SOUTHERN CALIFORNIA REGIONAL ITS ARCHITECTURE

EXISTING AND PLANNED CROSS-COUNTY SERVICES

2011 UPDATE

Prepared for:

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

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CONTRACT INFORMATION

2005 Version

This document is produced as the deliverable for Phase 1 of a series of documents divided into four phases that collectively represent the Southern California ITS Regional Architecture. The value of the contract, Agreement No. 07A1670 is as follows:

Table 1 - Contract and Sub-Contracts

Prime – NET	$315,674
Sub-URS	$112,973
Sub-Transportation & Energy Solutions	$44,729
Sub-Albert Grover Associates	$32,004
Sub-Franklin Hill Group	$14,952
Sub-ITS Consensus	$14,040
Sub-Amelia Regan	$8,100
Total Prime + Subs	$542,472

2011 Update

This revision, delivered in 2011, was developed under contract to SCAG to represent an update to the 2005 original version. This report reflects the existing and planned cross-county services as updated to reflect 2011 industry conditions and existing and planned programs of the public and private sector within the region. This effort was led by Kimley-Horn and Associates, Inc. as the prime contractor with subconsultant services provided by ConSysTec, Halcrow, and BGM Consulting.

REVISION TABLE

2005 Version

Version No.	Date Submitted	Comments
Draft 1.0	November 30, 2004	
Draft 2.0	December 17, 2004	
Draft 3.0	January 25, 2005	
Draft 4.0	February 22, 2005	
Final 5.0	April 7, 2005	
Final 6.0	April 15, 2005	

2011 Update

Filename	Version No.	Date Submitted	Comments
SCAG Regional Arch Existing and Planned 011911mh.doc	Draft 1.0	January 19, 2011	First Draft

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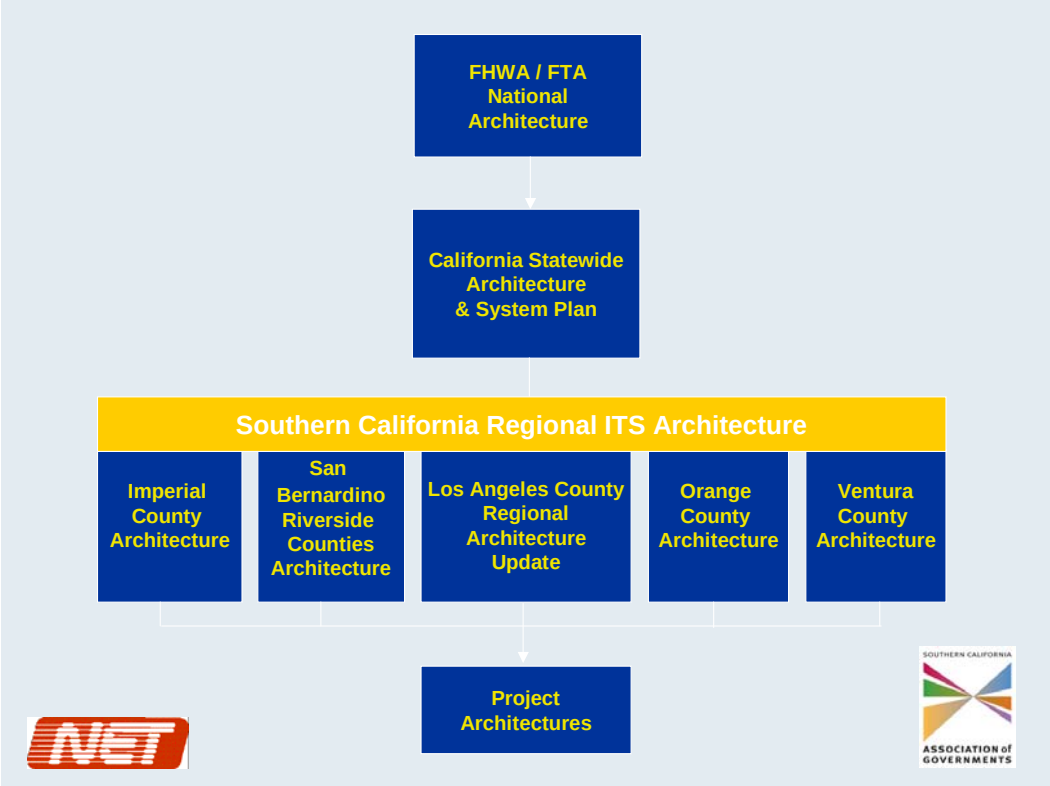
1 INTRODUCTION

1.1 Project Purpose and Background

A regional Intelligent Transportation System (ITS) architecture is a structured view of the world of transportation technology and is intended to help optimize the benefit of individual investments. That is, it tries to capitalize on years of previous investment in transportation technology by identifying the interfaces and paths that will make it possible to integrate many systems in the future. Sharing information in this way multiplies the value of the original investment many times over while promoting the efficiency of regional transportation operations.

The Southern California Regional ITS Architecture provides a framework that includes a vision for the future deployment of ITS applications throughout the region. The Regional ITS Architecture incorporates the existing and planned ITS projects, and it effectively provides a path to be followed as new projects are conceived, designed and deployed. This ITS architecture approach is shown in Figure 1-1.



Source: NET, 2005

Figure 1-1: Structure of the Regional Architecture

As can be seen in Figure 1-1, the National Architecture developed by the Federal Government is the source of structure for the architecture documents developed by the individual counties. Each county regional ITS architecture represents a complete statement of the county approach to their vision for ITS. Each one is different and represents different levels of maturity and scale. There is also a need to link these individual county architectures through consideration of multi-county issues that cross the internal borders of the extensive Southern California region. These issues are documented in the Southern California Regional ITS Architecture statement on Multi-County issues. Collectively the five County-level Regional ITS Architectures and this Multi-County Issues document represent the complete

statement of the Southern California Regional ITS Architecture. This statement meets the requirements of the Transportation Equity Act for the 21st Century (TEA-21) the Federal Highway Administration (FHWA) / Federal Transportation Agency (FTA) Rule ("Rule"), now implemented as 5206(e), which requires that all ITS projects funded from the Highway Trust Fund (including transit projects funded from the Mass Transit Account) be in conformance with the National ITS Architecture and appropriate standards.

Definitions of the term "Regional" are troublesome in the context of this project. The county-level architectures have been historically developed with the term "Regional" in their titles. The "Rule" however refers to a "region" as being, at a minimum, the area within the Metropolitan Planning Organization (MPO). *This document will therefore use the expression "Southern California Regional ITS Architecture" to refer to the collective, multi-county set of documentation.* To help distinguish the different architectural levels this document will refer to county-level architectures when meaning the individual county regional ITS Architectures. **This architecture document, which addresses only those issues that cross the county borders, will be referred to as the multi-county or multi-county issues document.**

1.2 Project History

The original Southern California Region ITS Architecture was published in 2005 and represents the first "layered" approach to ITS architecture definition in Southern California. In addition to the cross-county issues, individual regional architectures were updated at that time for each of the six counties that comprise the SCAG region.

This revision, delivered in 2011, was developed under contract to SCAG to represent an update to the 2005 original version. This report reflects the existing and planned cross-county services as updated to reflect 2011 industry conditions and existing and planned programs of the public and private sector within the region. At this time, recommendations will be offered to regional champions to reflect potential changes that they may choose to make to their respective regional ITS architectures.

1.3 Organization

This document sets out the statement on Multi-County Issues for the Southern California Regional Architecture and is organized in the following sections:

1. Introduction
2. Regional Description
3. Regional Stakeholders
4. ITS Inventory
5. ITS Needs and Operational Concepts
6. Functional Requirements
7. Information Flows and Interface Requirements
8. Project Sequencing
9. Identification of Required Standards
10. Architecture Maintenance
11. Agency Agreements

Appendices:

- Acronyms and Terms
- Inventory Report
- Stakeholder Report
- ITS Flows
- Comments Disposition

2 REGIONAL DESCRIPTION

2.1 Introduction

This section provides the context for the development of the Southern California Regional ITS Architecture. We begin with a consideration of the general demographic and geographic characteristics of the area and the existing transportation systems of the region. It is important to recognize from the outset the immense size, diversity, and complexity of the region for which the Southern California Regional ITS Architecture will be developed and deployed. The general characteristics of the region are identified and will be used as a frame of reference throughout the Southern California Regional ITS Architecture Document.

The Southern California Association of Governments (SCAG) is the Metropolitan Planning Organization (MPO) for six Southern California counties: Los Angeles, Orange, Ventura, Imperial, Riverside, and San Bernardino. The region includes 187 cities and constitutes the nation's second largest MPO by population and the largest MPO by land area. It includes the County of San Bernardino which is the largest county in the nation by land area and the County of Los Angeles, the largest county in the nation by population. This is shown in Figure 2-1.

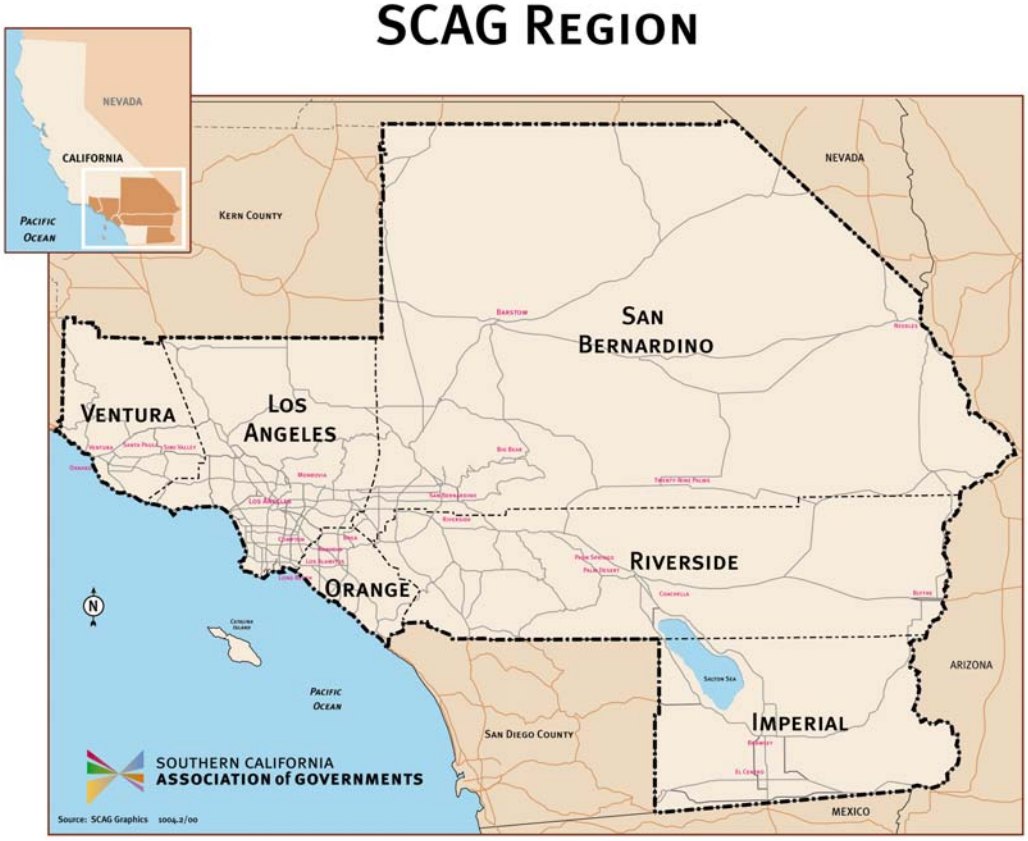


Figure 2-1: The Six County SCAG Region

The extent of the SCAG region means that it also has many neighbors. The Inland Empire, which includes San Bernardino and Riverside, has borders with the States of Arizona and Nevada to the east and Kern County to the north. Imperial County has both an international border with Mexico, a state border with Arizona and a county border with San Diego County. San Diego County is outside the SCAG region but is an integral part of the Southern California region and the urban development that

stretches from the United States/Mexico border to Ventura County to the north. Orange County connects directly to San Diego County at its southern border. Three counties, Ventura, Los Angeles, and Orange all have the Pacific coastline at their edge, which gives rise to both dense concentrations of population and major transportation gateways to the Pacific.

The SCAG region encompasses a population of 18.5 million (49 percent of California's population) in an area of more than 38,000 square miles. FHWA forecasts that the SCAG region will add an additional five million residents over the next 20 years. In 2007, the region's Gross Regional Product was $865 billion and ranked 16th among all National Economies.

This large population, mostly confined to areas surrounded by mountainous terrain, with a vibrant economy and predominately auto-oriented travel, goes hand in hand with severe traffic congestion and air quality problems. Extensive commuting in a hot region with a natural physical landscape that encourages smog formation only exacerbates the air quality problems.

Freight movement through the region is also a critical aspect of the region's transportation network. Southern California is home to the nation's largest container port complex within the Ports of Long Beach and Los Angeles plus Port Hueneme, the U.S. Port of Entry for California's Central Coast. Additionally, a major air cargo center at Los Angeles International Airport and the growing cargo center of Ontario International Airport, a West Coast rail hub, and numerous regional distribution centers, generate tremendous freight movement activity.

The region's transportation system, which includes the networks and support infrastructure, are of the utmost importance to the mobility, safety, security, and economic vitality of both the region and its inhabitants. Throughout the region significant investment in ITS technologies is being used to help increase the efficient management of the transportation networks. While ITS alone will not solve the region's transportation problems, ITS applications provide key management tools that help the operational efficiency of the network. ITS applications are also expected to significantly contribute to security and safety, e.g. on high truck volume freeways and at rail/highway crossings. The greatest challenges and perhaps the greatest benefits lie in integrating major systems across the entire region.

2.2 Major Roadways

By 2007, the SCAG region had 9,424 lane-miles freeway (non-carpool), 1,033 lane-miles of managed lanes (High Occupancy Vehicle (HOV) lanes and High Occupancy Toll (HOT) lanes), and 38,871 lane-miles of arterial roads. The region's roadway networks are equipped with vehicle detection , Closed-Circuit Television (CCTV) cameras, Dynamic Message Signs (CMS), ramp meters, Highway Advisory Radio (HAR), and Environmental Sensor Stations are employed in strategic locations. These ITS field elements are connected to the Transportation Management Centers (TMCs) for the California Department of Transportation (Caltrans) Districts 7, 8 and 12.

In summary, the SCAG region maintains and operates an extensive roadway and freeway system within its vast area. These are identified through individual county architectures that contain a listing of the significant roadways for their respective areas. Please refer to those documents for the roadways, as the lists are not included in this document.

2.3 Highway Use and Congestion

The total vehicle miles traveled (VMT) in the region exceeded 144 billion in 2001. Travelers in Los Angeles and Orange counties experienced a total of 72 hours of delay during the peak period in 2005 compared to 49 hours of delay in San Bernardino and Riverside counties and 39 hours for Ventura County. Los Angeles County has four of the ten most congested highway locations in the U.S., namely the I-405 at the I-10 interchange, U.S. 101 at the I-405 interchange, State Route 55 at the State Route 22

Interchange, and the I-10 at the I-5 interchange. Each location average ten (10) minutes of delay per vehicle per trip during peak hours. Trucks are significant contributors to congestion but are also affected by congestion, and the resultant costs ultimately affect all residents and consumers.

2.4 Emergency Management Services

The California Highway Patrol (CHP) provides traffic patrols and response to incidents and emergencies with responsibility for all freeways, conventional state routes, and some roadways in unincorporated areas of the county. They also provide service under contract to the Toll Roads in Orange County. Both CHP and Caltrans staff monitor traffic conditions and incident information at the Caltrans TMCs for dissemination to field staff. Information disseminated may include CCTV camera images, status reports from field crews, traffic flow data, weather data, CHP incident reports, or summaries of 911 calls. The field staff may include CHP officers, Caltrans maintenance crews, local agencies, including police and transit officials, and private contractors involved in towing, roadside maintenance, or hazardous material spill cleanups.

In addition to CHP, each county has Sheriff and Fire Departments that provide law enforcement, fire protection, and Emergency Medical Services (EMS) in unincorporated areas of the county, as well as to certain city jurisdictions under contract arrangements. These departments are dispatched through county 9-1-1 centers. These centers are equipped with Computer Aided Dispatch (CAD) systems, which allow dispatchers to initiate emergency response through radio dispatch communications and then track response activities performed by field personnel. Many of the larger cities also have their own police and/or fire departments, which handle law enforcement, fire protection, and EMS for their jurisdictions. The larger agencies are most often but not always CAD-equipped.

2.5 Transit Use and Performance

In 2007, there were 5,443 public transit buses in this region. In 2006, the total number of transit boardings reached 737 million, with 48 transit trips per capita. Expanded transit services, particularly the heavy rail, light rail and commuter rail, attracted additional transit riders. Nevertheless, transit usage in the region currently accounts for nearly 5% of the total work trips and 2% of the total person trips.

The two basic types of transit service are fixed route and demand-responsive. The first type allows buses to operate on fixed schedules on a fixed route. Demand-responsive service allows route changes based on individual trip requests. The fixed route service also accommodates commuters using long-distance routes (also referred to as Express Routes), which provide trips to and from a single destination without intermittent stops. Demand-responsive services for the elderly and disabled are offered in the region. For both large and small fixed route systems, ITS applications are multi-faceted and may integrate two or more of the following functions: automatic vehicle location, vehicle and equipment monitoring, customer information, signal priority, fare box summaries, and central dispatch center facilities. For demand-responsive systems, the primary ITS application is automated trip scheduling and in some cases in conjunction with Automatic Vehicle Location (AVL) systems.

2.6 Metrolink

Metrolink is a premier regional rail system linking communities to employment and activity centers. In August 1991, the Southern California Regional Rail Authority (SCRRA), a Joint Powers Agency (JPA), was formed. The purpose of SCRRA was to plan, design, construct and administer the operation of regional passenger rail lines serving the counties of Los Angeles, Orange, Riverside, San Bernardino and Ventura. The SCRRA named the regional commuter rail system "Metrolink." Today, Metrolink serves 43,463 daily passengers in 50 cities throughout Southern California.

There are 11 SCRRA board members from five member agencies. These agencies are: Los Angeles County Metropolitan Transportation Authority, Orange County Transportation Authority, Riverside County Transportation Commission, San Bernardino Associated Governments, and Ventura County Transportation Commission. Metrolink has about 630 employees throughout its service areas.

2.7 Amtrak

The Pacific Surfliner Route is one of three passenger rail routes financially supported by the State of California. The route runs generally southeast to northwest along the Pacific Coast of California, connecting the cities of San Diego, Los Angeles, Oxnard, Santa Barbara and San Luis Obispo.

2.8 Freight Multimodal Corridors

Freight movement in Southern California consists of three major markets:

- Regional and local distribution, that accounts for 23% of the total freight shipped in the region
- Domestic trade and national distribution, that accounts for 77% of the freight shipped in the region
- International trade. Over 13.8% of the nation's trade (by value) passes through the region.

The modes of freight transportation include truck, air, water, and rail. An extensive network of multimodal facilities has developed in order to link the large cargo volumes of both domestic and international trade moving between Southern California and the rest of the country. The regional air cargo system also serves the domestic trade system. Southern California is a major rail hub with both Western Class I railroads operating on mainlines that connect the region to the national rail network.

The Alameda Corridor was the nation's largest freight-oriented public works project when it consolidated harbor-related rail traffic from four separate branch lines into a 20-mile, fully grade-separated route. The corridor connects the Ports of Los Angeles and Long Beach to the transcontinental rail line near downtown Los Angeles, eliminating 200 at-grade crossings and doubling rail speeds. The Alameda Corridor has helped the port area cope with growth in international trade and roadway/railroad congestion by facilitating more efficient on-dock rail movements to and from the ports and reducing delays at rail grade crossings. Increased on-dock rail will also have positive air quality implications as rail movements emit fewer pollutants per ton-mile than trucks. The elimination of 200 at-grade rail-roadway crossings has reduced accidents along the Corridor and improved the safety of the freight transportation system.

An effort to further improve the movement of goods on rail from the ports is underway with the Alameda Corridor East. The project that will construct grade separations along the Alhambra Subdivision and Los Angeles Subdivision tracks that run 35 miles east from downtown Los Angeles to San Bernardino County. The project will eliminate 39 at grade crossing that clog north-south streets throughout the San Gabriel Valley.

