Our existing transportation system represents a major investment of resources over the past several decades. While MOBILITY 2030 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. At the same time, lower cost investments in existing transportation facilities, which can be implemented in the near-term, will help reduce the need for higher cost investments in the future.

Equally important to maximizing transportation system performance is making real-time travel information available to assist people in making informed travel choices. Studies have shown that transportation system users are willing to accept a certain level of congestion, especially during peak periods and will take these delays into consideration when making their travel plans. What they do not like are delays that are unpredictable or significantly greater than those they normally encounter. With the advent of modern technology it is possible to control and reduce the impacts of roadway incidents or special events and advise travelers of alternative routings.

Key to getting the most out of our investment is to monitor its performance (Performance Monitoring); “fine tune” the facilities to better manage congestion through low-cost, near-term strategies (Congestion Management Program, Freeway Service Patrol); and incorporate the latest technological advances in transportation (Advanced Technologies and HOT Lanes). These strategies are described in this Systems Management Chapter.

PERFORMANCE MONITORING

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.

Consistency and frequency of data collection are key to tracking how well the transportation system is performing. The following section outlines the status of current or near-term regional transportation system performance monitoring efforts.

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It is critical that the region make the best use of the existing facilities until the benefits of future system improvements are realized.
CHAPTER 7
SYSTEM'S MANAGEMENT: MAKING BETTER USE OF WHAT WE HAVE

STEPS TO IMPROVE TRANSPORTATION SYSTEM PERFORMANCE

- Determine the information best suited for performance monitoring
- Collect consistent data on a regular basis, and automate data collection as much as possible
- Report the results of monitoring efforts to decision-makers and the general public
- Adjust decisions based on monitoring results

➢ 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. Approximately 70 percent of the urban freeway system is automatically monitored through use of these detectors, and Caltrans has an ongoing program to install additional detectors. Manual data collection is done on other freeway segments and some conventional highways.

For local streets and roads, traffic volume counts also are 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. SANDAG is proposing to install permanent detectors on the Congestion Management Program arterial and conventional highways network so data can be continuously and automatically collected, similar to the urban freeway system.

In cooperation with UC Berkeley, Caltrans has developed a Performance Measurement System (PeMS) program that uses the urban freeway data collected through freeway loop detectors. This program provides current, ongoing data on freeway volumes and speeds and can be displayed graphically and exported to other monitoring applications.

➢ Transit System - Through SANDAG’s annual passenger counting program, transit ridership information is reported to the two transit districts - the Metropolitan Transit Development Board and the San Diego North County Transit District. This information is supplemented by each transit district’s own payment-based counts and other transit operational data (e.g., bus speed, mileage, hours of service). Each district develops their short-range transit plans using these data. The ridership data are currently collected manually, although there are plans to implement an automated passenger counting and a vehicle location system. In addition, SANDAG regularly conducts both on-board passenger and residential opinion surveys to better gauge ridership trends and satisfaction with transit service.
Roadway & Transit Travel Times - In 2002, SANDAG began implementing a monitoring program to track and compare auto and transit trip travel times within representative travel corridors in the region. Participants in the program are asked to monitor their door-to-door travel times including transfers and wait times (if via transit) and ramp metering delays (if via auto). The program is evaluating both manual and automated data collection techniques.

Since the adoption of the 2020 RTP, SANDAG has re-examined these monitoring efforts. Issues considered include: What types of data are best suited to assess the performance of our multimodal transportation system? How can we build upon existing data collection efforts? What is the best way to collect these data and how often? Who should be responsible for the data collection and monitoring, and how will we pay for it? How will this information be used?

Based upon this analysis, the following needed improvements in performance monitoring were identified:

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

2. The existing automated freeway data collection and reporting activity available 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. 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 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.

The CMP requirement was born of the realization 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. This section summarizes the main features of SANDAG’s 2002 CMP.

