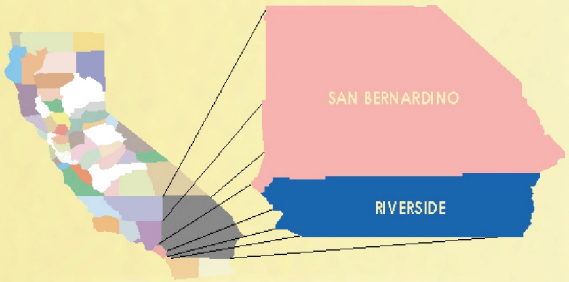

Inland Empire Regional Intelligent Transportation System (ITS) Architecture Project

Chapter 1: Draft Inventory Report

Submitted by:

ITERIS™

J99-0495

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Contained in this Report…

Each of the written deliverables for the Inland Empire Regional Intelligent Transportation Systems (ITS) Architecture Project will be introduced to the project stakeholders as an individual Chapter of the overall project documentation set. This Report is the first Chapter in what will ultimately be one comprehensive document concerning the ITS Architecture development as well as other associated activities. After receiving stakeholder comments on each Chapter, a disposition of comments will be released detailing the individual comments and how they will be dealt with in modifying the Chapter under review. The individual Chapters (revised based on stakeholder comments) will be re-issued as one document in the Final Report.

Following is a summary listing of the Chapters that will, in total, make up the complete documentation set for the Inland Empire Regional ITS Architecture Project. The Chapters that are either complete or "currently under review by the stakeholder group" are indicated in bold type.

- **Chapter 1: Inventory Report**
- Chapter 2: ITS User Needs, ITS Services and Operational Concepts
- Chapter 3: Functional Requirements Define and Interface Definitions
- Chapter 4: Project Sequencing
- Chapter 5: List of Agency Agreements
- Chapter 6: ITS Architecture Maintenance Plan
- FINAL REPORT

This Report contains the following sections.

Section 1.1: Introduction
Provides a brief introduction and background to the project and the project tasks.

Section 1.2: Regional Boundaries
Describes the geography and features of the project area.

Section 1.3: Methodology
Describes the approach and steps taken by the Project Advisory Committee (PAC) and the project consultant to collect and assemble a complete ITS inventory for the Inland Empire.

Section 1.4: Inland Empire ITS Inventory
Describes the current inventory of ITS in the Inland Empire.

Section 1.5: Next Steps
Provides a discussion of what was accomplished in this Report, and how the subject material contained in this Report will flow into subsequent project activities and deliverables. This section will also outline the next steps in the project.

1.0 ITS INVENTORY

1.1 Introduction

1.1.1 Project Background

The Inland Empire* Intelligent Transportation Systems (ITS) Strategic Plan, developed in 1998, was a joint effort of the local transportation agencies to develop an approach for integration of regional ITS opportunities and projects. Since the development of this Plan, the Federal Highway Administration (FHWA) published a Rule (National ITS Architecture and Standards) and the Federal Transit Agency (FTA) published a companion Policy to implement Section 5206(e) of the Transportation Equity Act for the 21st Century (TEA-21). This Rule/Policy seeks to foster regional integration by requiring that all ITS projects funded from the Highway Trust Fund be in conformance with the National ITS Architecture and appropriate standards. "Conformance" is defined as using the National ITS Architecture to develop a regional ITS architecture tailored to address the local situation and ITS investment needs, and the subsequent adherence of ITS projects to the regional ITS architecture. The Inland Empire ITS Strategic Plan preceded the Rule/Policy and is, therefore, in need of modifications in order for the region to continue on a path to conformance.

1.1.2 Stakeholder Participation

The participation of local stakeholders is critical to the development of the Inland Empire ITS Architecture and the accompanying documentation. Their input was specifically requested to develop the ITS inventory contained in this Report. They have also been asked to contribute to the project through participation at a series of project workshops in which additional stakeholder input will be gathered. **Appendix A** is a listing of the Project Stakeholder Agencies. This list will be updated and modified periodically throughout the life of this project.

1.2 Regional Boundaries

The regional boundaries used for this project are contiguous with Riverside and San Bernardino Counties within the state of California. This geographic arrangement is typically referred to as the Inland Empire in Southern California. It also coincides with the geographic boundaries of the District 8 region of the California Department of Transportation (Caltrans).

The Inland Empire is a very large and geographically diverse region. Generally speaking, the western portion of both counties is the most populous and urbanized area of the Inland Empire Region. Some of the cities in this area include: Riverside, San Bernardino, Fontana, Temecula and Corona. The San Bernardino and San Jacinto Mountains separate the western portions of the region from the desert areas. Within the mountains themselves are located a handful of small to medium sized communities such as the Big Bear Lake, Lake Arrowhead, and Idyllwild. The areas north and east of the San Bernardino Mountains are commonly referred to as the high desert. Some of the high desert cities include:

* The Inland Empire is the moniker for the Counties of Riverside and San Bernardino in California.

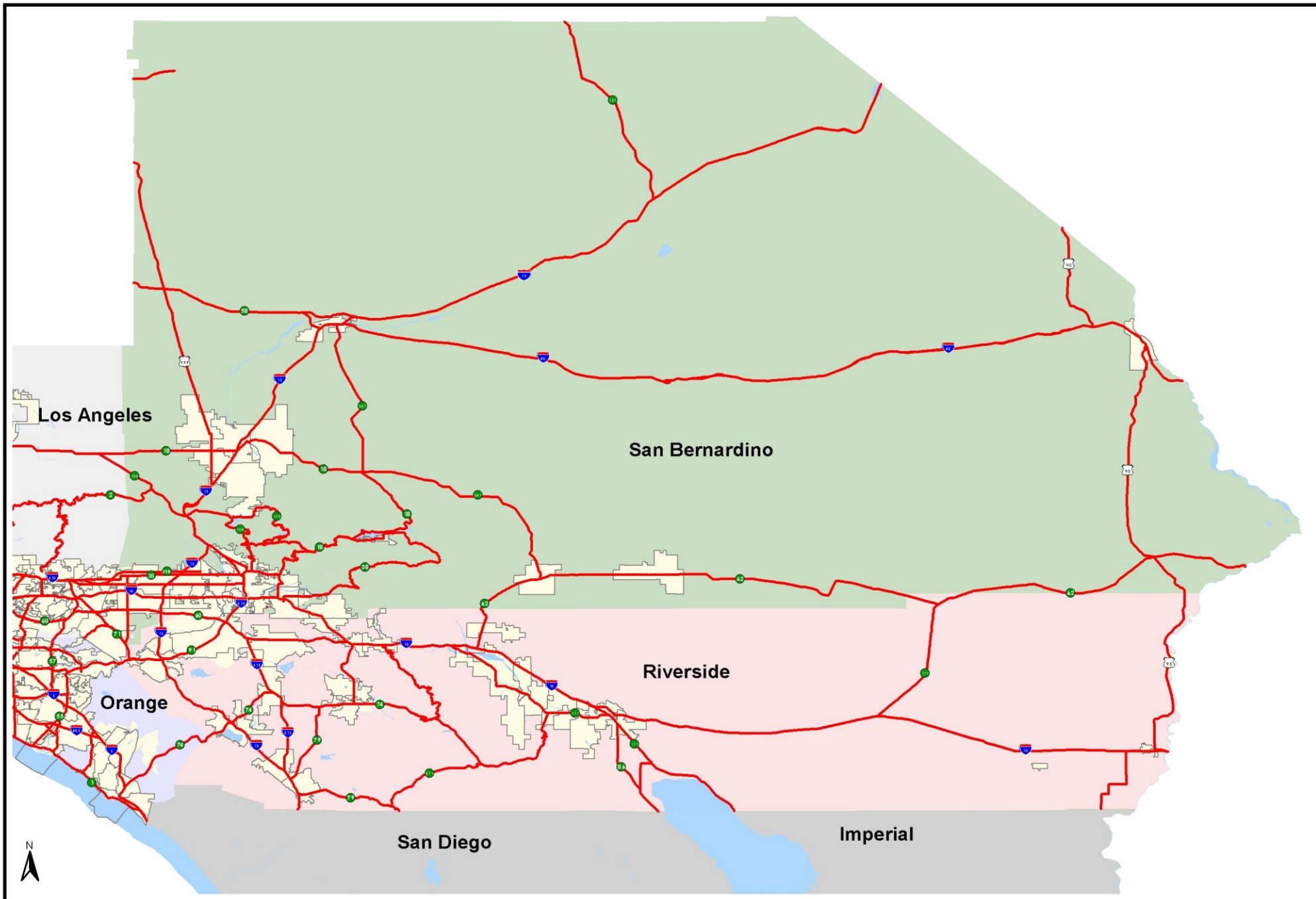
Victorville, Barstow and Hesperia, and the Morongo Basin communities of Yucca Valley and Twentynine Palms. East of the San Jacinto Mountains is the low desert area known as the Coachella Valley. Some of the cities in the Coachella Valley include: Palm Springs, Cathedral City, Palm Desert, Indio and Coachella. In the extreme eastern portion of the Region, on the California/Arizona border, there are two incorporated cities, Needles and Blythe. Much of the rest of the region north and east of Barstow and between the Coachella Valley and the Needles/Blythe area is characterized by vast rural desert and mountain geography. **Figure 1.2-1** shows the entire study area. Additional, and more detailed maps of the region are shown in Section 1.4 – Inland Empire ITS Architecture.

