



# I-10 Integrated Corridor Management

## Project Management Plan

December 2015

Prepared for:



Prepared by:

**Kimley»»Horn**

In Association with:



## TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	<i>Purpose and Objectives.....</i>	1
1.2	<i>Study Area.....</i>	2
1.3	<i>ICM in the MAG Region.....</i>	3
1.4	<i>Project Management Team .....</i>	4
1.5	<i>Project Stakeholders .....</i>	4
<b>2</b>	<b>PROJECT ORGANIZATION .....</b>	<b>5</b>
2.1	<i>Project Scope.....</i>	5
2.2	<i>Scope Management .....</i>	6
2.3	<i>Roles and Responsibilities .....</i>	7
<b>3</b>	<b>PROJECT MANAGEMENT APPROACH.....</b>	<b>9</b>
3.1	<i>Schedule Control and Deliverables Plan.....</i>	9
3.2	<i>Project Meetings and Workshops.....</i>	13
3.3	<i>Project Milestones.....</i>	13
3.3.1	<i>Format for Deliverables.....</i>	15
3.3.2	<i>Review Process for Deliverables.....</i>	15
3.4	<i>Cost Management and Tracking.....</i>	15
<b>4</b>	<b>COMMUNICATIONS MANAGEMENT PLAN.....</b>	<b>17</b>
4.1	<i>Project Management Team Communications .....</i>	17
4.2	<i>Internal Team Resource Coordination .....</i>	17
4.3	<i>Planning Partners Oversight .....</i>	17
4.4	<i>Communications with FHWA and Other Agencies.....</i>	18
<b>5</b>	<b>PROJECT MONITORING AND CONTROL.....</b>	<b>19</b>
5.1	<i>Change Management .....</i>	19
5.2	<i>Issue Resolution Management .....</i>	19
<b>6</b>	<b>PROJECT PROCUREMENT.....</b>	<b>20</b>
<b>7</b>	<b>PROJECT QUALITY MANAGEMENT.....</b>	<b>22</b>
7.1	<i>Quality Control/Quality Assurance Plan .....</i>	22
7.2	<i>Quality Controls .....</i>	22
7.3	<i>Project Performance Metrics .....</i>	22
<b>8</b>	<b>RISK IDENTIFICATION AND MITIGATION .....</b>	<b>24</b>
<b>9</b>	<b>PROJECT CLOSING .....</b>	<b>27</b>

## LIST OF TABLES

Table 1 – Project Planning Partners for the I-10 ICM Project.....	4
Table 2 – I-10 ICM Phase 1 Key Deliverables .....	14
Table 3 – Cost Table for the I-10 ICM Project.....	15
Table 4 – Performance Objectives and Targets for Project Development .....	22
Table 5 – Preliminary Identified Risks and Mitigation Strategies.....	24

## LIST OF FIGURES

Figure 1 – I-10 ICM Study Area ..... 2  
 Figure 2a – Phase 1 Project Work Breakdown Structure and Schedule..... 10  
 Figure 2b – Phase 1 Project Work Breakdown Structure and Schedule (continued)..... 11  
 Figure 3 – High-Level Project Schedule..... 12

## LIST OF ACRONYMS

ADOT – Arizona Department of Transportation	MCDOT – Maricopa County Department of Transportation
ALERT – Arizona Local Emergency Response Team	PIO – Public Information Officer
AMS – Analysis, Modeling and Simulation	PM – Project Manager
ATM – Active Traffic Management	PMP – Project Management Plan
CIP – Capital Improvement Program	QA – Quality Assurance
CMAQ – Congestion Mitigation Air Quality	QC – Quality Control
ConOps – Concept of Operations	REACT – Regional Emergency Action Coordinating Team
DTMS – Downtown Traffic Management System	SEMP – Systems Engineering Management Plan
FHWA – Federal Highway Administration	SR – State Route
ICM – Integrated Corridor Management	SyRS – System Requirements
ITS – Intelligent Transportation Systems	TIM – Traffic Incident Management
KH – Kimley-Horn	TIP – Transportation Improvement Program
MAG – Maricopa Association of Governments	TMC – Traffic Management Center
	TSOP – Traffic Signal Optimization Program

## REVISION HISTORY

Filename	Version	Date	Comment
I-10 ICM PMP (Draft)	Draft	12/1/2015	Draft for review
Final I-10 ICM PMP_12 31 2015.docx	1.0	12/31/2015	Final submitted to MAG

## 1 INTRODUCTION

The Interstate 10 (I-10) freeway runs through the Phoenix metropolitan area serves an important role as part of the national Interstate Highway System and the regional freeway network. The freeway provides links to Sky Harbor International Airport, to major sporting event venues, and between the east and west valley communities. Major traffic incidents on I-10 significantly affect commuter travel and the movement of freight and goods while also jeopardizing the safety of travelers and emergency responders. A major freeway closure leads to impacts on other freeway corridors in the metropolitan area. Adjacent city arterials suffer tremendous impacts when freeway closures divert traffic to the arterial network.

The I-10 Integrated Corridor Management (ICM) project will accelerate key steps towards broader implementation of ICM strategies on the I-10 corridor. ICM is a combination of operational strategies and partnerships to improve throughput and reduce congestion. ICM looks at a freeway corridor as a network that includes the freeway, arterials and transit and encourages coordination among these facilities to optimize the use of existing infrastructure and capacity, and improve operational efficiency of the corridor.

The region has a solid foundation for ICM and is moving toward a focused implementation effort; this project will help formalize these activities in a detailed Concept of Operations and a set of system requirements to help advance important initiatives planned for the near-term. As part of a phased project approach, the first phase will develop foundational project management documents, a formal concept of operations, system requirements and initial modeling activities to validate strategies. Subsequent phases for design and implementation depend on the success of the first phase and funding availability. Phase 1 is funded through a federal ICM planning grant with local agency match; funding has not yet been identified for any subsequent phases.

This Project Management Plan (PMP) outlines the activities, roles and responsibilities, project management processes, and communications among the project team and with external stakeholders. It also documents how project risks will be identified and managed. A separate Systems Engineering Management Plan (SEMP) has been developed to address systems engineering management components.

### ***1.1 Purpose and Objectives***

The purpose of this project is to develop a feasible concept for implementing ICM along a portion of I-10 within the Phoenix metropolitan area. Initial ICM planning activities will focus on more effective operations and strategies for major incidents and closures on I-10 including:

