committee is system and network integration and issues related to ITS equipment deployment. The focus of the Traffic Operations Working Group is coordination of ITS and traffic operations between jurisdictions.

### 3.5.2.2 Strategy Groups

The AZTech™ Strategy Groups are organized to plan and direct the activities of AZTech™ to achieve five major strategies. Each Strategy Group has a Chair that is also a member of the AZTech™ Executive Committee. Improving transportation operations is the objective of three of the Strategy Groups. These are:

- Expand and Strengthen Partnerships – The objective of this group is to further the AZTech™ objective of increasing partnerships, particularly among representatives of public safety and emergency management agencies. One of the goals of this expanded partnership is improved regional coordination of operations in the valley;
- Plan, Develop, and Deploy Integrated Regional Systems – The objective of this group is to plan and advise on activities that will help further the deployment of integrated regional transportation systems; and
- Optimize Regional Operations and Management – This group has met on a variety of transportation operations subjects, ranging from incident response to special event management.

The other two strategy groups are:

- Establish Education and Outreach Programs; and
- Research and Test New Technological Opportunities.

AZTech™ Strategy Group meeting intervals vary from group to group. Each group has met at least once in the past three months as of October 2002. Activities that are planned and directed by the groups are typically those under direction from other project managers or steering committees. The general function of the groups has been to provide regional input on projects that are being implemented by participating agencies.

### 3.5.3 *East Valley Traffic Signal Group/West Valley Traffic Signal Group/Valley Area Traffic Engineers Committee*

In addition to the officially sponsored working groups within AZTech™, there are less formal meetings that provide forums for coordination of traffic operations: the East Valley Traffic Signal group and West Valley Traffic Signal group, and VATEC.

The Valley Traffic Signal Groups deal with traffic signal operations and management issues that are specific to each geographic area. These groups are invited to report on their activities at the AZTech™ Traffic Operations Working Group meetings.

VATEC meets on a quarterly basis. Membership of this group includes traffic engineers from around the MAG Region, and discussions of this group span the breadth of transportation operational issues. City of Glendale is the current host of this committee.

### 3.5.6 *Summary*

Three categories of functions that provide a framework for coordination of transportation operations have been identified in this section. A summary of these functions is shown in **Table 5**.

**Table 5 – Organization and Function of Existing Regional Consortiums**

<b>Framework</b>	<b>Activities</b>	<b>Level of Participation</b>	<b>Frequency</b>
MAG ITS Committee Standing committee at the MPO Established source of federal funding	<ul style="list-style-type: none"> <li>▪ Planning and prioritization of all regional ITS infrastructure</li> <li>▪ Freeways service patrol program (see Section 3.6.3)</li> </ul>	Transportation officials from all MAG member agencies, ADOT, FHWA, Sky Harbor and DPS.	Monthly meetings.
AZTech™ Informal group No established funding stream	<ul style="list-style-type: none"> <li>▪ Inter-agency coordination</li> <li>▪ Traffic management</li> <li>▪ Incident management</li> <li>▪ Emergency management</li> </ul>	All major agencies within Maricopa County attend, including transportation, fire, police, and emergency management.	At least one AZTech™ meeting occurs every month. Executive Committee meets every two months.
Informal Signal Group Meetings No established funding stream	<ul style="list-style-type: none"> <li>▪ Signal operations</li> <li>▪ Traffic management</li> <li>▪ Inter-agency coordination</li> <li>▪ ITS equipment and use</li> </ul>	All affected transportation agencies generally have representation.	Meetings occur approximately every quarter. There is no formal schedule.

### **3.6 Existing Regional Organizational Framework for Coordination of Emergency Management**

Several formal agreements and organizations exist within the MAG Region that currently form the framework for coordination of emergency management. These groups are discussed below.

- Incident Command System;
- Phoenix Regional Standard Operating Procedures, Volume 2;
- Freeway Service Patrol Program (FSP);
- Arizona Local Emergency Response Team (ALERT); and
- REACT Pilot Project.

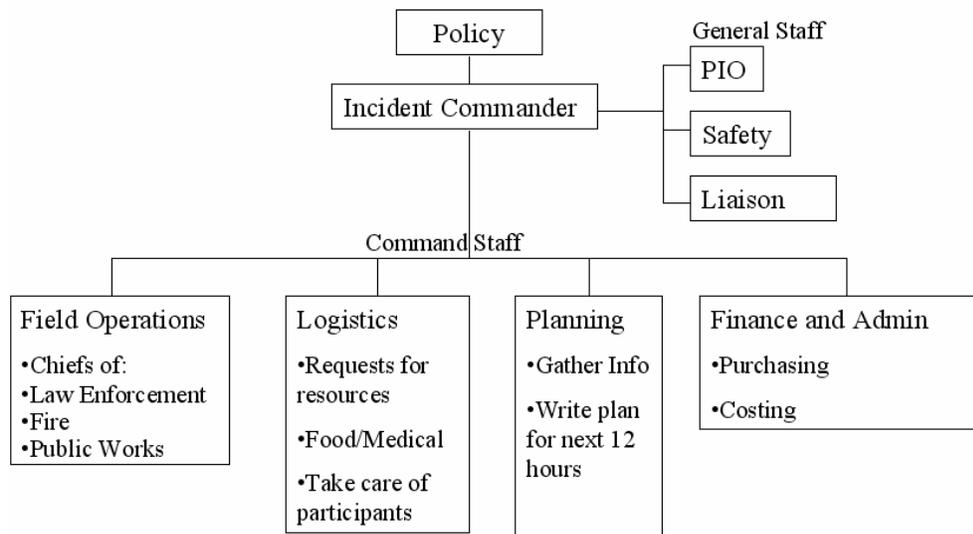
#### **3.6.1 Incident Command System**

The Incident Command System (ICS) provides an important framework from which different departments can work together. In both minor and major incidents, many local, state and federal agencies may become involved. The challenge is to get the various agencies to work together in the most efficient and effective manner.

The principles of the Incident Command System enables State and local emergency response agencies to utilize common terminology, span of control, organizational flexibility, personnel accountability, comprehensive resource management, unified command and incident action plans.

