Our existing transportation system represents a major investment of resources over the past several decades. While the 2030 San Diego Regional Transportation Plan: Pathways for the Future (RTP or the “Plan”) identifies additional investments needed to meet future transportation needs, it is critical that the region make the best use of the facilities already in place. There are a wide range of emerging technologies and opportunities to increase the effectiveness of overall transportation system management. New management possibilities are emerging as we continue to make progress toward enhancing data collection and improving information delivery to travelers.

Transportation professionals are gaining access to the types of data and tools needed to provide a complete view of the transportation network. These tools utilize sophisticated data analysis and information-processing techniques, allowing for the definition and development of real-time management and operations strategies. The information also allows for the delivery of real-time information to travelers, enabling them to make the best choices and get the optimum effect from use of the system.

There is an opportunity to take a “portfolio” approach to managing the transportation system by deploying a range of tools and strategies in a coordinated manner, with a focus on the delivery of a system for real-time systems management. Such a system would drive our operational strategies to focus on measurable effects and adoption of proactive operations.

These tools and strategies can be applied within the framework of an objectives-driven approach and balanced with similar approaches for demand management to address specific transportation goals. A growing trend in larger transportation systems nationally and internationally is to develop strategies and tactics aimed at congestion reduction by tackling demand and capacity management simultaneously.

While the Systems Management and Demand Management chapters of the 2030 RTP will provide a high-level overview of this balanced approach, the 2007 Intelligent Transportation Systems Strategic Plan provides a detailed strategy of how portfolio investments would occur and be measured to ensure that positive effects are delivered.
PERFORMANCE MONITORING

Getting the most out of our transportation investments requires monitoring the system’s performance (Performance Monitoring) and utilizing the data to develop operational strategies. The purpose of performance monitoring is to: (1) provide current and ongoing information on how well the transportation system is performing; (2) identify opportunities for near-term improvements; and (3) assess the impacts of future improvements. In the past, SANDAG and other transportation operators have conducted performance monitoring, though not always on a consistent or ongoing basis. Automated and consistent data collection is key to tracking how well the transportation system is performing and being able to actively manage the network. The following section outlines the status of current or near-term regional transportation system performance monitoring efforts.

Roadway System – For the region’s roadway network, SANDAG currently coordinates the annual collection of average daily traffic volumes from Caltrans and local jurisdictions, and through the Congestion Management Program, collects roadway level of service data every two years. Collection of this data is not yet fully automated and is dependent to a large extent on the available resources of reporting agencies.

For most freeways, traffic volumes and speed data are automatically collected by Caltrans through loop detectors embedded underneath the pavement and other emerging vehicle detection technologies. Approximately 55 percent of the urban freeway system is automatically monitored by detectors that are spaced about one mile apart. This spacing is considered ideal for achieving the greatest system detection coverage. Caltrans has an ongoing program to install additional detectors that will improve overall system coverage. Manual data collection is done on other freeway segments and some conventional highways.

For local streets and roads, traffic volume counts also are currently done manually and are not always performed on an annual basis. Speed data on local streets and roads are not normally collected, but counts are performed on an as-needed basis. The need to develop an automated and accurate arterial data system is a key emphasis area for systems management.

In cooperation with UC Berkeley, Caltrans has developed a Performance Measurement System (PeMS) program that uses the urban freeway data. This program provides current, ongoing data on freeway volumes and speeds and can be displayed graphically and exported to other monitoring applications. Since the development of MOBILITY 2030, SANDAG has worked with Caltrans and UC Berkeley to extend the capabilities of PeMS. Efforts have included the addition

<table>
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<tr>
<th>STEPS TO IMPROVE TRANSPORTATION SYSTEM PERFORMANCE</th>
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<tbody>
<tr>
<td>▪ Determine the information best suited for performance monitoring</td>
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<tr>
<td>▪ Collect consistent data on a regular basis and automate data collection as much as possible</td>
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<tr>
<td>▪ Report the results of monitoring efforts to decision-makers and the general public</td>
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<tr>
<td>▪ Adjust decisions based on monitoring results</td>
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</table>

2030 Regional Transportation Plan
of historical San Diego data and the development of a ramp metering interface. The interface provides the ability to analyze, monitor, and report ramp metering volumes.

