
California ITS Architecture and System Plan

FINAL

Appendix B8: Project Sequencing

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1. PROJECT SEQUENCING

The California Statewide ITS Architecture will be implemented through a series of projects led by both public sector and private sector agencies. Key foundation systems will need to be implemented in order to support other systems and projects. Project sequencing identifies those foundation systems, projects, or infrastructure that are required to be in place for other projects to move forward. Additionally, in some cases, studies may be required prior to full project development and implementation and operational agreements may be necessary for interregional projects to effectively work together. The Statewide architecture is a plan, or blueprint, to document how systems and projects fit together to improve the integration, coordination, and effectiveness of ITS in California. The architecture is not intended to prescribe that all systems and projects have to be built or are required to be integrated, but rather is meant to be a framework for interregional services to guide integration and coordination as desired by the local, regional, and state-level agencies that retain responsibility for deployment, operations, and maintenance of these technologies. The deployment of the systems required to achieve the final Architecture build-out will occur over time and may change over time as well. Future updates to the Statewide ITS Architecture will ensure that the projects outlined are kept up-to-date in terms of the foundation projects and systems being put into place; future changes to stakeholder agency involvement, needs, and priorities; and progress in the ITS standards development arena.

Given the interregional complexities of the California Statewide ITS Architecture project and per guidance from the project Advisory Committee, projects are not prioritized against one another. This project sequencing chapter of the Statewide Architecture rather focuses only on the sequencing for each project: what systems, projects, studies, or agreements are necessary in each case for a project to move forward.

1.1 Methodology

The architecture development process is governed by the National ITS Architecture², developed by the USDOT as a tool to guide the development of regional architectures throughout the country. The process being followed in the development of the California Statewide ITS Architecture is modeled after the process defined in the USDOT's *Regional ITS Architecture Guidance: Developing, Using, and Maintaining an ITS Architecture for Your Region*¹. Project sequencing falls under Step 4 – Implementation (see **Figure 1**). This portion focuses on how the architecture will be put into action: the sequencing of projects, inter-agency agreements that will be necessary, and current applicable ITS standards that relate to each project.

Earlier tasks of this project documented existing and planned ITS projects throughout the State as well as desired outcomes of the overall system. The Project Sequencing is based on the existing and planned state-level and interregional projects and the identification of new projects that would be necessary to fill any “gaps” in providing the outcomes that have been identified as desirable for California’s transportation system in each service category:

- Traffic Management;
- Traveler Information;
- Goods Movement;
- Electronic Payment;
- Public Transportation;
- Archived Data;
- Maintenance and Construction Management;

- Vehicle Safety and Control; and
- Emergency Management.

Previous steps of this project designated user services and market packages under the following categories to assist in scaling the focus of the Statewide ITS Architecture and System Plan to only those services that are statewide and interregional in nature. Those designated as primarily Private are also addressed in this project to ensure that connections and infrastructure are properly addressed to support these services.

Market Package Scope Designations in this report are defined as follows:

- **S - State-level** - The service contains functions or interfaces that are statewide in nature. This service is covered by this project.
- **I - Interregional** - The service contains functions or interfaces that are Interregional in nature. This service is covered by this project.
- **L - Local** - The service contains functions or interfaces that are entirely local to a single region. This service is not covered by this project.
- **P - Private** - The service is made up of functions or interfaces between private entities. This project will not cover the service.
- **S/L - Statewide Standardization** - Where both S and L are identified for a service, that indicates that the services that are local in nature, but which have interfaces that are *candidates* for standardization on a statewide basis. By statewide standardization we mean statewide use of common data, message, and communications standards for transmitting information on an interface. These interfaces most commonly represent *candidates* for statewide standardization by Caltrans.

The methodology for completing the implementation portion of the architecture includes the following steps:

1. Document the existing and planned ITS projects that relate to state-level and interregional services.
2. Identify and define projects that will be needed to fill the “gaps” in the architecture in order to implement the full framework of the architecture and achieve the desired outcomes (as previously identified)
3. Identify project dependencies, that is what projects, elements, processes, or studies need to be completed before each project can be built (this is the project sequencing).
4. Document agency agreements that need to be in place and applicable ITS standards for each project.

