2017 **CITY OF SURPRISE**
ITS STRATEGIC PLAN
Kimley»Horn
Arizona Department of Transportation - Multimodal Planning Division

TASK ORDER: MPD0050-17

City of Surprise

Intelligent Transportation Systems Strategic Plan

Technical Memorandum 5 and 6 – Transportation Systems Management and Operations (TSMO) and Funding Sources and Opportunities

September 2017

FINAL

Prepared for:

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In partnership with:

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1 INTRODUCTION TO THE ITS STRATEGIC PLAN

The City of Surprise (City) has received federal funding and is working with the Arizona Department of Transportation (ADOT) to develop an Intelligent Transportation Systems (ITS) Strategic Plan. The goal of an ITS Strategic Plan is to identify strategies and tools to allow the City to manage its transportation network and information exchange more efficiently. ITS includes communications and field technologies that are integrated into the transportation network such as traffic signals, cameras, fiber optic communications, and central management software. ITS technologies are widely deployed throughout the Phoenix metropolitan area, the County, and the world.

1.1 Surprise ITS Strategic Plan Process

The City has invested in ITS communications and traffic management devices to outfit major arterial intersections throughout the City. Surprise is in a unique position to create a plan for how the current ITS infrastructure should be used to maximize investment, and identify priority focus areas for the growth of the ITS Program as the City itself continues to grow in both physical size and population.

The project to develop this Plan will include the following phases:

- Establishing a Stakeholders Group – identifying City staff and technical staff from other agencies to provide input into the Plan and guide its development.
- Data Collection – learn about existing infrastructure, processes, resources, and planned activities within Surprise.
- Needs and Strategy Development – collect needs and challenges related to transportation operations and data/information sharing in the City to guide the development of ITS strategies that could address those needs.
- Transportation Systems Management and Operations (TSMO) – identify City focus areas related to transportation and information sharing such as operation of key corridors, management of events and incidents, and improved freeway coordination. This task will identify resources that will support the City in operations and management for those focus areas.
- Funding and Implementation – identify methods to help the City implement ITS strategies in a phased manner and obtain the necessary resources and support for continuing operations and management of Surprise's transportation and communications network.

1.2 Transportation Systems Management and Operations Overview

Transportation Systems Management and Operations (TSMO) is a term coined by the USDOT to describe an integrated program to optimize the performance of existing multimodal infrastructure through implementation of systems, services, and projects to preserve capacity and improve the security, safety, and reliability. The development of a TSMO program plan for an agency focuses on institutional capabilities and enabling business processes to help improve overall transportation system performance and safety. The goal of TSMO within the Surprise ITS Strategic Plan is to develop a program plan that will provide the necessary structure for a comprehensive ITS Program through outlining the programmatic objectives, processes, procedures, and resources needed to deliver the ITS vision and goals.

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With fewer funds available for agencies to 'build their way out of congestion', improving and optimizing the current/planned transportation network has become critical. Throughout the Country, agencies at all levels (federal to local) are using a TSMO lens to identify a wide range of functions aimed at reducing delay and improving mobility – clearing traffic incidents, providing real-time information to travelers, actively managing congestion using devices and systems, proactively developing traffic management plans for work zones and special events, among others. Both the Arizona Department of Transportation (ADOT) and MAG, are currently developing TSMO Plans to support the elevated management and operations of the State and regional transportation networks. Using technology and process solutions can:

- Lower capital and maintenance costs;
- Facilitate the efficient use of resources and funding for the transportation network;
- Establish partnerships within the City and with other agencies that can support the City's ITS program; and
- Create a foundation for supporting a City ITS Program in the long-term.

The TSMO Plan will identify purposes and goals for operations and management of the City's transportation network, recommended staffing, programming, and funding models to support ITS at the City, and key agreements and coordination efforts that need to occur.

1.3 Opportunities for TSMO to Support the City

The success of this ITS Strategic Plan relies on the City's ability to implement the strategies defined by the Plan. The City of Surprise, like many cities within the region and throughout the Country, have challenges rooted in institutional arrangements and processes that create barriers for the efficient and successful implementation of some strategies. A TSMO approach to this ITS Plan will help identify these challenges and provide guidance on how they may be overcome.

1.3.1 Staffing Availability and Responsibilities

The ITS strategies for Surprise cover a broad range of opportunities and each will require different levels of effort and resources to implement; however, one thing that is common across all ITS strategies is that they require commitment and time from City staff. Currently, there are challenges related to the capacity of ITS-specific staff as well as the ability of non-ITS staff to provide support for ITS.

The TMC is staffed by one manager/operator who must take on many roles needed to operate and maintain the ITS network and manage the ITS Program in general. The goal of ITS is to have the ability to interface and operate elements of the transportation network in real-time 24/7. With only one ITS staff person to cover the 24x7 demand, the TMC is currently limited to the functions that can be performed by one person. In order to achieve the benefits associated with ITS technologies and a well-established and capable TMC, staff resources are required to support the functions that are currently deficient.

Examples of challenges associated with achieving proper TMC functionality with limited staff:

- The success of traffic management during Spring Training in Surprise relies on the availability of someone to monitor and operate traffic signals near the stadium at each game. With a single TMC operator and no back up person, if that person is unavailable, the City loses its ability to provide real-time traffic management and will have to revert to manual traffic control by police officers in the field. As the City grows and develops and traffic management needs increase and become more frequent, a shortage of staff to support real-time operations will become more evident.
- There is limited awareness of the capabilities and functionalities of the TMC and the ITS network in departments outside of the TMC. Some working relationships between staff in other departments and the

TMC have formed, but the relationship and information/knowledge that become established are usually not transferred to other staff and are at risk of being lost from staff turnover.

- There is a tremendous amount of institutional knowledge and nuance related to the Surprise ITS Program that sits with a single person. If that person is no-longer an ITS resource for the City, there will be significant gaps in knowledge of the TMC or ITS Program and no way of filling them in the near-term.
- A key element of ITS devices and systems is the generation and collection of real-time and historical data on transportation network conditions. Analysis of this data could help identify areas where the network can be improved for efficiency, safety and mobility, however there is currently no TMC staff capacity to engage with the data and identify these possible improvements.

1.3.2 Funding and Programming

Some activities for the ITS Program require capital or programmatic funding to support, but even those activities that do not have specific capital or operational costs have funding implications in terms of the value of staff time required to support these activities. There are currently many challenges associated with maintaining the ITS equipment that it is deployed as well as keeping up with the pace of the City related to its envisioned growth in services it would like to provide to the traveling public.

Challenges associated with identifying ongoing funding to support the ITS Program include:

- The Surprise ITS infrastructure and systems that are in place, including the TMC and all ITS fiber communication, were largely implemented using regional funding and thus were not largely integrated into the City's regular asset tracking. Because of this, there was no mechanism in place to replace critical ITS assets when they failed. One example is the TMC's video wall; when the video wall processor failed, there was no funding available to replace it, so the wall sat dark for more than a year before funds were identified in the City's Asset Replacement Program.
- The allocated budget for ITS operations is earmarked to be used for replacing critical ITS components, including ITS devices and supporting infrastructure traffic signal cabinets, but does not account for emergency replacements. Periodically, a traffic signal cabinet is hit by a vehicle and requires replacement prior to the actual end-of-life replacement date for the cabinet. Even though the cost of the cabinet will be covered by the City's insurance, the funds for its replacements have historically come out of the ITS operations budget. This has created budget challenges, as the ITS operations budget is not equipped for these kinds of high-value emergency replacements and largely disrupts the program's ability to undergo the regular purchasing and replacement of ITS equipment that is planned.
- The ITS operations budget is identified for any ITS equipment needs under $5,000. Equipment such as traffic signal controllers have per unit costs below the $5,000 threshold, however, generally, traffic signal controllers are replaced in batches. Replacing 10 units at a cost of $4,500 is $45,000, which is much higher than the allocated ITS operations budget for these devices.
- The current budgets allocated to ITS for traffic signal infrastructure were defined around seven or eight years ago and identified line items for specific infrastructure. While the types of infrastructure that are included at traffic signals has expanded and changed over time, the budgeting for traffic signals has not been simultaneously updated, creating mismatches between available budgets and actual needs at traffic signals.
- The City anticipates dramatic growth in single family residential land use projects in the next 20 years, especially in the northwest area of the City. Supporting the field infrastructure required to serve the growing traffic signal and transportation network is a necessity.

