SOUTHERN CALIFORNIA REGIONAL ITS ARCHITECTURE

Phase 2.1 – Development of Ventura County Regional ITS Architecture

DRAFT Version 4.0

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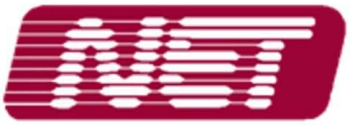

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DISCLAIMER

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CONTRACT INFORMATION

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:

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REVISION TABLE

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1 INTRODUCTION

1.1 Project Purpose and Background

For a number of years the Ventura County Transportation Commission (VCTC) has been pursuing the use of advanced technology to support the transportation network. This is a practical response to the need to combat ever-increasing congestion by working to integrate information about all modes of transportation and better support the mobility needs of residents, visitors and those who travel through Ventura County. These efforts were documented in 2001 in a report to VCTC called *Using Technology to Help Move People and Products – A Strategy for Ventura County*. This comprehensive policy document for the use of advanced technology in transportation was adopted and later incorporated into the 2004 Ventura County Congestion Management Program.

VCTC has always been a leader in the practical use of innovative technologies that support and improve the transportation system. They have long recognized the need for improved monitoring and detection systems on Ventura freeways and the need to make the information available to the California Highway Patrol, city and county traffic operating agencies and the traveling public. The growing county of Ventura also needs a modern, effective transit system that is easy to understand and use. VCTC has introduced transit and multi-modal information systems that have made its countywide operations national examples of leading edge transit technology and enhanced mode choice.

A Regional Intelligent Transportation System (ITS) Architecture is an organized view of the world of transportation technology. That is, it seeks to capitalize on years of 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. One example of this is when Caltrans installs cameras to monitor freeway conditions, the video should not only be available in the Caltrans Transportation Management Center in Los Angeles, but also available to the Ventura California Highway Patrol (CHP) dispatchers who control the local response to incidents; to the traffic engineers of cities adjacent to the freeways to aid in monitoring the impact of freeway congestion and incidents on city streets; and, to VCTC traveler information systems that provide real-time information to the traveling public. Similarly using automatic vehicle location systems to track the locations of buses and trains in real time is important to operators, reassuring for passengers waiting at stops and stations and for those who wish to meet them at their destination.

The Ventura County Regional ITS Architecture provides a framework that is firmly based on the existing ITS systems and includes a vision for the future deployment of integrated ITS applications in the county that will yield continuous benefits. The Regional ITS Architecture incorporates existing and planned ITS projects and provides

a path to be followed as new projects are conceived, designed and deployed. The Ventura County Regional ITS Architecture is a document but it should also be viewed as a process that will be maintained, revised, and validated as needed over the years. Most importantly it utilizes and is consistent with the National Architecture whose purpose is to foster interoperability and permit an exchange of traffic, transit and traveler information between regions, states and throughout the county. This document will therefore fulfill the requirement of the Transportation Equity Act for the 21st Century (TEA-21) and the FHWA/FTA Rule/Policy 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. The Ventura County Regional ITS Architecture uses the current National ITS Architecture Version 5.0 and the latest version of the software tool TurboArchitecture™ version 3.0.

1.2 Organization

The document is organized into the following sections that cover all of the federal requirements for Regional ITS Architecture to be considered consistent with the Rule/Policy:

1. Introduction
2. Regional Description
3. Regional Stakeholders
4. ITS Inventory
5. User Needs, Services
6. Concept of Operations
7. Functional Requirements
8. Information Flows and Interface Requirements
9. Project Sequencing
10. Identification of Required standards
11. Architecture Maintenance & Configuration Management Plan

Appendices:

- Acronyms and Terms
- Inventory Report
- Stakeholder Report
- Examples of Interagency Agreements
- Additional Standards Information
- Additional Interconnect List
- Additional Interconnect Diagrams

- ITS Data Flows
- Meeting Minutes

The above contents are consistent with the requirements of the Rule/Policy and therefore satisfy the federal requirements for documentation. To aid in the interpretation of the requirements the document follows guidance contained in U.S. DOT publication "Regional ITS Architecture Guidelines – Developing, Using and Maintaining an ITS Architecture for Your Region" prepared by the National ITS Architecture team October 12, 2001.

1.3 Project Time Frame

The regional ITS architecture should look far enough into the future in order to guide the efficient integration of services over time. The Ventura County Regional ITS Architecture planning horizon is ten years. This time horizon was selected in recognition that it takes time to make serious progress even in already developed and sophisticated counties. A longer time period was not deemed appropriate as it is expected that much progress will be made within that ten-year period.

1.4 The Southern California Regional ITS Architecture

The FHWA/FTA Rule/Policy specifies that there should be a Regional ITS Architecture for the region that is no less than the boundaries of the metropolitan planning area. The Southern California Association of Governments (SCAG) is the Metropolitan Planning Organization (MPO) for six counties in California. By virtue of its MPO status SCAG has assumed responsibility for building consensus around the Southern California Regional ITS Architecture. This is composed of five county level architecture documents, which represent local stakeholder needs and interests and a separate document that deals with multi county issues of importance to the Southern California Region. The Ventura County Regional ITS Architecture is one of the five regional county level architectures, which are as follows:

- Imperial County Regional ITS Architecture
- Inland Empire (i.e. San Bernardino & Riverside Counties) regional ITS Architecture
- Los Angeles County Regional ITS Architecture
- Orange County regional ITS Architecture
- Ventura County Regional ITS Architecture

2 REGIONAL DESCRIPTION

This section describes the general demographic, geographic and transportation system characteristics of Ventura County. The county map in Figure 2-1~~Figure 2-1~~ shows the major highways and boundaries with the adjacent counties.

Figure 2-1: Ventura County Map

Ventura County covers an area of 1,873 square miles including 43 miles of coastline. It is located northwest of Los Angeles County and is bordered by Kern County to the north and Santa Barbara County to the West. The coastline has 7.5 miles of public beaches and 411 acres of State beach parks. Other attractions include the Reagan Presidential Library, the San Buenaventura Mission, and the Channel Islands National Park, a wilderness preserve and marine sanctuary. Also, the Los Padres National Forest, which accounts for 860 square miles of the northern portion of the county.

Ventura County has a rapidly growing population of 742,000. It has a strong economic base that includes; agriculture, biotechnology, telecommunications and advanced technologies, manufacturing, tourism, military testing and development. The Naval Station at Point Mugu is home to research and development of weapons systems. The Naval Construction Battalion (Seabees) is located in Port Hueneme and the combined naval operations make them the largest employer in the county.

Port Hueneme is the State's smallest and only deep-water port between Los Angeles and San Francisco. It boasts the West Coast's largest refrigerated fruit terminal and serves as the western U.S. distribution network for many imported vehicles. The strong economic base of the county is reflected in median household incomes that consistently exceed both national and state levels.

Ventura County has the following 10 cities:

1. Camarillo
2. Fillmore
3. Moorpark
4. Ojai
5. Oxnard
6. Port Hueneme
7. Santa Paula
8. Simi Valley
9. Thousand Oaks
10. Ventura

2.1 Transportation Systems

Caltrans District 7 operates and manages the freeway system within both Los Angeles County and Ventura County. There is no HOV system in Ventura so far and there are nine corridors as illustrated below.

Table 2-1: Ventura County Major Roadways

Roadway	Alternative Name	Brief Description
CA 1	Pacific Coast Highway	A north/south route providing interregional, recreational, commuter and local travel through both rural & urban settings. Part of California's Scenic Highway System.

Roadway	Alternative Name	Brief Description
SR 23		A north/south route linking the Cities of Fillmore, Moorpark, Thousand Oaks and Westlake Village to the Los Angeles County line where it continues on to meet Route 1 at the ocean.
SR 33		Route 33 stretches 57.3 miles from SR 101 north to the Santa Barbara County Line. SR 33 connects with SR 150 near Ojai.
SR 34		Non-freeway, connects SR 118 with US 101 and City of Camarillo
US 101	Ventura Freeway	The major east/west transportation corridor in Ventura County. Commuters traveling between Ventura, Los Angeles, and Santa Barbara Counties heavily use the route. There is also heavy seasonal recreational traffic.
SR 118	Ronald Reagan Freeway	Runs in an east/west direction for 33 miles through Ventura County from the Los Angeles County Line in the east, to SR 126 in Saticoy to the west, changing from freeway to rural arterial road west of SR 23. It is used as an alternative route connecting I-210, I-5, I-405, and SR 23 to the highly congested SR 101.
SR 126		Located in the Santa Clara Valley, the 41-mile long corridor provides an important east/west connection between the Ventura coast and the Santa Clarita Valley
SR 150		A conventional two lane rural arterial road connecting SR 101 in Santa Barbara County to the west and the cities of Ojai and Santa Paula to the east
SR 232		A short arterial road in Oxnard connecting SR 118, CA 1 and US 101

The County and the Cities operate, monitor and maintain the local streets and highways. Their individual systems are discussed in Section 4.

2.2 VCTC and Transportation System Coordination

Created by state legislation in 1988, the Ventura County Transportation Commission (VCTC) began operations in 1989 and assumed all of the transportation responsibilities and resources of Ventura County. VCTC develops and implements transportation

policies, projects, funding, and priorities for a wide variety of projects that reflect all modes of transportation.

VCTC plays a lead role in coordinating transportation information sources for the County. Service is available via telephone, website and in hard copy. VCTC's website at www.goventura.org serves as a comprehensive multimodal traveler information system. It also utilizes links to other sites to make the broadest possible range of services available. The site offers the following:

1. **Travel Planner:** Provides complete directions, routing, and schedule information for driving, transit, flight, and park-and-ride.
2. **Traffic and Road:** Provides links to: the California Highway Patrol (CHP) where the current status of any accidents or incidents on the state highways can be found; Regional Integration of Intelligent Transportation System (RIITS) real-time traffic map, which covers Los Angeles County and part of Ventura County; and City of Los Angeles real-time traffic map for city streets.
3. **Local Excursions:** provides events and attractions information by city.
4. **By Bus:** Provides information about countywide local bus services including real-time bus locations (provided by a link to NextBus), the GoVentura smart card, the Guaranteed-Ride-Home program, and the Ventura Airporter—local airport shuttle services.
5. **By Plane:** Via a website link, provides flight arrival information and links to the airports within and near the county.
6. **By Train:** Provides the schedule and fare information of Amtrak and Metrolink as well as links to their websites.
7. **By Bike:** Provides the county's bike trail information and map.
8. **Park-and-Ride:** Provides the available parking locations for transferring to public transportation
9. **Ride Share:** Provides a link to http://www.ridematch.info/, the Southern California Ride Matching Service powered by the RidePro system.

2.3 Transit

Ventura has extensive transit coverage within the County and utilizes an advanced transit system of both fixed route, dial-a-ride and paratransit services supported by fully deployed cutting-edge technologies that include automated vehicle location systems, automated passenger counters and smart card readers. Remote terminal outlets can also be used to pay for smart cards, which then allow value to be automatically added to the card when next used on a bus.

2.3.1 VISTA

VISTA (Ventura Intercity Service Transit Authority) operates seven regular bus routes and two general public dial-a-ride services that connect with the municipal transit operators in Ventura County. Service is primarily along the major corridors, and stops are limited to transit stations and transfer points, colleges, and major employment centers. VISTA East Route serves Thousand Oaks, Simi Valley, and Moorpark. VISTA 101 serves Ventura, Oxnard, Camarillo, and Thousand Oaks. VISTA 126 serves Ventura, Santa Paula, and Fillmore. The Coastal Express runs north to Santa Barbara and two routes serve the new California State University Channel Islands (CSUCI) campus. In FY 2003 to 2004, VISTA carried almost 600,000 passengers.

Other than VISTA, the Los Angeles Department of Transportation (LADOT) and Metropolitan Transportation Authority (MTA) provide across-county bus services between Ventura and Los Angeles.

2.3.2 SCAT

The largest public transit service in Ventura County, South Coast Area Transit (SCAT) operates 15 regular bus routes, serves the cities of Ventura, Ojai, Oxnard, Port Hueneme, and San Buenaventura as well as the county areas between them. SCAT carries approximately 3.4 million passengers a year. Most routes run Monday through Saturday, with some routes running on Sunday as well. SCAT connects with VISTA, Metrolink, AMTRAK, Greyhound, and Oxnard Harbors and Beaches.

SCAT ACCESS is the largest of the paratransit services. It provides service to ADA certified people and seniors. Its annual ridership has grown to 110,000 in 2003/2004. SCAT ACCESS connects with Camarillo and Santa Paula dial-a-ride as well as Thousand Oaks Transit dial-a-ride service.

2.3.3 Simi Valley Transit

Simi Valley Area Transit serves Simi Valley with four regular bus routes, one of which connects with the Los Angeles County Metropolitan Transit Authority (MTA) in Chatsworth. In addition, it provides connections to VISTA East services, and the AMTRAK/Metrolink at the Simi Valley railroad station. Bus service is Monday through Saturday. Simi Valley Transit carries 520,000 passengers per year.

2.3.4 Thousand Oaks Transit

Thousand Oaks Transit (TOT) operates four regular bus routes. TOT serves Newbury Park, Thousand Oaks, and the Westlake area Monday through Friday. The NextBus arrival information is not provided for Thousand Oaks Transit due to poor communications coverage in that area. Thousand Oaks Transit connects to VISTA 101, Conejo Connection, VISTA East, Metro route 161, and LA DOT buses.

2.3.5 Camarillo Area Transit

Camarillo Area Transit (CAT) offers both a fixed route bus service Monday through Friday and a general public dial-a-ride Monday through Saturday. A Dial-A-Ride service reservation is provided by phone services. The Camarillo dial-a-ride services connect with the VISTA 101 and Camarillo-CSUCI buses, as well as AMTRAK services in Camarillo. The CAT service carries approximately 55,000 riders per year.

2.3.6 Moorpark Transit

Moorpark City Transit city bus operates two routes Monday through Friday. The buses connect to the VISTA East services at both the railroad station and Moorpark College. Annual ridership is approaching 40,000 passengers.

2.3.7 Ojai Trolley

Ojai City Trolley provides service between Meiners Oaks and Ojai seven days per week. Currently the service carries over 141,000 passengers a year. The service is considering a major modification, which would re-align the routes, and expand services to Oak View.

HELP of Ojai operates inside the Ojai Valley, including part of the SCAT ACCESS service area. It provides door-to-door service for seniors and disabled persons Monday-Friday. The service carried approximately 18,000 riders in 2002 to 2003.

2.3.8 California State University Channel Island (CSUCI)

In August 2004, VCTC and CSUCI began a one-year demonstration of an internal campus circulator service called the “CSUCI WAVE” using a prototype electric bus. The fare-free service is operated Monday through Friday. The service is funded through a VCTC Federal CMAQ grant and a Federal Transit Administration “Earmark”.

2.3.9 Harbor Beaches

Although inside the SCAT service area, the cities of Oxnard, Port Hueneme, and the County jointly operate a dial-a-ride serving the Channel Islands harbor area, part of Port Hueneme, the unincorporated beach communities near Oxnard, and the Oxnard Transportation Center. This service carries about 12,000 passengers per year. The service provides circulation within the beach communities, and serves as a feeder service to SCAT and AMTRAK.

2.3.10 Oak Park Dial-A-Ride

Ventura County contracts for dial-a-ride transit services in the Oak Park area from the City of Agoura Hills. This service provides access to the City of Thousand Oaks and allows connections to Thousand Oaks Transit and VISTA, Los Angeles Metro, and LADOT bus lines.

2.3.11 Other Services

In addition to the transit systems above, Metrolink, Amtrak, Greyhound and Airport Shuttle services are also available within Ventura County. MetroLink has one line – Ventura County Line in the County, and currently has five stations:

- Simi Valley
- Moorpark
- Camarillo
- Oxnard
- Montalvo

2.4 Major Airports

The Camarillo Airport is located on southwest border of the City of Camarillo. The airport is classified as a general aviation reliever airport for the Los Angeles area, supporting a wide range of general aviation activity. The Oxnard Airport is located on the Oxnard Plain, 1.5 mile from the coastline on the southwest of the City of Oxnard. The airport is classified as a non-hub commercial service airport with commuter flights currently serving Los Angeles International Airport.

In addition to the two local airports, air passenger and cargo is also transported through Los Angeles County airports or Santa Barbara Airport.

2.5 Sea Port

Port Hueneme is the only deepwater harbor between Los Angeles and the San Francisco Bay area and is the U.S. Port of Entry for California's central coast region. It serves international businesses and ocean carriers from the Pacific Rim and Europe. Port Hueneme ranks among the top seaports in California for general cargo throughput. The markets that Hueneme serves include: the import and export of automobiles, fresh fruit, and forest products. Port Hueneme is the top seaport in the United States for citrus exports and ranks among the top ten ports in the country for automobile and banana imports. Its unique positioning near the Santa Barbara Channel has also made the port primary support facility for the offshore oil industry in California's Central Coast area. Each year over $4 billion in cargo value moves through the port and port-related activity generates over $450 million for the nation’s economy each year. Additionally 3,500 jobs in Ventura County are directly or indirectly related to port activities.

There is no direct freeway access to Port Hueneme. It is connected to the Pacific Coast Highway, the closest freeway, by local roads and urban arterials.

2.6 Emergency Management Services

This section provides a high-level description of the Emergency Management Services (EMS) within Ventura County. This includes agencies responsible for law enforcement, as well as fire and rescue services.

2.6.1 California Highway Patrol (CHP)

The CHP provides traffic patrols and response to incidents and emergencies with responsibility of all freeways, all state routes, and some roadways in county unincorporated areas. CHP maintains a staff presence in the Caltrans District 7 Transportation Management Center (TMC) located in downtown Los Angeles. In addition, remote traffic management workstations are installed in both VCTC 's offices and the Ventura CHP facility and are linked to Caltrans District 7 TMC. These workstations allow both VCTC and CHP staff to view real-time traffic management information including congestion, ramp metering, planned lane closure and CCTV video.

CHP respond to 911 calls and use their own Computer Aided Dispatch (CAD) system to assemble incident information and manage their law enforcement duties. They use other information such as CCTV images, status reports, traffic flow data, and weather data from the TMC and disseminate it to field staff. The field staff may include CHP officers, allied agencies such as local agency police or public works, and private firms with contracts to clean up hazardous material spills.

2.6.2 County Sheriffs and Fire Departments

Ventura County has a Sheriff Department and Fire Authority that provide law enforcement, fire protection, and EMS services 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 their own CAD systems, which allow dispatchers to initiate emergency response through radio dispatch communications and then track response activities performed by field personnel.

Under the Statewide Incident Management System (SIMS) Ventura is required to have an operational area. This includes the County and all of the cities, political sub-divisions and special districts including 125 water districts. The Sheriff's office is the coordinator for the operational area at the operational level. The Office of Emergency Services has a full-time staff of four and falls under the Ventura County Sheriff's Department.

2.6.3 City EMS Agencies

Many of the cities have either their own police and/or fire departments, which handle law enforcement, fire protection, and EMS for their jurisdictions, or they contract with the county for those services.

3 Regional Stakeholders

3.1 Stakeholder Outreach

VCTC has extremely good, longstanding relationships with agencies involved in transportation throughout the County. In 2001 VCTC embarked on an inventory of road related advanced technology applications that are currently being used in each of the cities and the County of Ventura. Agencies filled out and returned detailed questionnaires. The inventory information for advanced technology involving transit systems came from VCTC itself, as they have been intimately involved in the procurement and deployment of these applications. This followed from a lengthy cooperative demonstration project, which deployed and evaluated the use of smart card, passenger counting equipment and software for the reconciliation of card use. The results of this project, which required years of close cooperation between the transit operators and VCTC, resulted in support for the advanced technology projects that have since been deployed in such an effective highly coordinated fashion.

Following the inventory of systems, VCTC collated the information in the report entitled *Using Technology to help Move People and Products: A Strategy for Ventura County*. The report mapped existing systems and laid out the vision for projects and an implementation strategy. The goal is to ensure that steps are taken to improve the collection and dissemination of real-time transportation information for the County. To achieve this requires that any new construction include provision for the necessary communication and information infrastructure.

The report was presented to and adopted by the Ventura County Transportation Commission in September 2001 and represents complete endorsement of the principles of the Ventura Regional ITS Architecture. This Regional ITS Architecture document has merely re-formulated all of the information into the required FHWA/FTA format.

The VCTC Stakeholders are as follows:

VCTC Commissioners:

- Council member John Procter -- City of Santa Paula, Chair
- Supervisor John Flynn – Ventura County, Vice Chair
- Supervisor Steve Bennett -- Ventura County
- Supervisor Kathy Long - Ventura County
- Supervisor Judy Mikels - City of Simi Valley
- Supervisor Linda Parks - City of Thousand Oaks
- Council member Cecelia Cuevas – City of Fillmore
- Council member Joe DeVito - City of Ojai
- Council member Dennis Gillette - City of Thousand Oaks

- Council member Dean Maulhardt - City of Oxnard
- Council member Keith Millhouse - City of Moorpark
- Council member Carl Morehouse - City of San Buenaventura
- Council member Michael Morgan - City of Camarillo
- Council member Barbara Williamson – City of Simi Valley
- Council member Toni Young - City of Port Hueneme
- Brian Humphrey, Citizen Representative, Cities
- Jay Scott, Citizen Representative, County
- Douglas Failing, Ex Officio Member, Director, Caltrans District 7
- Mitchell B Kahn, Legal Counsel

3.2 Identification of Architecture Champions

VCTC staff provide leadership in ITS thinking and how to secure its benefits through the Director, Ginger Gherardi and the Director of ITS, Steven DeGeorge. The very active group of stakeholders and partners includes: the County, the cities, transit operators, Caltrans District 7, the CHP, Metrolink and Amtrak. The VCTC Transportation Technical Advisory Committee supports the VCTC Commissioners and were briefed in detail on both the original ITS Strategy Report and the completed Ventura County Regional ITS Architecture. A complete listing of the Technical Advisory Committee is included in Appendix C, the Stakeholder Report. In addition, a group of emergency service agencies that are potential beneficiaries of ITS services were assembled and briefed on the architecture effort. Their representatives are also included in Appendix C.

4 ITS Inventory

4.1 Methodology

Data was collected through a questionnaire and has been expanded through discussion with VCTC staff. An inventory includes the listing of ITS elements and the elements that interface with them e.g. Caltrans Advanced Transportation Management System (ATMS) that interfaces with field devices such as loop detectors, surveillance cameras and changeable message signs. The National Architecture provides a common framework for planning, defining and integrating ITS systems and elements. The architecture defines and classifies:

- The ITS Functions, e.g. Transit center tracking and dispatch – provides the capabilities for monitoring transit vehicle locations and determining schedule adherence.
- The subsystems, i.e. physically where these functions are located e.g. a center, in the field or in vehicles.
- The information and data flows that connect these functions.

TurboArchitecture™ is a software application designed to work with the National Architecture to offer support for both regional and project architectures. It can be used at a high level or at a very detailed level according to purpose and preference. All the inventory data has been input into TurboArchitecture™ and an inventory report is attached as Appendix B. Please note that Traveler Information Systems are listed even if they are only websites and telephone based systems. A narrow interpretation of the National Architecture terminology would place them in the category of Information Service Provider or ISP. The systems would then be search engines that operate behind the web sites performing various functions. Where the background systems are known they are identified.

4.2 High Level Summary

Table 4-1: Ventura County ITS Systems

Systems	Descriptions
Caltrans District 7: Freeway & Highway Management Systems:	The freeways are equipped with Vehicle Detection Stations, CCTV, CMS, Ramp Meter Stations (RMS) at entrance ramps and HAR. These field elements are connected to Caltrans District 7 Transportation Management Center (TMC) currently located in downtown Los Angeles, but moving shortly to a new facility shared with CHP in Glendale. CTNET is Caltrans own central traffic signal control system linked to the TMC where conventional highways are also monitored. CTNET is in the early stages of deployment.

Systems	Descriptions
Transportation Management Center (TMC)	Located in Los Angeles
Advanced Transportation Management System (ATMS)	Controls and monitors all of the field devices including ramp meters and CMS and includes incident management features. Both VCTC and Ventura CHP have remote traffic management workstations directly linked to the District 7 TMC. The workstations have all of the ATMS functionality in terms of viewing. However, they do not have operating privileges enabled.
Vehicle Detection Systems	Loop detection – insufficient on Ventura freeways
Closed Circuit Television Cameras (Surveillance Systems CCTV)	Currently only 4 Ventura County locations
Changeable Message Signs (CMS)	Currently only 4 locations in Ventura County
Highway Advisory Radio (HAR)	One location
Ramp Metering	61 locations
Central Arterial Traffic Signal Control System (CTNET)	Not yet deployed
Cities & County of Ventura	
Camarillo	
Traffic Management System	Central computer surveillance system, some but not all signals synchronized. No emergency service signal preemption.
Public Railroad Crossings	Signal preemption with emergency battery backup
Transit Information	Website includes transit schedule information
Fillmore	
Public Railroad Crossings	Signal preemption with emergency battery backup
Traveler Information	Website has multiple links to information sites

Systems	Descriptions
Moorpark	
Public Railroad Crossings	Signal preemption with emergency battery backup
Transit Information	City website has schedule, fare and route information and a hot link to the NextBus website whose NextBus system enables bus locations to be seen in real-time
Ojai	
Traffic Management System	Some signal synchronization
Transit Information	City website has schedule, fare and route information
Oxnard	
Traffic Management System	Uses BiTrans signal system and SCOOT (currently inoperable). Signal synchronization extends to sixty percent of the system. Red light enforcement cameras are rotated at 11-instrumented intersections. Limited fire department signal preemption.
Public Railroad Crossings	Signal preemption with emergency battery backup
Multi-Modal Traveler Information	Website offers multi-mode information and hot links to providers.
Port Hueneme	
Traffic Management	Some loop detection and signal synchronization
Public Railroad Crossings	Signal preemption with emergency battery backup
Santa Paula	
Traffic Management	Some signal synchronization
Public Railroad Crossings	Signal preemption with emergency battery backup
San Buenaventura	
Traffic Management	BiTrans QuicNet System and type 170 controller unit controlling the 127 traffic signal system all of which are interconnected. Vehicle detection uses video detection.
Public Railroad Crossings	Signal preemption with emergency battery backup
Traveler Information	Multi-modal information and hot links

Systems	Descriptions
Simi Valley	
Traffic Management system	Central traffic signal monitoring system interconnected with 50 signals. Signals are traffic actuated, loops or video vehicle detection used. Fire station signal preemption at both fire stations.
Public Railroad Crossings	Signal preemption with emergency battery backup
Transit Information	Website provides route, schedule & fare information
Thousand Oaks	
Traffic Management	Some coordinated signals but no interconnect. Two fire stations have signal preemption
Transit Information	Website provides route, schedule & fare information
County of Ventura	
Traffic Management	Some interconnected signals and video detection. One fire station has signal preemption
Public Railroad Crossings	Signal preemption with emergency battery backup
Traveler Information	Web site links to VCTC website
Transit	
Traveler Information System -Transit Routing & Itinerary Systems	VCTC website has routes and schedules for all public bus systems in Ventura County; on line registration for a guaranteed ride home program. A point-to-point trip planner (the background operating system) includes time transfers, special needs such as bikes and wheelchairs and includes a walking map. Hot links to NextBus give real time locations of buses. The website is complimented by the telephone call in service that will be augmented in the future with 24/7 service operated by an Interactive Voice Recognition system

Systems	Descriptions
Smart Card – Fare Management System	The smart card is used as a bus pass or pre-paid bus fare (e-purse). The contactless smart card works in tandem with a Global Positioning System (GPS) and passenger counting hardware for an integrated countywide system that provides bus operators with a wide spectrum of system performance measures and planning data. There are plans to expand use to the Ventura County Metrolink rail line. This is really a bundle of linked systems including a fare reconciliation system located at VCTC that enables the distribution of revenues between all operators based on actual use of their routes and services.
Real-time bus notification system	Buses are automatically located using GPS and using the Internet information is posted on dynamic signs and on the NextBus website. The NextBus system powers the information flow. Historical tracking data is also made available to VCTC and the transit agencies
Metrolink	
Real-time train location	Demonstration deployment is underway. Dynamic message signs at stations and on websites will keep passengers and those meeting passengers informed.

5 ITS Needs and Operational Concepts

5.1 ITS Needs

The previous section described an inventory of the existing ITS systems in Ventura County. This section considers the ITS needs that remain to be satisfied. The VCTC report on Ventura County ITS deployment strategies, "*Using Technology To Help Move People and Products -- A Strategy For Ventura County*", identified needs for County ITS implementation as follows:

1. All future Caltrans construction projects in Ventura County should be designed and include, at a minimum, vehicle detection stations, ramp meters, changeable message signs, CCTV cameras, conduit, pull boxes and fiber optic communication cable, where appropriate.
2. The design of the current freeway widening projects scheduled for both the 118 and 23 Freeways should be revised to include the provision of fiber, ramp meters, changeable message signs and CCTV, where needed. It is acknowledged that these modifications will increase the cost of the project, however, it will be much more cost effective incorporating these elements into the widening projects now rather than doing stand alone projects later.
3. Develop policies and agreements between and among local agencies to connect and share the use of conduits.
4. Provide and/or upgrade signal preemption systems for all fire stations in the County. All new construction requiring signalized intersections should be "conditioned" as a part of the development permit process to provide signal preemption.
5. Pursue introduction of the Smart Card on Metrolink.
6. Work with all of the Paratransit service providers to improve coordination and explore and address liability or other barriers to facilitate inter-jurisdictional service delivery.
7. Provide real-time dispatching of paratransit vehicles, namely with the vehicle closest to the passenger picking him or her up, so that it is easier and more convenient for people to use the paratransit systems.

Additional needs are the further improvement of the VCTC traveler information services so that a telephone service is available 24/7. This could be achieved by the use of Interactive Voice Recognition (IVR) technology.

It is also noted that the traffic management systems for the County and cities continue to require upgrades and modernization improving both signal coordination for smoother throughput of traffic and more efficient means of monitoring signal maintenance.

5.2 Operational Concepts

In this section, the identified transportation system needs that can be satisfied by selected ITS services were grouped by Market Packages from the National ITS Architecture. Market Packages are a classification system used by the National ITS Architecture. A market package collects together several different subsystems, equipment packages, terminators, and can be used to illustrate the information flows that provide the desired service. In addition, for each selected market package, each stakeholder's current and future roles and responsibilities in the implementation and operation of the regional systems are described. These roles and responsibilities are one of the required components of the Rule/Policy in that they illustrate how to gain the most effectiveness from coordinated and integrated systems. The market package codes utilized from the National Architecture uphold consistency across all regional ITS architectures.

