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# California ITS Architecture and System Plan

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## Final Appendix A9 - Maintaining the Architecture (Maintenance Plan)

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## REVISION HISTORY

<b>Filename</b>	<b>Version</b>	<b>Date</b>	<b>Author</b>	<b>Comment</b>
CalifMaintPlan-2-6-04.doc	0.00.01	02/06/04	B Eisenhart	First draft
CalifMaintPlan 030904.doc	0.00.02	03/09/04	B. Eisenhart	Revision of First Draft
Appendix A9 – Maintenance Plan.doc	1.00	9/30/04	B. Eisenhart	Initial Baseline Release of Document

## 1. INTRODUCTION

### 1.1 Project Overview

New federal regulations require ITS projects funded with highway trust funds to conform to the National ITS Architecture and standards; be guided by a regional architecture of geographic boundaries defined by stakeholder needs; and use a system engineering analysis that considers the total project life cycle. These requirements are referred to as the Final Rule. The California ITS Architecture and System Plan will accomplish two goals in this context:

- Compile an ITS architecture focusing on state-level and interregional services in California that will supplement the regional ITS Architectures and deployment plans to ensure that statewide and interregional services are deployed in an integrated and cost-effective manner, thereby adhering to the “regional architecture” requirement described in the above summary of the Final Rule for those projects developed at this level.
- Develop a 10-year System Plan that describes the blueprint for deployment of specific projects that fall within this category of statewide or interregional services. Based on the Final Rule summarized above, each of these projects will require that a systems engineering approach be taken when it is developed and throughout the project life cycle.

The development process for the California ITS Architecture and System Plan considers ITS plans and architectures including regional ITS architectures and strategic deployment plans, the statewide *Initiatives* project, and the Caltrans draft *Transportation Management Systems Master Plan* and is developing a new Architecture and System Plan that focuses on the state-level and interregional systems in the state.

The general approach proposed for this project is one of public participation and a coalition building process that is fully integrated into the ITS Architecture and System Plan development. The approach is built around extensive interaction with and input by regional ITS stakeholders throughout the process and the end result will be an Architecture and System Plan that reflects the needs and goals of the transportation network from a state-level and interregional standpoint.

### 1.2 Maintenance Plan Overview

The California Statewide ITS Architecture and System Plan is a dynamic set of outputs. Following the completion of the first version of the architecture and system plan, it will need to be updated or maintained on a periodic basis in order to keep the contents up-to-date with the current and planned ITS activities throughout the State. This document describes the Maintenance Plan for keeping the California Statewide ITS Architecture and System Plan up-to-date and includes discussion of the major components of the Plan and how recommendations were developed (e.g., how often the document should be updated).

Other terms used for *maintenance* are *configuration management* or *change management*. Configuration management (or change management) is defined as: “A management process for establishing and maintaining consistency of a product’s performance, functional, and physical attributes with its requirements, design and operational information throughout its life”<sup>1</sup> and can

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<sup>1</sup> ANSI/EIA 649-1998, *National Consensus Standard for Configuration Management*

be applied to the development of any system. In the context of the California Statewide ITS Architecture and System Plan it is a process for establishing and maintaining consistency of the architecture's information content throughout its life. In general, configuration management consists of five major activities:

- Configuration management planning – making decisions about what needs to be controlled within a product configuration, when you establish a controlled configuration, how you change a controlled configuration, and what amount of effort you're going to expend in managing configurations, with the decisions formalized in a *configuration management plan*. In the context of maintaining the California Statewide ITS Architecture and System Plan this corresponds to this Architecture Maintenance Plan (described in this report).
- Configuration identification – identifying the *configuration items* and the unique identifiers that you use to keep track of all items that need to be independently identified, stored, tested, reviewed, used, changed, delivered and/or maintained. In the context of maintaining the California Statewide ITS Architecture and System Plan this corresponds to the *architecture baseline* (described in Section 4 below).
- Configuration control – the control of which changes are made to the architecture baseline and when and how they are made.
- Configuration status accounting – keeping track of the state of all configuration items, all pending proposed changes, and all approved changes to configuration items.
- Configuration audits – verifying consistency of configuration documentation against the product. In the context of the California Statewide ITS Architecture and System Plan this includes verifying that different representations of the architecture (e.g., reports and database files) match.

This maintenance plan addresses the following four key areas:

- Who will maintain the architecture?
- When will the maintenance happen?
- What will be maintained?
- How it will be maintained (i.e., what configuration control process will be used)?

### 1.3 Intended Audience

This Maintenance Plan document is intended primarily for stakeholders and stakeholder representatives directly involved with the maintenance of the California ITS Architecture. The majority of the persons participating with the architecture will not be directly involved with the actual initiation of the change management policies and procedures contained in this Maintenance Plan. However, all stakeholders, including planners, managers, and implementers, should be familiar with the highlights of the maintenance plan. These highlights include the purpose of the maintenance plan, what constitutes a change, the components of the architecture that are subject to the maintenance process, and how to initiate a change to the architecture.

## 1.4 Plan Organization

This Maintenance Plan is organized in five chapters to facilitate the different parts of a maintenance plan:

- **Chapter 1: Introduction** – Provides introductory and background information about the project and this document.
- **Chapter 2: Roles and Responsibilities for Maintenance** – This section defines the roles and responsibilities of each stakeholder in the maintenance of the California Statewide ITS Architecture and System Plan.
- **Chapter 3: Timetable for Maintenance** – This section describes when changes to the architecture might occur.
- **Chapter 4: Baseline** – This section describes what documents and other outputs are to be maintained by the process and procedures documented in this Maintenance Plan.
- **Chapter 5: Change Management Process** – This section defines the process and the procedures to be used for initiating, accepting and updating any changes to the architecture.

