SYSTEMS ENGINEERING

MANAGEMENT PLAN FOR THE

Multi-Modal Intelligent Traffic Signal System
Deployment Readiness Enhancements
(Phase III)
Version 2.0

June 2019

University of Arizona (Lead)
University of California, California Partners for Advanced Transportation
Technology (PATH) Program

PREFACE

This Systems Engineering Management Plan (SEMP) is intended to supplement the details of the Project Management Plan (PMP) and focuses on the technical plan of the project and the systems engineering processes to be used for the Pool Fund: Multi-Modal Intelligent Traffic Signal System (MMITSS) Deployment Readiness project.

The plan has been tailored from the United States (US) Department of Transportation (DOT), Federal Highway Administration (FHWA) – California Division Systems Engineering Guidebook for Intelligent Transportation Systems, November 2009. This document has been modified to meet the needs and expectations of the MMITSS Deployment Readiness project

The MMITSS Principal Investigator (Professor Larry Head) assumes responsibility for this document and updates it as required to meet the needs of the Sponsor. Updates to this document are performed in accordance with the MMITSS Configuration Management Process.

RECORD OF CHANGES

*A - ADDED M - MODIFIED D – DELETED

VERSION NUMBER	DATE	NUMBER OF FIGURE, TABLE OR PARAGRAPH	TITLE OR BRIEF DESCRIPTION	CHANGE REQUEST NUMBER
1.0	6/2018	-	Draft	-
2.0	6/2019		Integration of changes based on review comments	

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SECTION 1.0 PURPOSE OF DOCUMENT

This Systems Engineering Management Plan (SEMP) is an extension of the Project Management Plan. The SEMP focuses on the technical tasks and is a repository for project technical plans. The SEMP identifies what items are to be developed, delivered, integrated, installed, verified, and supported. It identifies when these tasks will be done, who will do them, and how the products will be accepted and managed. Finally, it defines the technical processes to be used to produce each of the project's products.

SECTION 2.0 SCOPE OF PROJECT

2.1 Project Summary

The proposal for this project was developed in response to the request for proposal (RFP) from the Connected Vehicle Pooled Fund Study (CV PFS) to improve deployment of the MMITSS prototypes to address needs identified by the Pooled Fund Members, stakeholders, and the MMITSS developers (University of Arizona and California PATH program).

In order to make the MMITSS bundle and associated applications readily deployable, the goals of this project are to enhance the existing MMITSS prototypes that were developed and field tested in Anthem, Arizona (AZ), and Palo Alto, California (CA) and to make the MMITSS software code widely deployable with as little code customization as possible.

 The objectives of this project are:

- To prioritize the enhancement components based on the USDOT's preliminary research plan, high-level gap analysis document, and feedback from past stakeholder engagement activities.
- To enhance the existing MMITSS prototypes to expedite the deployment, which includes, but not limited to, control interface, message standard version, security, control logic and generic application algorithm.
- To work, coordinate and collaborate with other deployers (including CV Pilots and Smart Cities) / standard groups / Crash Avoidance Metrics Partnership (CAMP) / Original Equipment Manufacturers (OEM) to build on existing research and avoid duplication where possible.
- To conduct field testing/demonstration of the enhanced components of the Multi-Modal Intelligent Traffic Signal System (MMITSS).

Improvements in Phase III include creating a more robust and maintainable application code that is hardware agnostic and interoperable or transferable regardless of the hardware vendors or products.

2.2 Program Organization and Stakeholders

The structure of the organizations that create and maintain this project are the Connected Vehicle Pooled Fund Study (CV PFS) Pooled Fund Members, the MMITSS developers (University of Arizona and California PATH program) and other stakeholders including a newly formed working group called the MMITSS Development Group (MDG).