1.3 Methodology

The methodology used to compile an ITS inventory for the Inland Empire consisted of distributing a survey to appropriate stakeholders, making phone calls, conducting a workshop, and reviewing documents that provided information concerning existing ITS elements in the region. A copy of the general survey that was distributed for the inventory activities is provided in **Appendix B** of this report. This general survey was sent to Caltrans, SANBAG, RCTC, and SCAG; whereas, modified versions (created by removing irrelevant portions of the general survey) were sent to the Cities, Counties, and Transit Agencies throughout the Inland Empire. Telephone calls were made approximately one to two weeks after sending out the survey in order to supplement the information obtained from the survey.

The importance of compiling an ITS inventory in developing a Regional ITS Architecture was explained during a workshop conducted for the stakeholders on February 5, 2003. During the course of this workshop another effort was made to solicit ITS inventory information from the stakeholders that attended. Finally, the following documents provided additional information about ITS inventory within the Inland Empire:

- *Intelligent Transportation Systems Strategic Plan for the Inland Empire*, 1998
- *Corridor-wide ATIS and ATMS Inventory, Compliance And Deployment* documents for the Southern California ITS Priority Corridor, dated September 6, 2001
- *San Bernardino Valley Coordinated Traffic Signal System Plan, Final Report*, dated October, 2000



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Inland Empire ITS Architecture Project

Project Study Area

Figure 1.2 - 1

1.4 Inland Empire ITS Inventory

1.4.1 Overview

As defined in the FHWA Rule, and for purposes of this report, an ITS inventory is *a list of ITS elements and the elements that interface with them.* An element is then defined as *the name used by stakeholders to describe an ITS system or piece of a system*. Thus, the focus of this section is on identifying Intelligent Transportation Systems and their related elements, both existing and planned, within the Inland Empire. In association with the ITS inventory, it is important to identify the ITS owners and/or operators, the presence of operation centers, and the connections (communication links and data flows) internally between various system elements and externally to other systems. Identifying technological aspects of the ITS inventory is not necessary; rather, assessing the function and capabilities of the various systems is vital. Furthermore, the total number of various ITS elements (such as signals, CCTV cameras, busses with automatic vehicle locators, etc.) that exist, and the location of all these elements, is not critical with respect to developing an ITS Regional Architecture.

As indicated in Section 1.2, the Inland Empire is a very large, geographically diverse area. Not surprisingly, the extent of ITS within this region is directly related to the level of urbanization that has occurred. The State of California owns and operates some fairly advanced systems and is currently planning upgrades so that the Traffic Management Center in this region will have capabilities similar to those that are found in much larger urban areas, such as in Los Angeles and Orange Counties. Although the State has ITS infrastructure throughout the Inland Empire, a significant majority resides in the urbanized areas of western Riverside and San Bernardino Counties. The metropolitan planning organizations and transportation commissions (SCAG, SANBAG, and RCTC) in the Inland Empire own and/or operate relatively few ITS assets, but they do play, and have played, a significant role in planning and promoting ITS. Likewise, other than operating certain traffic signals and coordinating signal timing with local agencies, Riverside and San Bernardino Counties are not directly operating ITS.

The ITS capabilities of cities varies widely throughout the Inland Empire. Some small cities/towns don't operate traffic signals located in their jurisdiction, such as Big Bear Lake and Adelanto, where all of the traffic signals are operated by the State. On the other hand, the City of Fontana has recently deployed an advanced traffic management system, which includes the ability to operate traffic signals and CCTV cameras, determine traffic counts and speeds, and change signal timing plans based on real-time traffic conditions. A significant number of other cities currently have, or plan to have, the ability to monitor and operate traffic signals from a central location. Corona and Temecula are planning on upgrading their systems so that they have capabilities similar to those in Fontana. As a general rule, many cities within metropolitan areas have plans to coordinate and centrally control their traffic signal systems as part of an on-going congestion and traffic management strategy.

Transit service providers in the Inland Empire are as varied as the geographic areas that they serve. In the Inland Empire Region there are two relatively large operators (Omnitrans and Riverside Transit Agency (RTA)), a medium size operator (SunLine) and a handful of small operators. Omnitrans operates primarily in the San Bernardino Valley area, RTA operates primarily in the western Riverside area and SunLine operates primarily in the Coachella Valley area. Most of the smaller operators are "municipal" operators that operate as a transit department of a city and serve primarily within their own city limits.

The remaining operators are small joint powers agencies made up of a single city and/or the County and operate very much like the municipal operators.

As a general rule, transit management systems have not been considered to be as mature as other forms of traffic management systems. However, this perception is fast changing. With more widespread deployment and increasing interest by transit agencies in deploying technology to better manage field assets, the field is rapidly maturing. Furthermore, many agencies are looking for ways to better integrate traffic systems and transit systems to more effectively and efficiently share information with one another.

The existing intelligent transportation systems within the Inland Empire appear to map to the following National ITS Architecture Subsystem categories:

- **Centers:** Traffic Management, Emergency Management, Transit Management, and Information Service Provider.
- **Roadside:** Roadway, Commercial Vehicle Check
- **Vehicles:** Emergency Vehicles and Transit Vehicles
- **Travelers:** Personal Information Access

More detailed information about regional systems, city systems, and transit systems are provided in the following sections.

1.4.2 Regional Systems

The State of California (i.e. Caltrans and the California Highway Patrol (CHP)) is the primary owner/operator of regional intelligent transportation systems (ITS) within the Inland Empire; however, SANBAG, RCTC, SCAG, San Bernardino County, and Riverside County are also involved with some regional systems. It is worth noting that the Caltrans District 8 region coincides with the two-county, Inland Empire region. Tables 1.4.2-1 and 1.4.2-2 provide a listing of regional systems along with a brief description of the systems.

Table 1.4.2-1: Regional ITS Owned/Operated by Caltrans or CHP

System	Description
Freeway Management Systems • Traffic Management Center (TMC) • Advanced Traffic Management System (ATMS) • Vehicle Detection Systems • Closed Circuit Television (CCTV) Surveillance • Environmental Sensor Stations (also known as road weather information systems (RWIS)) • Changeable Message Signs (CMS) • Highway Advisory Radio (HAR) • Ramp Metering System • High Occupancy Vehicle (HOV) Lanes	Caltrans and CHP jointly operate a TMC located in San Bernardino. With the use of ATMS computer software and hardware, Caltrans receives, and is able to view, real-time traffic data and information from vehicle detection systems (inductive loops and radar detectors) and CCTV systems. In addition, the ATMS provides control of CCTV and CMS field elements. The TMC also receives information from environmental sensors stations located on highways in the mountainous and desert regions. Caltrans provides roadway/traffic advisories using CMS and HAR. Caltrans also manages and operates a ramp metering system and HOV lanes as part of the freeway management system. The vast majority of ITS field elements are located in the urbanized Western Riverside/San Bernardino area; however there are some CMS and environmental sensor stations located in other areas of the Inland Empire.
Arterial Traffic Management • Traffic Signals • Real-Time Traffic Adaptive Control of Ramp-Metering Signals (planned) • Signal Preemption for Emergency Vehicles (planned) • Signal Priority for Transit Vehicles (planned) • Automated Signal Timing Adjustments for highway-rail intersections • Data Shared with other Traffic Management Centers (planned)	Caltrans owns and operates traffic signals throughout the Inland Empire. The majority of traffic signals are coordinated with, and sometimes operated by, local agency traffic signal systems. Some system upgrades are currently planned that will allow real-time adaptive control of ramp-metering signals based on traffic conditions, signal preemption for emergency vehicles, and signal priority for transit vehicles. Traffic signals located near highway-rail intersections are interconnected with active crossing devices so that the signal timing is automatically adjusted to avoid vehicle entrapment. There are currently plans to enable sharing traffic data with City TMCs and other State TMCs, particularly CCTV images, congestion data, and incident or event data.
Emergency Management • CHP CAD System • Incident Response System • Incident Detection System (planned) • Portable Traffic Control • Freeway Service Patrol	CHP operates a computer aided dispatch (CAD) system that facilitates emergency response to incidents on state highways by law enforcement, fire departments, and ambulance operators. CHP also manages the Freeway Service Patrol (administered by SANBAG and RCTC), which assists drivers experiencing problems with their vehicles and clears vehicles from the highway that were involved in an accident. Caltrans can monitor incidents, and the related impact on traffic, with CCTV cameras and vehicle detectors. Based on the nature of the incident, Caltrans can dispatch the Traffic Management Team to provide portable traffic control and monitor the incident in the field as it is being cleared.
Regional Traveler Information	In addition to providing traffic/roadway information to travelers using CMS and HAR, Caltrans and CHP provide information to the media and to the public via an internet web page containing traffic speeds, incident data, planned roadway construction or maintenance, and roadway/weather conditions.