2   TSMO GOAL

In a traditional planning process, a vision drives the development of goals, and goals along with objectives (this plan calls them "strategies") carry out the vision. The City's ITS Program is already established and serves the City's transportation network well, so this ITS Plan is targeted at identifying ways to improve existing functionalities and expanding the reach of ITS to serve other City services.

Two purposes were established to focus and guide strategic goals for the City – one internal to the ITS Program and one external to the ITS program to support other departments and City services. Strategies that were identified for each of the two purposes, internal and external, will require different levels of staffing and funding support depending on the initiatives the City pursues as part of this ITS Strategic Plan. Figure 1 provides an overview of the purposes and strategy goals that guided development of this TSMO document. Because of this, there is one TSMO goal being pursued by this plan, with two separate applications:

TSMO Goal – Establish ITS operational capabilities that are sustainable and efficiently resourced to support:

1.   Strengthening of the ITS Program to support traffic management, mobility and multiple City services; and

2.   Growth of the ITS Program to improve traveler information and incident response

Near-Term Purpose: **Guide the Enhancement and Expansion of the Current ITS Program**	Long-Term Purpose: **Help the City to Better Leverage ITS Investments**
Strategy Goal #1: **Enhance and expand ITS assets to support current and future operations.** (recommendations in *Section 4 Infrastructure ITS Master Plan*)	**Strategy Goal #3:** **Use ITS to provide traveler information and performance tracking.** (recommendations in *Section 6 Data ITS Master Plan*)
Strategy Goal #2: **Provide ITS communications structure that supports multiple City services.** (recommendations in *Section 5 Communications ITS Master Plan*)	**Strategy Goal #4:** **Use ITS to improve incident management and response.** (recommendations in *Section 7 Public Safety ITS Master Plan*)

Figure 1: Strategy Goals Associated with TSMO Goal

Each of these applications will have separate staffing and funding requirements. For example, an additional position at the TMC may be warranted for more robust operations and functioning of the current TMC; however, an entirely separate staff liaison to a different department may be required to address the need for improved traveler information or incident response.

This document outlines the staffing and funding requirements toward addressing the internal and external components of the TSMO goal that support the four strategic goals.

3 SUPPORT FOR ITS PROGRAM

3.1 TSMO Focus Areas

Using a TSMO approach within this ITS Strategic Plan helps make sure that there is a realistic view of the efforts that are needed to implement the Plan. While desire and agreement from staff is important for the success of the ITS Plan, there are other factors that need to be in place to realistically implement and sustain the ITS Program that is envisioned. As part of TSMO, there are three, key focus areas that, if not considered early in the process, could pose significant barriers to the success of the plan. However, considering and addressing these three focus areas early in the process will create a foundation within the City to develop a practical and implementable plan. These three TSMO focus areas include:

- People;
- Funding; and
- Documentation.

It will be important that multiple departments within the City initiate and stay involved in the pursuit of strategies related to this Plan in order to continue momentum for implementation.

3.2 TSMO Focus Area #1 – People

The first TSMO focus area is organizing the people behind initiating, completing, and sustaining strategies related to the ITS Program. People means staffing, leveraging other department resources, leveraging other agency resources, and even acquiring outside assistance to complete activities, as applicable. This focus area largely depends on the functions required by the ITS Program to support City services on a multi-departmental basis and is organized by internal City ITS staffing and external partnerships involved in achieving the goals for the City's ITS Program.

3.2.1 ITS Program Staffing

Before identifying specific staff needs for the City's ITS Program, it is important to first identify the key functions that need to be provided by the ITS Program to allow it to serve its intended purposes. Internal functions are those that are required for the ITS Program, while external functions serve other City departments or jurisdictions. When the ITS Program can serve both internal and external functions, a consistent and reliable transportation network is created.

To address internal and external ITS functions, staff are required to take initiative and be responsive. Based on the strategic goals outlined for this Plan, including the elevated interest in external ITS functions to support other City departments and improved service for the traveling public, there are additional or enhanced ITS functions that will be expected beyond those that the Surprise TMC is currently serving. Table 1 highlights the differences in the current and future functions for both internal and external demands of the ITS Program.

Table 1: ITS Functions in the City of Surprise

Function	Internal to ITS Program		External for Other Departments	
	Current Responsibilities	Additional Future Responsibilities	Current Responsibilities	Additional Future Responsibilities
TMC function	• Support day-to-day business hours traffic signal operations and address issues and complaints • Support traffic management for planned special events	• Real-time monitoring of ITS equipment (CCTV cameras, traffic signal timing changes) • Support regional traffic management activities related to ICM • Operational monitoring/ management during after-hours periods	• Manage the video wall for the EOC • Respond, when available, to incidents and activities in the City	• Support EOC access to control video wall and view City CCTV camera images • Support camera feed and sharing and expanded DMS use in partnership with the Police Department • Provide real-time support for police in incident and emergency response and management activities • Support data collection and sharing requests for internal uses and public dissemination
Maintenance function	• Maintain the City's traffic signal, ITS communications, and current ITS device infrastructure • Track ITS assets and participate in lifecycle planning and budgeting for asset replacement	• Maintain additional traffic signals, communications and ITS devices, including new device types and models that not currently deployed	• Maintain EVP for fire vehicles • Maintain fiber to City facilities	• Maintain communications infrastructure to additional City facilities
Signal Timing function	• Develop signal timing plans and optimize corridor signal timing as needed	• Regular optimization of corridors • Data analysis and evaluation to improve operational efficiencies	• Develop signal timing plans to support special event traffic management	

3.2.1.1 Current ITS Staffing Structure

Currently, there is one staff that manages the ITS Program, operates the TMC and supervises two traffic signal technicians that support the maintenance of traffic signals and the ITS devices in the City. When the one TMC manager/operator is not in the TMC, for reasons including attending a meeting, taking vacation, or being out sick, the TMC is left unattended and the functions that the TMC is intended to serve are not addressed.

In addition to being responsible for the management and operation of the TMC, its TMC equipment and the City's ITS equipment, the ITS staff person is responsible for the following:

- Managing the inventory and budget for ITS assets;
- Supporting maintenance of the City's traffic signals, ITS communications network, and ITS devices;
- Developing and implementing signal timing plans;
- Applying for grants to support the ITS program;
- Participating in and representing the City at numerous Committees on a local and regional level;
- Developing and managing capital projects; and
- Supporting traffic management during special events.

To date, the City ITS Program has largely been able to accomplish the necessary functions and tasks given the size and activity of the City and the ITS network. However, as the City grows, demands on the transportation network will increase and expanded functionality will be needed from the ITS Program. As the result, the staffing structure and staffing resources available for the City ITS Program will need to be expanded.