Table 1 Program Roles and Responsibilities

POSITION	ROLES/RESPONSIBILITIES
CV PFS (Virginia Lingham, VDOT)	Project Manager for the Connected Vehicle Pooled Fund Study
CV PFS PI (Brian Smith, UVA)	Principal Investigator for the Connected Vehicle Pooled Fund Study which is the overall project tasked to develop infrastructure based connected vehicle applications
CTS PFS Project Manager (Hyungjun Park, UVA)	Responsible for Project Management and Oversight
CV PFS Project Panel - Champion: Greg Larson (Caltrans), Faisal Saleem (Maricopa County DOT), Gene McHale (FHWA) - Members: Blaine Leonard (Utah), Chuck Felice (Utah), Virginia Lingham (Virginia), Jianming Ma (Texas), Raj Ponnaluri (Florida), Hua Xiang (Maryland), Govind Vadakpat (FHWA), Debora Curtis (FHWA), Vanloan Nguyen (Virginia), Michael Clements (Virginia), Ahmad Jawad (Oakland County), Reza Karimvand (Arizona); - References: Ray Derr (TRB)	Provides direction, review, and input to the Project Manager and Project team
Project Team PI: Larry Head, UA Co-PI: Kun Zhou, PATH	Responsible for the management and technical leadership of the project.
Project Team	Team members are responsible for contribution to technical execution of the project plan. PI for each Team organization is responsible for the team members at that organization. UA: Sherilyn Keaton, Senior Software Engineer Niraj Altekar, Graduate Research Assistant Debashis Das, Graduate Research Assistant Jane Gatzemeier, Undergraduate Research Assistant Drake Sitaraman, Undergraduate Research Assistant PATH: John Spring, R&D Engineering 4 Huadong Meng, Research Engineer David Nelson, , R&D Engineering 4

The MDG includes key development members from each of the projects shown in the bulleted list above, along with identified individuals that are actively using one of the MMITSS prototypes from the FHWA Open Source Application Development Portal (OSADP) where each prototype deployment has been submitted. Each of these organizations will be able to assign a designated individual to the MDG who can provide technical input on development planning decisions and priority establishment. The Pooled Fund

Panel members will have "final voting" rights on these decisions.

The MMITSS Phase I and Phase II projects resulted in the development of two (2) prototype software systems referred to as MMITSS-AZ and MMITSS-CA. These prototypes have been submitted to the FHWA OSADP and there are several teams using the source code to develop systems for projects. These projects include:

- Tampa Hillsborough Expressway Authority (THEA) Connected Vehicle Pilot Deployment (MMITSS-AZ),
- Utah DOT Connected Vehicle Deployment (MMITSS-AZ),
- San Diego Port Tenants Association (via Peloton) (MMITSS-AZ),
- Columbus Smart City (via Peloton) (MMITSS-AZ),
- Vehicle-to-Infrastructure (V2I)---Hub Integration Project (MMITSS-AZ, Battelle, UA),
- Santa Clara Valley Transportation Authority (VTA), San Mateo County Transit Authority (SamTrans) and Metropolitan Transportation Commission (MTC) for CV-based Transit Signal Priority along El Camino Real (MMITSS-CA),
- Los Angeles (LA) DOT (MMITSS-CA), and
- Potential MMITSS implementation with other interested agencies.

SECTION 3.0 TECHNICAL PLANNING AND CONTROL

This section lays out the plan for the systems engineering activities and is written in close synchronization with the Project Management Plan (PMP) for Phase III. Although duplication between the PMP and SEMP has been minimized, further expansion of the systems engineering effort in this document will rely on similar high level descriptions that may appear in both documents.

3.1   Open Source Project

This project includes software development and documentation creation and updates. This project is also intended to produce Open Source Software. All software will be delivered to the FHWA Open Source Application Development Portal (OSADP) to support further development outside of this systems engineering process.

In order to maintain an environment conducive to ongoing open source development, an open source repository will be used (e.g., GitHub, GitLab, and / or Bitbucket). Software and document change requests will be handled via issue trackers built in to the repository platform. That means that all change tracking will be open for view and maintained at the repository level. Consideration of the tools to be used in this project included review of the tools being used in the USDOT Open Data Environment (ODE) project. Table 1 shows the open source tools proposed for the USDOT ODE and for the MMITSS Deployment Readiness project. Any of these tools may be replaced by another tool if necessary.

All of the documentation (e.g. Concept of Operations, System Requirements, High Level Design, and Detailed Design) from the MMITSS Phase I and Phase II efforts will be included in the open source repository as well as all new documentation from this phase III effort. These will be available to future developers through the repository.

Table 2 Open Source Development Tools

Tool	USDOT ODE *	MMITSS
Version Control System	GitHub Open Source Repository	GitHub Open Source Repository

Agile Process Management	Jira by Atlassian (Agile Process assumed)	GitHub Issues (Agile not built in, but can be used in an Agile Process environment)
Project Wiki Page	Confluence by Atlassian	GitHub Wikis
Continuous Integration and Delivery	Travis	TBD (Travis is the current choice when we get to this capability)
Static Code Analysis	SonarQube / SonarCloud	TBD

SECTION 4.0 SYSTEMS ENGINEERING PROCESS

This is the third phase of the MMITSS project and the Systems Engineering "V" Process has been followed for each phase. Figure 1 shows the documents (from the timeline of documents marked in the orange rectangle) that are relevant for this SEMP document. The following documents already exist for MMITSS:

- Concept of Operations
- System Requirements
- High Level Design
- Detailed Design

These documents will not be updated for this phase, however the changes made to the system are reflected in the MMITSS Development Plan, MMITSS Project Management Plan (PMP), and in this SEMP. These documents will serve as a reference and as the basis for new documentation developed during the software design and development process.