System	Description
Archive Data Systems	The Caltrans ATMS archives vehicle speed and traffic count data that is provided by the vehicle detection system. The CHP CAD system also archives data related to highway incidents and emergency response.
Commercial Vehicle Operations (CVO)	Public sector systems for managing ITS/CVO are typically undertaken at a statewide level. One of the primary CVO/ITS efforts currently underway in California is the deployment of a suite of systems and capabilities that make up the Commercial Vehicle Information Systems & Networks (CVISN). CVISN is a national program administered by the Federal Motor Carrier Safety Administration (FMCSA). CVISN Level 1 focuses on using technology in the areas of Safety Information Exchange, Credentials Administration and Electronic Screening. PrePass is a private company that implements an automated vehicle identification (AVI) technology on trucks and works with weigh-in-motion technologies at weigh stations to verify compliance of credentials and safety regulations. If a commercial vehicle operator is given a "bypass" signal, that vehicle is allowed to bypass the weigh station without stopping. This is seen as a great operating efficiency for most commercial vehicle operators. There are three functioning PrePass sites in the Inland Empire, with others operating in close proximity to the borders of the Inland Empire.

There are plans to build a new Caltrans/CHP Traffic Management Center (TMC) in Fontana within the next three to five years. The new TMC building will be designed to meet seismic standards that will allow the TMC to operate as an emergency operating center in times of emergency. Currently, CHP personnel are split between two centers in San Bernardino, one of those being in the basement of the Caltrans District 8 Building. In addition to housing all of the pertinent CHP and Caltrans personnel at one location, the new TMC will be staffed 24 hours per day, every day of the week, rather than the current hours of 5:00 a.m. to 8:00 p.m., Monday through Friday. The ITS elements located in, or operated from, the new TMC will be consistent with those described in the above table.

Table 1.4.2-2: Regional ITS Owned/Operated by Local Agencies

System	Owner/Operator	Description
Call Box Program	RCTC in Riverside Co. SANBAG in San Bern. Co.	Call boxes are located along freeways throughout the Inland Empire for motorists to use as appropriate. Calls are answered by a private call-answering center. Emergency calls are routed to one of three CHP communication centers for appropriate action. Non-emergency calls are routed to either an emergency road service company, family member, or friends for further assistance (CHP is advised of call through a remote message to the appropriate communications center).
Smart Call Boxes	RCTC and SANBAG	A vehicle detection system is connected to some call boxes, which transmit traffic data (speed and traffic counts) to the Caltrans TMC. This augments the existing vehicle detection system that Caltrans owns and operates as described in Table 1.4.2-1.

System	Owner/Operator	Description
Freeway Service Patrol (FSP)	RCTC and SANBAG	RCTC and SANBAG administer the FSP program in the Inland Empire, in cooperation with the Caltrans and CHP. Caltrans provides some funding for FSP and CHP provides field supervision of the tow trucks.
Traffic Signal Systems	Riverside and San Bernardino Counties	Both counties own and operate some traffic signals on county roadways within the Inland Empire. The majority of traffic signals are coordinated with, and often operated by, local agency traffic signal systems.
Traveler Advisory News Network (TANN) (Advanced Traveler Information System)	SCAG	SCAG, in collaboration with The Partnership, provides traveler information (roadway congestion, incidents, closures, etc.) via a website for the SCAG Region, which includes the Inland Empire.
Archived Data User Service (ADUS)	SCAG	Various transportation and transit data is collected and archived by SCAG to satisfy various federal and state performance monitoring and data reporting requirements for the Region.

1.4.3 City Systems

Intelligent transportation systems owned and operated by cities in the Inland Empire are summarized in Tables 1.4.3-1 through 1.4.3-4. The geographic locations of the cities, along with the location of traffic management centers, are illustrated in Figures 1.4.3-1 through 1.4.3-4. A brief description of each system referred to in the tables is provided below.

Traffic Signal System – Any traffic signal system operated by the city. In some cases, such as Big Bear Lake and Adelanto, traffic signals are present within the city limits but they are owned and operated by the State.

Vehicle Detection System – Most traffic signal systems are linked to vehicle detectors consisting of inductor loops or video imaging processors. In most cases these vehicle detectors have the capability to count vehicles and determine speeds; however, they are generally not used in this matter unless a city has implemented an advanced traffic management system.

Emergency Vehicle Traffic Signal Preemption – Provides the ability for emergency vehicles to change a red light to green as they approach an intersection.

Signal Priority for Transit Vehicles – Signal timing is adjusted based on location of transit vehicle in order to reduce signalization delays.

Changeable Message Signs – Electronic display devices located along the roadside that can display text messages. These are generally operated from a traffic management center (TMC). [Changeable message Sign and CMS are standard conventions used by Caltrans in California. CMS are also known by various other names around the country, primarily Variable Message Sign (VMS) and Dynamic Message Sign (DMS).]

CCTV Roadway Surveillance – CCTV cameras mounted along the roadside to send images of traffic conditions to a TMC, which is where the cameras are operated, monitored, and controlled.

Advanced Traveler Information System – Provide real-time traffic/traveler information to the public via a range of communication techniques, such as broadcast radio, the internet, or cable TV.

Traffic Management Center – Sometimes referred to as a traffic operations center, broadly defined to include any center that has the capability to monitor, operate, or control a field device, such as a traffic signal or CCTV camera.

Advanced Traffic Management System (ATMS) - The application of ATMS is generally considered one of the more robust areas of ITS design and deployment, as it is very mature in terms of both number of system elements and their characteristics. For purposes of this inventory, ATMS is an integrated area-wide system, which includes the ability to control and coordinate traffic signals, perform roadway surveillance, and automatically (or prompt operator to) adjust signal timing plans based on real-time traffic conditions. ATMS may also include data/video/control sharing among more than one agency.

Advanced Rail/Roadway Intersection Technologies – Any system or element that does more than provide basic control of traffic at rail crossings. This could include modifying signal timing plans, video surveillance, electronic surveillance other than video, electronic traffic violator devices, etc.

Incident Response System – A system that notifies appropriate traffic management and emergency response personnel when an incident is detected.