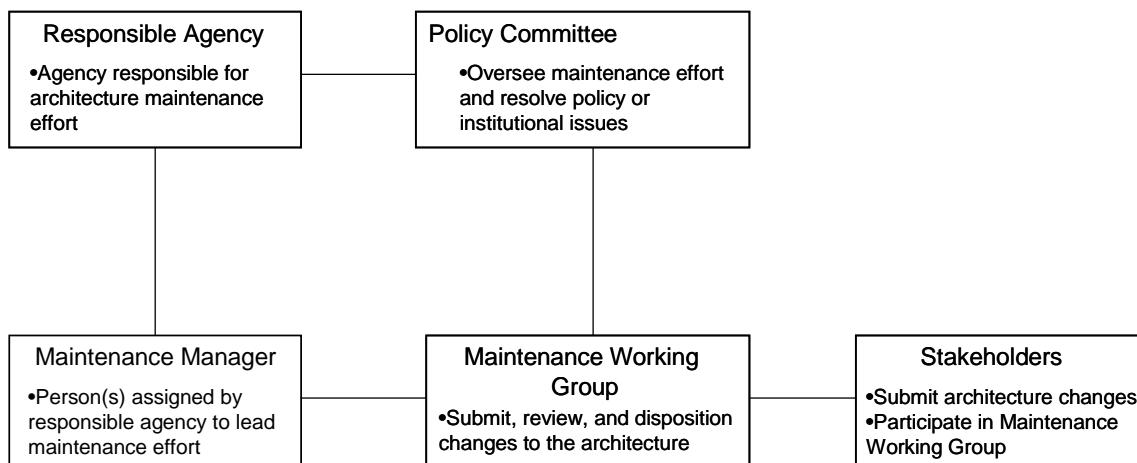
## 2. ROLES AND RESPONSIBILITIES FOR MAINTENANCE

This section defines the stakeholders and their roles and responsibilities for the maintenance of the California ITS Architecture and System Plan. Each subsection provides an introduction describing the particular set of stakeholders considered followed by a description of their roles and responsibilities for the maintenance of the California ITS Architecture and System Plan.

The following stakeholder groups will have a role in the maintenance of the architecture:

- Stakeholders – Any government agency or private organization that has a role in providing transportation services in the region.
- Maintenance Working Group – The group of persons responsible for reviewing proposed changes to the California ITS Architecture and System Plan and for forwarding the proposed changes to the Policy Committee.
- Policy Committee – The group of persons responsible for approving the proposed changes recommended by the Maintenance Working Group. They are also responsible for any policy or institutional decision-making.
- Responsible Agency – The stakeholder agency responsible for supporting the maintenance of the architecture.
- Maintenance Manager - The person(s) assigned by the Responsible Agency to lead the maintenance effort.

Figure 1 provides an organizational chart that depicts the relationships for each of these groups that will be covered in more detail below.



**Figure 1: Maintenance Organization Chart**

### 2.1 Stakeholders

#### Introduction

Stakeholders are any government agency or private organization that is involved with or has an interest in providing transportation services in the state. Each stakeholder owns, operates, and/or maintains one or more ITS elements in the architecture. In some cases the elements of the architecture are owned by a single stakeholder (e.g., the Metrolink Rail Agency operates the Metrolink Operations Center in Southern California). In some cases the “stakeholder” represents



a variety of individual agencies (e.g., the element Central California Transit Systems has as its stakeholder “Central California Transit Agencies”, which represent a variety of transit operators in the central part of the state).

Stakeholders are important to the change management process described in this Maintenance Plan because changes to the architecture start from changes in the scope, definition, and interconnection of the stakeholder elements.

Each stakeholder who has one or more elements in the California ITS Architecture should assign one or more authorized representatives who can submit or approve changes to their elements. The architecture created is a consensus architecture and changes to it should only be made with the concurrence of affected stakeholders. The stakeholder may also assign a point-of-contact for the agency to assist with day-to-day communications. The point-of-contact will receive updates regarding the status of the California ITS Architecture and System Plan and will be responsible for distributing these updates to the appropriate persons within their agency. The point-of-contact for the agency may be the same person as the Authorized Representative, or they may be different people.

Each stakeholder will be assigned to one or more *ITS Planning Regions* based upon their elements. ITS Planning Regions is a term used in this project to refer to informal alliances formed to address ITS planning under the combined jurisdiction of member agencies, MPO's, RTPA's, the State of California, cities, counties or some mix thereof. The following ITS Planning Regions are defined for the purposes of this effort. Key stakeholders from these ITS Planning Regions will form the basis for the makeup of the Maintenance Working Group and Policy Committee (described below).

The ITS Planning Regions are defined as:

- Bay Area
- North Central
- Statewide (representing state-level stakeholders such as Caltrans Headquarters)
- Central Coast
- National Parks
- Northern California (representing the California portion of COATS)
- Sacramento Area
- SANDAG
- San Joaquin Valley
- Southern California
- Sierra Nevada
- Tahoe Basin
- Tahoe Gateway

The assignment of stakeholders to ITS Planning Regions will serve as the path for introducing changes into the California ITS Architecture and System Plan relative to elements belonging to the stakeholder. Each stakeholder should assign someone to periodically gather information from within their agency on the status of their agency's ITS systems. This person should collect the information and submit Change Requests to the member(s) of the Maintenance Working Group from their planning region.

### **Roles and Responsibilities**

For the maintenance of the California ITS Architecture and System Plan, each Stakeholder has the following responsibilities:

- Appoint one or more Authorized Representatives to submit changes and make decisions for the Stakeholder relative to maintenance of the California ITS Architecture and System Plan
- May appoint a point-of-contact for day-to-day communications regarding updates and status of the California ITS Architecture and System Plan
- Provide the Maintenance Manager or Responsible Agency with current contact list of all Authorized Representative(s) and point-of-contact(s)
- Submit changes in the architecture relevant to their elements to the Planning Region representatives to the Maintenance Working Group.
- Provide stakeholder staff to support evaluation of any change request impacting the stakeholder's aspects of the architecture.
- Concur on changes in the architecture submitted through other sources that affect their elements. This concurrence would be provided to the appropriate Planning Region representatives to the Maintenance Working Group.

If stakeholders desire more involvement, they can get involved through voluntary representation on the Maintenance Working Group.