- **Transit System** – The Regional Transit Management System (RTMS) is a sophisticated management tool providing for real-time performance monitoring and reporting for more than 50 percent of the region’s fixed-route services. The system has been implemented, and the two transit districts – the Metropolitan Transit System and the North County Transit District – are able to use it to better manage services and deliver real-time information to customers. Through SANDAG’s annual passenger counting program, transit ridership information is reported to the transit districts using data from the RTMS automated passenger counters, collected manually, and supplemented by each transit district’s own payment-based counts and other transit operational data (e.g., bus speed, mileage, and hours of service). The region’s short-range transit plan is developed using this data.

- **Travel Times and Volumes** – As part of the performance monitoring program, SANDAG will initiate the monitoring and reporting of travel times and volumes for key transportation corridors. This data will serve as the basis for monitoring changes in travel corridors identified in the 2030 RTP, the RCP Performance Monitoring report, and the State of the Commute report.

- **PeMS Enhancements** – Planned improvements to PeMS recently initiated by SANDAG in coordination with Caltrans, NCTD, MTS, and local agencies, include the development and integration of transit and arterial modules. These features will allow PeMS to perform as a multi-modal performance measurement and evaluation tool for the San Diego region. These improvements will supplement the SANDAG Performance Monitoring Program by providing the ability of gathering, tracking, and analyzing real-time transit and arterial data.

In MOBILITY 2030, SANDAG identified a number of issues that needed to be considered on an ongoing basis for improving SANDAG’s performance monitoring effort and included:

- **What types of data and collection systems are best suited to address the performance monitoring needs of our multimodal transportation system?**
- **How can we build upon existing data collection efforts?**
- **Who should be responsible for the data collection and monitoring, and how will we pay for it?**
- **How will this information be used to affect operational strategies and to make decisions on optimizing the transportation network?**

Based upon these issues, SANDAG has identified the following improvements that serve as key principles for undertaking an effective performance monitoring program:

Performance monitoring needs to reflect the multimodal nature of our transportation system by focusing on all modes of travel. Data collection needs to be automated, consistent, and reported to decision-makers and the general public to assist them in making informed decisions.
CHAPTER 7
SYSTEMS MANAGEMENT: MAKING BETTER USE OF WHAT WE HAVE

1. Performance monitoring needs to reflect the multi-modal nature of our transportation system by focusing on all modes of travel.

2. The existing automated freeway data collection and reporting activity needs to be expanded beyond freeways to include freeway on-ramps, conventional highways, principal arterials, and transit.

3. Data collection in support of performance monitoring needs to be:
   - **Automated** - This will reduce costs and provide more frequent data collection.
   - **Uniform** - If system performance is to be monitored over time, then data collection efforts must be consistent year to year.
   - **Reported** - Performance monitoring information needs to be regularly reported to decision-makers to assist in project selection and programming decisions and to the general public to assist them in making travel route and mode choices.

4. The most useful indicators of how well our transportation system is performing should include:
   - **Travel Time** - The average time it takes to complete a trip.
   - **Travel Speed** - The average speed of a trip.
   - **Usage** - Changes in traffic, transit ridership, or bicycle facility usage.

   These basic data can be combined to generate other indicators, for example, speed and traffic volume are used to determine roadway level of service (LOS), an indicator of congestion levels.

5. Data availability and accuracy should be sufficient to support development of a decision support system and real-time proactive operational strategies.

6. Augmenting these automated data collection efforts should be periodic surveys to assess customer satisfaction and to identify other needed improvements from a user perspective.