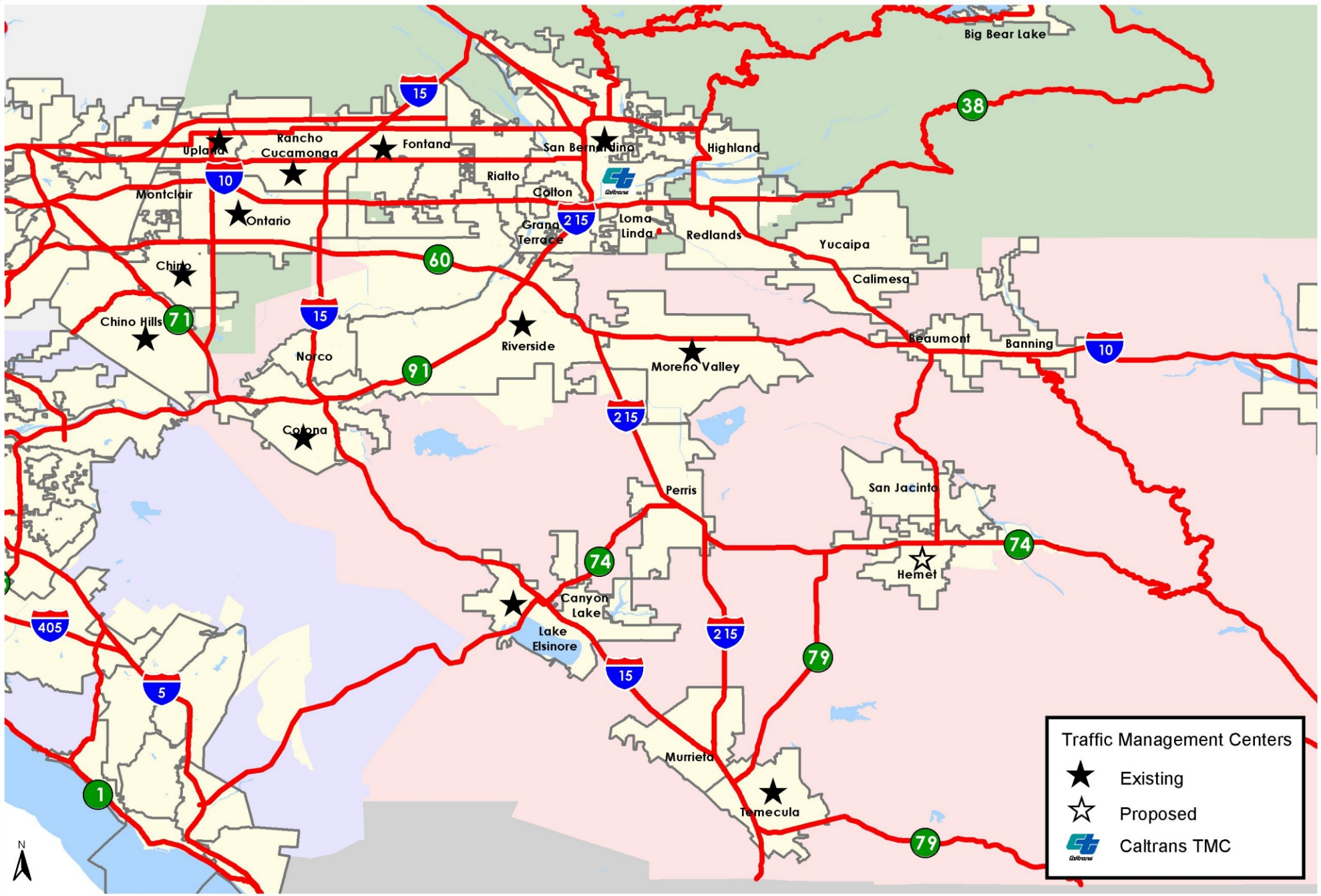
Incident Detection System – An advanced vehicle detection and/or roadway surveillance system that has the ability to identify the location of a probable incident and provide an appropriate warning to the system operator.

Table 1.4.3-1: ITS Inventory for Cities in the Western Riverside and San Bernardino Valley Area

	Traffic Signal System	Vehicle Detection System	Emer. Veh. Traf. Signal Preemption	Signal Priority for Transit Vehicles	Changeable Message Signs	CCTV Roadway Surveillance	Advanced Traveler Info. System	Traffic Management Center	Advanced Traffic Management Sys.	Adv. Rail/Road Intersection Tech.	Incident Response System	Incident Detection System
Banning	E	E										
Beaumont	E	E										
Big Bear Lake	No ITS											
Calimesa	E	E										

	Traffic Signal System	Vehicle Detection System	Emer. Veh. Traf. Signal Preemption	Signal Priority for Transit Vehicles	Changeable Message Signs	CCTV Roadway Surveillance	Advanced Traveler Info. System	Traffic Management Center	Advanced Traffic Management Sys.	Adv. Rail/Road Intersection Tech.	Incident Response System	Incident Detection System
Canyon Lake	E	E										
Chino	E	E						E				
Chino Hills	E	E						E				
Colton	E											
Corona	E	E	E		P	P	P	E	P	P		
Fontana	E	E	E	E		E	E	E	E	E		
Hemet	E	E	E					P	P			
Highland	E	E										
Lake Elsinore	E	E						E				
Loma Linda	E	E										
Montclair	E	E	E									
Moreno Valley	E	E	E					E				
Murrieta	E	E	E					E				
Norco	E	E										
Ontario	E	E	E					E				
Perris	E	E										
Rancho Cucamonga	E	E				P		E				
Redlands	E	E										
Rialto	E	E										
Riverside	E	E	E					E		E		
San Bernadino	E	E	E					E				
Temecula	E	E	E		P	P	P	E	P		P	P
Upland	E	E	E					E	E			

Note: ‘E’ and ‘P’ indicate Existing and Planned systems, respectively.



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Inland Empire ITS Architecture Project

Western Riverside and San Bernardino Valley Area

Figure 1.4.3 - 1

Table 1.4.3-2: ITS Inventory for Cities in the Coachella Valley Area

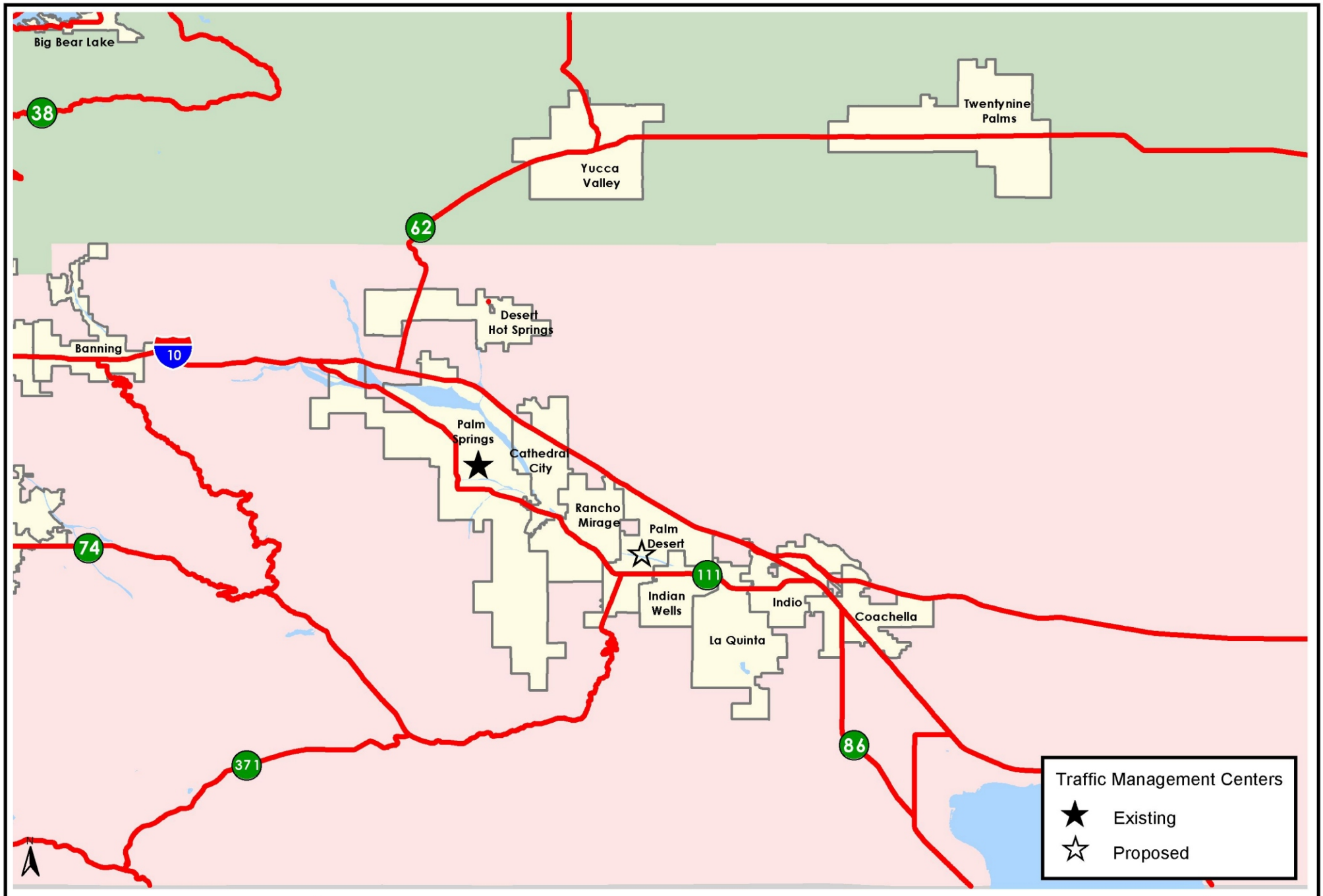
	Traffic Signal System	Vehicle Detection System	Emer. Veh. Traf. Signal Preemption	Traffic Management Center	Advanced Traffic Management Sys.
Cathedral City	E	E	E	P	
Coachella	E	E	E		
Desert Hot Springs	E	E			
Indian Wells	E				
Indio	E	E	E		
La Quinta	E	E	E		
Palm Desert	E	E	E	P	
Palm Springs	E	E	E	E	
Rancho Mirage	E	E	E		

Note: 'E' and 'P' indicate Existing and Planned systems, respectively.