## **2.2 Responsible Agency**

### **Introduction**

The Responsible Agency is the government agency that will formally maintain the California ITS Architecture and System Plan. The Responsible Agency will assign resources for making the physical changes to the architecture baseline and for coordinating the maintenance of the architecture. A Maintenance Manager may be assigned by the responsible agency as being the individual responsible for the activities required by that agency to maintain the architecture.

For the maintenance of the California ITS Architecture, the Responsible Agency will be Caltrans Headquarters.

### **Roles and Responsibilities**

For the maintenance of the California ITS Architecture and System Plan, the Responsible Agency has the following responsibilities:

- Identifies resources for maintaining the architecture baseline; and
- Assign a person (or persons) to be the Maintenance Manager for the architecture

## **2.3 Maintenance Working Group**

### **Introduction**

The ITS Architecture Maintenance Working Group, or the Maintenance Working Group, consists of representatives from each ITS Planning Region (described above) responsible for reviewing submitted Change Requests. The Maintenance Working Group evaluates all proposed changes to the California ITS Architecture and System Plan, reaches a consensus on the proposed change, and makes a recommendation to the Policy Committee on the disposition of the Change Request.

Any agency identified as a Stakeholder in the California ITS Architecture and System Plan may assign representative(s) to the Maintenance Working Group to participate in discussions about proposed changes to the architecture.

The Maintenance Working Group members, particularly the ITS Planning Region representatives, will need to commit some time and effort to the change management process. The level of effort required will be a function of how many changes are brought forward, which cannot be known at this stage in the development of the plan. Funding considerations do need to be addressed in order to have adequate participation in the change management process.

The Maintenance Working Group should consist of the following members:

- One voting member from each ITS Planning Region. The voting member represents the ITS Planning Region.
- A designated alternate voting member from each ITS Planning Region (who can act for the voting member in their absence).
- Voluntary representatives of stakeholders or agencies that are part of the ITS Planning Region.

**Note:** it is the responsibility of each ITS Planning Region to select a voting member and alternate voting member.

Any agency identified as a Stakeholder in the California ITS Statewide Architecture (See Section 2.1, Stakeholders) may participate in the Maintenance Working Group. Other agencies or organizations that wish to participate in the Maintenance Working Group must be identified as a “guest” of a current Stakeholder. FHWA and FTA representatives, and any consultant hired on behalf of stakeholders to assist with the maintenance of the California ITS Architecture and System Plan may also participate in the Maintenance Working Group. The Maintenance Manager shall maintain the list of stakeholders along with their association with ITS Planning Regions.

### **Chairperson**

The Maintenance Working Group shall elect a Chairperson to conduct the meetings. The Chairperson shall be responsible for calling meetings, leading the meetings, and reporting to the Policy Committee.

A Chairperson shall be elected for a two-year term by a majority vote of the voting members present. If the Chairperson is unable to attend a meeting, the Maintenance Manager shall act as the Chairperson, or the Chairperson may appoint another representative to act in his/her place.

Election of the Chairperson will be the first action of the first Maintenance Working Group meeting.

### **Roles and Responsibilities**

The primary responsibilities of the Maintenance Working Group are:

- Collecting and compiling proposed major and minor changes to the architecture from stakeholders within the ITS Planning Regions. (Major and minor changes are discussed in more detail below in **Section 5.1**)
- Review submitted Change Request forms from a technical standpoint and consider the effects of the proposed changes to the California ITS Architecture and System Plan.

- Reaching a consensus on the proposed changes, and dispositioning the changes (i.e. deciding to approve, reject, or defer the change.) One additional possible output of this dispositioning is to refer the change to the Policy Committee for review and resolution.
- Reporting to the Policy Committee on a periodic basis about the maintenance activities of the Maintenance Working Group and requesting guidance on issues or problems that may arise.

## 2.4 Policy Committee

### Introduction

The California ITS Architecture Policy Committee, or the Policy Committee, is a group of policy level agency representatives who shall oversee the activities of the Maintenance Working Group and decide upon any policy or institutional issues facing the maintenance effort.

The Policy Committee shall consist of one representative from each ITS Planning Region. Each ITS Planning Region may designate alternates to the representative. The Responsible Agency (described above) would be a permanent member of this committee and would be the lead (chairperson would be a designated representative of the Responsible Agency).

A Chairperson shall be designated by the Responsible Agency (Caltrans Headquarters) to conduct the meetings. The Chairperson shall be responsible for calling meetings and leading the meetings.

### Roles and Responsibilities

The primary responsibilities of the Policy Committee are:

- Reviewing the status and decisions of the Maintenance Working Group and
- Making any institutional or policy related decisions that arise in the maintenance of the architecture.

## 2.4 Maintenance Manager

### Introduction

The Responsible Agency shall appoint a person to the role of Maintenance Manager to coordinate the maintenance activities of the California ITS Architecture and System Plan. The Maintenance Manager will be the coordinator and main point of contact for all maintenance activities, including receiving Change Requests forms, tracking Change Requests, “framing the issues” of each Change Request and submitting the Change Request to the Maintenance Working Group, distributing documentation, maintaining lists, and sending annual reminders to update the ITS Architecture.

### Roles and Responsibilities

For the maintenance of the ITS Architecture, the Maintenance Manager has the following responsibilities:

- Updates the “official” records of the ITS Architecture, including the baseline documents, meeting minutes, the Change Request Database, the list of the Authorized Representatives for each Stakeholder, and the list of members of the Maintenance Working Group
- Receives Change Request forms and updates the Change Request Database

- ‘Frames’ the issues of each Change Request and submits it to the Maintenance Working Group for its consideration
- Distributes updates and documentation to Stakeholders
- Sends annual reminders to the Stakeholders to update the ITS Architecture

Some of the Maintenance Manager’s responsibilities may be delegated to staff or consultants, although the Maintenance Manager is ultimately responsible for the performance of these tasks.