3.2.1.2 *Recommended Staffing Structure*

The staffing recommendation for Surprise is provided in Figure 2 and highlights staffing positions that will be needed to properly operate and maintain the current ITS Program. The ITS/Traffic Analyst position identified with an asterisk (*) is anticipated to be an additional staff person required if all strategies in this ITS Strategic Plan are implemented, which will require significant data analytics and evaluation activities to support multiple departments. The recommended staffing structure includes staffing positions that currently exist in the City (in purple) and new positions that are needed to support the ITS program (in gold). All of the ITS-specific staffing functions will be within the Public Works Department. There are also multiple staff positions or liaisons (in grey), many who are in different departments, that are not direct ITS staff, but who will play a critical role in the successful operation and maintenance of the ITS program. All staff roles are described in more detail below.
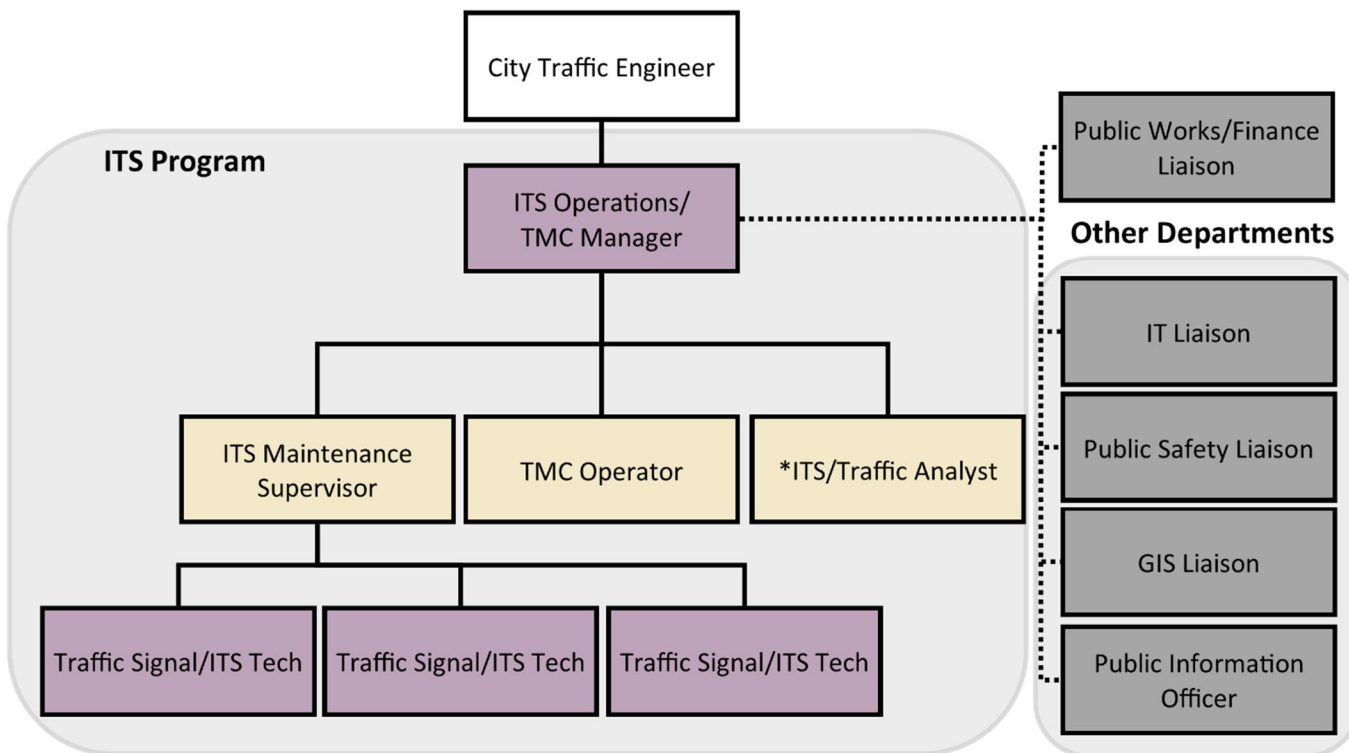

Figure 2: Proposed Staffing Structure for the Surprise ITS Program

Internal ITS Program Staff Positions

ITS Operations/TMC Manager –

The ITS Operations/TMC Manager manages all ITS-related activities in Surprise.

- Manage TMC operations, staff, and facility (equipment, hardware, and software);
- Oversee ITS/traffic signal maintenance activities and staff;
- Coordinate ITS/TMC asset management and annual programming and budgeting activities;
- Manage the traffic signal equipment network, including ITS hardware and software systems and any needed enhancements or upgrades; and
- Coordinate with department liaisons, as appropriate.
    - Work with the IT Liaison for lifecycle and upkeep of software and servers in the TMC and ITS-specific communications hardware in the TMC and in the field.
    - Works with the Public Works/Finance Liaison to manage the CIP budget process for the ITS program.
    - Work with the Public Safety Liaison and the Public Information Officer to support traffic management and the dissemination of traveler information during traffic-related events in the City.

ITS/Traffic Analyst

The ITS Analyst is responsible for managing and implementing traffic signal timing in the City.
- Manages signal timing and coordination, traffic signal studies, and computerized traffic signal programming and control;
- Works with the City Traffic Engineer to get approval for signal timing plans;
- Works with other jurisdictions and the City's signal crews to receive their timing and have them match signal timing;
- Performs field visits to review traffic problems; and
- Handles complaints and inquiries from public on any phase of traffic signal operations.

TMC Operator –

The ITS Operator is responsible for the real-time and remote operation and management all of ITS equipment and systems, including CCTV cameras, detection and traffic signals.

- Monitor operation status for ITS devices and systems and troubleshoot when needed;
- Monitor traffic signal system and video management system make appropriate adjustments to traffic signal timing plans in response to real-time traffic conditions;
- Notify staff, supervisors, internal and external departments, and appropriate authorities of emergency response needs; and
- Dispatch resources and coordinate fleet or field personnel response to traffic and incident issues.

ITS Maintenance Supervisor –

The ITS Maintenance Supervisor is responsible for overseeing the ITS and ITS and traffic signal equipment maintenance and the technicians that perform the maintenance in the City.

- Oversee technicians in installing, modifying, maintaining, troubleshooting, and repairing traffic signal and ITS equipment;
- Be responsible for TMC and ITS fiber communications to field equipment and software systems;
- Manage manufacturer services contracts for ITS and communications equipment;
- Oversee inventory records of field and central management equipment;
- Coordinate traffic signal work with developers; and

- Provide inspection for all traffic signal installations and modifications.

Traffic Signal/ITS Technician –

The ITS Maintenance Technician(s) will be responsible for performing maintenance of City ITS equipment in the field.

- Monitor status of ITS devices and the communications network and maintain on-line update status;
- Perform preventative and responsive maintenance to ITS devices;
- Perform Arizona Blue Stake locate duties;
- Coordinate with the ITS Maintenance Supervisor for inventory needs and fiber and equipment malfunctions; and
- Test traffic signal equipment in the shop and field.

External Staffing Positions that Support the ITS Program

City Traffic Engineer –

The City Traffic Engineer is responsible for overseeing and approving signal timing plans and traffic signal and ITS design plans. Any signal timing plans that are developed by the ITS Analyst will be reviewed and approved by the Traffic Engineer before being implemented. The TMC Manager will work with Traffic Engineering during capital projects to coordinate the design of ITS as part of traffic signal and other roadway projects.

Public Works/Finance Liaison –

To support asset replacement and budgeting for the ITS program, the TMC Manager will coordinate with the designated liaison between Public Works and the Finance Department. The responsibility of this role is to support the CIP and budgeting process for the Public Works Department so that ITS and traffic signal needs are properly provided to and included in the City CIP.

IT Liaison –

The ITS group should look to establish a formal commitment from the City's IT Department to provide support services for the TMC and some ITS telecommunications equipment through an IT Liaison. The IT Liaison should:

- Support the TMC Manager in TMC asset management and replacement with relation to TMC server and network equipment
- Implement appropriate network security measures consistent with agency policies;
- Support upkeep and replacement of telecommunications hardware at the TMC and in the field;
- Assess system operations, databases, and networks to troubleshoot potential system errors; and
- As requested, support the implementation, repair, and maintenance of communications equipment, infrastructure, and databases.

Public Safety Liaison –

The establishment of the TMC Public Safety Liaison will provide the City with data and situational awareness information that will support heightened incident response and management by the Police and Fire Departments. However, to facilitate this exchange of information and real-time coordination, there should be an identified liaison from public safety that understands the TMC functions and provides this coordination between departments. Initially, this liaison will have a method of real-time communication with the TMC to allow for coordination during incidents or special events. Eventually, it may make sense to co-locate a public safety liaison in the TMC to allow for more direct coordination between the TMC and police dispatch and officers in the field.

GIS Liaison –

A GIS analyst will support the ITS Program in terms of inventory tracking and centralization of as-built information for traffic signals. As such, there should be a specific GIS liaison identified who will provide this support, through coordination with the TMC Manager.