Table 1.4.3-3: ITS Inventory for Cities in the High Desert Area
(Including the Morongo Basin Area)

	Traffic Signal System	Vehicle Detection System	Emer. Veh. Traf. Signal Preemption	Traffic Management Center	Advanced Traffic Management Sys.
Adelanto	No ITS				
Apple Valley	E	E			
Barstow	E	E	E		
Hesperia	E	E	E	E	
Victorville	E	E	E	E	
Twenty-Nine Palms	E	E			
Yucca Valley	E	E			

Note: 'E' and 'P' indicate Existing and Planned systems, respectively.



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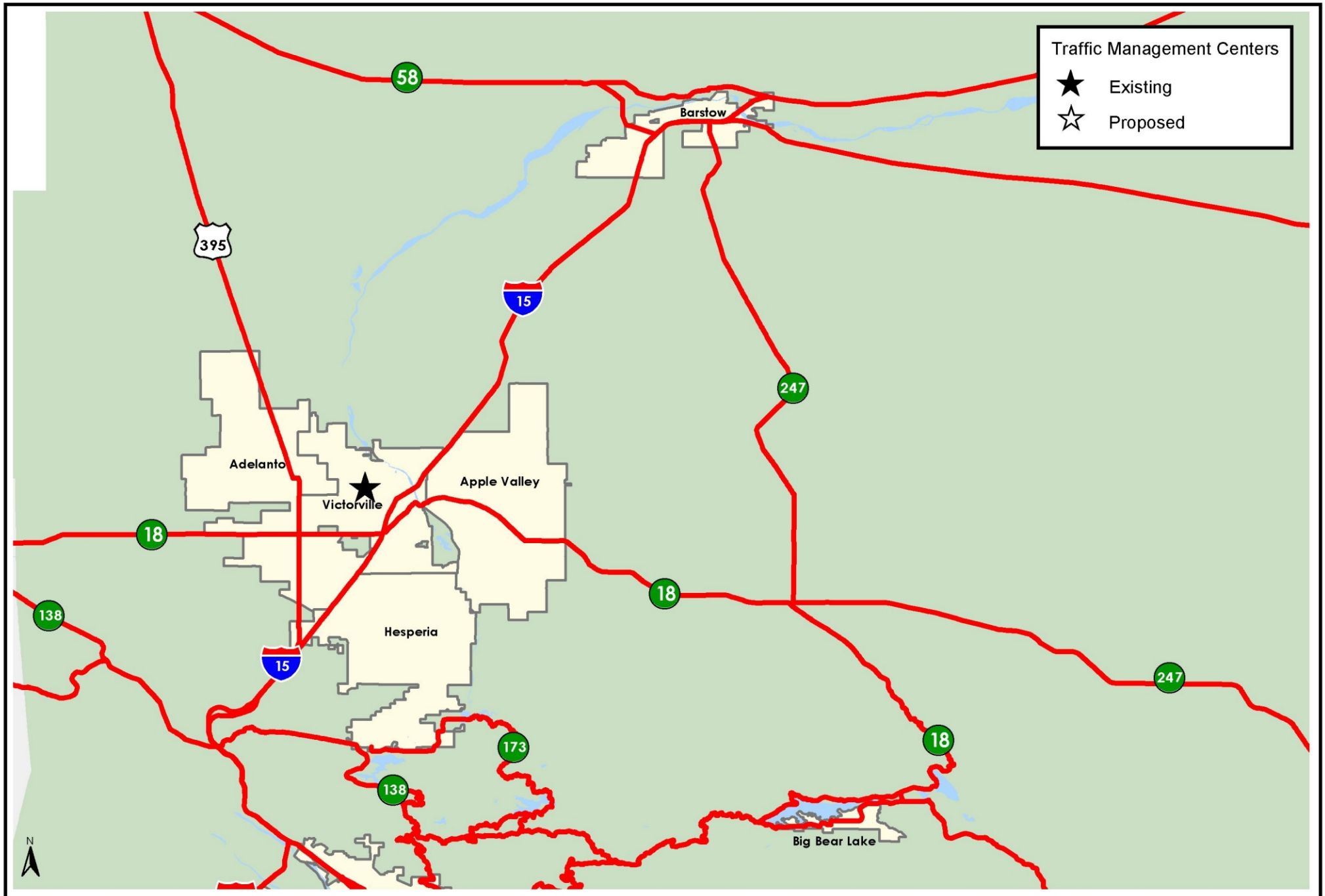
Inland Empire ITS Architecture Project

Coachella Valley and Morongo Basin Areas

Figure 1.4.3 - 2



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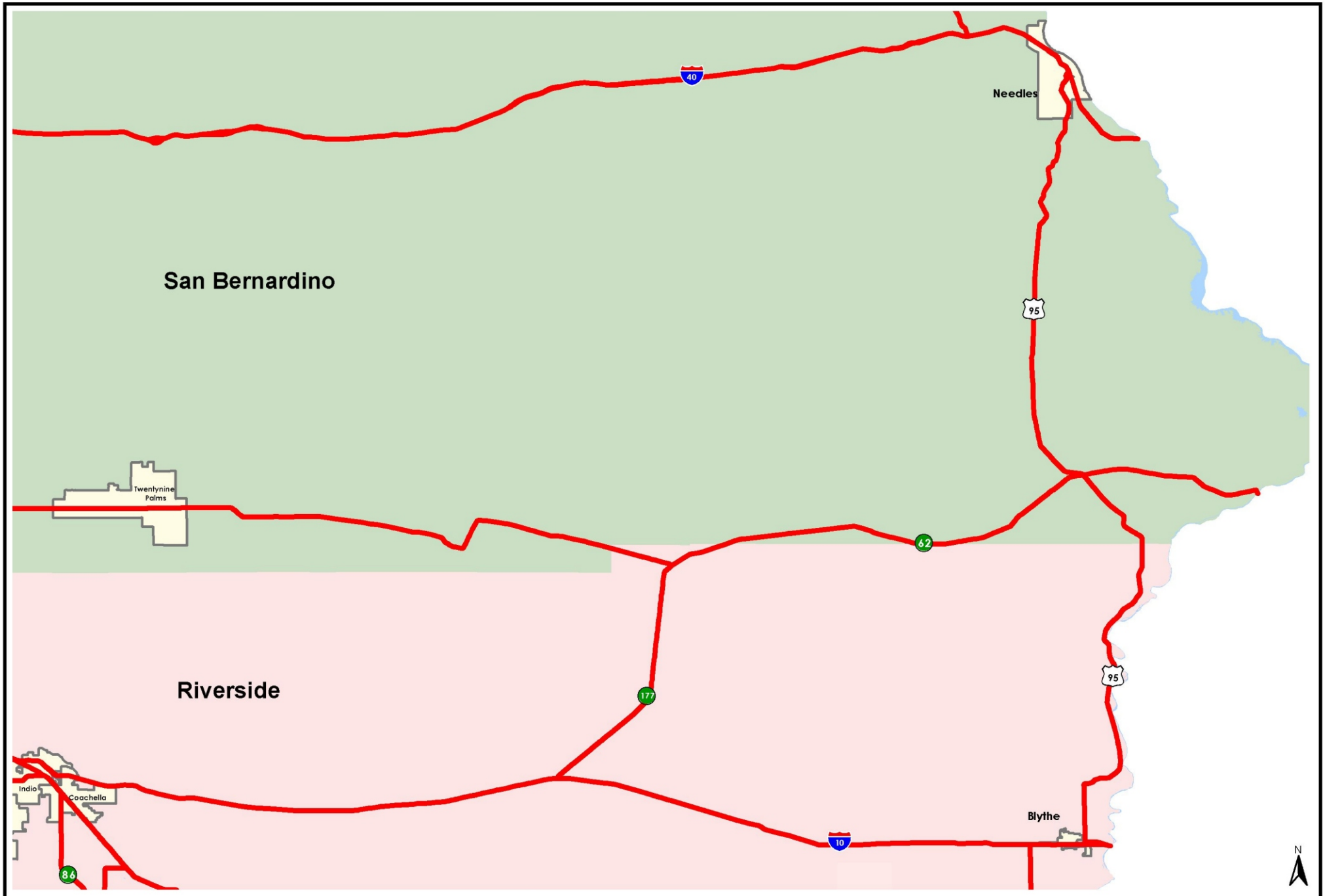
Inland Empire ITS Architecture Project