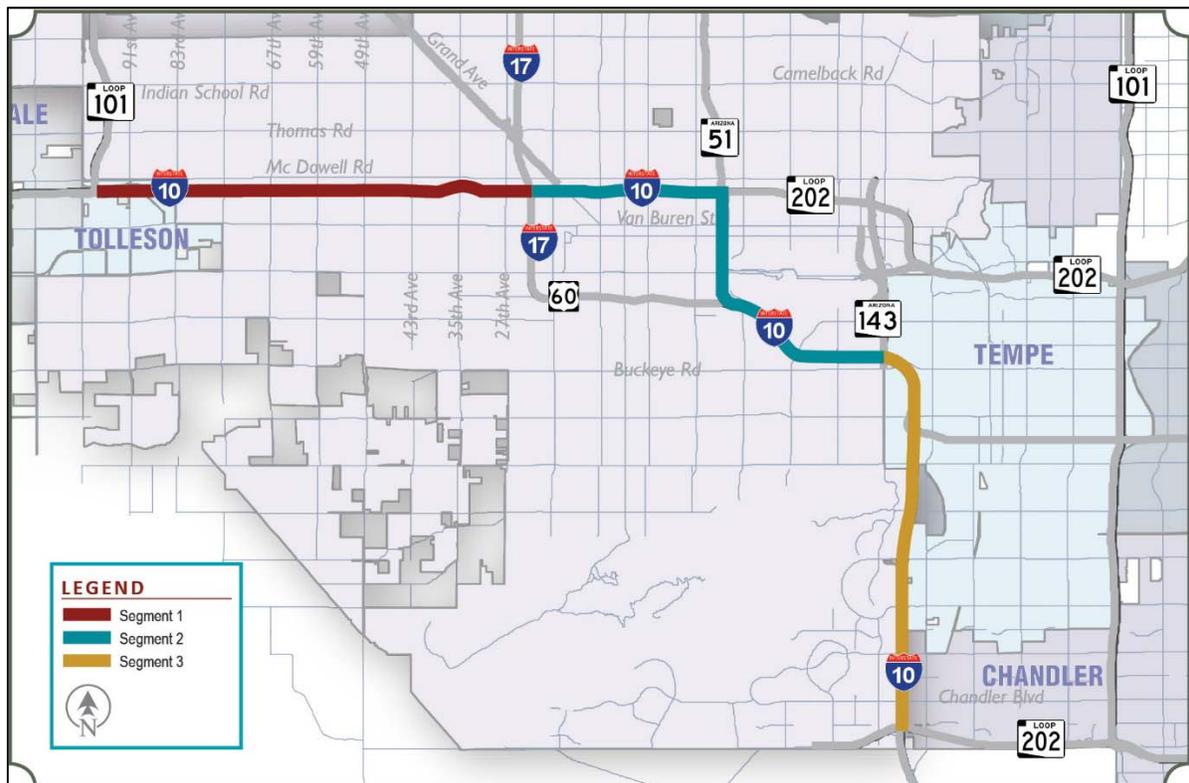
- Implementing technologies and systems that will support enhanced real-time monitoring and agency communications;
- Supporting proactive freeway-arterial coordination and operations strategies; and
- Informing travelers of conditions through a variety of means to support en-route decision making.

The purpose of this project is to explore innovative and cost effective ways to develop and implement better corridor management practices at the regional level. The following elements reflect the stakeholders' vision for ICM in the Region:

- Actively manage transportation systems with available tools and technologies to better respond to recurring and non-recurring congestion in a way that improves both mobility and safety for the region’s travelers;
- Plan and coordinate deployments and collaborate on strategies that will help to balance demand across transportation modes in the region to maximize available network capacity;
- Leverage staff technical resources, regional systems and tools, and agency operations across the region to provide for more coordinated system management and operations; and
- Collaborate to share information among agencies in real-time to proactively implement traffic management strategies across the network.

## 1.2 Study Area

The I-10 corridor is the primarily east-west highway corridor through the Phoenix Metropolitan region. For ICM planning, the I-10 study area in the metropolitan region is comprised of three distinct segments, shown in **Figure 1**.



**Figure 1 – I-10 ICM Study Area**

Segment 1 is situated between Loop 101 to the west and Interstate 17 (I-17) to the east. Within this segment, I-10 crosses four jurisdictions: Maricopa County, City of Phoenix, City of Avondale and City of Tolleson.

Segment 2 begins at I-17 to the west, runs through Downtown Phoenix and terminates at State Route (SR) 143 to the east. This segment is entirely in City of Phoenix jurisdiction and includes routing through the Deck Park Tunnel and access routes to Sky Harbor Airport and major sporting venues in the

Downtown area. Multiple other freeways connect to this segment of I-10 including I-17 to the south, Loop 202 and SR 143 to the east, and SR 51 to the north.

Segment 3 describes the north-south portion of I-10 as it runs through the cities of Tempe and Chandler. The northern boundary for this segment is SR 143 to the north and Loop 202 to the south. This portion of I-10 falls within three jurisdictions: City of Phoenix, City of Tempe and City of Chandler.

### **1.3 ICM in the MAG Region**

Agencies in the Maricopa Association of Government (MAG) region have had a strong focus on continued deployment and integration of Intelligent Transportation Systems (ITS) systems and technologies to support enhanced regional mobility and safety. Over the last two decades, the MAG region has made significant investments in infrastructure and systems for freeways, arterials and transit networks. MAG has worked to leverage these investments towards developing more collaborative regional operations strategies.

There has been a regional focus on the I-10 corridor since 2007. Some of the key projects and programs that have an ICM focus along the corridor include:

- I-10 and US 60 Traffic Signal Optimization Program (TSOP) projects that focus on signal timing of interchanges and parallel arterials, with an emphasis on accommodating freeway traffic on arterials in response to a freeway closure;
- Incremental infrastructure enhancements on arterials through local and regional funding (ex: Phoenix Downtown Traffic Management System (DTMS) upgrade; City of Chandler fiber upgrade along Ray Road);
- Establishment of a Traffic Incident Management (TIM) Coalition and associated TIM training programs to improve timeliness, efficiency and safety of incident management and response procedures on freeways;
- I-17 Spine Near-Term Improvement project that is developing, designing and implementing components of Active Traffic Management (ATM) and ICM for a portion of I-17, including the I-10 approaches and ramps to the I-17; and
- Arizona Department of Transportation’s (ADOT) Arizona Local Emergency Response Team (ALERT) and Maricopa County Department of Transportation’s (MCDOT) Regional Emergency Action Coordinating Team (REACT) to support freeway (ALERT) and arterial (REACT) incident response.

Other projects that align with future ICM initiatives include:

- ADOT I-10 Freeway Management System upgrades
- City of Chandler Arterial Travel Time displays program
- City of Chandler annual travel time studies for signal timing
- Phoenix ITS Strategic Plan which identified specific projects for arterials that parallel major freeways
- Tempe ITS Strategic Plan which recommended device and communications deployment that can support ICM
- Construction of the South Mountain Freeway
- Other ADOT Near Term Improvements (in addition to ATM and ICM)
- I-10, 35<sup>th</sup> Avenue – Sky Harbor Boulevard Safety Planning Study

### 1.4 Project Management Team

MAG serves as the lead agency for coordinating activities for the I-10 ICM project. **Micah Henry** will serve as the overall MAG Project Manager (MAG PM). He will coordinate with Lisa Burgess, the Kimley-Horn project manager (KH PM), on contracting matters, deliverable submittal, and monthly status updates and invoicing. He will coordinate with other MAG staff for deliverable review and will play an important role in project stakeholder outreach and communications. **Sarath Joshua** and **Eric Nava** are key members of the MAG Project Team and will be involved in the regular coordination and communications for this project.

Kimley-Horn will be the primary consultant for the I-10 ICM project, with **Lisa Burgess** as the KH PM. She will coordinate directly with the MAG PM on any contracting matters, deliverable submittal, monthly status updates and invoicing and any other matters relating to the management of the project and its components. She will also be the primary contact for the project sub-consultant.

**Anita Shanker Johari** will serve as the Project Manager for ASJ Engineering Consultants, LLC, who will be the sub-consultant for the I-10 ICM project. She will coordinate with Lisa Burgess on contracting matters, ASJ project-related task activities, deliverable submittals and monthly status updates and invoicing.

### 1.5 Project Stakeholders

MAG will serve as the lead agency for ICM planning. MAG has already established a formal ICM Working Group comprised of champions from each of the involved agencies to be able to collaborate on ICM planning and pursue strategies implementation. These stakeholders comprise the Planning Partners referenced in this PMP and in the SEMP. The Project Planning Partners are listed in **Table 1**.