Table 5-1: Ventura County ITS Operational Concepts

Market Package	Contents	Organization	Roles/Responsibilities
ATMS01 Network Surveillance	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	Caltrans	• Install and maintain the surveillance equipment along freeways • Share surveillance data with local agencies and EMS agencies
		VCTC	• Provide resource when requested by local traffic agencies
		Other Local Agencies	• Install and maintain the surveillance equipment on surface street network • Share surveillance data with other agencies

Market Package	Contents	Organization	Roles/Responsibilities
ATMS03 Surface Street Control	Central control and monitoring equipment, communication links, and the signal control equipment that support local surface street control and/or arterial traffic management	Emergency Agencies	• Dispatch emergency vehicles • Interface with other agencies to support coordinated emergency response • Create and update emergency response plans • Track and mange emergency vehicle fleets using AVL and two-way communication with the vehicle • Use real-time traffic information received from other agencies to aide the emergency dispatching in selecting the emergency vehicles and routes
		Local City and County Traffic Operations	• Manage traffic on arterial streets using traffic signals including preemption for emergency vehicles • Maintain centralized signal systems and software • Monitor traffic on arterials • Provide traffic and incident information to the public • Coordinate traffic control response to incidents with emergency and traffic agencies • Receive or provide signal priority requests

Market Package	Contents	Organization	Roles/Responsibilities
ATMS04 Freeway Control	Communications and roadside equipment to support ramp control, lane controls, interchange control, and incident detection for freeways	Caltrans	• Install CCTV, CMS and other freeway detection devices • Share freeway control data and traffic information with other agencies • Maintain freeway control systems and software • Maintain field equipment • Provide traffic and incident info to drivers
		CHP	• Receive public safety calls and forward them to appropriate dispatch center • Dispatch state patrol vehicles • Communicate and coordinate with other emergency agencies • Report freeway road closure to all agencies
		VCTC	• Provide resource when requested by emergency management agency
ATMS06 Traffic Information Dissemination	Driver information using roadway equipment such as dynamic message signs or highway advisory radio	Caltrans	• Install and maintain the traffic information dissemination equipment along freeways
		VCTC	• Provide resource when requested by local traffic agencies
		Other Local Agencies	• Install and maintain the traffic information dissemination equipment on surface street network

Market Package	Contents	Organization	Roles/Responsibilities
ATMS07 Regional Traffic Control	Sharing of traffic information and control among traffic management centers to support a regional control strategy, adding the communications links and integrated control strategies that enable integrated inter-jurisdictional traffic control	VCTC	• Develop policies and agreements between and among local agencies to connect and share the use of conduits
		Other Local Agencies	• Participate in and contribute to the integration process
ATMS08 Traffic Incident Management System	Managing both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized	Caltrans	• Collect incident data and confirm incident time and location
		CHP	• Receive public incident calls • Respond to incident by coordinating with field staff • Provide incident status information
ATMS13 Standard Railroad Grade Crossing	Manages highway traffic at highway-rail intersections where operational requirements do not dictate more advanced features Both passive and active warning systems are supported	VCTC	• Develop railroad crossing management plan
		Rail Operators	• Operate rail service by the requirements listed in the railroad crossing plan
		Other Local Agencies	• Install and maintain the railroad crossing equipments for detections and warning

Market Package	Contents	Organization	Roles/Responsibilities
APTS1 Transit Vehicle Tracking	Monitoring of current transit vehicle location using Automated Vehicle Location System	Transit Operators	• Maintain and operate the hardware on vehicle
		VCTC	• Maintain and operate hardware and software system • Provide the transit vehicle location information to public
APTS2 Transit Fixed-Route Operations	Vehicle routing and scheduling, as well as automatic operator assignment and system monitoring for fixed-route and flexible-route transit services	Transit Operators	• Operate vehicle according to schedule and route • Send status to agency center • Assign transit operators
		VCTC	• Plan transit route and schedule according to demand • Receive, store, and analyze ridership data.
APTS3 Demand Response Transit System	Vehicle routing and scheduling as well as automatic operator assignment and monitoring for demand responsive transit services	Transit Operators	• Receive ride request • Schedule and dispatch vehicle in a systematic manner • Coordinate with other transit operators to achieve inter-jurisdictional service • Send status to agency center
		VCTC	• Coordinate the integration of all paratransit service
APTS4 Transit Passenger and Fare Management	Passenger loading and fare payments on-board transit vehicles using electronic means	Transit Operators	• Receive bus location and occupancy information from AVL system • Maintain passenger count • Manage, and maintain electronic payment system • Issue request for signal priority

Market Package	Contents	Organization	Roles/Responsibilities
		VCTC	• Maintain and operate the data system • Prompt the awareness of smart card • Build and expand the smart card distribution network • Manage the data collected through smart card and other transit management systems
APTS7 Multi-modal Coordination	Multimodal coordination between transit agencies can increase traveler convenience at transit transfer points and improve operating efficiency	Transit Operators	• Receive ride request • Schedule and dispatch vehicle in a systematic manner • Coordinate with other transit operators to achieve inter-jurisdictional service • Send status to agency center
		VCTC	• Coordinate the integration of all paratransit service
APTS8 Transit Traveler Information	Provides transit users at transit stops and on-board transit vehicles with ready access to transit information	Transit Operators	• Maintain the proper performance of the system • Provide the feedback of problems, recommendations, and solutions
		VCTC	• Design and implement the system • Improve the system according to feedback from passengers and transit operators

Market Package	Contents	Organization	Roles/Responsibilities
ATIS1 Broadcast Traveler Information	Collects traffic conditions, advisories, general public transportation, incident information, roadway maintenance and construction information, weather information, and broadly disseminates this information through existing infrastructures	VCTC	• Collect and disseminate traveler information through website
		Transit Operators	• Provide transit operation status
		Caltrans	• Provide freeway traffic status
		CHP	• Provide incident management status
ATIS2 Interactive Traveler Information	Provides tailored information in response to a traveler request	VCTC	• Provide routing and scheduling through website • Provide routing and scheduling through telephone service
EM 01 Emergency Call-Taking and Dispatch	Basic public safety call-taking and dispatch services	CHP	• Provide basic public safety call-taking and dispatch service on freeways
		Other Local Agencies	• Provide basic public safety call-taking and dispatch service on arterial streets
EM 02 Emergency Routing	Automated vehicle location and dynamic routing of emergency vehicles	CHP	• Provide dynamic routing for emergency vehicle dispatched
		Caltrans	• Provide freeway traffic information
		Other Local Agencies	• Provide surface street traffic information

Market Package	Contents	Organization	Roles/Responsibilities
EM 06 Wide Area Alert	Uses ITS driver and traveler information systems to alert the public in emergency situations that pose a threat to life and property	Sheriff's Dept.	• Receive alert information • Disseminate alert to other emergency services and ISPs
		ISP	• Disseminate alert information
		CHP, Fire, Police, and other EMS	• Disseminate alert information
EM 08 Disaster Response and Recovery	Enhances the surface transportation system to respond to and recover from disasters	All EMS (Sheriff, CHP, Fire, etc.)	• Collect disaster status • Send out request of resources to all centers
		Caltrans	• Provide road network status • Coordinate with EMS on emergency traffic control
		VCTC and Other Transit Agencies	• Provide transit status • Provide emergency transit service
MC08 Work Zone Management	Controlling traffic through (DMS) and informing other groups of activity (e.g., ISP, traffic management, other maintenance and construction centers) for better coordination management	Other Local Agencies	• Collect construction data for advisory messages • Direct activities in work zones, control CMS, DMS, and inform other centers.

Market Package	Contents	Organization	Roles/Responsibilities
MC09 Work Zone Safety Monitoring	Systems that improve work crew safety and reduce collisions between the motoring public and maintenance and construction vehicles	Other Local Agencies	• Direct activities in work zones • Collect current work zone, road, and weather conditions

6 Functional Requirements

Chapter 4 of this document has presented the ITS inventory including existing and planned systems owned and operated by Ventura County ITS stakeholders, and Chapter 5 has identified the needs of the stakeholders in the county. The development of functional requirements is the next logical step in the evolution of architecture development. Each identified ITS system must perform certain functions to effectively deliver the ITS services in Ventura County. By the definition of the "Regional ITS Architecture Guidance", a Functional Requirement is the documentation of task or activity that is performed by each system in the region to provide the required regional ITS services. The functional requirements reflect not only existing requirements but also desirable functional requirements that fit within the context of the architecture.

The lists below detail the primary functional requirements for the major ITS elements in Ventura County.

Stakeholder: Amtrak

System: Amtrak Service

This system shall:

- Monitor the vehicle in real-time and transmit information to the management center
- Support the use of a fare medium for all applicable regional surface transportation services

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Stakeholder: California Highway Patrol (CHP)

System: CHP Dispatch Center

This system shall:

- Support the interface to the Emergency Telecommunications System (e.g. 911 or 7-digit call routing) to receive emergency notification information and provide it to the emergency system operator
- Receive emergency call information from 911 services and present the possible incident information to the emergency system operator
- Receive emergency call information from motorist call-boxes and present the possible incident information to the emergency system operator
- Receive emergency call information from mayday service providers and present the possible incident information to the emergency system operator
- Receive emergency notification information from other public safety agencies and present the possible incident information to the emergency system operator

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- Receive emergency notification information from public transit systems and present the possible incident information to the emergency system operator
- Request a CCTV camera view from a traffic management center in order to verify the reported incident
- Update the incident information log once the emergency system operator has verified the incident
- Forward the verified emergency information to the responding agency based on the location and nature of the emergency
- Dispatch emergency vehicles to respond to verified emergencies and provide suggested routing under center personnel control
- Store the current status of all emergency vehicles available for dispatch and those that have been dispatched
- Relay location and incident details to the responding vehicles
- Provide the capability to request traffic control measures from traffic management centers such as signal preemption, traffic barriers and road closures
- Track the location and status of emergency vehicles responding to an emergency and update the incident status based on information from the emergency vehicle
- Store and maintain the emergency service responses in an action log
- Receive traffic information, including closures, traffic conditions, etc. from traffic management centers
- Coordinate response to incidents with other Emergency Management centers to ensure appropriate resources are dispatched and utilized
- Receive inputs from traffic management and maintenance centers on the location and status of traffic control equipment and work zones along potential emergency routes
- Calculate emergency vehicle routes based on information from traffic management and maintenance centers
- Provide strategic emergency response capabilities such as that of an Emergency Operations Center for large-scale incidents and disasters
- Manage coordinated inter-agency responses to and recovery from large-scale emergencies. Such agencies include traffic management, transit, maintenance and construction management, rail operations, and other emergency management agencies
- Provide the capability to implement response plans and track progress through the incident by exchanging incident information and distributing response status to allied agencies

- Develop, coordinate with other agencies, and store emergency response plans
- Track the availability of resources (including vehicles, roadway cleanup, etc.), request additional resources from traffic, maintenance, or other emergency centers if needed
- Provide information to the media concerning the status of an emergency response

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Stakeholder: California Highway Patrol (CHP)

System: CHP Vehicles

This system shall:

- Receive dispatch instructions sufficient to enable emergency personnel in the field to implement an effective incident response. It includes local traffic, road, and weather conditions, hazardous material information, and the current status of resources that have been allocated to an incident
- Provide an interface to the center for emergency personnel to transmit information about the incident site such as the extent of injuries, identification of vehicles and people involved, hazardous material, etc
- Provide an interface to the center for emergency personnel to transmit information about the current incident response status such as the identification of the resources on site, site management strategies in effect, and current clearance status

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Stakeholder: California Highway Patrol (CHP)

System: Remote TMC

This system shall:

- Distribute traffic data to maintenance and construction centers, transit centers, emergency management centers, and traveler information providers
- Distribute traffic data to the media upon request; the capability to provide the information in both data stream and graphical display shall be supported
- Exchange traffic information with other traffic management centers, includes incident information, congestion data, traffic data, signal timing plans, and real-time signal control information
- Exchange traffic control information with other traffic management centers, includes remote monitoring of traffic management devices (e.g. signs, sensors, signals, cameras, etc.)
- Provide road network conditions and traffic images to emergency management centers to support the detection, verification, and classification of incidents

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Stakeholder: Caltrans District 7

System: Caltrans District 7 TMC

This system shall:

- Remotely control systems to manage use of the freeways, including ramp meters, mainline metering, and lane controls
- Collect operational status from ramp meters, mainline metering, and lane controls and compare against the control information sent by the center.
- Collect fault data from ramp meters, mainline metering, and lane controls
- Implement control strategies, under control of center personnel, on some or all of the freeway network devices (e.g. ramp meters, mainline metering, and lane controls), based on data from sensors monitoring traffic conditions upstream, downstream, and queue data on the ramps themselves
- Collect and store traffic flow and image data from the field equipment to detect and verify incidents
- Exchange incident and threat information with emergency management centers as well as maintenance and construction centers; including notification of existence of incident and expected severity, location, time and nature of incident
- Support requests from emergency management centers to remotely control sensor and surveillance equipment located in the field
- Provide road network conditions and traffic images to emergency management centers to support the detection, verification, and classification of incidents
- Provide video and traffic sensor control commands to the field equipment to detect and verify incidents

Stakeholder: Caltrans District 7

System: Caltrans D7 Roadside Equipment

This system shall:

- Collect, process, digitize, and send traffic sensor data (speed, volume, and occupancy) to the center for further analysis and storage, under center control
- Collect, process, and send traffic images to the center for further analysis and distribution
- Return sensor and CCTV system operational status to the controlling center
- Return sensor and CCTV system fault data to the controlling center for repair

- Include ramp metering controllers, mainline meters, and lane controls for use on freeways, under center control
- Monitor operation of ramp meter, mainline meters, and lane control indicators and report to the center any instances in which the indicator response does not match that expected from the indicator control information
- Include changeable messages signs for dissemination of traffic and other information to drivers, under center control; the CMS may be either those that display variable text messages, or those that have fixed format display(s) (e.g. vehicle restrictions, or lane open/close)
- Include driver information systems that communicate directly from a center to the vehicle radio (such as Highway Advisory Radios) for dissemination of traffic and other information to drivers, under center control
- Provide operational status for the driver information systems equipment (CMS, HAR, etc.) to the center
- Provide fault data for the driver information systems equipment (CMS, HAR, etc.) to the center for repair
- Collect, process, and send traffic images to the center for further analysis and distribution
- Remotely process video data and provide an indication of potential incidents to the traffic management center
- Be remotely controlled by the Caltrans transportation management center
- Provide operational status and fault data from the incident detection devices to the transportation management center

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Stakeholder: Caltrans District 7

System: Caltrans Maintenance Vehicle

System:

- Compute the location of the vehicle based on inputs from a vehicle location determination function
- Send the vehicle location to the controlling center

Stakeholder: Cities and County

System: Local City and County Signal Systems

These systems shall:

- Monitor and diagnose field equipment to detect failures, issue problem reports and track maintenance

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- Provide traffic data
- Collect and store traffic information
- Develop and implement control plans to coordinate signals at intersections
- Monitor and manage intersection traffic flow
- Collect, store and provide electronic access to traffic surveillance data

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Stakeholder: Cities and County

System: Local City and County Roadside Equipment

These systems shall:

- Monitor traffic flow
- Control traffic signals
- Monitor surveillance equipment and report detected problems
- Monitor traffic signal and report detected problems
- Receive vehicle signal priority requests and send request to signal controllers
- Provide pre-emption of signalized intersections when activated, as appropriate
- Display traffic information on roadway equipment

Stakeholder Cities and County

System: Local and other Fire department Systems

These systems shall:

- Receive and respond to emergency calls
- Forward information to other systems that manage emergency response, as needed
- Collect and store emergency information collected during operations
- Dispatch emergency vehicles to incident
- Track emergency vehicles
- Develop and store emergency response plans in concert with associated emergency response agencies
- Coordinate with allied agencies throughout incident

Stakeholder: County and Local Cities

Systems: Sheriff and Local Police Systems

These systems shall:

- Receive and respond to emergency calls

- Forward/transfer information to other systems that manage emergency response, as needed
- Collect and store emergency information collected during operations
- Dispatch emergency vehicles to incident
- Track emergency vehicles
- Develop and store emergency response plans in concert with associated emergency response agencies
- Coordinate with allied agencies throughout incident

Stakeholder: Municipal and Small Transit Agencies

System: Cities' Transit Center

This system shall:

- Generate transit routes and schedules based on such factors as parameters input by the system operator, road network conditions, operational data on current routes and schedules, and digitized map data
- Provide the interface to the system operator to control the generation of new routes and schedules (transit services) including the ability to review and update the parameters used by the routes and schedules generation processes and to initiate these processes
- Collect transit operational data for use in the generation of routes and schedules
- Assign transit vehicle operators based on factors such as eligibility, route preferences, seniority, and transit vehicle availability
- Acquire information from Maintenance and Construction Operations concerning work zones, roadway conditions, asset restrictions, work plans, etc
- Disseminate up-to-date schedules and route information to other centers for fixed and flexible route services
- Manage the actual value of transit fares for each segment of each regular transit route, including the transmission of the information to transit vehicles and transit stops or stations
- Provide the capability for a system operator to manage the transit fares and control the exchange of transit fare information
- Process the financial requests from the transit vehicles or roadside and manage an interface to a Financial Institution
- Collect data on fare payment violations and send the data, including images of the violator, to the appropriate enforcement agency.

- Facilitate the exchange of fare and load information with VCTC fare payment reconciliation system
- Provide transit fare information to other centers, including traveler information providers upon request

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Stakeholder: Municipal and Small Transit Agencies

System: Transit Vehicles

This system shall:

- Compute the location of the transit vehicle based on inputs from a vehicle location determination function
- Support the computation of the location of a transit vehicle using on-board sensors to augment the location determination function. This may include proximity to the transit stops or other known reference points as well as recording trip length
- Record transit trip monitoring data including operational status information such as doors open/closed, passenger loading, running times, etc
- Send the transit vehicle trip monitoring data to center-based trip monitoring functions
- Detect embarking travelers on-board a transit vehicle and read data from the traveler card / payment instrument that they are carrying
- Determine the traveler's travel routing based on the transit vehicle's current location and the traveler's destination
- Calculate the traveler's fare based on the origin and destination provided by the traveler as well as factors such as the transit routing, transit fare category, traveler history, and route-specific information
- Have access to the complete range of transit services (routes and schedules) that are available to the traveler
- Provide a transit fare payment interface that is suitable for travelers with physical disabilities
- Include a database on-board the transit vehicle for use in fare processing from which the fares for all possible trips within the transit operational network can be determined
- Provide passenger loading and fare statistics data to the center
- Enable traffic and travel advisory information to be requested and output to the traveler. Such information may include transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, and special events

Stakeholder: County of Ventura

System: Dial-A-Ride Transit Systems

This system shall:

- Process trip requests for demand responsive transit services, i.e. paratransit. Sources of the requests may include traveler information service providers
- Track the location and availability of transit vehicles for use in demand responsive transit (paratransit) operations
- Generate demand responsive transit (paratransit) routes and schedules based on such factors as parameters input by the system operator, what other demand responsive transit schedules have been planned, the availability and location of vehicles, the relevance of any fixed transit routes and schedules, and road network information
- Assign transit vehicle operators for confirmed demand responsive transit (paratransit) trips based on factors such as eligibility, route preferences, seniority, and transit vehicle availability
- Acquire information from Maintenance and Construction Operations concerning work zones, roadway conditions, asset restrictions, work plans, etc
- Disseminate up-to-date schedules and route information to other centers for demand responsive transit services (paratransit)

Stakeholder: County of Ventura

System: Dial-A-Ride Transit Vehicles

This system shall:

- Compute the location of the transit vehicle based on inputs from a vehicle location determination function
- Support the computation of the location of a transit vehicle using on-board sensors to augment the location determination function. This may include proximity to the transit stops or other known reference points as well as recording trip length
- Record transit trip monitoring data including operational status information such as doors open/closed, passenger loading, running times, etc
- Send the transit vehicle trip monitoring data to center-based trip monitoring functions
- Detect embarking travelers on-board a transit vehicle and read data from the traveler card / payment instrument that they are carrying

- Determine the traveler's travel routing based on the transit vehicle's current location and the traveler's destination
- Calculate the traveler's fare based on the origin and destination provided by the traveler as well as factors such as the transit routing, transit fare category, traveler history, and route-specific information
- Have access to the complete range of transit services (routes and schedules) that are available to the traveler
- Provide a transit fare payment interface that is suitable for travelers with physical disabilities
- Include a database on-board the transit vehicle for use in fare processing from which the fares for all possible trips within the transit operational network can be determined
- Provide passenger loading and fare statistics data to the center
- Enable traffic and travel advisory information to be requested and output to the traveler. Such information may include transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, and special events

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Stakeholder: MetroLink

System: MetroLink Operations Center

This system shall:

- Support use of a fare medium for all applicable regional surface transportation services
- Allow two-way voice communication between the train vehicle driver and a facility and two-way data communication between the train vehicles and a facility
- Support services to develop, print and disseminate schedules and automatically update customer service operator systems region-wide with schedule information
- Provide real-time and schedule information at stations and en-route
- Support schedule coordination between transit properties
- Monitor train locations and determine vehicle schedule adherence

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Stakeholder Metrolink

System: Metrolink Trains

This system shall:

- Monitor the vehicle in real-time and transmit information to the management center

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- Track vehicle and transmit location to central
- Collect data to determine ridership levels and support fare structures
- Support use of a fare medium for all applicable regional surface transportation services
- Allow two-way voice communication between the train vehicle driver and a facility and two-way data communication between the train vehicles and a facility

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Stakeholder: VCTC

System: Guaranteed Ride Home

This system shall:

- Process registrations for the Guaranteed Ride Home Program
- Process billings and administration of use of taxis and rental cars

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Stakeholder: VCTC

System: VCTC Remote TMC

This system shall:

- Enable the distribution of traffic data to maintenance and construction centers, transit centers, emergency management centers, and traveler information providers
- Enable the distribution of traffic data to the media upon request; the capability to provide the information in both data stream and graphical display shall be supported
- On request provide road network conditions and traffic images to emergency management centers to support the detection, verification, and classification of incidents

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Stakeholder: VCTC

System: Website (www.goventura.org)

This system shall:

- Collect, process, store, and disseminate traffic and highway condition information to travelers, including incident information, detours and road closures, event information, recommended routes, and current speeds on specific routes.
- Collect, process, store, and disseminate maintenance and construction information to travelers, including scheduled maintenance and construction work activities and work zone activities

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- Collect, process, store, and disseminate transit routes and schedules, transit transfer options, transit fares, and real-time schedule adherence information to travelers
- Collect, process, store, and disseminate event information to travelers

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Stakeholder: VCTC

System: SmartCard

This system shall:

- Provide the capability for a system operator to manage the transit fares and control the exchange of transit fare information
- Process the financial requests from the transit vehicles or roadside and manage an interface to a Financial Institution
- Support the payment of transit fare transactions using data provided by the traveler cards / payment instruments
- Process requests for transit fares to be paid in advance

Stakeholder: VCTC

System: NextBus

This system shall:

- Collect and provide real-time travel-related information at transit stops, multi-modal transfer points, and other public transportation areas
- Collect and present to the transit traveler information on transit routes, schedules, and real-time schedule adherence
- Provide support for general annunciation and/or display of imminent arrival information and other information of general interest to transit users
- Present information to the traveler in a form suitable for travelers with physical disabilities

7 INFORMATION FLOWS AND INTERFACE REQUIREMENTS

7.1 Data Exchange - the Physical Elements of the Architecture

The development of the architecture has now reached a point where the actual information can be defined that will need to flow between the region's ITS systems in order to support the needed ITS services. We begin with a physical depiction of the architecture, which shows the connections that can be established between the systems at the very highest level. The diagram used is often referred to as the "sausage diagram" and is first generated in TurboArchitecture™ and has then been customized to reflect the systems of the Ventura region. The connections shown in Figure 7-1~~Figure 7-1~~ should not be interpreted as having all already been implemented. Rather they show the current physical architecture and the potential for interconnects.

Because Ventura County is well advanced in some areas of ITS deployment we next illustrate the manner in which the County transit systems have been integrated by VCTC. Figure 7-2~~Figure 7-2~~ illustrates the manner in which VCTC has deployed its integrated transit system and the data flows that are exchanged. Smart card remote sales locations are distributed throughout the County. Cards can be purchased as monthly passes or as debit cards to which value can be added. The sales points are linked to transit management so that transaction data can be sent to a depot server where it can be downloaded wirelessly to the on-board computers on the buses. If a customer adds value to their card or renews a monthly pass this information will be transferred to the system and be recognized next time the card is used. Card use and location of use are wirelessly downloaded to the depot server and the information is retrieved nightly by VCTC when it polls each depot server. VCTC then performs the financial reconciliation function that allows revenues to be distributed across the agencies. Another part of the integrated transit system is the AVL system, which is used to locate the position of each bus on its route. The NextBus system polls the vehicles and predicts the estimated time of arrival at the next stop. This information is posted on dynamic message signs at bus stops and on the NextBus web site. NextBus also has data reporting package that is downloaded to VCTC giving bus locations, predictions and full historical data available in both table and graphic form. VCTC's web site GoVentura.org also links directly to NextBus. In the event of serious events occurring that could impact the County transit systems VCTC has access to both CHP and Caltrans information and this information can be given to the transit agencies by voice or e-mail. Figure 7-3~~Figure 7-3~~ through Figure 7-23~~Figure 7-23~~ are diagrams of all the Market Packages applied in Ventura County, including the elements and the data flow among them.

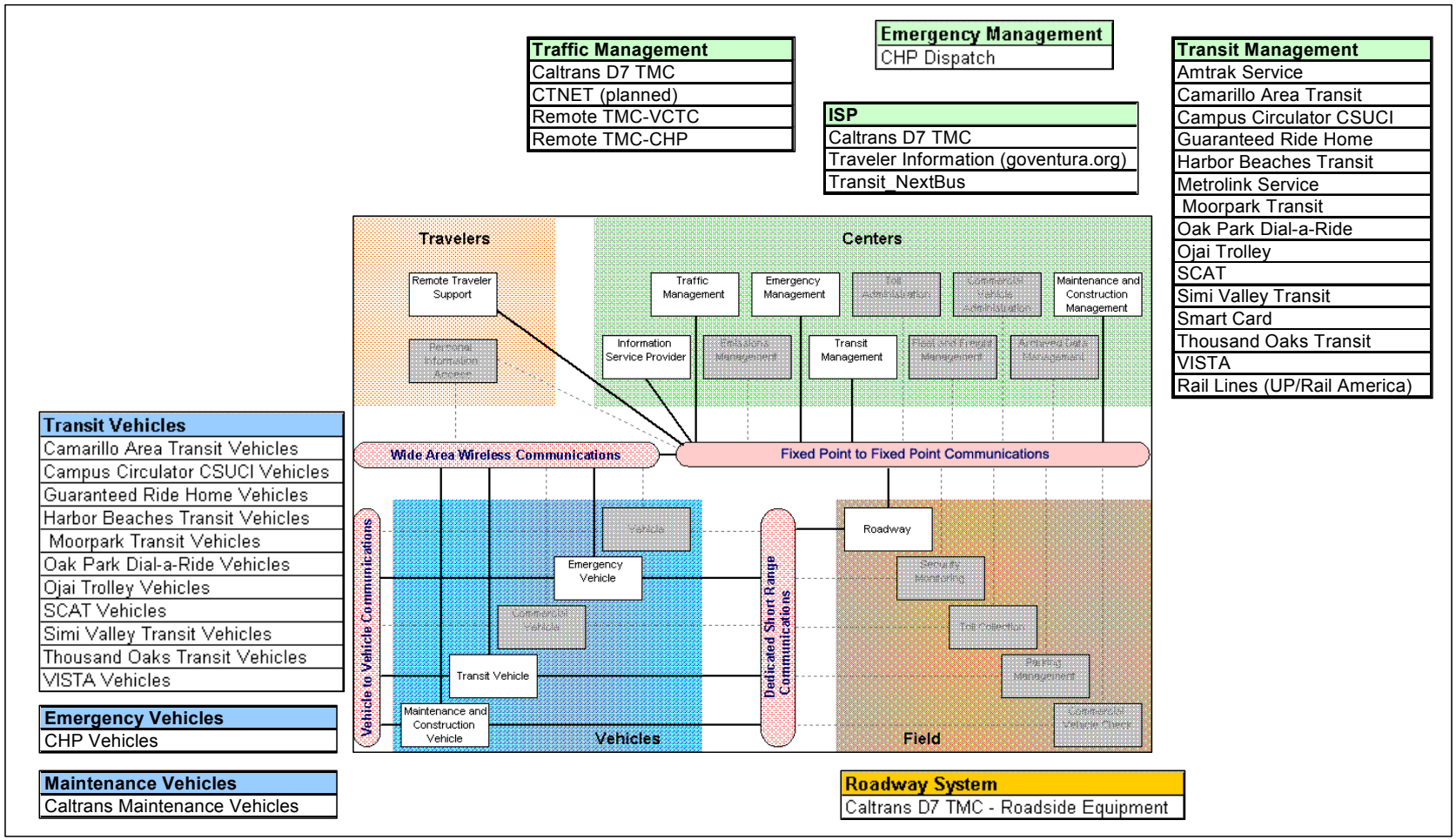

Figure 7-1: Ventura County Interconnect Diagram

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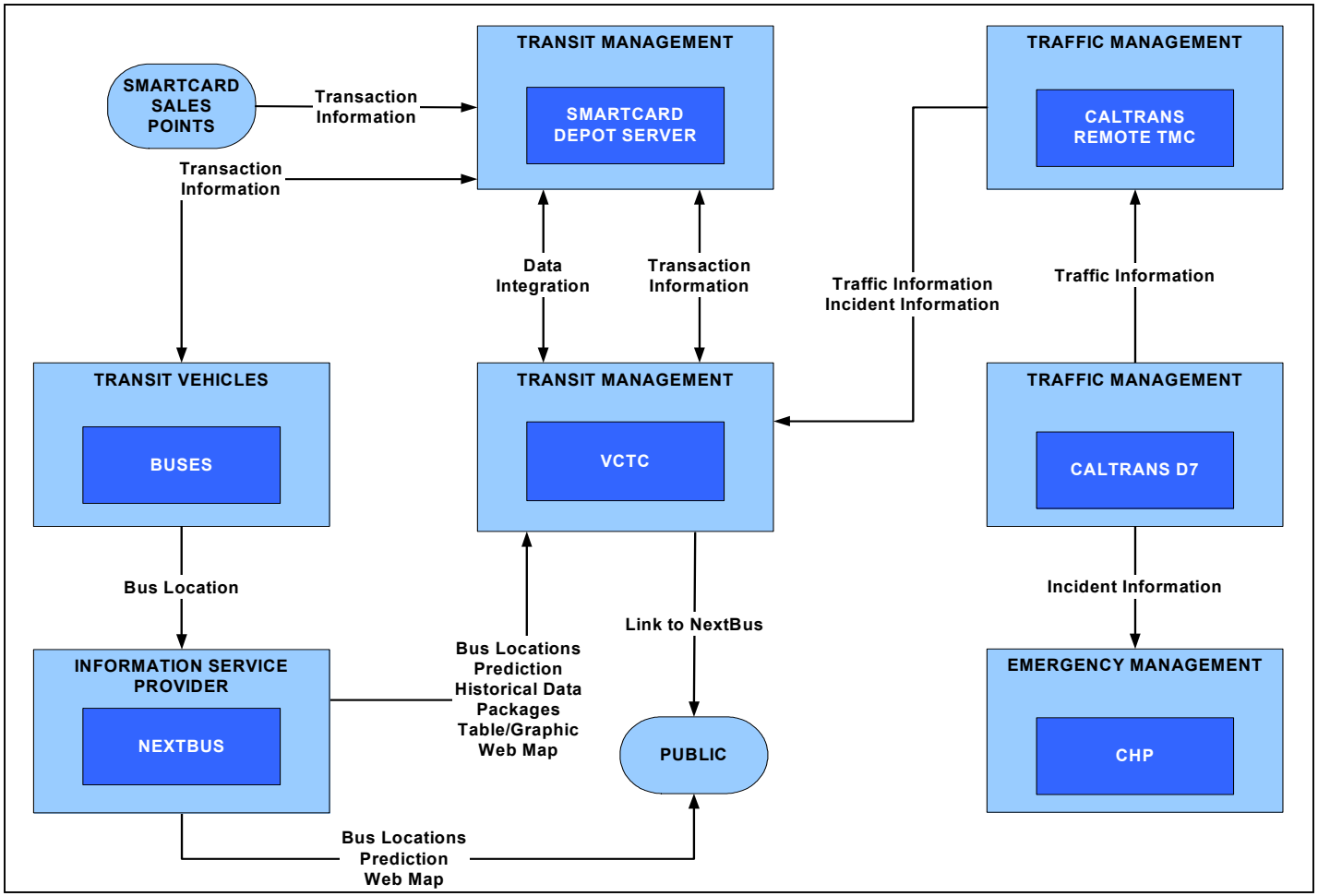