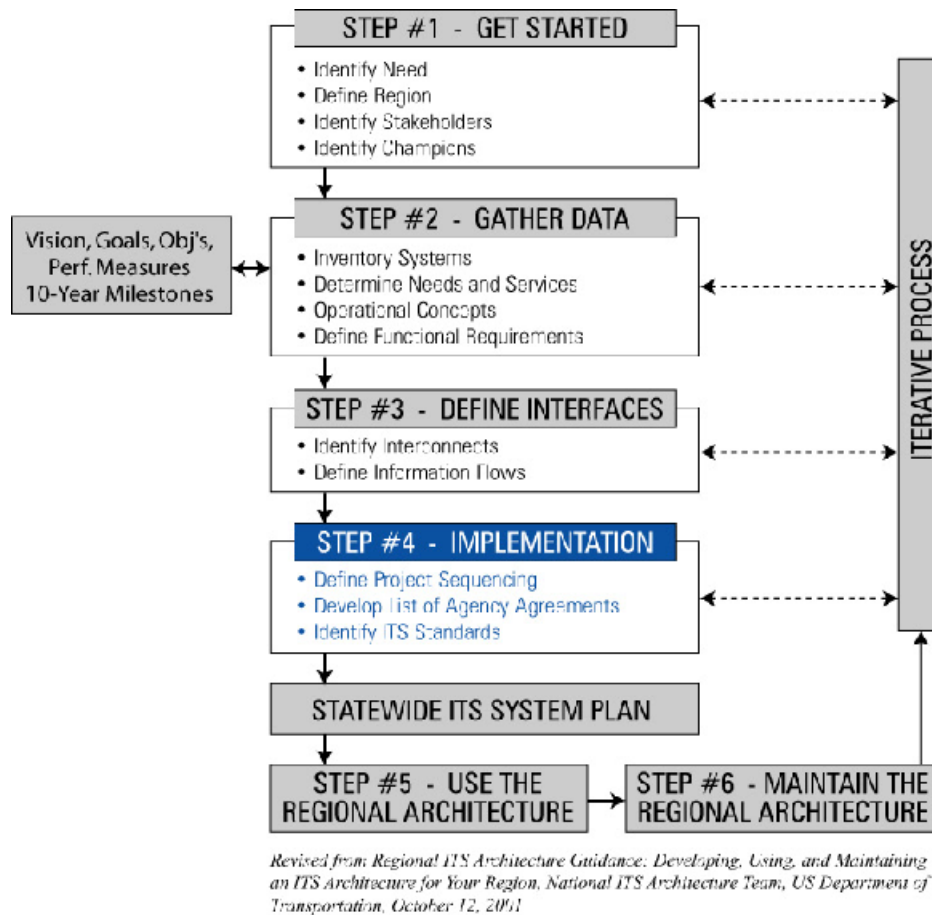


Figure 1 – Regional ITS Architecture Development Process

1.2 Projects

The existing and planned projects were inventoried in Step 2 of the process above. They are summarized in nine service categories in **Appendix 1**. These existing and planned projects are considered ‘committed projects’. They also serve as a starting point for identifying new projects.

The process to identify new projects starts from mapping the desired outcomes (a part of the 10-year vision statements previously developed) against the committed projects. In this process, “gaps” are identified where additional projects are required to achieve the outcomes. This formed the basis of the new proposed projects.

Table 1 summarizes the proposed projects for each of the nine service categories. Each proposed project is mapped to *market packages* (a National Architecture term used to describe a group of technologies that is generally packaged together into a project). The market package mapping will assist in determining interdependencies and connections in the architecture. The “Project Sequencing” column provides the inter-relationship and inter-dependency of some projects. The last column, titled “Desired Outcome,” demonstrates the mapping of desired outcomes developed in previous tasks to the proposed projects. This mapping is shown to demonstrate how the proposed projects can be used to achieve the desired outcomes.

Table 1 – Proposed Projects to Achieve Desired Outcomes

| Proposed Projects | Market Packages | Market Package Scope Designation | Project Sequencing | Desired Outcome (mapped to milestones) |
|---|--|----------------------------------|---|--|
| TRAFFIC MANAGEMENT | | | | |
| <p>TM01 – Inter-regional traffic management coordination strategies and procedures. Caltrans traffic management, while programmed at a regional (district) level, would be more coordinated with local/regional agencies within the districts and across the state (for example, for state arterial routes and freeway facilities interfacing with regional and local facilities). This project is to develop and implement traffic management strategies and procedures for Caltrans districts, involving local and regional traffic management agencies in the strategy development (for example, developing guidelines for operating procedures for incidents).</p> | <p>ATMS04 – Freeway Control ATMS06 – Traffic Information dissemination ATMS07 – Regional Traffic Control</p> | <p>S/L S/L/I S/L/I</p> | <p>Prior to implementation of coordination strategies, a list of strategies and procedures will need to be developed in conjunction with local, regional and other stakeholders who will be impacted by the inter-agency coordination. Multiple district representatives should be involved as equal stakeholders. Upon consensus among stakeholders, the strategies and procedures would be reviewed and approved/ adopted by Caltrans headquarters.</p> | <p>Coordinated traffic management operational strategies (including traffic management, incident management, Amber Alert, others) among state, regional, and local agencies resulting in improved interregional mobility</p> |
| <p>TM02 – Statewide Standardization of Caltrans Data Communication Protocols. Develop common data communication protocols among different traffic management systems in the different districts throughout the state, with a view of automatically sharing important data among neighboring districts and facilitating implementation of suitable traffic management strategies.</p> | <p>ATMS04 – Freeway Control ATMS08 – Traffic Incident Management System</p> | <p>S/L S/L/I</p> | <p>Another project is proposed (TM03), based on Caltrans' TMS Master Plan¹ recommendations, that seeks to standardize traffic management system software in all applicable Caltrans Districts. If this TMS Standardization project is approved, it should proceed in parallel with the communication protocol standardization in order to improve efficiency and cost-effectiveness of these two projects.</p> | <p>Uniform traffic management software systems in each Caltrans District (where traffic management systems are used/ needed) that are consistent and increase efficiency of system maintenance</p> |

¹ The *Draft TMS Master Plan* has been used as a resource in this project for its critical content for statewide ITS system development. As of May 18, 2004, it is awaiting final approval by the Business, Transportation and Housing Agency.