This systems engineering process will be used to construct, test, validate, and accept the MMITSS Deployment Readiness project components. All software delivered to the OSADP is available to external developers and any future development, by necessity, falls outside of this systems engineering process.
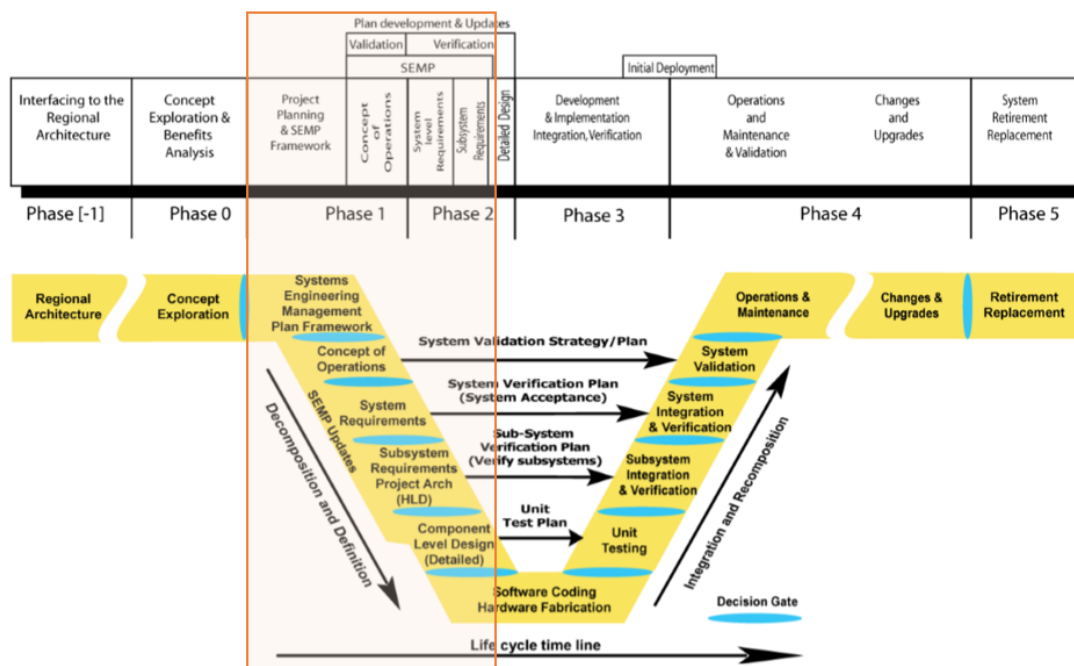
Figure 1 Systems Engineering Management Planning on the Systems Engineering Life Cycle Line

4.1 Work Breakdown Structure

The deliverables created in this project are intended to investigate the enhancement of existing MMITSS prototypes to make the system readily deployable. The deliverables are summarized in Table 3 Project Deliverables By Task below with a project start date of February 1, 2018 as denoted in the Project Plan shown in **Error! Reference source not found.Error! Reference source not found.**. The Tasks in this table are referred to throughout this document.

Table 3 Project Deliverables By Task

Task Name and Deliverable	Project Relative Date
Task 1 – Project Management and Systems Engineering Management	
Briefing Materials, Kick-Off Meeting	March 2018
Draft PMP	February 2018
Draft SEMP	February 2018
Draft Project Schedule	February 2018
Final PMP	June 2019
Final SEMP	June 2019
Final Project Schedule	June 2019
Monthly Progress Reports	Monthly
Briefing Materials, Closeout Meeting (Assume this reporting will occur at the December 2019 CV Pooled Fund Meeting)	December 2019
Task 2 – Cross Cutting Activities	
Monthly reports of the cross-cutting activities	Monthly
MMITSS Development Group Meeting	May 2018
Draft Deployment Readiness Development Plan and Briefing	June 2018