The region includes six rail-truck intermodal facilities, including Burlington Northern Santa Fe's (BNSF) Hobart Intermodal Facility, the busiest in the U.S. (handling over 90,000 lifts per month). There are three major interstate highway corridors in the region: I-5 (providing linkages to the rest of the West Coast of the U.S., Canada, and Mexico); I-15/I-40 (providing links to the interior U.S.); and I-10 (the "Southwest Passage" to the rest of the Sun Belt). Each of these interstates ranks among the highest truck volume corridors in the Western U.S.

2.9 Airports

The region is a major air cargo center, home to three international airports (Los Angeles International Airport, San Diego International Ariport, and Ontario International Airport) and numerous commercial airports. Most of the region's air cargo moves through Los Angeles International Airport (LAX), making it the thirteenth busiest air cargo facility in the world. (LAWA 2008) Air cargo is critical for many manufacturing operations both in the U.S. and abroad. The high-value cargo typically shipped by air explains why LAX handles more exports by dollar value ($36.5 billion in 1997) than the nearby Ports of Long Beach and Los Angeles ($35.2 billion).

LAX is administered by the Los Angeles World Airports (LAWA) agency, a department of the City of Los Angeles. LAX accommodates passengers as well as freight movement. LAX operates as two distinct functional areas of responsibility, airside operations and groundside operations. The airside operations group is concerned with air traffic control and air terminal operations. The groundside operations group controls and monitors vehicular traffic in and around the Central Terminal Area (CTA). Their TMC is linked to the Los Angeles Department of Transportation Automated Traffic Surveillance and Control (ATSAC), which also controls signals on airport right of way.

In addition to freight transportation, total air passengers in the SCAG region were 87.7 million in 2006 . (State of the Region 2007. SCAG) The annual number of passengers for LAX alone was 59.8 million passengers ranking 6th in total passenger traffic in the world. (LAWA 2008)

2.10 Ports

Southern California is home to three international deepwater port facilities that comprise the Los Angeles Customs Region. The Ports of Los Angeles and Long Beach, respectively the first and second largest container port facilities in the United States, together form the 5th largest container port complex in the world, following Singapore, Hong Kong, Shanghai and Shenzen. Their share of West Coast container cargo is 58 percent of the total traffic, and they handle 41% of the maritime trade in the U.S. (State of the Region 2007. SCAG) Port Hueneme is the only deepwater harbor between Los Angeles and the San Francisco Bay Area. It is the top seaport in the United States for citrus exports and ranks among the top 10 ports in the country for imports of automobiles and bananas.

The Port of Long Beach (POLB) is a department of the City of Long Beach, and the Port of Los Angeles (POLA) is a department of the City of Los Angeles. POLB and POLA transfer container freight between ship and land-based carriers involving multiple organizations. The ports operate in coordination with organizations such as the California Trucking Association and the Steamship Association of Southern California. The ports have a joint project involving the use of vehicle detection, CMS and CCTV for monitoring port access routes. In 2006, the total traffic at the Ports of Los Angeles and Long Beach increased to 210.4 million tons. (State of the Region 2007. SCAG) Close to 84% of all cargo shipments were through containers. In April 2002, the Alameda Corridor was opened and allowed faster transfer of cargo from the twin ports to eastern destinations.

In addition to the Alameda Corridor, two major highways serve the twin port complex. Interstate 710, the Long Beach Freeway, is a heavy trucking corridor that carries traffic from the busy Port of Los Angeles north to downtown Los Angeles, with a connection to transcontinental Interstate 10. The numbering of I-710 as a spur of I-10 is related to the fact that both I-110 and I-710 connect that freeway with the port. The northern terminus of I-710 is temporary. Plans call for extension of I-710 from Alhambra north to I-210 in Pasadena, but the construction has yet to begin due to ongoing controversy of the selected route of the freeway. The southern terminus of I-710 is fractured into three separate spur freeways: the Terminal Island Spur, Downtown Long Beach Spur, and the Queen Mary Spur. I-110 carries traffic from the Port of Los Angeles to downtown Los Angeles and connects to I-10.

To relieve congestion on the I-710, the Los Angeles County Metropolitan Transportation Authority (Metro) completed a major corridor study in 2005 that analyzed transportation improvement alternatives along the corridor. The I-710 project is now preparing an Environmental Impact Report/Environmental Impact Statement (EIR/EIS) to screen the impacts of six alternative strategies including ITS, advanced goods movement technology, freeway widening and truck lane improvements in the study area from the City of Long Beach to SR-60.

2.11 International Ports of Entry

The U.S. Department of Homeland Security, Customs and Border Protection Division, oversees the Port(s) of Entry (POE) department. There are three landside POEs, all of which are in Imperial County. They are: are Andrade (eastern Imperial County on Interstate 8), Calexico East (cargo only) on SR – 7, and Calexico West (passengers and cargo). Table 2-1 indicates their current traffic volumes, which are expected to increase dramatically in the future.

Table 2-1: 2004 Imperial County POE Traffic Volumes

Mode of Transportation	Calexico West (Downtown) POE	Calexico East POE	Andrade POE
Persons Total	**15,950,571**	**6,991,620**	**3,628,255**
Pedestrians on Foot	5,339,244	3,195	1,953,513
Passengers in Vehicles	10,590,421	6,587,376	1,667,227
In Commercial Trucks	0	390,154	5,824
In Buses	13,572	9,131	1,691
In Trains	0	1,764	0
In Private Aircraft	7,334	0	0
Vehicles Total	**5,657,189**	**3,538,023**	**765,525**
Passenger Vehicles	5,652,330	3,228,938	762,815
Commercial Trucks	0	300,041	2,670
Buses	1,621	404	40
Trains	0	252	0
Rail Containers	0	8,388	0
Private Aircraft	3,238	0	0

2.12 Traveler Information Services

The provision of timely, reliable and relevant information to Southern California's travelers has evolved to become an important component of the region's Transportation Systems Management (TSM) and Travel Demand Strategies (TDM). The expansion of traveler information services has gone hand in hand with long term investments in traffic, transit, incident, and weather monitoring and management systems that create the information sources. Two publically-provided traveler information programs provide the public with traveler information services in the SCAG region. The Motorist Aid and Traveler Information System (MATIS) and Inland Empire 511 systems were developed through partnerships with

the transportation commissions from Orange, Los Angeles, Ventura, San Bernardino and Riverside counties.

The LA SAFE MATIS program delivers multi-modal traveler information to the public in Southern California through a 511 interactive voice response (IVR) telephone services and 511 website (go511.com). The system was designed to be the real-time and static data collection, analysis, and dissemination tool to provide relevant traveler information to the public as well as monitor and manage service on the freeways in Los Angeles, Orange, Riverside, San Bernardino and Ventura counties. The system provides information about traffic drive times and freeway speeds, road construction, incidents, buses and trains, carpool/vanpool, bicycle information, and weather. Sources for real-time data include RIITS (District 7), Caltrans Traffic Management Center (District 8 and District 12), Caltrans Lane Closure System portal, California Highway Patrol CAD and Nextrip (transit vehicle status).

After working cooperatively on the LA SAFE MATIS program, the Riverside County Transportation Commission (RCTC) and the San Bernardino Association of Governments (SANBAG) formed a partnership to develop a separate 511 system for the Inland Empire. The system provides a similar traveler information service with an interactive voice response (IVR) telephone component and a 511 website (IE511.org). Traffic coverage includes Los Angeles, Orange, Riverside, San Bernardino and San Diego County. Callers do not have to distinguish between Inland Empire or the LA SAFE MATIS service; callers dial the same 511 number and are handed off to either system depending on the originating area code for landline users or the location of the receiving cell phone tower for mobile users.

2.13 Institutional Complexity

The complexity of ITS planning in the Southern California region is a reflection of the complicated web of governmental institutions and responsibilities for transportation policy, planning and operations. Table 2-2 attempts to summarize the network of institutions and entities that must be considered in developing and deploying ITS. The SCAG Board alone consists of 90 representatives, most of whom are locally elected officials. A quick glance at Table 2-2 indicates why achieving region-wide consensus on anything, much less use of scarce local funding for ITS deployment and operations is difficult. The real challenge lies in trying to bridge the interests of the individual institutions and the constituencies that they represent in order to build support for needed projects that cross all the county borders. In recognition of the political reality of the task, this element of the Southern California Regional ITS Architecture is approached at an extremely high level and is more general in nature than the county-level regional architectures.

Table 2-2: Transportation Policy, Planning and Operations Entities in Southern California

Metropolitan Planning Organization	Southern California Association of Governments						Region Total
Counties	Los Angeles	Orange	Riverside	San Bernardino	Ventura	Imperial	6
Subregional Councils/ Associations of Government	8	1	2	1	1	1	14
Transportation Stakeholders							
Transportation Commissions	1	1	1	1	1		5
Transportation Authorities	1	1	1	1			4
Caltrans Districts	District 7	District 12	District 8	District 8	District 7	District 11	4
Ports	2				1		3
Commercial/General Airports[1]	15	2	13	17	3	6	56
Transit Operators[2]	24	2	7	6	8	6	53
Toll Road Authorities		3					3
International Ports of Entry						3	3
California Highway Patrol							
Local Jurisdictions							
Cities[3]	88	34	24	24	10	7	187
Law Enforcement (Police/Sheriff)[4]	74	25	15	17	11	7	149
Fire Departments/Districts	42	14	34	45	5	14	154
Regulating/Resource Agencies							
Air Quality/Air Pollution ControlDistricts	Mojave Desert South Coast	South Coast	Mojave Desert Salton Sea	Mojave Desert South Coast	Ventura	Salton Sea	4

[1] Source: Federal Aviation Administration Airport Data (5010) Reports, Public-Use Airports only
[2] Source: State of California Controller's Office, Transit Service Operators and/or Claimants Receiving Transportation Development Act (TDA) funds
[3] Source: State of California Department of Finance
[4] Source: Police Officer Standards and Training (POST), includes local police, county sheriffs, airport/port police, school district/college/university police

			South Coast				

Reference:

"*Southern California Regional Freight Study*", FHWA office of Freight Management and Operations, 2004, http://ops.fhwa.dot.gov/freight/freight_analysis/reg_ind_studies/so_cal_study.htm

3 REGIONAL STAKEHOLDERS

The development of ITS Plans and architectures varies greatly between the six counties. Effectively a bottoms-up approach has been adopted with county-level architectures being established first. Each county-level regional architecture has an extensive Stakeholder list and in most cases a core group of champion agencies. For the Multi-County Team a small group was assembled in 2004/2005 representing primarily the Transportation Commissions and Caltrans Districts. This group was deliberately kept small to facilitate the consensus building that had to take place in an abbreviated time-period. Multiple means of outreach were employed at all levels.

The original Multi-County Team, convened in 2004/2005, was represented by local ITS champions from the following agencies:

- Southern California Association of Governments (SCAG)
- Caltrans District 7*
- Caltrans District 8*
- Caltrans District 12*
- Los Angeles County Metropolitan Transportation Authority (Metro)
- San Bernardino Associated Governments (SANBAG)
- Riverside County Transportation Commission (RCTC)
- Ventura County Transportation Commission (VCTC)
- Orange County Transportation Authority (OCTA)
- Imperial County Association of Governments (represented by their consultant team developing their local architecture).
- Imperial Valley Association of Governments (IVAG)

Note*: The Caltrans districts also represent the interests of the CHP in line with Caltrans TMC Master Plan which recognizes collocation of facilities and some joint responsibilities.

The 2011 update was conducted as a minor update to efficiently and cost effectively bring the core cross-county services portion up to date and to add major components including goods movement, express lanes, non-motorized, and positive train control. These new “chapters” each are being developed with focused outreach to appropriate stakeholders. Documentation is provided for each new topic/service area.

4 ITS INVENTORY

4.1 Inventory Approach

Each of the county-level architectures has created inventories of existing and planned systems within their county. Also, this multi-county level of architecture is, by its nature focused on "center-to-center" integration. The field elements of most agencies are captured in their county architectures and need not be repeated in the regional architecture. The exceptions to this are multi-county agencies not captured effectively at the local level such as SCRRA and its Metrolink services. Therefore, the ITS inventory for the Multi-County architecture level of the Southern California Regional ITS Project only focuses on systems or generic categories of systems with projects that involve (or potentially involve) integration across the six county region.

An example of this high level thinking is the classification of the Regional Traveler Information Systems in the inventory. This high level group includes all means and methods of disseminating traveler information regardless of whether they are public or private systems. It covers all modes of transportation and all types of information. The various Market Packages associated with the very high level systems are included. "Systems" as used in this context is a general concept that may include hardware, software, communication, and dissemination devices. For further information concerning this ITS inventory, please refer to Appendix B, which contains the TurboArchitecture™ generated inventory report.

5 ITS NEEDS AND OPERATIONAL CONCEPTS

5.1 Needs

The identification of needs provides the essential framework for architectural development at the highest level. A number of potential concerns were discussed in Multi-County group meetings in 2005. Some of these concerns arose from the latest version of the National Architecture which, emphasizes the relationship of security to ITS. Also the county-level architectures and discussions with Stakeholders identified issues to be considered in the broader context of the six- county region. The issues discussed were:

- Caltrans District Interfaces;
- Regional Data Exchange;
- Advanced Traveler Information Systems;
- Regional Fare Systems;
- Goods Movement;
- Arterial Cross Boundary Data Exchange; and,
- Regional Archives.

Through discussion in 2005, the following needs listed below were identified as consensus items. These needs were revisited and further refined as a part of the 2011 update. These needs are described in the following sections.

5.1.1 Traffic Management

- Interfaces between the Caltrans Districts that create District networks and support coordination between the Districts.
- Interface to provide arterial traffic information exchange between local jurisdictions.

5.1.2 Commercial Vehicle Traveler Information

- Traveler information in support of improved commercial vehicle operations including access to the ports, railroad crossings, and other needs.

5.1.3 Transit Operations and Maintenance

- Operational and maintenance projects in support of regional rail service (only those services that are multi-county such as SCRRA are addressed at this architecture level).
- Improved integration of transit services across the region.

5.1.4 Regional Data Archive

- Data archives for planning and evaluation purposes

5.1.5 Advanced Traveler Information Systems

The two primary, publically offered traveler information services in Southern California represent a major change since the 2005 architecture was developed. While these two systems are now operational, they continue to expand functionally and in some cases geographically to address previously defined needs that were not addressed in initial phases or new needs that are identified over time. Generally the needs related to these systems that would be addressed at this multi-county issue

level relate to system connectivity, improved service and market penetration, performance monitoring and reporting, and enhanced service to tailor service (or provide through a separate system(s)) to commercial vehicles.

5.2 User Services

Southern California Multi-County ITS User Services were narrowed down to reflect only the needs identified above and the existing and planned systems capable of Multi-County integration or services that are being addressed at a multi-county level. This architecture document includes only those projects that fall within the above categories and were anticipated in a ten-year time line. The topics fall into the following categories:

- Archived Data Management
- Public Transportation
- Traffic Management
- Traveler Information
- Commercial Vehicle Operations

Individual market packages are identified below.

Table 5-1: Selected Market Packages

User Service	Market Package	Market Package Name & Description
Archived Data Management System	AD 2	ITS Data Warehouse
	AD 3	ITS Virtual Data Warehouse
Public Transportation	APTS 2	Transit Fixed Route Operations
	APTS 4	Transit Passenger and Fare Management
	APTS 6	Transit Maintenance
Traffic Management		
	ATMS 6	Traffic Information Dissemination
	ATMS 7	Regional Traffic Control
	ATMS 13	Standard Railroad Grade Crossing
	ATMS 14	Advanced Railroad Grade Crossing
	ATMS 15	Railroad Operations Coordination
Traveler	ATIS 1	Broadcast Traveler Information

User Service	Market Package	Market Package Name & Description
Information	ATIS 2	Interactive Traveler Information

5.3 Operational Concepts

From the needs analysis, the market packages of relevance to the Southern California regional architecture have been identified. These in turn become the basis for the operational concepts that link market packages to agencies and their roles and responsibilities within them.

The operational concept process develops and documents Stakeholders' current and future roles and responsibilities in the implementation and operation of ITS based on a common regional architecture. An operational concept is one of the required components of a regional ITS architecture. A useful function of the concept is helping to identify areas of content for multi-agency agreements.

Table 5-2: Southern California Multi-County ITS Operational Concepts

Market Package	Contents	Organization	Roles/Responsibilities
AD 2 ITS Data Warehouse	Collection of data from multiple agencies and data sources spanning across modal and jurisdictional boundaries	LA Metro/Regional Partners	• Develop system interfaces with regional agencies • Use open standards to distribute data to a variety of users • Provide for regular maintenance of data warehouse
AD3 ITS Virtual Warehouse	Provide for a regional archiving warehouse for long term planning	LA Metro/Regional Partners	• Provide a definition of the data to be archived • Provide for regular maintenance of data warehouse
APTS4 Transit Passenger and Fare Management	Receive and process passenger and fare information Receive and process passenger and fare information	SCRRA and Regional Partners	• Provide for installation of communications infrastructure • Provide for installation of new ticket vending machines and validator machines • Provide for enhancements to electronic passenger information system (supplemented by GPS) • Support interoperability with regional fare systems
APTS 5 Transit Security	Provides for the physical security of transit passengers and transit vehicle operators	SCRRA	• Monitor train security • Monitor train station • Receive security call from train operators • Maintain the communication network with transit vehicles and emergency services

Market Package	Contents	Organization	Roles/Responsibilities
ATIS 1 Broadcast Traveler Information	Broadly disseminates traveler information through existing infrastructures and low cost user equipment such as radio and cell phone	LA Metro and Regional Partners	• Provide roadway/transit/goods movement traffic and incident information to travelers • Share traffic information with each other and emergency agencies • Share control of field equipment with other transportation and emergency agencies • Maintain AVI/AVL systems for maintenance vehicles • Update information to ISP and Media Outlets (Websites, TV, etc.) and send alerts on CMS and HAR equipment
ATIS 2 Interactive Traveler Information	Provides tailored traveler information in response to a traveler request	LA Metro and Regional Partners	• Establish and maintain interactive traveler information systems such as itinerary planning website
ATMS 06 Traffic Information Dissemination	Provides driver information using roadway equipment such as CMS or HAR	Regional Partners	• Install and maintain the traffic information dissemination equipment • Update information to ISP and Media Outlets (Websites, TV, etc.) and send alerts on CMS and HAR equipment

Market Package	Contents	Organization	Roles/Responsibilities

ATMS07 Regional Traffic Control	Sharing of traffic information among traffic management centers/agencies to support a regional control strategy	Caltrans/Regional Partners	• Make the following information available to other Caltrans Districts:
			  • Real-time congestion
			  • Real-time incident
			  • CMS with messages (active CMSs)
			  • All CCTV real-time video images
			• Provide a consistent source of data to other Caltrans Districts.
			• Potential future shared control of field devices

		Local Jurisdictions	• Make real-time arterial traffic information available to other agencies
ATMS13 Standard Railroad Grade Crossing	Installation of grade crossing system	SCRRA	• Provide for installation of new grade crossing monitor analyzer system
ATMS14 Advanced Railroad Grade Crossing	Manages highway traffic at highway-rail intersections where demands advanced features (e.g. rail operational speeds >80 mph).	SCRRA	• Design advanced railroad grade crossing safety enhancement strategy • Install advanced railroad crossing equipment
		Arterial Traffic Agencies	• Coordinate with SCRRA in local traffic operation
ATMS 15 Railroad Operations Coordination	Provides an additional level of strategic coordination between freight rail operations and traffic management centers	SCRRA	• Design railroad operation coordination strategy • Provide for installation of equipment for operation coordination
CVO01 Fleet Administration	Make real-time traffic conditions available to commercial vehicles	Regional Partners	• Disseminate traffic conditions (queue backup, etc.) to commercial vehicle operators • Maintain communications infrastructure for information dissemination

Market Package	Contents	Organization	Roles/Responsibilities
MC07 Roadway Maintenance and Construction	Coordinate maintenance activities at transit roadways (i.e. railroad tracks)	SCRRA	• Provide for installation of communications infrastructure • Provide coordination for track improvements (track, bridges, tunnels, etc) • Provide coordination for grade crossing improvements
* MC10 Maintenance and Construction Activity Coordination	Coordinate maintenance activities at transit storage facilities	SCRRA	• Provide for the installation of communications infrastructure • Provide coordination of maintenance and construction activities at transit stations • Provide coordination of construction activities for new storage facilities • Provide for maintenance activities on existing maintenance facilities

* NOTE: Transit in this instance refers to rail systems as well as bus.