Public Information Officer (PIO) –

One of the major goals of developing and ITS program is to improve the amount of data and information about the transportation network in order to inform decision making and improve operations. Thus, the movement of data and information is essential for the City to see success from the ITS Program. While, a City PIO will not be directly involved with the operation and maintenance of the ITS Program, the PIO will play a critical role in facilitating the exchange and dissemination of information between the TMC and other City departments and the public. The City PIO, or a PIO liaison will have the following responsibilities:

- Facilitate direct and frequent communication with the TMC Manager or TMC Operator to collect and disseminate, as appropriate, information collected by the ITS Program; and
- Follow and manage sources of information, such as social media, and provide the TMC Manager with any information that will affect the transportation or ITS system, as it becomes available.

3.2.2 Partnerships to Support the Surprise ITS Program

The strategies identified within the ITS Strategic Plan involve coordination and partnerships with internal departments and other agencies within the region. Many of the important partnerships are already established and should continue to be maintained and possibly expanded as the ITS Program grows. Some partnerships still need to be established to assist in implementing ITS strategies, maximizing benefits of ITS devices and systems, and continuing the City's participation in regional initiatives.

Partnerships provide the opportunity to capitalize on local and regional initiatives and funding programs. These encompass internal, local, and regional partnerships that should be pursued to improve the effectiveness and efficiency of communication and data sharing. Table 2 shows the recommended partnerships that should be established between the TMC and other departments or agencies to support the implementation of the ITS Strategic Plan and the ITS Program.

Table 2: Recommended Partnerships

Level of Partnership	Agency/Department/Division
Internal	- Traffic Engineering - Police Department - IT Department (including GIS) - City Manager's Office/PIO - Economic Development Department
Local Agencies	- City of El Mirage - City of Peoria - City of Glendale
Regional/Statewide Agencies	- MAG - ADOT - Maricopa County DOT (MCDOT) - Luke Air Force Base

3.2.2.1   Internal Partnerships

The strategies identified in Technical Memorandum 4 – Needs and Recommended Strategies, identifies a variety of other City departments who will need to be involved to implement many of the strategies. In some cases, other departments, including Engineering, Police, IT, and Economic Development are identified as the lead for implementing a strategy; many of these departments, as well as others, are identified as key stakeholders to be involved in the implementation of other strategies. Having more regular partnering between the ITS Program and other City departments will be critical for the sustainability of the ITS Program and to achieve one of the key purposes of the ITS Program, which is to expand the influence of the ITS Program in the City so that the City ITS investments can be better leveraged.

3.2.2.2   Partnerships with other Local Agencies

The City will benefit by partnering and coordinating with the neighboring Cities of Peoria, Glendale, and El Mirage to support the ITS Program and support traffic management within the City. Coordinating with neighboring agencies to share information and signal timing plans will allow for improved mobility along corridors that may cross jurisdictional boundaries.

The sharing of information with adjacent arterial agencies is needed for ICM planning and implementation. As with the intra-jurisdictional connectivity needs, telecommunications security policies are needed for any interjurisdictional connections to Peoria, Glendale and El Mirage.

3.2.2.3   Partnerships with Regional and Statewide Agencies

The City of Surprise is adjacent or intersected by two major ADOT facilities, SR 303L and US 60/Grand Avenue. The operations of these facilities within the City jurisdiction have significant impact on the Surprise transportation network, especially when operations are interrupted due to construction activity or an incident. During the planning stages of the SR 303L project, the City was an active participant and ultimately finalized an agreement with ADOT for City specific equipment and upgraded infrastructure. From a City ITS perspective, the agreement included one (1) 3″ conduit dedicated for City ITS within ADOT right of way for the entire project limits.

For Surprise to successfully manage and operate their transportation network, it will be necessary to have frequent coordination and communications with ADOT operations staff, including formalized notification processes and procedures for when events occur on SR 303L or US 60. Formalizing the process for ADOT to notify the City about any construction or incident closures that occur on SR 303L and US 60 will be an important step toward better notification of freeway conditions that will impact the City.

3.2.3   Outreach and Education

During the course of this Plan's development, City departments became aware of opportunities and existing functions that the ITS Program served or had access to that were previously hidden/out of sight. While the process of developing this Plan is an outreach method in itself, there are also outreach activities required beyond the Plan's completion that will be the most important in continuing the momentum.

There are at minimum two different audiences for the ITS Program to acknowledge: internal City Departments and the traveling public. Within the internal City Departments audience, there are also a few levels of audience that exist: elected officials/decision makers and operations/service providers. Each category of audience requires a different level of information that is not only desired to understand the complexity and scope of the ITS Program, but also is required to serve in appropriate capacity as a City service. Where one group may see value in a particular dollar amount or percentage decrease in one performance indicator, another may be interested in additional level of detail that is affecting their travel every day.

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A dedicated outreach plan for the City will be defined in the Implementation Plan task, but is acknowledged in this TSMO context as an intentional involvement with specific "people" that can influence the ongoing operations and maintenance of the ITS Program. As a cross-cutting service to the City, the benefits, successes, and even detriments of the ITS Program will need to be communicated in an ongoing basis not only internally to City departments, but externally to the traveling public. Connecting the "people" affected by the ITS Program to the ITS Program will be an important goal for the City to pursue.

3.3 TSMO Focus Area #2 – Funding

As the City of Surprise ITS infrastructure was initially being deployed, the focus was on capital design and implementation. Over time, the City has built the infrastructure necessary to manage the system, with minimal updates/additions required. As such, the funding needs will shift from design and implementation to operations and maintenance. This represents a very different funding strategy in that operations and maintenance are not covered by federal funding (such as CMAQ). This is a challenge for many agencies, as maintenance budgets rarely increase to keep pace with deployment and level of infrastructure in the field. To help address this known and upcoming need, this plan needs to factor in the shift in funding needs over the next decade.

It is a reality that funding will be necessary to establish and then sustain the ITS Program. This TSMO focus area looks at the funding sources, levels and processes that are currently available and that are needed to reach the goals for the ITS Program. There may be changes to the way that funding is used or becomes available that are identified to best support the ITS Program and strategies that are recommended.

3.3.1 Budgeting and Programming for ITS

The City's TMC manager is in charge of all maintenance activities for traffic signals and ITS infrastructure. Summarized below are the categories of ITS assets and the current number of each asset that is under the jurisdiction of the City TMC manager:

Traffic Signal Infrastructure:

- TS2 Signal Cabinet – 52
- ASC3 Signal Controller – 52
- Field Network Switch - 49
- In-Pavement Detection – 36
- Video Image Detection – 45
- Radar Detection – 2
- Emergency Vehicle Preemption – 51

ITS Infrastructure, Communications, and TMC Equipment:

- CCTV camera – 44
- Arterial DMS – 8
- ARID Detector – 4
- Fiber Optic Cable – 28.5 miles
- Wireless Radio – 14
- TMC Servers – 6
- TMC Network Core Switch – 13
- TMC Rack Equipment – 7
- TMC Workstations – 4
- TMC Workstation Displays – 14
- TMC Uninterruptible Power Supply – 4
- TMC Video Wall – 1

It is recommended that each of these assets be incorporated into a formal asset replacement program as each of them have a known lifecycle timeframe. The lifecycle timeframe for each electronic component asset item is typically between 7-10 years, except for field-hardened non-electronic infrastructure such as fiber optic communications and traffic signal cabinets that be expected to last 20+ years.

Appendix A provides a summary of lifecycle timeframes anticipated for each of the assets as well as annual replacement funding requirements over the next 30 years. The recommended values in Appendix A were used to evaluate the number of assets, the anticipated lifecycle replacement timeframe, and expected man-hours needed for operation and maintenance (O&M) based on industry standards for ITS maintenance.

3.3.2 Evaluation of Existing Funding for the Traffic Signal and ITS Program

An evaluation of the existing funding programs for ITS was completed for this Plan. The existing annual budgets to support the traffic signal and ITS Program are shown in Table 3.