Table 1 – Proposed Projects to Achieve Desired Outcomes (continued)

| Proposed Projects | Market Packages | Market Package Scope Designation | Project Sequencing | Desired Outcome (mapped to milestones) |
|---|---|----------------------------------|--|--|
| <p>TM03 – Statewide Standardization of Caltrans TMS software in each district. Caltrans has expressed an interest in standardizing TMS software in applicable districts for improved coordination, maintenance, and statewide cost-savings (efficiencies).</p> | <p>ATMS04 – Freeway Control ATMS08 – Traffic Incident Management System</p> | <p>S/L S/L/I</p> | <p>Another project is proposed (TM02) that seeks to standardize data communication protocols in all applicable Caltrans Districts. If this TMS Standardization project is approved, it should proceed in parallel with the communication protocol standardization in order to improve efficiency and cost-effectiveness of these two projects.</p> | <p>Uniform traffic management software systems in each Caltrans District (where traffic management systems are used/ needed) that are consistent and increase efficiency of system maintenance</p> |
| <p>TM04 – Study gaps in and implement effective detection infrastructure statewide. Detection infrastructure includes detection of traffic, incidents, weather conditions, and potentially hazardous travel conditions. The study would address physical gaps in coverage (lack of data), inoperable detection or poor data, and options for detection technologies/ strategies that would best suit different gaps. Detection could be accomplished through public agency roadside (or in-pavement) infrastructure, vehicle probes, or other means. The objective of this project is to fill gaps in physical infrastructure needed to support improved traffic management, traveler information, public transit, goods movement, and safety and security of travelers and infrastructure. Gaps in data collection in California relate to inoperable current infrastructure, poor or inaccessible data from existing infrastructure or lack of infrastructure.</p> | <p>ATMS01 – Network Surveillance ATMS02 – Probe Surveillance</p> | <p>S/L L</p> | <p>This project provides a foundation for most other ITS projects, including traffic management, traveler information, public transit, goods movement, and safety and security of travelers and infrastructure. As such, this project should be funded and pursued in the short-term to enable other projects to succeed.</p> | <p>A comprehensive, real-time data collection infrastructure for multiple agencies, multiple levels, and multiple purposes</p> |
| <p>TM05 – Analyze Port access improvements on a statewide basis, following through on the improvements outlined in the GGDP. While generally a local/ regional issue, accessibility to Ports, given projections for truck traffic growth and security issues, is a major issue to be supported and analyzed by Caltrans on a statewide basis.</p> | <p>ATMS01 – Network Surveillance ATMS04 – Freeway Control</p> | <p>S/L S/L</p> | <p>The analysis would precede implementation. Project sequencing should be determined for projects or improvements resulting from the analysis.</p> | <p>Improved mobility and security on state routes serving Ports and Border Crossings</p> |

Table 1 – Proposed Projects to Achieve Desired Outcomes (continued)

| Proposed Projects | Market Packages | Market Package Scope Designation | Project Sequencing | Desired Outcome (mapped to milestones) |
|---|--|---|--|--|
| <p>TM06 – Statewide Infrastructure security. In partnership with law enforcement agencies, identify gaps in surveillance coverage and ensure data exchange especially at strategic locations such as major bridge support structures.</p> | <p>ATMS01 – Network Surveillance ATMS02 – Probe Surveillance EM05 – Transportation Infrastructure Protection</p> | <p>S/L L S/L/I</p> | <p>Other projects are proposed to study and fill gaps in data collection infrastructure (TM04) and to standardize data exchange protocols for Caltrans statewide (TM02). Both of these projects would provide a foundation for the efficient delivery of this project. With security as a high priority for California, however, if the timing for the aforementioned projects inhibits the fast completion of this project, it should be noted that this project is not dependent on the others and can move forward independently.</p> | <p>Coordinated, statewide transportation infrastructure security measures that support the State of California Office of Homeland Security's comprehensive state strategy.</p> |
| TRAVELER INFORMATION | | | | |
| <p>TI01 – Statewide Traveler Information System. Portal for multi-modal traveler information, including Caltrans districts (as identified in the Caltrans Traveler Information Implementation Plan), other state departments (such as CHP), and links to regional/ local ATIS as desired by regional and local agencies. Stakeholders have expressed interest in a statewide ATIS serving as a gateway or portal which consists of links to various traveler information, such as the Bay Area 511 deployment, rural, and interstate links. Project could be provided by private or public sector. This project should address both internet and telephone (511) systems. Per the Caltrans Traveler Information Implementation Plan, the project would involve organization of the current multiple Caltrans District ATIS (phone & internet).</p> | <p>ATIS1 – Broadcast Traveler Information ATIS2 – Interactive Traveler Information APTS7 – Multi-Modal Coordination APTS8 – Transit Traveler Information MC04 – Weather Info. Processing & Dist. CVO04 – CV Administrative Processes</p> | <p>S/I S/I I I L/I S/P</p> | <p>As many ATIS are currently operational in California, this project can proceed without any preface. Additionally, the Caltrans Traveler Information Implementation Plan documents the beginning of a project definition and priorities for the project as follows (for the state-level portion):</p> | <p>Traveler information systems on a region-by-region basis, as desired by each region, with provision for links between regional systems</p> |

Table 1 – Proposed Projects to Achieve Desired Outcomes (continued)

| Proposed Projects | Market Packages | Market Package Scope Designation | Project Sequencing | Desired Outcome (mapped to milestones) |
|--|-----------------|----------------------------------|---|--|
| <p>T101 – Statewide Traveler Information System (continued)</p> | | | <p>FIRST YEAR PRIORITY</p> <p>Real-time highway closures, lane closures, and restrictions</p> <p>Planned lane closures anticipated over the next week.</p> <p>Real-time highway traffic speeds by route/segment (400 miles of instrumented state freeways)</p> <p>Historic average daily traffic by route/segment (15,000 miles of non-instrumented highways)</p> <p>Changeable message sign and highway advisory radio messages</p> <p>Closed-circuit television images (currently limited to 4 per district)</p> <p>STAA and Truck Permit routes, plus link to proper unit for e-government processing</p> <p>High Occupancy Vehicle lanes, including real-time speeds where available</p> <p>Highway Photo log</p> <p>Amtrak California schedules/ fares</p> | |