**Table 1 – Project Planning Partners for the I-10 ICM Project**

Agency	ICM Involvement	Champion(s)
MAG	Infrastructure, Operations and Safety Planning, Modeling	Micah Henry; Sarath Joshua; Eric Nava
ADOT	TOC, ALERT, Public Information Officer (PIO)	Mark Poppe; Brent Cain; Jim Windsor; Reza Karimvand; Farzana Yasmin; Lydia Warnick; Tim Tait
AZDPS	Dispatch, Field Officers for incident response, PIO	Captain Burley Copeland; Sergeant John Paul Cartier
MCDOT	Traffic Management Center (TMC), REACT, PIO	Nicolaas Swart; Faisal Saleem
Valley Metro	Bus, Light Rail	Jay Yenerich; Wulf Grote
City of Phoenix	Transportation, Police, Fire, PIO	Bruce Littleton; Marshall Riegel
City of Tempe	Transportation, Police, Fire, PIO	David Lucas; John Hoang; Christine Warren; Julian Dresang
City of Chandler	Transportation, Police, Fire, PIO	Hong Huo; Mike Mah
Federal Highway Administration (FHWA)	Federal liaison	Toni Whitfield

## 2 PROJECT ORGANIZATION

This section discusses the overall project scope for the I-10 ICM project.

### 2.1 Project Scope

The I-10 ICM project is divided into planning and deployment phases. The planning phase includes the development of the PMP, the SEMP, a Concept of Operations (ConOps), System Requirements and an Analysis, Modeling and Simulation (AMS) Plan. Funding for any later phases (such as deployment) has not been identified at this point. The following list provides a description of the project tasks as part of Phase 1.

#### 1. Development of a Project Management Plan (PMP) (this document)

Responsible Party: Kimley-Horn with review by MAG and Planning Partners

A PMP will be developed and submitted prior to commencing with other project activities. The PMP will include:

- An overall plan and approach for managing the Phase 1 components, activities and deliverables;
- A communications plan with FHWA and project stakeholders;
- Project risks and a risk management plan;
- Schedule and plan for managing the project activities; and
- Stakeholder roles and responsibilities.

#### 2. Development of a Systems Engineering Management Plan (SEMP)

Responsible Party: Kimley-Horn with review by MAG and Planning Partners

The SEMP will have a more technical focus than the PMP and will identify roles and responsibilities as well as the relationships of project activities and key milestones. The SEMP will include:

- Detailed tasks and work breakdown structure;
- Relationship to the Systems Engineering Progress and Regional ITS Architecture and how they will be applied to this project;
- Technical risks;
- Stakeholder coordination and involvement in technical decisions;
- Process for how needs identification, analysis, reviews and other key activities will be conducted; and
- How work products will be managed, controlled and updated.

#### 3. Development of an ICM Concept of Operations (ConOps)

Responsible Party: Kimley-Horn with input and review from MAG and Planning Partners

The ConOps will follow the IEEE Concept of Operations standard format and will include specific operational scenarios for the I-10 study area. The ConOps will identify:

- Networks and modes that comprise the I-10 within the study area;
- Needs and deficiencies within the study area that can be improved by ICM;

- Specific elements of performance requirements;
- Existing conditions and desired future operational activities in the corridor;
- Existing systems, data, and data sharing to support ICM;
- Institutional issues and needs that will require agreements or policies, such as a formal Master IGA between all agencies involved;
- ICM strategies for the study area;
- How decision support will be handled among partner agencies and systems; and
- Performance metrics and measures for the I-10 study area.

Additionally, systems engineering and management will be addressed as part of the ConOps process.

#### **4. Develop ICM System Requirements Specifications (SyRS)**

Responsible Party: Kimley-Horn with input from MAG and Planning Partners

The Requirements document will capture the lexicon and program/system definitions as well as identify the standards in use or planned in developing the I-10 ICM’s subsystem interfaces. Unique requirements will be developed to support ICM operational objectives, system interactions, and coordination (such as traffic incident management). They will be numbered for traceability and phrased as “shall” statements. Other ICM program deployments will be reviewed to identify best practices for organizing and presenting these requirements and additional guidance provided by the FHWA will be leveraged.

#### **5. Develop an ICM Analysis, Modeling and Simulation (AMS) Plan**

Responsible Party: MAG with input from Kimley-Horn and Planning Partners

The AMS plan will served as the mechanism to better understand existing corridor and traffic conditions and will identify analysis scenarios and strategies brought forth from the ConOps. The AMS Plan will:

- Identify analysis needs and requirements to meet ICM objectives and goals;
- Provide an enriched understanding of existing conditions or the corridor and identify deficiencies from an analysis perspective;
- Identify and characterize flaws and unforeseen challenges of ICM strategies that were not realized in the ConOps; and
- Support agencies in setting realistic expectations of partner agencies in terms of level and extent participation, responsibility, involvement from partner agencies and how their roles could evolve based on various ICM strategies.

Future phases of the I-10 ICM could include the design, implementation and testing of an ultimate ICM solution identified in the ConOps.

## **2.2 Scope Management**

Scope management is an ongoing process within the Systems Engineering process. The KH PM has responsibility for monitoring scope compliance as part of weekly reviews and monthly team meetings. This review includes adherence to stated objectives within the scope, alignment of team work products (including interim products) with the scope, and identifications and corrective action for any deviations from the scope.

Scope change management is handled through a formal process of documenting potential scope issues and involves the KH PM communicating (verbally and in writing) with the MAG PM when issues arise that may warrant a change in the project scope. Discussions about changes to the project scope will only occur if there is a significant event or circumstance that affects the ability of the consultant team to produce the deliverables identified in the scope within the allotted budget. Additional change management details are included in Section 5.1.

### **2.3 Roles and Responsibilities**

The following section describes the roles and responsibilities of various project participants and stakeholders as identified in this PMP.

The **MAG PM** has the following responsibilities:

- Coordinate with the KH PM on contracting matters, deliverable submittal and monthly status updates and invoicing;
- Coordinate with MAG Project Team for deliverable review and stakeholder outreach;
- Discuss any potential scope issues or changes with the KH PM;
- Upload all project deliverables to the project-specific website on the MAG ITS Committee website for review by project planning partners;
- Facilitate processing of monthly invoices as provided by the KH PM;
- Track in-kind staff time of MAG staff and Planning Partners using sign-in sheets and tracking of deliverable review; and
- Facilitate the involvement of MAG upper management in the project development by ensuring management is involved in the review of deliverables and by arranging opportunities to present project updates to Regional Council.

The **KH PM** has of the following responsibilities:

- Coordinate with the MAG PM on contracting matters, deliverable submittal, monthly status updates and invoicing and other matters relating to the management of the project;
- Coordinate with the sub-consultant on contracting matters, activities, deliverable submittal and monthly status updates and invoicing;
- Monitor scope compliance as part of weekly reviews and monthly team meetings;
- Provide formal written documentation of potential scope or schedule issues and changes and communicate with the MAG PM;
- If updates to the schedule are approved by the MAG PM, update the project schedule, submit to MAG PM for approval and communicate any changes to the scope or schedule to the project team and Planning Partners;
- Forecast project effort for each month on each task and review task status to ensure tasks are on schedule and that the team is aware of critical path milestones;
- Identify a facilitator and note taker for all project-related meetings and workshops;
- Provide meeting agendas and meeting notes for all project meetings and workshops;
- Provide the MAG PM with all deliverables in electronic format via electronic mail; and
- Submit formal monthly invoices to the MAG PM that include progress reports.