In addition to meeting the legislative requirements, the CMP provides a number of benefits both to the region as a whole and to local jurisdictions. These benefits include:

- **Ongoing System Monitoring** - The CMP provides regular, consistent monitoring of the region’s roadway and transit system performance that is used to identify congestion “hot spots” and to prepare deficiency plans. Deficiency plans are used by SANDAG, the transit districts, Caltrans, and local jurisdictions to further investigate the causes of congestion and to identify remedial actions as well as establishing funding mechanisms for capital projects.

- **Wide Range of Non-Traditional Strategies** - In addition to the traditional capital projects (road widenings or extensions), the CMP offers a wide range of alternative strategies to better manage congestion. Congestion is caused by a variety of factors and accordingly, potential solutions need to be varied and flexible in order to respond to local conditions and funding opportunities.

- **Focus On Near-Term Solutions** - The CMP focuses on near-term, low cost strategies that can be implemented earlier than the more capital intensive, long-range RTP recommendations. These strategies can be used by local agencies to address the impacts at the onset of new development projects, minimizing larger project impacts in the future.
Since the prior 2020 RTP, SANDAG has adopted a major update of the CMP. The major changes in the 2002 CMP update are summarized below:

- **Greater Focus on Non-Traditional Strategies** - The new CMP focuses more on 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 MOBILITY 2030, can be used in preparing deficiency plans, mitigating new development impacts, and supporting other local planning activities.

- **Increased Use of Deficiency Plans** - The CMP recommends increased use of deficiency plans to further investigate and recommend specific mitigation measures for congestion “hot spots” identified as a result of ongoing roadway system monitoring. The CMP further recommends that deficiency plans be used as one means to mitigate the impacts of new development projects. Deficiency plans will be developed in partnership among SANDAG, Caltrans, the two transit districts, and local jurisdictions. The CMP provides improved guidelines for preparing deficiency plans and increased SANDAG involvement with their development.

- **Improved Project Mitigation** - For all major development projects, the CMP encourages the use of appropriate strategies contained within the CMP, as determined by local agencies, to mitigate significant impacts on the CMP system. 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.

- **Increased 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.

The general approach recommended in the 2002 CMP update is summarized in Figure 7.1. Figure 7.2 depicts the CMP system, and Figure 7.3 shows 2002 level of service on the CMP system based on actual conditions. The recommended actions necessary to implement the recommendations of the 2002 CMP update are provided at the end of this chapter.
“Regular Check-Ups” – The CMP roadway system is regularly monitored (annually for highways, every two years for arterials) against the adopted level of service standard.

“See You Next Time” – If the roadway standard is met for a given segment, then the segment is evaluated again in two years for CMP arterials and next year for CMP freeways and conventional highways.

“More Tests Are Needed” – If the roadway standard is not met for a given segment, then the segment is further evaluated.

“Preventive Medicine” – On an ongoing basis, the impacts of new major developments on the CMP system are evaluated, and if there are significant impacts, then an attempt is made to mitigate those impacts.

“Treatment Plan” – This consists of either (1) approved mitigation for a new development project or (2) an approved deficiency plan containing recommendations for improving a roadway’s performance.

“Pay Insurance Premium” – If it is not feasible to fully mitigate new development impacts, then the project sponsor has the option of helping fund approved deficiency plan recommendations.

“Medicine Cabinet” – Consists of a number of congestion management strategies for use in preparing deficiency plans and/or to mitigate the transportation impacts of new development projects.
Figure 7.2
CONGESTION MANAGEMENT PROGRAM (CMP) SYSTEM
April 2003

- State Freeways
- State Highways
- CMP Arterials

SANDAG
Figure 7.3
CONGESTION MANAGEMENT SYSTEM PROGRAM (CMP)
2002 Update

2001 Peak Hour Level of Service

Freeways
Arterials

LOS A-C
LOS D
LOS E
LOS F
NO DATA

MILES
0 3 6
KILOMETERS
0 1.9 3.18

SANDAG
The purpose of Advanced Technologies is to develop an integrated Intelligent Transportation Systems Strategy (ITS Strategy) using the latest advances in technology to better manage our transportation systems performance and safety. The concept of developing an ITS Strategy 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 encouraged the application of advanced transportation systems and technologies to improve the efficiency and safety of the nation’s existing transportation infrastructure.