High Desert Area

Figure 1.4.3 - 3

Table 1.4.3-4: ITS Inventory for Cities in the Eastern Inland Empire Area

	Traffic Signal System	Vehicle Detection System	Emer. Veh. Traf. Signal Preemption	Traffic Management Center	Advanced Traffic Management Sys.
Blythe	E	E	P		
Needles	E	E			



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Inland Empire ITS Architecture Project

Eastern Riverside and San Bernardino Area

Figure 1.4.3 - 4

1.4.4 Transit Systems

Transit agencies use various technologies to better manage their assets in the field and to provide enhanced customer service and traveler information. Following is a summary of common transit ITS technologies that are in use in the Region and about which the transit agencies were asked in the survey process.

Automated Vehicle Location (AVL) systems: - These are systems that typically allow a dispatcher to view vehicle location in real time or near real time. Occasionally, an AVL system is deployed that does not report in real time but uploads an entire day's worth of location information at the end of the day for later viewing and/or analysis. The most common vehicle location technologies utilize global positioning system (GPS) technology, coupled with a wireless data communications medium to transmit the location data back to the dispatch center.

En-route Transit Traveler Information systems: - These are systems that disseminate transit traveler information in real time (or near real time) to users of the transit system. This information is usually disseminated at bus stops, transfer centers, train stations and other major activity centers with transit activity. The information may include such elements as vehicle location and status and next bus/train arrival times. An operational AVL system is usually essential to the function of capability.

Pre-trip Transit Traveler Information systems: - Pre-trip transit traveler information has traditionally been disseminated via telephone, by customer service operators. Transit customers would typically tell the operator the beginning and ending points of their desired trip and the operator would give a travel itinerary. The advent of the Internet has provided another dissemination channel for this type of traveler information. Standard information typically provided includes static schedule and route information and helpful hints and rules for using the transit system. More sophisticated transit traveler information Internet websites now allow a user to enter the starting and ending points of their trip and an itinerary is automatically generated.

In-vehicle Monitoring systems: - In-vehicle monitoring systems refer to two separate and distinct functions. One function is the monitoring of mechanical systems, including: engine and transmission, cooling systems, heating and air conditioning systems, hydraulics and air controlled systems (most commonly, brakes). For monitoring mechanical systems the data is most typically saved on board the vehicle and retrieved at the end of the day by maintenance and material management systems and analyzed by maintenance personnel. Metrics that indicate potential mechanical malfunctions or failures are flagged for follow-up inspection and servicing. Some transit agencies are now deploying monitoring systems that detect potential mechanical systems problems and notifying the driver, dispatcher and maintenance personnel in real time to reduce the risk of catastrophic mechanical failures in the field.

The other function of in-vehicle monitoring is safety and security. Similar to the mechanical systems monitoring, safety and security monitoring data and information is most typically retrieved at the end of the workday. However, with the advent of new broadband wireless data systems, safety and security system data such as audio and video can now be transmitted in real time to give emergency responders more information regarding the nature of an emergency before arrival on the scene. For some systems the default is for data to be retrieved at the end of the workday unless there

is an emergency. If the vehicle operator can safely trigger an alarm, then the vehicle can be monitored in real time as needed.

Electronic Fare Payment systems: - The most basic fare payment systems for transit are simple "gravity fed" fare boxes, where a fare is deposited into a farebox and upon verification that the fare is correct, it then drops into a lock box located below the fare box. Advances in fare collection include electronic fare boxes that accept paper currency and can compare operator inputs to determine if the correct fare has been inserted. Most of the new fareboxes now include an "expansion slot" to allow the addition of a fare card reader.

In performing the inventory, most of the transit operators mentioned that they were aware of a Smart Card project currently underway, led by Caltrans. Most of those properties mentioned that they are interested in the outcome but were unsure at this time of how they would participate, if at all.

Data/Information Sharing With Other Centers: - Many transit agencies see value in sharing operational and vehicle status data with other entities such as emergency responders and traffic management centers. The most common information a transit property would share with another agency is transit vehicle location data. A valuable bit of information a transit operator could receive in return is traffic condition information. This would allow the transit operator to better manage vehicles in the field based on real time traffic conditions.

Table 1.4.4-1: ITS Inventory for Transit Operators in the Inland Empire

	Automated Vehicle Location (AVL) System	En-route Transit Traveler Information	Pre-trip Transit Traveler Information	In-vehicle Security/Monitoring Systems	Electronic Fare Payment System	Data/Information Sharing With Another Center
Banning – Transit	P		P	E		
Barstow Area Transit (BAT)						
Beaumont – Transit	P		E			
Corona Cruiser and Dial-a-Ride (City of Corona)	P	P	E			P
Morongo Basin Transit Authority (MBTA)	P		P			
Mountain Area Regional Transit Authority (MARTA)			P			

	Automated Vehicle Location (AVL) System	En-route Transit Traveler Information	Pre-trip Transit Traveler Information	In-vehicle Security/Monitoring Systems	Electronic Fare Payment System	Data/Information Sharing With Another Center
Needles Area Transit (NAT)						
Omnitrans	P	P	E	E	P	
Palo Verde Valley Transit Agency						
Riverside Special Services (City of Riverside)	E		E	P		
Riverside Transit Agency (RTA)	P	P	E	E	E	P
Southern California Regional Rail Authority (Metrolink)	P	P	E		E	
SunLine Transit Agency	P	P	E	P	E	P
Victor Valley Transit Authority (VVTA)	P		E	E	E	

Note: 'E' and 'P' indicate Existing and Planned systems, respectively.

1.4.5 Other Systems

When considering other potential influences on the Inland Empire Regional ITS Architecture, it is important to make note of system inventories beyond the borders of the Inland Empire. Some of the most notable items to be considered include:

- Southern California Priority ITS Corridor Showcase Project
- SCAG's TranStar System
- Adjoining ITS Architectures

Each of these items is described below.

The Southern California Priority ITS Corridor Showcase Project was conceived as an integrated system of systems providing transportation management and traveler information services within the geographic region that includes most of Southern California, including the Inland Empire. The Showcase Project developed an ITS architecture and a physical network that was planned to support integration of a series of regional ITS projects across jurisdictional boundaries. For a variety of reasons, the current status of

the Showcase Project can be considered dormant, with the result that the intended over-arching nature of Showcase has been shifted to each Southern California region to proceed as they see fit in creating a sub-regional ITS architecture. The Inland Empire ITS Architecture effort will incorporate and/or recognize future decisions relating to Showcase as well as efforts by the regional MPO, SCAG, to compile the Southern California sub-regional ITS architectures.

SCAG has developed a trip planning system that allows the retrieval of a transit itinerary for travel anywhere in Southern California. TranStar, as this system is called, includes all bus, rail and Amtrak schedules for Los Angeles, Orange, Riverside, San Bernardino, Santa Barbara and Ventura counties, as well as connecting service between lines. Currently, this system relies on static transit scheduling data, but there is a potential to provide this system with real-time dynamic data to provide even more accurate trip plans. The Inland Empire ITS Architecture will need to consider this system interface.

The Inland Empire borders the counties of San Diego, Imperial, Orange, Los Angeles, Kern and Inyo in California and the states of Arizona and Nevada. Each of these adjacent regions is developing or has developed a regional ITS architecture with certain systematic assumptions of the ability to transmit ITS data across boundaries. These system interfaces are also part of the Inland Empire ITS inventory and will be considered in the architecture schema.