Final Deployment Readiness Development Plan	May 2019
Task 3 - Enhancement of Existing MMITSS Prototypes	
Code to GitHub MMITSS-Public Repository (previously Code to the OSADP)	Quarterly (as available)
Task 4 – Field Test and Demonstration	
Draft Deployment and Field Test Plan	August 2019
Final Deployment and Field Test Plan	September 2019
Field Demonstration	December 2019
Data and Test Results to the RDE	December 2019
Draft Task 4 Report	November 2019
Final Task 4 Report	December 2019
Task 5 – Technical Assistance to Deploy MMITSS	
Select MMITSS Technical Support Recipient (new MMITSS deployment site)	August 2019
Draft MMITSS Deployment Guidance document	October 2019
Final MMITSS Deployment Guidance document	November 2019
MMITSS Results and Guidance meeting/webinar	December 2019
Draft MMITSS Deployment Lessons Learned report	November 2019
Final MMITSS Deployment Lessons Learned report	December 2019

4.2 Work Description

The following work description provides an overview of each activity in the Work Breakdown Structure above.

Table 4 Work Description By Task

Task Name and Deliverable	Task Description
Task 1 – Project Management and Systems Engineering Management	
Briefing Materials, Kick-Off Meeting	Project Manager, Pooled Fund Study Group, PIs conducted via remote conferencing service. The purpose of the meeting will be to review the approach to the project including work activities.
Project Management Plan	MMITSS PI and Project Management Team will create the Project Management approach for the project in that both development teams (MMITSS--AZ and MMITSS--CA) will support.
Systems Engineering Management Plan	MMITSS PI and Project Management Team will create the SEMP that describes an overall system engineering management approach for the project in which both development teams (MMITSS--AZ and MMITSS--CA) will support.
Project Schedule	MMITSS PI and Project Management Team will create a detailed project schedule will be prepared that lists tasks, meetings, deliverables, and major milestones. The project schedule will be submitted electronically in Microsoft Project Plan (.MPP) format (MS Project 2010 or higher).

Monthly Progress Reports	Monthly progress conference calls will be held throughout the project.
Team Meetings Summaries	Meeting minutes, including action items will be submitted in PDF format within one week after the meeting.
Briefing Materials, Closeout Meeting	Larry Head (PI) will attend a project closeout meeting to be held during the last week of the project. During this meeting, they will present a summary of the work performed under each task, an overview and status of each deliverable, and total funds expended.
Task 2 – Cross Cutting Activities	
Quarterly reports of the cross cutting activities	MMITSS Project Management Team via the Monthly Progress Report.
Meeting Minutes	Contained in the Meeting Minutes from the Monthly Progress Report.
Task 3 - Enhancement of Existing MMITSS Prototypes	
Draft Deployment Readiness Development Plan and Briefing	MMITSS Team creates a Development Plan detailing the enhancements to be made to the software. The MMITSS Development Plan includes stakeholder input that reflect the needs to make the MMITSS prototypes more deployable. The stakeholders will include Pooled Fund Panel Members as well as connected vehicle device manufacturers, traffic controller/system manufacturers, consultants and system integrators as well as FHWA team members and researchers. The input received will guide the enhancement of the concept of operations, systems requirements, and system design.
Final Deployment Readiness Development Plan	MMITSS Team updates the plan based on comment.
Code to the OSADP	MMITSS Team delivers the final code to the OSADP repository.
Task 4 – Field Test and Demonstration	
Draft Deployment and Field Test Plan	MMITSS Team will develop a plan covering the test objectives, detailed test procedures, collected data, performance measures, and reporting outlines.
Final Deployment and Field Test Plan	MMITSS Team updates the Test Plan based on comment.
Field Demonstration	MMITSS Team demonstrates the MMITSS application in the Anthem, AZ, and Palo Alto, CA testbeds and document the results into a final assessment report.
Task 5 – Technical Assistance to Deploy MMITSS	
Draft MMITSS Deployment Lessons Learned report	MMITSS Team will produce a document capturing the key lessons learned, including perspectives of participating stakeholders.
Final MMITSS Deployment Lessons Learned report	MMITSS Team will update and submit the document based on review comments.