Figure 7-2: Ventura County Transit Integration

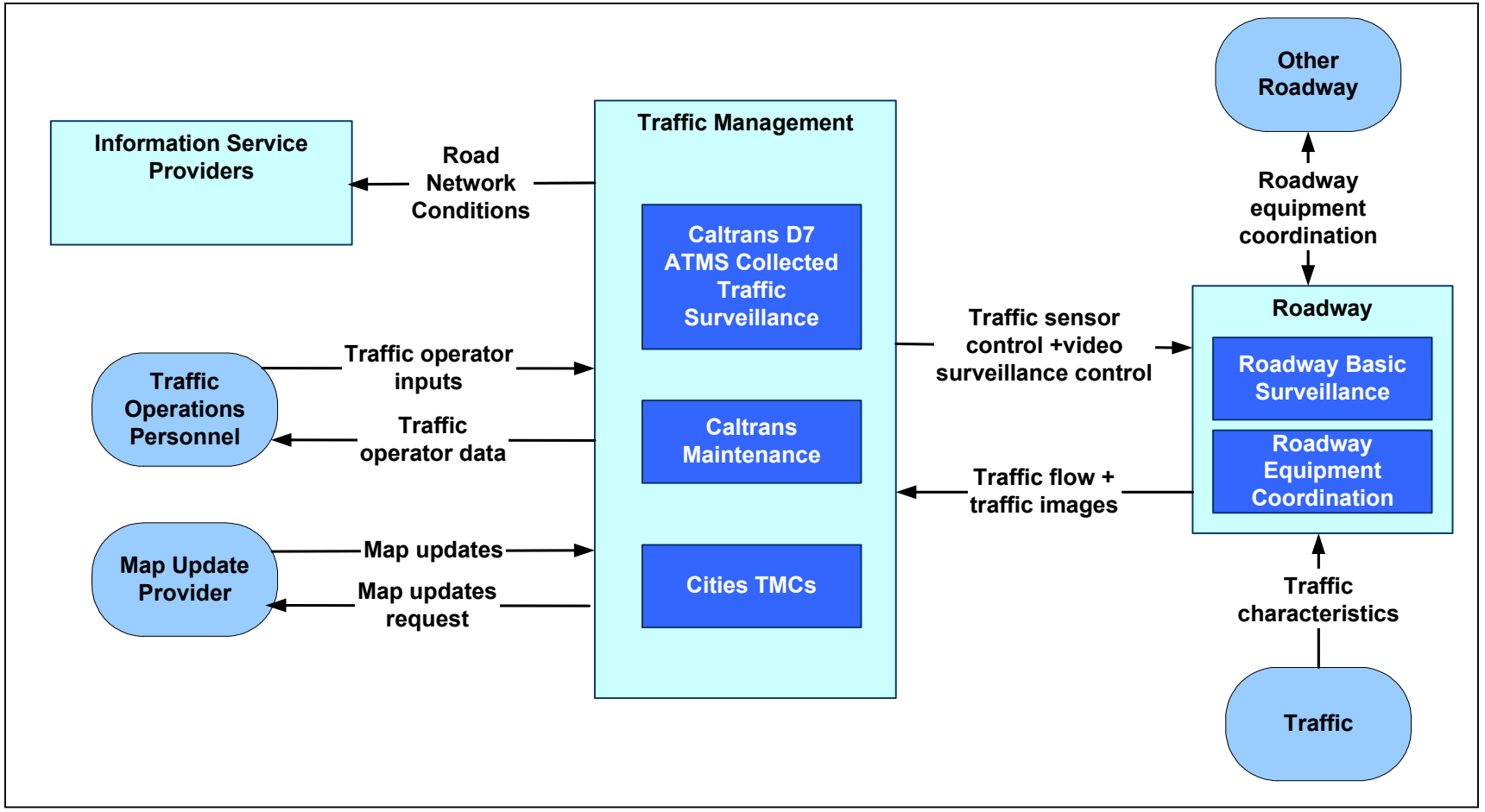

Figure 7-3: ATMS 1 –Network Surveillance

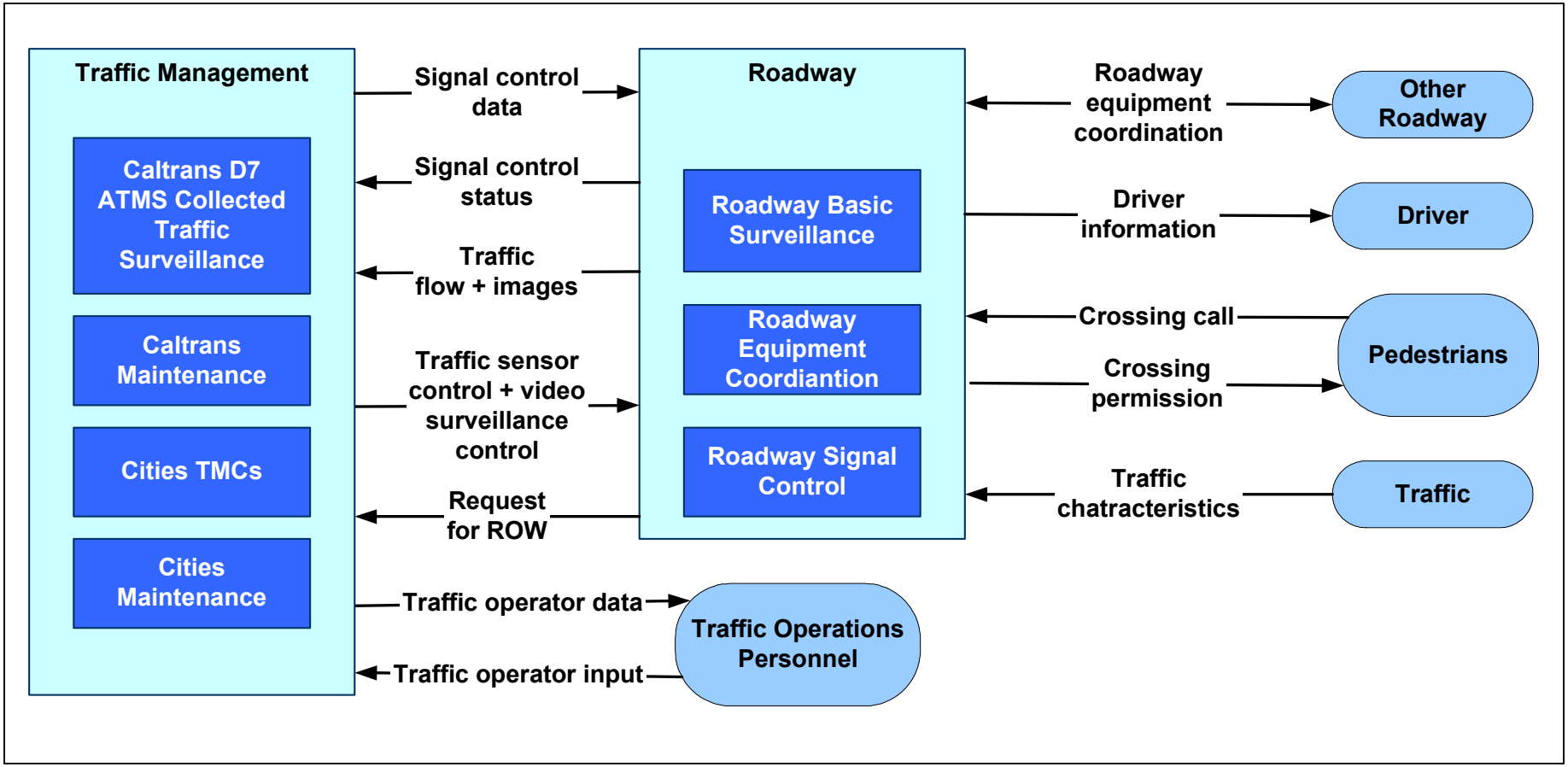

Figure 7-4: ATMS 3 – Surface Street Control

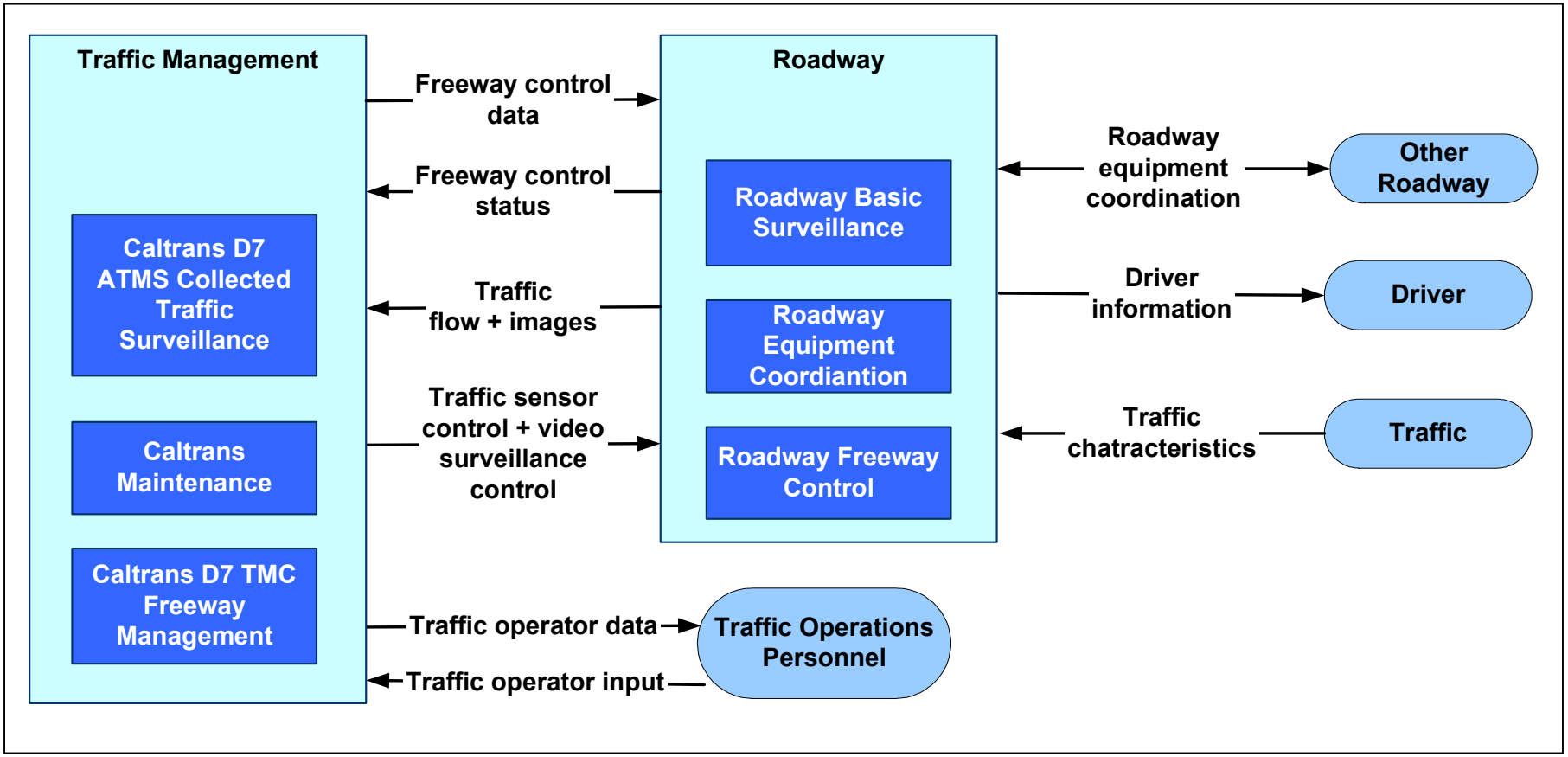

Figure 7-5: ATMS 4 – Freeway Control

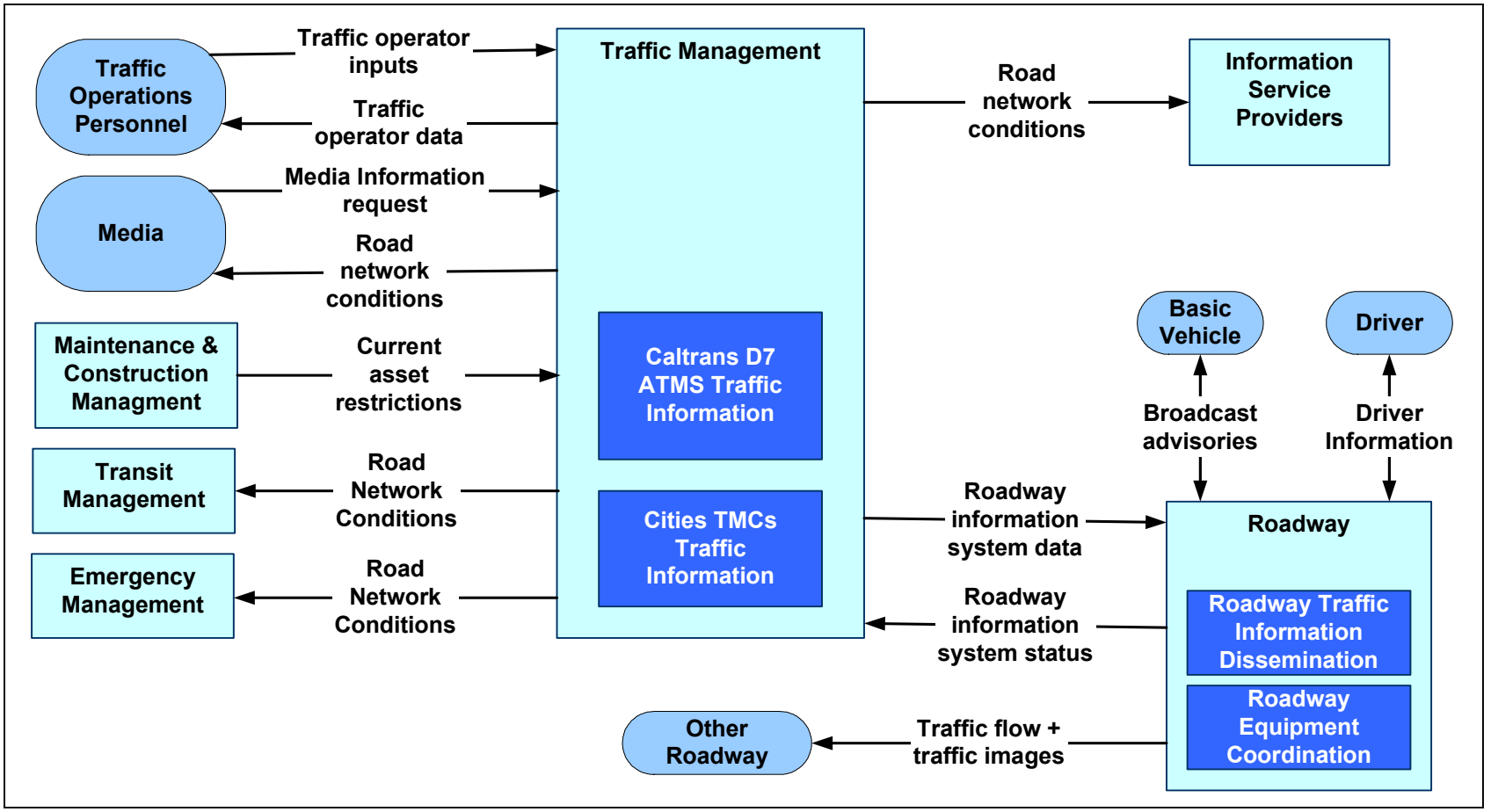

Figure 7-6: ATMS 6 – Traffic Information Dissemination

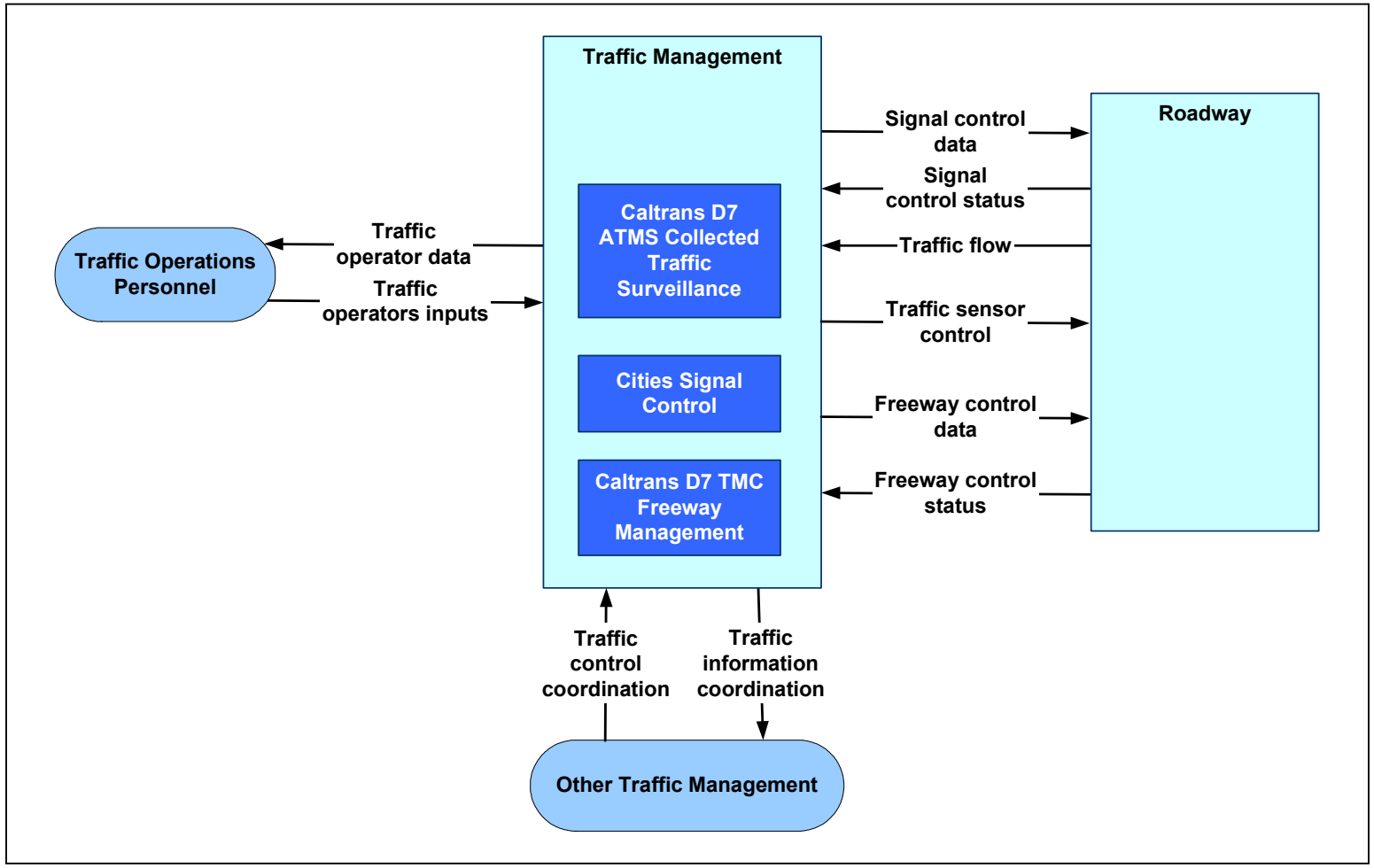

Figure 7-7: ATMS 7 – Regional Traffic Control

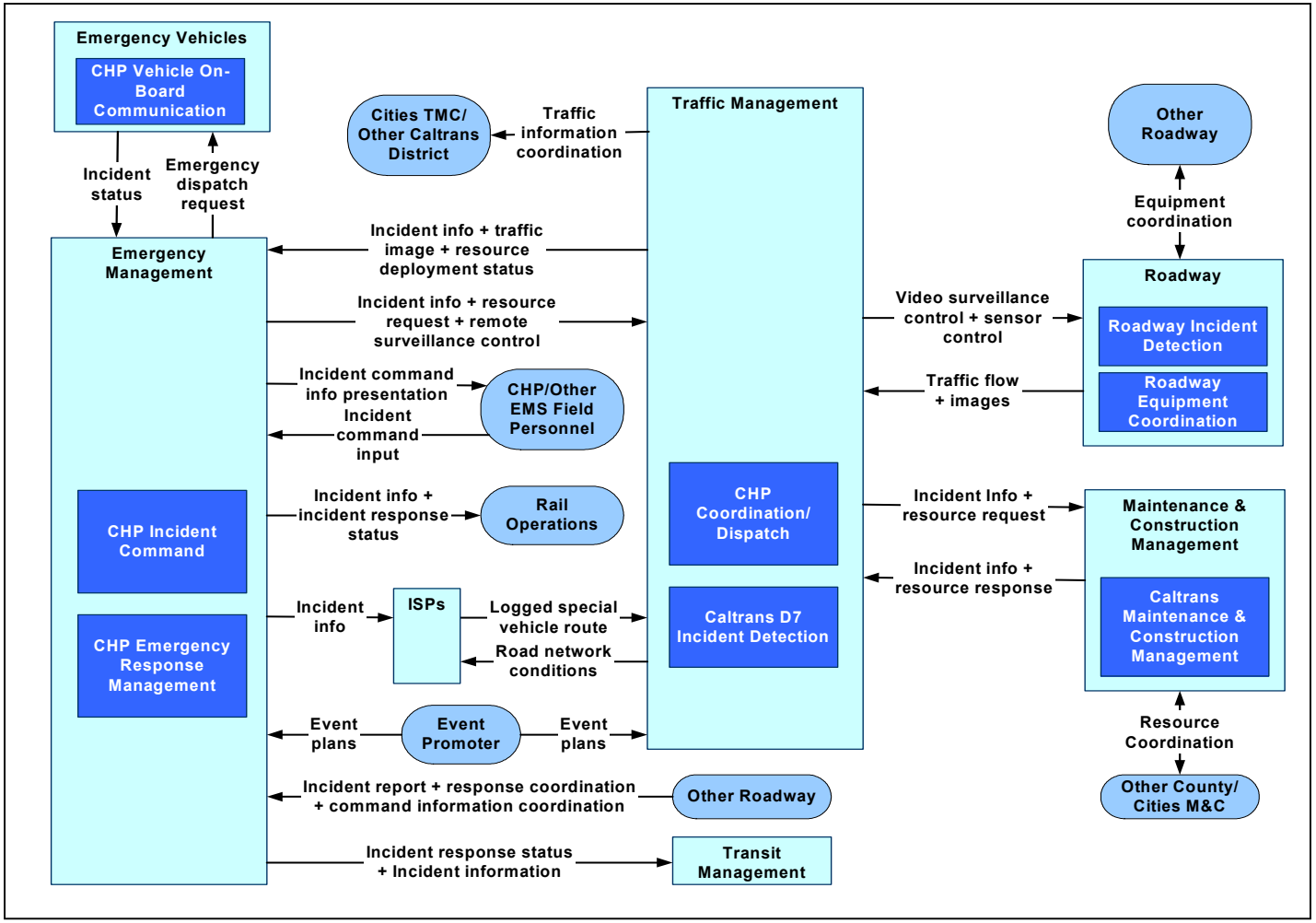

Figure 7-8: ATMS 8 – Traffic Incident Management System

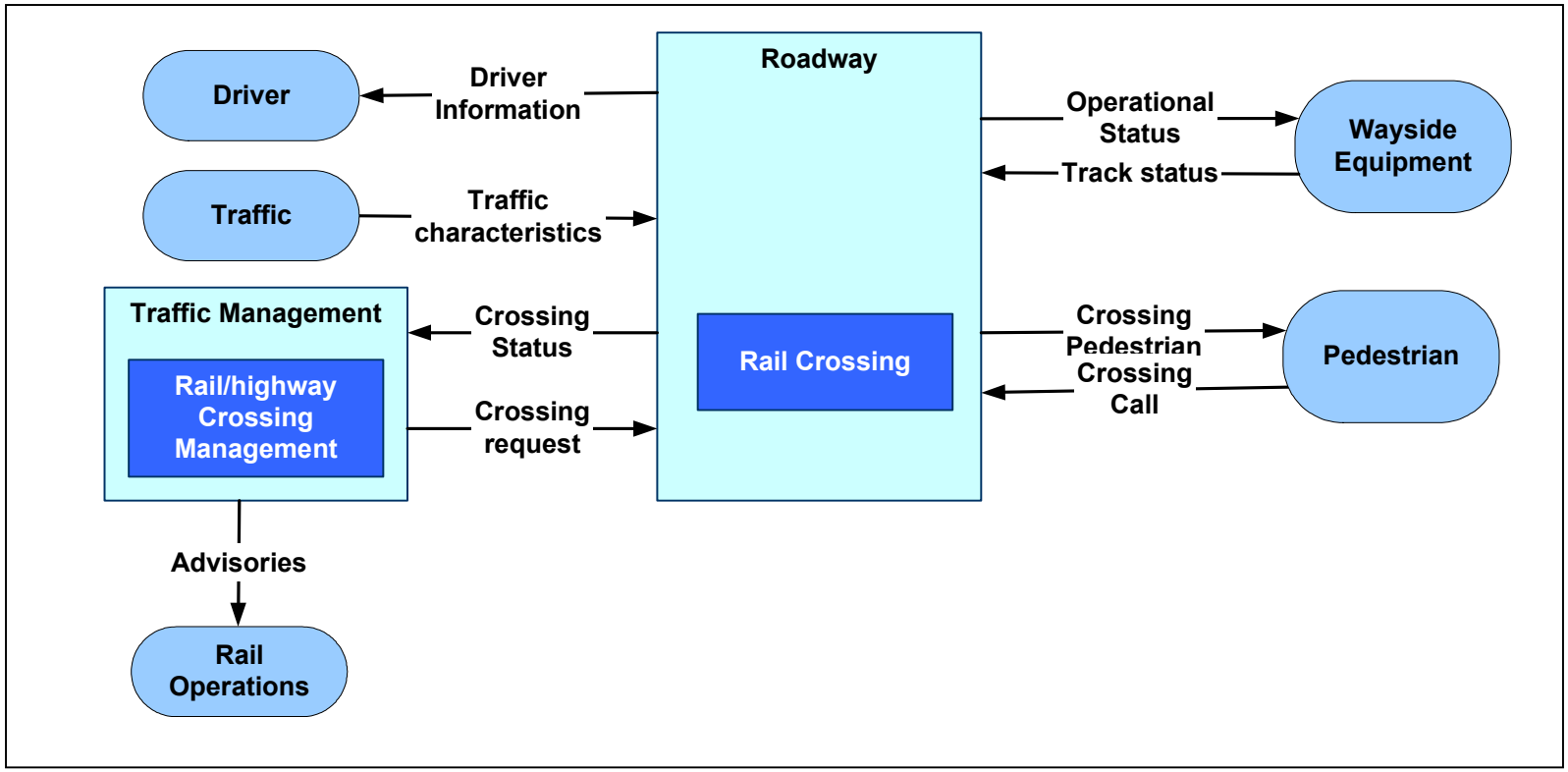

Figure 7-9: ATMS 13 – Standard Railroad Crossing

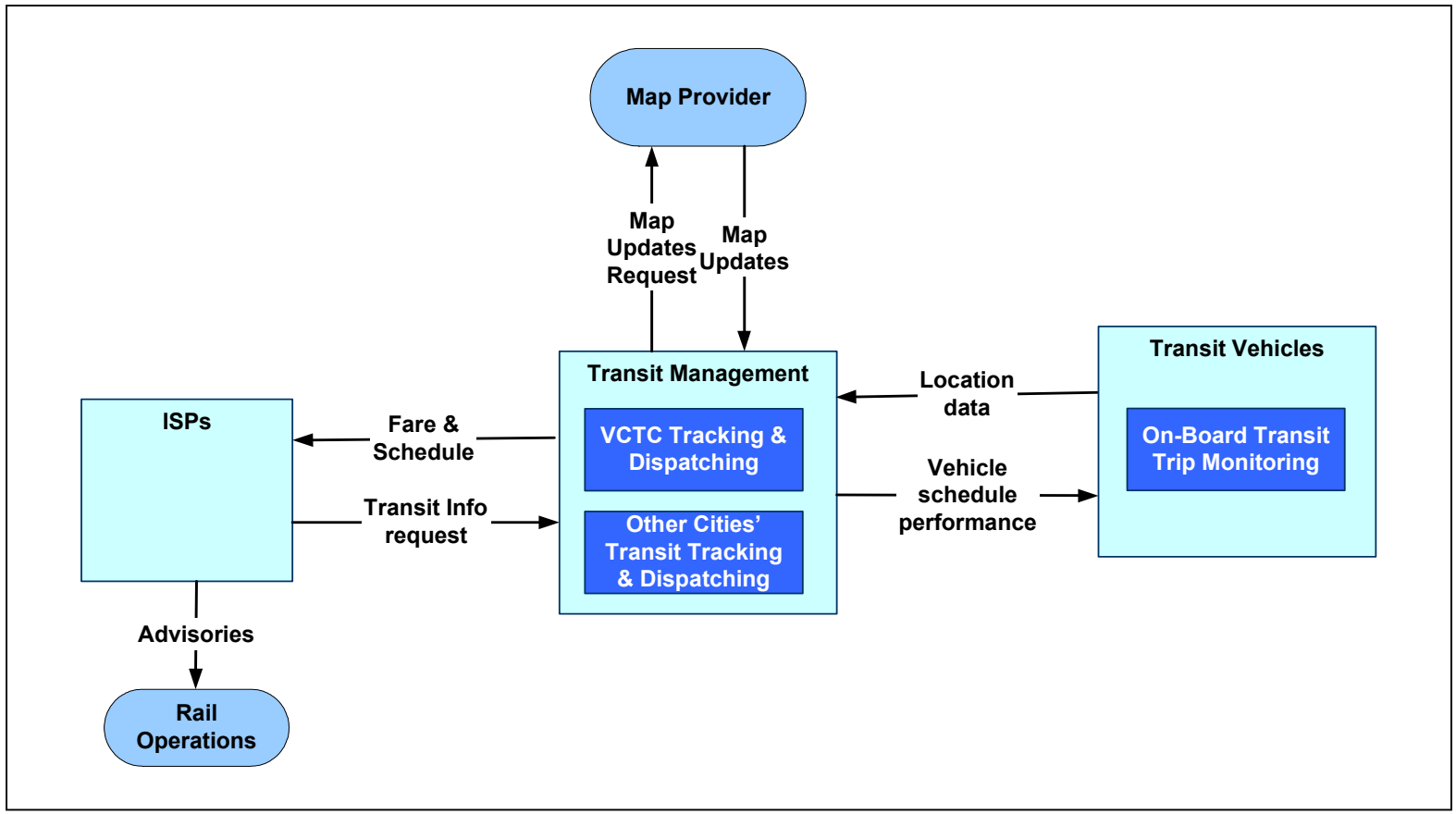

Figure 7-10: APTS 1 – Transit Vehicle Tracking

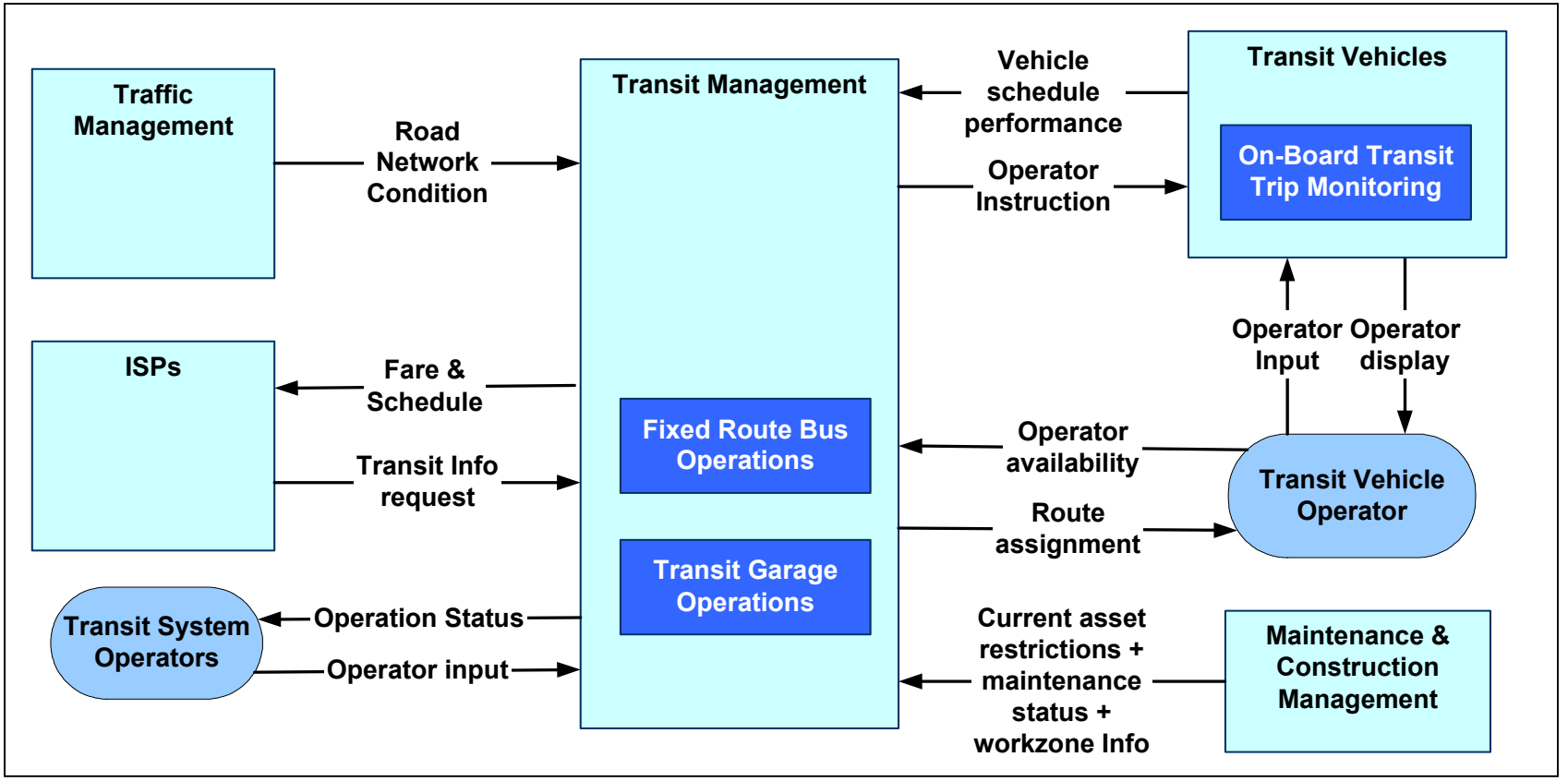

Figure 7-11: APTS 2 – Transit Fixed Route Operation

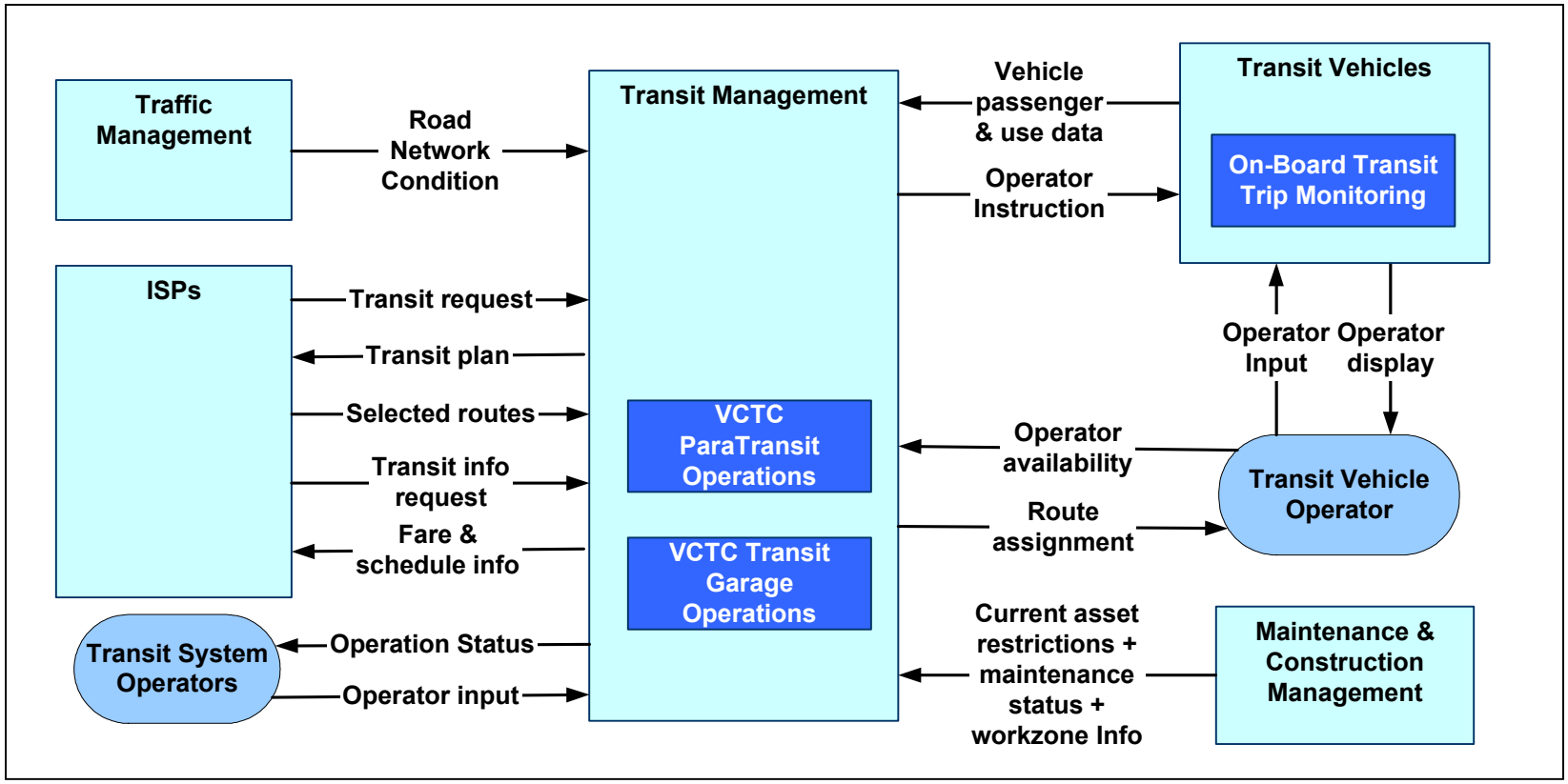

Figure 7-12: APTS 3 – Demand Response Operation

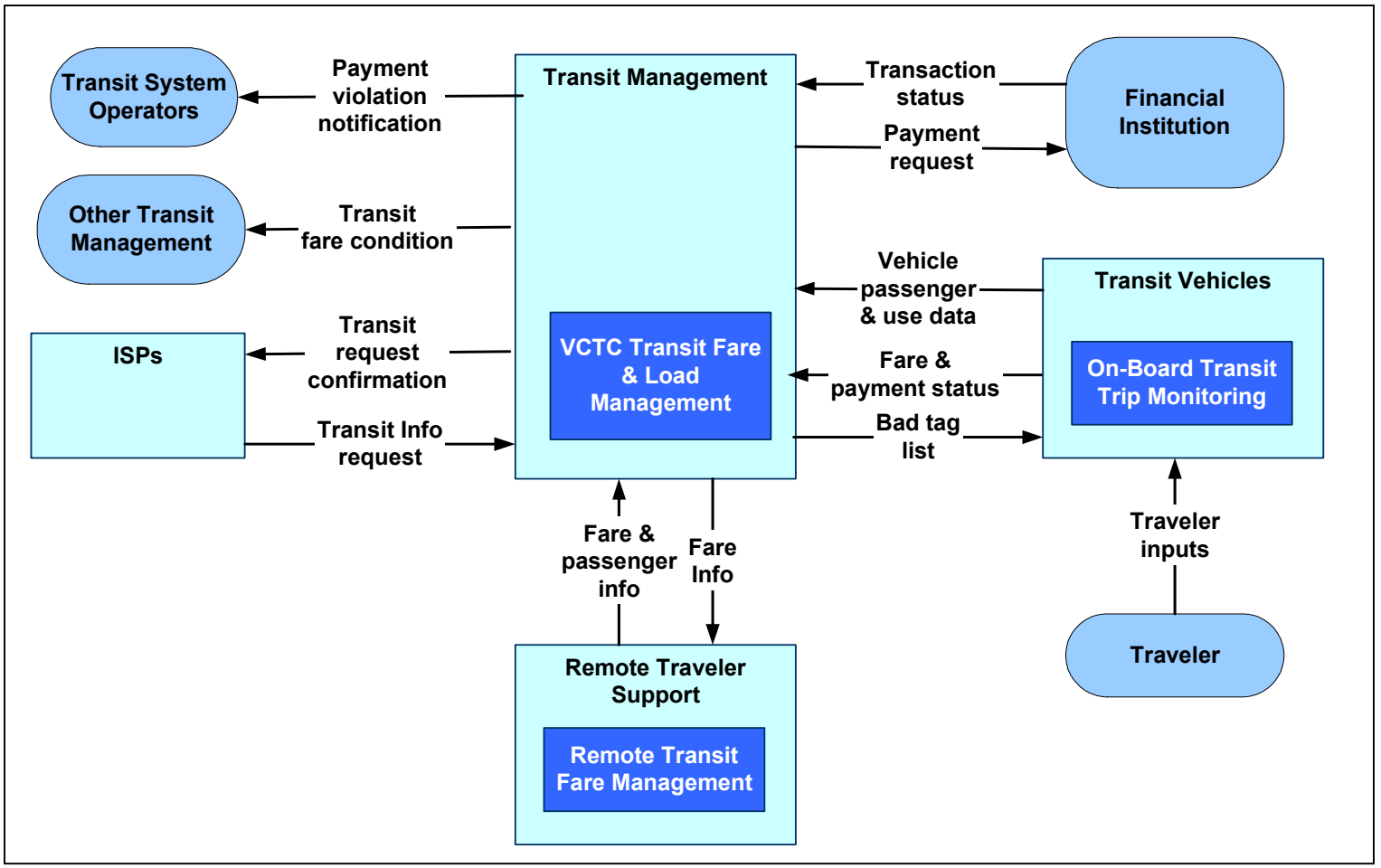

Figure 7-13: APTS 4 – Transit Passenger and Fare Management

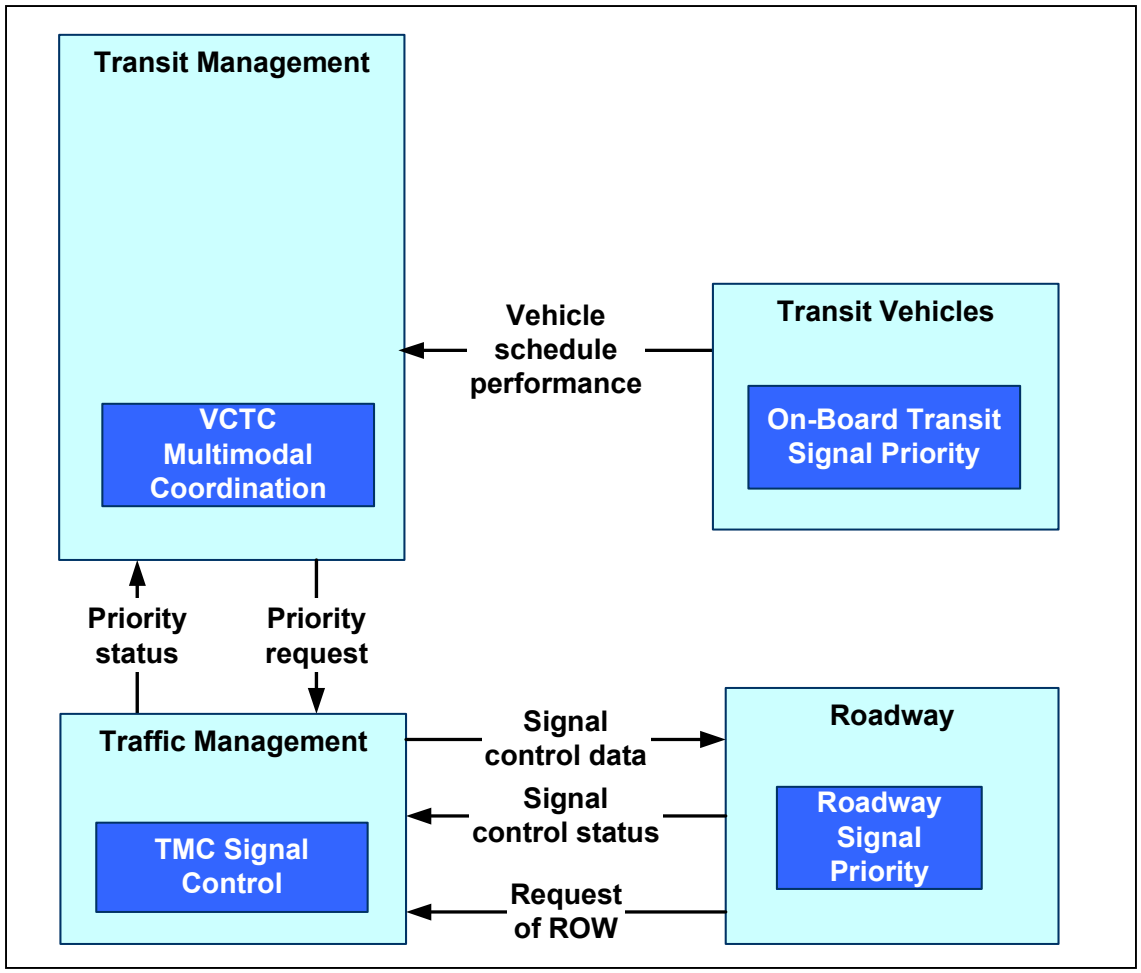

Figure 7-14: APTS 7 – Multimodal Coordination

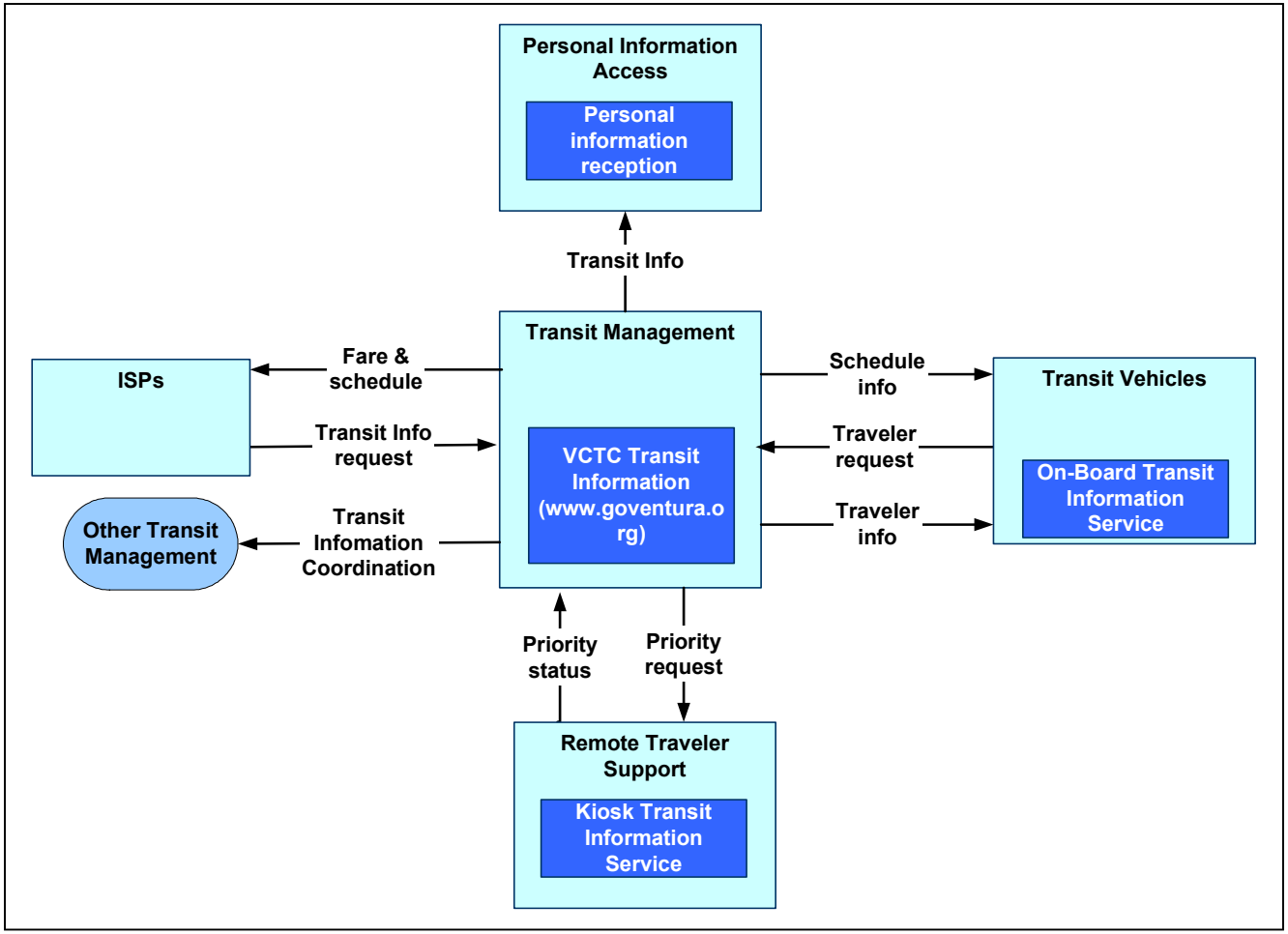

Figure 7-15: APTS 8 – Transit Traveler Information

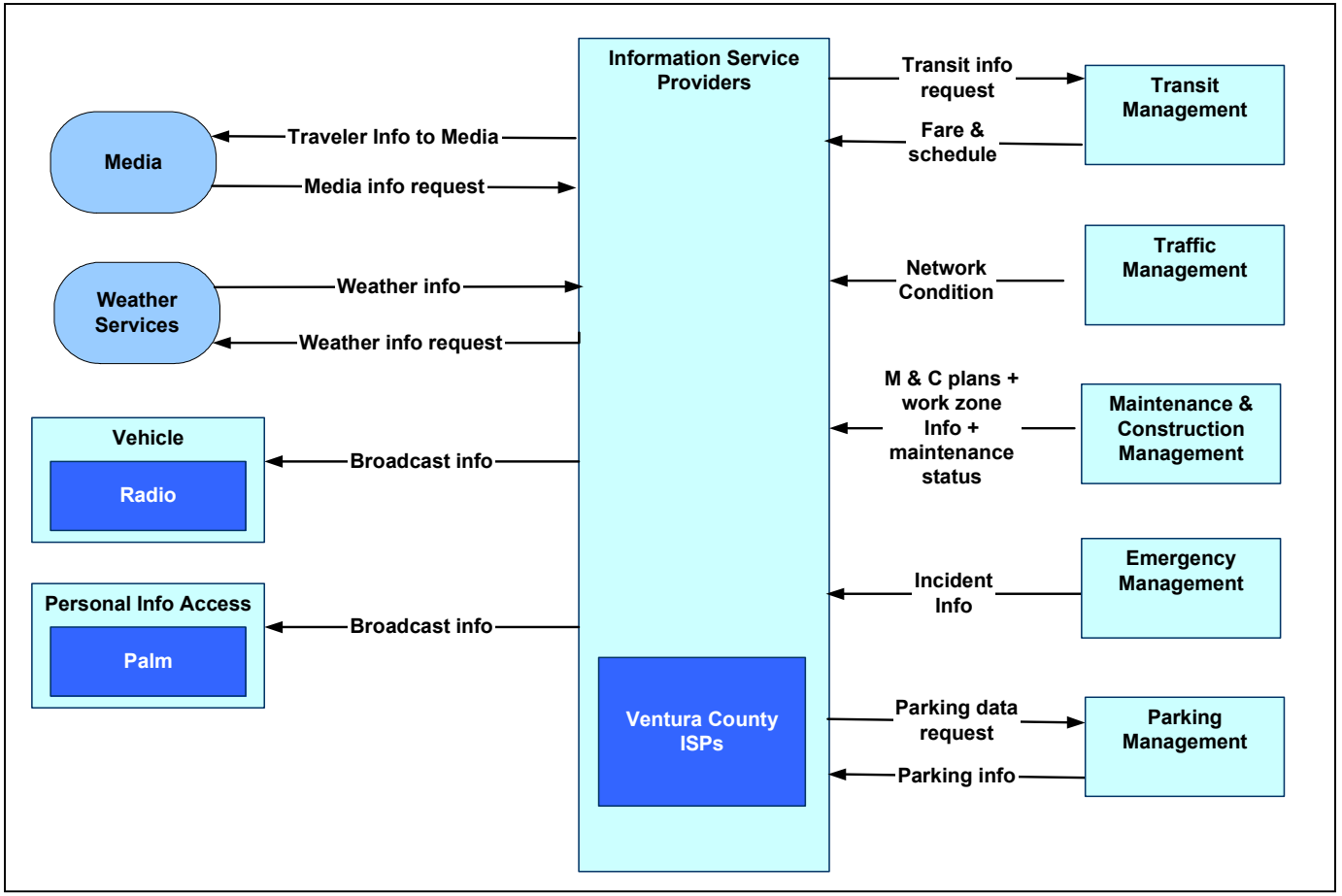

Figure 7-16: ATIS 1 – Broadcast Traveler Information

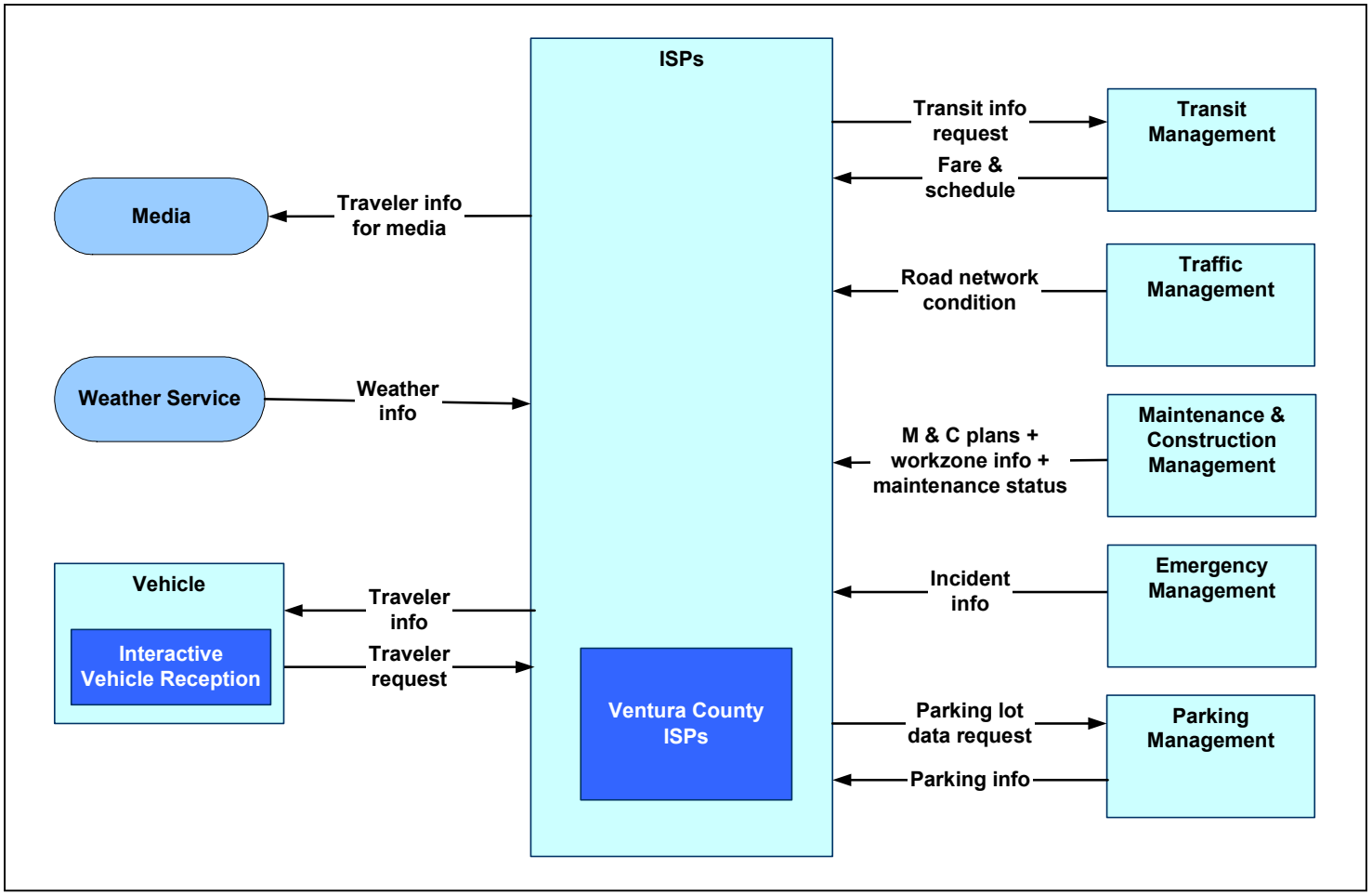

Figure 7-17: ATIS 2 – Interactive Traveler Information

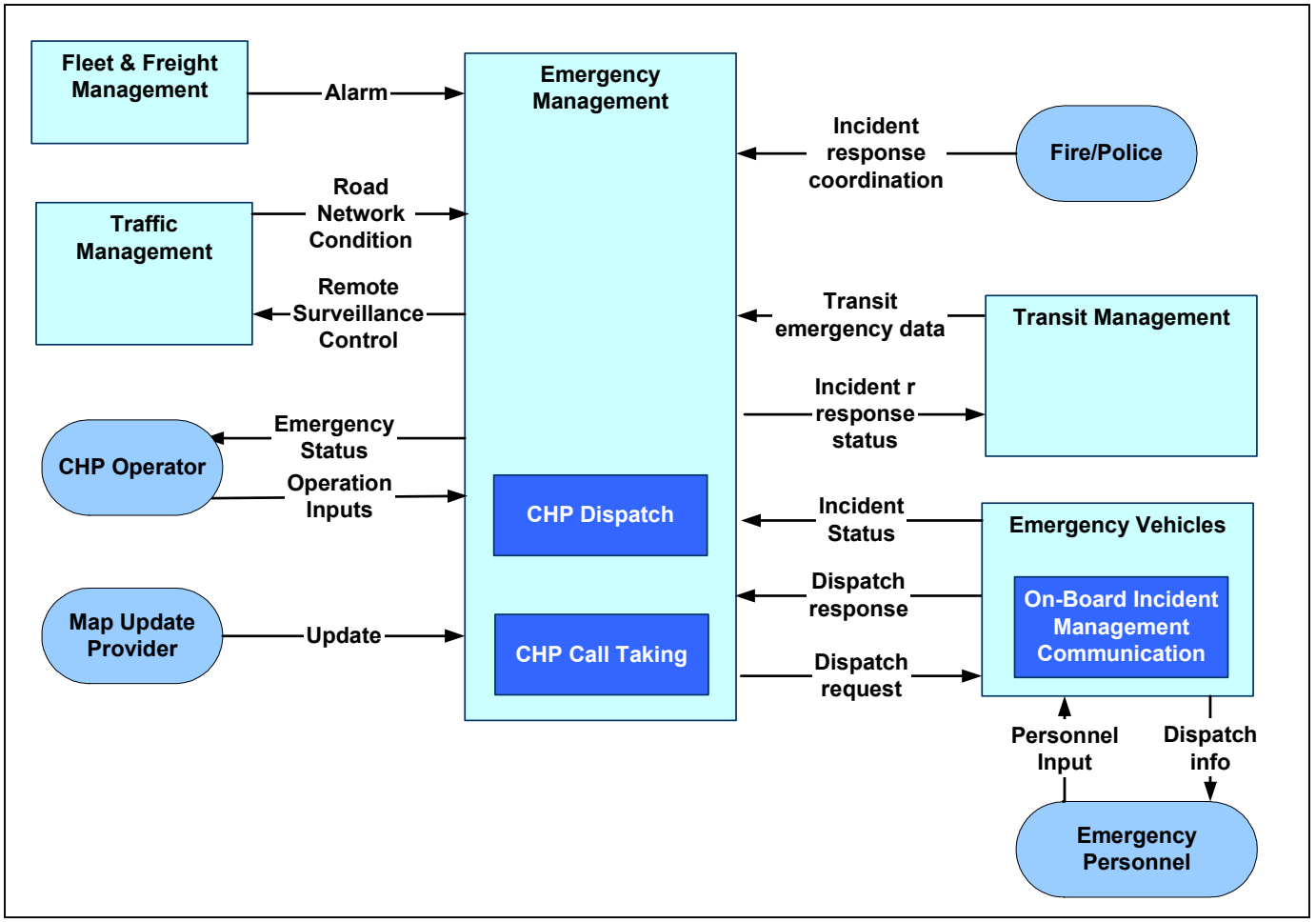

Figure 7-18: EM 1 – Emergency Call Taking and Dispatch

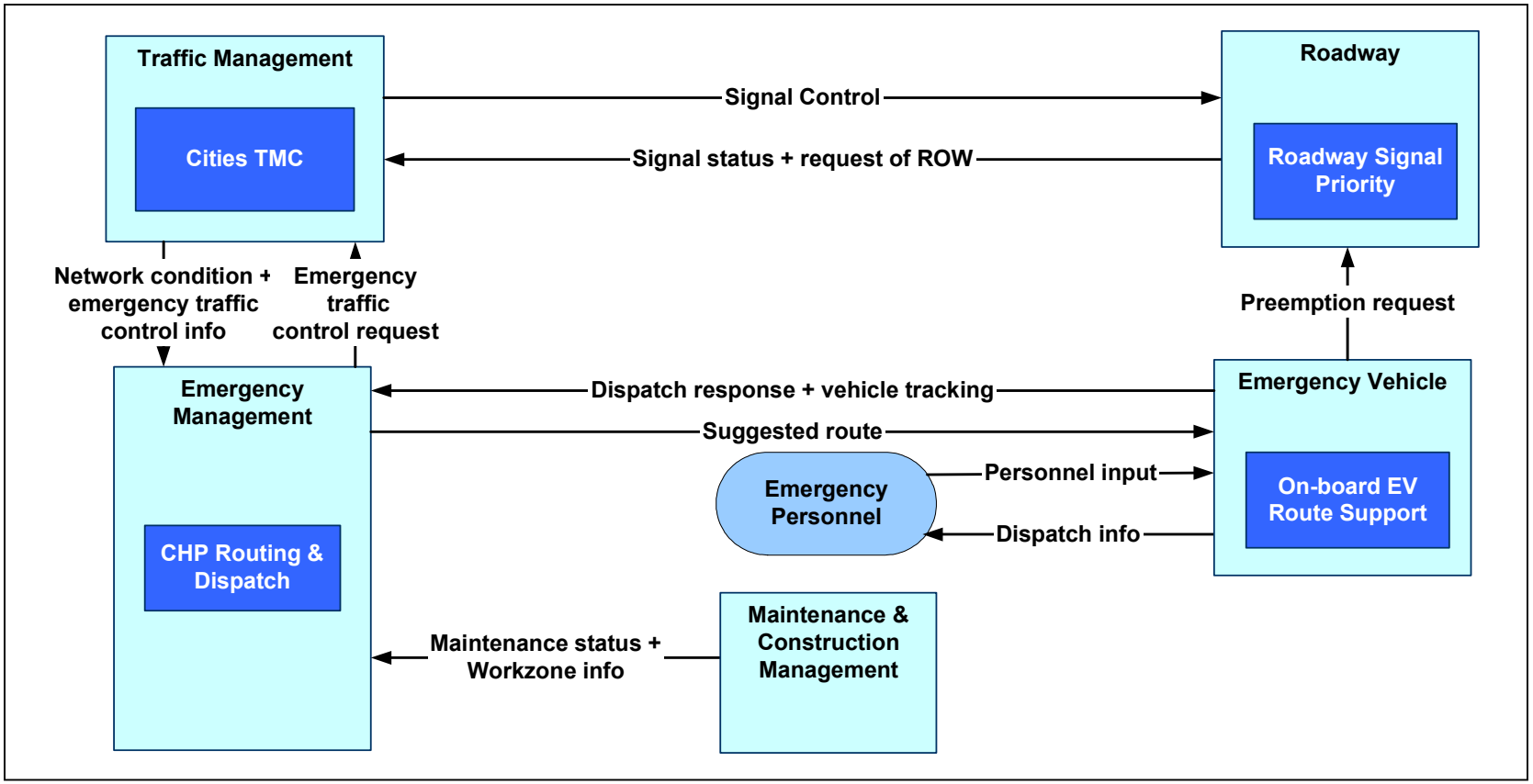

Figure 7-19: EM 2 – Emergency Routing

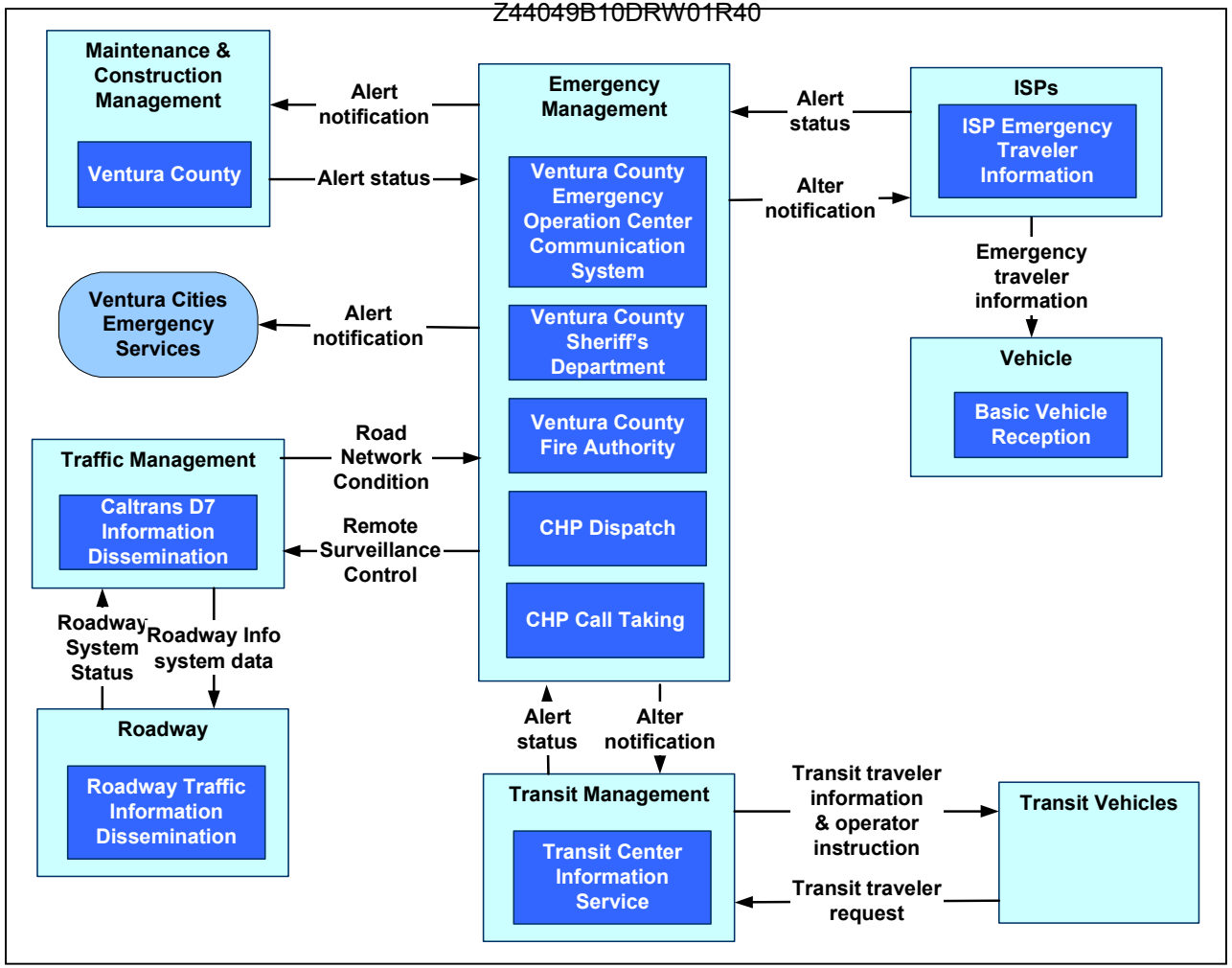

Figure 7-20: EM 6 – Wide Area Alert

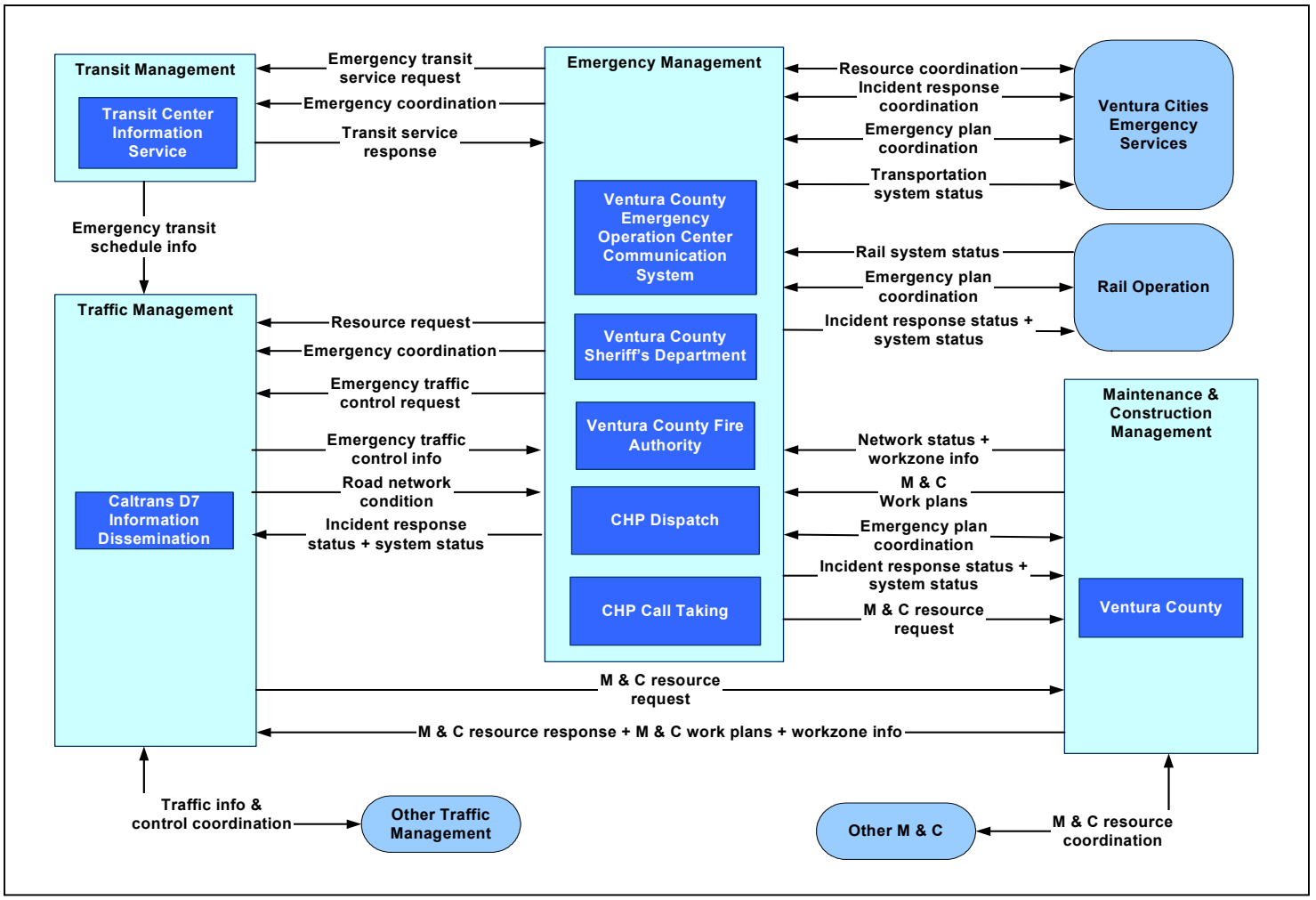

Figure 7-21: EM 8—Disaster Response and Recovery

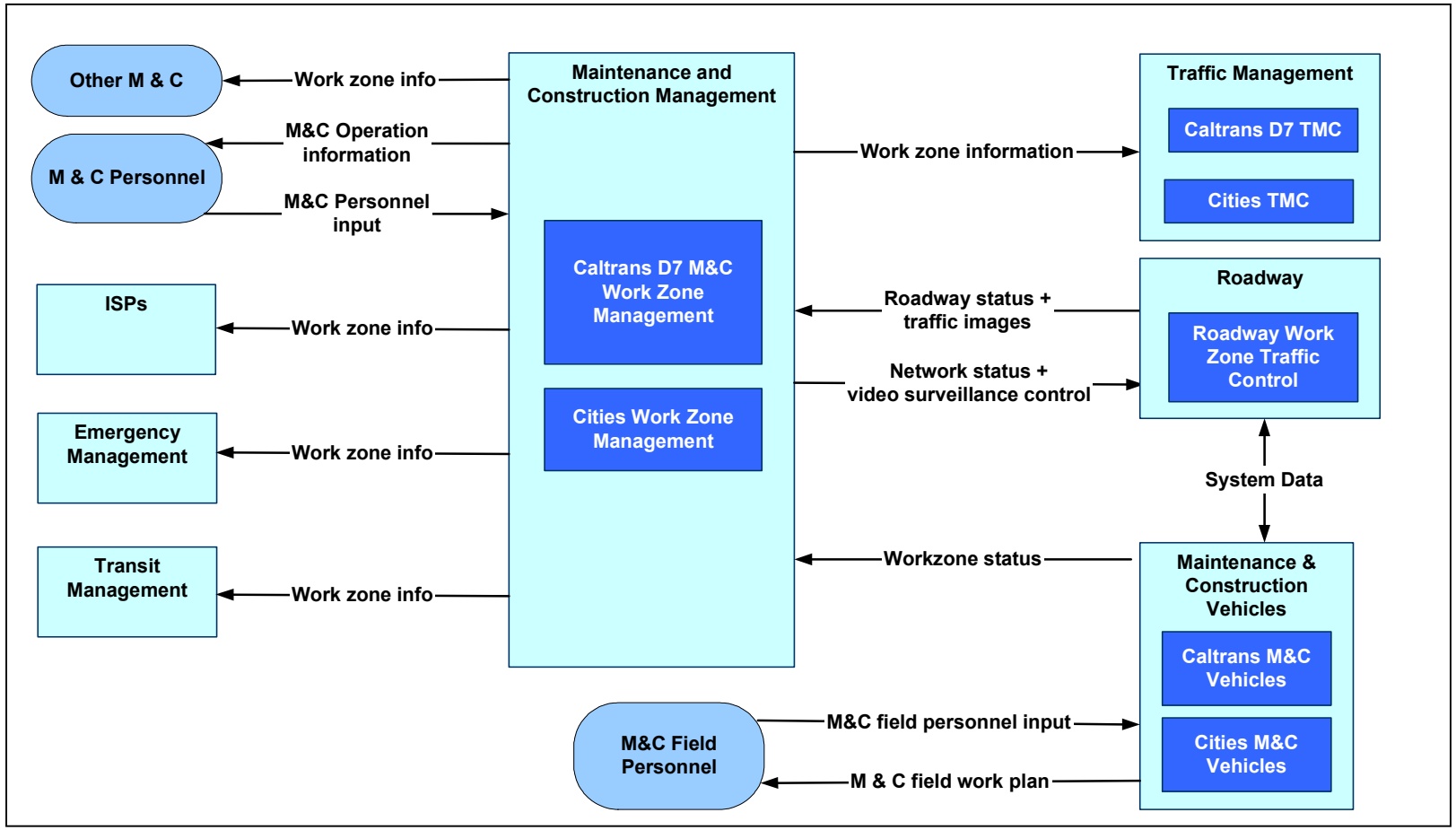

Figure 7-22: MC 8 – Work Zone Management

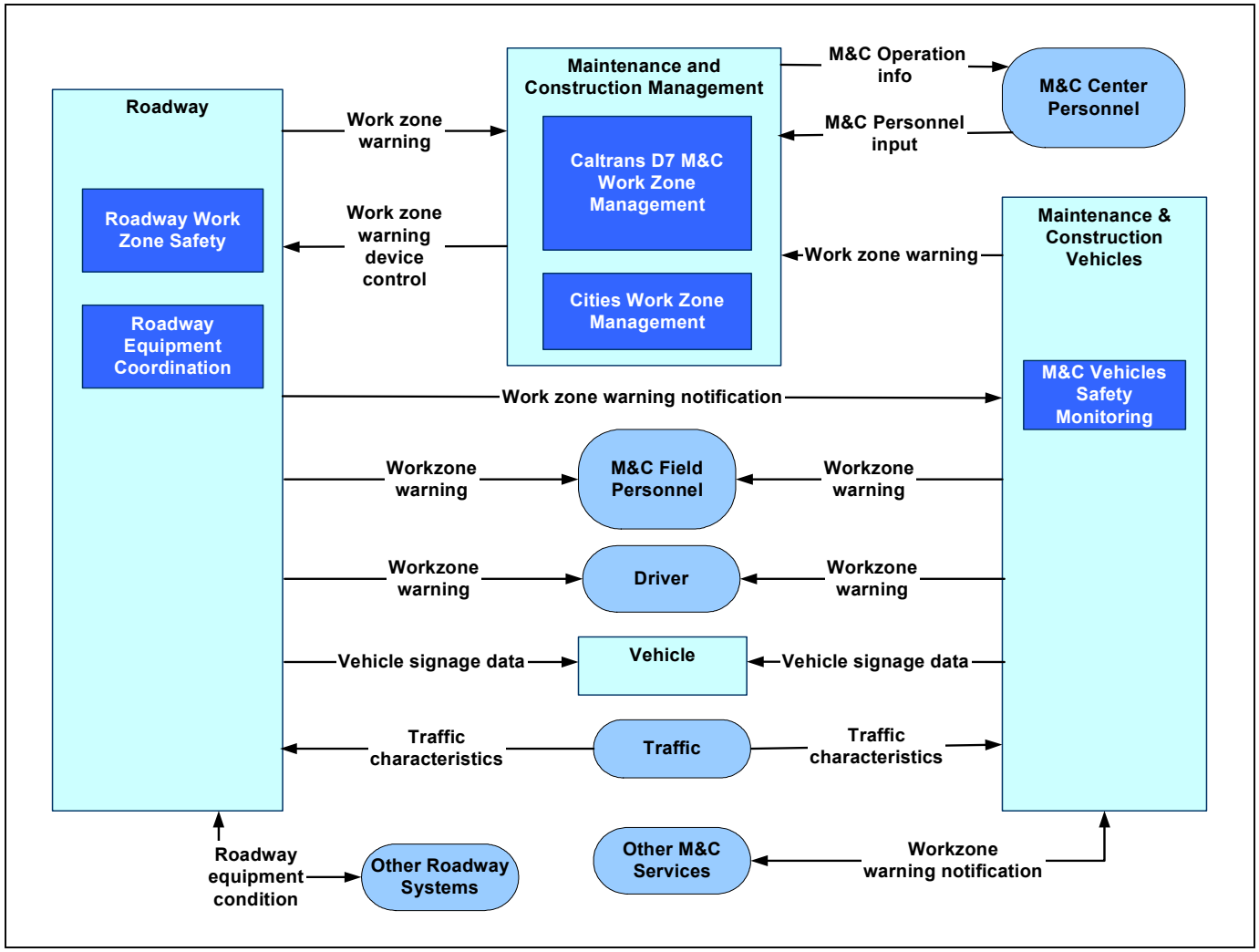

Figure 7-23: MC 9 – Work Zone Safety Monitoring

8 Project Sequencing

In this chapter of the Ventura County ITS architecture development, a sequence of ITS projects that will contribute to the integrated regional transportation system is identified in Table 8-1. 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 ITS user services.” The regional ITS architecture is implemented through many individual ITS projects that may be implemented over an extended period of time.

Ventura County has been planning and deploying ITS systems for a number of years in accordance with a vision of the role that ITS can play in combating congestion and improving mobility for residents. The implemented and planned ITS projects are documented in three separate documents.

1. *“Using Technology to Help Move People and Products – A Strategy for Ventura County 2001”*, a report of transportation system plan,
2. *“Congestion Management Plan”*, which contains the planned capital improvement program
3. *“State Transportation Improvement Programs 2005”*, a detailed and list of current transportation projects completed, undergoing, and planned.

In addition discussions took place with both VCTC and stakeholders to establish the projects that should be included in the table that follows.

Table 8-1: Ventura County Project Sequencing

Project Title	Market Package(s)	Stakeholder(s)	Description	Timing *
Simi Valley System Maintenance	APTS 2: Transit Fixed-Route Operations	Simi Valley Transit	Including replacement of 14 computers, replacement of transit radio system, and installation of mobile data terminals	S
Simi Valley Farebox Replacement	APTS 4: Transit Fare and Passenger Management	Simi Valley Transit	Including replacement of GFI farebox and 2 expansion electronic fare boxes (NABI buses)	S
Simi Valley AVL	APTS 1: Transit Vehicle Tracking	Simi Valley Transit	Installation of automated vehicle location system for Simi Valley Transit	S
Thousand Oaks Transit Electronic Fare Boxes	APTS 4: Transit Fare and Passenger Management	Thousand Oaks Transit	Install Electronic Fare Boxes for the Thousand Oaks Transit	S
SCAT Management Info System Replacement	APTS 2: Transit Fixed-Route Operations	SCAT	Replacement of the Management Information System for SCAT transit	S
SCAT Two-Way Radio System Replacement	APTS 2: Transit Fixed-Route Operations	SCAT	SCAT Two-Way Radio System Replacement	S
Ojai Computer Equipment Upgrades and Dispatch Software	APTS 2: Transit Fixed-Route Operations	Ojai Trolley	Upgrade the computer equipment and dispatch software for Ojai	M

Project Title	Market Package(s)	Stakeholder(s)	Description	Timing *
Moorpark Bus Radio System	APTS 1: Transit Vehicle Tracking	Moorpark Transit	Installing radio system on transit vehicle to improve communication	M
Moorpark Electronic Fare Boxes	APTS 4: Transit Fare and Passenger Management	Moorpark Transit	Installing electronic fare box on transit vehicles	M
Regional Transit NextBus Upgrade for Bus Stop Signage	APTS 8: Transit Traveler Information	VCTC	Continue upgrading NextBus system for Bus Stop Signage	S
Regional Transit SmartCard Installation	APTS 4: Transit Fare and Passenger Management	VCTC	Continue installing SmartCard equipment on more transit vehicles	S
MetroLink Infrastructure Upgrade	ATMS 15: Railroad Operations Coordination	SCRRA VCTC	MetroLink infrastructure replacement/upgrade, including rehabilitation and renovation of tracks, signals and other items system-wide	S
Highway Construction/Widening	ATMS 4: Freeway Control	Caltrans	Implement highway ITS surveillance and detection devices for newly designed, constructed, or widened highway, as well as highway interchanges. These highways include SR-118, SR-23, US-101.	S/M
Traffic Signal Systems Upgrade	ATMS 3: Surface Street Control	Cities	Upgrade cities' traffic signal systems to be more reliable and easier to maintain, improve signal synchronization, and possibly add adaptive signal control. Improve signal coordination across boundaries between jurisdictions.	S/M

Project Title	Market Package(s)	Stakeholder(s)	Description	Timing *
Traffic Detection/monitoring System Upgrade	ATMS 1: Network Surveillance ATMS 3: Surface Street Control	Cities Caltrans	CCTV and video detection/joint use with traffic and security, add new TMC equipment	S/M
Improve Fiber Optic Communication	ATMS 1: Network Surveillance ATMS 3: Surface Street Control	Cities Caltrans	Integrate and share fiber optic network	S/M
GoVentura Information Service upgrades	ATIS 2: Interactive Traveler Information	VCTC	IVR system for improved 24/7 information service	M
Vista Resource Exchange	APTS 2: Transit Fixed Route Operation APTS 5: Transit Security	VCTC Office of Emergency Service (OES)	VCTC and OES will establish coordination and mutual aid agreement in order to make VISTA resources available, and enable database exchange on real-time availability and status of the resources	M
NextBus information link to EMS	APTS 1: Transit Vehicle Tracking APTS 5: Transit Security	NextBus Office of Emergency Service (OES)	Build links between NEXTBUS System and County Emergency Services for data sharing	M

Project Title	Market Package(s)	Stakeholder(s)	Description	Timing *
GoVentura Emergency Links Update	ATIS 1: Broadcast Traveler Information APTS 5: Transit Security	VCTC Office of Emergency Service (OES)	GoVentura website emergency links to OES website, plus automated system for informing transit agencies of emergency status information	S/M
Red Light Camera	ATMS 3: Surface Street Control	Cities	Implementation and upgrade of the red light cameras in potentially all cities	S/M

** Note: S-Short Term; M-Medium Term; L-Long Term*

9 List of Agency Agreements

One requirement of the regional architecture is that it should provide a list of agreements associated with multi-agency ITS projects. Experience shows that it takes an actual project deployment to drive the agreements process along and define actual content. However, it is important to be aware of the types of projects that will lead to the need for multi-party agreements and the alternative types of agreement that are available to manage different types of project content.

To this point VCTC has proceeded with ITS deployments through handshake agreements. However it is to be expected that in the future as more complex projects are deployed, questions of ownership, maintenance, operations and liability may need the support of interagency agreements. Table 9-1~~Table 9-1~~ identifies common types of agreement provided by the Regional ITS Architecture guidance.

Table 9-1: 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 and State DOT, etc.)

Type of Agreement	Description
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.
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 over and over (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.