6 FUNCTIONAL REQUIREMENTS

At this point the needs, services and market packages as well as the roles of the agencies have been defined in order to continue to developing ITS services. The next step is to list the tasks or activities that are performed by the systems themselves. This can be either the existing systems or those that are planned. Functional requirements can be high level in nature for a plan such this. For a project architecture leading to the procurement of a system, they will, of necessity, be very detailed.

1. Stakeholder: Caltrans HQ (Headquarters)

   System: California Highway Information

   - The system shall provide to the user real-time traffic information

2. Stakeholder: Local Jurisdictions

   System: Arterial Traffic Information

   - The system(s) that support cross boundary data exchange shall be consistent with the county-level regional ITS Architectures

3. Stakeholder: Regional Partners

   System: Regional Traveler Information Systems

   - The system(s) shall provide information to users that will support travel time savings, safety, and modal choice.

4. Stakeholder: Regional Caltrans

   System: Caltrans TMC Interfaces

   - The system shall provide real-time traffic congestion information to adjacent Caltrans Districts
   - The system shall provide real-time incident information to adjacent Caltrans Districts
   - The system shall provide real-time active CMS messages to adjacent Caltrans Districts
   - The system shall provide real-time active CCTV cameras to adjacent Caltrans Districts
   - The system shall provide notification of system maintenance activities that impact the supply of traffic information to other Caltrans Districts

5. Stakeholder: LA Metro

   System: Data Archive

   - The system shall provide appropriate information as may be determined by a regional data archival consensus
   - The Stakeholder shall participate in regular management forums concerning Operations and Maintenance of the data archive

6. Stakeholder: SCRRA

   System: Rail Management Improvement System

   - The system shall provide upgraded ticket vending machines and validation throughout the system
   - The system shall provide overall improvement in fare management and ticketing alternatives
   - The system shall provide for an electronic passenger information system (supplemented by GPS) throughout the system

- The system shall provide for improved software and hardware for maintenance management
- The system shall provide for the application of upgraded maintenance management to way facilities
- The system shall enable procurement to incorporate ITS elements where appropriate to new rolling stock
- The system shall enable rehabilitation of existing rolling stock to incorporate ITS elements where appropriate in order to enhance operations and passenger security, safety and convenience
- The system shall provide for the installation of fiber optic communications system throughout the system in support of ITS systems
- The system shall provide for the installation of ITS systems as appropriate, such as passenger information systems in new track and platforms
- The system shall provide for the installation of ITS systems as appropriate, in parking and station platform and access improvements throughout the system
- The system shall provide for the installation of fiber optic communications system throughout the system that is capable of supporting ITS systems where appropriate
- The system shall include a grade crossing monitor analyzer system to be used throughout the system
- The system shall perform track, signal, and communications improvements including rehabilitation of existing track, signal, and communications throughout the system
- The system shall perform grade crossing improvements throughout the system
- The system shall provide for the improvement of existing layovers throughout the system
- The system shall provide for the building of new layovers in Orange and Ventura Counties

7. Stakeholder: SCRRA

   System: Wayside Hotbox

   - The system shall provide maintenance information to the Maintenance facility.

8. Stakeholder: SCRRA

   System: Rail Data Archive

   - The system shall extract Information to be made available to local government agencies, as well as federal agencies.

7 INFORMATION FLOWS AND INTERFACE REQUIREMENTS

Finally the point is reached in the architecture where it is possible to view the outline of a framework for integrating systems that will reap the benefits of sharing data. The National Architecture Interconnects and Information Flows is the point at which the framework for integration is identified and the potential flows are examined.

There are many ways to represent the potential data flows between systems. US DOT Regional ITS Architecture Guidance (2001) discusses the alternatives. The differences between the various alternatives largely reflect the level of detail of the flows described. Interconnects and data flows are first illustrated at a fairly high level using customized market package diagrams from the National Architecture. In this approach the information flows are only broadly described, i.e. the flows depict "bundles" of data. The following diagrams, Figure 7-1 to Figure 7-, represent at a high level the information flows for the suggested ITS concepts. Figure 7-5 to Figure 7-20 represent the National ITS Architecture Market Packages that have been applied or could be implemented region wide Southern California.

In Figure 7-21, the interconnects are graphically illustrated using TurboArchitecture™ and in Appendix D, the detailed flows are illustrated using TurboArchitecture™ for the sequencing of projects identified in Section 8.

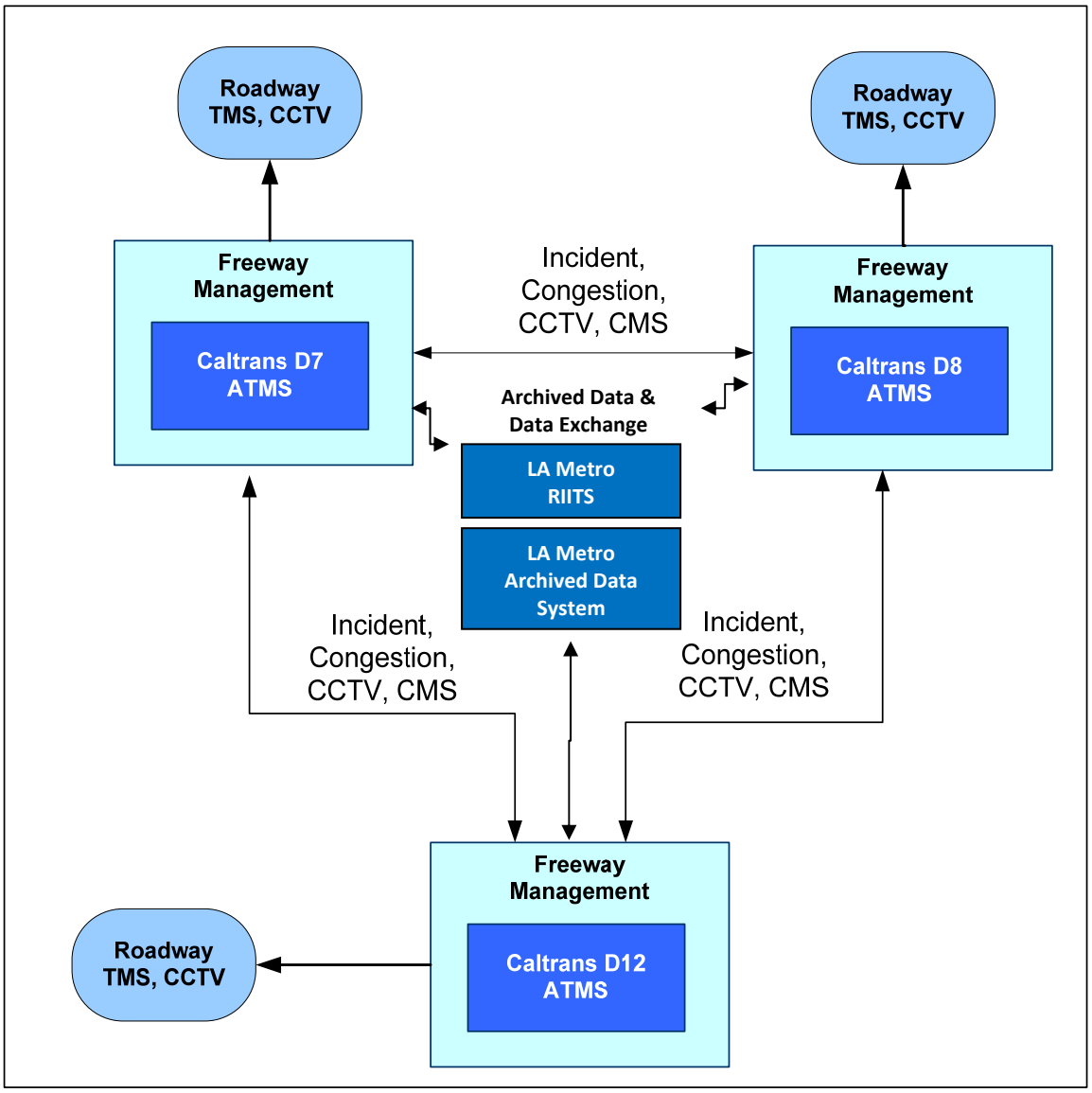


Figure 7-1: Multi Caltrans Districts Interfaces

Figure 7-1 illustrates the intended result of the creation of the Caltrans District interfaces. The project will realize the integrated exchange of data and potential interoperability. Not included in the illustration is the addition of District 11 that will complete the full six-county potential network for information exchange

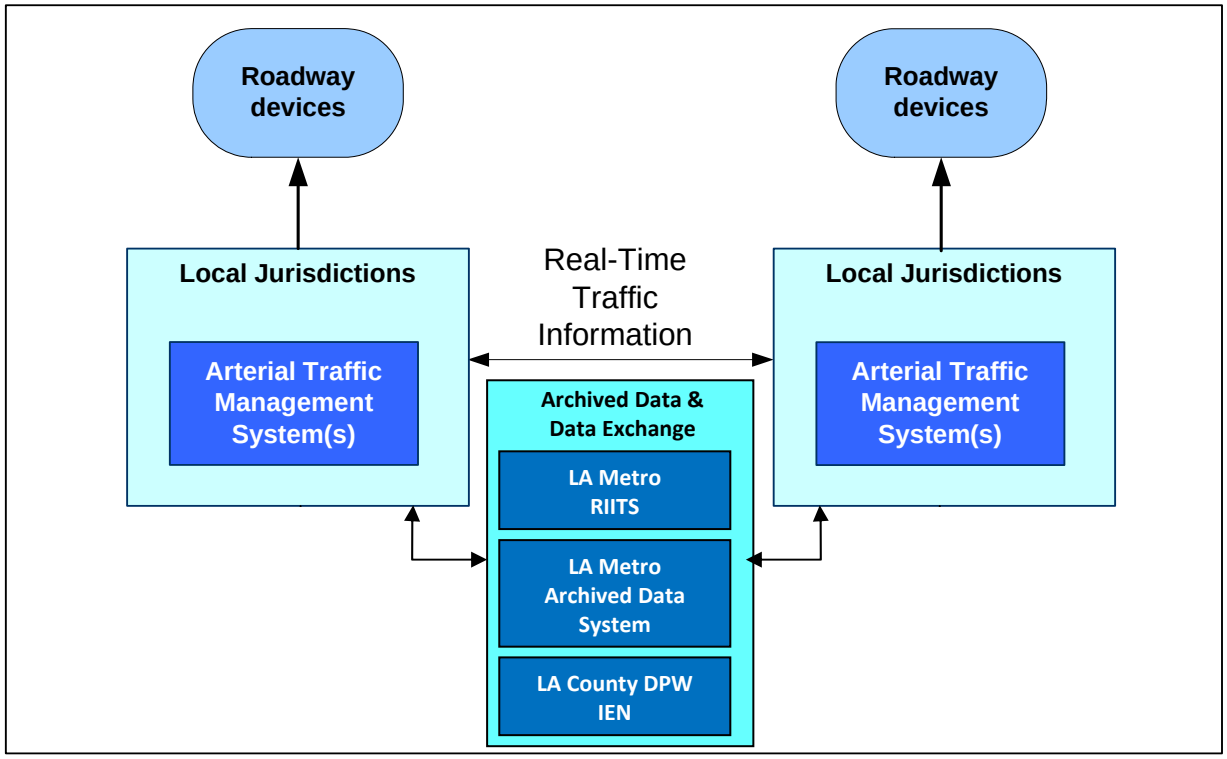


Figure 7-2: Arterial Cross Boundary Data Exchange

Figure 7-2 generically illustrates projects that will involve the exchange of real-time traffic information originating from traffic control systems separated by any one of the county borders. The inclusion of future regional network(s) indicates that if such unspecified networks are or become available they could be used to convey such information to a wider group of users on either side of the border.

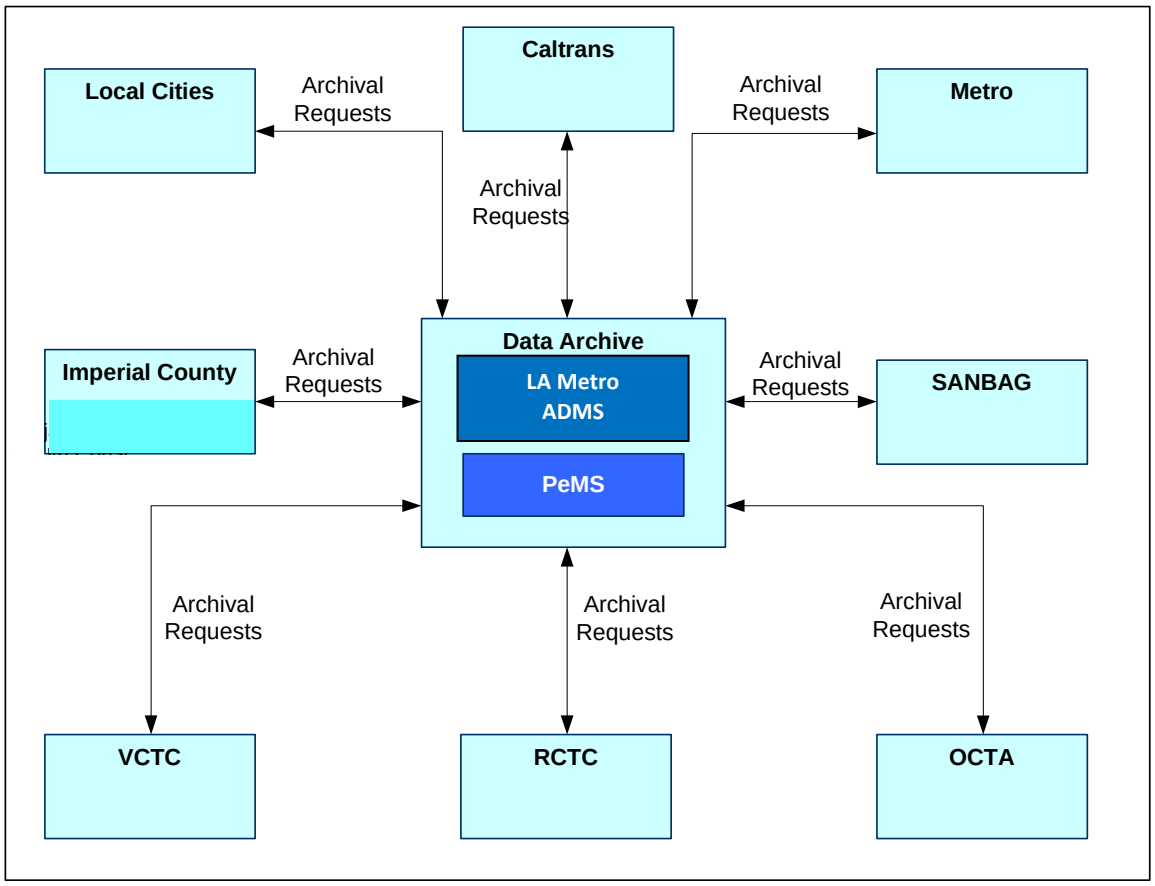


Figure 7-3: Data Archive System(s)

Figure 7-3 illustrates the regional potential to exchange data with a regional archive. LA Metro is located as a central system for the region. However we have also added a statewide system the Performance Management System (PeMS) since it is already used as a statewide repository that is contributed to by the Caltrans Districts and can be accessed by regional users including ISPs.

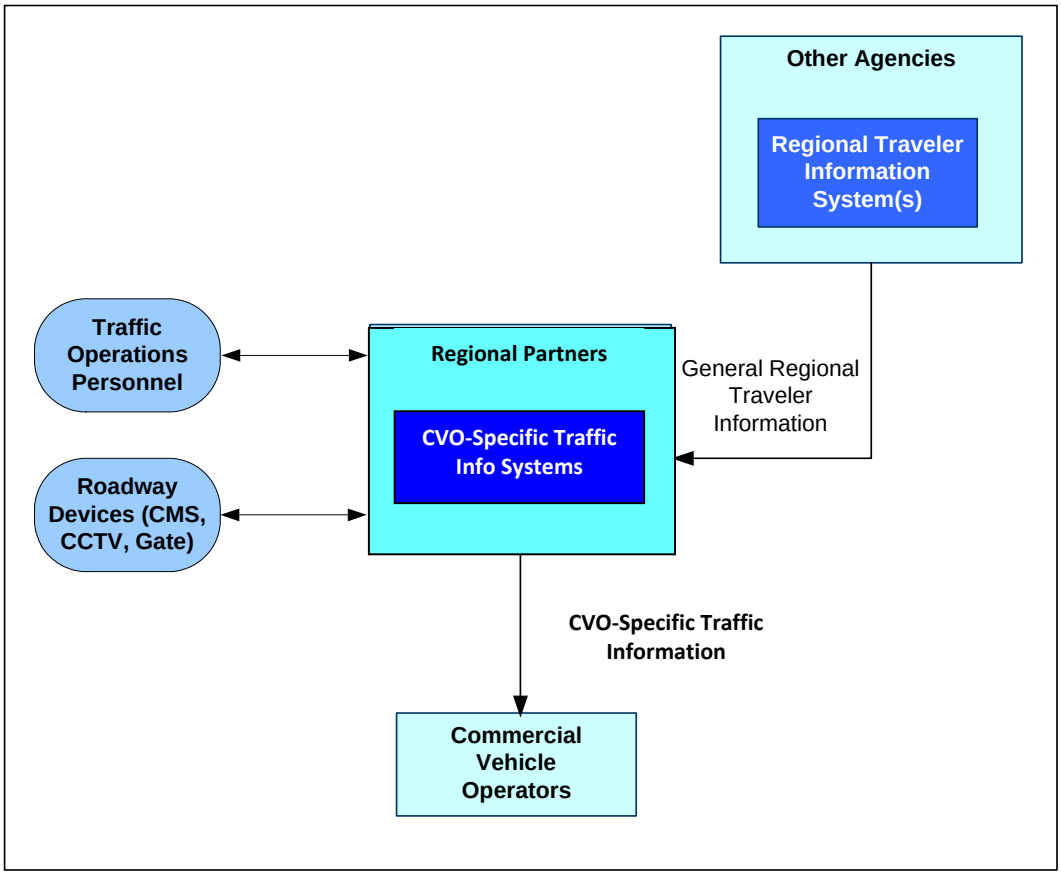


Figure 7-4: CVO-Specific Traffic Information

Figure 7-4 illustrates generically the type of Information System that will deliver tailored traffic information to commercial vehicle operators.

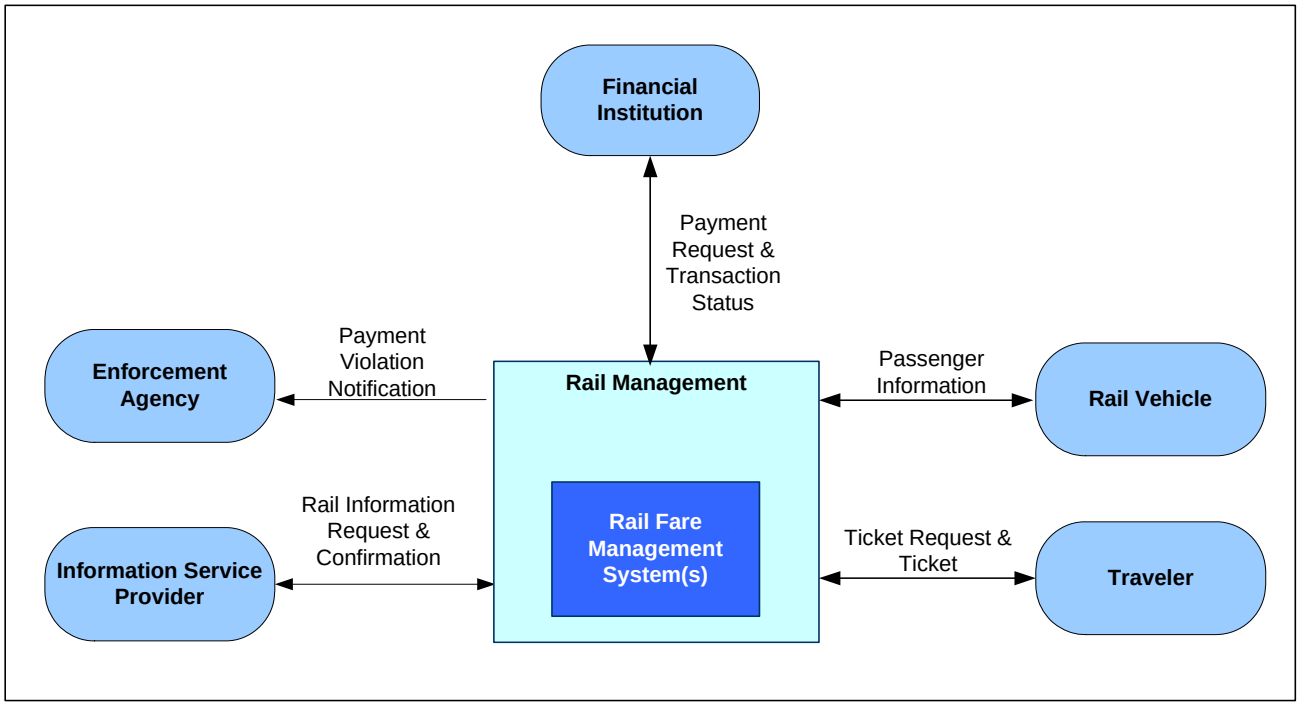


Figure 7-5: Rail Fare System Enhancement

Figure 7- illustrates a regional rail system project that involves modernization and upgrades to the fare management system for Metrolink.