Table 3: Traffic Signal and ITS Program Existing Funding Breakdown

Category	Current Budget	Funding Description
Maintenance Activities		
Traffic Signals (51403 – Traffic Signal Supplies)	$92,200	Traffic signal infrastructure replacements and maintenance, including emergency vehicle preemption (EVP)
ITS Capital Supplies (51401 – Operational Supplies)	$33,500	TMC equipment, ITS field infrastructure
Total Maintenance Activities Funding:	$125,700	
Maintenance Staff		
Signal Personnel Services (61572 – Signals Personnel Services)	$187,900	Includes all traffic signal and ITS infrastructure repair, replacement, and man hours associated with maintenance. Includes 2 full-time technician staff currently with salaries at $122,400 and 53.5% overhead.
Total Maintenance Staff Funding:	$187,900	
Operations/Services Activities		
Traffic Engineering (55095 – Professional _Outside Svc-Other)	$15,000	Studies, signal timing, traffic counts
Signals (55095 – Professional _Outside Svc-Other)	$40,000	Video detection installations, signal timing and re-timing completed by outside consultant, contract services for backup in traffic engineering signals
Total Operations/Services Activities Funding:	$55,000	
Operations Staff		
Traffic Engineering Personnel Services (61571 – Traffic Engineering Personnel Services)	$192,500-$289,700	Includes TMC Manager and TMC Operator/ITS Technician pay ranges. Includes salaries combined within the range of $125,400-$188,700 and 53.5% overhead.
Total Operations Staff Funding:	$192,500-$289,700	

The current budgets do not designate between asset replacements based on asset lifecycle timeframes and replacements because of an upgraded/updated function that warrants technology replacement before the natural end of lifecycle. There are times when upgrades to ITS infrastructure may be warranted to accommodate an expanded or enhanced function. Implementing adaptive traffic signal control on Bell Road is an example of implementing an enhanced traffic signal functionality which required upgrades to traffic signal detection equipment prior to the end-of-life of the original detectors.

Surprise is focused on well-proven and tested technology innovations that support:

▪ *Longer lifecycle timeframes* – modern technology is designed and built to withstand Arizona weather and extended use;

- *Less moveable/breakable parts* – such as encased dome CCTV that do not need to move rather than bullet-style CCTV that needed to physically turn to see new direction;
- *Modern functionality that serves multiple data purposes* – such as ASC3 controller that can accomplish new functions the ASC2 controller could not; and
- *Smaller equipment* – such as size of video wall screens getting smaller over time.

3.3.3 Evaluation of Future Funding Needed for Traffic Signal and ITS Program

Based on the existing inventory for traffic signals and ITS infrastructure in the City, an evaluation of the recommended funding levels for the Surprise traffic signal and ITS Program were identified; the calculations and assumptions to identify these funding levels are found in Appendix A, and the results are summarized in Table 4.

Table 4: Traffic Signal and ITS Program Funding Breakdown

Category	Existing Funding Amount	Recommended Funding Amount	Funding Shortfall
Maintenance Activities	$125,700	$903,900	$781,200
Maintenance Staff	$187,900	$395,400	$207,500
Operations/Services Activities	$55,000	$70,000	$15,000
Operations Staff	$125,900	$192,500 – $289,700*	$66,600 – $163,800
TOTAL	$494,500	$1,561,800 – $1,659,000	$1,070,300 – $1,167,500

This amount includes a level 113 Traffic Signal Specialist serving as a TMC Operator/ITS Technician as well as the level 114 ITS Supervisor serving as the TMC Manager. With the supervision of additional staff recommended as part of this Plan, an evaluation is also recommended on the ITS Supervisor position acknowledging the new supervision requirements overseeing both Traffic Signal Technicians and Traffic Signal Specialists.

The recommended funding amounts identified assume that an average range traffic signal and ITS infrastructure costs will cover most O&M needs during a year. In all transportation networks, it is a foundational assumption that infrastructure that is deployed will require ongoing operations and maintenance, which should be programmed and budgeted for.

Per Appendix A, the anticipated asset replacement cycle will naturally warrant the capital cost funding to go up and down each year depending on the age of the equipment. Budgets for this traffic signal and ITS infrastructure program should be carried over for at least one year so that budgets are not reduced in an annual City budgeting evaluation because of a surplus from a previous year. It is expected that there will be years where O&M funding for ITS may need to be accelerated from future years to cover a higher than unanticipated number of crashes, weather issues, damage, repairs, or other malfunctions. Similarly, there may be years where a smaller budget is required because of a smaller number of events or malfunctions.

Table 5 summarizes the existing funding shortage for traffic signal and ITS infrastructure program by funding category.

Table 5: Recommended Traffic Signal and ITS Program Funding Breakdown

Funding Category	Current Annual Funding	Current Annual Funding Description	Needed Annual Funding	Funding Budgets Adjustments Required to Support Traffic Signal and ITS Program
Maintenance Activities				
Traffic Signals (51403 – Traffic Signal Supplies) (Maintenance Activities)	$92,200	Includes traffic signal infrastructure replacements and maintenance, street lights, signal controllers, power supplies, video detection, and EVP	$242,300 per year for traffic signal and detection maintenance	Increase of 174% or $160,100 above current maintenance budget for traffic signals
		Not currently included in budget	$29,800 per year for other ITS infrastructure maintenance	Identify new $30,800 budget for ITS infrastructure maintenance
ITS Capital Supplies (51401 – Operational Supplies) (Maintenance Activities)	$33,500	Includes some TMC equipment (including cabinet, controller, field network switches, wires, signal heads) and ITS field infrastructure (including miscellaneous repairs, downed server, video wall, radios, wireless equipment, DMS, network switches, count station access points)	Range of Asset Replacement Capital Costs: Traffic Signal Infrastructure = $676,200 to $762,500 ITS Infrastructure = $36,500 to $336,800 Average Asset Replacement Costs: Traffic Signal Infrastructure = $745,200 ITS Infrastructure = $158,700	Identify new $745,200 budget for traffic signal infrastructure asset replacement costs and $158,700 budget for ITS infrastructure asset replacement costs
Maintenance Staff				
Signal Personnel Services (61572 – Signals Personnel Services)	$187,900 (2 full-time technician staff currently)	Includes all traffic signal and ITS infrastructure repair, replacement, and man-hours associated with maintenance	$395,400 (calculated based on working hours estimation of $272,100 from Appendix A O&M totals for traffic signal and ITS maintenance plus 45.3% required overhead)	Two additional technicians could be justified to completed man-hours effort for all City infrastructure, but only one is recommended based on the staffing structure
Operations/Services Activities				
Traffic Engineering (55095 – Professional _Outside Svc-Other)	$15,000	Miscellaneous traffic studies, de-warranting, safety review	$30,000 (per TMC Manager to complete City appropriate studies annually)	Increase of $15,000 to funding source (or new TMC Operator may be able to complete services
Signals (55095 – Professional _Outside Svc-Other)	$10,000	Video detection installations	$125,000 per year (51403 – Traffic Signal Supplies already captures a $26,500 cost for video detection)	Remove line item in budget as asset replacement program for video detection will now need to occur under 51403
	$20,000	Signal timing and re-timing completed by outside consultant	$30,000 per year to complete services	Increase of $10,000 to existing funding source or 0.5 additional TMC staff
	$10,000	Contract services for backup in traffic engineering signals	$10,000	No change recommended to funding
Operations Staff				
Traffic Engineering Personnel Services (61571 – Traffic Engineering Personnel Services)	$125,900	Includes TMC Manager only	$192,500 – $289,700 (calculated based on a current TMC Manager and an additional TMC Operator/ITS Technician totaling a pay range of $192,500 - $289,700 plus 53.5% required overhead) $93,700 – $141,200 (Future ITS/Traffic Analyst including salary plus 53.5% required overhead)	Includes additional cost of new TMC Operator and a future new ITS/Traffic Analyst

3.4 TSMO Focus Area #3 – Documentation

'Documentation' is meant to describe the need for formalized procedures or agreements that would support the implementation and operation of the ITS Program. In many cases, a major barrier to implementing strategies is the lack of supporting documentation that establishes processes or agreements that are necessary for the strategy to be successful. This section describes some of those types of documentation efforts that may be necessary for the successful implementation of the ITS Plan and Program.