**MAG Project Team** – In addition to the responsibilities of the MAG PM, the MAG Project team has responsibilities as part of project management as well as project development. The MAG project team has the following responsibilities:

- Participate in monthly project check-in interactions;
- Participate in the development and approval of the scope for Phase 1 tasks;
- Track staff in-kind time spent on the project and provide it to MAG PM; and
- Participate in the management of the development of the AMS Plan.

**Kimley-Horn Project Team** – In addition to the responsibilities of the KH PM, the Kimley-Horn Project team has the following responsibilities:

- Participate in the development of all project deliverables including meeting agendas and notes;
- Track staff time to be included in monthly invoice and monthly effort projections; and
- Participate in the tracking and documentation of stakeholder review comments for project deliverables.

**Agency Stakeholders**, identified earlier as planning partners, have the following responsibilities that, if met, will allow this project to be successful:

- Attend project meetings and workshops or provide a suitable replacement from the agency to attend the meeting;
- Provide constructive input from the perspective of the representative agency to make sure that the project reflects the needs and requirements of the agency;
- Review all deliverables that are posted on the MAG ITS Committee website and any documents that are provided for review by electronic email; and
- Provide a confirmation of deliverable review either through the provision of comments or an acknowledgement that the document was reviewed and that there were no comments.

## 3 PROJECT MANAGEMENT APPROACH

### *3.1 Schedule Control and Deliverables Plan*

The work breakdown structure for Phase 1 is provided in **Figures 2a** and **2b** and is based on the scope objectives and key tasks in the project scope of work. The 24-month project schedule is shown in **Figure 3**. The schedule will be refined upon the completion of each task within Phase 1. The KH PM will communicate and make available to the team the work breakdown structure elements, the relationship of those elements to project tasks, and the project team responsibilities for achieving project objectives.

The KH PM will review task status on a monthly basis to ensure tasks are on schedule and that the team is aware of critical path milestones. Team members will review the schedule as part of monthly project status briefings, and schedule status will be provided to the MAG PM as part of the regularly scheduled progress briefings.

Any changes to schedule because of meeting date changes, workshop date changes, scope changes or other impacts will be coordinated with the MAG PM. Any updates to the project schedule will be developed and submitted to the project team.

Submittal of a schedule change request for approval by the MAG PM can be undertaken if the scheduling of a project workshop or meeting is delayed by at least one week due to conflicts in the schedules of the project team or planning partners. If the workshop or meeting can be scheduled within a week of its identified date, then no schedule changes will be necessary.

Once the change request has been reviewed and approved, the KH PM is responsible for adjusting the schedule and communicating all changes and impacts to the project team and all Planning Partners. The KH PM must also ensure that all change requests are archived in the project records repository.