These identified improvements and principles provide the basis for the recommended actions at the end of this chapter.
CONGESTION MANAGEMENT PROGRAM

State Proposition 111, passed by voters in 1990, established a requirement that urbanized areas prepare and regularly update a congestion management program (CMP). The purpose of the CMP is to: (1) monitor the performance of our transportation system; (2) develop programs to address near-term and long-term congestion; and (3) better integrate transportation and land use planning. If a CMP roadway segment falls below the established level of service (LOS) standard, then a Deficiency Plan needs to be prepared. The current CMP LOS standard, as established by the original 1991 CMP, is LOS E. The LOS analysis is based on density and speed measurements thresholds using the Highway Capacity Manual (HCM) methodology.

The CMP requirement supports the concept that large capital projects alone cannot solve our congestion problems and that local land use decisions contribute to roadway congestion. SANDAG, as the designated congestion management agency (CMA) for the San Diego region, adopts and regularly updates the CMP. In July 2006 SANDAG adopted the 2006 CMP. Key CMP highlights are included below:

- **Promote Non-Traditional Strategies** – The focus is the use of near-term, lower-cost alternative transportation strategies to address congestion. These strategies are grouped into the following areas: transportation demand management (rideshare programs, transit pass subsidies, flexible work hours, teleworking, etc.); transportation system management (signal synchronization, peak-period parking restrictions, bicycle paths, etc.); land use (mixed-use developments, smart growth strategies); and design guidelines (pedestrian, transit oriented, bicycle, etc.). These strategies, which are described in other chapters of the 2030 RTP, can be used in preparing deficiency plans, mitigating new development impacts, and supporting other local planning activities.

- **Project Mitigation** – For all major development projects, appropriate CMP strategies are encouraged to mitigate significant impacts on the CMP system, as determined by local agencies. Through the early mitigation of new development impacts, it may be possible to reduce future congestion on the CMP network. The CMP can assist agencies with this responsibility by offering a range of mitigation strategies that can be applied to unique development project impacts and varying local conditions.

- **CMP Compliance Monitoring** – The CMP recommends that SANDAG take a more proactive stance in working with local jurisdictions and transportation operators to monitor implementation of the CMP and to fine tune the CMP in response to evolving local needs.

WHAT ARE OUR OPTIONS TO BETTER MANAGE CONGESTION?

- Identify current and potential congestion “hot spots”
- Address congestion on a corridor level
- Use a wide variety of non-traditional and low-cost solutions to better manage congestion
**Deficiency Plan Development Process** – Instead of preparing individual deficiency plans for all roadway segments projected to be deficient in the future, a first step will be to use RTP as a systemwide deficiency plan. This process provides the ability to evaluate roadway congestion and recommend systemwide and individual corridor improvements. The new development plan process is includes the following key steps:

- **Identifying Deficient Segments** – The development of the 2008 CMP will include a systemwide deficiency plan analysis to identify deficient roadway segments.

- **Addressing Deficient Segments with the 2030 RTP** – The deficient roadway segments then will be evaluated to determine and identify possible mitigation strategies based on identified long- and near-term transportation improvements, programs, and projects included in the 2030 RTP. The new process places emphasis on the 2030 RTP as the primary resource to determine if the CMP Level of Service E standard is met along the CMP roadway network.

- **Segments Needing Further Analysis** – Further CMP deficiency analysis will be conducted for deficient roadway segments that are not eliminated by proposed 2030 RTP long- or near-term transportation improvements, programs, or projects. This analysis will be conducted by SANDAG in cooperation with local jurisdictions.

- **Deficiency Plan Requirements** – SANDAG will collaborate with local agencies to initiate deficiency plan preparation through subregional planning studies. A key effort anticipated involves having SANDAG and local jurisdictions work together to identify and prioritize the development of subregional planning studies. This effort will assist SANDAG to determine and set priorities in the Overall Work Program for developing deficiency plans. These studies can help coordinate the development of regional highway, light rail, and bus rapid transit projects with local land use and transportation plans, one of the key initiatives identified in the RCP.