Since 2001, there is an increasing awareness in the transportation community of the content of this framework. The incident command structure is shown in **Figure 2**. The first responder to the scene of an incident initiates this structure. It is important to recognize that the Incident Command Structure allows for flexibility as the nature of the incident evolves and changes. For example, if an incident is primarily rescue or fire oriented, fire department personnel may serve as the incident commander. As the nature of the incident changes and the emphasis becomes more on law enforcement or traffic control, the incident command may shift to police department personnel.

### Emergency Management Structure



**Figure 2 – Emergency Management and Incident Command Framework**

The geographic scale and impact of an incident will usually determine the number of agencies that need to be involved. At the Unified Command level, emergency managers at the city, county, or state level might need to be involved, and communications at the Unified Command level could be moved to the respective jurisdictions’ emergency operations center. Major incident response procedures are well documented in material such as Maricopa County’s Emergency Operations Plan. Fortunately, these major incident and disaster response plans are applied less frequently than Phoenix Fire’s standard operating procedures.

#### 3.6.2 Phoenix Regional Standard Operating Procedures

The Phoenix Regional Standard Operating Procedures (Volume Two) are utilized by fire departments valley wide, and serve as the framework for regional emergency management coordination. Among the documented policies and procedures are:

- Command Procedures;
- Fire Operations;
- Medical Operations;
- Technical Operations;

- Communication Deployment and Response; and
- Special Considerations.

These procedures are extremely detailed. For example, under Communication Deployment and Response, one of the sections is Sky Harbor Response Aviation Emergencies. This section details the staging of equipment, notification of agencies, and use of material under three different emergency levels.

The procedures clearly document the communication paths and message sets to be used when communicating between agencies. For example, a section on Traffic Control in the Police Liaison section under Command Procedures contains the following material:

### ***Police Liaison Sector***

M.P. 201.05I

03/00-R

Traffic Control

*“Dispatch will automatically notify the police department of the need for traffic control at any working fire. When the need for traffic control is urgent or complex, this should be reported to Dispatch to be relayed to police communications. Time will be saved if specific traffic control locations are relayed through Dispatch (Example: ‘Have P.D. close Van Buren from 7th Street to 9th Street’).*

*When special traffic control measures are needed, such as with hazardous materials incidents, the basic requirements may be relayed through Dispatch with a request for a police supervisor at the Command Post.”*

As part of these standard operating procedures, the fire departments have mutual aid agreements that document procedures for response to fires in each other’s jurisdiction.

### **3.6.3 FSP and ALERT**

FSP and ALERT are similar in that they are associated with road clearance and incident response.

The FSP is currently funded and managed by MAG and operated by DPS to alleviate the demands of stranded motorists, clear abandoned vehicles, and clear road debris on the regional freeway system. FSP, which maintains eight vehicles, primarily provides assistance to stranded motorists, and identifies and clears road debris. An Interagency Oversight Team consisting of DPS, ADOT, FHWA, and MAG provides oversight to this program.

ALERT, which consists of eight response vehicles, is funded by ADOT and is operated by the Phoenix Maintenance District of ADOT. ALERT provides incident management assistance to DPS at the scene of accidents on ADOT freeways.

### **3.6.4 REACT**

REACT is a pilot project operated by MCDOT on behalf of AZTech™. REACT consists of eight (with two more on order) vehicles split into two response teams that are called out by police departments on an as-needed basis. Team members provide traffic management for emergencies on arterial roadways in the four pilot jurisdictions. REACT coordinates with

police and fire departments on the scene of the incident. The current phase deployment of REACT covers the northwest portion of the greater Phoenix metropolitan area, including the City of Peoria, City of Glendale, and District 3 of the Maricopa County Sheriff’s Office.

Thus, whereas the FSP and ALERT operate on the freeways, REACT is testing the feasibility of providing incident traffic management on arterial streets. REACT activity is currently limited to the west valley; however, other cities and departments including Phoenix police, City of Scottsdale, and Town of Gilbert have expressed an interest in expanding REACT to their jurisdictions.

### 3.6.5 Summary

Four categories of functions that provide a framework for coordination of emergency management have been identified in this section. A summary of these functions is shown in **Table 6**.

**Table 6 – Organization and Function of Existing Regional Consortiums**

Framework	Activities	Level of Participation	Frequency
Phoenix Fire City funds MAG regional funds for 911 system	<ul style="list-style-type: none"> <li>▪ Mutual aid agreements with other cities’ fire departments</li> <li>▪ Framework for coordination with site-specific agencies (e.g., Deck Park Tunnel response)</li> </ul>	All affected fire departments, public safety agencies, and public contacts are detailed in standard operating procedures.	Continual day-to-day applications.
Emergency Management County EM funds	<ul style="list-style-type: none"> <li>▪ Emergency response plans for cities, County and State</li> </ul>	Emergency management and public safety officials from every city, the County, and State.	Applied during disasters or major incident response. Some exercises conducted regularly.
FSP/ALERT	<ul style="list-style-type: none"> <li>▪ FSP coordination between DPS ADOT FHWA and MAG</li> <li>▪ ALERT – coordination between ADOT and DPS</li> </ul>	FSP involves coordination between DPS, ADOT, FHWA and MAG  ALERT involves coordination between ADOT and DPS	Continual day-to-day applications.
REACT Pilot project	<ul style="list-style-type: none"> <li>▪ REACT – coordination with sheriff’s office and three police agencies</li> </ul>	REACT participation currently includes Sheriff, DPS, and police departments in Glendale, Peoria, and El Mirage	Continual day-to-day applications.

### 3.7 Existing Chain of Command for Operational Policies/Practices

From the interview process, the existing chain of command for each agency was identified for the following transportation system management components:

- Freeway Systems Management;
- Arterial Systems Management;
- Incident Management;
- Special Event Management;

- Work Zone Management; and
- Transit Incident Management.

There are three categories of command: (1) Intra-departmental (within a state/local agency department), (2) Inter-departmental (between state/local agency departments), and (3) Inter-jurisdictional (between state or local agencies).

**Intra-departmental Chain of Command:** Intra-departmental command refers to communication within a single department of a state or local agency. For emergency management personnel, the intra-departmental chain of command is outlined in their respective standard operating procedures and manuals. The chain of command is less formal for traffic and transportation personnel. Instructions and communications are conveyed through the organizational structure of supervisor to supervisee, etc.