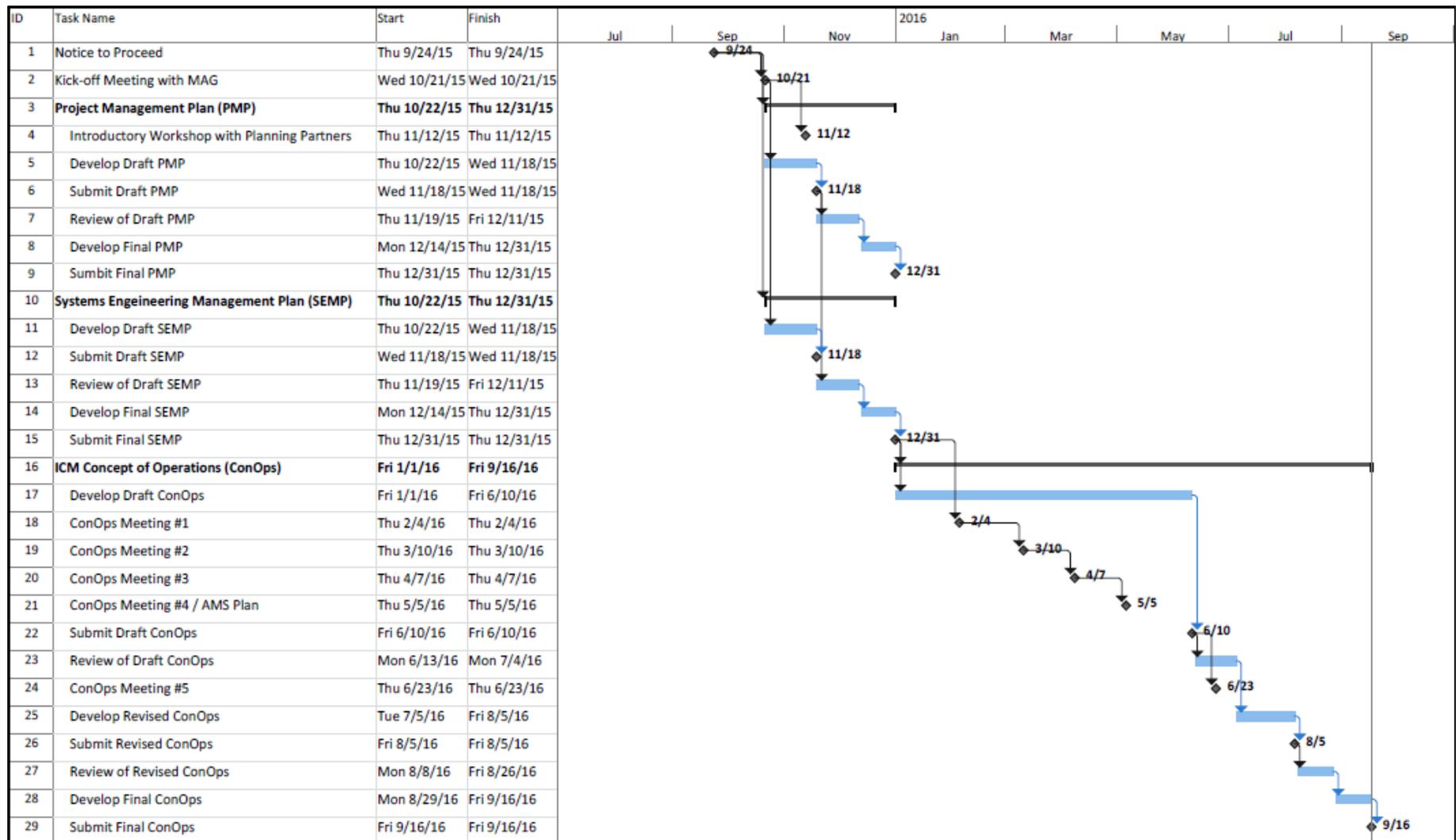


Figure 2a – Phase 1 Project Work Breakdown Structure and Schedule

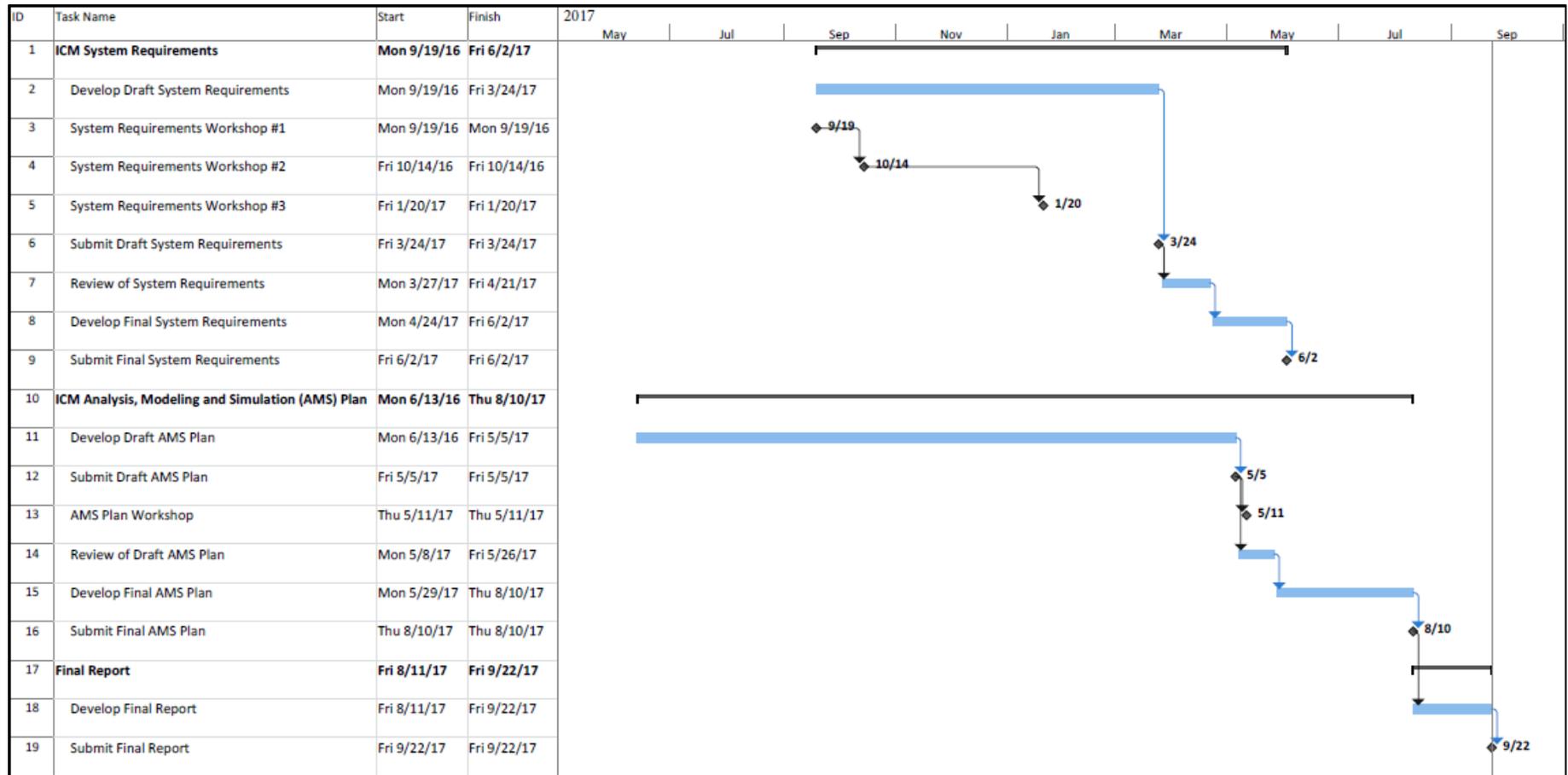


Figure 2b – Phase 1 Project Work Breakdown Structure and Schedule (continued)

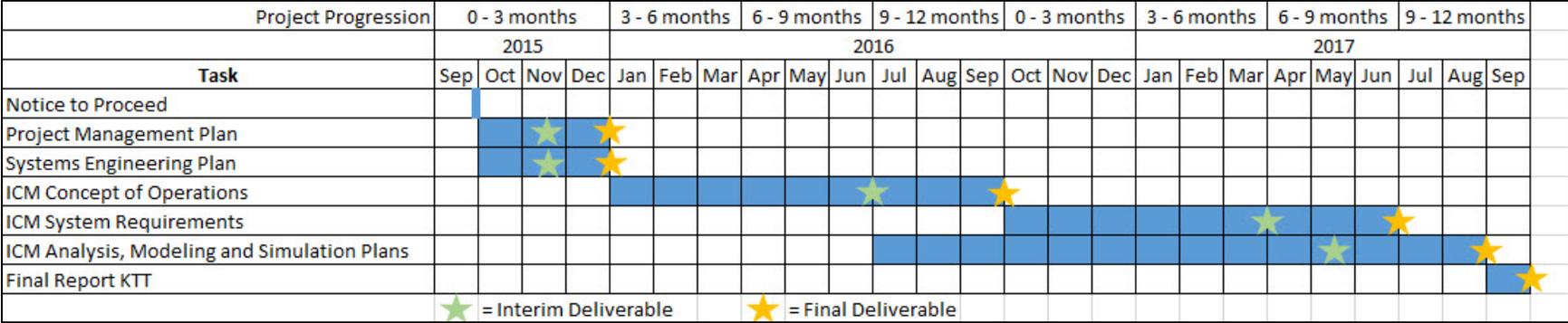


Figure 3 – High-Level Project Schedule

### 3.2 Project Meetings and Workshops

The following section identifies guidelines for conducting meetings and/or workshops associated with the I-10 ICM project.

- **Agendas** will be distributed at all meetings or workshops. When possible, the agenda will be sent to participants prior to the meeting. The agenda will identify the topics that will be covered during the meeting time, where the first item in the agenda will be a review of outcomes of the previous meetings and the project status.
- A **Sign In Sheet** will be available at every meeting to document the participants who attended. This will be important for computation of in-kind staff time as well as having documentation of who was involved in the decisions made in that meeting or workshop.
- **Meeting Notes** will be distributed within one week of the completion of a meeting or workshop. The notes will be structured around the agenda and provide the status of each agenda item as well as any new items that arose during the meeting. The notes will also include a list of decisions made, follow-up items identified, and attendees and their agency affiliation with respect to the project.
- The **Facilitator** is responsible for distributing the agenda, facilitating the meeting or workshop and distributing the notes. The facilitator will be responsible for managing the time during the meeting and making sure that all meetings start and end on time.
- A **Note Taker** is responsible for documenting the discussions and outcomes of the workshop, which will be summarized in the workshop meeting notes. The note taker will be responsible for documenting all decisions made, any follow-up items that arose and high-level summaries of the discussions during the workshop to provide context and justification for the recorded decisions. The Note Taker will provide the meeting notes to the Facilitator in electronic form for review and distribution to project stakeholders.

### 3.3 Project Milestones

Several milestones are built in to this schedule and they align with work breakdown structure elements. **Table 2** shows the deliverables and corresponding date ranges for Phase 1 of the project. Dates may require modification based on timing of review comments, workshop scheduling or other constraints. Any deviations from these dates and the reason for deviation will be communicated to the MAG PM.