Table 1 – Proposed Projects to Achieve Desired Outcomes (continued)

| Proposed Projects | Market Packages | Market Package Scope Designation | Project Sequencing | Desired Outcome (mapped to milestones) |
|--|-----------------|----------------------------------|---|--|
| <p>T101 – Statewide Traveler Information System (continued)</p> | | | <p>WITHIN TWO YEARS</p> <p>Highway travel time between points (current if available; otherwise historic average)</p> <p>Safety Roadside Rest Areas, Scenic Overlooks, Truck Inspection Stations, Park and Ride lots, and other features. Specific information will include location, conditions of use, features about each site, and provide links to each functional unit's internet pages for more information or comments.</p> <p>Closed-circuit television images (expand to include all cameras)</p> <p>THREE YEARS OR LONGER</p> <p>Metered on-ramp queue delay (note: infrastructure to collect this data is not in place)</p> <p>Scenic, Bicycle and other special highway routes, with links to the operational unit, e.g., state bicycle routes will link to Department's bicycle unit web page for bicycle safety and laws."</p> | |

Table 1 – Proposed Projects to Achieve Desired Outcomes (continued)

| Proposed Projects | Market Packages | Market Package Scope Designation | Project Sequencing | Desired Outcome (mapped to milestones) |
|---|---|--|--|--|
| <p>TI02 – Establish Virtual Private Network (VPN) for Caltrans Data. This project facilitates and supports the widespread dissemination of data to private sector in standard formats (From Caltrans Traveler Information Implementation Plan). Other agencies, including local/ regional agencies, would have the option of joining as desired by the local/ regional agencies.</p> | <p>ATIS1 – Broadcast Traveler Information ATMS06 – Traffic Information Dissemination</p> | <p>S/I S/L/I</p> | <p>As many ATIS are currently operational in California, this project can proceed without any preface. Additionally, the Caltrans Traveler Information Implementation Plan documents the beginning of a project definition and priorities for the project.</p> | <p>Public and private opportunities for dissemination for traveler information</p> |
| <p>TI03 – Evaluate and Pursue Caltrans Traveler Information Partnerships (from Caltrans Traveler Information Implementation Plan). This project would evaluate existing partnerships, determine actual benefits, and prepare for and pursue, based on the analysis, valuable and various partnerships (such as partnerships among public sector agencies with adjacent jurisdictions, among public sector agencies with overlapping jurisdictions, or among public and private sector entities) for traveler information. The project would consider Caltrans as a whole, multiple districts, or individual districts as appropriate.</p> | <p>ATIS1 – Broadcast Traveler Information ATMS06 – Traffic Information Dissemination</p> | <p>S/I S/L/I</p> | <p>Prior to pursuing partnerships, this project would include or be preceded by the development of a formal Department directive on partnerships.</p> | <p>Public and private opportunities for dissemination for traveler information</p> |
| <p>TI04 – Dissemination of Real-time CVO-tailored Information. Numerous stakeholders and resources have noted a need for specially packaged traveler information for commercial-vehicle operators, such as real-time incident and road closure information packaged with designated truck routes through local jurisdictions. In partnership with private entities, this project would pursue CVISN areas beyond CVISN Level 2, including integration with other ITS services such as traffic management, traveler information, and incident response, especially near ports of entry and California-Mexico border. This may be a private-sector or public-agency provided service or a partnership.</p> | <p>CVO01 – Fleet Administration CVO02 – Freight Administration ATIS1 – Broadcast Traveler Information ATIS2 – Interactive Traveler Information ATMS06 – Traffic Information Dissemination</p> | <p>P P S/I S/I S/L/I</p> | <p>Several private entities are endeavoring to provide this service. The precursor to this project working effectively (whether provided by the private sector or otherwise), is a solid foundation of data collection and access (this refers to quality and quantity of data as well as standard accessibility) as provided by project TM04.</p> | <p>CVO-tailored real-time traveler information for truckers statewide</p> |

Table 1 – Proposed Projects to Achieve Desired Outcomes (continued)

| Proposed Projects | Market Packages | Market Package Scope Designation | Project Sequencing | Desired Outcome (mapped to milestones) |
|---|--|---|--|--|
| ELECTRONIC PAYMENT | | | | |
| <p>EP1 – Evaluate and establish interregional/statewide direction for Electronic Payment coordination. This project would be to establish a committee of appropriate stakeholders from around the state to evaluate and come to consensus on the interregional or statewide application for electronic payment. Following consensus on the direction, appropriate formal agreements, standards, software applications, requirements, or laws (such as Title 21 standard mandated by state law) governing future electronic payment projects and systems. The committee may also address such issues as universal payment media and potential additional services, if any, to be coordinated with electronic fare payment for transit (e.g., electronic toll collection, commercial vehicle clearance and credentialing, parking, etc.)</p> | <p>APTS4 – Transit Passenger and Fare Management ATMS10 – Electronic Toll Collection CVO03 – Electronic Clearance CVO04 – CVO Administrative Processes</p> | <p>S/I S/L/I S/P S/P</p> | <p>No other projects are needed for this project to proceed. As several electronic payment projects are currently in place or in design in the State that will not necessarily operate with one another, it may be desirable to pursue this project in the short term to reduce the impacts of the outcomes to California agencies in the future. Note that coordination with private services would likely be governed by national trends, data exchange and security standards, and potentially payment media options.</p> | <p>Single e-payment accounts for users for both electronic toll collection and transit fare payment at regional and inter-regional levels with account reconciliation that is seamless to users</p> <p>Universal e-payment devices for users for [each of] electronic toll collection and fare payment, which make(s) the system(s) transparent to the users</p> |
| PUBLIC TRANSPORTATION | | | | |
| <p>PT01 – Interregional Transit Service Connection Protection. This project would address coordination of delays/ schedules on major inter-regional transit services to avoid stranding passengers making common connections between regions (this concept is also known as “connection protection”).</p> | <p>APTS7 – Multi-Modal Coordination</p> | <p>I</p> | <p>Would require a study to analyze ridership/ transfers (establishing need and scope) and technology options for links (integration) prior to implementation.</p> | <p>Inter-regional coordination of delays on major transit services to avoid stranding passengers making common connections between regions</p> |
| COMMERCIAL VEHICLE OPERATIONS | | | | |
| <p>CV01 - Expansion of the STARS (State Truck Activities Reporting System) project to provide this automated application capability to all OS/OW permit applicants. The STARS project has thus far been implemented for high-volume</p> | <p>Could potentially address some CVO market packages: CVO01 – Fleet</p> | <p>P</p> | <p>No other projects are needed for this project to proceed. The Caltrans Single-Trip Application and Routing System (STARS) is</p> | <p>One-stop state, interstate, and federal credentialing for all commercial vehicles traveling in California with opportunities for local</p> |