1.5 NEXT STEPS

This Draft Inventory Report has been completed based on best available information at this current time. Upon release, the Inland Empire ITS stakeholders are asked to review this report with a critical eye for accuracy and missing information. Comments are requested back to the consultant team by February 28, 2003. This inventory will then be used as input to the architecture development process to define system interfaces.

During this report review cycle, the consultant will continue to work on development of regional ITS needs and services. This topic will be discussed at a workshop on March 4, 2003.

APPENDIX A
STAKEHOLDER LIST

Inland Empire Regional ITS Architecture - Stakeholder List

Agency	Stakeholder Category
California Speedway	Activity Centers
Carousel Mall	Activity Centers
Desert Hills Factory Outlets	Activity Centers
Galleria at Tyler	Activity Centers
Inland Center Mall	Activity Centers
Ontario Mills Mall	Activity Centers
Riverside Plaza	Activity Centers
March Joint Powers Authority	Airports
Ontario International Airport	Airports
Palm Springs International Airport	Airports
San Bernardino International Airport	Airports
Southern California Logistics Airport	Airports
Adelanto	Cities
Banning	Cities
Barstow	Cities
Beaumont	Cities
Big Bear Lake	Cities
Blythe	Cities
Calimesa	Cities
Canyon Lake	Cities
Cathedral City	Cities
Chino	Cities
Chino Hills	Cities
Coachella	Cities
Colton	Cities
Corona	Cities
Desert Hot Springs	Cities
Fontana	Cities
Hemet	Cities
Hesperia	Cities
Highland	Cities
Indian Wells	Cities
Indio	Cities
La Quinta	Cities
Lake Elsinore	Cities
Loma Linda	Cities
Montclair	Cities
Montclair	Cities
Moreno Valley	Cities
Murrieta	Cities
Needles	Cities
Norco	Cities
Ontario	Cities
Palm Desert	Cities
Palm Springs	Cities
Perris	Cities
Rancho Cucamonga	Cities
Rancho Mirage	Cities
Redlands	Cities
Rialto	Cities
Rialto	Cities
Riverside	Cities

Inland Empire Regional ITS Architecture - Stakeholder List

Agency	Stakeholder Category
San Bernardino	Cities
San Jacinto	Cities
Temecula	Cities
Temecula	Cities
Twentynine Palms	Cities
Upland	Cities
Victorville	Cities
Yucaipa	Cities
Federal Emergency Management Agency (FEMA)	Federal Agencies
Federal Railroad Administration (FRA)	Federal Agencies
Federal Transit Administration (FTA)	Federal Agencies
FHWA, CA Division	Federal Agencies
FTA/FHWA L.A. Metropolitan Office	Federal Agencies
Coachella Valley Assn. of Governments (CVAG)	Local Agencies
Riverside County	Local Agencies
Riverside County Transportation Commission	Local Agencies
Riverside County Transportation Commission	Local Agencies
San Bernardino Association of Governments	Local Agencies
San Bernardino County	Local Agencies
Southern California Assn. Of Governments (SCAG)	Local Agencies
Western Riv. Council of Governments (WRCOG)	Local Agencies
California Highway Patrol (CHP)	Public Safety Agencies
Riverside County Fire	Public Safety Agencies
Riverside County Sheriff - Tech. Services Division	Public Safety Agencies
San Bernardino County Fire	Public Safety Agencies
San Bernardino County Sheriff	Public Safety Agencies
Caltrans, Division of Research and Innovation	Pulic/Private
Calif. Alliance for Advanced Transportation Systems (CAATS)	State Agencies
California Air Resources Board	State Agencies
California Air Resources Board	State Agencies
California Alliance for Advanced Transportation Systems (CAATS)	State Agencies
California Transportation Commission	State Agencies
California Transportation Commission	State Agencies
Caltrans, District 8	State Agencies
Apple Valley	Town
Yucca Valley	Town
Banning	Transit Agencies
Beaumont	Transit Agencies

Inland Empire Regional ITS Architecture - Stakeholder List

Agency	Stakeholder Category
Corona	Transit Agencies
Morongo Basin Transit Authority	Transit Agencies
Omnitrans	Transit Agencies
Omnitrans	Transit Agencies
Palo Verde Valley Transit Agency (City of Blythe)	Transit Agencies
Riverside Special Services	Transit Agencies
Riverside Transit Agency	Transit Agencies
So. Calif. Regional Rail Authority (SCRRA)	Transit Agencies
SunLine Transit Agency	Transit Agencies
Victor Valley Transit Authority (VVTA)	Transit Agencies

APPENDIX B
INVENTORY SURVEY FORMS

General Angency Information and Respondent Identification

The following information will allow us to understand your perspective and to contact you if we need to better understand the information you provide.

Organization _____

Name _____

Title _____

Telephone _____

Fax _____

E-mail _____

Overview of Intelligent Transportation Systems (ITS)

Please indicate the types of ITS that you currently operate (O) or are planning (P) within the next 10 years.

___ Advanced Traffic Management System
___ CCTV Roadway Surveillance System
___ Vehicle Detection Systems
___ Emergency Vehicle Traffic Signal Preemption
___ Transit Vehicle Traffic Signal Preemption
___ Adv. Roadway/Railway Intersection Technologies
___ Advanced Traveler Information System
___ Traveler Services Information (Yellow Pages)
___ Parking Management System
___ Public Transportation Management System
___ Transit Traveler Information System
___ Commercial Vehicle Operations Systems
___ Emergency Vehicle Management System
___ Maint. or Constr. Vehicle Management System
___ Traffic Signal System
___ Ramp-Metering System
___ Changeable Message Signs
___ Portable Traffic Control
___ Freeway Service Patrol
___ Ridesharing System
___ Incident Response System
___ Incident Detection System
___ Transit AVL System
___ Paratransit Management System
___ Transit Vehicle Security System
___ Electronic Payment Systems
___ Information Mangement/Archive System

Other Systems:

Freeway Management

The objectives of Freeway Management are to:

- Monitor traffic conditions on the freeway system
- Identify recurring and non-recurring flow impediments so that short-term and long-term actions can be taken to alleviate congestion
- Implement various control and management strategies (such as ramp metering, lane control, or traffic diversion)
- Provide traveler information to travelers through infrastructure-based dissemination methods such as Variable Message Signs (VMS), Highway Advisory Radio (HAR), and In-Vehicle Signing (IVS).

Question #	Question			
1	Name Center			
2	Identify Stakeholder/Agency/Organization Associations			
3	Are any of your freeways managed by the Freeway Management Center currently under (or are there plans to add) electronic surveillance using real-time traffic data collection technologies? (**Yes or No**)			
3a	- If answered Yes to question 3, Indicate what types of technologies are used:'			
	Loop Detectors			
	Closed Circuit Television			
	Vehicle Probe Readers			
	Other (e.g., radar)			
4	Does your Freeway Management Center have (or plan to add) environmental sensor stations to monitor the environmental conditions? **(Existing, Planned or Not Planned)**			
5	Does your Freeway Management Center currently distribute (or are there plans to distribute) information to travelers directly using roadside infrastructure on the freeways? **(Yes or No)**			

Freeway Management

The objectives of Freeway Management are to:

- Monitor traffic conditions on the freeway system
- Identify recurring and non-recurring flow impediments so that short-term and long-term actions can be taken to alleviate congestion
- Implement various control and management strategies (such as ramp metering, lane control, or traffic diversion)
- Provide traveler information to travelers through infrastructure-based dissemination methods such as Variable Message Signs (VMS), Highway Advisory Radio (HAR), and In-Vehicle Signing (IVS).

Question #	Question			
5a	- If answered Yes to question 5, Indicate what types of technologies are used:			
	Variable Message Signs (VMS) -- either permanent or portable			
	Highway Advisory Radio (HAR)			
	Portable Traffic Control			
	In-vehicle Signing			
	Other			
6	Does your Freeway Management Center operate (or plan to add) ramp meters on freeway entrances? **(Yes or No**)			
6a	If answered yes to queston 6, Indicate what types of technologies are used:			
	Preemption for emergency vehicles?			
	Priority for transit vehicles?			
7	Does your Freeway Management Center operate (or plan to add) lane control devices (e.g., changeable overhead directional arrows) on the freeways? **(Existing, Planned or Not Planned)**			
8	Does your Freeway Management Center disseminate (or plan to disseminate) freeway travel times, speeds, and conditions information to the public? **(Yes or No)**			

Freeway Management

The objectives of Freeway Management are to:

- Monitor traffic conditions on the freeway system
- Identify recurring and non-recurring flow impediments so that short-term and long-term actions can be taken to alleviate congestion
- Implement various control and management strategies (such as ramp metering, lane control, or traffic diversion)
- Provide traveler information to travelers through infrastructure-based dissemination methods such as Variable Message Signs (VMS), Highway Advisory Radio (HAR), and In-Vehicle Signing (IVS).