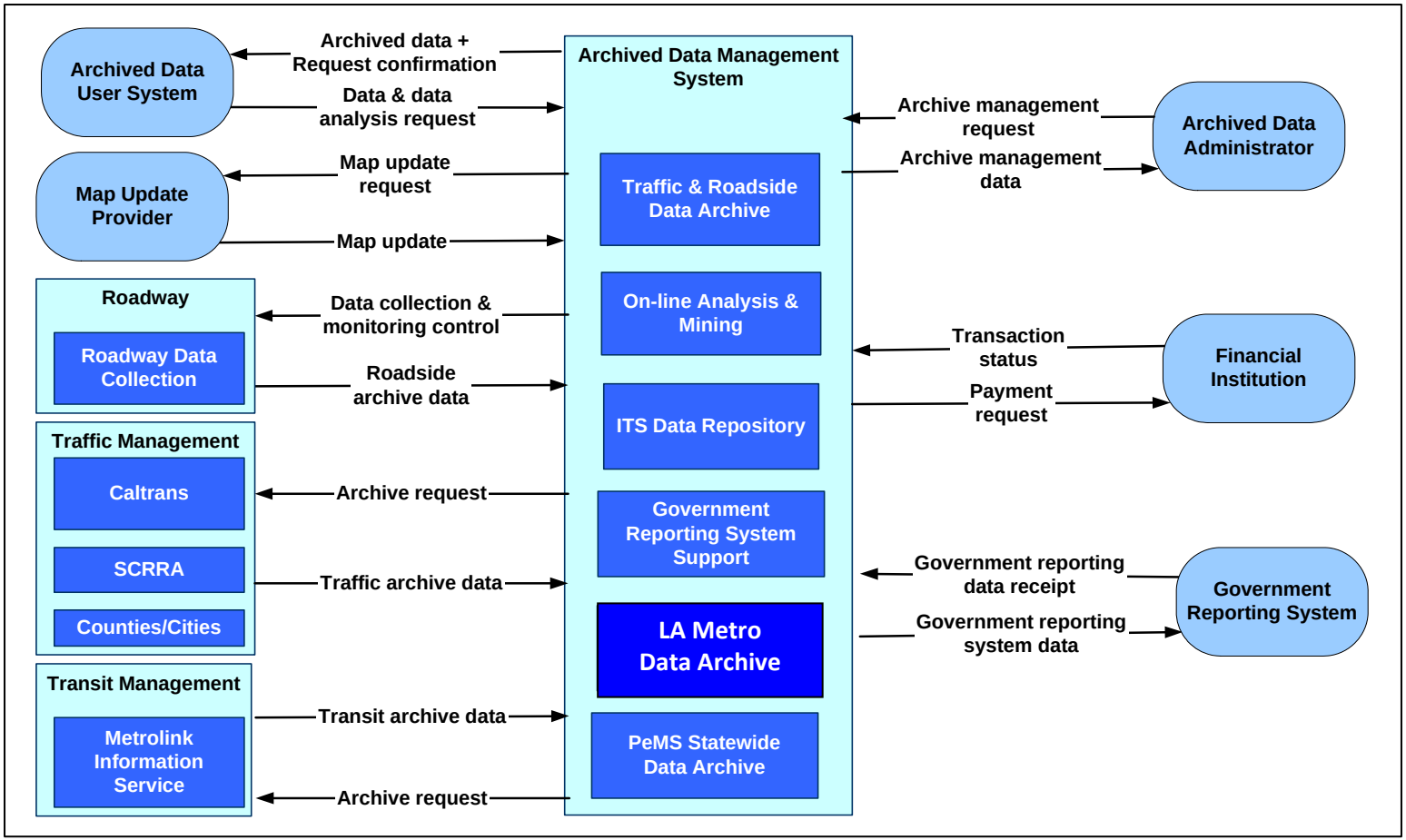


Figure 7-5: AD 2-- ITS Data Warehouse

This market package includes the data collection and management capabilities and the functionality and interface definitions that allow collection of data from multiple agencies and data sources spanning across modal and jurisdictional boundaries.

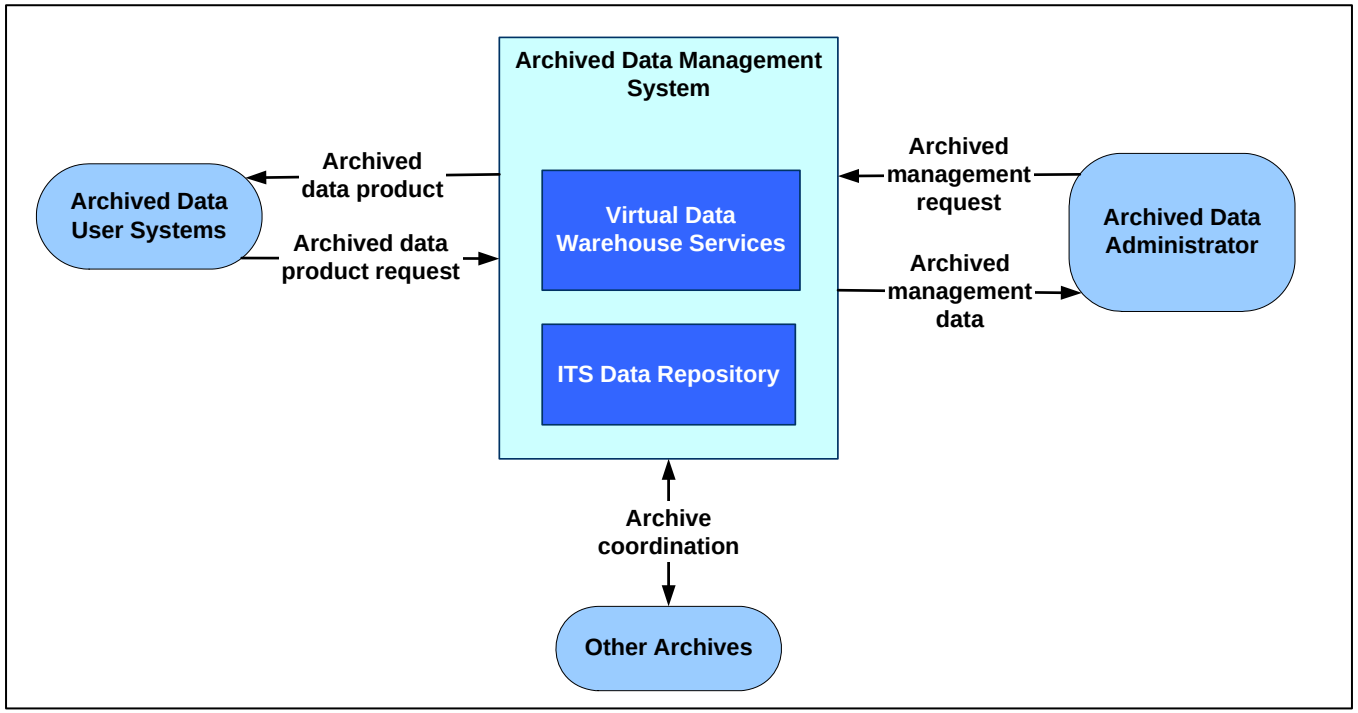


Figure 7-6: AD 3 – ITS Virtual Data Warehouse

This market package provides the same broad access to multimodal, multidimensional data from varied data sources as in the ITS Data Warehouse Market Package, but provides this access using enhanced interoperability between physically distributed ITS archives that are each locally managed.

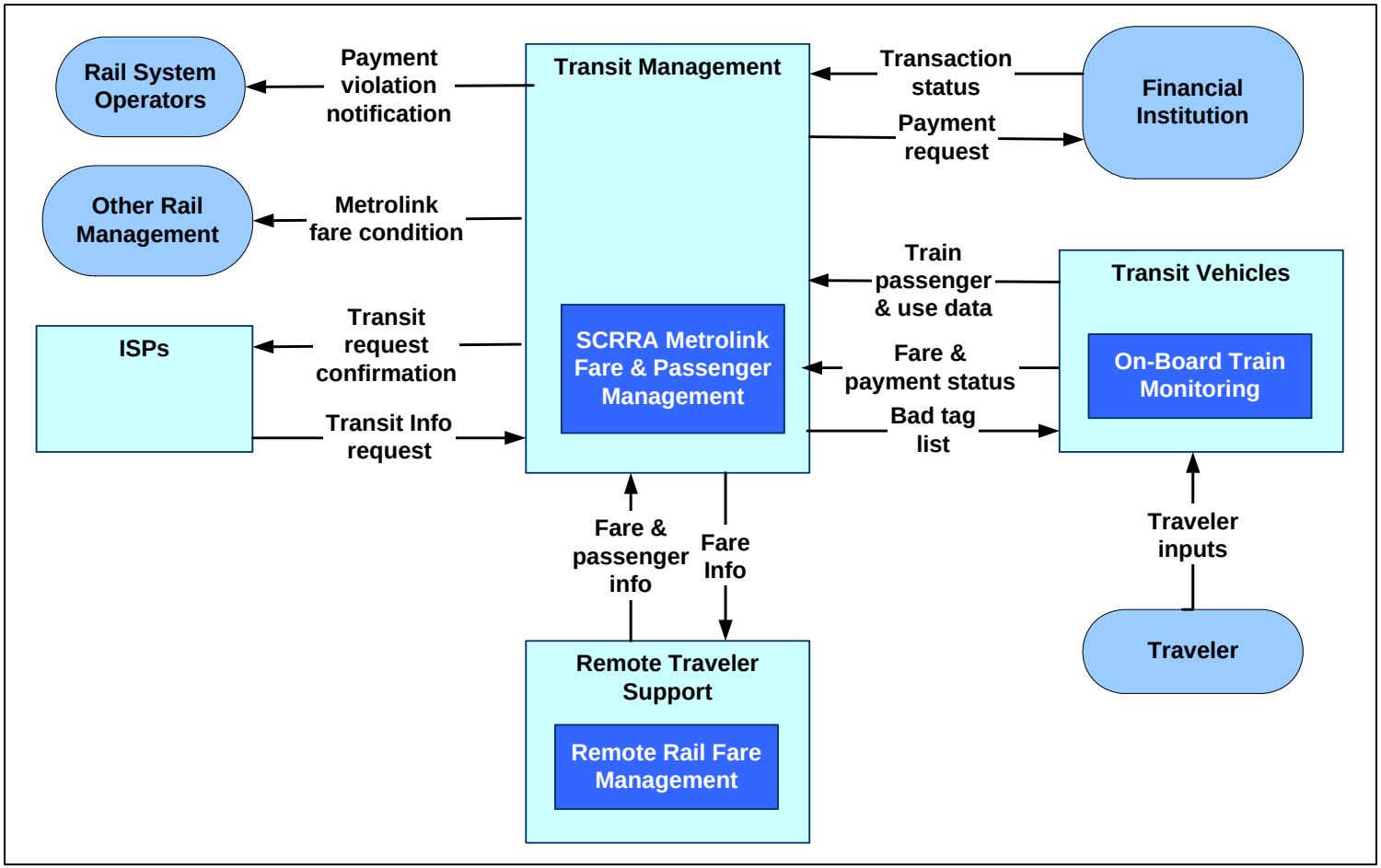


Figure 7-7: APTS 4—Transit Passenger and Fare Management

This market package manages passenger loading and fare payments on-board transit vehicles using electronic means. It allows transit users to use a traveler card or other electronic payment device.

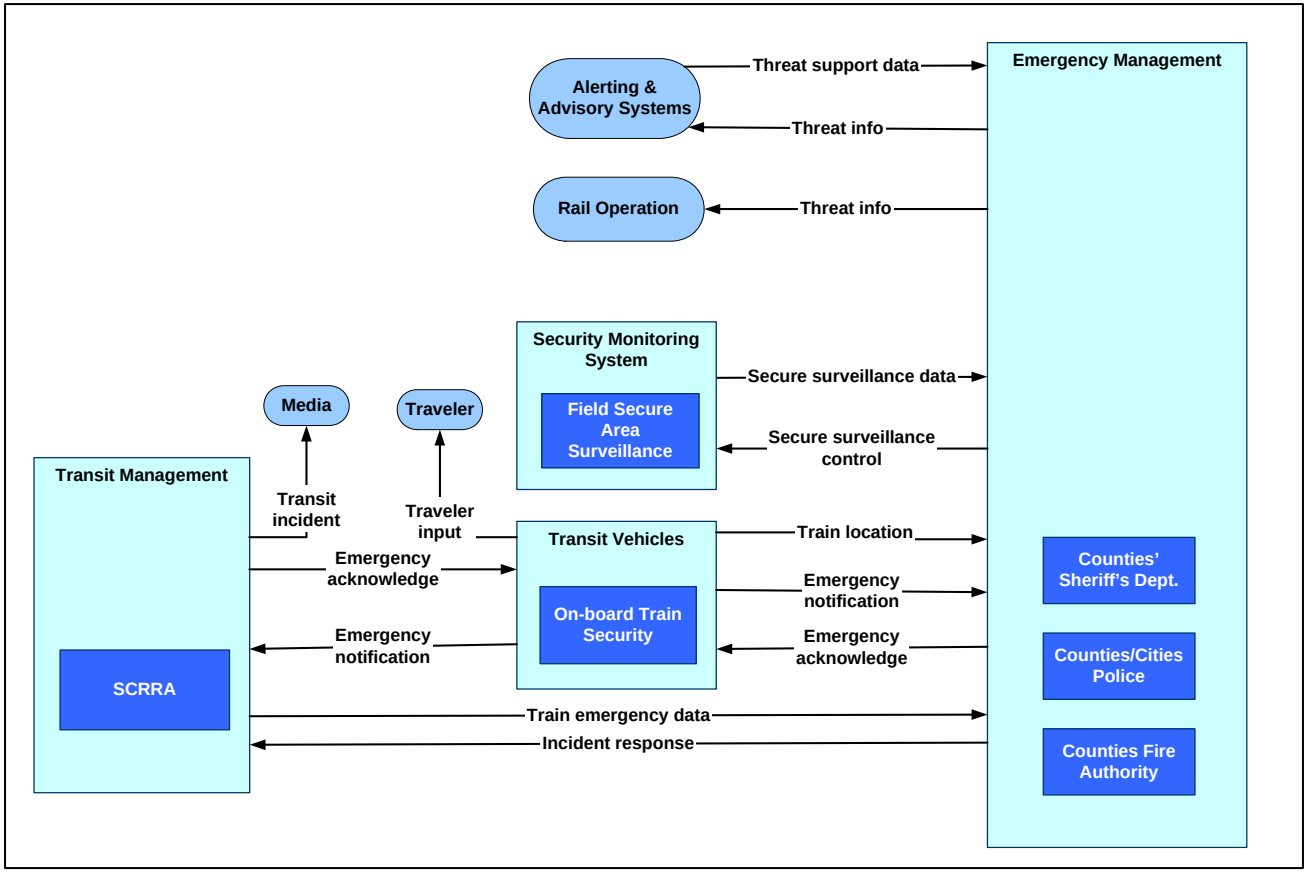


Figure 7-8: APTS 5 – Transit Security

This market package provides for the physical security of transit passengers and transit vehicle operators. On-board equipment is deployed to perform surveillance and sensor monitoring in order to warn of potentially hazardous situations.

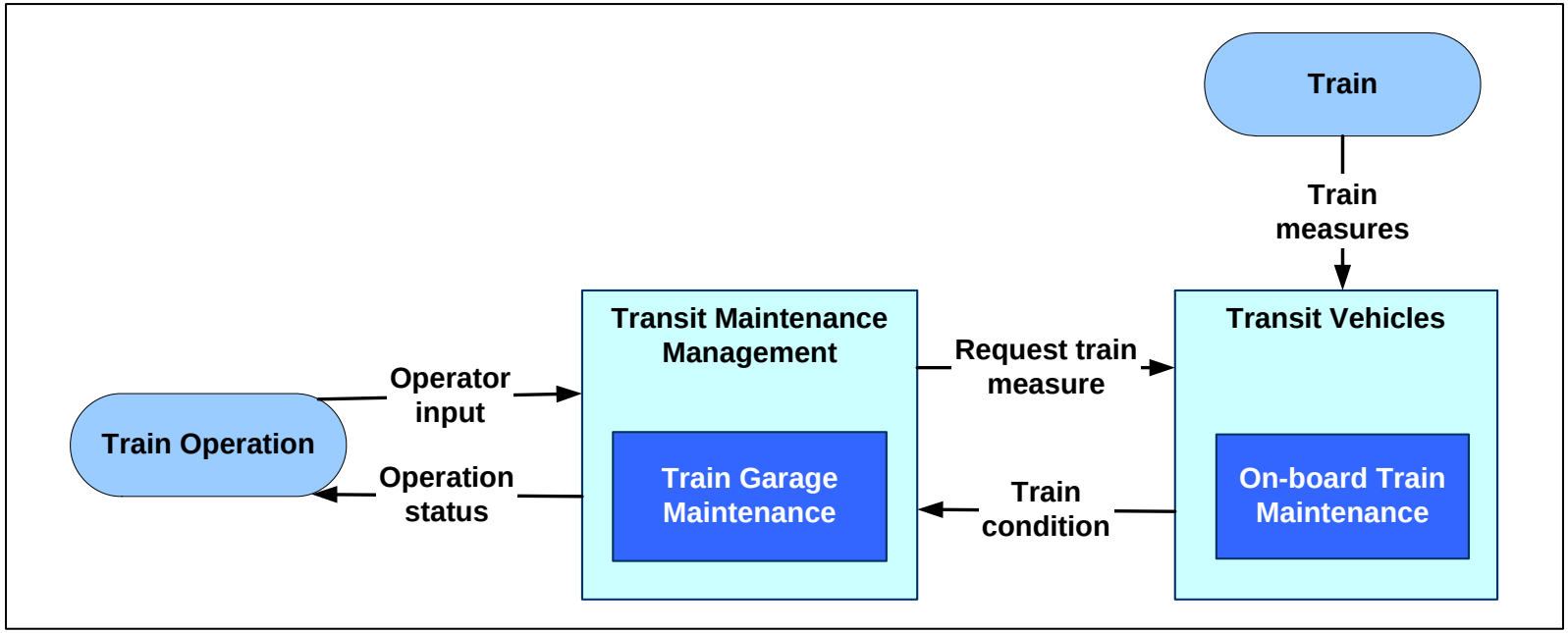


Figure 7-9: APTS 6 – Transit Maintenance

This market package supports automatic transit maintenance scheduling and monitoring. On-board condition sensors monitor system status and transmit critical status information to the Transit Management Subsystem. Hardware and software in the Transit Management Subsystem processes this data and schedules preventative and corrective maintenance.