## 3. TIMETABLE FOR MAINTENANCE

### 3.1 Introduction

This section addresses how often the California Statewide ITS Architecture and System Plan will be modified or updated and what events or timetables will be used for making modifications or updates. The timetable will depend on the basic approach chosen for maintaining the architecture. Several options were considered:

- **Periodic Maintenance.** This approach ties the maintenance of the architecture to one of the recurring activities of the transportation planning process. For example, it's natural that the ITS architecture would be updated at the same frequency as the statewide transportation plan is updated (approximately every five years) or the Statewide Transportation Improvement Program is updated (every two years). The update of the architecture should occur several months prior to the update of the California Transportation Plan (the most recent update was the California Transportation Plan 2025, published in 2003), so that the revised architecture could serve as an input to the planning update. Publication and versioning costs are minimized for the periodic maintenance approach since there is a new version only once in the maintenance cycle.
- **Exception Maintenance.** This approach considers and makes changes to the architecture in a process that is initiated as needed. Publication and versioning costs are dependent on the frequency of changes made to the regional ITS architecture.
- **Combination.** An approach may be considered that is a combination of these timetables, based on the types of changes. For example, minor changes may not warrant exception maintenance, but rather would be collected to be incorporated into the next regularly scheduled periodic update. A major change, however, may warrant exception maintenance to occur.

### 3.2 What changes will impact the architecture?

The California ITS Architecture and System Plan is dynamic. It must change as plans change, ITS projects are implemented, and the ITS needs and services evolve throughout the State. The architecture must be maintained so that it continues to reflect the current and planned ITS systems, interconnections, and other aspects of architecture. There are many actions that may cause a need to update the architecture. These actions include:

- **Changes in Needs.** ITS architectures are created to support transportation planning in addressing local, regional and statewide needs. Over time these needs can change and the corresponding aspects of the ITS architecture that address these needs may need to be updated. These changes in needs should be expressed in updates to planning documents such as Regional Transportation Plans.
- **New stakeholders.** New stakeholders become active in ITS and the ITS architecture should be updated to reflect their place in the regional view of ITS elements, interfaces, and information flows. Why might new stakeholders emerge? The stakeholders might represent new organizations that were not in place during the original development of the regional ITS architecture. Or maybe additional transportation modes or transportation services are being considered that affect the systems of additional stakeholders.
- **Changes in stakeholder or element names.** An agency's name or the name used to describe their element(s) undergoes change. Transportation agencies occasionally merge, split, or



rename themselves. In addition element names may evolve as projects are defined. The California ITS Architecture and System Plan should be updated to use current names for stakeholders and elements.

- **Changes in other architectures.** The California ITS Architecture and System Plan covers not only elements and interfaces that provide statewide services, but also elements and interfaces that provide interregional services. Many of these elements will be described in various regional ITS architectures in California and adjoining states. Changes in these regional ITS architectures may necessitate changes in the California ITS Architecture and System Plan in order to maintain consistency between the architectures.

There are several changes relating to projects that will cause the need for updates to the California ITS Architecture and System Plan.

- **Changes to Project Definitions.** As funding for projects is identified, and as projects are implemented, the projects may add, subtract or modify elements, interfaces, or information flows based on available funding or changes in requirements. Because the architecture is meant to describe not only ITS planned for the State, but also the current ITS implementations, it should be updated to correctly reflect changes in the scope of projects.
- **Changes for Project Addition/Deletion.** Occasionally a project will be added, deleted or modified during the planning process. When this occurs, the aspects of the architecture associated with the project should be added, deleted or modified.
- **Changes in Project Status.** As projects are deployed, the status of the architecture elements, services and flows that are part of the project should be updated from planned to existing. Elements, services and flows are considered existing when they are substantially complete and tested.
- **Changes in Project Priority.** Due to funding constraints, technological changes or other considerations, a project planned for the region may be delayed or accelerated. Such changes should be reflected in the architecture.

The development of an architecture maintenance plan and the implementation of a program to maintain the architecture is also a requirement of the ITS Architecture and Standards Final Rule/Final Policy, which says: *“The agencies and other stakeholders participating in the development of the regional ITS architecture shall develop and implement procedures and responsibilities for maintaining it, as needs evolve within the region.”*

### 3.3 Timetable For Changes

A **comprehensive architecture update should occur every three years**, concurrent with the formal update of the Statewide Transportation Plan. This is a natural result of the California ITS Architecture and System Plan being a component of the statewide transportation planning process. The update is necessary to ensure that the architecture continues to accurately represent the statewide view of ITS Systems. The comprehensive update, which would be considered a “major update” (note: for a definition of types of updates see Section 5.1), may include adding new stakeholders, reviewing transportation needs and services covered by the architecture, updating the status of projects, and reflecting new goals and strategies, as appropriate. Operational concepts, system functional requirements, project sequencing, ITS standards, and list of agency agreements should also be updated at this time.



***Between major updates of the architecture, the following interim update actions should be performed:***

- Accept comments as they come in. The Maintenance Working Group should review the changes every 6 months and decide if updates are needed, or can wait until the yearly update discussed next.
- ***Actively solicit changes on an annual basis*** from each ITS Planning Region to provide a set of needed updates on an annual basis. The Maintenance Working Group should review all changes requested, evaluate and approve the changes as appropriate, and decide if the architecture should be updated. Minor updates (see section 5.1 for a description of types of updates) should be implemented at this yearly update. Major updates may be addressed at this time or deferred for the comprehensive architecture update mentioned previously. The Maintenance Working Group will decide on the appropriate timing for the updates.

The Maintenance Plan should also be reviewed at the previously discussed times for required changes. Use of the California ITS Architecture and System Plan and modifications to it may differ from what was anticipated during the initial development of this Maintenance Plan. Revising the Maintenance Plan will ensure that the change management process defined is effective.



## 4. ARCHITECTURE BASELINE

### 4.1 Introduction

Establishing an architecture baseline requires clear identification of the architecture products that will be maintained, including specific format and version information. This Section defines what documents, databases, etc. will be included in the Architecture Baseline and hence will be subject to the change management process described in this Maintenance Plan. The section also establishes the specific formats and version information for the initial maintenance activities.