4.3 Schedule

The Master project schedule is shown in Figure 2 below. Because of the size of the schedule, the Task 3, 4,

and 5 details are shown in separate figures below. The schedule is used to guide the team to so that the updates and enhancements are completed in time to conduct the 90-day field test (Task 4). The duration and sequence (precedence) was estimated based on logic development planning, but could be flexible due to implementation details and challenges.
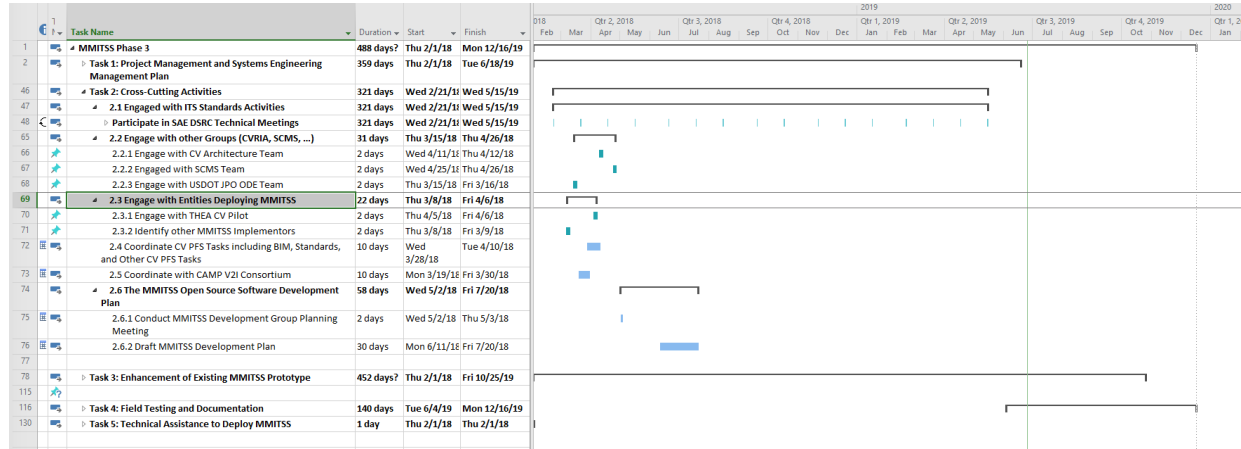

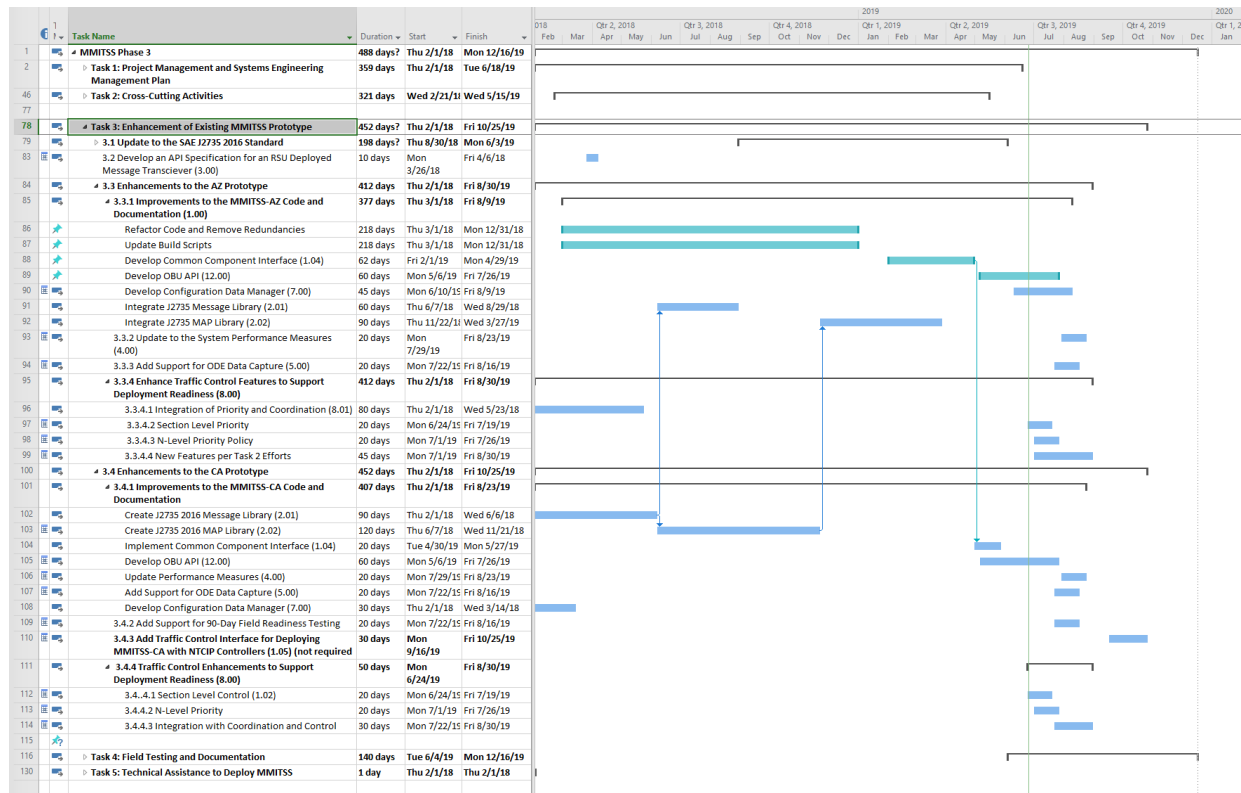**Figure 2. Gantt Chart of Multi-Modal Intelligent Traffic Signal System Phase III.**