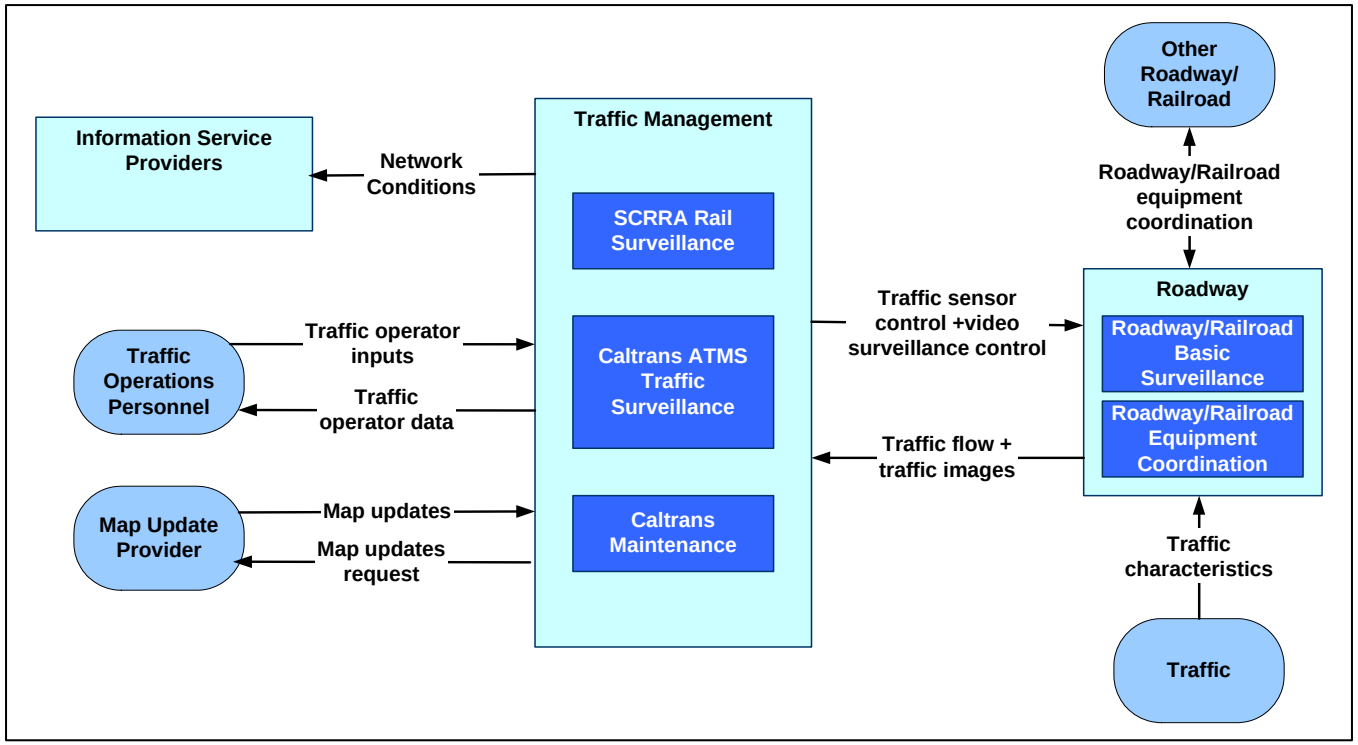


Figure 7-10: ATMS 1 – Network Surveillance

This market package includes traffic detectors, other surveillance equipment, the supporting field equipment, and fixed-point to fixed-point communications to transmit the collected data back to the Traffic Management Subsystem. The derived data can be used locally such as when traffic detectors are connected directly to a signal control system or remotely (e.g., when a CCTV system sends data back to the Traffic Management Subsystem).

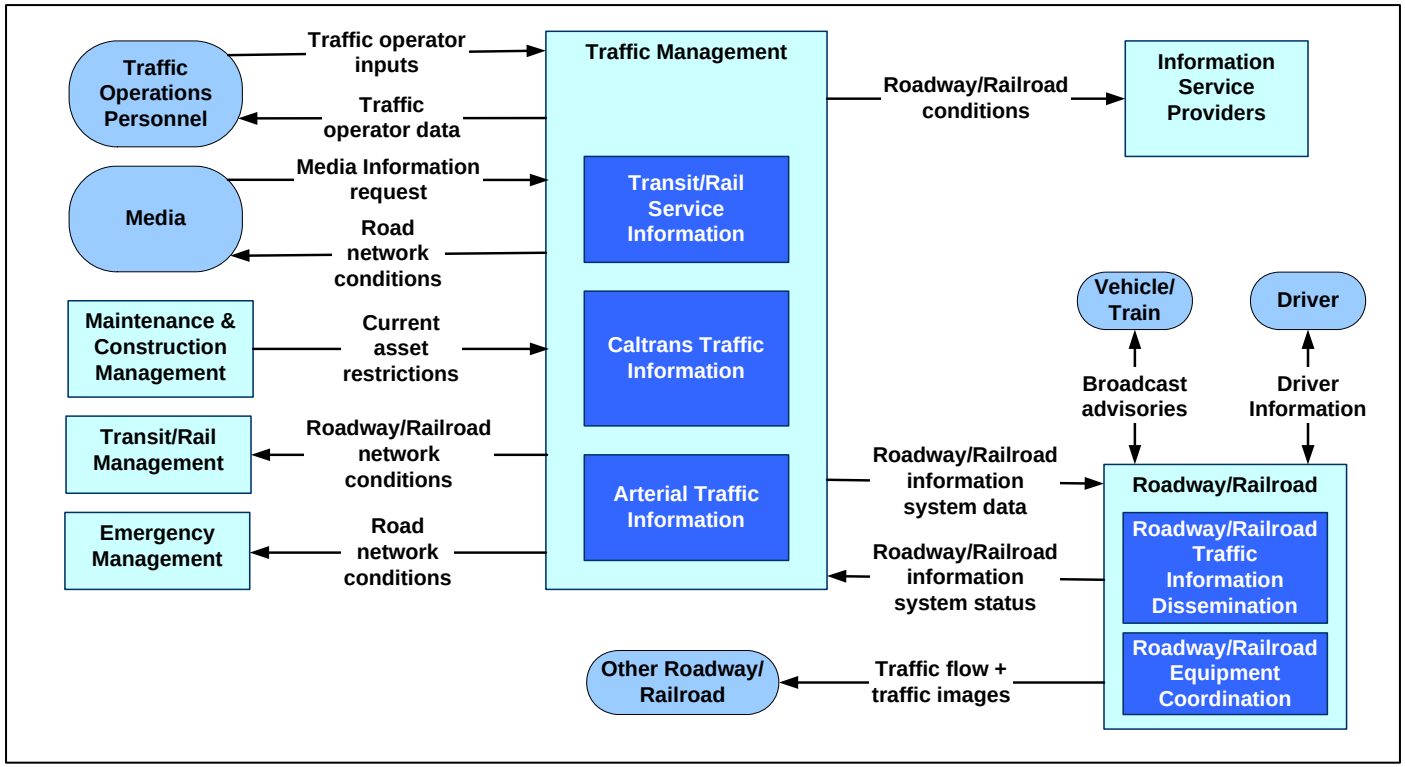


Figure 7-11: ATMS 6 – Network Surveillance

This market package provides driver information using roadway equipment such as dynamic message signs or highway advisory radio. A wide range of information can be disseminated including traffic and road conditions, closure and detour information, incident information, and emergency alerts and driver advisories. This package provides information to drivers at specific equipped locations on the road network.

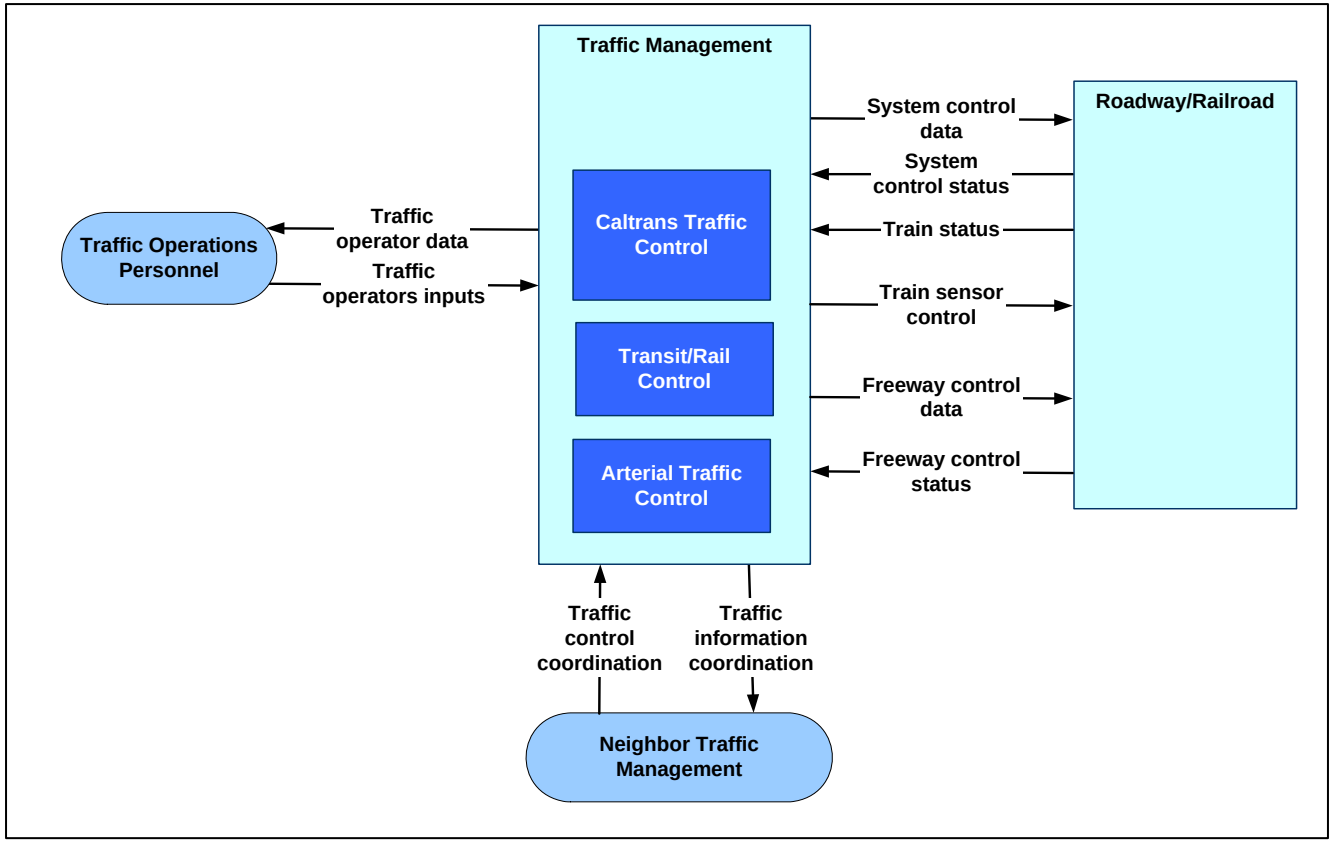


Figure 7-12: ATMS 7 – Regional Traffic Control

This market package provides for the sharing of traffic information and control among traffic management centers to support a regional control strategy. This market package advances the Surface Street Control and Freeway Control Market Packages by adding the communications links and integrated control strategies that enable integrated interjurisdictional traffic control.

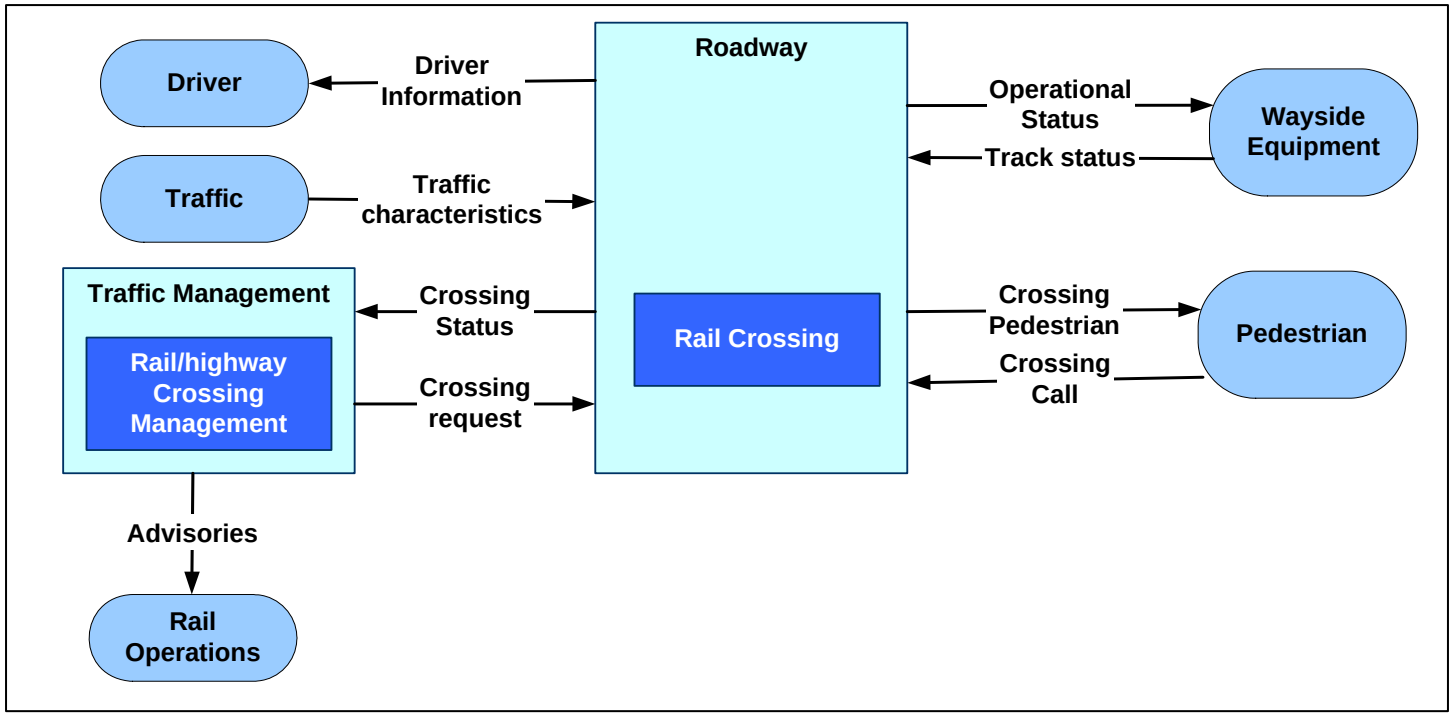


Figure 7-13: ATMS 13 – Standard Railroad Grade Crossing

This market package manages highway traffic at highway-rail intersections (HRIs) where operational requirements do not dictate more advanced features (e.g., where rail operational speeds are less than 80 miles per hour). Both passive (e.g., the crossbuck sign) and active warning systems (e.g., flashing lights and gates) are supported.

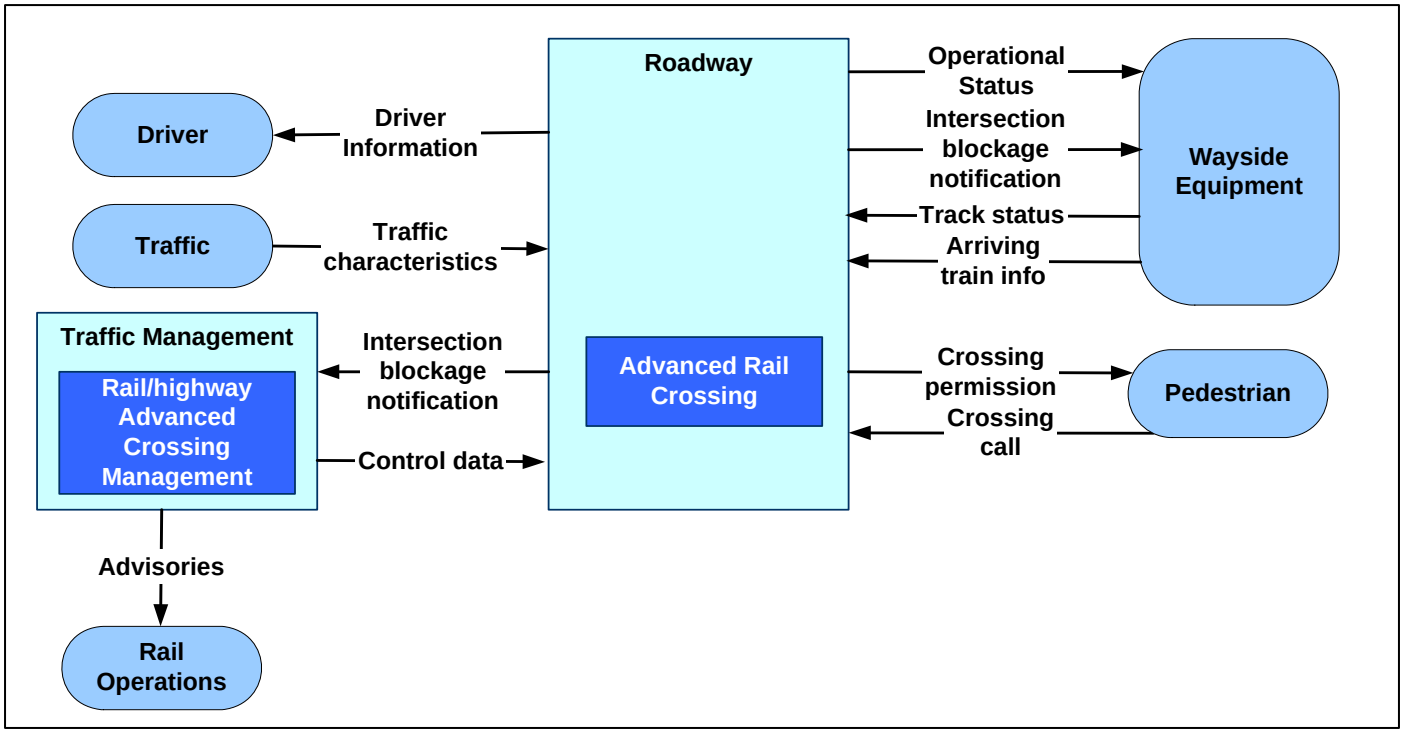


Figure 7-14: ATMS 14 – Advanced Railroad Grade Crossing

This market package manages highway traffic at highway-rail intersections (HRIs) where operational requirements demand advanced features (e.g., where rail operational speeds are greater than 80 miles per hour). This market package includes all capabilities from the Standard Railroad Grade Crossing Market Package and augments these with additional safety features to mitigate the risks associated with higher rail speeds.

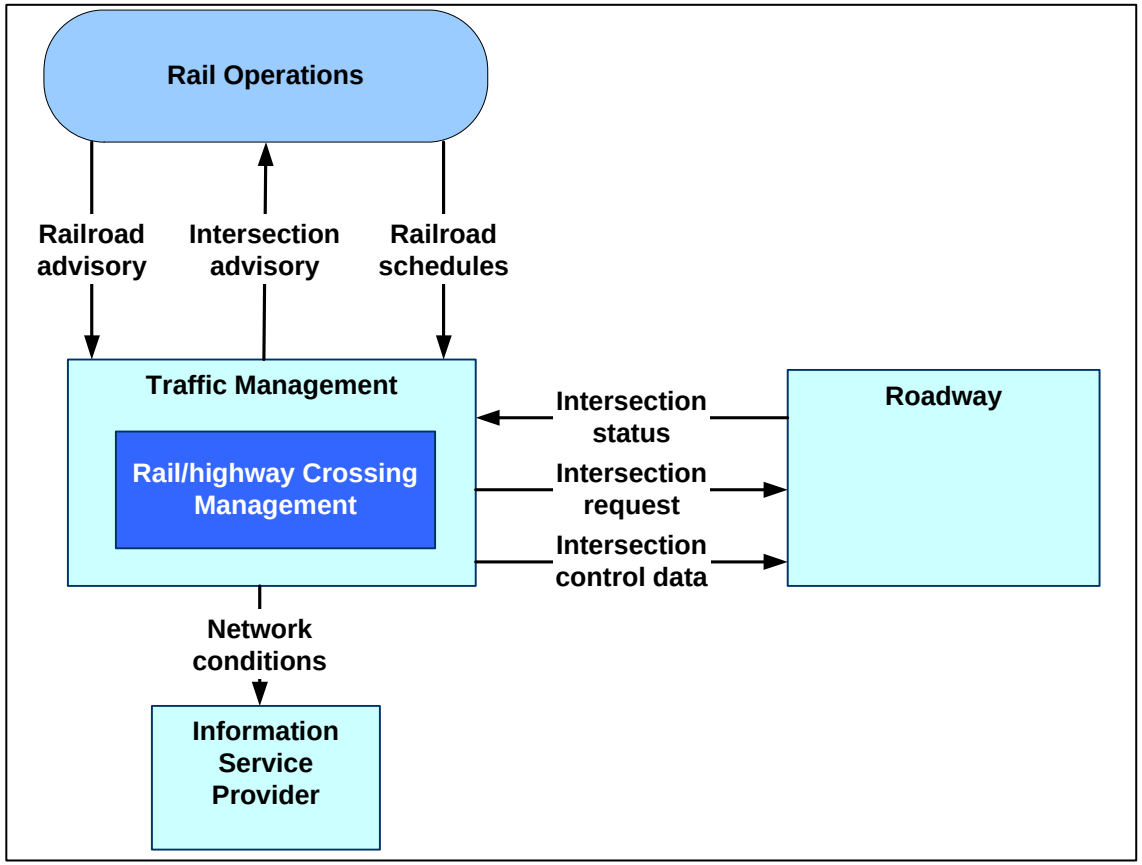


Figure 7-15: ATMS 15 – Railroad Operations Coordination

This market package provides an additional level of strategic coordination between freight rail operations and traffic management centers. Rail operations provide train schedules, maintenance schedules, and any other forecast events that will result in highway-rail intersection (HRI) closures. This information is used to develop forecast HRI closure times and durations that may be used in advanced traffic control strategies or to enhance the quality of traveler information including commercial vehicle operations.