Figure 7.1 depicts the CMP network and Figure 7.2 shows the 2005 level of service included in the 2006 CMP. The existing levels of service depicted in this figure are slightly different than the ones in Figure 1.4. The base years are different (2005 versus 2006), and volumes in Figure 1.4 are generated by the transportation model instead of actual traffic data (Figure 7.2). The Deficiency Plan Process is shown in Figure 7.3. The recommended actions necessary to promote the recommendations of the 2006 CMP update are provided at the end of this chapter.
Figure 7.1
CONGESTION MANAGEMENT PROGRAM (CMP) SYSTEM (2006 Update)
November 2007

State Freeways
State Highways
CMP Arterials

0 3 6
MILES
0 4.83 9.6
KILOMETERS

SANDAG
2030 Regional Transportation Plan
Figure 7.3—Deficiency Plan Process

1. Deficient Segment
   → Regional Transportation Plan (RTP)
   → Systemwide Analysis and Recommendations

2. Segments Needing Further Analysis
   → Deficient Segment
   → Deficient Segment
   → Deficient Segment
   → Deficient Segment
   → Deficient Segment

3. Deficiency Plan Requirements
   → Individual Deficiency Plan
   → Individual Deficiency Plan
   → Individual Deficiency Plan

4. Individual Deficiency Plan

(1) CMIP identifies deficient segments.
(2) As part of RTP development, deficient segments are evaluated and potential improvements modeled. Deficient segments addressed by RTP recommendations are noted and documented.
(3) Deficient segments not addressed by RTP recommendations are identified and will require further evaluation by local jurisdictions in cooperation with SANDAG.
(4) Individual deficiency plans are prepared jointly by local jurisdictions and SANDAG for segments not addressed in the RTP.
Freeway Service patrol
The purpose of the Freeway Service Patrol (FSP) is to alleviate traffic congestion associated with non-recurring traffic incidents. The FSP program supports the 2030 RTP goals of Reliability and Efficiency by minimizing disruptions to the freeway system caused by minor traffic incidents. This is accomplished by providing for the rapid removal of disabled vehicles, helping stranded motorists, assisting with traffic accidents, and removing debris from the roadway as needed.

The FSP continuously patrols selected freeway segments during both morning and afternoon commute periods, Monday through Friday. All FSP services are provided free of charge to motorists. The program is funded by SANDAG and Caltrans, with field supervision provided by the California Highway Patrol (CHP). Currently, 25 tow trucks and 7 light-duty pick-up trucks are used for 13 FSP beats or patrols covering sections of Interstates 5, 8, 15, 805 and State Routes 52, 56, 54, 78, 94, 125, 163, and 905 for a total of 225 miles of coverage. Approximately 60,000 motorists are assisted annually.

In response to changing traffic patterns and traveler behavior, future expansion of the FSP are planned to improve both the current coverage and to expand the program’s coverage to more highways and off-peak periods, including weekends. Other FSP improvements include additional FSP service during major capital construction projects. The 2030 RTP continues to support increased funding levels for enhanced or expanded FSP services introduced in MOBILITY 2030.

PUBLIC SAFETY

Several natural disasters and acts of terrorism have brought the safety and security of our transportation system to the forefront. The federal transportation bill is the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). It calls for an increased emphasis to be placed on the safety and security of the transportation system. On a regional planning scale, three key areas of concern have been identified: the ability to plan for and react to natural disasters; the capability to respond effectively to man-made events; and the interoperability of various public safety communication systems.

The San Diego region has a number of existing organizations, plans, and infrastructure in place to provide for the safety of the regional transportation system. Additionally, there are a number of current or pending efforts to plan for and respond to large-scale natural or man-made disasters and improve public safety communications systems.
Within the San Diego region the Unified San Diego County Emergency Services Organization (OES) coordinates the overall county response to disasters and provides for a single operational area for the coordination of mitigation, preparedness, response, and recovery. The San Diego Transportation Management Center (TMC) integrates Caltrans’ Traffic Operations and Maintenance and the CHP communications in a unified communication and command center and provides communications, surveillance, and computer infrastructure to coordinate transportation management on state highways.