| Proposed Projects | Market Packages | Market Package Scope Designation | Project Sequencing | Desired Outcome (mapped to milestones) |
|---|---|--|--|--|
| <p>permit users only. Coupled with an on-line routing system, this has the capability to become an effective streamlining of the current process, once available to a wider user base. Project benefits include convenience and time savings for private industry applicants.</p> | <p>Administration CVO02 – Freight Administration CVO03 – Electronic Clearance CVO04 – CV Administrative Processes CVO06 – Weigh-In-Motion CVO07 – Roadside CVO Safety</p> | <p>P S/P S/P S/P S/P</p> | <p>an automated method for customers to obtain single trip oversize/overweight transportation permits.</p> | <p>agencies to be involved on a voluntary basis, and integrated public agency goods and carrier data collection/tracking software for real-time data exchange and coordination of agency efforts</p> |

Table 1 – Proposed Projects to Achieve Desired Outcomes (continued)

| Proposed Projects | Market Packages | Market Package Scope Designation | Project Sequencing | Desired Outcome (mapped to milestones) |
|---|--|--|---|---|
| VEHICLE SAFETY AND CONTROL | | | | |
| <p>VS01 – Caltrans Coordination with National Initiatives. Caltrans leadership at the state level (including resources and recommendations) to ensure that vehicle safety and control initiatives and research throughout the state are capable of interfacing with federal VII (Vehicle Infrastructure Integration) or other vehicle-infrastructure related initiatives and programs. Current USDOT VSC initiatives (such as VII) are still in the early stages. State and Interregional initiatives will follow the federal lead, and any gaps will be addressed once the federal program becomes more clearly defined. Potentially future updates of the California Statewide ITS Architecture would include proposed projects and associated sequencing, agreements, and standards for VSC-related projects.</p> | <p>Could potentially address some or all of the AVS market packages:</p> <p>AVSS01 – Vehicle Safety Monitoring</p> <p>AVSS02 – Driver Safety Monitoring</p> <p>AVSS03 – Longitudinal Safety Warning</p> <p>AVSS04 – Lateral Safety Warning</p> <p>AVSS05 – Intersection Safety Warning</p> <p>AVSS06 – Pre-Crash Restraint Deployment</p> <p>AVSS07 – Driver Visibility Improvement</p> <p>AVSS08 – Advanced Vehicle Longitudinal Control</p> <p>AVSS09 – Advanced Vehicle Lateral Control</p> <p>AVSS10 – Intersection Collision Avoidance</p> <p>AVSS11 – Automated Highway System</p> | <p>P</p> <p>P</p> <p>P</p> <p>P</p> <p>P</p> <p>P</p> <p>P</p> <p>P</p> <p>P</p> <p>L/P</p> <p>P</p> | <p>No other projects are required for this to proceed.</p> | <p>Caltrans leadership at the state level (including resources and recommendations) to ensure that vehicle safety and control initiatives throughout the state are capable of interfacing with federal VII (Vehicle Infrastructure Integration) or other vehicle-infrastructure related initiatives and programs.</p> |
| ARCHIVED DATA | | | | |
| <p>AD01 – State-level Archived Data Service. A statewide archived data service for state-level data (Caltrans, CHP, others) to be accessible to users through a single portal. Local and regional data archiving will remain a “local” service. The state-level service may be used by regions as a resource for provision of an archived data service as desired by each region.</p> | <p>AD1 – ITS Data Mart</p> <p>AD2 – ITS Data Warehouse</p> <p>AD3 – ITS Virtual Data Warehouse</p> | <p>S</p> <p>S</p> <p>S/I</p> | <p>Several projects and systems are currently in place that are storing this data. This project does not have any precursors, but should evaluate whether one of the existing systems should be expanded to serve this purpose.</p> | <p>A statewide archived data service for state-level data that is available for use by regions as a resource as desired by each region</p> |