The list of the required Ventura County 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 only be performed to support ITS projects if needed as they are implemented in the future.

The agreement should describe the high-level information that each agency needs to exchange in order to meet the goals and expectations of each other rather than defining how the delivery of that information will occur. The process may begin with something as simple as a handshake agreement. But, once interconnections and integration of systems begin, agencies may want to have something more substantial in place. A documented agreement will aid agencies in planning their operational costs, understanding their respective roles and responsibilities, and build trust for future projects. Formal agreements are necessary where funding or financial arrangements

are defined or participation in large regionally significant projects is required. Catalysts for agreement development are usually projects involving any of the following: data sharing, any aspects of shared control/interoperability, ownership and maintenance of equipment, shared communications e.g. fiber, operations e.g. 24/7 or peak period only, liability issues, configuration management of jointly owned and operated systems, ownership of data and third party agreements.

Table 9-2~~Table 9-2~~ presents the list of agreements for Ventura County, including both existing and planned agreements. 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 future to note any issues or barriers in agreement execution during the architecture maintenance cycle.

Table 9-2: Ventura County List of Agreements

ITS Service	Stakeholder	Type of Agreement	Agreement Description
Small scale signal upgrade and maintenance	VCTC Cities	Handshake Agreement	Briefly includes the budget, goals and responsibilities of the agencies implementing the project
Inter-jurisdictional Traffic Management	Caltrans D7 and other adjacent Caltrans districts and CHP	Interagency Agreement	Provides for data exchange, device control, detailed jurisdiction-to-jurisdiction operations, and regional incident management.
Regional Traffic Management and Emergency Services	Caltrans and cities, VCTC and EMS providers	MOU	Provides for signal operations and coordination and local incident management.
Emergency Vehicles Signal Preemption	Caltrans VCTC Fire and Police of Cities and County	Interagency Agreement/or MOU	Specifies the roles, responsibilities, and functions for emergency vehicle preemption at signalized intersections for police, fire, ambulance, and other agencies

ITS Service	Stakeholder	Type of Agreement	Agreement Description
Transit Signal Priority	VCTC Cities Transit Operators	Interagency Agreement/MOU	Specifies the roles, responsibilities, and functions for transit vehicle priority at signalized intersections for transit agency
Emergency Call Answering and Freeway Service Patrol	Caltrans, CHP, and VCTC	Interagency Agreement	Specifies the roles, responsibilities, and functions for providing a call answering service and freeway service patrol activities
Traveler Information	All Transportation Agencies in the county and ISPs	MOU/Service agreements with ISPs	Specifies expectations, roles, and responsibilities for the provision of transportation-related data and information to the raveling public. Also documents the policy or disclaimer for release of traveler information
Archived Data Management	All Transportation Agencies	MOU/Service agreements with users	Specifies expectations, roles, and responsibilities for the provision of transportation-related data and information to a public archive agency, recognition of sources
Infrastructure, Device, and Data Sharing	Caltrans, VCTC, and Cities	Interagency Agreement/MOU	Documents provisions for design, development, maintenance, and revenue sharing (if applicable) with regards to shared use of fiber.

10 Identification of Desired Standards

The Rule/Policy requires the ITS data flow standards to be recognized in the process of ITS architecture. It has two major 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 said, standards and their development is a far from simple subject, and both the full development and testing of standards and their effective adoption by vendors is in many cases still some way off in the future.

Ventura County however is no stranger to the subject of standards and their importance. Several years ago, VCTC promoted an initiative in the State Legislature to require that Smart Cards procured by transit agencies be interoperable. The initiative was not successful; however, it stimulated a great deal of discussion regionally about the importance of open architecture. Ventura County Emergency Management agencies have also taken the need for interoperability seriously. They reached agreement to purchase the same radio system with 12 channels available of which four are available for common communication purposes.

In this chapter, ITS standards are identified for each information flow in the Ventura County ITS architecture. Establishing regional and national standards for exchanging information among ITS systems is important not only from an interoperability point of view. Standards facilitate deployment of interoperable systems at local, regional, and national levels without impeding innovation as technology advances and new approaches evolve. It also reduces risk and cost since a region can select among multiple vendors for deployment products. Standards help create competition, better products, and lower prices. The ITS community recognized these advantages and therefore encouraged Standards Development Organizations (SDOs) to create ITS standards between the most critical ITS system interfaces.

There are currently 89 ITS standards of five different types, namely communication standards, data standards, message set standards, equipment standards, and software standards. The regional ITS architecture is only required to reference those standards that are applicable to the region and this is done by relating the identified information flows to relevant standards. The more detailed report, a sample of output of the TURBO software, is attached as Appendix E.

10.1 Standards Development Organization

The ITS community recognized the advantages of stands and encouraged SDOs to create ITS stands between the most critical ITS interfaces. The following is a list of SDOs that are developing ITS standards. The overall responsibility for the ITS standards development program rests with the US DOT, ITS Joint Program Office. The following paragraphs describe the various SDOs that are currently involved in some

aspect of ITS standards development. Each of the underlined headings is a link to that organization's web site where further background information and details can be found.

American Association of State Highway and Transportation Officials (AASHTO): AASHTO, teamed with the National Electrical Manufacturers Association (NEMA) and the Institute of Transportation Engineers (ITE), is the lead organization for the National Transportation Communications for ITS Protocol (NTCIP). (Also see the NTCIP SDO description below.)

American National Standards Institute (ANSI): The American National Standards Institute (ANSI), the U.S. administrator and coordinator of private sector voluntary standardization, does not itself develop standards. An ANSI committee [the Accredited Standards Committee (ASC) X12] was chartered to develop standards to facilitate electronic data interchange (EDI) for business transactions. This committee is in the process of developing ITS-related standards involving commercial vehicle operations (CVO).

American Society for Testing & Materials (ASTM): ASTM provides a forum for producers, users, consumers, and others who have interest in standard test methods, specifications, practices, guides, classifications, and terminology. ASTM leads efforts in ITS standards concerning dedicated short-range communications (DSRC).

Commercial Vehicle Information Systems Network (CVISN – US DOT sponsored program): The scope of commercial vehicle operations, of which CVISN is a part, includes the operations and regulations associated with moving goods and passengers via commercial vehicles. It includes activities related to safety assurance, commercial vehicle credentials and tax administration, roadside operations, freight and fleet management, and vehicle operation.

Consumer Electronics Manufacturers Association (CEMA): CEMA is a sector of the Electronic Industries Alliance (EIA). Two ITS standards have been developed under the auspices of CEMA, both having to do with traveler information radio and FM subcarrier systems.