**Inter-departmental Chain of Command:** Inter-departmental command pertains to communication between different departments of the same municipality. The Incident Command System (ICS) serves as the framework for inter-departmental communication, particularly between fire, police, and other emergency management personnel. Fire departments implement the Incident Command System at nearly every incident. Police departments implement the Incident Command System for larger incidents; however, police, sheriff, and DPS might not implement Incident Command during smaller, routine, traffic related incidents.

Inter-departmental communication between traffic engineering and emergency management is less formalized. While some police departments automatically notify traffic management/engineering departments when a serious incident that impacts traffic occurs, in some agencies there are no established procedures to receive such notification. Fire departments rarely communicate directly with personnel from traffic management/engineering, but generally expect police/sheriff/DPS to handle such coordination. While police and fire departments are on active duty 24-hours a day, most local agency traffic engineering/management personnel are on active duty 8-10 hours a day. The exception to this is the ADOT Traffic Operations Center manned 24-hours a day.

**Inter-jurisdictional Chain of Command:** Inter-jurisdictional coordination refers to communication between two different jurisdictions or municipalities. The incident command system largely dictates the inter-jurisdictional chain of command between incident management agencies. As it pertains strictly to transportation system management and operations, no formal chain of command exists between agencies. ADOT is currently developing a protocol for notifying local agencies when a traffic incident occurs on a freeway within their jurisdiction.

**Table 7** shows a generalized chain of command matrix for each transportation operations components for inter-jurisdiction chain of command for ADOT, DPS, Valley Metro, and Local Responding Fire Department. The cells are labeled to reflect each agency's priority and involvement for the corresponding component: (1) lead/primary role; (2) support role; (3) involved by request; and (-) no involvement. It should be noted that for Traffic Accidents and Incidents, the lead/primary role may shift between police department and fire department depending upon the nature of the incident. If the incident is primarily traffic or enforcement related, police would assume the primary role. If the incident is rescue or hazard oriented, the primary role would be assumed by the fire department.

**Table 8** shows a generalized chain of command matrix for each transportation operations component for inter-departmental chain of command for the cities and Maricopa County.

**Table 7 – Inter-Jurisdictional Chain of Command**

Agency	Freeways	State Route Arterials	Traffic Accidents/Incidents	Special Events	Work Zones or Temp Traffic Control	Transit Incident
ADOT	1	1	3	2	1	-
DPS	3	3	1	1	3	2*
Responding Local Agency Fire Department	-	-	2	-	-	1
Valley Metro	-	-	-	-	-	2

\* Responder could also be the responding local police department.

**Table 8 – Inter-Departmental Chain of Command**

Agency	Arterials within Jurisdiction	Traffic Accidents/Incidents	Special Events	Work Zones or Temp Traffic Control
<b>Chandler</b>				
Traffic Engineering	1	-	1	1
Police Department	3	2	-	2
Fire Department	-	1	-	-
<b>Gilbert</b>				
Traffic Engineering	1	3	2	1
Police Department	3	2	1	-
Fire Department	-	1	3	-
<b>Glendale</b>				
Traffic Engineering	1	3	1	1
Police Department	3	2	-	-
Fire Department	-	1	3	-



**Table 8 – Inter-Departmental Chain of Command (continued)**

<b>Agency</b>	<b>Arterials within Jurisdiction</b>	<b>Traffic Accidents/Incidents</b>	<b>Special Events</b>	<b>Work Zones or Temp Traffic Control</b>
<b>Goodyear</b>				
Traffic Engineering	1	3	2	1
Police Department	3	2	1	2
Fire Department	-	1	3	-
<b>Maricopa County</b>				
Department of Transportation	1	3	2	1
Sheriff	3	1	1	2
Responding Fire Department	-	2	-	-
<b>Mesa</b>				
Traffic Engineering	1	3	1	1
Police Department	3	2	2	2
Fire Department	-	1	-	-
<b>Peoria</b>				
Traffic Engineering	1	3	1	1
Police Department	3	2	2	2
Fire Department	-	1	2	-
<b>Phoenix</b>				
Traffic Engineering	1	-	2	1
Police Department	3	1	1	2
Fire Department	-	1	-	-
<b>Scottsdale</b>				
Traffic Engineering	1	3	2	1
Police Department	3	2	1	2
Rural/Metro	-	1	-	-

**Table 8 – Inter-Departmental Chain of Command (continued)**

Agency	Arterials within Jurisdiction	Traffic Accidents/Incidents	Special Events	Work Zones or Temp Traffic Control
<b>Tempe</b>				
Traffic Engineering	1	3	1	1
Police Department	3	2	2	-
Fire Department	-	1	-	-

**Legend**

- 1 = Lead/Primary Role
- 2 = Support Role
- 3 = Involved by Request
- = No Role

### 3.8 Current Annual Funding Amounts and Sources for Transportation

A critical step in implementing any project is the identification of potential funding sources for deployment, operation, and maintenance. The diverse nature of a regional transportation operations project offers many combinations for federal, state, local, and private funding opportunities to implement, operate, and maintain the system.

The major funding sources and the level of funding for transportation related expenditures in the MAG Region include:

- Congestion Mitigation and Air Quality (CMAQ) Improvement Program. These funds are programmed by MAG based on regional ITS planning recommendations by the MAG ITS Committee. At present nearly \$45 million has been programmed for the next five years of regional ITS implementation and operation through this process. CMAQ provides funds for various types of projects to improve air quality. Examples include transit improvements, travel demand management strategies, traffic flow improvements, and public fleet conversions to cleaner fuels.
- Arizona Highway Users Revenue Fund (HURF). The State of Arizona taxes motor fuels and collects a variety of fees relating to the registration and operation of motor vehicles on public highways. These revenues are deposited into the Arizona Highway Users Fund and are then distributed to cities, towns, and counties and to the State Highway Fund. **Table A-1** shows the projected distribution of HURF for the next 5 years. The distribution for these funds is formula based, and is shown in **Table A-2**.
- Local Transportation Assistance Fund (LTAF I) – The Local Transportation Assistance Fund I is funded from state lottery proceeds up to \$23 million per year. The funds are distributed to cities and towns on the basis of population. The funds can be used for public transportation and transportation purposes depending on the jurisdiction's population. Cities with a population of 300,000 or more must spend all its LTAF I money to transit services. Cities of