### 4.2 Baseline Documents and Outputs

The set of documents and outputs that comprise the California ITS Architecture and System Plan Architecture Baseline are listed in **Table 1**. The set of outputs of the California ITS Architecture and System Plan Project that were produced on the project but that will not be included in the Architecture Baseline are shown in **Table 2**.

**Table 1 – Architecture Baseline**

Output	Type of Output	Comments	Project Task
User Needs Database	Access Database		3
User Needs Website	Hyperlinked files	Provides information from the User Needs Database in a hyperlinked format.	3
User Service and Market Package Database	Access Database		5
User Service and Market Package Website	Hyperlinked files	Provides information from the User Service and Market Package Database in a hyperlinked format.	5
Operational Concepts	Document		6
Functional Reqmts Database	Access Database		7
Functional Reqmts Website	Hyperlinked files	Provides information from the Functional Requirements Database in a hyperlinked format.	7
Turbo Architecture Database (Interconnects and Information Flows)	Access Database		8 and 9
Set of Interconnect diagrams	EMF files		8
Sausage Diagram	PDF File		8
Customized Market Packages	EMF files		9
Elements (final inventory) and	Hyperlinked files	Contains diagrams and info from turbo database.	9



<b>Output</b>	<b>Type of Output</b>	<b>Comments</b>	<b>Project Task</b>
Information Flows Website			
Project Sequencing- Project List	Access Database	Part of Federal Rule Reqmts for Arch	12
Project Sequencing- Dependencies and actual sequence	Document	Part of Federal Rule Reqmts for Arch	12
List of Agency Agreements	Document	Part of Federal Rule Reqmts for Arch	13
Standards mapping details (part of Turbo Database)	Access Database	Baselined as part of baselining Turbo Database	14
Maintenance Plan	Document	The process used to maintain the architecture- this document.	15
Final Architecture and System Plan Document	Document	Compilation of documentation from previous tasks, will contain some of the outputs described above and will be baselined.	16

**Table 2 – Project Outputs not included Architecture Baseline**

<b>Output</b>	<b>Type of Output</b>	<b>Comments</b>	<b>Project Task</b>
Interim Inventory Database	Access Database	This was an interim output- the final arch inventory (in the Turbo Arch database) is what needs to be baselined.	2
Interim Inventory Website	Hyperlinked files	This is an interim output- the final arch inventory (in the Turbo Arch database) is what needs to be baselined.	2
Comment Database	Access Database	The comments received are part of the initial development process and don't need to be maintained.	all
Vision Report	Document	An interim document developed primarily to assist the stakeholders in assessing gaps and interregional services to pursue. Not a part of the Federal Rule Reqts for Arch.	4 and 11
Project Sequencing- Sys Eng Analysis	Document	Each project will do its own system engineering analysis. This is a starting set of outputs from this contract.	12
Project Sequencing- project evaluations	Document	Each project will do its own system engineering analysis. This is a starting set of outputs from this contract.	12

### 4.3 Version Control

Over time, the components and documents that are part of the architecture baseline will change. Documents may be deleted or added to the list and changes will be made to the various outputs. To manage the changes to the components and documents, version numbers should be assigned to each revision approved by the Policy Committee or the Maintenance Working Group. This section provides guidelines on assign version numbers when revisions are approved.

All baseline documents subject to the change management process outlined in this Maintenance Plan shall have a version number and a revision date clearly identified.

Each update of a document or other output (e.g., databases) shall be designated with a new version number. The version number shall be assigned by the Maintenance Manager in accordance with the version control guidelines. The revision date shall be the date the document was created.

#### 4.3.1 Version Control Guidelines

The following version control guidelines for documents that are a part of the architecture baseline:

- Each baseline document shall have a version number consisting of at least 3 digits, in the format  $p.ss$ , where  $p$  is the major version number, and  $ss$  is the secondary version number.
- The version number and the revision date shall be approved (or assigned) by the Maintenance Manager.
- Minor revisions approved by the Maintenance Working Group shall be incremented in the second order, that is,  $p.ss$ , such that the first minor revision will be  $p.01$ . Minor revisions may include grammatical or spelling corrections, or modifications to a limited number of information flows, elements or stakeholders. These changes may include changes in project status (e.g., from future to existing).
- The first released version of a baseline document is Version 1.00.
- Approved significant changes to the architecture or to a document are considered to be a major revision. Major changes involve multiple and significant modifications to the architecture or to baseline documents. These changes may be a result of a new Transportation Plan, Transportation Improvement Plan, or other significant changes. When a major revision is approved by the Policy Committee, the version number shall be incremented in the first order. Thus, the first approved major revision will be Version 2.00.

#### 4.3.2 Revision History

Each baseline document shall include at least one page with a Revision History, indicating the history of the document since the last approved major version. The Revision History shall include the following columns:

- Version Number – Version number of the document as approved or assigned by the Maintenance Manager.
- Revision Date – Date the document was revised.

- Filename – File name of the document. To aid the California ITS Architecture in architecture version document control, the filename of the database should contain the last revision date.
- Author – Principal author of the revisions. This should be the name of the person who compiled and made the approved changes to the document.
- Comments – Comments should consist of a short description of the modifications made since the last major or minor revision.

The revision history shall have an entry for each major revision since and including the original baseline (Version 1.00); and an entry for each minor revision since the last major revision.

A database or list shall be maintained by the Maintenance Manager containing the entire revision history of each baseline document, including all major and minor revisions. This list shall be made available to all Policy Committee members, Maintenance Working Group members, or the authorized representative from each stakeholder who requests it. Distribution may be hardcopy and/or electronic means.

A list or database shall also be kept by the Maintenance Manager on all changes made to any of the baselined documents. Where the software allows, the Tracking feature shall be used to reflect the changes since the last revision.