Table 1 – Proposed Projects to Achieve Desired Outcomes (continued)

| Proposed Projects | Market Packages | Market Package Scope Designation | Project Sequencing | Desired Outcome (mapped to milestones) |
|---|---|--|---|---|
| EMERGENCY MANAGEMENT | | | | |
| EM01 – Coordinated HAZMAT Routes and Procedures. Develop and implement coordinated HAZMAT transportation routes and procedures statewide and with adjoining states, with voluntary involvement by local and regional agencies. | CVO10 – HAZMAT Management CVO11 – Roadside HAZMAT Security Detection and Mitigation EM01 – Emergency Call-Taking and Dispatch EM02 – Emergency Routing | S S S/L/I S/L | No projects are required for this to proceed. | Coordinated HAZMAT transportation routes and procedures statewide and with adjoining states, with voluntary involvement by local and regional agencies |
| EM02 – Inter-regional disaster evacuation plan. Develop and implement coordinated statewide and interregional response procedures for disasters and evacuations that are developed in coordination with adjoining states' and national procedures and guidelines, with voluntary involvement by local and regional agencies. | EM01 – Emergency Call-Taking and Dispatch EM02 – Emergency Routing EM03 – Mayday Support EM04 – Roadway Service Patrols EM05 – Transportation Infrastructure Protection EM06 – Wider-Area Alert EM07 – Early Warning System EM08 – Disaster Response and Recover EM09 – Evacuation and Reentry Management EM10 – Disaster Traveler Information | S/L/I S/L I/P L S/L/I S/I S/I S/I S/I S/I | No projects are required for this to proceed. | Coordinated statewide response procedures for disasters and evacuations that are developed in coordination with adjoining states' and national procedures and guidelines, with voluntary involvement by local and regional agencies |

Table 1 – Proposed Projects to Achieve Desired Outcomes (continued)

| Proposed Projects | Market Packages | Market Package Scope Designation | Project Sequencing | Desired Outcome (mapped to milestones) |
|---|---|----------------------------------|--|--|
| MAINTENANCE AND CONSTRUCTION MANAGEMENT | | | | |
| MC01 – Coordinate existing Caltrans Real-Time Work Zone Travel Delay Monitoring Systems with District TMS. | MC08 – Work Zone Management MC09 – Work Zone Safety Monitoring MC10 – Maintenance and Construction Activity Coordination | S/L/I L I | Project should include or be preceded by a study to how the coordination would occur (e.g., could be a software integration, data fusion, or manual coordination). | A real-time work zone monitoring system for use in Caltrans work zones that is coordinated with District traffic management systems |
| MC02 – As-needed Caltrans Roadway Condition Monitoring and Coordination. Project would be implemented as needed for Caltrans at a district level (and coordinated/standardized statewide) for detection of icy bridges and other pavement conditions, and coordinated with District TMS. | MC03 – Road Weather Data Collection MC04 – Weather Information Processing and Distribution MC05 – Roadway Automated Treatment MC06 – Winter Maintenance MC07 – Roadway Maintenance and Construction | S/L L/I L I S/L | Other projects are proposed to standardize Caltrans TMS software statewide (TM03) and to standardize data exchange protocols for Caltrans statewide (TM02). Both of these projects would provide a foundation for the efficient delivery of this project. These projects are not required, however, for this project to proceed. | Roadway condition monitoring that is implemented as needed at a district level for detection of icy bridges and other pavement conditions, that is coordinated with District traffic management and traveler information systems |

APPENDIX 1

Appendix 1 – Existing and Currently Planned Projects

| Existing and Currently Planned Projects | Existing | Planned |
|--|----------|---------|
| TRAFFIC MANAGEMENT | | |
| Caltrans Local District Traffic Management Centers (TMCs) | ∴ | |
| ARTIC (Advanced Rural Technology Integration Center) and Caltrans/CHP Satellite Operation Centers | ∴ | |
| City, County, and Regional Traffic Signal Systems | ∴ | ∴ |
| Adjacent State TMC/TOCs | ∴ | ∴ |
| Event Centers ATIS/ATMS | ∴ | ∴ |
| Airport Traffic Management Centers | ∴ | ∴ |
| Multi-jurisdictional Signal Coordination Improvements | ∴ | ∴ |
| TMS – Caltrans Automated Warnings System (CAWS) | ∴ | |
| Caltrans Real Time Work Zone Travel Delay Monitoring Systems | ∴ | |
| Global Gateways Development Program (GGDP) including infrastructure improvements for Seaport, Airport, Railroad and Border Crossing Access | ∴ | ∴ |
| SMART Borders Initiatives at Otay Mesa and San Ysidro International Ports of Entry (POEs) | ∴ | ∴ |
| TRAVELER INFORMATION | | |
| Various regional and local phone and internet systems (e.g., Bay Area 511, etc.) | ∴ | ∴ |
| Various Caltrans district/ division phone and internet systems | ∴ | |
| CHIN, accessible via 1-800-427-ROAD and www.roadinfo/dot.ca.gov | ∴ | ∴ |
| California Smart-Traveler via internet and telephone | ∴ | |
| PUBLIC TRANSPORTATION | | |
| Various trip planning systems throughout the state | ∴ | |
| Various local, regional, and inter-city transit systems | ∴ | ∴ |
| Various Multimodal Transit Operations Centers and Transit Management Centers | | ∴ |
| Alamont Commuter Express (ACE) Train (service between Stockton/ Tracy and San Jose) | ∴ | |
| Caltrain | ∴ | |
| Amtrak California | ∴ | |

