



Appendix E

INTELLIGENT TRANSPORTATION SYSTEMS STRATEGIC DEPLOYMENT PLAN



Task 2.1 Gap Assessment

Prepared for:



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March 2005
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1. INTRODUCTION

This report is the output for *Task 2.1: Gap Assessment* of the Sacramento Council of Governments (SACOG) Intelligent Transportation Systems (ITS) Strategic Deployment Plan (Strategic Deployment Plan). It includes a review summary of the ITS Vision objectives and existing, planned, and programmed ITS deployments mapped to the market packages of the National ITS Architecture. The ITS Vision was a document prepared by the Sacramento ITS Partnership in 2002 and updated during the Strategic Deployment Plan process. The existing, planned, and programmed ITS deployments were gathered from the SACOG Metropolitan Transportation Plan (MTP) and other land use and transportation plans in the region that included projects related to ITS. The Gap Assessment will reveal three major elements:

- ITS Vision objectives that are being satisfied by a current project;
- National ITS Architecture Market Packages that are relevant to the Sacramento Regional needs and vision; and
- ITS Vision objectives and required Market Packages (defined by the stakeholders) that need to have projects identified in order to be satisfied.

If an ITS Vision objective or a required Market Package does not currently have a project identified that satisfies that element, this is defined as a “gap”. A gap means that under the current scenario of planned projects, a portion of the ITS Vision would not be achieved; or a Market Package that the stakeholders identify as a necessary component of the Sacramento Regional ITS Architecture will not be satisfied. One facet of the final Strategic Deployment Plan will be to identify and recommend projects that will fulfill the “gaps” identified in the Gap Assessment.

1.1 Strategic Deployment Plan Background

This Strategic Deployment Plan replaces the 1996 Early Deployment Plan and updates the Sacramento ITS Regional Architecture which was completed in 2001. This Strategic Deployment Plan will incorporate work completed since the Early Deployment Plan was released. The project addresses the current USDOT Rule and Federal Transit Administration Policy for National ITS Architecture, and provides the additional required detail in the following areas: new subsystems, operational concept, system functional requirements, system interfaces, project sequencing, and agency operational agreements. The Strategic Deployment Plan will bring the Sacramento region into full compliance with Architecture requirements; provide a vision for ITS; outline a program of low, medium and high priority projects; identify a funding strategy; and establish a plan for managing, integrating and operating the ITS elements in the region that are to be implemented over a designated planning period.

The Strategic Deployment Plan will also incorporate and build upon recent efforts by various local agencies and SACOG which demonstrate the importance of *land use in planning* for future transportation improvements, and the interrelation between land use and circulation. This Strategic Deployment Plan will represent a first effort to integrate ITS planning and ITS project deployment strategies within the broader transportation and land use planning efforts. The Strategic Deployment Plan will also address ways in which advanced technologies can improve mobility and air quality in the region.



The individual elements of the Strategic Deployment Plan project are listed on the following page. The items in bold have been completed or are part of the current deliverable. Throughout the project, many sections will be completed as separate deliverables. When combined, the Strategic Deployment Plan will culminate in a comprehensive, usable document to guide future ITS deployment in the region.

SACOG ITS Strategic Deployment Plan Project

TASK 1: DEVELOP OUTREACH PROGRAM

§ **TASK 1.1: EXISTING CONDITIONS SUMMARY REPORT**

§ **TASK 1.2: DEVELOP OUTREACH PLAN**

TASK 2: PLANNING PROCESS

§ **TASK 2.1: GAP ASSESSMENT**

§ **TASK 2.2: REFINE ITS VISION**

§ TASK 2.3: MARKET PACKAGES

§ TASK 2.4: UPDATE REGIONAL ITS ARCHITECTURE

TASK 3: STRATEGIC DEPLOYMENT PLAN

§ TASK 3.1: PROJECT SEQUENCING

§ TASK 3.2: AGREEMENTS

§ TASK 3.3: STRATEGIC DEPLOYMENT PLAN REPORT

§ TASK 3.4: EXECUTIVE SUMMARY

TASK 4: MAINTENANCE PLAN

§ TASK 4.1: MAINTENANCE PLAN





2. METHODOLOGY AND ANALYSIS

To fully assess the potential gaps in the regional ITS program, there are three components that need to be considered: Sacramento Region ITS Vision; National ITS Architecture Market Packages; and Existing, Planned, and Programmed Projects. Each of these components are mapped to each other in order to identify what areas of the ITS Vision and Market Packages are not being satisfied by the current program of ITS deployment.