**Table 2 – I-10 ICM Phase 1 Key Deliverables**

<b>Milestone Title</b>	<b>Milestone Description</b>	<b>Milestone Date</b>
Project Management Plan	Project Management Plan incorporating Project Manager review comments on draft following the project kick-off meeting.	Draft: Nov. 18, 2015 Final: Dec. 31, 2015
Introductory Stakeholder Workshop	Project kick-off workshop with stakeholders to introduce the project, explain the goals and expectations for the project and stakeholder involvement and get input to be incorporated in the PMP and SEMP.	November 12, 2015
Systems Engineering Management Plan	Systems Engineering Management Plan incorporating Project Manager review comments on draft and input following the project kick-off meeting.	Draft: Nov. 18, 2015 Final: Dec. 31, 2015
Concept of Operations Workshop #1	Project workshop with complete stakeholder group to discuss the I-10 ICM needs and goals and to begin to develop a preliminary solution concept that can address the identified needs.	February 2016
Concept of Operations Workshop #2	Project workshop with I-10 Segment 1 stakeholders to discuss and identify the I-10 ICM solution concept for Segment 1.	March 2016
Concept of Operations Workshop #3	Project workshop with I-10 Segment 2 stakeholders to discuss and identify the I-10 ICM solution concept for Segment 2.	April 2016
Concept of Operations Workshop #4 / AMS Plan	Project workshop with I-10 Segment 3 stakeholders to discuss and identify the I-10 ICM solution concept for Segment 3. Review AMS Plan development process and relationship to the ConOps.	May 2016
Concept of Operations Workshop #5	Project workshop with complete stakeholder group to discuss draft ConOps document and elicit input for final ConOps.	June 2016
Concept of Operations	Concept of Operations document that describes the operational concepts, identifies roles and responsibilities, performance metrics, operational scenarios, and high-level costs. Final documents will be submitted to FHWA and to agency executives for approval.	Draft: June 2016 Final: September 2016
Requirements Workshop #1	Project workshop with complete stakeholder group to discuss operational requirements of the ICM solution.	October 2016
Requirements Workshop #2	Project workshop with stakeholder group to discuss technical requirements of the ICM solution; AMS plan check-in	November 2016
Requirements Workshop #3	Project workshop with stakeholder group to confirm requirements decisions and discuss draft requirements; AMS plan check-in.	February 2017
System Requirements	Systems Requirements document that identifies unique requirements to support ICM operational objectives, system interactions, and coordination in the form of 'shall' statements.	Draft: March 2017 Final: June 2017
AMS Workshop	Workshop with MAG team to discuss draft AMS Plan	May 2017
AMS Plan	Plan that identifies and describes the analysis and modeling needs to better understand the results of the proposed concept and to achieve the ICM solution goals.	Draft: May 2017 Final: August 2017
Final Report	Update, where necessary, and finalize all deliverables from Phase 1 and submittal to FHWA for review.	September 2017

### 3.3.1 Format for Deliverables

Deliverables will be provided to the MAG PM in electronic format. Microsoft Word will be used to prepare outlines, reports (drafts and finals), summaries and related documents. Graphics will be developed and inserted into documents as JPEG files. Presentations will be prepared using Microsoft PowerPoint.

### 3.3.2 Review Process for Deliverables

It will be important to get feedback from each of the Planning Partners for every major deliverable. Feedback on the Concept of Operations draft and final documents are especially important.

Draft and final deliverables will be emailed to the MAG PM to upload to the project-specific page on the MAG ITS Committee website. Draft documents will be clearly marked as such and will be removed from the website when a final document is available. Review periods will be two weeks long for major deliverables, with one week allocated in the project schedule for comment consolidation by Kimley-Horn.

All comments received from stakeholders will be consolidated and tracked, either through a comment resolution table or through track-changes in Microsoft Word. The response or recommended action to each comment will also be documented as part of the tracking process. Any conflicting comments or those that impact other partners will be resolved through further discussions at the next project workshop, at an in-person meeting or via a conference call on the specific issue being raised.

## 3.4 Cost Management and Tracking

**Table 3** provides a cost breakdown of the project by task per the grant application submitted to FHWA.

**Table 3 – Cost Table for the I-10 ICM Project**

Activity	Grant Funds	Responsible Party	Local Match	Sources
PMP development	\$12,000	Kimley-Horn	\$0	Local Sales Tax Funds
SEMP development	\$13,000	Kimley-Horn	\$0	Local Sales Tax Funds
ConOps development	\$100,000	Kimley-Horn	\$0	-
System Requirements development	\$65,000	Kimley-Horn	\$0	-
AMS Plan development	\$0	MAG Staff with Local Agency Review	\$8,400	In-kind staff time
KTT Related Travel by MAG Project Staff	\$10,000	-	\$0	-
Project Meetings and Review	\$0	MAG and Local Agency Staff	\$50,400	In-kind staff time
Subtotals	\$200,000		\$58,800	
Total Project Costs	\$258,800			

Cost control is achieved through three independent processes:

- The KH PM will receive a system-generated Project Effort Report twice monthly that shows the actual level of effort expended by task. This level of tracking will allow a continuous budget control process and the KH PM will communicate any notable items regarding the budget in the monthly project status calls.
- Once per month, the KH PM will coordinate the project invoice for the previous month, which involves a detailed review of effort on each task and its budget and of the overall project budget and schedule to completion.
- Each month, the KH PM will project a forecast of effort on each task for the upcoming months to be able to identify periods where increased project support may be needed as well as to manage the effort in order to meet the project schedule.

These three, independent processes will be used by the KH PM to identify trends, forecast project performance and identify and proactively address challenges to eliminate major project surprises. The KH PM will communicate with the MAG PM any variances or concerns in the overall project budget that warrant discussion during the monthly project status calls.

The MAG PM will be tracking in-kind staff time using day and time identified sign in sheets provided at all project meetings as well as calculating staff time applied to attendance on a monthly basis. Additionally, MAG and local agency staff will track and report their in-kind time spent on the development of the AMS Plan. This time will be reported to the MAG PM for documentation of in-kind staff time in relation to the required local match.

## **4 COMMUNICATIONS MANAGEMENT PLAN**

This section identifies the components of the Communications Plan that includes Project Management communications, internal team communications, and external stakeholder communications. Reference to this Communications Management Plan is also included in the SEMP.

### ***4.1 Project Management Team Communications***

The KH PM will be responsible for communicating with the MAG PM on any contract issues as well as on day-to-day project activities, information requests, updates and briefings. Regular communications will be via telephone as well as electronic mail. The KH PM will also submit formal monthly invoices, which include progress reports, to the MAG PM on behalf of the project team.

Communications with the MAG PM will occur on a monthly basis through formal written communications as well as teleconferences regarding project status or specific deliverables and activities.

### ***4.2 Internal Team Resource Coordination***

In Phase 1 of the project, the project team is anticipated to conduct regular coordination calls to maintain constant and clear communication and coordination on project activities. Communications tools are in place to accommodate team members in multiple offices. The internal communications plan will include monthly check-in calls to review tasks in progress, discuss status of deliverables and reviews, and discuss cost/budget/schedule. These will be conducted via teleconference to accommodate team members in multiple offices. They may also take the form of Skype Meetings or webinars in order to facilitate the visually sharing of graphics or concepts. These calls will be facilitated by the KH PM. Discussions, outcomes and action items, as appropriate, will be distributed to each team member after the call or meeting.

### ***4.3 Planning Partners Oversight***

Project stakeholders will include a variety of agencies with operational or management role in the corridor study area. A core stakeholder team is identified in Table 1 of this document and will be engaged throughout the duration of the project via electronic mail and project workshops. A schedule of project workshops for Phase 1 can be found in Table 2 in Section 3.3 that provides an overview of the major project milestones.

Stakeholders will be periodically asked to provide input on project deliverables. All deliverables for review (draft and final) will be posted on the project-specific page on the MAG ITS Committee Website by the MAG PM. Each stakeholder will have access to this website and can download all documents from there. Written messages via electronic mail will also be sent to all stakeholders providing draft or final deliverables as an attachment to the email (if possible) as well as directing the stakeholder to the MAG ITS Committee website site for downloading deliverables.

Information and data will be distributed to project planning partners via the following methods of communication:

- Project Workshops to provide information about the project activities, gather inputs needed, and allow for discussion amongst stakeholder group;
- Periodic project updates and messages via electronic mail regarding document and deliverable review; and
- Upload of documents on the project-specific page of the MAG ITS Committee website.