Question #	Question			
8a	If answered Yes to question 8, Indicate what types of technologies are used:			
	Internet Web Page			
	Pagers or Personal Data Assistants			
	Kiosks			
	e-mail or other direct PC communications			
	In-Vehicle Navigation Systems			
	TV (interactive or dedicated Cable)			
	Other			
9	Does your Freeway Management Center detect and verify (or plan to detect and verify) incidents? **(Existing, Planned or Not Planned)**			
10	Does your Freeway Management Center share (or plan to share) traffic data with another Freeway Management Center or Arterial Management Center? **(Existing, Planned or Not Planned)**			
11	Does your Freeway Management Center manage (or plan to manage) HOV lanes? **(Existing, Planned or Not Planned)**			

Freeway Management

The objectives of Freeway Management are to:

- Monitor traffic conditions on the freeway system
- Identify recurring and non-recurring flow impediments so that short-term and long-term actions can be taken to alleviate congestion
- Implement various control and management strategies (such as ramp metering, lane control, or traffic diversion)
- Provide traveler information to travelers through infrastructure-based dissemination methods such as Variable Message Signs (VMS), Highway Advisory Radio (HAR), and In-Vehicle Signing (IVS).

Question #	Question			
12	Do you operate a Freeway Service Patrol? If so, who is responsible for managing operations (i.e. Caltrans, CHP, local agency, etc.)?			

Arterial / Traffic Management

The objectives of Arterial Management are to:

- Coordinate traffic signal timing patterns across urban arterials, networks and Central Business District,
- Implement traffic signal timing patterns that are responsive to traffic conditions, and
- Implement traffic signal timing patterns that are responsive to transit and emergency vehicles.

Question #	Question			
1	Name Center			
2	Identify Stakeholder/Agency/Organization Associations			
3	Does your Arterial or Traffic Management Center control (or plan to control) signalized intersections? **(Yes or No)**			
3a	If answered Yes to Question 3, Indicate what types of technologies are used:			
	Closed Loop or Centralized Control			
	Real-Time traffic adaptive control such as SCOOT/SCATS or similar			
	Signal Preemption for emergency vehicles			
	Signal Priority for Transit Vehicles			
4	Do you have signalized intersections operated by the Arterial Management Center within 200 feet of a highway-rail intersection that currently (or are planned to) adjust signal timing in response to train crossing to avoid vehicle entrapment, or are interconnected with active crossing devices? (**Existing, Planned or Not Planned)**			

Question #	Question			
5	Does your Arterial or Traffic Management Center deploy (or plan to deploy) electronic surveillance using real-time traffic data collection technologies? (**Yes or No)**			
5a	If answered Yes to question 5, Indicate what types of technologies are used:			
	Loop Detectors that provide volume and speed data (this excludes actuators on intersection approaches)			
	CCTV Cameras			
	Probe Readers to estimate travel times on arterials			
	Other			
6	Does your Arterial or Traffic Management Center distribute (or plan to distribute) information to travelers directly using roadside media infrastructure on the arterials? (**Yes or**			
6a	If answered Yes to question 6, Indicate what types of technologies are used:			
	Variable Message Signs on mainline streets			
	Highway Advisory Radio (HAR)			
	Variable Message Signs controlling parking access			
	Portable Traffic Control			
	In-Vehicle Signing transmitter locations			
	Other			

Question #	Question			
7	Does your agency deploy (or plan to deploy) technologies associated with highway-rail intersections? (**Yes or No**)			
7a	If answered Yes to question 7, Indicate what types of technologies are used for each type of rail line:	(Rail Line 1)	(Rail Line 2)	(Rail Line 3)
	Video Surveillance			
	Electronic Surveillance other than video			
	Ability to predict train arrivals electronically			
	Electronic Traffic Violator devices			
	Other			
8	Does your Arterial or Traffic Management Center have (or plan to add) environmental sensor (**Existing, Planned or Not Planned**)			
9	Does your Arterial or Traffic Management Center provide (or plan to provide) surface street travel times, speeds, and conditions information to the public? (**Yes or No**)			
9a	If answered Yes to question 9, Indicate what types of technologies are used:			
	Internet Web Page			
	Pagers or Personal Data Assistants			
	Kiosks			
	e-mail or other direct PC communications			
	In-Vehicle Navigation Systems			
	TV (interactive or dedicated Cable)			
	Other			
10	Does your Arterial Management Center detect and verify (or plan to detect and verify) incidents? (**Existing, Planned or Not Planned**)			

Question #	Question			
11	Does your Arterial Management Center share (or plan to share) traffic data with another Freeway Management Center or Arterial Management Center? (**Existing, Planned or Not Planned**)			

Public Transportation

The objectives of Transit Management are to:

- Monitor the location of transit vehicles to support schedule management and emergency response
- Monitor maintenance status of the transit vehicle fleet
- Provide demand responsive flexible routing and scheduling of transit vehicles
- Provide real-time, accurate, transit information to travelers

Question #	Question			
1	Name Center			
2	Identify Stakeholder/Agency/Organization Associations			
3	Does your Public Transportation Center manage (or plan to manage) transit vehicles? (**Yes or No**)			
3a	If answered Yes to question 3, Indicate what types of technologies are used:			
	Fixed Route			
	Rail			
	Demand Response (paratransit)			
4	Does your transit element provide (or plan to provide) maintenance of the transit vehicles? (**Existing, Planned or Not Planned**)			
5	Do you have (or plan to have) an Automated Vehicle Location (AVL) System? (**Existing, Planned or Not Planned**)			
6	Does your agency have (or plan to have) an electronic display (or automated audio output) of transit real time or static information at transit stops or kiosks? (**Existing, Planned or Not Planned**)			

Public Transportation

The objectives of Transit Management are to:

- Monitor the location of transit vehicles to support schedule management and emergency response
- Monitor maintenance status of the transit vehicle fleet
- Provide demand responsive flexible routing and scheduling of transit vehicles
- Provide real-time, accurate, transit information to travelers

Question #	Question			
7	Does your agency have (or plan to have) on board security monitoring systems or does it monitor (or plan to monitor) public areas (e.g., stops, park & ride lots, stations)? (**Existing, Planned or Not Planned**)			
8	Does your Public Transportation Center directly or indirectly (i.e., thru another agency/organization) disseminate (or plan to disseminate) info to the public? (**Yes or No**)			
8a	If answered Yes to question 8, Indicate what types of technologies are used:			
	Internet Web Page			
	Pagers or Personal Data Assistants			
	Kiosks			
	e-mail or other direct PC communications			
	Display/Audio in Transit Vehicles			
	TV (interactive or dedicated Cable)			
	Other			
9	Does your transit element share (or plan to share) transit data with a Freeway Management Center or Arterial Management Center? (**Existing, Planned or Not Planned**)			

Public Transportation

The objectives of Transit Management are to:

- Monitor the location of transit vehicles to support schedule management and emergency response
- Monitor maintenance status of the transit vehicle fleet
- Provide demand responsive flexible routing and scheduling of transit vehicles
- Provide real-time, accurate, transit information to travelers

Question #	Question			
10	Does your transit element have (or plan to have) a fully operational Electronic Fare Payment System (other than registering fareboxes)? (**Existing, Planned or Not Planned**)			

List of Acronyms

ADUS	Archived Data User Service
ATIS	Advanced Traveler Information System
ATMS	Advanced Traffic Management System
AVI	Automated Vehicle Identification
AVL	Automated Vehicle Locator
CAD	Computer Aided Dispatch
Caltrans	California Department of Transportation
CCTV	Closed Circuit Television
CVISN	Commercial Vehicle Information Systems & Networks
CVO	Commercial Vehicle Operations
CHP	California Highway Patrol
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FSP	Freeway Service Patrol
FTA	Federal Transit Authority
HAR	Highway Advisory Radio
HOV	High Occupancy Vehicles
ITS	Intelligent Transportation System(s)
MPO	Metropolitan Planning Organization
RCTC	Riverside County Transportation Commission
RTA	Riverside Transit Authority
RWIS	Road Weather Information System
SANBAG	San Bernardino Association of Governments
SCAG	Southern California Association of Governments
TMC	Traffic Management Center