Appendix 1 – Existing and Currently Planned Projects (continued)

| Existing and Currently Planned Projects | Existing | Planned |
|---|----------|---------|
| ELECTRONIC PAYMENT | | |
| Title 21 (Statewide Electronic Toll Collection Standard) and FasTrak™ (Transponder currently in use statewide) | | |
| Go Ventura, Ventura County | | |
| Los Angeles County MTA SmartCard system | | |
| TransLink®, San Francisco Bay Area | | |
| E-Payment via Magnetic Cards, various Transit Agencies | | |
| GOODS MOVEMENT | | |
| Caltrans Single-Trip Application and Routing System (STARS) | | |
| Commercial Vehicle Information Systems and Networks (CVISN) | | |
| Heavy Vehicle Electronic License Plate, Inc. | | |
| International Registration Plan, Inc., IRP Clearinghouse | | |
| Motor Carrier Management Information System (MCMIS) | | |
| Safety and Fitness Electronics Records System (SAFER) | | |
| CA Commercial Vehicle Inspection System (CCVIS) | | |
| CVO PrePass Sites | | |
| Weigh-In-Motion Stations and By-Pass System | | |
| Operation Respond | | |
| Monterey Bay Regional Freight Logistics Center | | |
| Global Gateways Development Program – including infrastructure improvements for Seaport, Airport, Railroad and Border Crossing Access | | |
| SMART Borders Initiatives at Otay Mesa and San Ysidro International Ports of Entry (POEs) | | |
| Cargo Handling Cooperative Program | | |
| Center for the Commercial Deployment of Transportation Technologies | | |
| VEHICLE SAFETY AND CONTROL | | |
| No current ongoing projects. Most recent (current) national initiative is Vehicle Infrastructure Integration. | | |

Appendix 1 – Existing and Currently Planned Projects (continued)

| Existing and Currently Planned Projects | Existing | Planned |
|---|----------|---------|
| ARCHIVED DATA | | |
| Caltrans/Performance Monitoring System (PeMS, UC Berkeley) | : | |
| Division of Transportation Systems Information internet site (Caltrans “warehouse” of travel related information, includes State Highway inventory, various travel statistical reports, and GIS maps, etc.) | : | : |
| Various existing and planned local/regional ADUS | : | : |
| EMERGENCY MANAGEMENT | | |
| Various existing regional emergency management initiatives | : | |
| National Institute for Environmental Renewal (NIER) HAZMAT Information | : | |
| Various existing regional emergency management initiatives | : | |
| Private EMS Provider Dispatch | : | |
| California Highway Patrol (CHP) local and regional Dispatch and 911 Centers | : | |
| MAINTENANCE AND CONSTRUCTION MANAGEMENT | | |
| Caltrans Real-Time Work Zone Travel Delay Monitoring Systems | : | |
| Caltrans Maintenance Districts | : | |

APPENDIX 2

BIBLIOGRAPHY

1. USDOT, *Regional ITS Architecture Guidance: Developing, Using, and Maintaining an ITS Architecture for Your Region*, October 12, 2001
2. USDOT, *National ITS Architecture, version 5.0*, October, 2003
3. FHWA/FTA, *ITS Architecture and Standards Final Rule/ Policy (23 CFR Parts 655 and 940 Intelligent Transportation System Architecture and Standards)*, effective April, 2001
4. *Advanced Transportation Systems Program Plan – 1996 Update: Framework for a California Partnership*, December 1998
5. *Advanced Transportation Systems Program Plan*, October 1995
6. *BayArea Regional Intelligent Transportation Systems Plan Project Deliverable 9: Architecture Maintenance*, April 2004
7. *California Commercial Vehicle Operations Strategic Business Plan*, November 1999
8. California Department of Transportation, Director’s Traveler Information Task Force, *Traveler Information Implementation Plan* (document not dated)
9. California Department of Transportation, Director’s Traveler Information Task Force, *Meeting Record*, August 1, 2001
10. California Department of Transportation, Director’s Traveler Information Task Force, *Proposed Traveler Information Strategy for Caltrans and California*, Memorandum from Jeff Morales to Janet Friedl and Russell Snyder, March 5, 2001
11. California Department of Transportation, Division of New Technology and Research, *Intelligent Transportation Systems Deployment Plan Strategic Evaluation*, June 2002
12. California Department of Transportation, Division of New Technology and Research, *Inventory, Compliance, and Deployment Document*, October 2000
13. California Department of Transportation, Division of New Technology and Research, *Inventory, Compliance and Deployment Appendices*, October 2000
14. California Department of Transportation, Division of New Technology and Research, *New Directions: An Action Summary for Southern California ITS Priority Corridor*, February 2000
15. California Department of Transportation, Division of New Technology and Research, *New Directions: A Strategic Deployment Guide for the Southern California ITS Priority Corridor*, May 2000

16. California Department of Transportation, Traffic Operations Program, *TMC Master Plan*, Revised December 1997
17. *California ITS Deployment Initiatives*, February 2000
18. *California ITS Developing the Business – Final Report*, 1998
19. *California ITS System Architecture*, Final Deliverable, July 1999.
20. *California Transportation Plan 2025*, August 2003
21. *California/Oregon Advanced Transportation Systems – Regional Architecture*, December 2000
22. *California’s National Parks Service Needs Assessment (still being developed)*, January 2003
23. *California State Rail Plan*, January 2002
24. *California Statewide Rail Transportation Assessment*, September 2002
25. *Central Coast ITS Strategic Deployment Plan, Executive Summary*, June 2000
26. *Central Coast: ITS Project Documentation, Volume Three*, June 2000
27. *Central Coast: ITS Project Implementation Guide, Volume Two*, June 2000
28. *Central Coast: ITS Strategic Plan, Volume One*, June 2000
29. *Connecting Californians: California Transportation Plan 2025*, August 2002
30. *Global Gateways Development Program - Final Report*, January 2002
31. *Inland Empire Regional Intelligent Transportation Systems (ITS) Architecture*, July 2003
32. *ITS/CVO and CVISN: Implications for Security and Commercial Freight Mobility*. Presentation at 2003 CAATS Annual Meeting, San Diego, December 2003.
33. *ITS Deployment Plan Strategic Evaluation*, June 2002
34. *ITS Standards Program Update*, April 2002
35. *Los Angeles and Ventura Region Intelligent Transportation Systems Strategic Deployment Plan*, October 1998
36. Los Angeles County MTA, *Regional Integration of Intelligent Transportation System (RIITS), Los Angeles County ITS Integration Master Plan*, October 2002
37. *Los Angeles County Regional ITS Architecture*, April 2004
38. Los Angeles MTA (RIITS), *Regional ITS Architecture*, October 2002