#### ***4.4 Communications with FHWA and Other Agencies***

Kimley-Horn will support MAG's coordination the FHWA as part of any required reporting or participation in phone calls, webinars, or other established activities. In addition, Kimley-Horn anticipates reaching out to other agencies who have participated in ICM activities to identify best practices or lessons learned for similar types of projects.

## 5 PROJECT MONITORING AND CONTROL

### 5.1 Change Management

All project changes will be reviewed and tracked so that the direction of the project does not stray from its objectives. Project changes can have a significant impact on the project's scope, budget, and schedule, and thus will be reviewed by the Project Management team for approval prior to implementing.

Changes to the project scope will be handled through a formal process of documenting potential issues and changes and will involve the KH PM communicating (verbal and written) with the MAG PM to discuss potential scope changes. The MAG PM will communicate with the KH PM about any scope changes that are identified through the course of the project. The MAG PM and KH PM will discuss the requested change and any associated schedule, deliverable or effort impacts; the KH PM is then responsible for communicating this request to the team members.

No changes to scope will be made without direction and approval from the MAG PM. If a change to scope is warranted, this change will be reviewed for impacts to schedule, deliverables and effort. The scope change will be documented and provided to the MAG PM along with any updates to schedule or effort.

Any changes to schedule, as a result of meeting date changes, workshop date changes, scope changes or other impacts will be coordinated with the MAG PM. An updated schedule, if needed, will be developed and submitted to the project team.

### 5.2 Issue Resolution Management

Many aspects of the project management approach are focused on proactively identifying issues relative to cost, schedule, and resources. If any issues do arise, they will be identified, discussed and addressed as part of formal and informal communications between the internal team or between the KH PM and the MAG PM, as appropriate. Part of the formal process will be documenting any issues that are identified as well as documenting all steps taken to resolve the issue.

Other issues that may arise are relevant to the input from planning partners. Most project discussions will occur as part of project workshops that will include the attendance of all project planning partners. Any issues or conflicting ideas will be discussed and resolved during these meetings. If issues arise as part of document review, then an in-person meeting or a teleconference may be set up to discuss and resolve any conflicting ideas. An important step that will be taken to minimize issues is to work with planning partners at the beginning of the ConOps development to decide on a set of goals and objectives from which the ConOps will be developed. Identifying a set of agreed-upon goals from which the ConOps will be developed should help prevent many conflicts during the project development.

## 6 PROJECT PROCUREMENT

A project Procurement Management Plan will be developed prior to the commencement of any deployment or implementation activities that might occur as part of subsequent phases of this project. The Procurement Management Plan will identify the items to be procured, the types of contracts to be used in support of the project, the contract approval process, and decision criteria. It will identify individuals who are authorized to approve purchases for the project, and will outline the process for contracting with vendors.

During Phase 1 of the project, the project team and planning partners will stay apprised of all federal grants or other funding opportunities that might arise to support implementation of the ICM solution concept that is developed. The following processes will be followed during project development in order to put MAG in a favorable position to receive federal funding for implementation if it arises:

- Providing periodic updates to the FHWA on project process and concept development to make sure that they align with FHWA priorities and standards; and
- During ConOps development, provide a ‘menu’ of options that show the range of concept options that would be implemented along the study corridor depending on funding availability.

In the absence of federal funding, there are also funding mechanisms that have been used in the recent past to support ICM activities in the region. These funding sources include:

**MAG Transportation Improvement Program (TIP)** – The MAG TIP is a funding program that identifies regionally funded projects for five fiscal years. The MAG TIP involves roadway improvements, ITS infrastructure, landscaping, complete streets, and other capital improvements. The MAG TIP funding comes from various sources (as identified in the Regional Transportation Plan). These include:

- Local funds through the Proposition 400 (extension of the half-cent sales tax for transportation);
- ADOT funds; and
- Federal funds such as Congestion Mitigation Air Quality (CMAQ) funds.

Agencies in the MAG region submit applications for projects from the local capital improvement plans (CIP) for this funding, and projects are reviewed and ranked by the MAG ITS Committee. The MAG Regional Council makes a final recommendation and approval before projects are formally included in the TIP.

**MAG Traffic Signal Optimization Program (TSOP)** – The MAG TSOP is a regional funding opportunity for improving traffic signal operations and coordination over roadway corridors and networks. MAG sets aside approximately \$300K annually from ITS funding for local agencies to undertake signal timing studies, travel time studies, and ICM integration strategies. Individual projects are typically \$25K-\$30K and agencies that apply could feasibly get two projects funded per year. Both stand-alone projects and multi-agency partnerships are encouraged to apply for TSOP funding.

MAG will utilize this funding to support arterial integrated corridor management-focused projects, as these will require changes to signal operations to support better freeway/arterial coordination.

**Local Agency Capital Improvement Program (CIP)** – Every agency has a process for providing local funding for capital improvement projects each year. Many agencies have an established 5-year CIP that identifies the capital projects that will be included in the annual budget for a specific fiscal year;

transportation is one of several categories for which projects can be submitted. Projects found in the CIP can be submitted for inclusion within the MAG TIP and can include projects such as street improvements, traffic signal construction or other safety improvements. CIPs can assist in the implementation of projects that are not funded by the MAG TIP or that are more appropriately funded by local funds.

**MAG Unified Work Program** – Each year, the MAG Unified Planning Work Program is developed in conjunction with member agencies and includes non-capital projects for the upcoming year. The Work Program is reviewed each year by the federal agencies in the spring and approved by the Regional Council in May. Any projects included in the Work Program are included in the annual budget for that year.

**Interagency Cooperative Contract Language** – Some agencies have open-ended contract language that allows other agencies to use their on-call contracts with pre-qualified vendors and consultants for services in their jurisdiction. This may help agencies expedite deployment of projects, and it can help streamline contracting going for a specific piece of equipment or professional service.

## 7 PROJECT QUALITY MANAGEMENT

### 7.1 Quality Control/Quality Assurance Plan

Quality Control (QC) involves monitoring both the process and products to determine if the project is meeting quality standards and identifying ways to mitigate risk or eliminate unsatisfactory outcomes. Quality Assurance (QA) involves review an evaluation of the overall project performance to make sure the project is satisfying quality standards.

The objective of the QC/QA Plan is to establish controls and reviews of major project deliverables, including interim reviews and reviews of full drafts, prior to submitting to the MAG PM for review. As part of this quality management plan, a senior advisor will participate as part of internal concept development discussions to share technical and industry knowledge with the team. The senior advisor will not be directly involved in developing deliverables, but rather will be utilized to leverage their technical, industry and institutional knowledge during the development process. The project schedule includes time within the development of deliverables for internal quality reviews prior to submitting documents to the MAG PM.

In addition to the senior advisor, the quality management plan includes reviews by technical editors who will provide quality control reviews of deliverables prior to submitting to the MAG PM. All documents will be reviewed against technical requirements and will include editorial reviews for grammar, writing style, and content. The KH PM will review all edits and suggested modifications prior to commencing with finalizing draft and final documents for submittal.

### 7.2 Quality Controls

In addition to the mechanisms identified in the QC/QA Plan, a set of quality controls will be identified as part of the project schedule to ensure that quality checks are completed prior to the submittal of project deliverables. The project schedule has been developed to include internal review time prior to submitting a deliverable to the MAG PM, and it includes review time from both the MAG project team and the planning partners that will be involved throughout the project. These review periods will generally be two weeks long as to provide all stakeholders adequate time to review and comment on the deliverable. All review comments will be compiled and tracked for inclusion in the deliverable through track changes in Microsoft Word and/or a comment disposition spreadsheet, as necessary. No deliverable will be finalized prior to the review and comment resolution periods.