- 60,000 must commit at least one-third of their LTAF money to transit services, and of those less than 60,000 must commit at least three-quarters of their LTAF funds for transit services.
- Local Transportation Assistance Fund (LTAF II) – The 1998 Legislature passed HB 2565 to provide additional statewide transit and transportation funding to incorporated cities and towns as well as the counties. Senate Bill 1556 of 2000 amended the previous LTAF II by permitting a portion Vehicle License Tax (not to exceed \$18 million) and excess Powerball monies to be distributed on a population-basis formula to cities and counties for the purpose of public transportation projects. Cities receiving less than \$2,500 may use the funds for any local transportation purpose. Those that receive more than \$2,500 must use the money for public transportation. ADOT administers the LTAF II and the State Treasurer's Office distributes the funds to the Regional Public Transportation Authority (RPTA) for municipalities in the MAG Region. Cities and towns must submit a grant request through RPTA. In fiscal year 2002, \$6.5 million dollars was distributed.
  - Regional Area Road Fund (1/2 cent tax) – In October 1985, the voters of Maricopa County approved the Maricopa County Transportation Excise Tax in an amount up to ten percent of the State transaction privilege tax rates. This tax is often referred to as the "1/2 cent sales tax" and is levied upon business activities in Maricopa County, including retail sales, contracting, utilities, rental of real and personal property, restaurant and bar receipts, and other activities. The transportation excise tax revenues are deposited in the Maricopa County Regional Area Road Fund (RARF), which is administered by the Arizona Department of Transportation. These funds are the main source of funding for the Maricopa County Regional Freeway System. The tax expires December 31, 2005. **Table A-3** (See **Appendix**) shows the projected RARF revenue for the next five years.
  - General funds – These funds are programmed by each of the local municipalities for expenditures within their respective jurisdictions.
  - Impact fees – These funds are programmed by each of the local municipalities for expenditures within their respective jurisdictions.

In addition to the funds outlined above, there are several other state and federal funding sources and mechanisms for transportation within the MAG Region. These are outlined in **Table A-4**, **Table A-5**, and **Table A-6**; however, these funding sources are primarily for infrastructure and capital investment, and not for continued transportation operations.

In order for federal funds to be apportioned for a specific project, the project must meet the eligibility requirements for the specific fund. **Table A-4** highlights the funding resources available through the federal government with a short description of the eligibility requirements, the amount obligated for Arizona and the National apportionment in fiscal year 2002 for each fund.

**Table A-5** discusses the state funding mechanisms, which includes a description of the revenue sources and the monies allocated to the fund. In some cases, a description of the distribution formula is included in the table.

Bonds, loans and notes allow a project to be accelerated when the funding is not readily available; for instance, the federal funds have not been released. **Table A-6** discusses these financing options in more detail.

In addition to federal and state funding, many cities assess impact/development fees and collect local sales tax, which generate additional revenue. **Table 9** presents a breakdown of the levels of funding and the funding sources for transportation-related expenditures within each jurisdiction.



**Table 9 – Funding Amounts and Sources for Transportation Operations**

Sources of Funding	General Funds	General Obligation Bonds	HURF	LTAf	HURF Bonds	Impact Fees / Develop. Contributions	CMAQ	Various Funds/ Grants	Other - Description	Other – Amount	Capital Constr. Telecom Tax	
City/Agency Expenditure Item												Total
<b>ADOT</b>												
	(STIP)		(Highway Funds <sup>1</sup> )									
TOC IT Staff			\$1.2									\$1.2
TOC Administration			\$ .70									\$ .70
Construction Administration			\$ .30									\$ .30
Maintenance – (Phoenix District)			\$ .15									\$ .15
Preservation – Contracts	\$ .700											\$ .700
Preservation – Parts	\$ .500											\$ .500
Freeway Service Patrol <sup>2</sup>			\$ .250									\$ .250
ALERT			\$ .100									\$ .100
<b>ADOT Total</b>	\$1.2		\$2.7									\$3.9
<b>Chandler</b>												
Street Maintenance	\$0.70		\$3.90				\$2.20					\$4.6
CIP	\$2.10	\$2.60	\$0.90	\$0.05	\$3.30	\$1.50	\$2.20					\$12.8
Transit	\$0.30			\$1.20								\$1.5
Traffic Engineering	\$0.06		\$3.00	\$0.80								\$3.8
Transportation Administration	\$0.40		\$0.10									\$0.5
Street Sweeping	\$0.80						\$0.30					\$1.1

**Table 9 – Funding Amounts and Sources for Transportation Operations**

Sources of Funding	General Funds	General Obligation Bonds	HURF	LTAf	HURF Bonds	Impact Fees / Develop. Contributions	CMAQ	Various Funds/ Grants	Other - Description	Other – Amount	Capital Constr. Telecom Tax	
City/Agency Expenditure Item												Total
<b>Chandler Total</b>	\$4.36	\$2.60	\$7.90	\$2.50	\$3.30	\$1.50	\$2.50					\$24.3
<b>Gilbert</b>	\$3.48		\$7.11	\$ .668					None	-		\$11.25
<b>Glendale</b>												
Transportation Program Management									\$ .733			\$ .733
Traffic Administration and Engineering			\$ .322									\$ .322
Traffic Signals			\$1.2									\$1.2
Signs and Marking			\$ .928									\$ .928
Dial-a-Ride									\$2.4			\$2.4
Transit Operations									\$3.9			\$3.9
Trip Reduction/Demand Management									\$ .118			\$ .118
Traffic Design and Development			\$ .250									\$ .250
ITS Division									\$ .180			\$ .180
CIP – Signal Computerization												
<b>Glendale Transportation Operations Total</b>												
<b>Glendale Total</b>			\$2.7						\$7.33			\$10.03
<b>Goodyear</b>	\$2.6		\$1.23	\$ .125					None	-		