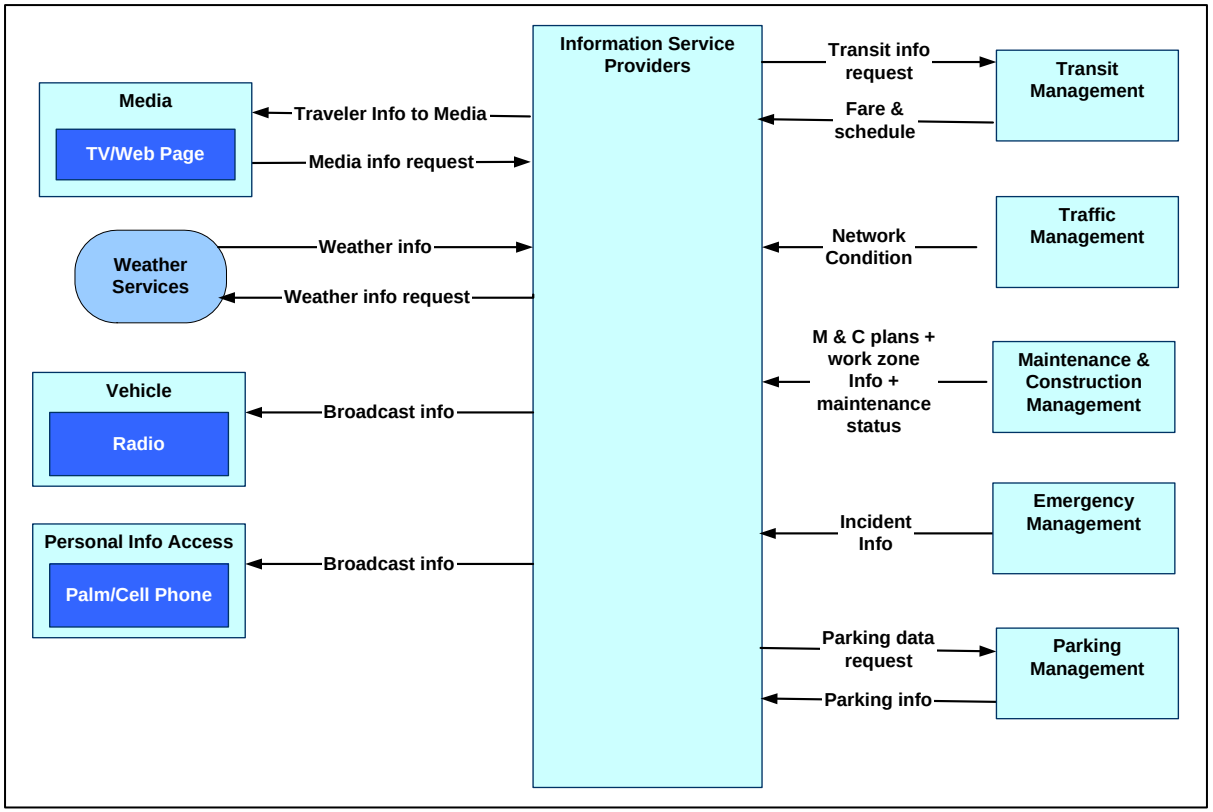


Figure 7-16: ATIS 1 – Broadcast Traveler Information

This market package collects traffic conditions, advisories, general public transportation, toll and parking information, incident information, roadway maintenance and construction information, air quality and weather information, and broadly disseminates this information through existing infrastructures and low cost user equipment (e.g., FM subcarrier, cellular data broadcast).

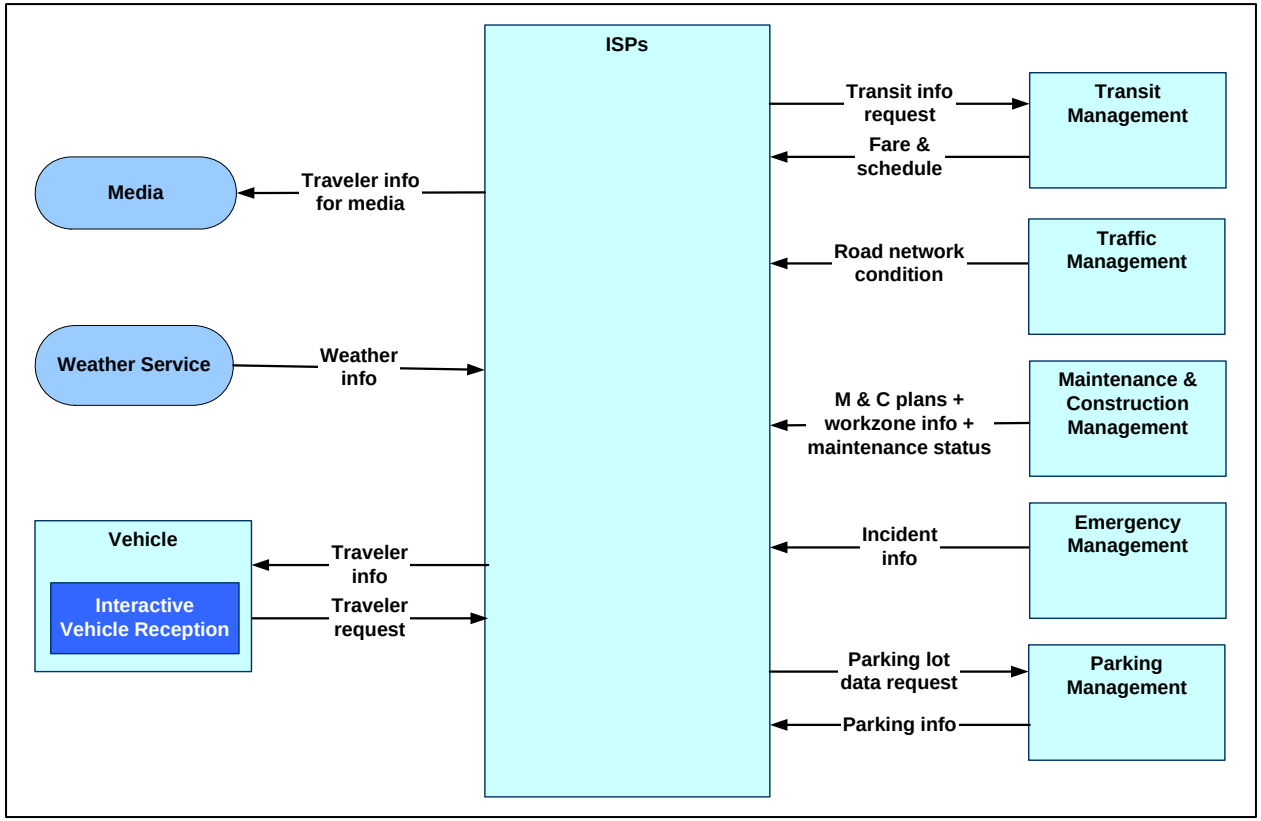


Figure 7-17: ATIS 2 – Interactive Traveler Information

This market package provides tailored information in response to a traveler request. Both real-time interactive request/response systems and information systems that "push" a tailored stream of information to the traveler based on a submitted profile are supported.

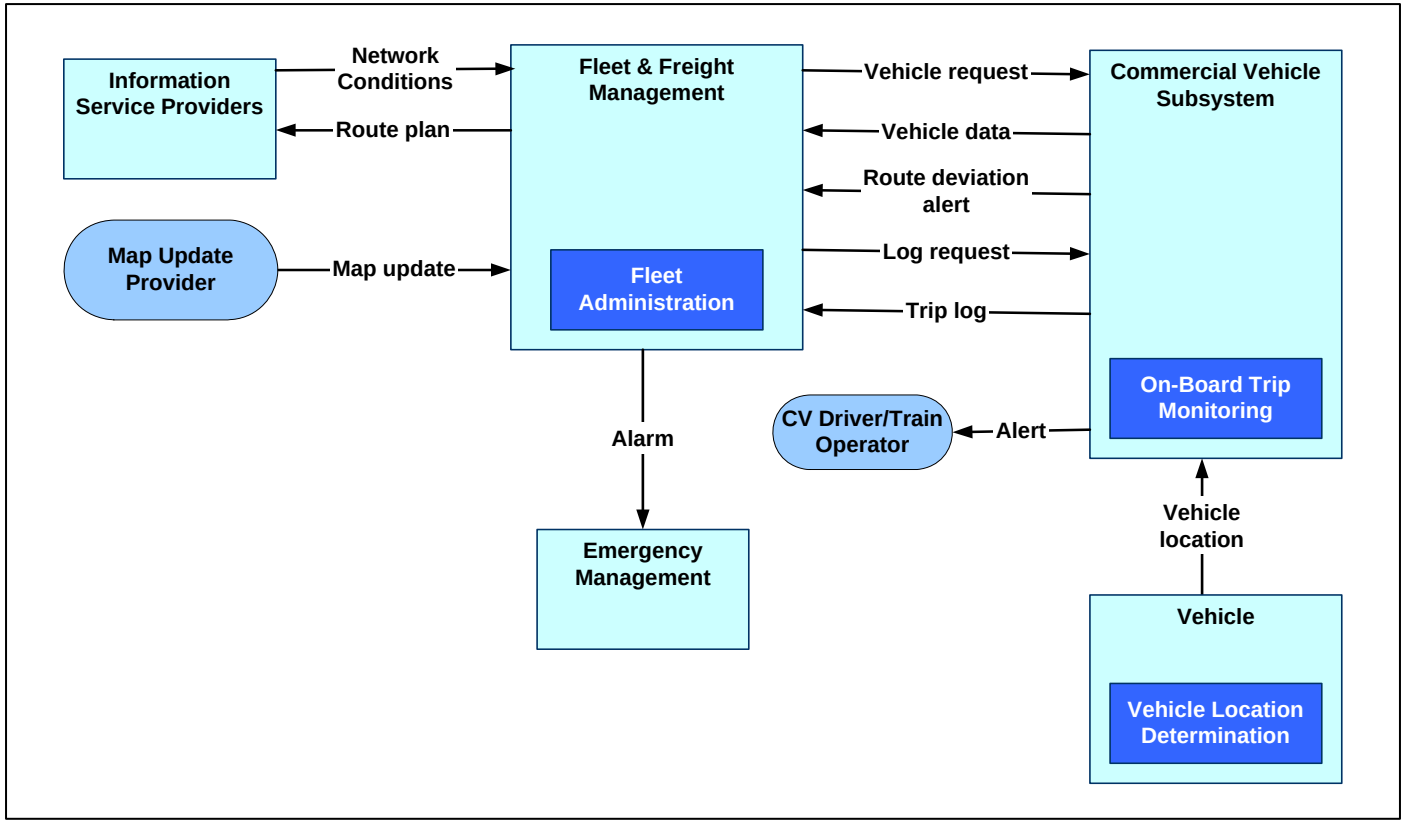


Figure 7-18: CVO 1 –Fleet Administration

This market package provides the capabilities to manage a fleet of commercial vehicles. The Fleet and Freight Management subsystem provides the route for a commercial vehicle by either utilizing an in-house routing software package or an Information Service Provider.

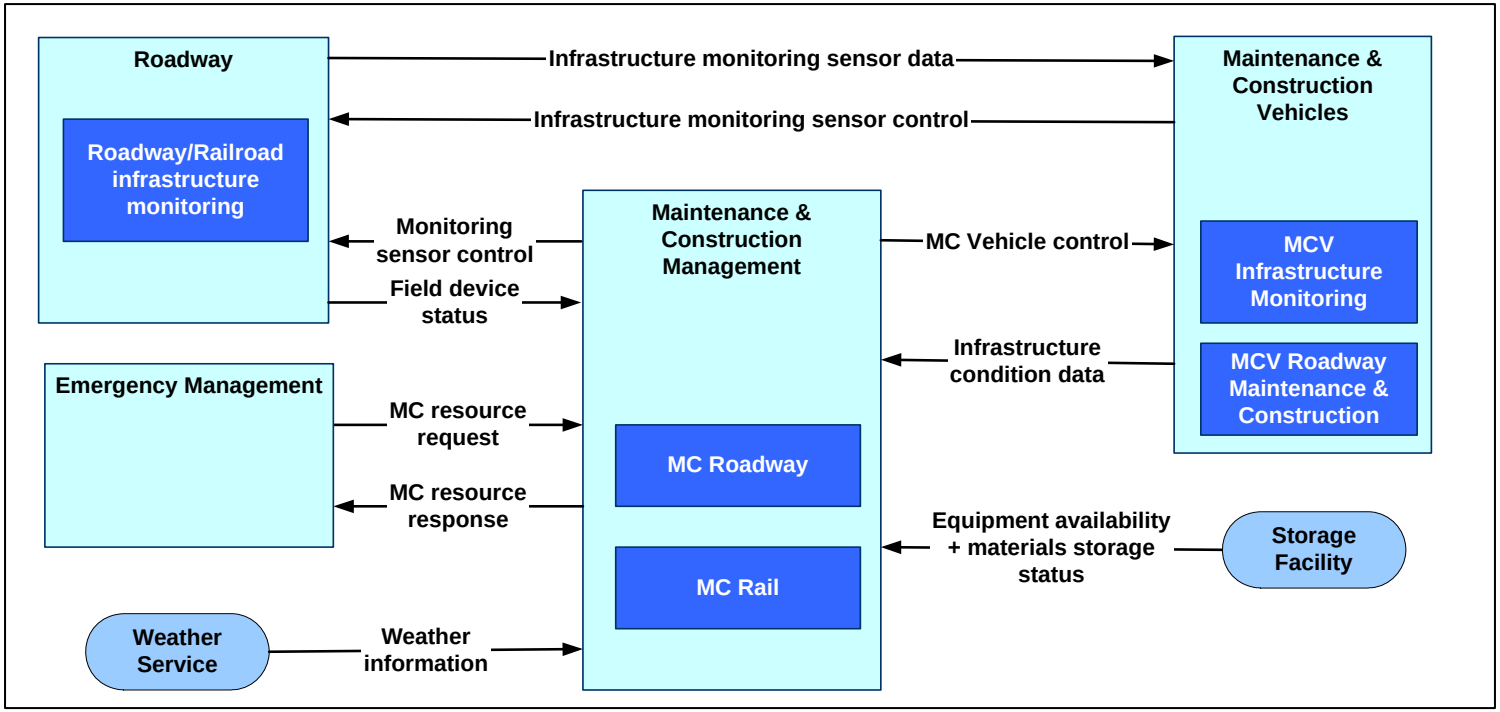


Figure 7-19: MC 7—Roadway Maintenance and Construction

This market package supports numerous services for scheduled and unscheduled maintenance and construction on a roadway system or right-of-way.

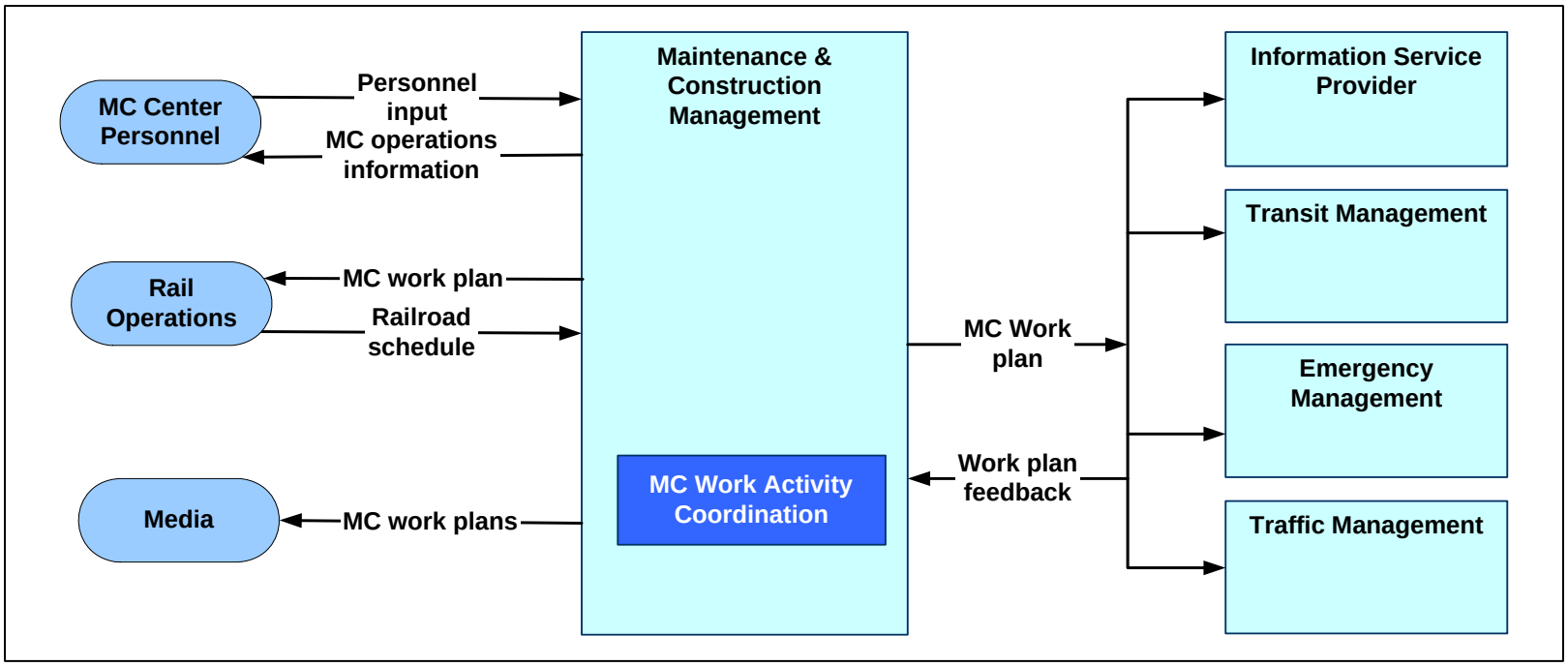


Figure 7-20: MC 10 – Maintenance and Construction Activity Coordination

This market package supports the dissemination of maintenance and construction activity to centers that can utilize it as part of their operations, or to the Information Service Providers who can provide the information to travelers.