Data Interchange Standards Association (DISA): DISA was chartered by the American National Standards Institute (ANSI) to provide its Accredited Standards Committee (ASC) X12 with administrative support. Some commercial vehicle operations (CVO) related standards are available for purchase at this site.

Institute of Electrical and Electronics Engineers (IEEE): The IEEE develops and disseminates voluntary, consensus-based industry standards involving all types of electro technology. ITS-related standards being developed by IEEE include message sets and data dictionaries.

Institute of Transportation Engineers (ITE): The Institute of Transportation Engineers (ITE) is one of the largest professional transportation organizations in the world. ITE members include traffic engineers, transportation planners, and other professionals who

are responsible for planning, designing, implementing, operating, and maintaining surface transportation systems worldwide. ITE is involved in the development of NTCIP, TCIP, and other ITS standards.

ITS America (ITSA): The Intelligent Transportation Society of America fosters public/private partnerships to increase the safety and efficiency of surface transportation through the application of advanced technologies. This site contains many excellent resources for basic information on ITS and related topics.

National Electrical Manufacturers Association (NEMA): NEMA is one of the largest standards development organizations (SDOs) in the nation and represents over 600 member organizations. NEMA is a member organization of NTCIP and acts as the publisher of NTCIP standards.

National Transportation Communications for ITS Protocol (NTCIP): The primary objective of the NTCIP is to provide communication standards that ensure the interoperability and interchangeability of traffic control and intelligent transportation systems (ITS) devices. The NTCIP is the first protocol for the transportation industry that provides a communications interface between disparate hardware and software products.

Oak Ridge National Laboratory (ORNL): Oak Ridge National Laboratory's Intelligent Transportation Systems (ITS) Research Program provides technical assistance and program support to the FHWA in the following subject areas: traffic simulation, signal optimization, real-time control, human factors, automation and systems engineering, operations research, traffic models, and management information systems.

Security Industry Association (SIA): The SIA was formed in 1969 to promote growth and expansion in the access control, auto security, biometrics, burglar alarm, CCTV, lock hardware, monitoring, outdoor protection, perimeter protection, personal response systems, and personal security product industries. SIA has recently begun to investigate the need for ITS-related standards.

Society of Automotive Engineers (SAE): This organization is made up of more than 75,000 engineers, business executives, educators, and students who share information and exchange ideas for advancing the engineering of mobility systems. Information about SAE's ITS standards activities can be found within the "Technical Committee" section of this Web site. SAE has developed several ITS standards related to in-vehicle electronics architectures and advanced traveler information systems.

Telecommunications Industry Association (TIA): TIA is a national trade organization that provides communications and information technology products, materials, systems, distribution services and professional services. The association's member companies manufacture or supply most of the products used in global communication networks.

Transit Communications Interface Profiles (TCIP): The TCIP is a family of ITS standards for transit communications. These new standards provide the interfaces among transit applications that will allow data to be shared by transit departments and other operating entities such as emergency response services and regional traffic management centers.

Transit Standards Consortium (TSC): The Transit Standards Consortium is a public/private, non-profit organization that facilitates the development, testing, maintenance, education, and training related to transit standards. The organization includes transit agencies, standards bodies, vendors, and other interested parties.

Volpe National Transportation Systems Center: The John A. Volpe National Transportation Systems Center (Volpe Center), located in Cambridge, MA, is an organization of the Federal Government whose principal role is to serve as a national center of transportation and logistics expertise. As such, it provides research, analytic, management, and engineering support to the U.S. Department of Transportation, other Federal agencies, and state and local governments.

10.2 Standards Elements

A number of key elements make up a standard or set of standards. These include Data Dictionaries, Message Sets, Object Definitions, and Communications Protocol. Each of these is described in more detail below.

10.2.1 Data Dictionary

Data Dictionaries provide the definition and format of individual data elements that are then grouped into individual messages. In other words, messages are the sentences and data elements are the individual words.

Two good examples of data dictionaries are the Traffic Management Data Dictionary (TMDD) developed by the Institute of Transportation Engineers (ITE) and the Advanced Traveler Information Systems (ATIS) Data Dictionary developed by SAE.

10.2.2 Message Set

Message Sets (MS) are an essential component in the design and operation of modern computer based systems. They provide the basic information flows (generally described as messages) upon which communications between systems depend. Specifically, a message set provides the information definition (semantics) and format (syntax) to handle individual informational exchanges on specific topics. Thus, agreed upon message sets with unambiguous message definitions is one of the essential characteristics of standards required for information exchange between individual traffic management systems. Message sets are also important for communications between traffic management systems and other ITS users and/or suppliers of traffic related information. An example of a currently implemented Message Set is Location Reference Message Specification (LRMS). This specification standard was developed at Oak Ridge National Laboratory. The LRMS establishes standard formats for

individual messages used within message sets to convey locations. The design of the LRMS is based on three fundamental concepts. First, the transfer of a location is a message in itself. Second, the use of multiple location message options (termed profiles) is used within an expandable framework. Finally, the use of a set of well-known ground control points (referred to as “datums”) is used to permit registration of different map databases to one another so that locations transferred can be understood with minimal ambiguity. Message Sets work in hand-in-hand with Data Dictionaries and Communications Protocol.

10.2.3 Object Definitions

The analogy to message sets in the world of object oriented software is object definitions. Objects are intuitive in nature – for example bus objects, traffic signal objects, vehicle detector objects, incident objects, etc. Each defined object has attributes, or characteristics and methods that act upon it. For example, a bus object contains attributes of <driver ID>, <bus number>, <passenger capacity>, <wheelchair compatible>, and so on. A bus object can be created, removed, or stored – these are examples of its methods.

10.2.4 Communications Protocols

The communications interface standards provide guidance on the first four layers of the Open System Interconnect (OSI) reference model. The data dictionary, message set, and object definitions deal with the fifth through seventh layers of the OSI reference model. The applicable NTCIP communication interface standards describe communications at the physical, link, network, and transport layers of the model. The communications standards address items such as electrical levels, cabling, connectors, how fast data can be exchanged, contention management, error detection and resolution, as well as addressing. Defined standards accommodate different layers (or groups of layers) of the protocols. For example, many installations utilize NTCIP 2202 (Internet (TCP/IP and UDP/IP) Transport Profile for layers three and four. NTCIP 2104 (Ethernet Sub-network Profile) defines requirements for layers one and two including requirements for specific types of coaxial cable, twisted wire pairs, and fiber-optic media.