3.4.1 Procedures for Asset Management and Replacement

Refining the current asset management procedure is required to meet the future needs of the transportation system within the City. As ITS technologies and communications evolve, the existing system components will need to be compatible for proper system functionality. Replacing or upgrading ITS equipment that has failed, reached end of life, or become obsolete poses significant challenges for keeping the system operational.

Examples of outcomes that can be realized through this ITS Infrastructure asset management process:

- Prolonging asset life and improving decisions about asset rehabilitation, repair, and replacement;
- Meeting critical demands with a focus on system sustainability;
- Budgeting focused on critical activities for sustained performance;
- Meeting level of service expectations;
- Improving responses to system outages;
- Improving the security and safety of assets; and
- Reducing overall costs for both operations and capital expenditures.

The City currently uses an asset management system called Infor where City departments can upload asset management tracking documents, and these are considered in the annual budget review and generation. With the current process, the ITS Program can track and plan for the replacement of ITS assets as they reach end-of-life, which is a critical process for sustaining the ITS Program. However, the ITS department faces the challenge of making sure that the network stays up-to-date with technology, regardless of the age of its components.

It will be important to be able to communicate through the efforts of this Plan the assets that are in use by the ITS Program, including traffic signal equipment. The Public Works Department, having ownership over the ITS Program and the TMC, will have ultimate ownership in the asset management and operational services provided by the ITS Program to the City departments and to the public.

3.4.2 Agreements

While the City's ITS Program, and particular the ITS Manager, has provided a solid foundation of partnering within the City and in the region, there are opportunities for additional partnering to support the City's goals for mobility, integration, and robust and responsive public services. The "people" side of partnering is described previously in Section 3.2.2; however, the formalized "documentation" side of partnering is described in this section. This section provides a summary of existing partnerships that can be elaborated on to serve new functions outlined in this Plan as well as identifying new relationships that may warrant formal or informal agreements to serve new functions as well.

3.4.2.1   Existing Established Agreements

There are a number of existing partnerships that the City's ITS Program has long established to serve current functions. These are described below:

Surprise ITS and ADOT

The City of Surprise is intersected by two major ADOT facilities, SR 303L and US 60. The operations of the freeways within the City jurisdictional boundaries have significant impact on the Surprise transportation network, especially when operations are interrupted due to construction activity or an incident. During the planning stages of the SR 303L project, the City formalized an Intergovernmental Agreement (IGA) with ADOT which included ADOT dedicating a one (1) 3" conduit for City ITS use within ADOT right of way for the entire project limits. The City was able to use this space to install their own ITS fiber to further their communications connectivity throughout the City.

Surprise ITS and Partners Along Bell Road

The City already partners with the jurisdictions along the Bell Road corridor (Peoria, Glendale, MCDOT) in pre-determined operational roles and responsibilities. The Bell Road Operations Plan defines those operational characteristics along the corridor through the entire region, including Phoenix and Scottsdale in the recent years. This coordinated effort between local agencies along one corridor is an innovation in operations that is paving the way in the region for future coordinated efforts across jurisdictional boundaries.

Surprise and AZTech

The AZTech Regional Archived Data System (RADS) is an ITS data archive for the transportation system in the Phoenix metro area that is integrated into many partner agency systems in the region. RADS archives operational data in a centralized server and then makes the data available to users through a web-based interface. The three main components of RADS consist of freeway and arterial data, public safety data, and traffic signal data. Local agencies, including the City of Surprise, are linked to RADS to provide traffic signal timing data. Travel times that are displayed on ADOT DMS are calculated in RADS using ADOT freeway management system (FMS) data. RADS also includes data from the Phoenix Fire Department's computer-aided dispatch (CAD) system, which provides filtered incident data from emergency dispatch and 911 calls.

The City currently subscribes to the AZTech Regional Information System (ARIS) which serves to provide incident notifications to local transportation departments that occur within a geographic area in the system that the City has specifically defined. The ARIS system automatically assimilates a range of useful information related to an incident and presents the information in a web-based "tactical screen" that is emailed or texted to the user. Information includes a map identifying the incident location, speed (and trend) of the nearby freeway traffic detector stations, DMS messages being displayed, and CCTV cameras snapshots. ARIS also provides charts (histograms) of nearby freeway detector stations showing both the speed and volume distributions since the time of the incident. A total of 35 clients representing more than 10 agencies and organizations are currently registered to receive real-time notifications from ARIS. ARIS generates over 900 notifications per day which represents an average of 18 closures, 200 lane restrictions, and 60 maintenance events on a typical day.

Expansions to both of these systems are anticipated in the future, and the City being an ongoing partner in these efforts puts the City at the forefront of innovation in data.

Surprise and MAG

The Regional Community Network (RCN) provides the communications infrastructure necessary to interconnect transportation and public safety centers (such as police or fire) throughout the region. The RCN enables agencies

to share CCTV video, detector data, and a variety of other types of data through a high speed optical fiber-based communication system. The network is widely considered the region's communication backbone, supporting interagency congestion mitigation efforts, and reducing costs by providing an additional fiber communications paths for shared-use. All 14 of the TOCs/TMCs in the region are connected to RCN, including the City of Surprise, with the goal of having all MAG member agencies have a central system that is connected as infrastructure becomes available. The live feeds from all of Surprise's 47 CCTV cameras are also shared with other agencies in the region through the regional community network and via the Luxriot video management system, which is sponsored by MAG and provided free to all agencies to be able to share camera feeds.

3.4.2.2 Recommended Additional Agreements

Partnering with other departments and other agencies provides the opportunity to capitalize on local and regional initiatives as well as funding programs. Table 3 shows the recommended partnerships that should be established or formalized within the City and with other agencies. These encompass internal and local partnerships that should be pursued to improve the effectiveness and efficiency of the communication and data sharing. Specific roles and responsibilities involved with the department or agency partnering with the City's ITS Program is also identified.

Table 3: Recommended Internal and External Agreements

Level of Partnership	Agency/Department/Division
Internal	• Public Works Department • Police Department • Fire Department • IT Department • Development Services Department
External	• MAG • ADOT • MCDOT • City of Buckeye • City of El Mirage • City of Peoria • City of Glendale • Luke Air Force Base • Dysart Unified School District

Surprise ITS and Other Internal Departments

The City IT, Public Works, Fire, and Police Departments and other potential departments as required should coordinate efforts related to City management of systems and infrastructure. This will be important during the development and implementation of strategies as defined in this plan. This will also be important to supporting multi-departmental response and situational awareness during activities that may impact all departments, such as incidents or special events. Formalizing or organizing partnerships to support activities such as detour plan development and implementation for when ADOT freeway incidents occur and send all traffic onto City streets will be necessary as the transportation network continues to be developed in the City.

Surprise ITS and ADOT

For the City to successfully manage and operate their transportation network, it will be necessary to have frequent coordination and communications with ADOT operations staff, including formalized notification processes and procedures for when events occur on SR 303L or US 60. Formalizing the process for ADOT to notify the City about any construction or incident closures that occur on SR 303L and US 60 will be an important step toward better notification of freeway conditions that will impact the City.

Surprise ITS and Other Arterial Agencies

In addition to the MAG RCN, the AZTech RADS and ARIS systems are important resources to support the sharing of traffic, incident, and traveler information between jurisdictions. It would be beneficial for the City to leverage the existing relationship with the City of Peoria and City of Glendale as part of the Bell Road Operations Plan as well as establish new partnerships with the City of El Mirage and City of Buckeye to extend signal timing coordination to other multi-jurisdictional corridors such as Peoria Avenue, Cactus Road, Thunderbird Road, Cotton Lane, and Sarival Road. Coordination with neighboring agencies to share information and signal timing plans to coordinate corridor mobility will be important as the region expands and populations continue to increase. The sharing of information with adjacent arterial agencies is also needed for integrated corridor management (ICM) planning and implementation. As with the intra-jurisdictional connectivity needs, telecommunications security policies are needed for any interjurisdictional connections to new agencies such as Buckeye and El Mirage that are not already established.