#### *4.3.3 Baseline Availability*

The most current version of each baseline document or other baseline outputs shall be available to all Maintenance Working Group members, Policy Committee members and stakeholders. It is the responsibility of the Maintenance Manager to have access to the versions of the baseline documents and make it available for distribution. All baseline documents shall be available by hardcopy and/or electronic means, as appropriate.



## 5. CHANGE MANAGEMENT PROCESS

### 5.1 Introduction

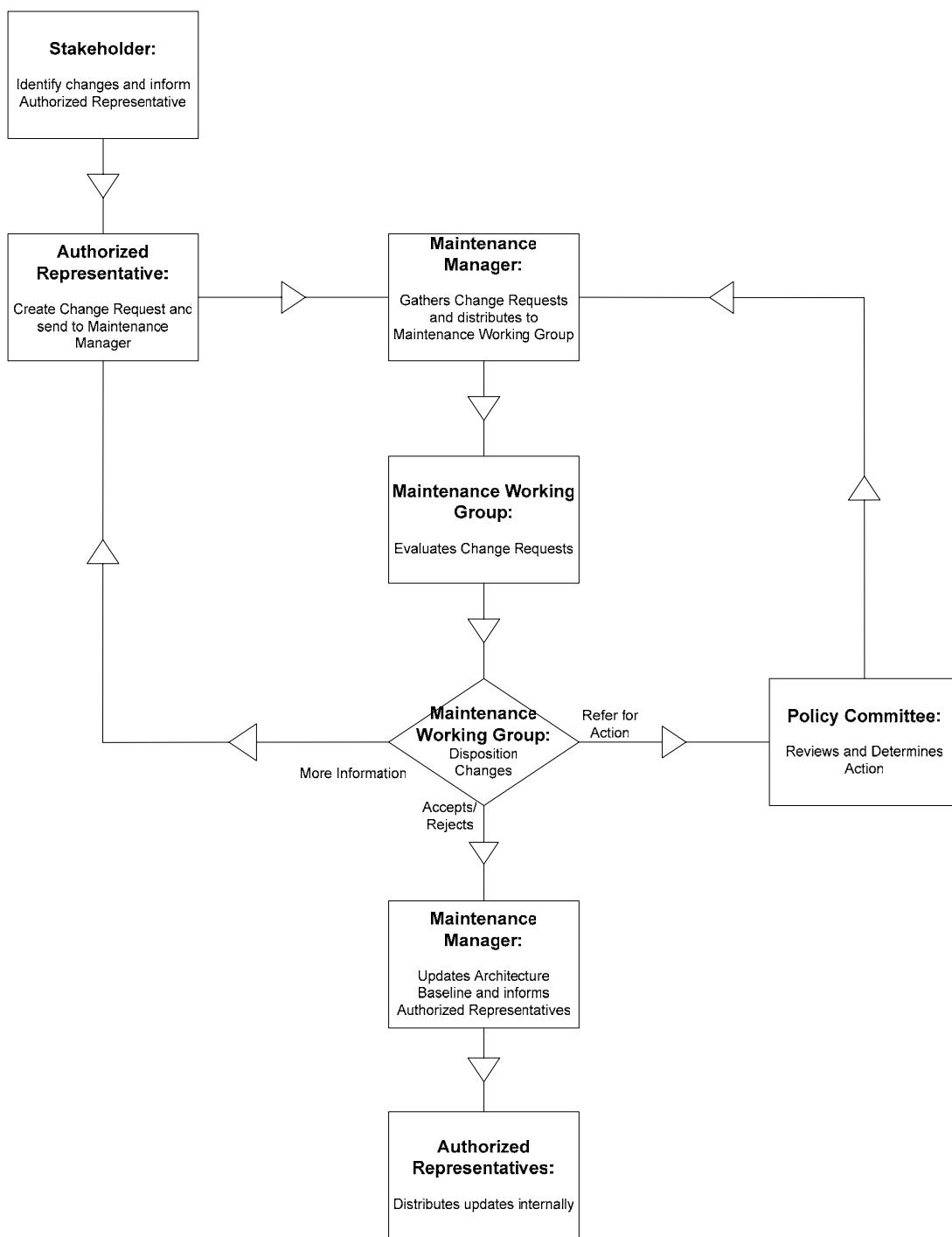
Once a baseline is defined, the process for making changes to this baseline must be established. The purpose of this Section is to define the procedures to initiate, approve and document proposed changes to the California ITS Architecture and System Plan architecture baseline.

These procedures will apply to all changes to any of the documents or outputs identified in the architecture baseline. This Maintenance Plan is part of the architecture baseline, and is also subject to the change management process. As the California ITS Architecture and System Plan is used, implemented and maintained, new change management processes may be added or existing procedures may be modified as required.

The change management process outlined in this Maintenance Plan is based on the philosophy that the California ITS Architecture and System Plan is a consensus plan and changes to it will be made based on the approval of the Stakeholders directly affected by the proposed changes. It is expected that in most cases the affected stakeholders will reach consensus on changes and they will be simply incorporated into the baseline. The inclusion of the Policy Committee in the plan is to handle those cases where consensus is not reached, or where questions of the scope of the architecture require resolution. The change management process was structured to:

- Formalize the procedures so proposed and approved changes can be carefully tracked for future reference
- Second, to provide the opportunity for other Stakeholders to review and comment on the proposed changes.

The change management process for the California ITS Architecture and System Plan is depicted in Figure 2.



**Figure 2 – Change Management Process**

## 5.2 Identifying Changes

The primary aspects of identifying changes are:

- Who can request a change?
- How is the change request documented?

### 5.2.1 Who can Request a Change?

For a “region” with as many stakeholders as the State of California, the question of who can make change requests is an important one. If literally anyone can input requests the region runs the risk of being overrun by requests that will tax scarce resources to review and decide upon. On the other end of the spectrum, if too much formality or paperwork is added to the process then many valid or needed changes may go unexpressed.

All requests for change to the Architecture Baseline shall be made through Authorized Representatives of stakeholders who are included in the architecture. The stakeholder authorized representative submits the change request to the Maintenance Manager and provides a copy to the ITS Planning Region representative on the Maintenance Working Group.