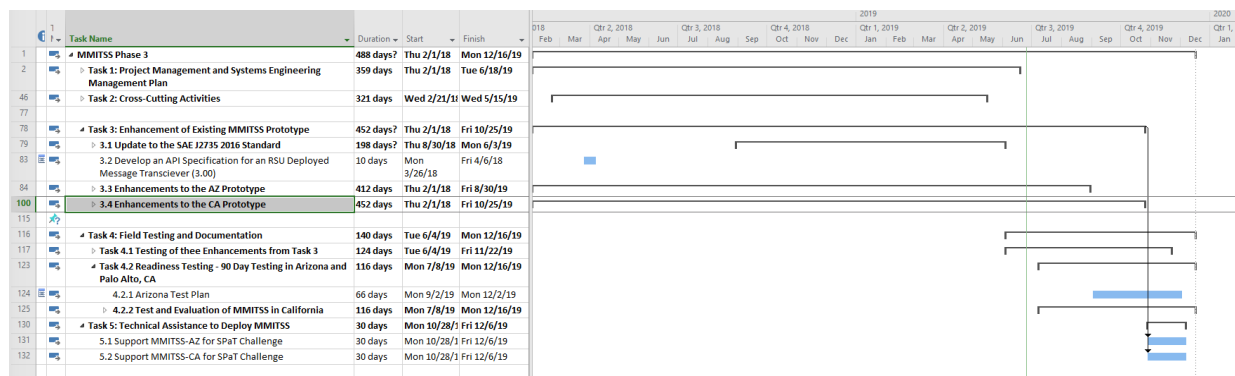**Figure 3. Gannt Chart of MMITSS - Task 3**

Figure 4. Gantt Chart Tasks 4 and 5.

4.4   Configuration Management

It is intended that each document and each element of non-proprietary, deliverable software is to be maintained under an electronic configuration management system that includes issue tracking as part of the Open Source Software Environment.

As stated previously, software and document change requests will be handled via issue trackers built in to the repository platform. That means that all change tracking will be open for view and maintained at the repository level.

Although relevant software and documents from this project are to be delivered to the OSADP environment, that environment is not considered a change management system for the purpose of collaborative, ongoing maintenance and development.

The evaluated metrics under configuration management include the proper work product identification, change control, records management, and change reports. Identification of work products is achieved through the establishment, adoption, and use of naming conventions.

Table 5 Phase III Work Product Identification

Item	Filename
Project Plan	Source: MMITSS_ProjectPlan_PhaseIII.mpp Distribution: MMITSS_ProjectPlan_PhaseIII.pdf
Monthly Briefings	Source: Phase3.*MonthYear*Update.pptx Distribution: Phase3.*MonthYear*Update.pdf
Monthly Briefings Meeting Minutes	Source: MMITSS_*MonthYear*MonthlyMeetingMinutes.docx Distribution: MMITSS_*MonthYear*MonthlyMeetingMinutes.pdf
MMITSS Development Plan	Source: MMITSS3_DevelopmentPlan.docx Distribution: MMITSS3_DevelopmentPlan.pdf
MMITSS Development Group Monthly Meetings	Source: MMITSS.DevGroup.MM.DD.YYYY.pptx Distribution: MMITSS.DevGroup.MM.DD.YYYY.pdf
MMITSS Source Code	Source: MMITSS GIT Repository Distribution: via OSADP
System Integration and Laboratory Testing Notebook	Source: MMITSS3 MMITSS3_DevelopmentPlan _SILT.docx