Surprise ITS and Other Neighboring Agencies

Partnerships with other agencies that may have an interest or stake in the ITS Program and transportation operations in the City of Surprise, such as Luke Air Force Base or Dysart Unified School District, there will need to be coordination periodically that may warrant informal partnerships or formalized processes, depending on the situation causing the coordination need.

3.4.2.3   Formal Agreements

Partnerships and agreements give the City the ability to leverage internal and regional initiatives and collaborate on successes of new technology or operations. The suggested agreements are directly correlated to the recommended ITS strategies purpose and function.

There are four types of agreements and coordination to help establish a line of communication and coordinated operations:

Intergovernmental Agreement and Memorandum of Understanding (MOU)

IGAs and MOUs are legal agreements that are used when agencies are looking to share resources, services, and/or information. Both of these types of agreements identify the purpose and scope of the agreement and roles and responsibilities of each party. These agreements are legal contracts that hold each party to the outlined terms and conditions and will establish the level of coordination as well as the limits of coordination. Limits can be helpful for agreements involving things such as bandwidth capacity of a communication network or the liability of archived video information.

The use of an IGA or MOU by the agencies in the MAG region depends on whether funding or resources are needed to support the purpose or scope of the agreement. For example, the City used an IGA to detail operations and maintenance responsibilities along the SR 303L within the City jurisdictional boundaries. Another example is when agencies use an IGA when sharing operations and maintenance of a physical device or when utilizing a regional

service, such as MCDOT's arterial incident management support team (REACT). Alternatively, when agencies are sharing CCTV images or committing to participate in a regional committee, agencies typically use an MOU.

Standard Operating Procedure (SOP)

SOPs are formalized, step-by-step instructions for carrying out routine tasks or operations that help achieve efficiency, uniformity and quality of output and help reduce miscommunication. SOPs can be established for specific tasks, such as SOPs for reviewing traffic signal timing plans or for operating CCTV cameras. SOPs can also be established to help achieve coordination; for example, an SOP can be established for Police Dispatch where any time someone dispatches an officer to a traffic accident, the dispatcher also sends an email to other folks in the City alerting them of the incident. An SOP is less formal than an MOU as it is not legally binding, however, it can help create a routine process for something that is mutually agreed upon and just requires change of process to implement.

Another example of an SOP is the Bell Road Operations Plan, which is a multi-agency plan that identifies plans and procedures for the multi-jurisdictional adaptive traffic signal system along Bell Road. This document was developed and signed by all agencies who operate Bell Road and represents agreed-upon procedures for signal timing, device management, and inter-agency coordination related to operations of Bell Road. This document not only represents a type of agreement, but can also be leveraged in the future to expand coordination with the participating agencies.

Table 6 identifies types of agreements that should be pursued with internal departments and regional agencies to support the growth of the City ITS Program. The table also indicates the types of activities that would warrant an agreement.

Table 6: Recommended ITS Program Agreements

Partnering Agency/ Department	Action						
	Share Camera Images	Sharing of Crash Data	Signal Coordination and Management	Incident Management Support	Traveler Information	Share/Maintain Fiber/ Communications	Funding Support/ Coordination
Internal Departments							
Traffic Engineering		SOP	SOP				SOP
Police Department	MOU	SOP	SOP	SOP	SOP		MOU
IT Department					SOP	MOU	MOU
City Manager's Office/PIO	MOU				SOP		
Economic Development Department							MOU
External Agencies							
MAG							IGA
ADOT	MOU		IGA		IGA	IGA	IGA
MCDOT	MOU		SOP	IGA	IGA		IGA
City of Buckeye							
City of El Mirage	MOU		SOP				IGA
City of Peoria	MOU		SOP				IGA

Partnering Agency/ Department	Action						
	Share Camera Images	Sharing of Crash Data	Signal Coordination and Management	Incident Management Support	Traveler Information	Share/Maintain Fiber/ Communications	Funding Support/ Coordination
City of Glendale	MOU		SOP		SOP		IGA
Luke Air Force Base				SOP	SOP		
Dysart Unified School District				SOP	SOP		

IGA – Intergovernmental Agreement   MOU – Memorandum of Understanding
SOP – Standard Operating Procedure

4 FUNDING SOURCES AND OPPORTUNITIES

Section 3.3 describes the various regular budgets that are currently used to support the current operations and maintenance of the ITS Program components. The evaluation of these budgets shows that there is additional funding support needed to allow the current ITS Program to operate at the level that it is intended. In addition to the funding needs for the current-day ITS Program, additional funding will be needed to support the implementation of the strategies identified in the ITS Strategic Plan and to support the ITS Program as it expands in line with City development. This section identifies and describes some of the other funding sources that may be leveraged to support the expansion and operations of the ITS Program in the future, including:

- City sources;
- Development Driven Projects;
- Regional Sources;
- Competitive Federal Funding;
- ADOT Local Public Agency Program; and
- Privatized Sources.

There are variety of other funding sources that do not apply to ITS and cannot be used to implement ITS for transportation-only use, and thus are not included in this Plan.

4.1 City Funding Sources

4.1.1 City Capital Improvement Program (CIP)

The City does not currently have a formally adopted multi-year CIP, but does have an annual budgeting process that identifies the departmental budgets and the programs and projects that will be funded for the next fiscal year. Each year, each City department submits project or budget requests to the Finance Department, who provide the ultimate recommended budget to City Council for approval. The annual ITS budget and project requests are handled through the Public Works liaison to the Finance Department.

The City CIP will probably need to be leveraged to support the implementation of some ITS projects as well as the annual operating and maintenance costs for the ITS Program. Table 5 or Section 3 provided a detailed breakdown of both annual budget needs and estimated annual asset replacement costs that should be submitted for inclusion

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in the annual budgeting process. The CIP may be a potential source of funding for capital projects such as installation of conduit and/or fiber, upgrades to the TMC (some of which have been approved for inclusion in the fiscal year 2018 CIP), or establishment of a central database for ITS or other City data.

4.1.2 Joint Funding Between Departments

One of the core purposes identified for this ITS Program is to leverage ITS investments to support multiple City departments. As such, many of the strategies included in Tech Memo #4 – ITS Needs, Recommended Strategies and Projects, and Estimated Costs, identified other City departments, including IT, Police, Economic Development and Engineering, as the lead or the co-lead for strategy implementation. The implementation of these strategies will provide benefits to the City beyond the reach of the ITS Program, and there is justification to propose that the implementation and sometimes maintenance of these strategies be funded by another City department or jointly-funded by ITS and another department. One example of this is the strategy of leasing conduit space to attract business development. In some cases, this may require the City to install an additional, non-transportation fiber cable into existing conduit, which they could lease to businesses who would like higher speed and higher bandwidth communications. In this case, the cost of the fiber installation should be borne by the Economic Development Department, understanding that the benefits of that fiber are to the ED Department and not to ITS. Additionally, the maintenance and upkeep of that fiber should be accounted for separately from the regular maintenance budgets for ITS fiber; either the IT Department can be made responsible for the fiber upkeep, or the ITS Program can be provided the staff and funding resources to take on the additional maintenance effort.

Another justification for encouraging City departments to partner on implementing ITS strategies is that some departments have access to external funding sources or opportunities that the ITS or Public Works Department do not. The most obvious example is related to public safety, where the Police and Fire Departments may have access to grant or other funding opportunities specific to public safety. When considering a strategy such as where Police work with ITS to set up a system that allows them to record CCTV video feeds to support accident and crime investigations, the Police Department have the opportunity to seek out a public safety grant opportunity not specifically related to ITS to implement this strategy.

4.2 Development Driven Projects

There is a significant amount of current and future development within the City of Surprise that will have significant influence on the layout and timing of the future City roadway network. As the City roadway network gets expanded and upgraded based on development-driven needs, there should be consideration for how the ITS network can be simultaneously upgraded and expanded in conjunction with development. "Mainstreaming" is a process by which various project elements, including ITS, can be integrated with other planned projects and construction activities, thereby minimizing impact on the corridors due to multiple construction projects over time, often reducing costs of multiple construction efforts (permitting, right-of- way, utility clearances, etc.). This means that for all roadway projects in the City that involve new roadway construction, widening, pavement reconstruction or trenching, there should be a review to see if ITS infrastructure, including ITS communications, can be included in the project or installed simultaneously. This will be particularly important for the northern portions of the City which are not currently developed but that are identified for future ITS infrastructure.