10.2.5 ITS Standards Identification Process

In general, each information flow has up to three types of standards that are relevant: a message set standard, a data element standard, and one or more communications protocol standards. Especially in the area of communications protocols, there are various technology choices that a region can make. Making the best choices depends on multiple factors, including throughput (how much data must be transmitted or received on the interface), network topology (how the ITS systems are connected together), and infrastructure (fiber optic lines, leased land lines, etc.). In most cases the final technology choices are up to the communications experts during project

implementation. Typically, these decisions are made as part of the Plans, Specifications and Estimates (PS&E) for each project.

The relative maturity of a key factor in determining whether the standard should be adopted for a given interface. The following questions should be considered in the decision-making:

- Has the ITS standard been approved or published by the SDOs?
- Has the ITS standard been adopted by multiple vendors?
- Has the ITS standard been tested, whether informally by the vendor, or through the formal ITS Standard Testing Program funded by FHWA?
- Is there an amendment to the ITS standard currently in the works, and if so, how much of the standard will change as a result?

By evaluating each standard with the above questions, the levels of maturity or stages of development for standards include:

- Draft Under Development. During this phase, there are significant changes likely to occur. 19 standards are in this category.
- Draft for Ballot or in Balloting. Standards being voted upon by a committee or working group or are undergoing other SDO procedures. 10 standards are in this category.
- Approved. Standards that have passed all necessary ballots and have been approved by an SDO, but have not published yet. 4 standards are in this category.
- Published. Standards available for purchase and use. 56 standards are in this category.
- Tested/deployed Standards. Only minor changes are likely to occur in this phase of a standard development.

The current maturity status of standards can be obtained from www.standards.its.dot.gov/standards.htm

10.3 ITS Standards for Ventura County

The ITS Standards report would include all selected Standards for each information flow in the county. Turbo Architecture provides an ITS Standards Report based on all of the architecture flows selected in the region. The report in Appendix E lists standards associated with each architecture flow.

In addition to the interface standards that are being defined for ITS, a range of other regional standards may be considered that would facilitate interoperability and implementation of the regional ITS architecture. For example, standard base maps, naming conventions, measurement & location standards, and organizational structure

identifiers can all facilitate the meaningful exchange of information between systems in the region.

11 Maintaining the ITS Architecture

At the end of this exercise to develop a Regional ITS Architecture for Ventura County a point has been reached when it is time to consider the future support activities needed to insure that the architecture is used, that projects are funded and deployed and the architecture documentation updated as needed. The six SCAG counties are at very different stages of ITS development and this is reflected in different approaches to the maintenance of their architectures.

Maintenance is a required section of the document and is clearly intended to ensure that the architecture will be:

- Used;
- Funded;
- Projects are deployed; and,
- That integration progresses to the benefit of all.

Maintenance activities involve the following:

- Maintenance of the stakeholder lists (an extremely valuable resource);
- Scheduling regular meetings i.e. continuing to maintain the dialogue established through the architecture development process;
- Maintaining the documents;
- Updating the architecture process as needed; and,
- Transmitting changes to SCAG.

VCTC has taken the lead in developing the Ventura County Regional ITS Architecture and will continue to do so in the future. The document will be updated in conjunction with the bi-annual Congestion Management Plan process. VCTC will also be responsive to SCAG's requests to submit updates in a timely manner for the Regional Transportation Improvement Program (RTIP) updates. VCTC will determine in conjunction with the Technical Advisory Committee, when and how changes to the architecture should be pursued.

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	CHP	California Highway Patrol
12	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)
13	COG	Council of Government.
14	Common Object Request Broker Architecture (CORBA)	A National Architecture data exchange standard adopted and used by Showcase.
15	CVISN	Commercial Vehicle Information Systems & Networks
16	CVO	Commercial Vehicle Operations

Number	TERM	DEFINITION
17	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)
18	DOT	Department of Transportation
19	EMS	Emergency Management Services / Systems
20	Extensible Markup Language (XML)	The data exchange standard that is gradually replacing CORBA in Southern California.
21	FHWA	Federal Highway Administration
22	FMCSA	Federal Motor Carrier Safety Administration
23	FTA	Federal Transit Authority
24	GIS	Geographic Information Systems used for a variety of emergency management and transportation planning tools with a digital map of the area being analyzed
25	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.
26	HAR	Highway Advisory Radio – mechanism for broadcasting traveler information to motorists.
27	HOV	High Occupancy Vehicle, also known as carpool lane or diamond lane.
28	ISP	Information Service Provider
29	Information Exchange Network (IEN)	A major sub-system developed for the exchange of arterial system data for the County of Los Angeles.

Number	TERM	DEFINITION
30	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.
31	IVHS	The precursor to ITS. Stands for Intelligent Vehicle Highway Systems.
32	JPA	Joint Powers Authority
33	Market Packages	Represent slices of the Physical Architecture that address specific services such as surface street control.
34	MCO	Maintenance & Construction Operations
35	MOU	Memorandum of Understanding
36	MPO	Metropolitan Planning Organization
37	National ITS Architecture	A common framework for ITS interoperability. The National 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.
38	NTCIP	National Transportation Communications for ITS protocol. Required for Traffic Management Operations. Allowing for wire line communications between traffic management centers and field equipment.
39	O & M	Operations and Maintenance.
40	POE	Port of Entry

Number	TERM	DEFINITION
41	Regional Integration of ITS (RIITS)	A Los Angeles County Metropolitan Transportation Authority (MTA) project which integrates data from multiple systems and is the core project within the Los Angeles County Regional ITS Architecture.
42	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.
43	Regional Transportation Plan (RTP)	A federally required long-term vision document that is updated every three years.
44	RTPA	Regional Transportation Planning Authority.
45	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).
46	RWIS	Road Weather Information System
47	SANDAG	San Diego Association of Governments in San Diego County
48	SCAG	Southern California Association of Governments
49	SCRRA	Southern California Regional Rail Authority
50	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.
51	SOV	Single Occupancy Vehicle.

Number	TERM	DEFINITION
52	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.
53	TestBed	A Caltrans project that supports the development of improved freeway operations and incident management, located at UC Irvine Institute of transportation Studies.
54	Travel Probe	An OCTA transit project intended to collect information on road congestion by tracking bus speeds. The project is no longer operational.
55	TMC	Traffic / Transportation Management Center
56	TOC	Traffic / Transportation Operations Center
57	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.
58	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.
59	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

Amtrak Service *Status:* Existing

Description: National Railroad Freight and Passenger Service

Associated Stakeholder: Amtrak

Mapped to Entity: Transit Management

Caltrans D7 TMC *Status:* Existing

Description: Located in Los Angeles

Associated Stakeholder: Caltrans District 7

Mapped to Entity: Information Service Provider

Mapped to Entity: Maintenance and Construction Management

Mapped to Entity: Traffic Management

Caltrans Maintenance Vehicles *Status:* Existing

Description: Maintenance and construction service on freeways in Ventura County

Associated Stakeholder: Caltrans District 7

Mapped to Entity: Maintenance and Construction Vehicle

Caltrans Roadside Equipment *Status:* Existing

Description: Roadside Equipment includes any and all equipment distributed on and along the roadway which monitors and controls traffic.

Associated Stakeholder: Caltrans District 7

Mapped to Entity: Roadway Subsystem

Camarillo Area Transit *Status:* Existing

Description: offers both a fixed route bus service and a general public dial-a-ride

Associated Stakeholder: City of Camarillo

Mapped to Entity: Transit Management

Camarillo Area Transit Vehicles *Status:* Existing

Description: offers both a fixed route bus service and a general public dial-a-ride

Associated Stakeholder: City of Camarillo

Mapped to Entity: Transit Vehicle Subsystem

Campus Circulator CSUCI *Status:* Existing

Description: In August 2004, the VCTC and CSUCI began a one-year demonstration of an internal campus circulator service called the "CSUCI WAVE" using a prototype electric bus. The fare-free service is operated Monday through Friday

Associated Stakeholder: VCTC

Mapped to Entity: Transit Management

Campus Circulator CSUCI Vehicles *Status:* Existing

Description: In August 2004, the VCTC and CSUCI began a one-year demonstration of an internal campus circulator service called the "CSUCI WAVE" using a prototype electric bus. The fare-free service is operated Monday through Friday

Associated Stakeholder: VCTC

Mapped to Entity: Transit Vehicle Subsystem

CHP Dispatch Center *Status:* Existing

Description: The CHP/Caltrans Traffic Management Center is responsible for freeway incident verification, monitoring, and scene management throughout Los Angeles County.

Associated Stakeholder: California Highway Patrol (CHP)

Mapped to Entity: Emergency Management

CHP Vehicles *Status:* Existing

Description: Emergency Response Vehicles

Associated Stakeholder: California Highway Patrol (CHP)

Mapped to Entity: Emergency Vehicle Subsystem

CTNET *Status:* Planned

Description: Central Arterial Traffic Signal Control System

Associated Stakeholder: Caltrans District 7

Mapped to Entity: Traffic Management

goventura.org *Status:* Existing

Description: No physical traveler center existed, but VCTC send traffic info to public through the goventura website

Associated Stakeholder: VCTC

Mapped to Entity: Information Service Provider

Guaranteed Ride Home *Status:* Existing

Description: available free of charge to anyone regularly using public transit, vanpooling or carpooling to work in Ventura County

Associated Stakeholder: VCTC

Mapped to Entity: Transit Management

Guaranteed Ride Home Vehicles *Status:* Existing

Description: available free of charge to anyone regularly using public transit, vanpooling or carpooling to work in Ventura County

Associated Stakeholder: VCTC

Mapped to Entity: Transit Vehicle Subsystem

Harbor Beaches Transit *Status:* Existing

Description: Although inside the SCAT service area, the cities of Oxnard, Port Hueneme, and the County jointly operate a dial-a-ride serving the Channel Islands harbor area, part of Port Hueneme, the unincorporated beach communities near Oxnard, and the Oxnard Transportation Center.

Associated Stakeholder: County of Ventura

Mapped to Entity: Transit Management

Harbor Beaches Transit Vehicles *Status:* Existing

Description: Although inside the SCAT service area, the cities of Oxnard, Port Hueneme, and the County jointly operate a dial-a-ride serving the Channel Islands harbor area, part of Port Hueneme, the unincorporated beach communities near Oxnard, and the Oxnard Transportation Center.

Associated Stakeholder: County of Ventura

Mapped to Entity: Transit Vehicle Subsystem

MetroLink Service *Status:* Existing

Description: Urban Commuter Rail Service. The Ventura County Line connects to other MetroLink Lines in LA County

Associated Stakeholder: MetroLink

Mapped to Entity: Transit Management

Moorpark Transit *Status:* Existing

Description: Signal preemption with emergency battery backup at rail crossing.

Associated Stakeholder: City of Moorpark

Mapped to Entity: Transit Management

Moorpark Transit Vehicles *Status:* Existing

Description: Signal preemption with emergency battery backup at rail crossing.

Associated Stakeholder: City of Moorpark

Mapped to Entity: Transit Vehicle Subsystem

NextBus *Status:* Existing

Description: Real time bus location through GPS

Associated Stakeholder: VCTC

Mapped to Entity: Information Service Provider

Mapped to Entity: Remote Traveler Support

Mapped to Entity: Transit Management

Oak Park Dial-A-Ride *Status:* Existing

Description: Ventura County contracts for dial-a-ride transit services in the Oak Park area from the City of Agoura Hills.

Associated Stakeholder: County of Ventura

Mapped to Entity: Transit Management

Oak Park Dial-A-Ride Vehicles *Status:* Existing

Description: Ventura County contracts for dial-a-ride transit services in the Oak Park area from the City of Agoura Hills.

Associated Stakeholder: County of Ventura

Mapped to Entity: Transit Vehicle Subsystem

Ojai Trolley *Status:* Existing

Description: provides service between Meiners Oaks and Ojai

Associated Stakeholder: City of Ojai

Mapped to Entity: Transit Management

Ojai Trolley Vehicles *Status:* Existing

Description: provides service between Meiners Oaks and Ojai

Associated Stakeholder: City of Ojai

Mapped to Entity: Transit Vehicle Subsystem

Remote TMC-CHP *Status:* Existing

Description: Directly linked to Caltrans D7 TMC in LA downtown. Installed for both VCTC and Ventura County CHP to view real time traffic information

Associated Stakeholder: California Highway Patrol (CHP)

Mapped to Entity: Traffic Management

Remote TMC-VCTC *Status:* Existing

Description: Directly linked to Caltrans D7 TMC in LA downtown. Installed for both VCTC and Ventura County CHP to view real time traffic information

Associated Stakeholder: VCTC

Mapped to Entity: Traffic Management

SCAT *Status:* Existing

Description: South Coast Area Transit. As the largest public transit service in Ventura County, SCAT serves the cities of Ventura, Ojai, Oxnard, Port Hueneme, and San Buenaventura as well as the county areas between them

Associated Stakeholder: VCTC

Mapped to Entity: Transit Management

SCAT Vehicles *Status:* Existing

Description: As the largest public transit service in Ventura County, SCAT serves the cities of Ventura, Ojai, Oxnard, Port Hueneme, and San Buenaventura as well as the county areas between them

Associated Stakeholder: VCTC

Mapped to Entity: Transit Vehicle Subsystem

Simi Valley Transit *Status:* Existing

Description: Simi Valley Area Transit serves Simi Valley with four regular bus routes

Associated Stakeholder: City of Simi Valley

Mapped to Entity: Transit Management

Simi Valley Transit Vehicles *Status:* Existing

Description: Simi Valley Area Transit serves Simi Valley with four regular bus routes

Associated Stakeholder: City of Simi Valley

Mapped to Entity: Transit Vehicle Subsystem

Smart Card *Status:* Existing

Description: Ventura County Passport: pre-paid fare card that can be used throughout the county

Associated Stakeholder: VCTC

Mapped to Entity: Financial Institution

Mapped to Entity: Transit Management

Thousand Oaks Transit *Status:* Existing

Description: serves Newbury Park, Thousand Oaks, and the Westlake area

Associated Stakeholder: City of Thousand Oaks

Mapped to Entity: Transit Management

Thousand Oaks Transit Vehicles *Status:* Existing

Description: serves Newbury Park, Thousand Oaks, and the Westlake area

Associated Stakeholder: City of Thousand Oaks

Mapped to Entity: Transit Vehicle Subsystem

VCTC Kiosks *Status:* Existing

Description: Kiosks are public informational displays supporting various levels of interaction and information access.

Associated Stakeholder: VCTC

Mapped to Entity: Remote Traveler Support

VISTA *Status:* Existing

Description: Ventura Intercity Service Transit Authority: connects all municipal transit operators in Ventura County and makes it possible for people to travel by bus throughout the County

Associated Stakeholder: VCTC

Mapped to Entity: Transit Management

VISTA Vehicles *Status:* Existing

Description: connects all municipal transit operators in Ventura County and makes it possible for people to travel by bus throughout the County

Associated Stakeholder: VCTC

Mapped to Entity: Transit Vehicle Subsystem

APPENDIX C

STAKEHOLDER REPORT

Stakeholders Report

Amtrak

Description: National Rail Service Provider

Associated Element: Amtrak Service

California Highway Patrol (CHP)

Description: The CHP is responsible for freeway incident verification, monitoring, and scene management throughout Ventura County.

Associated Element: CHP Vehicles

Associated Element: Remote TMC-CHP

Associated Element: CHP Dispatch Center

Caltrans District 7

Description: Caltrans District 7 is the state department of transportation for the Los Angeles and Ventura counties. Caltrans covers the counties in freeway and state highway operation in traffic monitoring, congestion, and incident management.

Associated Element: Caltrans D7 TMC

Associated Element: Caltrans Roadside Equipment

Associated Element: CTNET

Associated Element: Caltrans Maintenance Vehicles

City of Camarillo

Description: Camarillo has Camarillo Area Transit (CAT), which is both a fixed route bus service Monday through Friday and a general public dial-a-ride Monday through Saturday. The Camarillo dial-a-ride services connect with the VISTA 101 and Camarillo-CSUCI buses, as well as AMTRAK services in Camarillo

Associated Element: Camarillo Area Transit Vehicles

Associated Element: Camarillo Area Transit

City of Fillmore

Description: Does not have transit services provided by the City

City of Moorpark

Description: Moorpark City Transit city bus operates two routes Monday through Friday. The buses connect to the VISTA East services at both the railroad station and Moorpark College. Annual ridership is approaching 40,000 passengers.

Associated Element: Moorpark Transit Vehicles

Associated Element: Moorpark Transit

City of Ojai

Description: Ojai City Trolley provides service between Meiners Oaks and Ojai seven days per week. Currently the service carries over 141,000 passengers a year. The service is considering a major modification, which would re-align the routes, and expand services to Oak View. HELP of Ojai operates inside the Ojai Valley, including part of the SCAT ACCESS service area. It provides door-to-door service for seniors and disabled persons Monday-Friday. The service carried approximately 18,000 riders in 2002 to 2003.

Associated Element: Ojai Trolley Vehicles

Associated Element: Ojai Trolley

City of Simi Valley

Description: Simi Valley Area Transit serves Simi Valley with four regular bus routes, one of which connects with the Los Angeles County Metropolitan Transit Authority (MTA) in Chatsworth. In addition, it provides connections to VISTA East services, and the AMTRAK/Metrolink at the Simi Valley railroad station. Bus service is Monday through Saturday. Simi Valley Transit carries 520,000 passengers per year.

Associated Element: Simi Valley Transit

Associated Element: Simi Valley Transit Vehicles

City of Thousand Oaks

Description: Thousand Oaks Transit (TOT) operates four regular bus routes. TOT serves Newbury Park, Thousand Oaks, and the Westlake area Monday through Friday. The NextBus arrival information is not provided for Thousand Oaks Transit due to poor communications coverage in that area. Thousand Oaks Transit connects to VISTA 101, Conejo Connection, VISTA East, Metro route 161, and LA DOT buses

Associated Element: Thousand Oaks Transit Vehicles

Associated Element: Thousand Oaks Transit

County of Ventura

Description: Although inside the SCAT service area, the cities of Oxnard, Port Hueneme, and the County jointly operate a dial-a-ride serving the Channel Islands harbor area, part of Port Hueneme, the unincorporated beach communities near Oxnard, and the Oxnard Transportation Center. This service carries about 12,000 passengers per year. The service provides circulation within the beach communities, and serves as a feeder service to SCAT and AMTRAK. Ventura County contracts for dial-a-ride transit services in the Oak Park area from the City of Agoura Hills. This service provides access to the City of Thousand Oaks and allows connections to Thousand Oaks Transit and VISTA, Los Angeles Metro, and LA DOT bus lines.

Associated Element: Oak Park Dial-A-Ride

Associated Element: Oak Park Dial-A-Ride Vehicles

Associated Element: Harbor Beaches Transit

Associated Element: Harbor Beaches Transit Vehicles

MetroLink

Description: Urban Commuter Rail Service Provider. Operational responsibilities are to coordinate train movements in a safe and efficient manner

Associated Element: MetroLink Service

VCTC

Description: Ventura County Transportation Commission. VCTC develops and implements transportation policies, projects, funding, and priorities for a wide variety of projects that reflect all modes of transportation.

Associated Element: Smart Card

Associated Element: goventura.org

Associated Element: VCTC Kiosks

Associated Element: NextBus

Associated Element: VISTA

Associated Element: SCAT

Associated Element: Campus Circulator CSUCI

Associated Element: Remote TMC-VCTC

Associated Element: Guaranteed Ride Home

Associated Element: VISTA Vehicles

Associated Element: Guaranteed Ride Home Vehicles

Associated Element: SCAT Vehicles

Associated Element: Campus Circulator CSUCI Vehicles

APPENDIX D

EXAMPLES OF INTERAGENCY AGREEMENTS

The following are examples of interagency agreements from within Southern California. They can be used for reference purposes when considering content for proposed agreements and offer ideas for how to deal with particular types of elements. None of these agreements will ever be directly transferable, as each project and group of stakeholders will have their own particular characteristics.

Inter-Agency Agreement between Caltrans, LADOT and the MTA

INTER-AGENCY TRAFFIC OPERATION AND MANAGEMENT

MEMORANDUM OF UNDERSTANDING

CALIFORNIA DEPARTMENT OF TRANSPORTATION,

CITY OF LOS ANGELES DEPARTMENT OF TRANSPORTATION

AND

LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

This Memorandum of Understanding (MOU) is a no cost agreement entered into effective April 15, 2004 by and among the California Department of Transportation (Caltrans) for District 7, the City of Los Angeles Department of Transportation (LADOT) and the Los Angeles County Metropolitan Transportation Authority (MTA) to provide inter-agency operational guidelines, responsibilities and procedures for inter-agency traffic operation and management for the purpose of sharing of near-real time traffic information, congestion data, incident reports and operational resources.

RECITALS

A. The concept of coordinated inter-agency traffic operation and management evolved from the cooperative agreement between LADOT and Caltrans District 7, initiated during the 1984 Olympic games. The purpose of that cooperative agreement was to coordinate the use of their individual transportation management resources and to maximize utilization of available roadway capacity by providing the traveling public with then current information about congestion and the location of traffic delays. This concept of inter-agency operation and management led to the Santa Monica Freeway Smart Corridor demonstration Project. The major portion of the project funding came from the Petroleum Violation Escrow Account (PVEA) Grant and was funded through the MTA in 1990.

B. The Smart Corridor connected the traffic management operations and systems of LADOT, Caltrans District 7, the California Highway Patrol (CHP), the Cities of Santa Monica, Culver City, and Beverly Hills. This enabled full utilization of the capacity of the 11 miles section of I-10 freeway and the five (5) parallel surface streets between downtown Los Angeles on the east and I-405 on the west. The Smart Corridor aided in the initial establishment of inter-agency traffic management, communications, and traveler information systems and has become a national success in the deployment of ITS technologies. The Smart Corridor system was disconnected in December 1999 for two main reasons, (1) both Caltrans District 7 and LADOT adopted new advances in traffic management systems, and (2) the system software was not Y2K compliant. In

spite of the system shutdown, most of the infrastructure and communication network installed as part of the project remains in use today.

C. This MOU will facilitate the re-establishment of the traffic management and information sharing capabilities of the Smart Corridor and further expand the geographic coverage to the entire City of Los Angeles and Caltrans District 7 freeway system in Los Angeles County. This is made possible by the implementation of a federally funded project, Inter-Modal And Jurisdictional Network Environment (IMAJINE) through the Southern California Intelligent Transportation System (ITS) Priority Corridor and a MTA sponsored Regional Integration of ITS (RIITS) project. The new system connection, deployed by using the Los Angeles Regional ITS Architecture, has been developed in conformance with the statutory requirements of 23 CFR 490 of the Transportation Equity Act for the Twenty-First Century (TEA-21).

D. The purpose of this MOU is to provide guidelines, define responsibilities and formalize procedures to facilitate the sharing of traffic management resources among the parties.

SECTION I

1.0 CALTRANS AGREES:

Caltrans will grant LADOT and MTA access to the subsystems listed below, upon the compliance of LADOT and MTA with the terms outlined in the operational agreements in the sections that follow.

1.1 Operation

This section describes guidelines and protocols for the viewing of CCTV video images, ramp meter status and metering rate data, changeable message sign (CMS) status and messages, congestion detector data, and traffic incident and special event information originating from Caltrans. LADOT and MTA will be permitted to receive and view CCTV video images, ramp meter status and metering rate data, changeable message sign (CMS) status and messages, congestion detector data, and traffic incident and special event information supplied by Caltrans under the following conditions:

1.1.1 Video images, data and information received by LADOT / MTA shall be used only to provide general information about traffic circulation and to assist LADOT personnel in traffic management operations and MTA personnel in transit management operations. These video images, data and information shall not be used for any non-transportation related system management purposes, including but not limited to, law enforcement.

1.1.2 LADOT / MTA shall be fully responsible for preventing any unauthorized viewings of these video images and data by their respective personnel.

1.1.3 Caltrans shall retain exclusive control over all CMS and all CCTV cameras. If a selected camera is not in use by Caltrans, LADOT/MTA may request that its orientation may be changed temporarily.

1.1.4 Caltrans will provide one (1) video switch connection and one (1) data link to LADOT, allowing the transmission at a minimum of a 4 image single video feed. LADOT and MTA are responsible for the display of that video image within their respective facilities.

1.1.5 Video images and data shall not be recorded in any manner without the prior approval of Caltrans.

1.1.6 LADOT / MTA are each responsible for the procurement, maintenance and upgrade of all equipment required for receiving and displaying the video images and data supplied by Caltrans at their individual TMCs.

1.1.7 Caltrans will provide the timely maintenance of Caltrans owned equipment and processes required to transmit these video images and data to LADOT.

SECTION II

2.0 LADOT AGREES:

LADOT will grant Caltrans and MTA access to the subsystems listed below. Access to these subsystems is contingent on the compliance of Caltrans District 7 and MTA with the terms outlined in the operational agreements in the sections that follow.

2.1 Operation

This section describes guidelines and protocols for the viewing of Closed Circuit Television (CCTV) video images, arterial congestion data, traffic signal status and timing data, and special event information originating from LADOT. Caltrans and MTA may be permitted to use the data and view CCTV video images supplied by LADOT under the following conditions:

2.1.1 Video images and data received by Caltrans and MTA shall be used only to provide general information about traffic circulation and to assist Caltrans and MTA personnel in traffic management operations. Video images shall not be used for any non-transportation related system management purposes, including, but not limited to, law enforcement.

2.1.2 Caltrans and MTA shall be fully responsible for any unauthorized use of data and viewings of the video images by their respective personnel.

2.1.3 LADOT shall retain priority control over all of it's CCTV cameras. If a selected camera is not in use by LADOT, Caltrans and MTA may request to change its orientation temporarily to a preferred position.

2.1.4 LADOT will provide one (1) video switch connection and one (1) data link connection to Caltrans, allowing the transmission of up to 4 video images.

Caltrans is responsible for the display of the LADOT data and video images within its traffic management facility.

2.1.5 MTA shall be permitted to use one (1) video monitor and four (4) data monitors located in the bus dispatch center of MTA's main building located at One Gateway Plaza. Additional monitors must be approved by LADOT.

2.1.6 LADOT video images may not be recorded in any manner without the prior approval of LADOT.

2.1.7 Caltrans and MTA are each responsible for the procurement, maintenance and upgrade of all equipment required for receiving and displaying data, information and the video image supplied by LADOT.

2.1.8 LADOT will provide the timely maintenance of equipment and processes required to transmit data, information and video to Caltrans and MTA.

2.2 COMMUNICATION LINES

LADOT has established direct fiber optic cable links from the ATSAC Center to both Caltrans District 7 ATMS Center and MTA USG Building. LADOT will continue to operate and maintain these fiber optic communication links within the City of Los Angeles' Right–of-Way for the purpose of inter-agency traffic management and operation.

SECTION III

3.0 MTA AGREES:

MTA will grant Caltrans and LADOT access to the data from the MTA's Bus Operations Center and Rail Control Center listed below as data becomes available. Access to the data is contingent on the compliance of Caltrans and LADOT with the terms outlined in the section that follows.

I. LADOT - MTA Agreements Governing ATSAC CCTV Video Images

This Memorandum of Understanding (MOU) is made by and between the Los Angeles County Metropolitan Transportation Authority (MTA) and City of Los Angeles to summarize guidelines and protocol for the viewing of Closed Circuit Television (CCTV) video images originating from Los Angeles Department of Transportation's (LADOT) Automated Traffic Surveillance and Control (ATSAC) Center.

MTA may be permitted to view ATSAC CCTV video images under the following conditions:

1. Video images and data received by MTA shall be used only to provide general information about traffic circulation and to assist MTA personnel in the management of their bus and rail operation. Video images shall not be used for any non-transit related system management purposes including law enforcement.

2. MTA shall be fully responsible for any unauthorized viewings of the video images by MTA personnel.
3. LADOT has priority control over all CCTV cameras. If the selected camera is not in use by LADOT, MTA personnel may rotate the camera to their preferred position.
4. MTA shall be permitted the use of one (1) video monitor and four (4) data monitors located in the bus dispatch center of MTA's main building located at One Gateway Plaza. Additional monitors must be approved by LADOT.
5. Video images may not be recorded in any manner without the prior approval of LADOT.
6. MTA is responsible for the maintenance and upgrading, if necessary, of all hardware located within the MTA building. This hardware includes the graphics workstation; video monitor and the fiber optic interconnect system between ATSAC Center and the MTA.

II. Agreements Between Caltrans District 7 and LADOT

LADOT / Caltrans Operations Agreement

LADOT and Caltrans perform parallel missions on jurisdictionally separate facilities that are interdependent. To fully utilize the existing transportation network of freeways and arterials efficiently, it is imperative that transportation resources be utilized in a coordinated manner. Section 2.0 provides a brief description of the traffic management systems operated independently by LADOT and Caltrans respectively. While it is neither feasible nor necessary to coordinate the operation of all systems, it is possible to coordinate the operations of primary facilities through the development of resource sharing agreements. The sharing of resources shall not imply the relinquishment of control or jurisdictional liability at anytime. LADOT and Caltrans shall retain primary control and responsibility for all systems, subsystems, system components and maintenance within their respective jurisdiction. The sharing of resources within this document describes the ability to display the status of ITS devices, images, and traffic data associated with a separated jurisdiction. Where shared resources are utilized, each agency shall adhere fully to the operations agreements described herein.

Purpose

The purpose of this Memorandum of Understanding (MOU) is to provide guidelines, define responsibilities and formalize procedures to facilitate the sharing of traffic management resources between the Los Angeles Department of Transportation (LADOT) and the California Department of Transportation (Caltrans).

Background

The 1984 Summer Olympic Games initiated a cooperative agreement between the City of Los Angeles Department of Transportation (LADOT) and California Department of

Transportation (Caltrans) to coordinate the use of their individual transportation management resources. The goal of that agreement was to maximize roadway capacity by providing the traveling public with current information about congestion and the location of traffic delays.

The concept of coordinated interagency operations evolved from the lessons learned during the 1984 Olympic Games into a demonstration project earmarked as the Smart Corridor. The goal of Smart Corridor project was to connect the traffic management operations and resources of LADOT; Caltrans; the Los Angeles County Metropolitan Transportation Authority (LACMTA); the California Highway Patrol (CHP); the City of Santa Monica; Culver City and Beverly Hills to fully utilize the capacity of the freeway and parallel surface streets between downtown Los Angeles on the east and I-405 on the west. The Smart Corridor aided in the establishment of traffic management, communications, and traveler information systems that remain in use today.

With the introduction of the Southern California Priority Corridor Intelligent Transportation System (ITS) network, it is now possible to re-establish the information sharing capabilities of the Smart Corridor project. The new system connection is based on a regional architecture that will facilitate the integration of additional agencies, even beyond the limits of the Smart Corridor project.

System Description – Caltrans District 7 / Traffic Management Center (TMC)

Caltrans District 07 operates approximately 615 miles of interstate highway and approximately 500 miles of state highways and secondary routes. Caltrans is in the process of phasing out the legacy Semi Automated Traffic Management System (SATMS) with their newly developed Advanced Traffic Management System (ATMS). The ATMS is a modular traffic management system that integrates the following components into a singular operator interface:

- Ramp Metering System
- Changeable Message Signs (CMS) Control System
- Closed Circuit Television (CCTV) Traffic Cameras
- Video Display System
- Incident Management System

Caltrans also operates a Highway Advisory Radio (HAR) and traffic signal system that are not currently integrated into the ATMS.

LADOT / Automated Traffic Surveillance and Control (ATSAC) System

LADOT currently operates the Automated Traffic Surveillance and Control (ATSAC) center. ATSAC control 67% of Los Angeles's 4250 traffic signals using two traffic signal control systems, the Urban Traffic Control System (UTCS) and the Adaptive Traffic Control System (ATCS). The legacy UTCS has been the primary traffic signal control

system in ATSAC since 1984 and is currently being phased out with the implementation of ATCS. ATCS is a PC based advanced traffic management system and has been developed entirely within LADOT. ATCS is capable of performing adaptive traffic signal timing functions and the graphical user interface is expandable to the extent that all ATSAC functions may be eventually integrated into the ATCS client. Current systems operating in ATSAC include:

- UTCS (Traffic Signal System)
- ATCS (Traffic Signal System)
- Closed Circuit Television (CCTV) Traffic Cameras
- Video Display System
- Changeable Message Sign (CMS) System
- Transit Priority System (TPS)
- Reversible Lane Use Sign Control (LUSC)
- Light Rail Control System
- Optical Fiber Communications System
- Spread Spectrum Communications System
- Cellular Digital Packet Data (CDPD) Communications System
- ATSAC Traffic Information System Website

Caltrans Agreements Governing ATSAC CCTV Video Images

Caltrans CCTV Operation

This section describes guidelines and protocols for the viewing of Closed Circuit Television (CCTV) video images originating from Caltrans District 07.