39. *Los Angeles Spread Spectrum Radio Traffic Signal Interconnect, Practical Lessons Learned Evaluation Report*, June 1999
40. Metropolitan Transportation Commission (MTC), *ITS Early Deployment Plan*, 1996
41. Metropolitan Transportation Commission (MTC), *Assessment Plan*, June 2002
42. Metropolitan Transportation Commission (MTC), *ITS Inventory Design Plan*, May 2002
43. Metropolitan Transportation Commission (MTC), *State of ITS in the San Francisco Bay Area*, November 2002
44. Oak Ridge National Laboratory, *Cross-Cutting Studies and State-of-the-Practice Reviews: Archive and Use of ITS-Generated Data*, April 30, 2002
45. Orange County Transportation Authority, *ITS Study Update*, 1996
46. Orange County Transportation Authority, *ITS Master Plan Update (Final Draft)*, August 1998
47. *Oregon ITS Strategic Plan, 1997-2017*, October 1998
48. *Rural California and Oregon Advanced Transportation Systems (COATS): Regional Architecture*, December 2000
49. *Rural California and Oregon Advanced Transportation Systems (COATS): ITS Strategic Deployment Plan*, May 2001
50. Sacramento Area Council of Governments, *ITS Early Deployment Plan*, 1996
51. Sacramento Area Council of Governments, *Project Report, Sacramento ITS Deployment Partnership: Proposals for a Sacramento Transportation Area-Wide Network and Smart Corridor Development*, June 1999
52. Sacramento Area Council of Governments, *Sacramento Regional ITS Architecture – Executive Summary and Final Report*, July 2001
53. *STARNET System Needs Assessment*, Nov. 2001
54. *San Diego Region Intelligent Transportation Systems Architecture: Detailed Document*, Feb 2003
55. *San Diego Region System Architecture Summary*, August 2002
56. *San Joaquin Valley Intelligent Transportation System (ITS) Strategic Deployment Plan-Final*, September 2001
57. *Sierra Nevada ITS Strategic Deployment Plan*, June 2002
58. Smart Card Alliance, *Transit and Retail Payment: Opportunities for Collaboration and Convergence*, October 2003

59. *Southern California ITS Priority Corridor Strategic Deployment Plan, Interim Report*, August 1998
60. *Southern California Priority Corridor Intermodal Transportation Management and Information System (SHOWCASE) High Level Design, Showcase Kernel Network System Impact Document*, March 2000
61. *Statewide Goods Movement ITS Action Plan: Task 1 ITS Inventory Report*, May 2002
62. *Statewide Goods Movement ITS Action Plan: Task 5 Final Report*, May 2002
63. *Strategic Plan – Intelligent Transportation Systems (Riverside County Transportation Commission, San Bernardino Associated Governments)*, April 2000
64. *Status of California ITS Transportation Systems*, March 1999.
65. *Tahoe Basin ITS Strategic Plan Working Paper #2: ITS Vision for the Tahoe Basin*, Revised November 2000
66. *Tahoe Basin ITS Strategic Plan, Report #1: Market Packages and Functional Requirements*, November 2001
67. *Tahoe Basin ITS Strategic Plan, Working Paper #1: System Inventory Deficiencies, and Opportunities Assessment*, November 2002
68. *Tahoe Basin ITS Strategic Plan, Working Paper #3: ITS Project Funding Sources*, February 2002
69. *Tahoe Basin ITS Strategic Plan, Working Paper #4: Functional Areas and Technology Options*, May 2002
70. *Tahoe Gateway Counties ITS Strategic Deployment Plan, Report #1: Market Package and Functional Requirements*, January 2002
71. *Tahoe Gateway Counties ITS Strategic Deployment Plan, Report #2: Regional Architecture and Implementation Plan*, May 2002
72. Texas Transportation Institute, *Guidelines for Developing ITS Data Archiving Systems*, September 2001
73. Texas Transportation Institute, *Guidelines for The National Intelligent Transportation Systems Program Plan: A Ten Year Vision*, January 2002
74. *Transit Communication Interface Profile*, August 2002
75. *Transit ITS Standards Program Update*, April 2002
76. *Transportation Management Systems (TMS) Arterial Signalization Business Plan*, December 2002

77. *Transportation Management Systems (TMS) Baseline Inventory*, February 2002
78. *Transportation Management Systems (TMS) Detection Plan*, December 2002
79. *Transportation Management Systems (TMS) Incident Management Business Plan*, December 2002
80. *Transportation Management Systems (TMS) Ramp Metering Business Plan*, December 2002
81. *Transportation Management Systems (TMS) Transportation Management Centers: Development Considerations and Constraints*, December 2002
82. *Transportation Management Systems (TMS) Traveler Information Business Plan*, December 2002
83. Transportation Research Board, *TCRP Report 94: Fare Policies, Structures and Technologies: Update*, 2003
84. *Transportation System Performance Measures*, October 2000
85. United States Department of Transportation, Federal Highway Administration, *Evaluation Strategy*, December 1997
86. United States Department of Transportation, Maritime Administration, *Intermodal Access to US Ports, Report on Survey Findings*, August 2002
87. Ventura County Transportation Commission, *Using Technology to Help Move People and Products: A Strategy for Ventura County*, September 2001