**Table 9 – Funding Amounts and Sources for Transportation Operations**

Sources of Funding	General Funds	General Obligation Bonds	HURF	LTAF	HURF Bonds	Fees / Develop. Contributio	CMAQ	Various Funds/ Grants	Other - Description	Other – Amount	Capital Constr. Telecom Tax	Total
City/Agency Expenditure Item												Total
<b>Maricopa County</b>												
Street Maintenance												\$27.1
Transit												\$3.1
Transportation Administration												\$6.7
Right of Way												\$10.8
Street Maintenance												\$6.6
<b>Maricopa County Transportation Operations Total</b>												
<b>Maricopa County Total</b>			\$78.5						Partner Share on CIP	\$31.7		\$132.5 <sup>3</sup>
									License Fees	\$1.7		
									VLT	\$7.4		
									Other	\$1.4		
<b>Mesa</b>												
Street Maintenance – Operations, RC 363	\$0.85		\$8.06	\$0.87								\$9.78
Street Maintenance-Purchased Capital, RC 363	\$0.12											\$0.12
Transportation, 8100, CIP	\$0.16				\$43.32		\$0.84	\$0.02				\$44.34
Transit-Operations, RC 365	\$0.01			\$4.69				\$0.50				\$5.20

**Table 9 – Funding Amounts and Sources for Transportation Operations (continued)**

Sources of Funding	General Funds	General Obligation Bonds	HURF	LTAF	HURF Bonds	Fees / Develop. Contributio	CMAQ	Various Funds/ Grants	Other - Description	Other – Amount	Capital Constr. Telecom Tax	
City/Agency Expenditure Item												Total
<b>Mesa (continued)</b>												
Transit-Purchased Capital, RC 365				\$22.00				\$0.46				\$22.46
Traffic Engineering-Operations, RC 340	\$0.38											\$0.38
Traffic Engineering-Purchased Capital, RC 340	\$0.10											\$0.13
Transportation Administration – Operations, RC 364	\$1.96		\$7.89	\$32.60				\$0.03				\$42.48
Transportation Administration – Purchased Capital, RC 364	\$0.59		\$25.50									\$26.09
Street Sweeping, RC 363	\$0.91											\$0.91
Transit, 8860, CIP	\$3.45						\$7.95	\$9.78				\$21.18
<b>Mesa Transportation Operations Total</b>												
<b>Mesa Total</b>	<b>\$8.53</b>		<b>\$41.45</b>	<b>\$4.83</b>	<b>\$43.32</b>		<b>\$8.79</b>	<b>\$10.78</b>				<b>\$173.06</b>
<b>Peoria</b>												
Streets Admin												\$1.67
Streets – Signs and Striping												\$ .700
Streets – Traffic Signal Maintenance												\$1.589
Transit Fund												\$ .656
HB2565 – Transportation Grant												\$ .421

**Table 9 – Funding Amounts and Sources for Transportation Operations (continued)**

Sources of Funding	General Funds	General Obligation Bonds	HURF	LTAF	HURF Bonds	Fees / Develop. Contributio	CMAQ	Various Funds/ Grants	Other - Description	Other – Amount	Capital Constr. Telecom Tax	
City/Agency Expenditure Item												Total
<b>Peoria Transportation Operations Total</b>												\$5.04
<b>Peoria Total</b>												
<b>Phoenix</b>												
Public Transit Department – Operating Budget	\$29.0			\$7.16				\$17.7	Transit 2000 0.4% Tax	\$63.0		\$116.9
Street Transportation Dept – Operating Budget	\$32.2											
Traffic Improvement – CIP Projects			\$6.83					\$1.46			\$6.07	\$14.36
Freeway Mitigation – CIP Projects			\$4.78									\$4.78
<b>Phoenix Transportation Operations Total</b>												
<b>Phoenix Total</b>	\$61.2		\$11.61	\$7.16				\$19.16		\$63.0	\$6.07	\$136.04
<b>Scottsdale</b>												
Transportation Admin												\$ .60
Traffic Engineering												\$1.60
Traffic Management												\$3.528
<b>Scottsdale Transportation Operations Total</b>												\$5.73
<b>Scottsdale Total</b>												

**Table 9 – Funding Amounts and Sources for Transportation Operations (continued)**

Sources of Funding	General Funds	General Obligation Bonds	HURF	LTAf	HURF Bonds	Fees / Develop. Contributio	CMAQ	Various Funds/ Grants	Other - Description	Other – Amount	Capital Constr. Telecom Tax	Total
City/Agency Expenditure Item												
<b>Tempe</b>												
Construction			\$2.08									\$2.08
Admin-Transportation			\$1.79									\$1.79
Transportation Studies and Design			\$ .553									\$ .553
Operations-Transportation			\$ .946									\$ .946
Street Lights and Signals			\$1.67									\$1.67
Signal System			\$ .996									\$ .996
Transit				\$ .297				\$4.78	Transit Tax	\$26.45		\$34.5
					Other Misc.	\$2.61						
					ASU Flash	\$ .367						
CIP – Right of Way		\$3.17					\$ .400	Capital Fund/ Other		\$ .616		\$4.19
CIP- Sidewalks and Bikeways		\$ .02				\$ .310			\$ .08		\$ .410	
Traffic Signals and Street Lights – CIP		\$ .700							\$ .670		\$1.37	
Transit						\$ .500	\$26.75	Transit Tax	\$3.94			\$31.19
<b>Tempe Transportation Operations Total</b>												
<b>Tempe Total</b>												
		\$3.89	\$8.04	\$ .297		\$ .500		\$32.24				\$79.7

<sup>1</sup> Portions of the HURF Funds are directed to the State Highway Fund

<sup>2</sup> Freeway Service Patrol funding is allocated to DPS

<sup>3</sup> Revenues for Maricopa County total \$120.5, while expenditures total \$132.5. Difference arises from the reduction of HURF funds carried forward from previous year.

## 4. SUMMARY OF POTENTIAL NEW POLICIES AND PROCEDURES

The inventory process identified several areas that can be improved. While some might require large capital investments, many can be solved through enhanced institutional arrangements. The following is a summary of potential new policies and procedures, as identified during the interview process.

### 4.1 Incident Management

#### 4.1.1 *Inter-Agency Incident Notification*

Procedures need to be implemented and followed that facilitate inter-jurisdictional communication. When an incident occurs on the freeway, the affected cities and agencies should receive immediate notification so that they can implement the appropriate mitigation, including signal timing modifications, VMS activation, and other traffic control techniques. ADOT has already started an effort for doing this on the I-17 corridor with City of Phoenix.

#### 4.1.2 *After-Hours VMS Operations*

Policies are needed pertaining to the after-hours posting of messages on city-owned arterial VMS by the staff manning the ADOT Traffic Operations Center (TOC). Institutional arrangements need to be established.