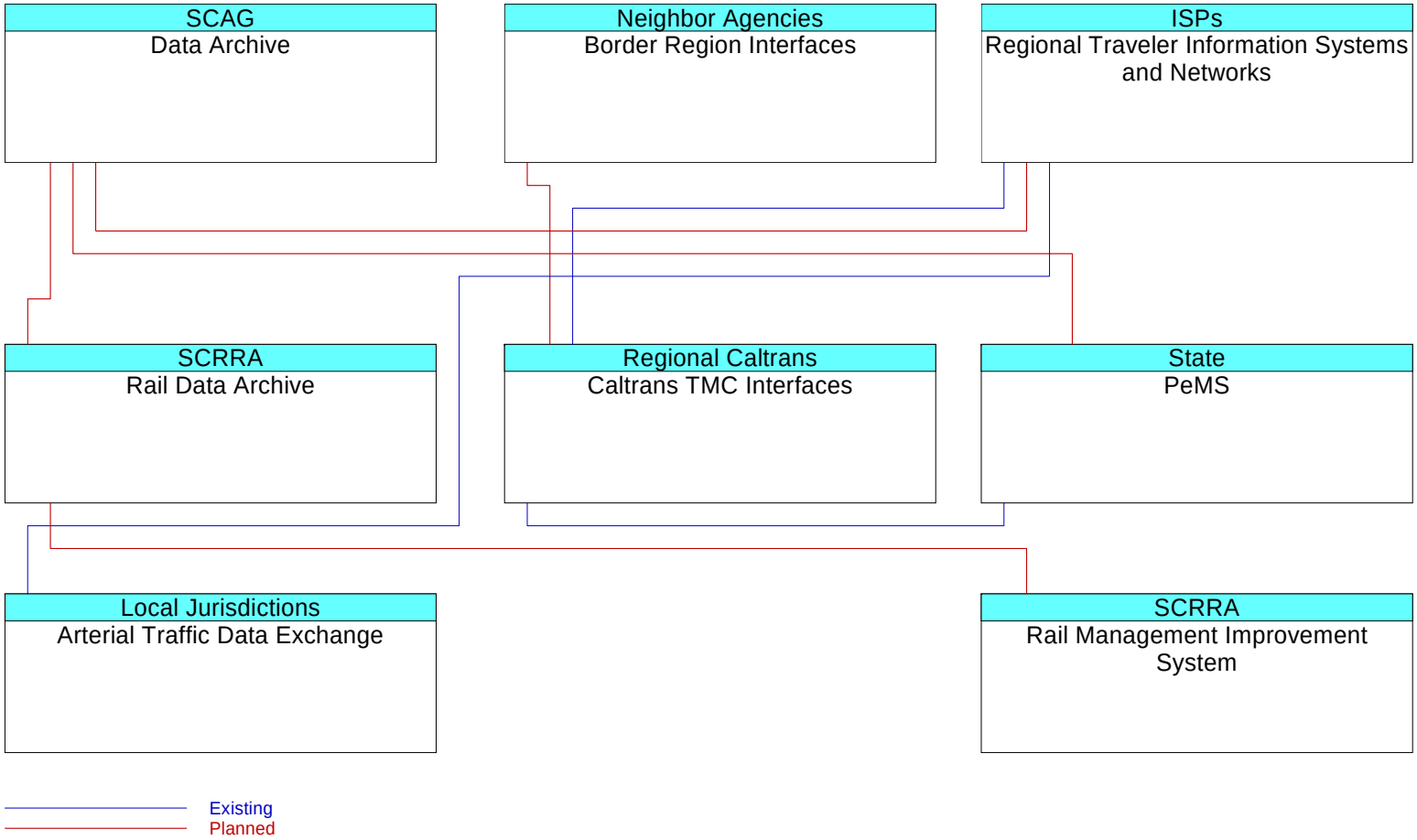


Figure 7-21: Southern California Multi-County Interconnect Diagram

8 PROJECT SEQUENCING

The regional ITS architecture is implemented through many individual ITS projects that occur over years, or even decades. In this step of the Regional ITS architectural development, a sequence of ITS projects that will contribute to the integrated regional transportation system is identified. An ITS project is defined by FHWA as "Any project that in whole or in part funds the acquisition of technologies or systems of technologies that provide or significantly contribute to the provision of one or more ITS user services as defined in the National Architecture." Since these projects are regional in concept, they generally represent the highest stages of ITS development, i.e. Caltrans interfaces represent the integration of data exchange between the four (4) Caltrans District systems. They tend to represent the top level of sequencing of projects. Lower level projects are to be found in the County level architectures.

The FHWA Regional ITS Guidance Document also refers to project sequencing as representing consensus building about setting priorities that show how ITS projects can build one another. For this document, Stakeholder meetings and discussions were used to identify the projects listed below.

Table 8-1 contains the listing of projects by title, market package, Stakeholder(s), simple description, and the expected timing (S= short term, M=medium term, L=long term). All projects are listed irrespective of whether or not they will be funded through federal sources.

Table 8-1: Project Sequencing

Project Title	Market Package(s)	Stakeholder (s)	Description	Timing
Multi Caltrans Districts Interfaces	ATMS7: Regional Traffic Control	Caltrans	Sharing of traffic information among the Southern California Caltrans districts to support a regional control strategy.	M/L
Arterial Interfaces	ATMS7: Regional Traffic Control	Local Jurisdictions	Sharing of real-time traffic conditions across county boundaries by local agencies. Additional interfaces are being added to the Regional Integration of Intelligent Transportation Systems (RIITS) to share data for agencies in Los Angeles County and several regional partners.	S
Data Archive	AD3: ITS Virtual Data Warehouse	Regional Partners	Provide for a regional archiving capability for long term planning. A system is being planned to archive traffic and transit data from RIITS, led by LA METRO.	S
CVO-Tailored Traffic Information	ATIS 1: Broadcast Traveler Information ATIS 2: Interactive Traveler Information	Regional Partners	This system will allow the dissemination of real-time traffic information to commercial vehicle operators.	S/M

Project Title	Market Package(s)	Stakeholder (s)	Description	Timing
Upgraded Rail Fare System	APTS4: Transit Passenger and Fare Management	SCRRA	Includes future capital projects entailing the following: • Ticket vending machine and validator purchase/upgrade	M
Upgraded Passenger Information system	APTS4: Transit Passenger and Fare Management	SCRRA	Includes future capital projects entailing the following: • Electronic passenger information system	M
Rail Sealed Corridor	ATMS 14: Advanced Railroad Grade Crossing	SCRRA	Various alternatives will be studied including quad gates for the best line protection to prevent drivers from penetrating the line as trains approach and enhance safety. The first priority locations are the Antelope Valley Line and Ventura County Line. These segments are also within the California High Speed Rail Corridor	S
Quad Gate Synchronization	ATMS 14: Advanced Railroad Grade Crossing	SCRRA	Investigate alternate means of clearing the crossing by detecting vehicles that are still in the crossing as the first barrier is lowered and synchronize actions with traffic signal systems in the vicinity	S
Rail Fiber Communication	ATMS 15: Railroad Operations Coordination	SCRRA	A fiber communication backbone is gradually being installed throughout the system to enable both voice and data transmission linking to central dispatch in Pomona	S/M
Rail Camera Surveillance	ATMS 1: Network Surveillance ATMS 15: Railroad Operations Coordination	SCRRA	Camera to be installed at Union station using a Homeland Security grant.	S/M

Project Title	Market Package(s)	Stakeholder (s)	Description	Timing
GPS Train Location System	ATMS 15: Railroad Operations Coordination	SCRRA	Project is underway and will be on-going for some time. The completion of the fiber communication is of importance. Human interpretation of information remains of importance in understanding train delays before posting of information. There is no fully automated on-time performance system.	L
Rail Information Dissemination	ATMS 6: Traffic Information Dissemination	SCRRA	Future real-time information projects including PDAs, e-mail and pagers, displays in trains. The current website has only static displays.	L
Rail Ticket Vending Machines (TVMS) & Validation Equipment	APTS 4: Transit Passenger and Fare Management	SCRRA	Future upgraded systems will take multiple media for inter-operability including Metro's Universal Fare System (UFS).	L
Rail Automated Passenger Counters	APTS 4: Transit Passenger and Fare Management	SCRRA	These sub-systems would be capable of monitoring information for central processing.	L
Parking and Electronic Signage at Metrolink Stations	ATMS 15: Railroad Operations Coordination	SCRRA	Pursuing funding to support this project.	L

Project Title	Market Package(s)	Stakeholder (s)	Description	Timing
Rail Automated Maintenance Support	APTS 6: Transit Maintenance	SCRRA	Long-term goal as funding becomes available.	L
Rail Data Archiving	AD 2: ITS Data Warehouse	SCRRA	Long-term, electronic collection and delivery of Section XV data	L
Regional Traveler Information	ATIS 1: Broadcast Traveler Information ATIS 2: Interactive Traveler Information	Regional Partners	A general project category that covers potential multi-agency initiatives to increase integrated dissemination of traveler information as widely as possible throughout the Southern California Region.	S/M

9 IDENTIFICATION OF REQUIRED STANDARDS

The standards section of a Regional ITS Architecture is required by "The Rule". There are two main objectives: (1) to identify ITS standards that support the interfaces and flows defined in the architecture and, (2) to help Stakeholders understand more about standards and their potential value and benefits. That being the case, standards and their development is not a simple subject and both the full development and testing of standards and their effective adoption by vendors is in some cases still some time in the future.

10 ARCHITECTURE MAINTENANCE

A discussion on the approach of maintaining the Regional ITS Architectures is a required element for each of the documents. The intent of this requirement is to promote the following:

- Use of the architectures;
- Maintenance of Stakeholder dialogue and understanding;
- Support for seeking funding;
- Support for project implementation;
- Progression of regional integration;
- Support for updates to the documentation; and
- Communication of updates, revisions and changes to the MPO.

Since the history of developing the deployment of ITS in Southern California varies greatly from county to county (reflecting different levels of maturity) it is to be expected that different approaches to organizing maintenance will also be adopted. The following is an overview of the approaches being adopted by the six counties. It should be noted that while tri-annual updates to coordinate with the RTIP process are desired by all counties, interim submission of changes are also facilitated.

To fulfill the maintenance requirements at the MPO level, SCAG should have electronic copies of all of the county-level Regional ITS Architecture documentation including the electronic databases in TurboArchitecture™. It would be appropriate that these be posted on SCAG's website in .PDF format and would be available in one location for all Stakeholders in the six-counties. SCAG should also keep on file all significant modifications to the documentation. Only when major revisions are made to the individual architectures would electronic replacements for the website be submitted.

To maintain the Multi-County issues documentation the Stakeholder group should meet regularly to review progress made on projects and decide at what point documentation updates need to be produced. At a minimum, such updates are desired to be made tri-annually in support of the RTP process.

SCAG will be responsible for issuing timely notification of the need for county-level Regional ITS Architecture updates to support the tri-annual RTP process. Project sequencing updates and any other significant updates that the county Stakeholders have made should be submitted to SCAG.

11 AGENCY AGREEMENTS

Agreements among the different Stakeholder agencies and organizations are required to implement the integration described in the Regional ITS Architecture. According to the FHWA Regional ITS Architecture Guidance, any agreements (existing or new) required for operations, including at a minimum those affecting ITS projects interoperability, utilization of ITS related standards, and the operation of the projects identified in the Regional ITS Architecture are required by the Rule/Policy. The requirement however is only to provide a list of agreements and not the agreements themselves. Experience shows that it takes an actual project deployment to initiate the agreements process.

The typical process of agreements list development starts from existing agreements that support sharing of information, funding, or specific ITS projects. These agreements are reviewed and assessed to determine if they can be extended and used to support the cooperative implementation and operation of ITS. The list of the required agreements was developed based on the regional operational concepts, knowledge of the types of ITS existing or planned for implementation in the county, and the information that needs to be exchanged in order to operate those systems. The detailed agreement work, including the preparation and execution of the identified agreements will be performed to support ITS projects as they are implemented in the future.

There is considerable variation between ITS projects and among Stakeholders regarding the types of agreements that are created to support ITS integration. Some common types of agreements provided by the Regional ITS Architecture Guidance are shown in Table 11-1.

Table 11-1: Agreement Types

Type of Agreement	Description
Handshake Agreement	▪ Early agreement between one or more partners ▪ Not recommended for long-term operations.
Memorandum of Understanding (MOU)	▪ Initial agreement used to provide minimal detail and usually demonstrating a general consensus. ▪ Used to expand a more detailed agreement like an Interagency Agreement that may be broad in scope but contains all of the standard contract clauses required by a specific agency. ▪ May serve as a means to modify a much broader Master Funding Agreement, allowing the master agreement to cover various ITS projects throughout the region and the MOUs to specify the scope and differences between the projects.
Interagency Agreement	▪ Between public agencies (e.g., transit authorities, cities, counties, etc.) for operations, services or funding. ▪ Documents responsibility, functions and liability at a minimum.
Intergovernmental Agreement	▪ Between governmental agencies (e.g., Agreements between universities and State DOT, MPOs, etc.).
Operational Agreement	▪ Between any agency involved in funding, operating, maintaining or using the right-of-way of another public or private agency. ▪ Identifies respective responsibilities for all activities associated with shared systems being operated and/or maintained.

Type of Agreement	Description
Funding Agreement	▪ Documents the funding arrangements for ITS projects (and other projects). ▪ Includes at a minimum standard funding clauses, detailed scope, services to be performed, detailed project budgets, etc.
Master Agreements	▪ Standard contract and/or legal verbiage for a specific agency and serving as a master agreement by which all business is done. These agreements can be found in the legal department of many public agencies. ▪ Allows states, cities, transit agencies, and other public agencies that do business with the same agencies on a regular basis (e.g., cities and counties) to have one Master Agreement that uses smaller agreements (e.g., MOUs, Scope-of-Work and Budget Modifications, Funding Agreements, Project Agreements, etc.) to modify or expand the boundaries of the larger agreement to include more specific language.

Table 11-2 presents the list of agreements for Southern California regional ITS development. Each entry identifies the ITS service addressed by the agreement, the Stakeholders involved, the type of agreement anticipated, high-level status (near-term or long-term), and a concise description of the purpose of the agreement. Another column can be added to the table in the future to note any issues or barriers in agreement execution during the architecture maintenance cycle.

Table 11-2: Regional List of Agreements

ITS Service	Stakeholder	Type of Agreement	Status	Agreement Description
Arterial Traffic Control Interfaces	Jurisdictions	Interagency Agreement	Near Term	Specifies interface requirement, responsibilities, and functions for all participating and neighboring cities
Data Archive System	Regional Partners	Interagency Agreement	Near Term	Specifies data source, access control, and configuration requirement
Emergency Management / Security Region Wide Integration	Regional Partners	Interagency Agreement/or MOU	Long Term	Provides the guidelines of the integration of emergency management system, including the roles and responsibilities of each agency as well as the functions required for each of their systems

APPENDIX A

ACRONYMS AND TERMS

Number	TERM	DEFINITION
1	AD	Archived Data
2	APTS	Advanced Public Transportation Systems
3	ATIS	Advanced Traveler Information System
4	ATMS	Advanced Traffic / Transportation Management System
5	AVI	Automated Vehicle Identification
6	AVL	Automated Vehicle Locator
7	AVSS	Advanced Vehicle Safety Systems
8	CAD	Computer Aided Dispatch
9	Caltrans	California Department of Transportation
10	CCTV	Closed Circuit Television – generic term often used to refer to many different types of camera systems.
11	CenterLine	An OCTA proposed light rail line.
12	CHP	California Highway Patrol
13	CMS	Changeable Message Signs are electronic signs that can change the message they display. They are also referred to as Dynamic Message Signs (DMS) or Variable Message Signs (VMS)
14	Common Object Request Broker Architecture (CORBA)	A National Architecture data exchange standard adopted and used by Showcase.
15	CTC	County Transportation Council
16	CVISN	Commercial Vehicle Information Systems & Networks
17	CVO	Commercial Vehicle Operations
18	DMS	Dynamic Message Signs are electronic signs that can change the message they display. They are also referred to as Changeable Message Signs (CMS) or Variable Message Signs (VMS)
19	DOT	Department of Transportation
20	EMS	Emergency Management Services / Systems
21	Extensible Markup Language (XML)	The data exchange standard that is gradually replacing CORBA in Southern California.
22	FHWA	Federal Highway Administration
23	FMCSA	Federal Motor Carrier Safety Administration

Number	TERM	DEFINITION
24	FTA	Federal Transit Authority
25	GIS	Geographic Information Systems used for a variety of emergency management and transportation planning tools with a digital map of the area being analyzed
26	GPS	Global Positioning Systems – determines the real time position of vehicles using communications with a satellite. Also refers more specifically to a government owned system of 24 Earth orbiting satellites that transmit data to ground based receivers and provides extremely accurate latitude/longitude ground positions.
27	HAR	Highway Advisory Radio – mechanism for broadcasting traveler information to motorists.
28	HOV	High Occupancy Vehicle, also known as carpool lane or diamond lane.
29	ISP	Information Service Provider
30	IVAG	Imperial Valley Association of Governments. IVAG is comprised of elected officials with one part time employee
31	IVECA	Imperial Valley Emergency Communications Authority. IVECA is comprised of appointed officials with one part time project manager
32	Information Exchange Network (IEN)	A major sub-system developed for the exchange of arterial system data for the County of Los Angeles.
33	ITS Architecture	A framework for ensuring institutional agreement and technical integration of technologies for the implementation of projects or groups of projects under an ITS strategy.
34	IVHS	The precursor to ITS. Stands for Intelligent Vehicle Highway Systems.
35	IVT	Imperial Valley Transit
36	JPA	Joint Powers Authority
37	Market Packages	Represent slices of the Physical Architecture that address specific services such as surface street control.
38	Measure M	Orange County local sales tax dedicated to transportation.
39	Metro	Metrolink, regional commuter rail service
40	MCO	Maintenance & Construction Operations
41	MOU	Memorandum of Understanding
42	MPO	Metropolitan Planning Organization
43	National ITS Architecture	A common framework for ITS interoperability. The National

Number	TERM	DEFINITION
		ITS Architecture comprises the logical architecture and physical architecture that satisfy a defined set of User Services. The National ITS Architecture is maintained by the United States Department of Transportation (DOT) and is available on the DOT web site at http://www.its.dot.gov. The National Architecture has been developed over time and the current version is 5.0.
44	NTCIP	National Transportation Communications for ITS protocol. Required for Traffic Management Operations. Allowing for wire line communications between traffic management centers and field equipment.
45	O & M	Operations and Maintenance.
46	POE	Port of Entry
47	Regional Integration of ITS (RIITS)	A Los Angeles County Metropolitan Transportation Authority (Metro) project which integrates data from multiple systems and is the core project within the Los Angeles County Regional ITS Architecture.
48	Regional Transportation Improvement Program (RTIP)	The federally required programming document that becomes a part of the Statewide Transportation Improvement Program (STIP). Projects must be included in this document if they are to receive federal funding and the document must be consistent with the RTP.
49	Regional Transportation Plan (RTP)	A federally required long-term vision document that is updated every three years.
50	RTPA	Regional Transportation Planning Authority.
51	Rule/Policy	An abbreviated reference to Department of Transportation 23 CFR Parts 655 and 940, January 8th 2001 that provides policies and procedures for implementing section 5206(e) of the Transportation Equity Act for the 21st Century (TEA-21).
52	RWIS	Road Weather Information System
53	SANBAG	San Bernardino Associated Governments
54	SANDAG	San Diego Association of Governments in San Diego County
55	SCAG	Southern California Association of Governments
56	SCRRA	Southern California Regional Rail Authority
57	Showcase	A federally funded ITS project for Southern California that included an architecture and set of projects. The architecture was based on a center-to center concept of operations.
58	SOV	Single Occupancy Vehicle.

Number	TERM	DEFINITION
59	Strategic Deployment Plan (SDP)	SDPs were usually precursor plans for ITS based on earlier versions of the National Architecture. In the SCAG region they reflect the original work that defined the baseline for later Regional ITS Architectures.
60	TestBed	A Caltrans project that supports the development of improved freeway operations and incident management, located at UC Irvine Institute of transportation Studies.
61	Travel Probe	An OCTA transit project intended to collect information on road congestion by tracking bus speeds. The project is no longer operational.
62	TravelTip	A traveler information system for Orange County that is no longer operational.
63	TMC	Traffic / Transportation Management Center
64	TOC	Traffic / Transportation Operations Center
65	TurboArchitecture™	A software tool developed by DOT to support the development of regional architectures. Also a long-term development. The current version is 3.0.
66	User Service	User services document describing what ITS should do from the user's perspective. There are currently eight high level classifications: Travel and Traffic Management, Public Transportation Management, Electronic Payment, Commercial Vehicle Operations, Emergency Management, Advanced Vehicle Safety Systems, Information Management and Maintenance and Construction Operations.
67	VMS	Variable Message Signs are electronic signs that can change the message they display. They are also referred to as Changeable Message Signs (CMS) or Dynamic Message Signs (DMS)

APPENDIX B

INVENTORY REPORT

Inventory Report

Arterial Traffic Data Exchange *Status:* Existing

Description: Real-time arterial traffic information

Associated Stakeholder: Local Jurisdictions

Mapped to Entity: Roadway Subsystem

Mapped to Entity: Traffic Management

Mapped to Entity: Traffic Operations Personnel

Caltrans TMC Interfaces *Status:* Planned

Description: Provide to other Caltrans Districts in the SCAG region, real-time traffic information.