Hurricane Katrina demonstrated the importance of having plans to evacuate persons without access to private vehicles. Identified coordination and response agencies provide for a systematic response to natural and man-made disasters, and existing infrastructure, such as changeable message signs (CMS) and the Reverse 911 telephone system, allow for information to be shared with portions of the population in an expeditious manner. The Reverse 911 telephone system was employed with positive results when over 500,000 people were evacuated during the San Diego County wildfires in October 2007.

As neighbors and key trade partners, assuring safe and time-efficient travel is critical to the economies of both California and Baja California. The U.S. Customs and Border Protection (CPB) have many systems in place to prevent the entrance of potentially dangerous persons and materials. Many physical, technology, and policy systems are in place to ensure the safety and security at the border.

SANDAG and various local, state and federal agencies continue to work together to continue to improve the safety and security of the transportation system.

**HIGH OCCUPANCY TOLL (HOT) LANES**

The 2030 RTP includes plans for high occupancy toll, or “HOT” lanes on our major freeways, including Interstates 5, 15, and 805, as well as a portion of State Route 52. These lanes are limited access lanes in which carpools, vanpools, and buses have first priority and travel for free, while other vehicles gain access by paying a fee.
The expansion of HOT lanes builds upon the success of the I-15 FasTrak® program, which has been operating since 1996 on the I-15 Express Lanes from the I-15/SR 163 junction to SR 56. The I-15 FasTrak® program is the first facility to employ “dynamic pricing” in the country. It uses electronic toll collection technology to vary solo driver fees in real-time. SANDAG continues to monitor the program and evaluate opportunities to expand the HOT lanes concept to similar facilities for highway access ramps and connectors. The HOT lanes proposed throughout the region are detailed in the Systems Development chapter. Net revenue from HOT lane programs will be used for transit service in the same corridor.

INTEGRATED PERFORMANCE MANAGEMENT

An important strategy in maximizing the efficiency of the existing system is cohesive management of the modal components. The region’s ground transportation network is the collection of our freeways, roads, and transit systems. Although these elements can be identified separately, they are interrelant and require a comprehensive management focus to achieve our mobility goals. This comprehensive, effects-driven approach is termed Integrated Performance Management (IPM). Improving mobility requires strategies, such as IPM, that deliver choices and combinations for travel, while focusing on the higher-level strategy of balancing system and demand management.

Implementation of an integrated performance strategy uses Intelligent Transportation System (ITS) deployments to deliver real-time and proactive operations by providing our system managers a decision support tool. This tool, built upon the performance monitoring capabilities discussed earlier in this chapter, combined with predictive analysis, will provide a “live” view into how the system is working overall, identify potential developing issues, and identify operational strategies to negate or remediate the impact.

The successful delivery of integrated performance management, customer choice, and balancing demand management with systems management can only be met through the introduction of new technologies and innovative services. New technologies and services have the potential to drastically change the way we manage the transportation network, deliver services, and empower customers to efficiently use the system.
CHAPTER 7
SYSTEMS MANAGEMENT: MAKING BETTER USE OF WHAT WE HAVE

INTELLIGENT TRANSPORTATION SYSTEMS

The purpose of an ITS is to improve transportation systems management, performance, and safety. The concept of developing a strategy for using ITS was established under a larger national planning effort initiated by the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). Under ISTEA, the U.S. Department of Transportation (U.S. DOT) encouraged the application of advanced transportation systems and technologies to improve the efficiency and safety of the nation’s existing transportation infrastructure.

Commitment for implementing and undertaking ITS strategies has been reaffirmed through subsequent federal legislations. Early efforts undertaken by SANDAG included the completion of the region’s first ITS Strategic Plan as part of SANDAG’s 2020 RTP. A new 2007 ITS Strategic Plan is being developed. The following section discusses the status of current ITS activities in the region.

A key aspect of the region’s ITS Strategic Plan is the development of the Integrated Performance Management Systems Network that will interconnect the region’s local transportation management centers (see Figure 7.4) and integrate data from the modal management systems. Completion of this network will enable the modal agencies to cohesively manage the overall performance of the local and regional transportation systems.