The City already includes ITS in their Engineering Standards, and there are two strategies identified as part of this plan to update traffic study requirements to consider ITS and to update development standards related to ITS. All of these activities create opportunities for the City to leverage development-driven projects in support of ITS network expansion.

4.3 Regional Funding Sources

4.3.1 MAG Transportation Improvement Program

The City of Surprise has significant experience with the MAG Transportation Improvement Program (TIP) as a funding source for ITS infrastructure projects; the Surprise TMC and most of the ITS communications infrastructure within the City was funded by the MAG TIP over the past 10-15 years. The MAG TIP identifies the five-year schedule of specific projects to be constructed across the MAG region and involves roadway improvements, ITS infrastructure, landscaping, complete street, and other capital improvements. The MAG TIP funding comes from various sources including local funds (through the half-cent sales tax for transportation put forth in Proposition 400), ADOT funds, and federal funds (mainly Congestion Mitigation Air Quality (CMAQ) funds).

Local agencies can typically obtain funds for qualifying ITS projects by submitting applications during MAG Call for Projects. All ITS projects are reviewed and ranked by the MAG ITS Committee, of which Surprise is a member. The MAG Regional Council provides the final recommendation and approval before projects are formally included in the TIP. It is recommended that the City review the MAG criteria when developing specific ITS project applications for City arterials or to connect to the freeway or neighboring agencies; it is important to show regional cooperation and participation to support a TIP application.

The call for TIP applications is usually announced by MAG during the first week of August and applications are due the second week of September of that same year. MAG does not issue a call for TIP applications every year and often uses one application cycle to cover multiple years of the TIP. The current MAG TIP application cycle was announced on August 7, 2017, and will identify projects for fiscal year 2021 and 2022. However, ITS projects will not be programmed in this cycle, as all funds made available for ITS infrastructure in the Regional Transportation Plan have been programmed.

In the most recent TIP programming cycle in 2015, ITS project applications required a 5.7% local match (with 94.3% of the costs covered by Congestion Mitigation and Air Quality (CAMQ) funds). Projects utilizing federal dollars must adhere to the Federal Project development process set forth by FHWA and ADOT. This process is typically a 12 to 18-month process consisting of Environmental Determination, Utility Clearance, Right of Way Clearance and PS&E submittals at the 30%, 60%, and 95% design levels. For these projects, ADOT requires a $10,000 design review fee for self-certified agencies and a $30,000 review fee for agencies that are not self-certified. Additionally, due to funding limitations, the 2015 applications capped funding requests at $400,000 per project. These application and funding guidelines may vary for each application cycle and should be verified.

In the 2015 application cycle, the design costs for projects were not eligible for federal funding. In the past, federal funds could be used for project design. In these cases, the local agency's design consultant selection process had to be reviewed and approved by ADOT, and the design could not proceed beyond the 30% level without environmental clearance.

There have been opportunities for close-out funding through MAG, whereby surplus federal funds received by MAG are made available for projects already programmed in the TIP. This is not the case for every year, and should not be viewed as a consistent funding source. MAG informs agencies when there is funding available during the close-out process.

MAG is currently in the process of developing a Systems Management and Operations (SMO) Plan that will help guide future regional investments in both ITS infrastructure and regional funding support for critical transportation operations. It is anticipated that recommendations in this plan will be incorporated in the MAG programming process to be applied in future TIP programming cycles.

4.3.2 MAG Traffic Signal Optimization Program

Like the MAG TIP, the City of Surprise has regularly leveraged the MAG Traffic Signal Optimization Program (TSOP) to obtain technical assistance for improving traffic signal operations and coordination over roadway corridors and networks. The MAG annual work program sets aside approximately $300,000 for this program and makes it available to provide local agencies with technical assistance in improving traffic signal operations. Qualifying projects include improving traffic signal coordination and optimization or developing computer-based traffic signal coordination networks that can be used by local agencies to refine signal timing.

Each year, TSOP funds become available in July. Shortly afterwards, MAG issues a call for projects. Agencies can submit multiple TSOP applications each year that meet MAG criteria, and individual projects are typically $25,000 to $30,000 and can address around 10 signals. There is no required local match for TSOP projects that are accepted. Applications are reviewed and ranked, and MAG tries to fund as many projects as feasible within the available funding.

Agencies can submit TSOP project requests for stand-alone projects within their jurisdiction, or they can partner with other agencies (neighboring jurisdictions, ADOT, MCDOT, DPS, etc.) to apply for TSOP funding for corridors that impact both agencies. The selected project's scopes are developed by MAG in consultation with the local agencies. The projects are then assigned to be carried out by consultants on the MAG On-Call Traffic Engineering Consultant list. These projects are administered by MAG and closely coordinated with the local agency at all stages of the project. These projects are typically initiated in January or February and completed by June 30th (i.e. the end of the fiscal year).

4.4 Competitive Federal Funding

The City can look to partner with other agencies to pursue federal funding opportunities, such as competitive grants or competitive research/test bed opportunities. Typically, applications for these opportunities are led by agencies such as ADOT or MAG, with local agencies as partners. Recent examples of these opportunities include the USDOT grant received by MAG for the I-10 Integrated Corridor Management Study and TIGER grant applications. To be well positioned to be included as partners in these types of projects, the City should make sure to continue active participation in the MAG ITS Committee and other regional ITS partnerships such as AZTech where these opportunities are discussed and pursued as multi-agency partnerships.

4.5 ADOT Local Public Agency Program

ADOT Local Public Agency (LPA) is a program that allows local agencies to utilize ADOT's on-call services with federal funding. Local agencies are either certified or non-certified. Certified cities can manage their own projects as project manager, while non-certified municipalities must have and ADOT project manager for their LPA projects. The City of Surprise is not a self-certified agency at this time. The following are the LPA's four step process on beginning a project to the final implementation:

- Planning/programming (7-14 months) – involves verifying the project is listened within the MAG TIP and STIP authorized, HSIP eligibility, design and construction are not within the same year, review of project issues, and development of scope;
- Development/ design process (18-24 months) – involves design review fees that are eligible for federal reimbursement, self-administration that is allowed for design only, meets ADOT standards, utility and railroad clearances, environmental clearances, right-of-way clearances, and materials report;
- Construction (6-26 months) – involves verifying American bought material with 90% domestically sourced steel/iron, as-builts responsibility has been defined in IGAs, and ADOT is reviewing project status; and

- Final Acceptance (1-4 months) – involves filing the documentation on project to be readily available and completion of project close out information.

4.6 Privatized Sources

Leveraging the private sector for implementing solutions is a more accepted/proven method of implementing innovation to expand functionality within an agency. ITS and operations provides a unique opportunity for public-private partnerships, as well as cost sharing with other capital projects. Examples of such relationships include:

- Combining conduit installation/construction as part of other roadway capital projects to minimize disruption to right-of-way.
- Demonstrations/pilots of technology within the City to gain functionality in exchange for the private sector to acquire data they otherwise would not have access to.
- Partnering with private telecommunications companies for shared use of conduit for telecommunications networks.
- Integrating equipment upgrades into other intersection or corridor enhancements.

This strategy emphasizes partnerships among City agencies and with the private sector. While privatized funding is an option, the City must consider implications of using public-private-partnership (P3) because of the desire to keep the City's ITS infrastructure separate and secured. As a result, it will require some advanced planning, particularly to work through any potential policies, agreements, or schedule coordination.

5 NEXT STEPS

In the next task, the strategies and recommendations will be organized by immediate, near-term, and long-term priority as well as identifying activities and responsibilities associated with implementing this ITS Strategic Plan.

APPENDIX A – SURPRISE ITS ASSET REPLACEMENT CYCLE FUNDING PROGRAM