2.1 Sacramento Region ITS Vision

The starting point for the Gap Assessment is the **Sacramento Region ITS Vision** which was originally approved by the stakeholders in 2002 and refined during the Strategic Deployment Plan project utilizing stakeholder input received at the Kickoff Meeting on March 8, 2005. The updated SACOG ITS Vision is available as a separate document on the project website at <http://www.sacog.org/websites/kimley-horn/index.cfm>. The ITS Vision is based on the following ten categories of the Metropolitan Transportation Plan Vision.

- Quality of Life
- Access and Mobility
- Air Quality
- Travel Choices
- Economic Vitality
- Equity
- Transportation and Land Use
- Funding and Revenue
- Health and Safety
- Environmental Sustainability

The Sacramento Region ITS Vision developed in 2002 added an ITS component to the Metropolitan Transportation Plan Vision. Each of the goals listed above has a set of objectives that were developed during this Strategic Deployment Plan process. These objectives were derived from the original Vision and from input received from stakeholders. The updated objectives for each Vision component are shown below. Objectives voiced by stakeholders which are not necessarily ITS related but have strong potential for ITS deployment are also include in the ITS Vision with the note “ITS Opportunity”.

Quality of Life

- Enhance and integrate transit services
- Improve traffic flow by reducing congestion (eg. on heavily traveled arterials), by reducing and/or enforcing speeds for safety (eg. in residential neighborhoods), and by improving facilities for alternative transportation modes such as walking or bicycling
- Improve traveler experience and reduce congestion by providing traveler information
- Reduce vehicle emissions
- Market ITS to encourage the use of multi-modal transportation system
- Reduce time residents spend in congestion



- Provide current traveler information via 511
- Improve traffic management
- Provide real-time transit vehicle arrival information system
- Provide guidance to available parking
- Provide electronic payment and/or regional fare collection system for transit (possibly multi-modal)
- Improve safety for all modes (i.e., surveillance on transit vehicles, traffic calming)
- Have a better ITS education system in the region

Access and Mobility

- Integrate transit services where practical and desirable
- Introduce new Bus Rapid Transit (BRT) transit trunk lines to enhance the local and regional transit service
- Improve access and mobility by introducing local paratransit services with door-to-door service
- Optimize operations (reduce congestion, improve the traveler experience)
- Reduce conflicts between motorized and non-motorized modes and vehicles
- Disseminate accurate, multimodal traveler information via STARNET
- Improve traffic signal timing, coordination, and management across jurisdictional boundaries
- Provide more predictable travel times
- Improve reliability of alternate modes
- Implement transit signal priority
- Improve coordination among traffic, public safety and transit agencies
- Provide for enhanced multi-modal transit transfers

Air Quality

- Reduce vehicle emissions by reducing total VMT
- Reduce vehicle emissions by reducing congestion and thus possibly reducing stop-and-go conditions
- Improve travel time along corridors
- Promote increased use of alternate modes (walking, bicycle, transit, carpool, vanpool)
- Streamline goods movement processes
- Improve overall congestion
- Improve traffic management
- Increase ridership on transit vehicles by improving reliability
- Consider addition of HOV/HOT lanes across region (ITS Opportunity)

Travel Choices

- Integrate transit services across different modes where practical and desirable
- Integrate transit services across different jurisdictions where practical and desirable
- Improve convenience of transit by introducing door-to-door paratransit service
- Improve transit safety by deploying surveillance cameras on board transit vehicles and at transit stops



- When optimizing signal operations, emphasize bicycle and pedestrian safety while reducing conflicts with vehicles
- Improve traveler experience via traveler information provided via STARNET
- Improve bicycle and pedestrian safety
- Provide priority for transit vehicles using transit priority, queue jumper lanes, and signal coordination
- Provide advantageous transit service over the use of automobiles
- Develop an ITS education program in the region
- Integrate Sacramento region ITS initiatives with adjacent regions

Economic Vitality

- Improve commercial vehicle operations using technologies such as weigh-in-motion sensors and real-time roadway condition information for trucks and delivery fleets
- Improve accessibility by integrating operations across jurisdictional boundaries via their TOCs. Interconnected TOCs can then optimize operations through actions such as accident response, real-time signal optimization, and provision of alternate routes when needed.
- Improve access into and out of economic centers
- Expedite commercial vehicle deliveries
- Improve accessibility to parking
- Develop an ITS education program in the region
- Integrate Sacramento region ITS initiatives with adjacent regions