The SANDAG ITS Strategic Plan identifies the future needs of the region’s transportation system users and local agencies and recommends the appropriate strategies and systems to serve those needs through better management and integration of the regional transportation system. The potential technologies and integration plans are described in the San Diego Regional ITS Architecture as part of the overall ITS Strategic Plan.

To date, the region has made significant investments in deploying systems as part of the regional network. The network includes the following modal management subsystems to provide the agencies with the necessary systems and tools to better manage the region’s freeways, arterials, transit, incidents and emergency response, special events, commercial vehicle operations, and traveler information:

- **Freeway Management System** – enables Caltrans District 11 to better manage the region’s freeways through installation of new computer hardware, software, vehicle detection, and cameras. It will help coordinate freeway operations with adjacent regions, improve incident detection and clearance, coordinate freeway-arterial operations with the local agencies, and further refine ramp-metering systems to dynamically adapt to changes in traffic.
- **Arterial Traffic Management System** – enables local agencies to better manage traffic with improved hardware and software. It enables the local agencies to coordinate traffic signal timing across jurisdictional boundaries, optimize traffic flow on regionally significant arterials, manage traffic caused by special events and major accidents, and coordinate arterial signals with freeway ramps, transit service, and rail grade crossings.

- **Transit Management System** – provides transit with a field operations management system to enable improved route planning, scheduling, and performance monitoring. The system, using vehicle tracking and on-time performance monitoring technologies, will provide emergency alert tracking and transit signal priority to keep transit vehicles on time. The system also will provide real-time transit information through kiosks, message boards, automated passenger counting, and the 511 Advanced Traveler Information System project.

- **Advanced Traveler Information System (511)** – collects real-time data from the freeway, arterial, and transit systems described above and packages it for the delivery traveler information. This system meets a key need of providing real-time traffic and transit information to the traveling public through the phone and Web at www.511sd.com. Advanced technology has been utilized to deliver an interactive voice response system on the 511 telephone system that allows for hands-free telephone utilization. Envisioned for the future is the inclusion of other transportation-related information, such as parking, and the dissemination of traveler information through wireless devices, such as cell phone, personal digital assistant (PDA), and in-vehicle navigation systems. The 511 system was launched in February 2007 with the goal of providing real-time information to the public as a means to improve mobility by promoting mode choice and influencing when users travel.

- **FasTrak® and Compass Card Electronic Payment Systems** – provide customers and operators with simple yet powerful tools to make and collect payments. The region’s I-15 Managed Lanes facility uses state-of-the-art, open road tolling technology to dynamically adjust rates and charge user accounts. As an initial deployment for transit services in late 2007, the Compass Card system will provide customers with a seamless method to pay for and use transit services. Using smart card technology, customers will be able to board vehicles quicker, and transit managers will be able to reduce the complexity of fare policies within the region. Future expansion of the Compass Card will provide for payment of on- and off-street parking fees and to a patron’s FasTrak® account.
ADVANCED TECHNOLOGIES AND INNOVATIVE SERVICES

As the state of knowledge regarding the effects and practical impacts of advanced transportation technologies grows, new challenges and new directions emerge. In particular, the capabilities of new technologies with respect to overall system management offer considerable potential. These advanced technologies present opportunities that should be evaluated and where appropriate, exploited to achieve the desired effects.

Transportation and systems engineering professionals recognize that technologies in themselves do not deliver effects and value. It is only when the technologies are packaged together as a set of coherent and focused applications that support the delivery of services, that effects and value can be delivered, measured, and managed. Therefore, the most effective application of advanced technologies can be attained through a focus on the applications that can be supported and the service or value that can be delivered to the citizens of the San Diego region.

During the last seven years, the San Diego region has been involved in multiple ITS program activities. The San Diego region has successfully delivered the modal management subsystems for freeways, arterials, and transit, along with the data integration, to deliver traveler information. It will work to add further sophistication to these subsystems, incorporate innovative services, and develop an integrated performance management system as key elements of the region’s system management strategy.