#### 4.1.3 *On-Scene Coordination and Communications*

The basic framework for inter-agency coordination exists through the incident command system. While incident command is almost always followed by fire departments and police agencies on large-scale incidents, it is rarely implemented for smaller, traffic-related incidents. Practices need to be developed that facilitate the on-scene coordination between traffic management and emergency response personnel.

During an incident, no common radio frequency exists between ADOT/DPS/cities. Practices need to be implemented that facilitate on-scene communications of incident management personnel.

#### 4.1.4 *Incident Investigation Response Time*

Procedures should be developed that facilitate the reduction of incident investigation response time. Potential policies could address the use of photogrammetry techniques for accident investigation.

#### 4.1.5 *Detours and Diversion Plans*

Policies are needed pertaining to the routing of freeway traffic onto city streets during freeway closures and restrictions. Current ADOT policy does not designate city streets as detour routes. Official ADOT detour routes could divert vehicles for several miles, even though shorter detours are available by utilizing city streets. Understandably, the traveling public does not always follow ADOT detour routes, but utilizes the city streets, resulting in congestion.

## 4.2 Emergency Vehicle Signal Preemption

### 4.2.1 *Implementation Parameters*

Regional coordination of the implementation of Emergency Vehicle Signal Preemption Systems (EVPS) is needed. While ADOT has developed some guidelines for the implementation of EVPS on ADOT routes, there is no common, agreed upon implementation of the EVPS within the numerous municipalities. For safety reasons, it is important that emergency vehicle driver expectations are consistent across jurisdictional boundaries and throughout the region. This is particularly important because of the high degree of cooperation among fire departments throughout Maricopa County. Thus, it is not uncommon to see fire response vehicles from Tempe, for example, respond to emergencies in Mesa. The policy should address phasing (i.e., left-turns permitted during preempt), distance before activation of preemption, and coding.

### 4.2.2 *Unauthorized Use/Coding*

In order to prevent unauthorized use of the preemption system, many cities have implemented coding systems that provide positive identification of the vehicle prior to preemption. By requiring positive identification, fire response vehicles are not able to preempt signals outside of their home city without authorization. A regional coding scheme is needed, such that cross-jurisdictional capabilities are maintained for mutual aid. The system should be secure, minimizing unauthorized access and system abuse. A draft uniform coding procedure for preemption has been developed by staff at City of Mesa (see **Table 2**).

## 4.3 Traffic Signal Systems

### 4.3.1 *Joint Project Agreements*

While Intergovernmental Agreements (IGA) and Joint Project Agreements (JPA) have been developed for signals at interchanges, it is difficult for many of the individuals performing the daily operations of the traffic signal system to know what agreements exist. ADOT expressed a desire for a process to be implemented that makes critical information contained in the IGAs more accessible to those who operate the traffic signals.

### 4.3.2 *After-hours Traffic Signal Operations*

Several agencies expressed a desire for policies that outline responsibilities for after-hours control of traffic signal systems. The policies would define who would have control at what times, the level of control permitted, and any associated restrictions. The policy would need to be well documented and agreed upon.

### 4.3.3 *Signal Coordination Across Jurisdictional Boundaries*

Many of the individuals interviewed identified the need for some regional guidelines or agreements for signal coordination across jurisdictional boundaries; however, they also mentioned that many of the issues could be resolved by implementing center-to-center communications. With center-to-center communications, an agency could access the timing plans in a neighboring jurisdiction and implement similar timing plans in their own jurisdiction. Regional policies and standards, such as naming conventions, and file formats are needed.

## 4.4 Operations Centers

### 4.4.1 Funding

During the interviews, several agencies expressed frustration that they have been given several operational tools (CCTV, VMS), but have not been given the means to fund their daily operations and maintenance. Nearly every agency cited funding (staffing, capital, maintenance) as a primary obstacle to improving transportation operations within their jurisdiction.

### 4.4.2 Institutional Arrangements

Many agencies also expressed a desire for after hours control/monitoring of their traffic signal and surveillance systems to be performed by ADOT. Policies would need to be developed that clearly define responsibilities and limitations of those performing off-hours control of the systems of another agency or municipality.

### 4.4.3 Center-to-Center Communications

As previously mentioned, policies need to be developed concerning center-to-center communications. The policy should address when communication and data transfer is required (accidents, congestion, special events), what data is to be transferred (traffic volumes, timing plans, location of fire trucks, traffic signal status), how the data will be sent (data definitions, what data is required to a meaningful exchange), and with whom it is to be communicated to (other TMCs, transit operations, media, emergency management). Alternative management strategies, such as shared maintenance/joint operating agreements, also should be explored.

Several municipalities in the MAG Region have access to an AZTech™ workstation. The AZTech™ workstation provides the functionality for cities to input information into the ADOT HCRS. The HCRS provides information for the travel information telephone line (511), as well as ADOT's website; however, very few of the local municipalities take advantage of the system. Reasons cited include a lack of human resources to continually input updated information, to general discontent with the AZTech™ system. Most agencies agreed that it is important that they input the information, but expressed a desire for the system to be compatible with their permitting systems, thus automating the input of restrictions issued by the individual city. Potential policies or practices could address the input of arterial restriction information into HCRS.

## APPENDIX

**Table A-1 – Highway Users Revenue Fund Distribution Forecast**

All amounts shown are in Millions of Dollars							
Fiscal Year	HURF	DPS/ESP	Net HURF	Forecast Distribution			
				Cities/Towns 27.5%	Cities – 300K 3%	Counties 19%	ADOT 50.5%
2002	1,065.8	\$27.9	\$1,037.9	\$524.1	\$285.4	\$31.1	\$197.2
2003	1,102.0	32.7	1,069.3	540.0	294.1	32.1	203.2
2004	1,148.5	11.0	1,137.5	574.4	312.8	34.1	216.1
2005	1,199.4	11.0	1,188.4	600.1	326.8	35.7	225.8
2006	1,256.2	11.0	1,245.2	628.8	342.4	37.4	236.6
2007	1,316.8	11.0	1,305.8	659.4	359.1	39.2	248.1
2008	1,375.7	11.0	1,364.7	689.2	375.3	40.9	259.3