Equity

- Improve transit level of service in existing and new transit corridors through greater frequency, timeliness, and easier transfers
- Improve mobility for alternate modes such as pedestrian and bicycle
- Develop programs that have a regional focus
- Develop compatible/consistent ITS deployment initiatives across region for similar deployments (i.e., transit priority deployed in one corridor has same technology as transit priority in another)
- Improve access to and reliability of alternate modes
- Provide traveler information in accessible formats (i.e., large print, Braille, 711, audio, multi-lingual) and varying media (i.e., web, TV, in-vehicle, 511, kiosks)

Transportation and Land Use

- Encourage and facilitate planning efforts which emphasize land use plans supporting new BRT corridors. In particular the planning can explore how to densify the corridors via redevelopment and infill, targeting the corridors for transit oriented development (TOD) improvements (ITS Opportunity)
- Consider alternate mode mobility in every development
- Improve transit service to jobs, services and housing
- Mainstream ITS initiatives into the transportation and land use planning process

Funding and Revenue



- For CIP projects, create a funding incentive for including ITS on the project
- Position the region to qualify for federal ITS funding
- Seek multi-jurisdictional opportunities for funding
- Promote benefits of ITS in the region to build support for funding
- Track the number or types of projects that successfully integrate ITS into a project
- Seek funding from traditional funding sources (i.e., Bicycle Transportation Account, Safe Routes to School, Federal Transit Authority)
- Obtain Homeland Security funding

Health and Safety

- Design transit oriented development (TODs) along BRT corridors to be conducive to walking and bicycling (ITS Opportunity)
- When optimizing signal operations, emphasize bicycle and pedestrian safety while reducing conflicts with vehicles
- Improve transit safety by deploying surveillance cameras on board transit vehicles and at transit stops
- Decrease emergency response times and capabilities using cameras and emergency vehicle signal preemption
- Reduce vehicle emissions by reducing total VMT
- Reduce vehicle emissions by reducing congestion and thus reducing stop-and-go conditions
- Encourage use of alternate modes (i.e., bicycle, pedestrian) for mobility
- Provide safer transit service
- Improve emergency response time and coordination by integrating emergency response and traffic management activities
- Reduce vehicle crashes

Environmental Sustainability

- Design transit oriented development (TODs) along BRT corridors thus limiting sprawl and reducing the conversion of agricultural and open space (ITS Opportunity)
- Design transit oriented development (TODs) along BRT corridors to be conducive to walking and bicycling in addition to transit, thus reducing motorized vehicle use and resultant emissions
- Reduce vehicle emissions by reducing congestion and thus reducing stop-and-go conditions
- Use technology to help maintain a balance of environmentally friendly growth and the use of advanced technology
- Provide real-time traveler information for ride-sharing and trip planning

2.2 National ITS Architecture Market Packages

The second component of the Gap Assessment is the **National ITS Architecture Market Packages**. Market packages help to define information flows, interconnects, and subsystems of various elements of ITS deployment. They are tailored to fit real world transportation problems and needs, addressing specific service requirements of traffic manager, transit



operators, travelers, and other ITS stakeholders. They were defined in enough detail to support specific benefits with clear ties to transportation problems.

Market packages are illustrative rather than prescriptive. There is not a single project or system that will address each market package. The market packages are simply tools that can help guide the development of an implementation strategy to identify incremental ITS deployment strategies in a manner that is relevant to the architecture definition.

A list of current market packages is shown below:

Archived Data Management	ITS Data Mart (focused archive, single agency)	AD1
	ITS Data Warehouse (multiple agencies, single repository, consistent format)	AD2
	ITS Virtual Data Warehouse (multiple locations)	AD3
Public Transportation	Transit Vehicle Tracking	APTS1
	Transit Fixed-Route Operations	APTS2
	Demand Response Transit Operations	APTS3
	Transit Passenger and Fare Management	APTS4
	Transit Security	APTS5
	Transit Maintenance	APTS6
	Multi-modal Coordination	APTS7
	Transit Traveler Information	APTS8
Traveler Information	Broadcast Traveler Information	ATIS1
	Interactive Traveler Information	ATIS2
	Autonomous Route Guidance	ATIS3
	Dynamic Route Guidance	ATIS4
	ISP Base Route Guidance (pre-trip, turn by turn)	ATIS5
	Integrated Transportation Mgmt/Route Guidance	ATIS6
	Yellow Pages and Reservation	ATIS7
	Dynamic Ridesharing	ATIS8
	In-Vehicle Signing	ATIS9