LADOT may be permitted to view CCTV video images supplied by Caltrans District 07 under the following conditions:

1. Video images and data received by LADOT shall be used only to provide general information about traffic circulation and to assist LADOT personnel in traffic management operations. Video images shall not be used for any non-transportation related system management purposes including law enforcement.
2. LADOT shall be fully responsible for any unauthorized viewings of the video images by LADOT personnel.
3. Caltrans District 07 shall retain priority control over all CCTV cameras. If a selected camera is not in use by Caltrans, its orientation may be changed temporarily to a preferred position.

4. Caltrans will provide (1) video switch connection to LADOT, allowing the transmission of a single video image. LADOT is responsible for the display of that video image within its traffic management facility.
5. Video images may not be recorded in any manner without the prior approval of Caltrans.
6. LADOT is responsible for the procurement, maintenance and upgrade of all equipment required to receive and display the video image supplied by Caltrans.
7. Caltrans will provide the timely maintenance of equipment and processes required to transmit video to LADOT.

Caltrans Changeable Message Sign (CMS) System Operation

This section describes guidelines and protocols for the display of Caltrans CMS status and message content information.

LADOT may be permitted to receive Caltrans CMS status and message information under the following conditions:

1. Caltrans will make provisions to supply CMS status (Active or Inactive) and message content via a data link between Caltrans District 07 and LADOT/ATSAC.
2. LADOT shall utilize Caltrans CMS state and message content only to provide general information about traffic circulation and to assist LADOT personnel in the management of their transportation operations. Caltrans CMS status and message content shall not be used for any non-transportation related system management purposes including law enforcement.
3. LADOT shall be fully responsible for any unauthorized use of the CMS status or message content by LADOT personnel.
4. Caltrans shall retain primary control of all CMS within its jurisdiction.
5. LADOT is responsible for the procurement, maintenance and upgrade of all equipment required to receive and display CMS status and message content supplied by Caltrans.
6. Caltrans will provide the timely maintenance of equipment and processes required to transmit CMS Status and message content to LADOT.

Caltrans Congestion (Detector Data) Operation

This section describes guidelines and protocols for the display of Caltrans congestion information.

LADOT may be permitted to receive Caltrans congestion data under the following conditions:

1. Caltrans will make provisions to supply freeway congestion data via a data link between Caltrans District 07 and LADOT/ATSAC.
2. LADOT shall utilize Caltrans congestion information only to provide general information about traffic circulation and to assist LADOT personnel in the management of their transportation operations. Caltrans congestion information shall not be used for any non-transportation related system management purposes including law enforcement.
3. LADOT shall be fully responsible for any unauthorized use Caltrans congestion data by LADOT personnel.
4. LADOT is responsible for the procurement, maintenance and upgrade of all equipment required to receive and display congestion information supplied by Caltrans.
5. Caltrans will provide the timely maintenance of equipment and processes required to transmit freeway congestion information to LADOT.

Caltrans Ramp Meter Status Metering Rate Data Operation

This section describes guidelines and protocols for the display of freeway ramp meter status and metering rate data.

LADOT may be permitted to receive Caltrans ramp meter status and metering rate data under the following conditions:

1. Caltrans will make provisions to supply freeway ramp meter status and metering rate data via a data link between Caltrans District 07 and LADOT/ATSAC.
2. LADOT shall utilize Caltrans metering rate status and metering rate data only to provide general information about traffic circulation and to assist LADOT personnel in the management of their transportation operations. Caltrans ramp meter information shall not be used for any non-transportation related system management purposes including law enforcement.
3. LADOT shall be fully responsible for any unauthorized us Caltrans ramp meter data by LADOT personnel.
4. LADOT is responsible for the procurement, maintenance and upgrade of all equipment required to receive and display ramp meter status and metering rate information supplied by Caltrans.
5. Caltrans will provide the timely maintenance of equipment and processes required to transmit freeway ramp meter data to LADOT.

Caltrans Traffic Incident and Special Event Information

This section describes guidelines and protocols for the display of Caltrans traffic incident and special event information.

LADOT may be permitted to receive Caltrans traffic incident and special event information under the following conditions:

1. Caltrans will make provisions to supply traffic incident and special event information via a data link between Caltrans District 07 and LADOT/ATSAC.
2. LADOT shall utilize Caltrans incident and special event information only to provide general information about traffic circulation and to assist LADOT personnel in the management of their transportation operations. Caltrans traffic incident data shall not be used for any non-transportation related system management purposes including law enforcement.
3. LADOT shall be fully responsible for any unauthorized us Caltrans incident and special event information by LADOT personnel.
4. LADOT is responsible for the procurement, maintenance and upgrade of all equipment required to receive and display Caltrans incident and special event information supplied by Caltrans.
5. Caltrans will provide the timely maintenance of equipment and processes required to transmit traffic incident and special event information to LADOT.

Caltrans Shared Resources

LADOT Shared Resources

LADOT will grant Caltrans access to the subsystems listed below. Access to these subsystems is contingent on the compliance of Caltrans District 07 with the terms outlined in the operation agreements in the sections that follow.

- Closed Circuit Television (CCTV) system
- Arterial Traffic congestion data (Detector Data)
- Traffic signal status and traffic signal timing information
- Special event information

Caltrans Shared Resources

Caltrans will grant LADOT access to the subsystems listed below. Access to these subsystems is contingent on the compliance of LADOT with the terms outlined in the operational agreements in the sections that follow.

- Closed Circuit Television (CCTV) Traffic Cameras
- Changeable Message Sign (CMS) System
- Traffic congestion data (Detector Data)
- Ramp meter status and metering rate data
- Traffic incident and special event information

LADOT CCTV Operations

This section describes guidelines and protocols for the viewing of Closed Circuit Television (CCTV) video images originating from LADOT.

Caltrans may be permitted to view CCTV video images supplied by LADOT under the following conditions:

1. Video images and data received by Caltrans shall be used only to provide general information about traffic circulation and to assist Caltrans personnel in traffic management operations. Video images shall not be used for any non-transportation related system management purposes including law enforcement.
2. Caltrans shall be fully responsible for any unauthorized viewings of the video images by Caltrans personnel.
3. LADOT shall retain priority control over all CCTV cameras. If a selected camera is not in use by LADOT, its orientation may be changed temporarily to a preferred position.
4. LADOT will provide (1) video switch connection to Caltrans, allowing the transmission of a single video image. Caltrans is responsible for the display of the LADOT video image within its traffic management facility.
5. LADOT Video images may not be recorded in any manner without the prior approval of LADOT.
6. Caltrans is responsible for the procurement, maintenance and upgrade of all equipment required to receive and display the video image supplied by LADOT.
7. LADOT will provide the timely maintenance of equipment and processes required to transmit video to Caltrans.

LADOT Arterial Congestion Data

This section describes guidelines and protocols for the display of arterial congestion data.

Caltrans may be permitted to view arterial congestion data supplied by LADOT under the following conditions:

1. LADOT will make provisions to supply arterial congestion data via a data link between Caltrans District 07 and LADOT/ATSAC.
2. Caltrans shall utilize LADOT arterial congestion information only to provide general information about traffic circulation and to assist Caltrans personnel in the management of their transportation operations. LADOT arterial congestion information shall not be used for any non-transportation related system management purposes including law enforcement.
3. Caltrans shall be fully responsible for any unauthorized use LADOT congestion data by LADOT personnel.

4. Caltrans is responsible for the procurement, maintenance and upgrade of all equipment required to receive and display LADOT arterial congestion information supplied by LADOT.
5. LADOT will provide the timely maintenance of equipment and processes required to transmit arterial congestion information to Caltrans.
6. Caltrans shall not redistribute, repackage or provide access to LADOT arterial congestion data without the prior approval of LADOT.

LADOT Traffic Signal Status and Signal Timing Data

This section describes guidelines and protocols for the display of LADOT traffic signal status and signal timing information.

Caltrans may be permitted to access the LADOT traffic signal subsystem for the display only of traffic signal subsystem and signal timing parameters under the following conditions:

1. LADOT will make provisions to supply traffic signal status and traffic signal timing data via a data link between Caltrans District 07 and LADOT/ATSAC.
2. Caltrans shall utilize LADOT traffic signal timing data only to provide general information about traffic circulation and to assist Caltrans personnel in the management of their transportation operations. LADOT traffic signal data shall not be used for any non-transportation related system management purpose.
3. Caltrans shall be fully responsible for any unauthorized use of LADOT traffic signal data by Caltrans personnel.
4. Caltrans is responsible for the procurement, maintenance and upgrade of all equipment required to receive and display LADOT traffic signal data.
5. LADOT will provide the timely maintenance of equipment and processes required to transmit traffic signal data to Caltrans.
6. Caltrans shall not redistribute, repackage or provide access to LADOT traffic signal data without the prior approval of LADOT.
7. Caltrans shall only have the ability to display LADOT traffic signal status and signal timing parameters. At no time will LADOT relinquish control of any traffic signal.

LADOT Special Event Information Operational Agreement

This section describes guidelines and protocols for the display of LADOT special event information.

LADOT may be permitted to receive Caltrans traffic incident and special event information under the following conditions:

1. LADOT will make provisions to supply special event information via a data link between Caltrans District 07 and LADOT/ATSAC.

2. Caltrans shall utilize LADOT special event information only to provide general information about traffic circulation and to assist Caltrans personnel in the management of their transportation operations. LADOT's traffic incident data shall not be used for any non-transportation related system management purposes.
3. Caltrans shall be fully responsible for any unauthorized use of LADOT special event information by Caltrans personnel.
4. Caltrans is responsible for the procurement, maintenance and upgrade of all equipment required to receive and display LADOT special event information supplied by LADOT.
5. LADOT will provide the timely maintenance of equipment and processes required to transmit special event information to Caltrans.
6. Caltrans shall not redistribute, repackage or provide access to LADOT traffic signal data without the prior approval of LADOT.

Amendments

This agreement may be modified or amended by so stipulating in future agreements or by written approval of both the General Manager of LADOT and Caltrans District 07 Director, or their authorized designates.

Fair Operation of Memorandum of Understanding (MOU)

In entering into this MOU, Caltrans and LADOT recognize that it is impractical to make provisions for every contingency that may arise during the life of the MOU. Caltrans and LADOT agree in principle that the MOU shall operate between them with fairness and without detriment to the interest of either party, and if in the course of the performance of this MOU, an infringement of this principle is anticipated or disclosed, Caltrans and LADOT shall promptly meet in good faith and shall determine what action needs to be taken to remove the cause or causes of such infringement.

Inter-Agency Agreement between Caltrans, LADOT and the MTA

INTER-AGENCY TRAFFIC OPERATION AND MANAGEMENT

MEMORANDUM OF UNDERSTANDING

CALIFORNIA DEPARTMENT OF TRANSPORTATION,

CITY OF LOS ANGELES DEPARTMENT OF TRANSPORTATION

AND

LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

This Memorandum of Understanding (MOU) is a no cost agreement entered into effective April 15, 2004 by and among the California Department of Transportation (Caltrans) for District 7, the City of Los Angeles Department of Transportation (LADOT) and the Los Angeles County Metropolitan Transportation Authority (MTA) to provide inter-agency operational guidelines, responsibilities and procedures for inter-agency traffic operation and management for the purpose of sharing of near-real time traffic information, congestion data, incident reports and operational resources.

RECITALS

A. The concept of coordinated inter-agency traffic operation and management evolved from the cooperative agreement between LADOT and Caltrans District 7, initiated during the 1984 Olympic games. The purpose of that cooperative agreement was to coordinate the use of their individual transportation management resources and to maximize utilization of available roadway capacity by providing the traveling public with then current information about congestion and the location of traffic delays. This concept of inter-agency operation and management led to the Santa Monica Freeway Smart Corridor demonstration Project. The major portion of the project funding came from the Petroleum Violation Escrow Account (PVEA) Grant and was funded through the MTA in 1990.

B. The Smart Corridor connected the traffic management operations and systems of LADOT, Caltrans District 7, the California Highway Patrol (CHP), the Cities of Santa Monica, Culver City, and Beverly Hills. This enabled full utilization of the capacity of the 11 miles section of I-10 freeway and the five (5) parallel surface streets between downtown Los Angeles on the east and I-405 on the west. The Smart Corridor aided in the initial establishment of inter-agency traffic management, communications, and traveler information systems and has become a national success in the deployment of ITS technologies. The Smart Corridor system was disconnected in December 1999 for two main reasons, (1) both Caltrans District 7 and LADOT adopted new advances in traffic management systems, and (2) the system software was not Y2K compliant. In

spite of the system shutdown, most of the infrastructure and communication network installed as part of the project remains in use today.

C. This MOU will facilitate the re-establishment of the traffic management and information sharing capabilities of the Smart Corridor and further expand the geographic coverage to the entire City of Los Angeles and Caltrans District 7 freeway system in Los Angeles County. This is made possible by the implementation of a federally funded project, Inter-Modal And Jurisdictional Network Environment (IMAJINE) through the Southern California Intelligent Transportation System (ITS) Priority Corridor and a MTA sponsored Regional Integration of ITS (RIITS) project. The new system connection, deployed by using the Los Angeles Regional ITS Architecture, has been developed in conformance with the statutory requirements of 23 CFR 490 of the Transportation Equity Act for the Twenty-First Century (TEA-21).

D. The purpose of this MOU is to provide guidelines, define responsibilities and formalize procedures to facilitate the sharing of traffic management resources among the parties.

SECTION I

1.0 CALTRANS AGREES:

Caltrans will grant LADOT and MTA access to the subsystems listed below, upon the compliance of LADOT and MTA with the terms outlined in the operational agreements in the sections that follow.

1.1. Operation

This section describes guidelines and protocols for the viewing of CCTV video images, ramp meter status and metering rate data, changeable message sign (CMS) status and messages, congestion detector data, and traffic incident and special event information originating from Caltrans. LADOT and MTA will be permitted to receive and view CCTV video images, ramp meter status and metering rate data, changeable message sign (CMS) status and messages, congestion detector data, and traffic incident and special event information supplied by Caltrans under the following conditions:

1.1.1 Video images, data and information received by LADOT / MTA shall be used only to provide general information about traffic circulation and to assist LADOT personnel in traffic management operations and MTA personnel in transit management operations. These video images, data and information shall not be used for any non-transportation related system management purposes, including but not limited to, law enforcement.

1.1.2 LADOT / MTA shall be fully responsible for preventing any unauthorized viewings of these video images and data by their respective personnel.

1.1.3 Caltrans shall retain exclusive control over all CMS and all CCTV cameras. If a selected camera is not in use by Caltrans, LADOT/MTA may request that its orientation may be changed temporarily.

1.1.4 Caltrans will provide one (1) video switch connection and one (1) data link to LADOT, allowing the transmission at a minimum of a 4 image single video feed. LADOT and MTA are responsible for the display of that video image within their respective facilities.

1.1.5 Video images and data shall not be recorded in any manner without the prior approval of Caltrans.

1.1.6 LADOT/ MTA are each responsible for the procurement, maintenance and upgrade of all equipment required for receiving and displaying the video images and data supplied by Caltrans at their individual TMCs.

1.1.7 Caltrans will provide the timely maintenance of Caltrans owned equipment and processes required to transmit these video images and data to LADOT.

SECTION II

2.0 LADOT AGREES:

LADOT will grant Caltrans and MTA access to the subsystems listed below. Access to these subsystems is contingent on the compliance of Caltrans District 7 and MTA with the terms outlined in the operational agreements in the sections that follow.

2.1 Operation

This section describes guidelines and protocols for the viewing of Closed Circuit Television (CCTV) video images, arterial congestion data, traffic signal status and timing data, and special event information originating from LADOT. Caltrans and MTA may be permitted to use the data and view CCTV video images supplied by LADOT under the following conditions:

2.1.1 Video images and data received by Caltrans and MTA shall be used only to provide general information about traffic circulation and to assist Caltrans and MTA personnel in traffic management operations. Video images shall not be used for any non-transportation related system management purposes, including, but not limited to, law enforcement.

2.1.2 Caltrans and MTA shall be fully responsible for any unauthorized use of data and viewings of the video images by their respective personnel.

2.1.3 LADOT shall retain priority control over all of it's CCTV cameras. If a selected camera is not in use by LADOT, Caltrans and MTA may request to changes its orientation temporarily to a preferred position.

2.1.4 LADOT will provide one (1) video switch connection and one (1) data link connection to Caltrans, allowing the transmission of up to 4 video images.

Caltrans is responsible for the display of the LADOT data and video images within its traffic management facility.

2.1.5 MTA shall be permitted to use one (1) video monitor and four (4) data monitors located in the bus dispatch center of MTA's main building located at One Gateway Plaza. Additional monitors must be approved by LADOT.

2.1.6 LADOT video images may not be recorded in any manner without the prior approval of LADOT.

2.1.7 Caltrans and MTA are each responsible for the procurement, maintenance and upgrade of all equipment required for receiving and displaying data, information and the video image supplied by LADOT.

2.1.8 LADOT will provide the timely maintenance of equipment and processes required to transmit data, information and video to Caltrans and MTA.

2.2 COMMUNICATION LINES

LADOT has established direct fiber optic cable links from the ATSAC Center to both Caltrans District 7 ATMS Center and MTA USG Building. LADOT will continue to operate and maintain these fiber optic communication links within the City of Los Angeles' Right–of-Way for the purpose of inter-agency traffic management and operation.

SECTION III

3.0 MTA AGREES:

MTA will grant Caltrans and LADOT access to the data from the MTA's Bus Operations Center and Rail Control Center listed below as data becomes available. Access to the data is contingent on the compliance of Caltrans and LADOT with the terms outlined in the section that follows.

3.1 Near Real-Time Bus and Rail Location and Schedule Data

MTA's Bus Operations Center, through its Transit Database (TDB) file server, and MTA's Rail Control Center will provide the following data to Caltrans and LADOT as they become available:

- Position data at an update frequency of every 5 minutes.
- MTA Operations next bus/rail Arrival time status at time points with an update frequency of every 5 minutes.
- Passenger counts with an update frequency of every 5 minutes.
- Route, stop and schedule data updated as needed.
- MTA transit and Rail event data updated as information changes.

Guidelines and protocols under which MTA will allow access to its schedules are as follows:

3.1.1 MTA equipment location and schedules will be accessed through the RIITS network only.

3.1.2 MTA equipment schedules are subject to change without prior notice.

3.1.3 MTA is providing this information for viewing purposes only. MTA will not be responsible for the misuse of information or any liability that may occur as a result of using published schedule information. Caltrans and LADOT shall be fully responsible for any unauthorized use of data by their respective personnel.

3.1.4 MTA will be responsible for updating location and schedule information when it becomes available.

3.1.5 MTA will be responsible for maintaining equipment and processes required to transmit location and schedule information to the RIITS network.

SECTION IV

4.0 IT IS MUTUALLY AGREED:

4.1 The term of this MOU shall commence on March 15, 2004, and shall continue until any party terminates this MOU at any time upon thirty (30) days prior written notice.

4.2 By accepting this MOU, Caltrans, LADOT, and MTA recognize that it is impractical to make provisions for every contingency that may arise during the term of this MOU. Caltrans, LADOT, and MTA agree in principle that the MOU shall operate with fairness and without detriment to the interest of all parties, and if in the course of the performance of this MOU, an infringement of this principle is anticipated or disclosed, Caltrans, LADOT, and MTA shall promptly meet in good faith and shall determine what actions needs to be taken place to remove the cause or causes of such infringement.

4.3 This MOU shall constitute the inter-agency traffic operation and management agreement among all parties; and such MOU may only be modified by a written amendment duly executed by LADOT, Caltrans and MTA.

4.4 This MOU supersedes the prior operational agreement and understanding reached in the administrative agreement adopted by LADOT and MTA, dated March 25, 2000.

4.5 The covenants and agreements contained herein shall remain binding upon each of the parties and their successors and assigns.

4.6 Neither Caltrans or LADOT nor any officer or employee thereof is responsible for any damages or liability occurring by reason of anything done or omitted to be done by MTA under or in connection with any work authority or

jurisdiction delegated to MTA under this MOU. It is understood and agreed that, pursuant to Government Code Section 895.4, MTA shall fully defend, indemnify and save harmless Caltrans, LADOT and their respective officers and employees from all claims, suits or actions of every name, kind and description brought for or on account of injury (as defined in Government Section 810.8) occurring by reason of anything done or omitted to be done by MTA under or in connection with any work, authority or jurisdiction delegated to MTA under this MOU.

4.7 Neither MTA or LADOT nor any officer or employee thereof is responsible for any damages or liability occurring by reason of anything done or omitted to be done by Caltrans under or in connection with any work authority or jurisdiction delegated to Caltrans under this MOU. It is understood and agreed that, pursuant to Government Code Section 895.4, Caltrans shall fully defend, indemnify and save harmless MTA, LADOT and their respective officers and employees from all claims, suits or actions of every name, kind and description brought for or on account of injury (as defined in Government Section 810.8) occurring by reason of anything done or omitted to be done by Caltrans under or in connection with any work, authority or jurisdiction delegated to Caltrans under this MOU.

4.8 Neither Caltrans or MTA nor any officer or employee thereof is responsible for any damages or liability occurring by reason of anything done or omitted to be done by LADOT under or in connection with any work authority or jurisdiction delegated to LADOT under this MOU. It is understood and agreed that, pursuant to Government Code Section 895.4, LADOT shall fully defend, indemnify and save harmless Caltrans, MTA and their respective officers and employees from all claims, suits or actions of every name, kind and description brought for or on account of injury (as defined in Government Section 810.8) occurring by reason of anything done or omitted to be done by LADOT under or in connection with any work, authority or jurisdiction delegated to LADOT under this MOU.

City of Los Angeles
Department of Transportation

_____
Wayne K. Tanda Date
General Manager

California State Department of
Transportation – District 7

_____
Doug R. Failing Date
District Director

Los Angeles County Metropolitan
Transportation Authority

_____
Roger Snoble Date
Chief Executive Officer

APPROVED AS TO FORM ..... APPROVED AS TO FORM

Rockard Delgadillo, City Attorney
By: Shelly I. Smith

_____
Assistant City Attorney Date
City of Los Angeles

_____
Attorney Date
California State Department of
Transportation

APPROVED AS TO FORM

Lloyd W. Pellman, County Counsel

By: _____
Deputy County Counsel Date

III. Examples of Joint Agreements from San Diego

Cooperative Field-Device Sharing Plan

Background

The San Diego Mission Valley Advanced Traveler Information System / Advanced Transportation Management System (San Diego Mission Valley ATMIS) is a Southern California ITS Priority Corridor Showcase Project. As such, the project has significance not only to the San Diego region, but also to the Southern California ITS Priority Corridor through its intended connection to the Priority Corridor Showcase Network.

The project proposes to deploy an ATMS/ATIS surveillance and control network within the San Diego Mission Valley corridor, giving special attention to inter-modal circulation and parking needs associated with events at San Diego Stadium and to high-density commercial properties throughout Mission Valley. Surveillance and control activity and corresponding transportation information and management response strategies will be managed through integrated workstations located within the City of San Diego Traffic Operations Center (TOC) inter-tied with workstations within the San Diego Regional Transportation Management Center (TMC) at Caltrans' Kearny Mesa site.

It is the intent of the principal operating agencies including the City of San Diego, the San Diego Stadium Event Management Center, and the California Department of Transportation and California Highway Patrol to develop a simplified, though formalized, "Field Device Sharing Plan" for facilitating the overall safety, circulation and travel efficiency of the region's travelers. This Plan and associated Guiding Principles are the subject of this Working Paper.

Guiding Principles

- The San Diego region encourages, supports and promotes intra-agency and interagency cooperation and coordination of traffic monitoring, surveillance, control and traveler information management for advancing traffic safety and efficiency in all aspects of the regions traveler needs and desires.
- Interagency sharing of relevant field traffic surveillance and traffic management devices for the purpose of enhancing traffic safety and traffic circulation efficiency is a desirable regional ITS Program objective.
- A simplified "Field Device Sharing Plan" will establish basic device sharing and control parameters through a tiered device control priority protocol which recognizes the primary owner/operator of the device and which reinforces the traveler safety and convenience objectives of the region's ITS Program.
- General and specific guidelines for sharing and control of field devices should be simplified and to every extent possible, consensus-based / non-punitive in order to promote optimum interagency cooperation and participation.

COMMITMENT

This Mission Valley ATIS/ATMS Device-Sharing Plan is developed and formulated for the purpose of promoting mutual-benefit, public-agency cooperation and collaboration in promoting travel safety and efficiency through the use of available traffic and transportation management techniques, programs and relevant field devices.

It is underscored that notwithstanding this ETMOP, emergency responses to roadway incidents or to non-traffic emergencies will be assumed and managed by authorized lead agencies and will take priority over specified event traffic management plans.

FORWARD

Whereas, the City of San Diego is pursuing development of the Mission Valley Advanced Traveler Information System (ATIS) and Advanced Transportation Management System (ATMS), and,

Whereas, Caltrans, is the owner/operator of the region's freeway system and as the operator of the regional Transportation Management Center (TMC), and

Whereas, the Mission Valley ATIS/ATMS is intended to deploy a traveler information and traffic management system through the Mission Valley corridor, including adjacent freeways, and,

Whereas, the City of San Diego is the lead agency in the development of the Mission Valley ATIS/ATMS which proposes deployment ATIS/ATMS with connections through the regional TMS to the Southern California Priority Corridor and Showcase Network and development consistent with Showcase standards, and,

Whereas, the Mission Valley ATIS/ATMS will provide for shared use of Closed Circuit Television (CCTV) and Changeable Message Sign (CMS) field equipment for enhancing the transportation management capability within and on approaches to the Mission Valley corridor, and,

Whereas, the Mission Valley ATIS/ATMS provides a base framework for future enhancements and increased regional participation,

Whereas, the City of San Diego and Caltrans desire to cooperate, through direct participation in the Mission Valley ATIS/ATMS and through this mutual-benefit approach in enhancing the travel safety, efficiency, and economy of all travelers in the Mission Valley corridor, and,

Whereas, the City of San Diego, in consultation with its ATIS/ATMS system integrator consultant under contract for designing, testing, and deploying the Mission Valley ATIS/ATMS, intends to deploy Phase II of the Mission Valley ATIS/ATMS during the 4th Quarter 2001, and,

Whereas, the City of San Diego and Caltrans, each has full authority to enter into this mutual agreement,

Now Therefore Be It Resolved, that it is mutually understood and agreed by parties participating hereto as follows:

ARTICLE 1, GENERAL GUIDELINES

1.1 The City of San Diego and Caltrans shall retain primary control of their respective agency-owned field devices and their associated control systems.

1.2 The City of San Diego and Caltrans will authorize secondary control of appropriate field devices by the sharing agency for coordinated transportation management purposes within certain specified guidelines.

1.3 Access, monitoring and control authorization to the secondary control agency shall be at the complete discretion of the owner / operator agency.

1.4 Caltrans and the City of San Diego are responsible for maintenance of their respective field devices and supporting system components deployed as part of the regional ATIS/ATMS.

ARTICLE 2, CHANGEABLE MESSAGE SIGNS (CMS) GUIDELINES

City of San Diego CMS – Guidelines for Caltrans Use

2.1 Messages on City of San Diego CMS, authorized for activation by Caltrans, will be pre-programmed by the City of San Diego.

2.2 Once approved and pre-programmed, messages on City of San Diego CMSs may be activated by Caltrans through the specified secondary control protocols without additional authorization from the City of San Diego prior to activation.

2.3 Changes to pre-programmed messages may be requested by Caltrans, although acceptance and integration of new or modified messages remains the sole discretion of the City of San Diego.

2.4 Caltrans will program free-format messages on City of San Diego CMS units.

Caltrans CMS – Guidelines for City of San Diego Use

2.5 Messages on Caltrans CMS, authorized for activation by the City of San Diego will be pre-programmed by Caltrans.

2.6 Once approved and pre-programmed, messages on Caltrans CMS may be activated by the City of San Diego through the specified secondary control protocols without additional authorization from Caltrans at the time of activation.

2.7 Changes to pre-programmed messages may be requested by the City of San Diego although acceptance and integration of new or modified messages remains the sole discretion of Caltrans.

2.8 City of San Diego will not program free-format messages on Caltrans CMS units.

The following simplified procedure for activation of any CMS by a secondary control agency will be observed. Caltrans will assume responsibility for establishing remote activation and monitoring procedures and for otherwise assisting CMS operation and message-display parameters.

- The City of San Diego and/or the San Diego Event Management Center (EMC) will advise designated Caltrans representative of impending / scheduled events and of their anticipated desire to assume secondary control of specified or pre-designated CMS locations.
- Caltrans will verify a remote control strategy and will program appropriate times for shifting control of appropriate CMS signs to the City and/or EMC.
- During the remote control period, pre-programmed messages may be activated by the City and/or EMC without further specific Caltrans approval.
- Upon conclusion of the secondary control period, the secondary control agency will verify the successful completion of pre-programmed return of field-device control to Caltrans.

ARTICLE 3, HIGHWAY ADVISORY RADIO (HAR) POLICY GUIDELINES

The City of San Diego, is the owner/operator of the Stadium-based Highway Advisory Radio (HAR) system, and, as FCC licensee, will maintain primary management of its operation.

3.1 Messages on City of San Diego HAR, requested for activation by the Stadium EMC or Caltrans, will be pre-programmed by the City of San Diego.

3.2 Once approved and pre-programmed, HAR messages may be activated by Caltrans or EMC through the specified secondary control protocols without additional authorization from the City of San Diego at time of activation.

3.3 Changes to pre-programmed messages or additional new messages may be requested by Caltrans or EMC. Acceptance and integration of new or modified messages remains the sole discretion of the City of San Diego.

3.4 Caltrans and EMC will not program free-format messages on City of San Diego HAR system.

ARTICLE 4, CLOSED CIRCUIT TELEVISION (CCTV) GUIDELINES

San Diego CCTV – Guidelines for Caltrans Use

4.1 The City of San Diego will share video and Pan/Tilt/Zoom (PTZ) control of designated field CCTV cameras with Caltrans.

4.2 The City of San Diego will retain primary control capability for all City of San Diego CCTV sites. Caltrans will be provided secondary control.

4.3 Caltrans shall adhere to the City of San Diego's policies for PTZ control.

4.4 Caltrans shall not record City of San Diego video.

4.5 Caltrans will not retransmit or share City of San Diego video with any external users.

Caltrans CCTV – Policies for City of San Diego Use

4.6 Caltrans will share video and PTZ control of designated field CCTV cameras with the City of San Diego.

4.7 Caltrans will retain primary control capability for all Caltrans CCTV sites. The City of San Diego will be provided secondary control.

4.8 All sharing agencies with PTZ control capability shall adhere to the Caltrans policies for PTZ control.

4.9 The City of San Diego shall not record Caltrans video.

4.10 The City of San Diego will not retransmit or share Caltrans video with any external users.

Draft Endorsement Request Letter

A Draft Endorsement Request Letter is designed for use by the City of San Diego and would serve as the vehicle for initiating the cooperative Device Sharing Plan demonstration. The letter proposes that the demonstration DSP will be refined as the Mission Valley event management experience unfolds.

APPENDIX E

ADDITIONAL STANDARDS INFORMATION
(Sample)

First eight flows only are shown at this time. A total of approximately 37 pages will be printed at final version.