### 7.3 Project Performance Metrics

Quality of Phase 1 of the project development process will be monitored against the performance objectives and targets shown in **Table 4**.

**Table 4 – Performance Objectives and Targets for Project Development**

Objective	Target
-----------	--------

The project is completed on time and on schedule.	100% of deliverables are submitted on time according to the most up-to-date project schedule at that time. The project is completed by the end of the 24-month period as identified in the PMP.
The project is completed within budget.	The cost of the project at the end of Phase 1 does not exceed the budget provided by the federal grant that was awarded.
The project engages all of the stakeholders that were identified as planning partners in the PMP.	75% of identified stakeholders attend each meeting or workshop. There is representation from each partner agency at every meeting.
The project incorporates the views and inputs of planning partners.	75% of agency stakeholders provide input into each deliverable. There is input from each partner agency for every deliverable.
Agency views are well-represented.	There are at least 2 reviewers per agency reviewing all deliverables throughout the project.
All deliverable reviews are completed in a timely manner.	100% of planning partners provide review of deliverables during the review time that is designated in the project schedule.

## 8 RISK IDENTIFICATION AND MITIGATION

The I-10 ICM project has components that make risk management an important part of the overall project management. Monitoring and addressing risks on this project will include the following steps:

- **Risk Identification** – identify the sources of risk, potential risk events, and symptoms of risk.
- **Risk Analysis** – assess the tradeoffs between opportunities and their associated risks to understand the opportunities to pursue and those to avoid.
- **Mitigation Strategy** – develop mitigation strategies to proactively limit or address known risks.
- **Risk Monitoring and Control** – mitigation strategies or corrective action plans are developed, implemented and monitored.

The following risks have already been identified that are related to the project process and project management and strategies to manage and mitigate the risk are shown in **Table 5**. Technical risks are addressed in the SEMP. Risks, status and mitigation strategies will be documented and discussed in the monthly progress meetings between the KH PM and the MAG PM.

**Table 5 – Preliminary Identified Risks and Mitigation Strategies**

Risk	Mitigation Strategies
<p>If the right stakeholders from each partner agency are not properly engaged and involved, the project risks missing key input that could influence design and operations of the proposed solutions(s).</p>	<ul style="list-style-type: none"> <li>• Focused outreach to all stakeholders and discussion about additional agency stakeholders that should be involved (outside of operations).</li> <li>• Active communication with stakeholders to keep them involved and engaged.</li> <li>• Multiple opportunities to provide input, feedback and review of critical deliverables.</li> <li>• In-person meetings in a central location to establish face-to-face communications on the project.</li> </ul>
<p>There is a risk of conflicting priorities among the I-10 partner agencies in terms of how they might want to see ICM function for their particular network and operating environment.</p>	<ul style="list-style-type: none"> <li>• The team will build in processes to capture all feedback, and identify conflicting priorities early in the assessment and objectives.</li> <li>• The ConOps development will be broken down by segment to highlight unique characteristics and opportunities of each identified segment.</li> <li>• Resolution will be achieved through proactive communications through workshops and teleconference.</li> <li>• The team will work with MAG to develop a strategy to address a situation where conflicting priorities cannot be resolved.</li> </ul>

Risk	Mitigation Strategies
<p>There is uncertainty regarding the ability of the region to obtaining funding to implement recommendations developed in Phase 1 of this project.</p>	<ul style="list-style-type: none"> <li>• Identify local, regional and federal funding sources for various aspects of the project and stay apprised of the application and funding schedules of each.</li> <li>• Identify a 'menu' of concept options that provide a range of strategies or strategy phasing, some of which can be implemented using local funding sources and others that require a larger funding source.</li> <li>• Identify low cost opportunities to use or expand the existing infrastructure (e.g., small software enhancements, additional modules to existing system).</li> </ul>
<p>There is a risk that regional priorities will change after the completion of the project.</p>	<ul style="list-style-type: none"> <li>• Involve stakeholders frequently and throughout the project development.</li> <li>• Update project-related documents and concepts as necessary throughout the project lifecycle.</li> <li>• Stay apprised of new or emerging priorities, processes and technologies that could affect or alter regional priorities.</li> </ul>
<p>There is a risk of failing to obtain approval and buy-in on a final concept from the executive/management level.</p>	<ul style="list-style-type: none"> <li>• Encourage stakeholders to involve all necessary staff to make sure each agency's views are well represented.</li> <li>• Provide periodic presentations to agency management and regional council throughout project development.</li> <li>• Make sure there is a clear understanding by each agency of the commitments needed for each concept and the types of resources that will be required.</li> <li>• Signed commitments from agency executives at the completion of the ConOps development.</li> <li>• The AMS task will model strategies identified in the ConOps. Outcomes will help determine potential safety and mobility benefits.</li> </ul>
<p>There is a risk that the parallel arterial networks along the corridor will not have adequate technology, infrastructure or operational resources (staffing) to support the ICM concept.</p>	<ul style="list-style-type: none"> <li>• Anticipate local arterial needs and apply for funding in advance of project completion.</li> <li>• Develop interim solutions for the arterials that can be implemented to support the system until permanent solutions can be implemented.</li> <li>• Understand arterial limitations during the project development and make sure all project concept outputs are feasible.</li> <li>• Identify non-infrastructure strategies (such as arterial traffic incident management) that will help improve arterial mobility and safety.</li> </ul>

Risk	Mitigation Strategies
<p>The construction of the South Mountain Freeway and I-10 near-term improvements and the uncertainty of the implications from these projects on the I-10 operational environment creates risks associated with being unable to anticipate the different near term and future conditions on the I-10.</p>	<ul style="list-style-type: none"> <li>• Early in project development, consider short-term impacts of construction and long-term impacts of traffic patterns wherever possible during concept development.</li> <li>• Use AMS Plan to test ICM concepts with short-term and long-term outcomes from the South Mountain Freeway and other near-term projects and enhancements.</li> </ul>
<p>Constraints of various funding and procurement processes.</p>	<ul style="list-style-type: none"> <li>• Developing ConOps based on Segments rather than a one-size-fits-all.</li> <li>• Be very specific about the elements needed to be procured and what funds are associated with specific elements.</li> </ul>
<p>Uncertainty regarding the ultimate ownership of the solution and any additional processes, such as procurement processes, that might be necessary based on the ultimate owner.</p>	<ul style="list-style-type: none"> <li>• Use the ConOps process as a space to explore various hosting options and understand the opportunities and limitations of each option.</li> <li>• Involve the correct stakeholders from each during the ConOps and Requirements development.</li> <li>• ICM requires ongoing focus for stakeholder engagement, including new stakeholders that might transition into an ICM role.</li> </ul>

## 9 PROJECT CLOSING

Project closing is as important as other processes in the PMP because it signifies that the project is complete and that the findings are accepted. The process for closing the project will include the following steps:

- All final deliverables will be transmitted, and there will be documentation that every final deliverable was accepted and considered satisfactory by the MAG PM;
- The PM will review the project scope and make sure that all scope items are complete. If an item has not been completed or was changed during the project, documentation should be available;
- After delivering the deliverables and receiving formal sign-off, any resources or data that was collected also will be delivered to MAG or to Planning Partners at the request of MAG. All project documentation and deliverables will be handled by MAG per agency policies on document retention and archiving;
- Only after final invoices have been received will all contracts related to the project will be closed in the Kimley-Horn System;
- The project files will be archived into the Kimley-Horn system seven (7) years after the completion of the project, per Kimley-Horn file retention guidelines; and
- Any lessons learned during the project will be informally documented and provided to the MAG PM.