INTELLIGENT TRANSPORTATION SYSTEMS STRATEGIC DEPLOYMENT PLAN



Traffic Management	Network Surveillance	ATMS01
	Probe Surveillance	ATMS02
	Surface Street Control	ATMS03
	Freeway Control	ATMS04
	HOV Lane Management	ATMS05
	Traffic Information Dissemination	ATMS06
	Regional Traffic Control	ATMS07
	Traffic Incident Management System	ATMS08
	Traffic Forecast and Demand Management	ATMS09
	Electronic Toll Collection	ATMS10
	Emissions Monitoring and Management	ATMS11
	Virtual TMC and Smart Probe Data	ATMS12
	Standard Railroad Grade Crossing (<80)	ATMS13
	Advanced Railroad Grade Crossing (> 80)	ATMS14
	Railroad Operations Coordination	ATMS15
	Parking Facility Management	ATMS16
	Regional Parking Management (Freight and TMC)	ATMS17
	Reversible Lane Management	ATMS18
	Speed Monitoring	ATMS19
	Drawbridge Management	ATMS20
	Roadway Closure Management	ATMS21
Vehicle Safety	Vehicle Safety Monitoring	AVSS01
	Driver Safety Monitoring	AVSS02
	Longitudinal Safety Warning	AVSS03
	Lateral Safety Warning	AVSS04
	Intersection Safety Warning (hazardous conditions)	AVSS05
	Pre-Crash Restraint Deployment	AVSS06
	Driver Visibility Improvement	AVSS07
	Advanced Vehicle Longitudinal Control	AVSS08
	Advanced Vehicle Lateral Control	AVSS09
	Intersection Collision Avoidance	AVSS10
	Automated Highway System	AVSS11



Commercial Vehicle Operations	Fleet Administration	CVO01
	Freight Administration (cargo itself)	CVO02
	Electronic Clearance	CVO03
	CV Administrative Processes	CVO04
	International Border Electronic Clearance	CVO05
	Weigh-In-Motion	CVO06
	Roadside CVO Safety	CVO07
	On-Board CVO and Freight Safety and Security	CVO08
	CVO Fleet Maintenance	CVO09
	HAZMAT Management	CVO10
	Roadside HAZMAT Security Detection and Mitigation	CVO11
	CV Driver Security Detection and Mitigation	CVO12
	Freight Assignment Tracking	CVO13
Emergency Management	Emergency Call-Taking and Dispatch	EM01
	Emergency Routing	EM02
	Mayday Support (user request, EMS = info)	EM03
	Roadway Service Patrols	EM04
	Transportation Infrastructure Protection	EM05
	Wide-Area Alert	EM06
	Early Warning System	EM07
	Disaster Response and Recovery	EM08
	Evacuation and Reentry Management	EM09
	Disaster Traveler Information	EM10
Maintenance and Construction Management	Maintenance and Cons Vehicle and Equipment Tracking	MC01
	Maintenance and Cons Vehicle Maintenance	MC02
	Road Weather Data Collection	MC03
	Weather Information Processing and Distribution	MC04
	Roadway Automated Treatment	MC05
	Winter Maintenance	MC06
	Roadway Maintenance and Construction	MC07
	Work Zone Management	MC08
	Work Zone Safety Monitoring	MC09
	Maintenance and Cons Activity Coordination	MC10

2.3 Existing, Planned, and Programmed Projects

The final component of the Gap Assessment is the **Existing, Planned, and Programmed projects**. These projects were collected from the SACOG 2025 MTP, STARNET Needs Assessment, Elk Grove - Rancho Cordova - El Dorado Connector Concept Plan, the original



Sacramento Regional ITS Architecture, Tahoe Gateway ITS Strategic Deployment Plan, Sacramento Regional Transit District, Elk Grove ITS Master Plan, and the San Joaquin Valley ITS Strategic Deployment Plan. All of these documents included ITS projects considered for the Gap Assessment.