	Distribution: MMITSS3_STP.pdf, MMITSS3 MMITSS3_DevelopmentPlan _STPMatrix.pdf
Limited Simulation Experiment Report	Source: MMITSS3_SimExpReport.docx
	Distribution: MMITSS3_SimExpReport.pdf
AZ Field Test Procedures	Source: MMITSS3_AZFieldTestProcedure.docx
	Distribution: MMITSS3_AZFieldTestProcedure.pdf
CA Field Test Procedures	Source: MMITSS3_CAFieldTestProcedure.docx
	Distribution: MMITSS3_CAFieldTestProcedure.pdf
AZ MMITSS System Performance Document	Source: MMITSS3_AZPerformance.docx
	Distribution: MMITSS3_ AZPerformance.pdf
CA Test Results	Source: MMITSS3_CATestResults.docx
	Distribution: MMITSS3_CATestResults.pdf
CA MMITSS System Performance Document	Source: MMITSS3_CAPerformance.docx
	Distribution: MMITSS3_CAPerformance.pdf
Final Documentation	Source: MMITSS3_FinalReport.docx
	Distribution: MMITSS3_FinalReport.pdf

SECTION 5.0 TRANSITIONING CRITICAL TECHNOLOGIES

Risks come in many forms. They usually involve products that have not been built before. These might include novel hardware applications [e.g., new vehicle detector technology], novel software algorithms [e.g., a new approach to adaptive signal control], or challenging performance requirements [e.g., response times, and bandwidth]. Each must be identified as a risk. The technical tasks necessary to address that risk must be included in the SEMP.

The technologies used in the MMITSS Deployment Readiness Enhancements project are one generation newer than the technologies used in the MMITSS Phase II Field Test and Demonstration in the Anthem, AZ and Palo Alto, CA testbeds. The newer generation hardware includes the Roadside Units (RSU), Onboard Units (OBU), and MMITSS Roadside Processors (MRP). Both the AZ and CA testbeds are using RSUs manufactured by Savari. These units were developed based on the FHWA RSU 4.1 specification. However, preliminary testing has revealed some issues (risks) associated with the RSU 4.1 interface (Appendix C) that will require special consideration. Also, during the procurement process, two hardware/firmware issues were discovered that required Savari to provide rework. Savari continues to support the devices.

The OBUs are also of a new generation, but since there is no specification similar to the RSU 4.1 specification, there is no defined interface to the OBUs. The MMITSS Team is using some Savari OBU devices, but is also considering using devices from other manufacturers. Each device will require a custom interface built using a vendor supplied Integrated Development Environment (IDE). The team has the Savari IDE and won't use other vendor's OBUs if they don't provide the IDE. The differences will be addressed in the OBU Interface design effort.

The MRPs to be used in CA are the same as in Phase II, so it is known that they will meet the project needs.

AZ will use the Econolite Connected Vehicle CoProcessor (CVCP) board for the MRP. This board was developed to be field hardened so that it can survive the hot temperatures in Maricopa County. The board uses a standard Linux operating system and openly available took chain. The AZ team has already tested and demonstrated the use of the board.

The strategy to manage project risk is to continually monitor and track potential project risk. Table 6. Risk Management Spreadsheet, is the risk tracking matrix that will be used in risk management. Each risk will be assigned an ID and a Risk Owner. A summary of the risk will be included (Risk Statement) and the potential impact to the project (Impact Statement) will be provided to allow reviewers to understand the risk. If the risk is directly associated with a project task, a reference to the Work Breakdown Schedule (WBS) shall be included. The Likelihood and Severity will be estimated (High (0.9 - Red), Medium (0.5 - Yellow), or Low (0.1-Greeen)) and a Risk Score = Likelihood * Severity will be used to assess the criticality of the risk.

Risks can be identified by any member of the project team, the UVA project management team, and the MMITSS Project panel members. Risks shall be reviewed in the weekly team project teleconferences and included in the monthly progress meetings. Any risk that as a high Risk Score (Greater than 0.5) shall be reported to the CV Pooled Fund Project Manager immediately. Risks shall be tracked and managed until they the management team is satisfied that they have be adequately mitigated. When a risk has been addressed, it shall remain in the risk table, but labeled "Closed" in the Risk Score column (Blue).

Table 6. Risk Management Spreadsheet

								Risk Response
ID	WBS Element	Risk Statement	Impact Statement	Risk Owner	Risk Likelihood	Risk Severity	Risk Score	Mitigation Strategy
<#>	X.X.X - reference to relevant WBS item	Brief summary statement capturing nature of the identified risk	How the risk might impact the project	Person who is responsible for managing mitigation	[low(0.1), medium(0.5), high(0.9)]	[low(0.1), medium(0.5), high(0.9)]	Likelihood * Severity	How will the risk be managed?

SECTION 6.0 INTEGRATION OF THE SYSTEM

This section describes the methods to be used to integrate the developed components into a functional system that meets the system requirements and is operationally supportable. The systems engineering process steps to be detailed here include: integration, verification, deployment, and the training necessary to support operations & maintenance. Plans for validation of the system should also be covered. For each step, the resources [tools and personnel] are identified and products and criteria for each step defined.