Source: Arizona Department of Transportation, Financial Management Services

**Table A-2 – Highway Users Revenue Fund Distribution Breakdown and Formula**

Revenues	Distribution Breakdown	Distribution Formula
\$.18 Gas Tax \$.26 Use Fuel Tax Vehicle Registration Motor Carrier 44.99% of Vehicle License Tax Other	50.5% to State Highway Fund	7.67% to Maricopa and Pima Counties for Controlled Access with a 75% and 25% split respectively. (Statutory 12.6% & Special 2.6% money), 42.83% to ADOT Discretionary.
	27.5% to Cities & Towns	One half distributed on basis of incorporated population and one half on the basis of county origin of gasoline sales and city or town population within each county.
	3% to Cities over 300,000	Distributed to Phoenix, Tucson and Mesa based on population.
	19% to Counties	Distributed based on a portion of gasoline distribution and diesel fuel consumption and on a portion of unincorporated population. The split as follows: 85/15 in FY 1997, 80/20 in FY 1998, 76/24 in FY 1999, and 72/28 in FY 2000 and thereafter

Source: Arizona Department of Transportation Financial Management Services

**Table A-3 – RARF Revenue Forecast**

Fiscal Year	RARF Total
2002	\$279.50
2003	\$284.8
2004	\$302.7
2005	\$323.9
2006	\$202.9

FY 2002 based on August 2001 forecast.

FY 2003-2006 estimates based on December 2001 Official Forecast.

The Maricopa County Transportation Excise Tax expires on December 31, 2005.

Source: Arizona Department of Transportation, Financial Management Services



**Table A-4 – Federal Funds**

Federal Revenue Sources	Description	FY 2002 Arizona Obligation Authority (Dollars in Millions)	FY 2002 National Apportionments (Dollars in Millions)
Interstate Maintenance (IM)	Provides funding for Interstate System Projects including: <ul style="list-style-type: none"> <li>▪ Resurfacing, restoration, and rehabilitation</li> <li>▪ Reconstruction of bridges and interchanges</li> <li>▪ Design</li> <li>▪ Acquisition of right-of-way</li> <li>▪ Preventive maintenance</li> </ul>	\$ 111.1	\$ 5,122.9
National Highway System (NHS)	Provides funding for: <ul style="list-style-type: none"> <li>▪ Construction</li> <li>▪ Reconstruction</li> <li>▪ Resurfacing</li> <li>▪ Restoration</li> <li>▪ Rehabilitation</li> <li>▪ Safety improvements</li> </ul>	\$ 118.6	\$ 6,305.9
Surface Transportation Program (STP)	Provides state flexibility funds for: <ul style="list-style-type: none"> <li>▪ Construction</li> <li>▪ Reconstruction</li> <li>▪ Rehabilitation</li> <li>▪ Resurfacing</li> <li>▪ Restoration</li> <li>▪ Operational improvements</li> </ul>	\$ 106.5	\$ 5,924.0
Enhancement (TEA)	Provides funds for: <ul style="list-style-type: none"> <li>▪ Pedestrian walkways and bicycle paths</li> <li>▪ Acquisition of scenic easements</li> <li>▪ Restoration of scenic or historic sites</li> <li>▪ Landscaping and other scenic beautification</li> </ul>	\$ 13.3	\$ 740.5
Safety (STP)	Provides funding for: <ul style="list-style-type: none"> <li>▪ Rail-highway crossings</li> <li>▪ Hazard elimination activities on any public road</li> </ul>	\$ 13.3	\$ 740.5

**Table A-4 – Federal Funds (continued)**

Federal Revenue Sources	Description	FY 2002 Arizona Obligation Authority (Dollars in Millions)	FY 2002 National Apportionments (Dollars in Millions)
Bridge Program (BR)	Provides funding for: <ul style="list-style-type: none"> <li>▪ Replacement of structurally deficient or functionally obsolete highway bridges</li> <li>▪ Rehabilitate the structural integrity of a bridge</li> </ul>	\$ 14.4	\$ 4,351.7
Congestion Mitigation and Air Quality Program (CMAQ)	Provides funds for various types of projects to improve air quality. Examples include: <ul style="list-style-type: none"> <li>▪ Transit improvements</li> <li>▪ Travel demand management strategies</li> <li>▪ Traffic flow improvements</li> <li>▪ Public fleet conversions to cleaner fuels</li> </ul>	\$ 37.3	\$ 1,791.7
Planning and Research (SRP)	Provides funding for: <ul style="list-style-type: none"> <li>▪ Planning of future highway programs and local public transportation systems</li> <li>▪ Research, development, and technology transfer activities necessary in connection with the planning, design, construction, and maintenance of highway, public transportation, and intermodal transportation systems.</li> </ul>	\$ 9.9	\$ 566.9
Metropolitan Planning	Provides funding to Metropolitan Planning Organizations (> 50,000 population) to carry out the transportation planning process.	\$ 2.9	\$ 195.5
Minimum Guarantee	Provides additional funds to insure each state receives apportionments of not less than 90.5 percent of its share of contributions to the Highway Trust Fund.	\$ 73.2	\$ 2,800.0
High Priority Projects	Provides designated funding for specific projects (demonstration projects) identified by Congress.	\$ 10.4	\$ 1,778.4
Safety Incentives (0.08 BAC)	Provides funding to states that have enacted 0.08 percent blood alcohol concentration (BAC) as legal limit for drunk driver offenses.	\$ 2.4	\$ 100.0
FTA, Section 5310 (Transit)	Provides funds to transit projects for the elderly and people with disabilities.	\$ 1.3	\$ 84.9
FTA, Section 5311 (Transit)	Provides funds to support costs associated with transportation in non-urbanized areas.	\$ 2.5	\$ 231.7