3. GAP ASSESSMENT OBSERVATIONS

As the ITS Vision and Existing, Planned, and Programmed Projects were mapped to the National ITS Architecture Market Packages, there were several observations:

- All of the Market Packages were satisfied by at least one ITS objective.
- Several objectives of the ITS Vision are not part of a specific National ITS Architecture Market Package. Since the stakeholders identified these objectives in the ITS Vision, they are included as part of the Gap Assessment, but will not have a market package associated with them.
- Several Market Packages do not have a Vision objective that can be mapped to it. The stakeholders need to determine if these are relevant to the Sacramento Region. These include:
 - § ATMS12 – Virtual TMC and Smart Probe Data
 - § ATMS18 – Reversible Lane Management
 - § AVSS06 – Pre-Crash Restraint Deployment
 - § AVSS07 – Driver Visibility Improvement
 - § AVSS11 – Automated Highway System
 - § CVO05 – International Border electronic Clearance
 - § MC01 – Maintenance and Construction Vehicle and Equipment Tracking
 - § MC03 – Road Weather Data Collection
 - § MC05 – Roadway Automated Treatment
 - § MC06 – Winter Maintenance
 - § MC07 – Roadway Maintenance and Construction
 - § MC10 – Maintenance and Construction Activity Coordination

3.1 System Gaps in Market Packages

Of the market packages that were satisfied by one of the Vision objectives, not all of the market packages had a project associated with them. This is a “gap”. The market packages identified below represent the “gaps” in the current deployment plan of projects.

- § APTS05 – Transit Security
- § APTS06 – Transit Maintenance
- § ATMS02 – Probe Surveillance
- § ATMS10 – Electronic Toll Collection
- § ATMS11 – Emissions Monitoring and Management
- § ATMS13 – Standard Railroad Grade Crossing (<80 mph)



- § ATMS14 – Advanced Railroad Grade Crossing (>80 mph)
- § ATMS15 – Railroad Operations Coordination
- § ATMS20 – Drawbridge Management
- § ATMS21 – Roadway Closure Management
- § AVSS02 – Driver Safety Monitoring
- § AVSS03 – Longitudinal Safety Warning
- § AVSS08 – Advanced Vehicle Longitudinal Control
- § AVSS10 – Intersection Collision Avoidance
- § CVO02 – Freight Administration (cargo)
- § CVO03 – Electronic Clearance
- § CVO04 – CV Administrative Processes
- § CVO06 – Weigh-In-Motion
- § CVO07 – Roadside CVO Safety
- § CVO08 – On-Board CVO and Freight Safety and Security
- § CVO09 – CVO Fleet Maintenance
- § CVO10 – HAZMAT Management
- § CVO11 – Roadside HAZMAT Security Detection and Mitigation
- § CVO12 – CV Driver Security Detection and Mitigation
- § CVO13 – Freight Assignment Tracking
- § EM05 – Transportation Infrastructure Protection
- § EM09 – Evacuation and Reentry Management
- § MC08 – Work Zone Management
- § MC09 – Work Zone Safety Monitoring

For these gaps between the market packages and the projects, an objective of the Strategic Deployment Plan is to define projects that will satisfy all of the market packages. This will be done at a later stage of the Strategic Deployment Plan development.

3.2 System Gaps in Market Packages

In the ITS Vision, there were several objectives that were defined that do not relate to any market package. The following objectives do not have a project already identified that will fulfill that Vision objective. These represent “gaps” in the current deployment plan of projects that do not satisfy the objective.

- § Improve access to and reliability of alternate modes
- § Improve bicycle and pedestrian safety
- § Provide traveler information in accessible formats (i.e., large print, Braille, 711, audio, multi-lingual) and varying media (i.e., web, TV, in-vehicle, 511, kiosks)
- § Develop an ITS education program in the region
- § Mainstream ITS initiatives into the transportation and land use planning process
- § For CIP projects, create a funding incentive for including ITS on the project
- § Position the region to qualify for federal ITS funding
- § Seek multi-jurisdictional opportunities for funding
- § Promote benefits of ITS in the region to build support for funding



- § Track the number or types of projects that successfully integrate ITS into a project
- § Seek funding from traditional funding sources (i.e., Bicycle Transportation Account, Safe Routes to School, Federal Transit Authority)
- § Obtain Homeland Security funding
- § Use technology to help maintain a balance of environmentally friendly growth and the use of advanced technology

Projects that could fulfill the ITS Vision objectives will be developed at a later stage of the Strategic Deployment Plan.

3.3 Summary

The next step in the process is to prioritize the market packages into low, medium, and high priorities. Then, the market packages will need to be customized so they are more applicable to the Sacramento Region. This effort will lead to a prioritization of the projects that satisfy the market packages as well as fulfill the ITS Vision objectives.