Flow: **alert notification**

Source:	CHP Dispatch Center	*Destination:*	goventura.org	
AASHTO/ITE/NEMA		NTCIP Center-to-Center Standards Group		(See Footnote)
Source:	CHP Dispatch Center	*Destination:*	Remote TMC-CHP	
AASHTO/ITE/NEMA		NTCIP Center-to-Center Standards Group		(See Footnote)

Flow: **alert status**

Source:	goventura.org	*Destination:*	CHP Dispatch Center	
AASHTO/ITE/NEMA		NTCIP Center-to-Center Standards Group		(See Footnote)
Source:	Remote TMC-CHP	*Destination:*	CHP Dispatch Center	
AASHTO/ITE/NEMA		NTCIP Center-to-Center Standards Group		(See Footnote)

Flow: **bad tag list**

Source:	Moorpark Transit	*Destination:*	Moorpark Transit Vehicles	
AASHTO/ITE/NEMA		TCIP - Fare Collection (FC) Business Area Standard		NTCIP 1408
Source:	NextBus	*Destination:*	Camarillo Area Transit Vehicles	
AASHTO/ITE/NEMA		TCIP - Fare Collection (FC) Business Area Standard		NTCIP 1408
Source:	NextBus	*Destination:*	Harbor Beaches Transit Vehicles	
AASHTO/ITE/NEMA		TCIP - Fare Collection (FC) Business Area Standard		NTCIP 1408
Source:	NextBus	*Destination:*	Moorpark Transit Vehicles	
AASHTO/ITE/NEMA		TCIP - Fare Collection (FC) Business Area Standard		NTCIP 1408
Source:	NextBus	*Destination:*	Ojai Trolley Vehicles	
AASHTO/ITE/NEMA		TCIP - Fare Collection (FC) Business Area Standard		NTCIP 1408
Source:	NextBus	*Destination:*	Simi Valley Transit Vehicles	
AASHTO/ITE/NEMA		TCIP - Fare Collection (FC) Business Area Standard		NTCIP 1408
Source:	NextBus	*Destination:*	Thousand Oaks Transit Vehicles	
AASHTO/ITE/NEMA		TCIP - Fare Collection (FC) Business Area Standard		NTCIP 1408
Source:	Smart Card	*Destination:*	Camarillo Area Transit Vehicles	
AASHTO/ITE/NEMA		TCIP - Fare Collection (FC) Business Area Standard		NTCIP 1408
Source:	Smart Card	*Destination:*	Campus Circulator CSUCI Vehicles	

AASHTO/ITE/NEMA	TCIP - Fare Collection (FC) Business Area Standard	NTCIP 1408
Source: Smart Card	*Destination:*	Harbor Beaches Transit Vehicles
AASHTO/ITE/NEMA	TCIP - Fare Collection (FC) Business Area Standard	NTCIP 1408
Source: Smart Card	*Destination:*	Moorpark Transit Vehicles
AASHTO/ITE/NEMA	TCIP - Fare Collection (FC) Business Area Standard	NTCIP 1408
Source: Smart Card	*Destination:*	Ojai Trolley Vehicles
AASHTO/ITE/NEMA	TCIP - Fare Collection (FC) Business Area Standard	NTCIP 1408
Source: Smart Card	*Destination:*	SCAT Vehicles
AASHTO/ITE/NEMA	TCIP - Fare Collection (FC) Business Area Standard	NTCIP 1408
Source: Smart Card	*Destination:*	Simi Valley Transit Vehicles
AASHTO/ITE/NEMA	TCIP - Fare Collection (FC) Business Area Standard	NTCIP 1408
Source: Smart Card	*Destination:*	Thousand Oaks Transit Vehicles
AASHTO/ITE/NEMA	TCIP - Fare Collection (FC) Business Area Standard	NTCIP 1408
Source: Smart Card	*Destination:*	VISTA Vehicles
AASHTO/ITE/NEMA	TCIP - Fare Collection (FC) Business Area Standard	NTCIP 1408

Flow: **barrier system control**

Source: Caltrans D7 TMC	*Destination:*	Caltrans Roadside Equipment
AASHTO/ITE/NEMA	NTCIP Center-to-Field Standards Group	(See Footnote)

Flow: **barrier system status**

Source: Caltrans Roadside Equipment	*Destination:*	Caltrans D7 TMC
AASHTO/ITE/NEMA	NTCIP Center-to-Field Standards Group	(See Footnote)

Flow: **broadcast information**

Source: goventura.org	*Destination:*	VCTC Kiosks
AASHTO/ITE/NEMA	NTCIP Center-to-Center Standards Group	(See Footnote)
SAE	Advanced Traveler Information Systems (ATIS) Bandwidth Limited Standards Group	(See Footnote)
SAE	Advanced Traveler Information Systems (ATIS) General Use Standards Group	(See Footnote)
Source: NextBus	*Destination:*	VCTC Kiosks
AASHTO/ITE/NEMA	NTCIP Center-to-Center Standards Group	(See Footnote)
SAE	Advanced Traveler Information Systems (ATIS) Bandwidth	(See Footnote)

Limited Standards Group		
SAE	Advanced Traveler Information Systems (ATIS) General Use	(See Footnote)
Standards Group		

Flow: **demand responsive transit plan**

Source:	Campus Circulator CSUCI	*Destination:*	goventura.org	
AASHTO/ITE/NEMA		NTCIP Center-to-Center Standards Group		(See Footnote)
Source:	Oak Park Dial-A-Ride	*Destination:*	goventura.org	
AASHTO/ITE/NEMA		NTCIP Center-to-Center Standards Group		(See Footnote)
Source:	VISTA	*Destination:*	goventura.org	
AASHTO/ITE/NEMA		NTCIP Center-to-Center Standards Group		(See Footnote)

Flow: **demand responsive transit request**

Source:	goventura.org	*Destination:*	Guaranteed Ride Home	
AASHTO/ITE/NEMA		NTCIP Center-to-Center Standards Group		(See Footnote)
Source:	goventura.org	*Destination:*	Oak Park Dial-A-Ride	
AASHTO/ITE/NEMA		NTCIP Center-to-Center Standards Group		(See Footnote)
Source:	goventura.org	*Destination:*	VISTA	
AASHTO/ITE/NEMA		NTCIP Center-to-Center Standards Group		(See Footnote)

APPENDIX F

ITS INTERCONNECTS

Amtrak Service	goventura.org	Existing	
Amtrak Service	Smart Card	Planned	
Caltrans D7 TMC	Caltrans Maintenance Vehicles	Existing	
Caltrans D7 TMC	Caltrans Roadside Equipment	Existing	
Caltrans D7 TMC	CTNET	Planned	
Caltrans D7 TMC	Remote TMC-CHP	Existing	
Caltrans D7 TMC	Remote TMC-VCTC	Existing	
Camarillo Area Transit	Camarillo Area Transit Vehicles	Existing	
Camarillo Area Transit	goventura.org	Existing	
Camarillo Area Transit	Smart Card	Existing	
Camarillo Area Transit Vehicles		NextBus	
Existing			
Camarillo Area Transit Vehicles		Smart	Card
Existing			
Campus Circulator CSUCI	Campus Circulator CSUCI Vehicles	Existing	
Campus Circulator CSUCI	goventura.org	Existing	
Campus Circulator CSUCI	Smart Card	Existing	
Campus Circulator CSUCI Vehicles		NextBus	
Existing			
Campus Circulator CSUCI Vehicles		Smart	Card
Existing			
CHP Dispatch Center	CHP Vehicles	Existing	
CHP Dispatch Center	goventura.org	Existing	
CHP Dispatch Center	Remote TMC-CHP	Existing	
goventura.org	Guaranteed Ride Home	Existing	
goventura.org	Harbor Beaches Transit	Existing	
goventura.org	MetroLink Service	Existing	
goventura.org	Moorpark Transit	Existing	
goventura.org	NextBus	Existing	
goventura.org	Oak Park Dial-A-Ride	Existing	
goventura.org	Ojai Trolley	Existing	
goventura.org	Remote TMC-VCTC	Existing	
goventura.org	SCAT	Existing	
goventura.org	Simi Valley Transit	Existing	
goventura.org	Smart Card	Existing	

goventura.org	Thousand Oaks Transit	Existing
goventura.org	VCTC Kiosks	Existing
goventura.org	VISTA	Existing
Guaranteed Ride Home	Guaranteed Ride Home Vehicles	Existing
Harbor Beaches Transit	Harbor Beaches Transit Vehicles	Existing
Harbor Beaches Transit	Smart Card	Existing
Harbor Beaches Transit Vehicles		NextBus Existing
Harbor Beaches Transit Vehicles		Smart Card Existing
MetroLink Service	Smart Card	Planned
Moorpark Transit	Moorpark Transit Vehicles	Existing
Moorpark Transit	Smart Card	Existing
Moorpark Transit Vehicles	NextBus	Existing
Moorpark Transit Vehicles	Smart Card	Planned
NextBus	Ojai Trolley Vehicles	Existing
NextBus	SCAT Vehicles	Existing
NextBus	Simi Valley Transit Vehicles	Existing
NextBus	Thousand Oaks Transit Vehicles	Existing
NextBus	VCTC Kiosks	Existing
NextBus	VISTA Vehicles	Existing
Oak Park Dial-A-Ride	Oak Park Dial-A-Ride Vehicles	Existing
Ojai Trolley	Ojai Trolley Vehicles	Existing
Ojai Trolley	SCAT	Existing
Ojai Trolley	Smart Card	Existing
Ojai Trolley Vehicles	Smart Card	Existing
SCAT	SCAT Vehicles	Existing
SCAT	Smart Card	Existing
SCAT Vehicles	Smart Card	Existing
Simi Valley Transit	Simi Valley Transit Vehicles	Existing
Simi Valley Transit	Smart Card	Existing
Simi Valley Transit Vehicles	Smart Card	Existing
Smart Card	Thousand Oaks Transit	Existing
Smart Card	Thousand Oaks Transit Vehicles	Existing
Smart Card	VISTA	Existing

Smart Card	VISTA Vehicles	Existing
Thousand Oaks Transit	Thousand Oaks Transit Vehicles	Existing
VISTA	VISTA Vehicles	Existing

APPENDIX G

ITS INTERCONNECT DIAGRAMS

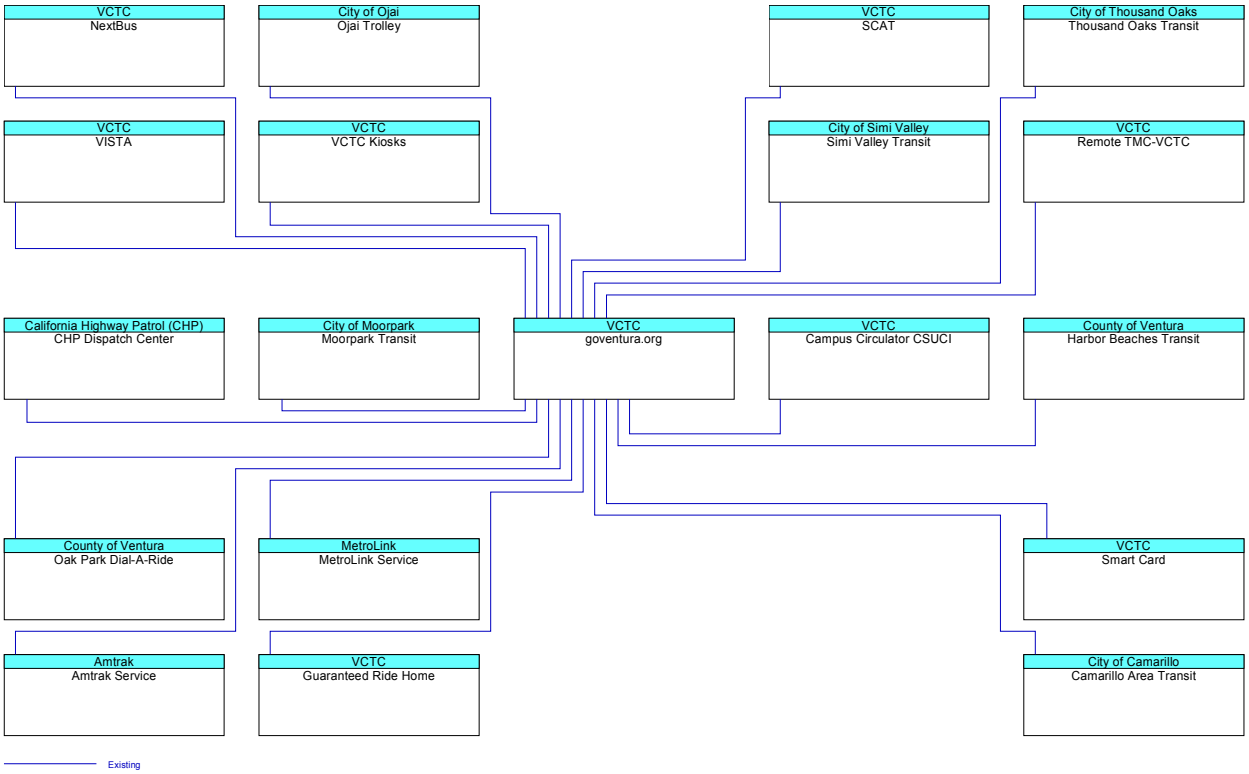

Figure G-1: (WWW.GOVENTURA.ORG) Traveler Information Interconnect

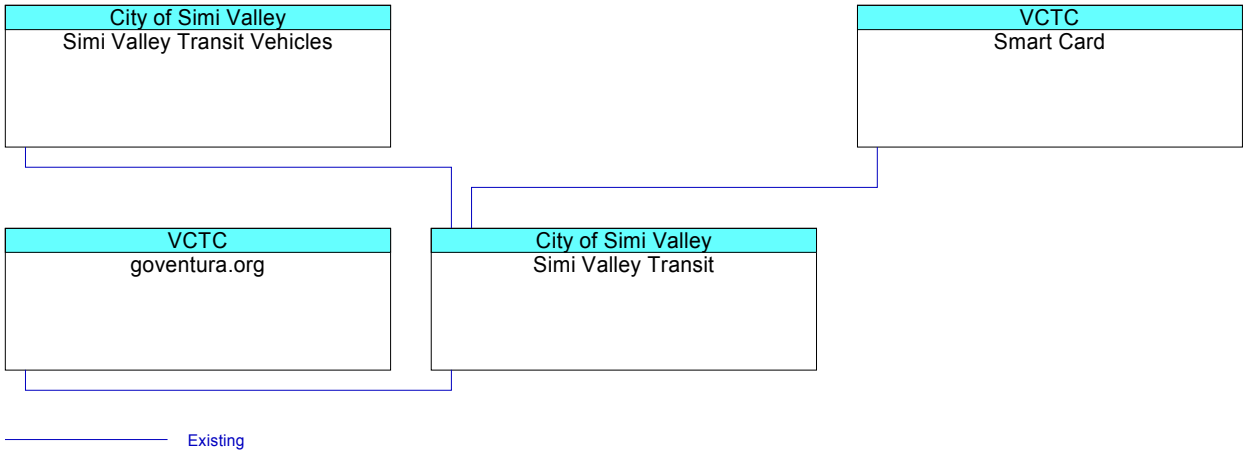

Figure G-2: Simi Valley Transit Interconnect

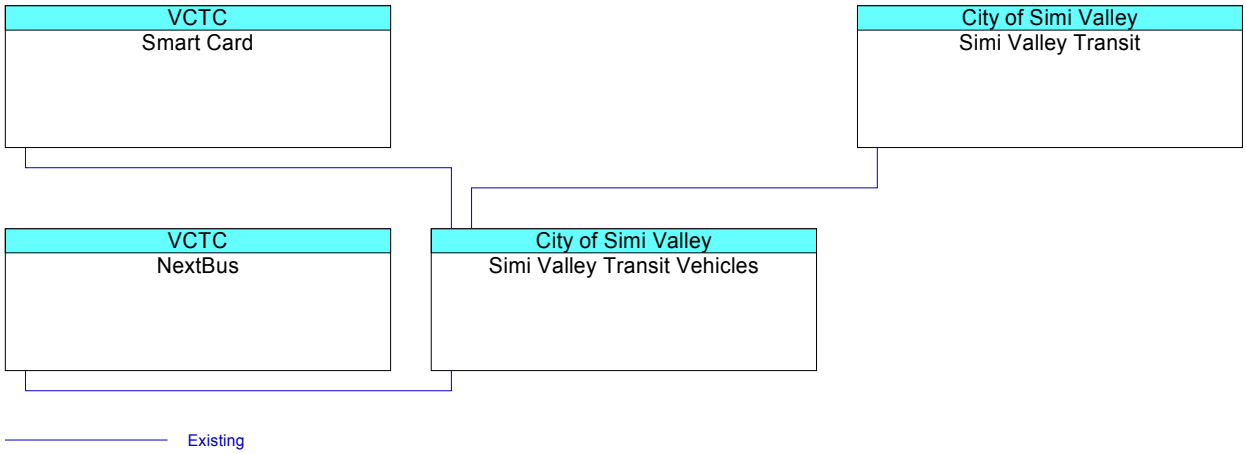

Figure G-3: Simi Valley Transit Vehicles Interconnect

APPENDIX H

ITS DATA FLOWS

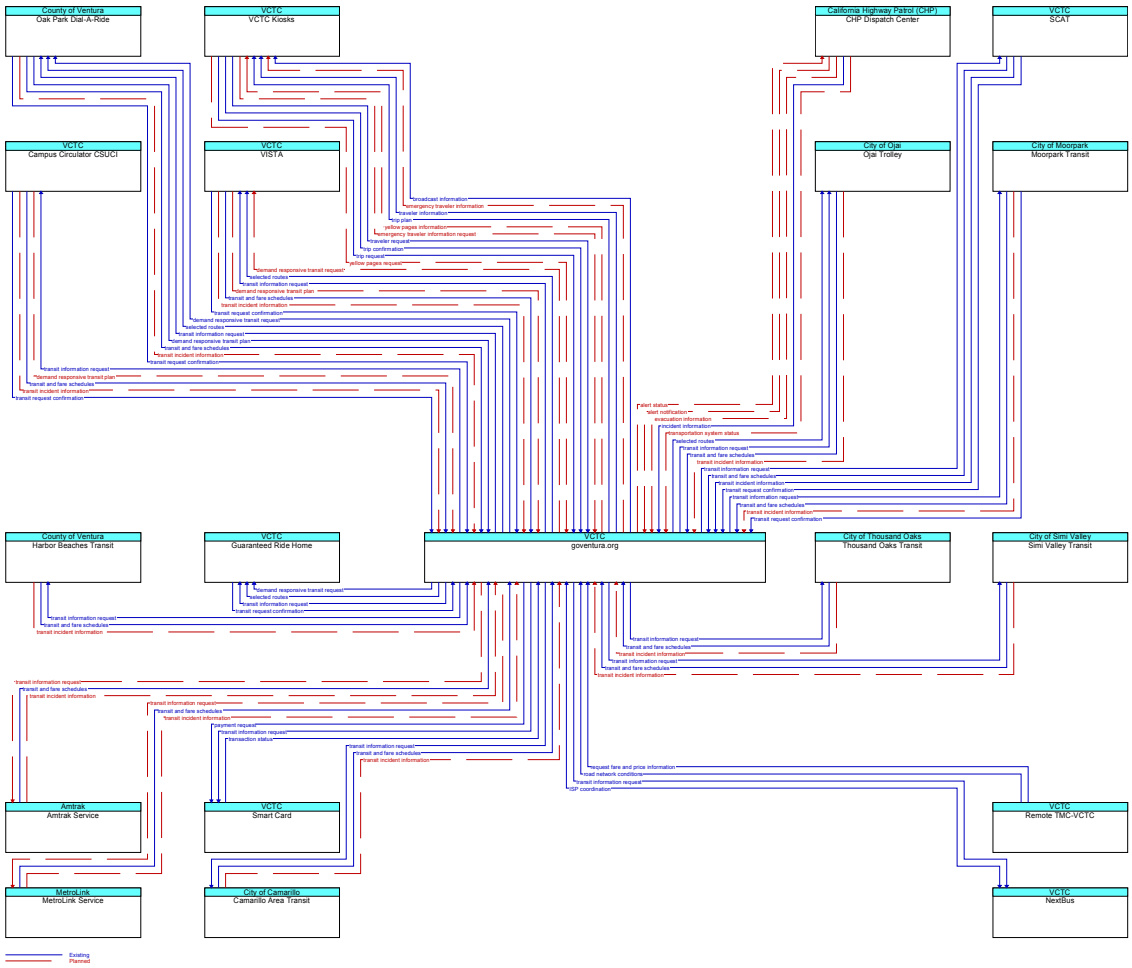

Figure H-1: (WWW.GOVENTURA.ORG) Traveler Information Data Flows

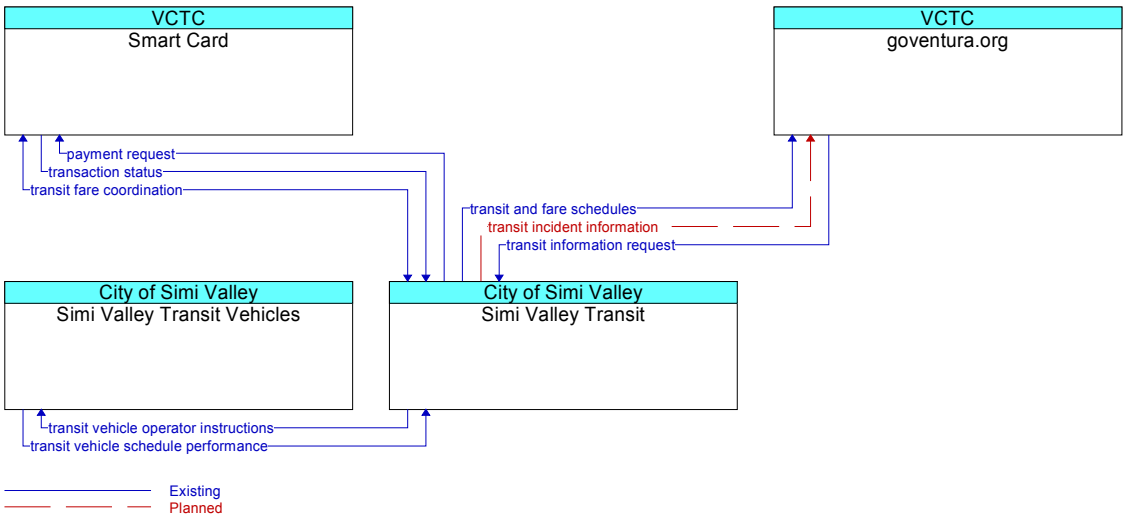

Figure H-2: Simi Valley Transit Data Flows

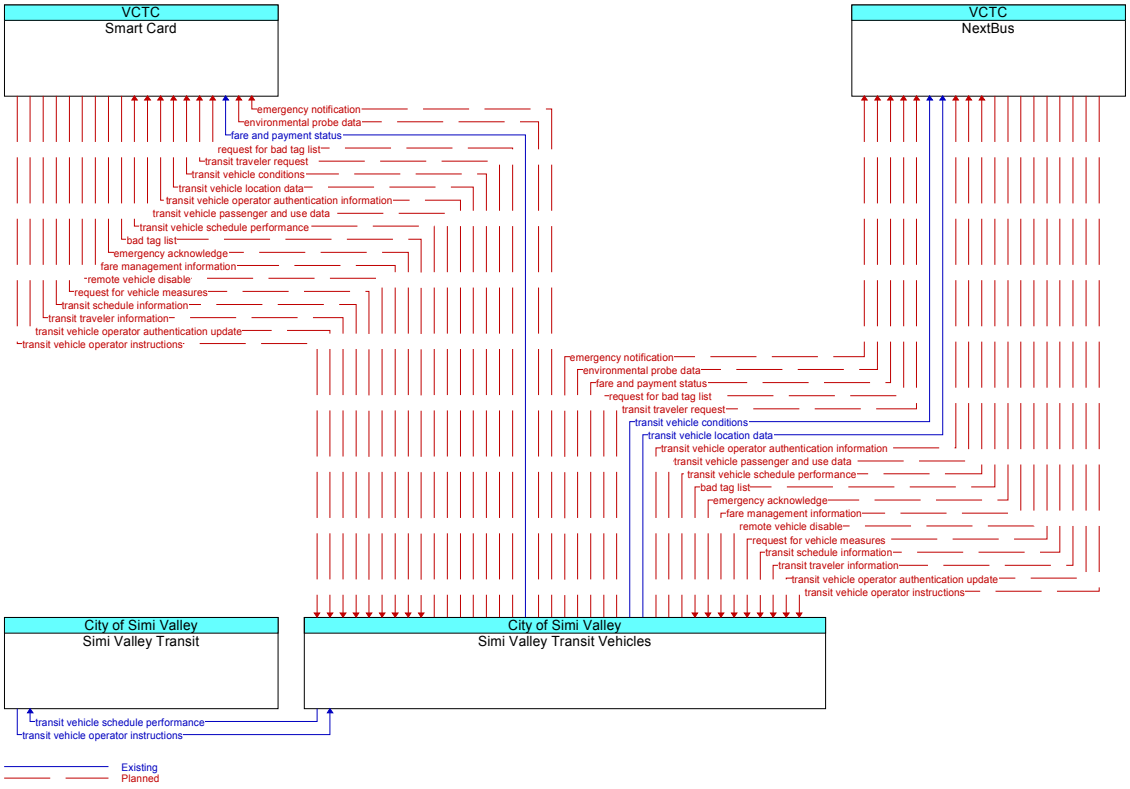

Figure H-3: Simi Valley Transit Vehicles Data Flows

APPENDIX I

STAKEHOLDER MEETING MINUTES

Southern California Regional ITS Architecture

Ventura County Transportation Commission Meeting

October 5th, 2004

10:00 AM – 12:00 PM

MEETING MINUTES

LOCATION: VCTC 950 County Square Drive, Suite 207, Ventura CA 93003.

ATTENDEES:

Name	Agency	Email	Phone
Ginger Gherardi	**VCTC**	**ggherardi@goventura.org**	**(805) 642-1591**
Steve DeGeorge	**VCTC**	**sdegeorge@goventura.org**	**(805) 642-1591**
Bob Huddy	**SCAG**	**huddy@scag.ca.gov**	**(213) 236-1972**
Queenie Ye	**NET**	**qye@nateng.com**	**(714) 562-5725**
Jackie Golob	**NET**	**jgolob@nateng.com**	**(714) 562-5725**

OBJECTIVE:

The purpose of this meeting is to collect the county's ITS inventory data and discuss with the VCTC about how the county level ITS Architecture should be built. The meeting also called for the Ventura County's involvement in the SCAG level ITS architecture development.

MEETING NOTES:

- Welcomes
- The ITS inventory data that was readily provided include the ITS Planning Report in both Word and Pdf format, and the County Congestion Management Plan (CMP). These files contains detailed ITS system inventory, operation and function descriptions, and planning projects.
- Since VCTC's document almost covered the entire scope required to build ITS architecture, it was agreed that the Ventura County ITS Architecture would be built by converting these data into the required format and Turbo. VCTC will review the architecture document after NET adopts these data into the required format.
- As to the local stakeholder outreach required by FHWA and The Rule, VCTC preferred to follow the minimum requirements based on local condition and needs. VCTC will conduct the outreach and NET will document this effort. VCTC is willing to attend the training of system engineering and constantly ensure that all the local public work agencies work in a coordinated manner in order to satisfy the Federal earmark funding requirements.
- VCTC indicated that Ventura has built a leading ITS system which is comprehensive, effective, and financially successful despite less than best state investment and involvement opportunities. There is a potential 0.5% sales tax raise dedicated to transportation in Ventura.
- VCTC explained that the Hueneme Port, with fruit and oil product as its primary cargo type, doesn't use much advanced technologies. It doesn't have security cameras.
- VCTC offered to contact local agencies to update the signal system document.
- Ventura already has an advanced ITS system on transit. The next step could be the voice recognition, which is not ready to be installed now.
- The smart cards are tested in the campus (?). Although with some financial issue not solved yet, the smart cards system is ready to be added in to architecture. Social services also use the smart cards and attempt to put welcome benefit information in the cards. Ventura uses a variety of ways to sell the smart cards.
- The latest highway project is the installation of surveillance cameras on SR 126. The project will benefit the entire community especially the less financially privileged. Almost $10 millions could be saved in this project with free access to the county's wireless network.

- Currently, there are not many formal agreements among agencies in Ventura other than handshake agreements. Formal agreements template will still be provided in the Architecture document. However, the document will also indicate that the informal type of agreements is prevalent and effective in this area.
- NET explained how the county level ITS architecture would be incorporated into the regional level ITS architecture. As to inter-regional communications, Ventura might need to translate the data flow in common data format to agree with other counties in case of differences.
- VCTC will attend meeting on the SCAG level ITS Architecture development, and will be available on Tuesdays.

Minutes Prepared by:

NATIONAL ENGINEERING TECHNOLOGY CORPORATION

Queenie Ye

cc: Attendees

Southern California Regional ITS Architecture

Meeting Topic: **Ventura County Regional ITS Architecture Emergency Management Meeting**

Date: February 1, 2005

Time: 1:30PM - 3:30PM

Place: Ventura County Sheriff's Department

Attendees:

NAME	AGENCY	TELEPHONE	E-MAIL
Dale Carnathan	Office of Emergency Services	805 654-5152	Dale.carnathan@mail.co.ventura.ca.us
Mark Layhew	Simi Valley P.D.		
Steve DeGeorge	VCTC	805 642-1591 ex 103	adegeorge@goventura.org
Jackie Golob	NET	(714) 562-5725	jgolob@nateng.com

Agenda: The meeting was used to inform the Ventura County office of Emergency Services about the Ventura County Regional ITS Architecture project, to gather information about emergency management in Ventura County, review any mutual needs and comment upon future projects.

Minutes:

The following items were discussed at the meeting:

- Steve DeGeorge and Jackie Golob outlined the architecture exercise and explained the federal thinking behind the project, which is to encourage the sharing of data and resources. To aid the discussion Steve took the recent example of an EM request to SCAT for vehicles in the context of La Conchita and some of the weather related issues. VCTC VISTA vehicles had been available in the area and could have been utilized if agreements had been in place.
- Dale explained that there are many things that have to be taken into account when considering interoperable resources:

- Knowledge of the resource e.g. how many vehicles of what type, wheel chair lift equipped or not, contract operation or not, availability, location, full of gas, availability for what duration, who pays.
- A prior agreement exists with SCAT because their employees are technically part of a government agency and therefore considered to be part of the available emergency resources.
- Steve responded that VCTC has all of that information available including the exact location of the vehicles and could be utilized as a resource in the future with appropriate discussion and agreement in place.

- Dale was asked to explain the organization of the many relationships within the county. Under the Statewide Incident Management System (SIMS) Ventura is required to have an operational area. This includes the County and all of the cities, political sub-divisions and special districts including 125 water districts. The Sheriff's office is the coordinator for the operational area at the operational level. The Office of Emergency Services has a full-time staff of four and falls under the Ventura County Sheriff's department. There are a combination of several different types of mutual aid systems e.g. fire services and law enforcement. When a major incident or emergency occurs OES will decide who needs to be at the table depending on the type of incident e.g. CHP, Caltrans, County Facilities Maintenance, Red Cross, Edison, Gas Company etc.
- The discussion moved to radio systems. Most of the countywide responders have all purchased the same radio program with 12 channels available of which four are available for common communication purposes. This was a countywide policy agreed a while ago. CHP however has a different system. As a rule transit radio systems have too few channels to be able to be included in such an interoperable service. There is a project underway with the LA County Sheriff's Department that will enable Ventura Sheriff's vehicles in pursuit that takes them into LA County to link through the two different dispatch systems.
- The group discussed some of the mutual needs that had been identified. On information for the public Dale explained that for the recent weather events OES had set up a special web site www.vcsd.org with a link to all of the emergency service information. Had VCTC staff have known of this they could have put up a link on their own site. If in the future VCTC information were to be provided to OES when dealing with an emergency the appropriate channel would be for VCTC to be linked to "Logistics" one of the four response sectors (the others being Operations, Planning and Finance)
- Dale commented further on the wider dissemination of information the National Weather Service is one means of communicating with the public provided that they have the weather radios. For amber alerts there is also an elaborate network of

communications media in place that could perhaps also be used for the rapid dissemination of other incident and emergency information.

- The meeting concluded with the discussion of initiating discussion within VCTC on VCTC staff representation at the EOC e.g. in cases of mass evacuations. VCTC staff to also give further consideration to the information that they have that could support emergency management responses.

Distribution: Meeting Attendees

APPENDIX J

STAKEHOLDER CONTACT LIST

Name	Agency	Phone (805)	Email
Bert Rapp	City of Fillmore	524-1500 x231	brapp@ci.fillmore.ca.us
Glenn Hawks	City of Ojai	640-2560	hawks@ci.ojai.ca.us
Mike Mathews	City of Moorpark	529-6864 x253	mmathews@ci.moorpark.ca.us
Lou Balderrama	City of Oxnard		lou.balderrama@ci.oxnard.ca.us
Martin erickson	City of Oxnard		martin.erickson@ci.oxnard.ca.us
Kit Neil	City of Port Hueneme	986-6500	kneil@ci.port-hueneme.ca.us
Chic Dabbs	City of Simi Valley	583-6809	cdabbs@simivalley.org
John Heliwell	City of Thousand Oaks	449-2412	jhelliwell@toaks.org
Rick Raives	City of Ventura	654-7870	rraives@ci.ventura.ca.us
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