A stakeholder, for the purposes of the Maintenance Plan, is any agency or private organization identified as a participant in the architecture. This effectively indicates that all changes have the approval of an existing, defined stakeholder in the architecture. The requirement that only current stakeholders may request changes has the added benefit of spreading the resources needed to generate or evaluate changes among the Maintenance Working Group.

If the Change Request is to add a new Stakeholder and that Stakeholder’s ITS Elements and Interfaces, the approval of one of the ITS Planning Region representatives (to the Maintenance Working Group) or an existing Stakeholder impacted by the change is sufficient.

### 5.2.2 Defining the Change

How will changes to the Architecture Baseline be defined and made? Is it possible to have a “self-service” model for changes where any stakeholder with elements in the architecture can access directly the baseline and input changes? Because the Architecture Baseline is under configuration management, this level of self-service is not really practical. The Architecture Baseline is made up of databases, documents, and other outputs. Any change that is requested must be put into all of the outputs in the same manner. The requested change needs to first be documented on some change request form. This form can be provided on-line so that stakeholders can create change requests with a minimum of effort.

Stakeholders shall propose changes in writing through their Authorized Representatives to the Maintenance Manager. A copy of the change request shall be forwarded to their ITS Planning Region representative on the Maintenance Working Group.

The change request form to be used in proposing changes is shown **Appendix B**. The form contains the following information, which should be completed by the requesting stakeholder:

- Agency(ies) requesting the change;

- Date of the request;
- Description of the proposed change;
- Nature of change (Major or minor- see description below)
- The architecture aspects to be added, deleted or revised;
- Rationale for change;
- Contact information for the person proposing the change if questions arise;
- Originator name or agency;
- Signature of authorized representative(s) of the originating stakeholder; and
- Signature of the ITS Planning Region representative (only required when change is generated by a new stakeholder).

To support the understanding of the proposed changes, copies of the sections or diagrams marked with the proposed changes should be included with the change requests.

Other information on the change request form, to be completed by the Maintenance Manager include:

- Change request number to be assigned by the Maintenance Manager;
- Date the change request was evaluated for recommendation;
- Disposition Date;
- Change disposition (approved, rejected, deferred [need more information]); and
- Disposition Comment.

Two general types of change are addressed via the change request:

Minor update are these changes have small impacts on a single stakeholder's element status, description, or other attributes of the elements. Also attributes of interfaces and information flows (e.g. changing the status of an information flow from planned to existing due to the implementation of a project). Also considered minor are changes to interfaces or information flows that impact interfaces elements of one or two stakeholders only.

Major update are those changes that have a wider impact on the architecture baseline, such as inclusion of a new service or deletion of an existing service. Also considered a major update are those changes affecting an array of stakeholders. The definitions of minor vs major are purposely somewhat vague, as it is hard to envision all the possible changes that might arise. It is up to the Maintenance Working Group to decide whether a change should be considered major or minor.

There is a third type of change not covered directly by the Change Request and that is the comprehensive update, which is the every 3 year review of the architecture as a whole and updating of the baseline to reconcile the architecture with the current status and plans for ITS in the state. This type of change could be handled by a single Change Request that summarizes what was changed in the update.

A database shall be maintained by the Maintenance Manager to track change requests. The database shall include all the information entered on the change request form.



### 5.3 Evaluating Changes

Upon receiving a change proposal, an initial assessment of the change proposal is to be made for the impact to the overall architecture or the affected document. There are several options as to who performs the initial assessment, including:

- The Maintenance Manager;
- Maintenance Working Group; and
- The person proposing the change.

Each of the above options has advantages and challenges, but regardless of the selection the evaluator must have working knowledge of the architecture to evaluate the proposed changes.

The initial assessment shall include an analysis of what impact the proposed change has on the architecture. The evaluator shall then provide a written recommendation to the Maintenance Working Group on the impact of the proposed change, whether or not to approve the change, if the change(s) requires a major or minor revision, and if the change requires immediate action.

If the proposal for architecture modification has an impact on other stakeholders, the evaluator(s) shall contact the stakeholders to confirm their agreement with the modification. All stakeholders directly involved with the change request must approve and sign-off the change request proposal before the Maintenance Working Group considers the change proposal.

### 5.4 Approving Changes

The approval process for changes will depend upon whether the change is minor or major.

Minor changes shall require approval from the affected stakeholders and the appropriate ITS Planning Region representative. They do not need approval from other members of the Maintenance Working Group, nor do they need to be brought before the full Maintenance Working Group. The minor changes can be handled via email and do not require face-to-face meetings.

For major changes, upon completing the initial assessment, the Maintenance Manager will distribute the assessment to members of the Maintenance Working Group for discussion at the next Maintenance Working Group meeting. The Maintenance Manager is responsible for assembling an agenda for the Maintenance Working Group meeting, and the agenda should include, at a minimum, what change proposals are to be discussed during the meeting.

It is at the discretion of the Maintenance Manager when to distribute the change proposals and assessments to the Maintenance Working Group. If the change proposals are minor in nature, the Maintenance Manager may choose to wait until other change proposals are received and distribute all the change proposals and assessments simultaneously. However, the requests and recommendations shall be distributed to the members within three months of the Maintenance Manager receiving the proposed change.

Either once every six months, or when sufficient change requests warrant it, the Maintenance Working Group shall meet and discuss the change proposals and assessments. The Maintenance Manager shall distribute change proposals to the Maintenance Working Group members. The Maintenance Working Group shall have sufficient time to review the change proposals and assessments before the meeting. The meeting may be in person or by teleconference.



During the meeting, the Maintenance Working Group will review the change proposals (primarily for major updates, but also for any minor updates that have some issue to discuss), reach consensus and disposition each change proposal. All stakeholders may have an opportunity to comment on each change request. Recommendations shall be “approve”, “reject” or “request more information”. The intent is to achieve unanimous consent of the affected stakeholders on change proposals (major or minor). For major change proposals (where a wide array of stakeholders are affected) the approval may be by ITS Planning Regions, rather than by individual stakeholder. If consensus cannot be reached then attempts should be made to amend the change so that consensus is developed, or the change can be forwarded to the Policy Committee for review and action. If more information is requested, the Maintenance Manager will send the request to the stakeholder that submitted the change proposal.