**Table A-5 – State Funds**

State Revenue Sources	Description	FY 2002 Actual (Dollars in Millions)
Highway User Revenue Fund (HURF)	<p>State of Arizona collects:</p> <ul style="list-style-type: none"> <li>▪ Gasoline and use fuel taxes</li> <li>▪ Motor carrier taxes</li> <li>▪ Vehicle license tax (VLT)</li> <li>▪ Motor vehicle registration fees</li> <li>▪ Miscellaneous fees</li> <li>▪ These revenues are deposited into HURF account, then distributed.</li> <li>▪ Department of Public Safety (DPS) and Economic Strength Project Fund (ESP) distributions are deducted from total (legislation-based).</li> </ul> <p>The remaining funds are distributed as follows:</p> <ul style="list-style-type: none"> <li>▪ ADOT – 50.5% (7.67% to Maricopa and Pima Counties for controlled access with a 75% and 25% split, respectively. 42.83% to ADOT Discretionary.</li> <li>▪ Cities/Towns – 27.5% (One half distributed based on incorporated population. One half on basis of county origin of gasoline sales and city or town population within each county.)</li> <li>▪ Cites (&gt; 300K) – 3% (Distributed to Phoenix, Tucson, and Mesa based on population)</li> <li>▪ Counties – 19% (Based on portion of gasoline distribution and diesel fuel consumption and portion of unincorporated population.)</li> </ul>	<p>\$ 1,076.4 (includes VLT of \$ 270.6)</p>
Vehicle License Tax (VLT)	<p>Owners of vehicles that are registered for operation on the highways of Arizona pay the VLT.</p> <p>Revenues are distributed to:</p> <ul style="list-style-type: none"> <li>▪ HURF</li> <li>▪ State Highway Fund</li> <li>▪ State General Fund</li> <li>▪ Cities/Towns</li> <li>▪ Counties</li> <li>▪ Local Transportation Assistance Fund (LTAF II)</li> </ul>	<p>\$ 601.7</p>
Regional Area Road Fund (RARF)	<p>Maricopa County Transportation Excise Tax. The “1/2 cent sales tax.” Main source of funding for the Maricopa County Regional Freeway System (RPTA). The tax expires December 31, 2005.</p>	<p>\$ 267.6  (\$ 7.3 million allocated to RPTA)</p>

**Table A-5 – State Funds (continued)**

<b>State Revenue Sources</b>	<b>Description</b>	<b>FY 2002 Actual (Dollars in Millions)</b>
Local Transportation Assistance Fund (LTAF I)	Funded from the state lottery proceeds. Funds are distributed to cities and towns on the basis of population. Not administered by ADOT.	\$ 23.0
Local Transportation Assistance Fund (LTAF II)	<p>Funded from:</p> <ul style="list-style-type: none"> <li>▪ Multi-state lottery game</li> <li>▪ Instant bingo game</li> <li>▪ Portion of State Highway Fund's VLT</li> <li>▪ Administered by ADOT</li> </ul> <p>State Treasurer distributes funds to:</p> <ul style="list-style-type: none"> <li>▪ Regional Public Transportation Authority (RPTA)</li> <li>▪ Metropolitan Planning Organizations (MPOs)</li> <li>▪ Cities and Counties not represented by RPTA or MPO</li> </ul>	\$ 6.5  (includes State General Fund of \$ 3.5 and Powerball of \$ 3.0)
Safety Enforcement and Transportation Infrastructure Fund	Provide revenue for the enforcement of vehicle safety requirements by the Department of Public Safety (DPS) and the maintenance of transportation facilities (including roads, streets and highways within 25 miles of the Arizona/Mexico border.	\$ 3.5

**Table A-6 – Additional Financing Options**

<b>Financing Options</b>	<b>Description</b>	<b>FY 2002 Actual (Dollars in Millions)</b>
<p>HURF Bonds Title 28, Chapter 21, Article 1 (Sections 7501-7517)</p>	<p>The State Transportation Board issues HURF Bonds to accelerate the construction of highway construction projects throughout Arizona. The pledged revenues for the bond issues are the HURF funds deposited in the State Highway fund. The bonds are an obligation of the State Transportation Board and are not obligations of the State of Arizona. They do not constitute a legal debt of the State, and payment is not enforceable from any revenue other than HURF.</p> <p>Includes Highway Revenue Bonds, Series 2001 – \$143,655,000</p>	<p>\$ 150.2 (includes \$74.3 in refunding)</p>
<p>RARF Bonds Title 28, Chapter 21, Article 2 (Sections 7561-7573)</p>	<p>The State Transportation Board issues RARF Bonds to accelerate the construction of controlled access facilities on the Maricopa Regional Freeway System. The pledged revenues for the bond issues are the Maricopa County Transportation Excise Tax revenues deposited in the RARF. The bonds are an obligation of the State Transportation Board and are not obligations of the State of Arizona. They do not constitute a legal debt of the State, and payment is not enforceable from any revenue other than RARF.</p>	<p>\$ 80.5 (includes \$4.6 in refunding)</p>
<p>Highway Expansion and Extension Loan Program (HELP) Title 28, Chapter 21, Article 5 (Sections 7671-7677)</p>	<p>Arizona's State Infrastructure Bank. Provides loans and financial assistance for eligible highway projects in Arizona. The HELP fund is capitalized with federal and state dollars and Board Funding Obligations that provide the capital for loans. As borrowers repay principal and interest on loans, the HELP fund is replenished and monies can be re-loaned. The fund is a self-sustaining mechanism to accelerate critical transportation projects.</p>	<p>\$ 172.8 (represents 20 loans)</p>
<p>Grant Anticipation Notes (GANs) Title 28, Chapter 21, Article 3 (Sections 7611-7617)</p>	<p>GANs offer a significant opportunity for accelerating projects throughout Arizona. GAN legislation enables the State to issue notes to pay the Federal share of projects in advance of the actual receipt of federal highway funding. Local communities participate in paying the cost of interest on the notes.</p>	<p>\$ 0.0</p>
<p>Board Funding Obligations (BFOs) Title 28, Chapter 21, Article 5, Section 7678</p>	<p>The State Transportation Board has the authority to issue nonnegotiable BFOs for purchase by the Arizona State Treasurer. The BFOs were initially used to capitalize Arizona's State Infrastructure Bank, which allowed the Department and political subdivisions to apply for loans from HELP. The Board also has the authority to issue BFOs for the State Highway Fund up to \$60 million in FY 2002 and FY 2004.</p>	<p>\$ 100.0 (HELP \$40.0) (State Hwy Fund \$60.0)</p>
<p>Transportation Infrastructure Finance and Innovation Act (TIFIA)</p>	<p>New federal program consisting of 3 distinct types of financial assistance.</p> <p>Secure loans – direct federal loans to project sponsors offering flexible repayment terms and providing combined construction and permanent financing of capital costs.</p> <p>Loan guarantees – full faith-and-credit guarantees by the federal government.</p> <p>Federal government Stand-by Lines of Credit – secondary sources of funding in the form of contingent federal loans.</p> <p>Under TEA-21, projects must qualify under Title 23.</p>	<p>\$ 0.0</p>