The programs, projects, and strategies for delivering a comprehensive mobility program are described in the ITS Strategic Plan. The ITS Strategic Plan provides for an effects-based approach to using measurable ITS implementation as a congestion mitigation tool. SANDAG pursues federally supported initiatives to conduct pilot operational studies of technologies and innovative services to assess regional value. Some of the key programs and projects SANDAG is working to evaluate include:

- **Smart Parking** – A sophisticated parking information and management system making use of Web technologies, wireless telecommunications, and a parking sensor network that will deliver new services to the citizens of San Diego. As the first step toward a regional parking management system, drivers who park at selected stations along the COASTER route paralleling the I-5 will be able to determine parking space availability in real time and, if desired, reserve a predetermined parking space for an additional service fee. The deployment of a parking management and payment system in coordination with FasTrak® and Compass Card will enable SANDAG to experiment with coordinated pricing for travel and explore ways to balance transportation demand by increasing value to transit users.
Figure 7.4
SAN DIEGO REGION INTEGRATED PERFORMANCE MANAGEMENT SYSTEM
November 2007

Local Transportation Management Center
Caltrans Transportation Management Center

MILES
0 3 6
KILOMETERS
0 4.83 9.6

SAN DIEGO REGION INTEGRATED PERFORMANCE MANAGEMENT NETWORK
SOUTHERN CALIFORNIA INTERREGIONAL IMTMS NETWORK
Congestion and Value Pricing on Managed Lanes, Connectors, and Ramps – Building on the initial success delivered through the I-15 Managed Lanes and Dynamic Toll projects, this project will extend and enhance the portfolio of dynamic pricing mechanisms that SANDAG currently employs for demand management. Pricing infrastructure will be extended to cover selected connectors and a network of ramp meters in the region. Using a range of pricing strategies and mechanisms, SANDAG will offer commuters a wider range of new choices to purchase time savings and increased reliability.

Smart Vehicles – Passenger vehicles are being equipped with the latest advances in technology, enabling development of ground-breaking safety and mobility applications along with new management tools. The U.S. DOT Vehicle Infrastructure Integration (VII) initiative develops a wireless communication network between vehicles, roadside elements, and transportation management systems, taking advantage of the emerging intelligence and capabilities of modern vehicles. The ability to exchange and collect data from vehicles will provide for significant improvements in safety, delivery of traveler information, and our ability to manage the system in real-time. This project would conduct field operational tests of parking guidance, probe, payment, and traveler information applications.

Regional Wireless Data Network – The project will involve the planning, design, and implementation of a regionwide, high-speed wireless data service capable of supporting the full range of transportation technology projects defined for the region. While primarily designed to support applications such as smart vehicles, enhanced arterial data collection, public access to WiFi on transit vehicles, and a wide range of other advanced transportation technology projects, the network also will provide opportunities for public safety usage and public-private partnerships.

Universal Transportation Account – This initiative will deliver increased value and convenience of payment for transportation services by providing users with simpler and more flexible choices for the payment of transportation-related user fees such as tolls, parking fees and transit tickets. This pilot project would build on current FasTrak® and Compass Card initiatives by integrating the computer systems for tolling, transit, and parking payments, providing users with a single account to manage all their transportation expenses. The project also will test the use of new public-private partnerships and managed-service approaches to system delivery, operation, and management.

Integrated Corridor Management (ICM) – ICM applies advanced technology and uses a collaborative, cooperative, and coordinated systems management approach to improve mobility and safety across modes and networks for people and goods. ICM showcases the transportation possibilities that exist when highway, arterial, and
transit managers work together in a unified approach to address transportation problems. ICM helps reduce travel times for commuters within the corridor, helps public transportation become a more attractive option, increases the use of HOVs, and increases person throughput within the corridor. ICM approaches have a secondary benefit for safety and reduction in response times to corridor incidents through inclusion of incident management plans.
The following actions support the Plan’s System Management Chapter recommendations.