The Chairperson of the Maintenance Working Group or the Maintenance Manager shall present to the Policy Committee any change proposals requiring action on their part. They shall also present any other issues requiring the Policy Committee input (e.g. issues relating to the scope of the architecture). In addition, the status of maintenance actions should be presented (effectively the results of the Maintenance Working Group activities) along with plans for updating the baseline.

The Policy Committee shall meet at least once a year, or more often if recommendations of the Maintenance Working Group need to be reviewed. Their recommendations will be given to the Maintenance Manager who will distribute them to affected stakeholders.

The Maintenance Manager shall be responsible for seeing that minutes are taken at both Maintenance Working Group and Policy Committee meetings. Minutes are to be distributed to the attendees and to the identified representatives of each stakeholder no less than five working days after the meeting. Comments are due within 10 working days to the Maintenance Manager .

Minutes shall include, at a minimum, an attendance list, comments made on each change proposal, and the consensus recommendation (approve/reject/request more information) of the Maintenance Working Group. Approved minutes will be distributed to all stakeholders and posted on the website. The minutes provide a recording process for the change management process and provide traceability.

## 5.5 Updating Architecture Baseline

Once a set of changes are approved, the Architecture Baseline must be updated. In addition to updating the baseline documents, databases, or other outputs, the configuration status should be updated. In the discipline of Configuration Management this is known as Configuration Status Accounting. This accounting is performed by having a document that defines the following information for each separate output of the architecture baseline:

- Output name;
- Output revision number;
- Date of latest revision;
- File Name; and
- Location/Point of Contact.

Periodically, the information in the various outputs of the architecture baseline should be audited to assure that the different representations of the architecture information (e.g. the database and

document) are in sync. This configuration auditing should be performed by someone independent of the staff or resources used to actually enter the changes.

Once the change proposal is dispositioned, the Maintenance Manager shall implement the decision agreed upon. The change proposal form is updated with the disposition information, and the same information is updated in the change proposal database by the Maintenance Manager. The Maintenance Manager shall also notify the originator of the change proposal of the results of the vote.

If the decision is to accept the change, then the appropriate portions of the architecture baseline are updated by the Maintenance Manager (or whomever they assign to perform the updates) and an updated architecture baseline is defined.

The configuration status document shall be updated to identify the current versions of the Architecture Baseline. On a biannual basis the information in the various outputs of the architecture baseline should be audited to assure that the different representations of the architecture information (e.g. the database and document) are in sync. The Maintenance Manager shall assign resources to perform this audit.

## **5.6 Notifying Stakeholders**

Authorized representatives for each stakeholder shall be notified by e-mail from the Maintenance Manager when baseline documents have been updated. All baseline documents shall also be available to stakeholders from a website or other electronic location, such as an ftp site. It is the responsibility of the Maintenance Manager to ensure the most recent document is available from the website.

Request for copies or access to the baseline documents shall be made to the Maintenance Manager. Only Policy Committee members, Maintenance Working Group members or the authorized representatives from each stakeholder may request the baseline documents. It is the responsibility of that stakeholder authorized representative to distribute the revised documents to all other members from his/her agency who requests a copy.

After major revisions to the architecture or the baseline documents, the Policy Committee may elect to also provide all baseline documents to members on CD-ROMs.

## APPENDIX A – GLOSSARY

**Architecture Baseline:** Documents and other outputs that define the California ITS Architecture and System Plan

**Element:** The name of an ITS system (or portion of an ITS system) operated by one of the stakeholders.

**Maintenance Working Group:** The group of persons responsible for reviewing and dispositioning proposed changes to the California ITS Architecture and System Plan.

**Policy Committee:** The group of persons responsible for resolving issues that arise from the activities of the Maintenance Working Group. They are also responsible for any policy or institutional decision-making.

**Stakeholder:** Any agency or private organization identified as a participant in the architecture



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and Associates, Inc.



## APPENDIX B – CHANGE REQUEST FORM



## California ITS Architecture and System Plan

### Change Request (CR) Form

Originator Name:		Date Submitted
Originator Telephone:	Originator Fax:	Originator E-Mail:
Originator Agency:		Revision Type: <input type="checkbox"/> Major <input type="checkbox"/> Minor
Agency Authorized Signature:		Signature Date:

Planning Region Representative (if applicable):	
Planning Region Representative Signature:	Signature Date:

Description of Proposed Change:      		
Rationale for Proposed Change:      		
Affected Agency:	Authorized Signature:	Signature Date:
Affected Agency:	Authorized Signature:	Signature Date:
List Attachments:		
Baseline Documents Affected:  <input type="checkbox"/> Website <input type="checkbox"/> Turbo Architecture <input type="checkbox"/> Customized MPs <input type="checkbox"/> Document <input type="checkbox"/> Other (describe)		

To Be Completed By Maintenance Manager		
Change Request Number:	Date CR Received:	Date CR Logged:
Date Initially Discussed:	Disposition: <input type="checkbox"/> Accepted <input type="checkbox"/> Rejected <input type="checkbox"/> More Info	Disposition Comments
Date Discussed:	Disposition: <input type="checkbox"/> Accepted <input type="checkbox"/> Rejected <input type="checkbox"/> More Info	Disposition Comments
Date Discussed:	Disposition: <input type="checkbox"/> Accepted <input type="checkbox"/> Rejected <input type="checkbox"/> More Info	Disposition Comments
Date Approved by Policy Committee:		
Baseline Documents Affected/Version implemented		
<input type="checkbox"/> Turbo Architecture Date: _____ Version: _____ <input type="checkbox"/> Website Date: _____ Version: _____		
<input type="checkbox"/> Customized MPs Date: _____ Version: _____ <input type="checkbox"/> _____ Date: _____ Version: _____		