6.1   Integration

System integration is addressed at the development stage, in the laboratory, in local field testing facilities, and in the testbeds. The MMITSS-CA system is integrated throughout the software development process using software and laboratory hardware testing of the interfaces between devices and applications. In addition, PATH operates the Richmond Field Station test intersection where field testing can be executed before transitioning new versions of the system to the California testbed.

The MMITSS-AZ system is integrated throughout the software development process using software, software-in-the-loop, and laboratory hardware testing of the interfaces between devices and applications. In addition, the University of Arizona utilizes a test intersection at the corner of Speedway and Mountain in Tucson, AZ where field testing can be executed before transitioning new versions of the system to the California testbed.

6.2   Field Test and Demonstration

A Test Plan will provide the test objectives, detailed test procedures, collected data, performance measures, and reporting outlines. The plan will outline methods to collect and evaluate both baseline data (MMITSS turned off) and operating MMITSS traffic control strategies. As part of the test preparation, connected vehicle based performance metrics identified in the MMITSS Phase I project will be selected for characterizing the system performance. With the infrastructure-based detection system, each performance measure will be implemented using both actual Blind Spot Monitors (BSM) from vehicles and emulated BSMs based on data from the Smart Microwave Sensor (SMS) radars, so that we will be able to compare calculated performance metrics with observation (measurements of actual traffic). As an example, MMITSS performance measures will estimate the queue length based on connected vehicle data at different penetration rates. This estimated queue length will be compared with the observed (Through SMS radar data) distance of the last stopped vehicle from the stop bar for each lane, and / or the queue in terms of the number of stopped vehicles at each lane.

6.2.1 Testing Enhancements from Task 3

The Task 3 enhancements are to be field tested prior to the start of the 90-day Readiness Test (Task 4.2). A test plan will be defined and executed for each enhancement. Any issues or problems will be corrected and retested, if needed. An iterative and incremental approach to design, development, and testing will be used to ensure a stable and operating system is maintained throughout the project.

6.2.2 Testing Updates to System Performance Measures

The Task 3 enhancements are to be field tested prior to the start of the 90-day Readiness Test (Task 4.2). The system performance measures will be updated to collect data to support the 90-day Readiness Testing, including collection of system uptime (i.e. System Availability), number of messages (vehicles) processed, and other system performance data identified to support evaluation of the system performance over the 90-day Readiness Test.

The updated performance measure will support future deployments. Ensuring the additional performance measures provide the desired characterization of system performance is essential to assessing the success of this project.

6.3 Deployment of the System

Both testbeds, CA and AZ, are continuously operating testbeds and have been so for over 5 years. As such, the implementation for the MMITSS Phase III effort is considered a deployment as well. The testbeds host demonstrations for national, regional, and local groups throughout the year. They serve as testbeds for other applications and other projects. Each testbed is supported through a partnership with the championing agency: Caltrans and MCDOT.

6.4 Training and Support

The MMITSS team recognizes the challenges that agencies face when considering utilizing new technologies, such as connected vehicles and MMITSS. To estimate a reasonable level of effort for this task, the MMITSS team will plan to support two SPaT Challenge projects that want to include MMITSS in the deployment corridor. One of the SPaT Challenge projects will want to use the MMITSS-CA system and one the MMITSS-AZ system. Support will include the following activities:

1. Provide an overview of MMITSS, in the context of the SPaT Challenge,
2. Discussion of the MMITSS architecture, including selecting the hardware vendors that the project chooses to install,
3. Support for the configuration of MMITSS for each of the 20 SPaT Challenge intersections including explanation of the configuration data required, MAP data, networking, etc.,
4. Support during integration and testing to answer questions and address issues identified, and
5. Support during a 90-day operation period including addressing questions or issues identified.

SECTION 7.0 APPLICABLE DOCUMENTS

The applicable documents which are inputs to this Systems Engineering Management Plan are:

- Systems Engineering Guidebook for Intelligent Transportation Systems, Version 3, Sponsoring Agencies: US Department of Transportation, Federal Highway Administration – California Division California Department of Transportation, http://fhwa.dot.gov/cadiv/segb.

- Project Management Plan for the Multi-Modal Intelligent Traffic Signal System Deployment Readiness Enhancements (Phase III), University of Arizona (Lead) University of California PATH Program

- Multi-Modal Intelligent Traffic Signal System Phase III: Development Plan, University of Arizona (Lead) University of California PATH Program