### SYSTEMS MANAGEMENT

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<th>Proposed Actions</th>
<th>Responsible Parties</th>
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<tr>
<td><strong>Performance Monitoring</strong> – The following proposed actions support the RTP goals of Mobility and Reliability.</td>
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</tr>
<tr>
<td>1. Implement a regional system to monitor 100 percent of the region’s urban freeways, on-ramps, and CMP arterial network through use of automated data collection systems.</td>
<td>Caltrans, SANDAG, and local jurisdictions</td>
</tr>
<tr>
<td>2. Implement monitoring of regional transit service through the use of automated data collection and vehicle location systems.</td>
<td>SANDAG, MTDB, NCTD, and Caltrans</td>
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<tr>
<td>3. Provide regular transportation system performance reports to the SANDAG Board of Directors and integrate and coordinate performance monitoring data with other ongoing planning and programming activities.</td>
<td>SANDAG</td>
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<tr>
<td>4. Regularly monitor average trip travel times and usage (volumes and ridership) for select travel corridors.</td>
<td>SANDAG</td>
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<td><strong>Congestion Management Program</strong> – The following proposed actions support the RTP goals of Reliability and Efficiency.</td>
<td></td>
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<tr>
<td>5. Complete the development of a systemwide deficiency plan through the RTP development process to address congestion in the region.</td>
<td>SANDAG, local jurisdictions, Caltrans, and transit agencies</td>
</tr>
<tr>
<td>6. Coordinate the development of subregional plans as a tool to address deficient roadway segments not evaluated in the RTP.</td>
<td>SANDAG, local jurisdictions, Caltrans, and transit agencies</td>
</tr>
<tr>
<td><strong>Freeway Service Patrol</strong> – The following proposed actions support the RTP goals of Reliability and Efficiency.</td>
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<tr>
<td>7. Regularly monitor the FSP program and modify, as needed, in response to changing traffic and commute patterns.</td>
<td>SANDAG</td>
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<tr>
<td>8. Implement an automated FSP vehicle fleet tracking and management system to monitor and report FSP program performance.</td>
<td>SANDAG</td>
</tr>
<tr>
<td>9. Seek additional federal, state, and local funding to expand the FSP program to other freeways and roadways and to off-peak commute times.</td>
<td>SANDAG</td>
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### Proposed Actions

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<th>Public Safety – The following proposed actions support the RTP goals of Reliability and Efficiency.</th>
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<tr>
<td>10. Coordinate emergency planning and implementation among various local, state, and federal agencies to allow for effective responses and eliminate duplication of efforts.</td>
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<tr>
<td>11. Develop emergency operations plans to evacuate residents via transit in the case of a large-scale emergency or disaster.</td>
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<tr>
<th>High Occupancy Toll Lanes – The following proposed actions support the RTP goals of Mobility and Efficiency.</th>
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<tr>
<td>12. Expand the HOT lane pricing concept to other existing or planned HOV/Managed Lanes to maximize lane capacity and obtain necessary state and federal legislation/approvals.</td>
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<tr>
<td>13. Consider peak-period pricing as an alternative whenever major new highway capacity is added.</td>
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<th>Integrated Performance Management and Advanced Technologies and Innovative Services – The following proposed actions support the RTP goals of Mobility, Reliability, and Efficiency.</th>
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</thead>
<tbody>
<tr>
<td>14. Monitor and support the development of an Integrated Performance Management System through the completion of the regional ITS Strategic Plan.</td>
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<td>15. Coordinate development and implementation of ITS Strategic Plan projects within the San Diego region so that the network is interoperable, compliant with the national and regional ITS architecture, and delivers aspects of integrated performance management.</td>
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<td>16. Monitor development of smart vehicles and the vehicle infrastructure integration initiatives and seek funding to conduct a field operations test.</td>
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<td>17. Regularly update the 511 systems and services to stay current with changes in technology and availability of transportation information.</td>
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<tr>
<td>18. Complete the evaluation of Smart Parking COASTER/I-5 study.</td>
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<tr>
<td>19. Implement the I-15 Integrated Corridor Management System.</td>
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</tbody>
</table>