Associated Stakeholder: Regional Caltrans

Stakeholders in this group:

Caltrans District 7

Caltrans District 8

Caltrans District 12

Caltrans District 11

Mapped to Entity: Maintenance and Construction Management

Mapped to Entity: Roadway Subsystem

Mapped to Entity: Traffic Management

Mapped to Entity: Traffic Operations Personnel

Data Archive *Status:* Existing

Description: Various transportation and transit data is collected and archived by SCAG to satisfy various federal and state performance monitoring and data reporting requirements for the Region

Associated Stakeholder: SCAG

Mapped to Entity: Archived Data Management Subsystem

PeMS *Status:* Existing

Description: The Freeway Performance Measurement System (PeMS) is a consolidated database of information collected via Caltrans loop detectors from traffic management centers (TMCs) throughout the state

Associated Stakeholder: State

Mapped to Entity: Archived Data User Systems

Rail Data Archive *Status:* Existing

Description: Data archive - currently in the process of being upgraded. Information is manually extracted and made available to local government agencies, as well as federal agencies.

Associated Stakeholder: SCRRA

Mapped to Entity: Archived Data Administrator

Mapped to Entity: Archived Data Management Subsystem

Mapped to Entity: Government Reporting Systems

Rail Management Improvement System *Status:* Existing

Description: Including Upgraded Fare Management, Maintenance Enhancement, Rolling Stock Enhancement, Station Security Surveillance Enhancement, Parking Information, Communication Improvement, Grade Crossing Analyzer

Associated Stakeholder: SCRRA

Mapped to Entity: Transit Management

Regional Traveler Information Systems *Status:* Existing

Description: Represents traveler information systems both public and private

Associated Stakeholder: ISPs

Mapped to Entity: Information Service Provider

Wayside Hotbox *Status:* Existing

Description: Maintenance detection system that provides low-tech maintenance information to the Maintenance facility.

Associated Stakeholder: SCRRA

Mapped to Entity: Basic Transit Vehicle

Mapped to Entity: Fleet and Freight Management

Mapped to Entity: Roadway Subsystem

APPENDIX C

STAKEHOLDER REPORT

Stakeholders Report
Arizona State DOT

Description: San Bernardino Associated Governments (SANBAG) is the council of governments and transportation planning agency for San Bernardino County. SANBAG is responsible for cooperative regional planning and furthering an efficient multi-modal transportation system countywide.

Caltrans District 11

Description: Caltrans District 11 covers both San Diego and Imperial Counties. As such it falls into two MPOs. District 11 is responsible for monitoring and maintaining freeway systems and field devices throughout Imperial County

Caltrans District 12

Description: Caltrans district 12 encompasses the entirety of Orange County. It operates and maintains field devices in Orange County. Located in Irvine, the TMC is shared with CHP.

Caltrans District 5

Description: Central Coast district, including counties of Monterey, San Benito, San Luis Obispo, Santa Barbara, and Santa Cruz. District 5 borders Ventura County on North, and has major highways connected to Southern California Region.

Caltrans District 6

Description: San Joaquin Valley district, including counties of Fresno, Kern, Kings, Madera, and Tulare. This district borders Counties of Los Angeles, and Ventura from North and has major highways connected to the Southern California Region.

Caltrans District 7

Description: District 7, which includes Los Angeles and Ventura Counties. In conjunction with CHP, District 7 has implemented the TMC to rapidly detect and respond to incidents while managing the resulting congestion. The TMC is located in the Caltrans District Office Building in downtown Los Angeles. A new facility, under construction in Glendale, will be freestanding and is slated to open in 2005.

Caltrans District 8

Description: Caltrans District 8 covers Riverside and San Bernardino Counties, which includes 49 incorporated cities. The TMC is located in San Bernardino and is co-located with the CHP.

Caltrans District 9

Description: This district includes the Counties of Inyo and Mono. It borders San Bernardino County from North and has highways connected to the Southern California Region.

Commercial Vehicle Owners

Description: The generic group that represents all carrier companies that operate in the Southern California Region.

 **CTC/RTPA**

Description: County Transportation Commission or Regional Transportation Planning Authority. This stakeholder group is regional commissions.

Stakeholders in this group:

SANBAG
METRO
VCTC
RCTC
OCTA

ISPs

Description: All the Information Service Providers in the region including public and private

Associated Element: Regional Traveler Information Systems

IVAG

Description: Imperial Valley Association of Governments (IVAG) is for Imperial County which extends over 4,597 square miles, bordering on Mexico to the south, Riverside County to the north, San Diego County on the west, and the State of Arizona on the east.

Local Emergency/Security Agencies

Description: Stakeholder group that represents local level of Emergency Management Agencies including CHP, law enforcement, and fire department.

Metro

Description: Los Angeles County Metropolitan Transportation Authority (Metro) serves as transportation planner and coordinator, designer, builder and operator for LA County. Metro operates over 2,000 peak-hour buses on an average weekday. It also designed, built and operates 73.1 miles of Metro Rail.

In addition, Metro funds 16 municipal bus operators and funds a wide array of transportation projects.

Local Jurisdictions

Description: Counties or local cities that are adjacent to county boundaries.

Associated Element: Arterial Traffic Data Exchange

Los Angeles County

Description: Los Angeles County Department of Public Works (LACDPW) is responsible for the design, construction, operation,

maintenance, and repair of roads, bridges, airports, sewers, water supply, flood control, water quality, and water

conservation facilities and for the design and construction of capital projects.

Neighbor Agencies

Description: Transportation agencies bordering SCAG region

Stakeholders in this group:

State
Arizona State DOT
Nevada State DOT
Caltrans District 6
Caltrans District 5
Caltrans District 9

Nevada State DOT

Description: State of Nevada Department of Transportation. The state of Nevada borders the San Bernardino County from East and has major highways connected to the Southern California Region.

OCTA

Description: The Orange County Transportation Authority (OCTA) is the county's primary transportation agency. OCTA creates, funds and delivers efficient transportation for Orange County.

RCTC

Description: The Riverside County Transportation Commission (RCTC) fulfills the following responsibilities: coordinate state highway planning, adopt short range transit plans, coordinate transit service, allocate transportation development act funds, identify projects for state and federal grant funds, and coordinate county highway and transit plans with regional and state agencies.

Regional Caltrans

Description: This stakeholder group is the local Caltrans districts. These four districts cover six of the Southern California counties (Los Angeles, Orange, Ventura, San Bernardino, Riverside, and Imperial).

Stakeholders in this group:

Caltrans District 7
Caltrans District 8
Caltrans District 12
Caltrans District 11

Associated Element: Caltrans TMC Interfaces

SANBAG

Description: San Bernardino Associated Governments (SANBAG) is the council of governments and transportation planning agency for San Bernardino County. SANBAG is responsible for cooperative regional planning and furthering an efficient multi-modal transportation system countywide.

SCAG

Description: The Southern California Association of Governments (SCAG) has evolved as the largest of nearly 700 councils of government in the United States, functioning as the Metropolitan Planning Organization (MPO) for six counties: Los Angeles, Orange, San Bernardino, Riverside, Ventura and Imperial. The region encompasses a population exceeding 15 million persons in an area of more than 38,000 square miles. As the designated Metropolitan Planning Organization, the Association of Governments is mandated by the federal government to research and draw up plans for transportation,

growth management, hazardous waste management, and air quality. Additional mandates exist at the state level.

Associated Element: Data Archive

SCRRA

Description: The purpose of Southern California Regional Rail Authority (SCRRA) was to plan, design, construct and administer the operation of regional passenger rail lines serving the counties of Los Angeles, Orange, Riverside, San Bernardino and Ventura. SCRRA is comprised of MTA, VCTC, OCTA, SANBAG, and RCTC. The regional commuter rail system "Metrolink." has 2 Centers: Operations Center in Pomona and Maintenance Facility in Glendale.

Associated Element: Rail Management Improvement System
Associated Element: Rail Data Archive
Associated Element: Wayside Hotbox

State

Description: The State of California
Associated Element: PeMS

VCTC

Description: Ventura County Transportation Authority (VCTC) is the county's primary transportation agency. It creates, funds and delivers efficient transportation for Ventura County.

APPENDIX D

ITS FLOWS

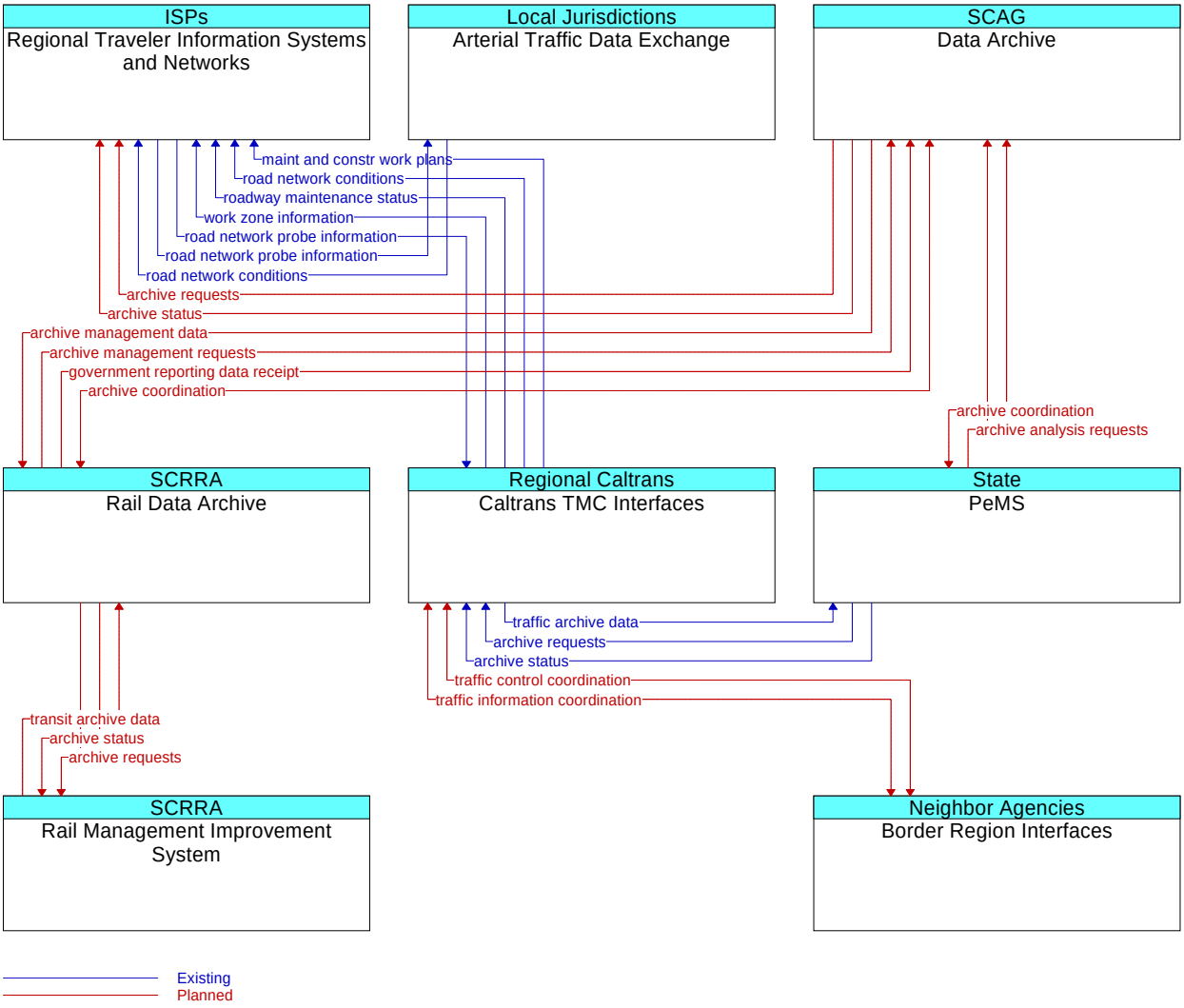


Figure D-1: Caltrans TMC Interfaces ITS Data Flows

APPENDIX E

COMMENTS DISPOSITION (from 2005 Version)

Stakeholder	Agency	Document	Comment	Action
Melissa Hewitt	Kimley-Horn, on behalf of OCTA	Phase 3	What is the responsibility of the "Steering Committee"? How other stakeholders would be incorporated and impacted? Is consensus building responsibility of the "Steering Committee" or "Project Team"	To add
			Page 1-4, Standards, paragraph 1, last sentence contains different meaning from the OC PM plan. Suggest clarify	To clarify
Michelle Kirkhoff	SANBAG	Page 2-11	Modification of description of transit services	Adopted
		Section 2.5	Add more San Bernardino transit services	Adopted
		Table 2.2	Correct description of San Bernardino	Adopted
		Page 3-1	Correct description of IE ITS Architecture	Adopted
		Page 3-1	Change Metro.net to Trip Planner	No change as MTA says this is the name that applies to public interface to a wide range of information including real-time information.
		Table 4.1	Correct description of 1800commute	Adopted
		General	Not to include website (smart traveler) info	Adopted
Marilyn Williams	RCTC	General	Exclude websites only providing links	Adopted
		General	Delete participants of 800-commute	Need to keep stakeholders, as they are critical to success of 800-commute
			No interface for the Smart Traveler website, references for all the entities should be deleted	Adopted
		Figure 7-1	Caltrans D8 will ultimately be linked to D7	Adopted
		Page A-2	HOV, suggest adding ".., also known as a carpool lane or diamond lane	Adopted
		Inventory Report	Suggest deleting FHWA website	Adopted
		Inventory Report	suggest deleting references to CTCs	
		Inventory Report	Metro Trip Planner - suggest changing to Trip Planner	No Change
		Inventory Report	Suggest deleting the smart traveler website reference; RCTC is definitely not involved	Adopted
		Section 1.1	Delete sentence: “Each County Regional Definitions of the word “Regional” are troublesome in the context of this project.”	Adopted

		Section 6	Correct first paragraph	Adopted
		General	Several places rephrase to be more smooth and clear	Adopted
		Table 2-1	Transit services description should be consistent	Adopted
		General	Add more Transit service from Riverside	Adopted
		Section 2.12	Inconsistency in Table 2-2	Adopted
		Section 7	Turbo is absolutely necessary	Adopted
Peter Liu	MTA	Page 1-1	Unfinished sentence	Adopted
		Table 2-1	Improve consistency	Adopted
		Table 4-2	Add more description to Metro.net	Adopted
		Section 5	Add Arterial Data Exchange across county borders	Adopted
		Figure 7-1	Add connection between D7 and D8	Adopted
		General	Question the use of Turbo Diagrams	Will be delivered separately from the document
Lori Huddleston	MTA	Section 1.1	Define purpose of the document	Added
		General	Are only current ITS elements and projects included?	The purpose of this document is only to identify multi-county projects all others should be in the county-level architectures. A wider range of issues was discounted at the previous meeting.
		Section 2.5	Disabled replaces Handicapped	Added
		Section 2.5	the transit listed are not regional	All transit services were included with thought of the issue of improved transit coordination across the region.
		Section 2.5	Specify if ADA available to each transit service	Added
		Section 2.5	Correct descriptions of several transit services	Adopted
		Table 2-2	Which Air Quality District does LA county belong to?	
		Section 4.1	CommuteView is missing	Added
		Section 5.1.1	Adding cross-county arterial corridors?	
		Page 7-1	Define Information flow and interfaces	
Melissa Hewitt	Kimley-Horn, on	Table 2-1	Add more transit services in Orange County	Added

	behalf of OCTA	Table 4-1	Complete Market Package list	Adopted
		Table 5-2	Define "Regional Partners"	
		Section 6	Suggest that the major systems that relate to the market packages that will comprise the architecture would be listed here ultimately as in the inventory section	Added
Jesse Glazer	FHWA	General	Include Private ISPs	Added
		General	No Regional Traveler Information??	Added
		General	Data Dictionary should not be removed, but it is not a system or MP, it is a Standard and should be discussed in Section 9	Adopted
		General	Document needs more than tri-annual maintenance	Stakeholder group will monitor and review comments also inserted in OC doc
		General	Describe 800-commute as a "gateway" rather than "telephone tree"	Adopted
		General	Terminator can exchange control & coordination info	Added
		General	Include PeMS and element's underlying systems	Added
		Table 2-1	Include only substantial transit services	Unchanged
		Section 5.1	No Emergency Management??	Added
		Section 5.1.4	Only Rail Interfaces and no transit interfaces?	Added
		Table 5-2	Operational Concept should also describe the activities needed to operate these services	This section follows the FHWA "Guidance"
		Section 6	Some functional requirement should belong to Operational Concept	The Functional Requirements were generated by Turbo and have been customized. They don't belong to Operational Concept
		Section 7	Add diagram for ATIS 2	Added
		Section 7	Add Arizona, Nevada TMCs and D11	Added
		Figure 7-2	Add "Signal Coordination" between 2 ATMSs	
		Figure 7-3	Include PeMS and flow from Caltrans to SCAG	Added
		Figure 7-6	Change Enhancement to Management	Adopted
		Table 8-1	Add 4th timing other than S/M/L?	Not necessary
		Section 10.6	Many "Should"/"Would" need to be clarified	Adopted

Michelle Kirkhoff & Marilyn Williams	SANBAG & RCTC	General	Not every element is mapped to National ITS Entities	Added
		General	Will CHP be inserted into this layer of architecture	CHP is represented via Caltrans
		General	Element description need to be more succinct	Adopted
		General	Some elements don't appear to be Systems	Some parts were modified, but some major elements, e.g. Caltrans TMC interfaces, is interpreted as a system.
		General	Include PeMS	Adopted
		General	Other regions and states should be included	Added
		Elements	800-Commute, modify description	Adopted
		Elements	Use stakeholder groups	Adopted
		Elements	Is "Arterial Traffic Information" an actual system	Kept as a System
		Elements	Combine CHIN & Cal. Hwy Info Web Page	Adopted
		Elements	Is Caltrans State Web Page a System?	Modified, combined with other websites and represented as a high level traveler information system
		Elements	Is Caltrans TMC Interface a System?	Kept as a System
		Elements	Add CommuteView, its stakeholder and other information	It is combined into Regional Traveler Information
		Elements	Is Data Dictionary a System	Removed from System but add to Standards
		Elements	Is Rail Data a System	Currently referenced on in Project Sequence
		Elements	Ridematch Website, should be called RidePro and designated as an ISP	It is combined into Regional Traveler Information
		Stakeholder Report	Add SCRRA as stakeholder of MetroLink	Adopted
		Stakeholder Report	CommuteView should be called CommuteCall	It is combined into Regional Traveler Information
		Stakeholder Report	Duplication by identifying both Regional Commissions and Transportation Commissions	Adopted
		Stakeholder Report	Include IVAG or Imperial County in Stakeholder Groups	Adopted
Michelle	SANBAG	General	Change "Local Cities" to "Local Jurisdictions"	Adopted

Kirkhoff		General	Change status of "Arterial Traffic Info" to Existing	Adopted
		General	Why data archive is a system	Data archives containing digital information have the potential to be shared and accessed electronically by multiple parties. Such is the intent with both the SCAG Archives and the Metrolink archives in the future. The National Architecture does not exclude historical data from ITS indeed it specifically includes it.
		Inventory Report	SCAG and IVAG are not CTC	Adopted
		Inventory Report	Add SANBAG	Adopted
		Inventory Report	Make stakeholder description consistent	Adopted
		Page 2-4	Not all larger agencies are CAD equipped	Adopted
		Section 2.5	Taking out all transit agencies	Removed
		Table 2-3	All counties have CTC but Imperial, all counties have Transportation. Authority except Ventura and Imperial	Adopted
		Figure 7-3	How exchange data ISPs becomes an ITS system?	We don't understand this comment as there are no ISPs in the graphic referred to
		Page 8-2	Data Dictionary should be medium-long term	Adopted
		General	Correct SANBAG name	Adopted
		Section 10.6	Insist on keeping architecture document on county's own website	Maintenance Issue to be determined if IE likes to keep the document
		Appendix A	Add CTC to Acronyms	Adopted
Emmanuel V. Aggreh	Office of Advance Planning, Caltrans District 7	General	Consider including Homeland Security	Recommend to be included in the future expanded Stakeholder Groups.
		Stakeholder Report	Add an "umbrella" stakeholder to represent emergency/security agencies	Adopted