The latest federal legislation, the Transportation Equity Act for the 21st Century (TEA-21), further supports this national effort and provides guidelines for inclusion of the regional ITS Strategy and architecture in the regional transportation planning process. SANDAG integrated a regional ITS Strategy with the previous 2020 RTP. The following section discusses the status of current ITS activities in the region.

The cornerstone of the region’s ITS Strategy is the development of the Regional Intermodal Transportation Management Systems Network that will interconnect the region’s local transportation management centers (see Figure 7.4). Completion of this Network will enable the modal agencies to cooperatively manage the overall performance of both the local and regional transportation systems. The Network will connect the San Diego region to the other regions in Southern California and eventually, to all of California and other states.

SANDAG’s ITS Strategic Plan identifies the future needs of the region’s transportation system users and local agencies and recommends the appropriate technologies to serve those needs through better management and integration of the regional transportation system. The ITS Architecture for the San Diego region is described in the Technical Appendices.

To date, SANDAG has allocated approximately $30 million in federal Congestion Mitigation and Air Quality (CMAQ) funds toward the improvements now underway. Closed circuit television incident detection systems are being installed or are in the design phase for several of our major freeways (Interstates 5, 8, 15, and 805, and State Routes 75, 94, and 163). Installation of changeable message signs and ramp meters also are planned where missing today.
Figure 7.4
SAN DIEGO REGION INTERMODAL TRANSPORTATION MANAGEMENT SYSTEM (IMTMS)
April 2003

Local Transportation Management Center
Caltrans Transportation Management Center

MILES 0 3 6
KILOMETERS 0 4.83 9.6

SAN DIEGO REGIONAL IMTMS NETWORK
SOUTHERN CALIFORNIA INTERREGIONAL IMTMS 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, loop detectors, 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 signal advantage to keep transit vehicles on-time. The system also will provide real-time transit information through kiosks, message boards, and the traveler information system project. The necessary communications infrastructure to support automated passenger counting (to support performance monitoring efforts) and electronic fare payment to make boarding more convenient and efficient also would be provided.

- **Traveler Information/Performance Monitoring Systems** - collects real-time data from the freeway, arterial, and transit systems described above and provides traveler information. This system will meet two key needs: enable the delivery of real-time traffic and transit conditions to the traveling public, and provide an ongoing source of data to transportation planners and researchers to identify efficiency and safety improvements to the transportation system. Envisioned for the future in MOBILITY 2030 is the dissemination of traveler information through wireless cellular and personal digital assistant (PDA) Internet devices and in-vehicle navigation systems. Advanced technology already allows Internet-based text messages to be converted to voice – so that future traveler information devices will “speak to you,” rather than require you to take your eyes off the road.

This Advanced Traveler Information System will meet two key needs: enable the delivery of real-time traffic and transit conditions to the traveling public, and provide an ongoing source of data to transportation planners.
Since the adoption of the 2020 RTP, the San Diego region became involved in two ITS program activities. First, the region is a part of the Southern California ITS Priority Corridor (Los Angeles to San Diego) – a national ITS demonstration corridor designated by Congress. SANDAG serves as the contract administrator for the Priority Corridor demonstration project on behalf of the 22 agencies which make up this important multi-regional effort to build a Southern California Transportation Systems Management Network (completed January 2001). The Corridor Network project provides the essential communications and “translator-like” software services necessary to link the dissimilar local and regional agency systems so that they can work together cooperatively.

Second, the San Diego region is now beginning to build the Regional Network and modal management subsystems – freeways, arterials, transit, and traveler information – so that the individual modes can operate in a coordinated manner. The current initial projects for the Regional Network are scheduled to be delivered between now and 2004 and are described in the Technical Appendices. The Technical Appendices provide a listing of regional projects completed or currently underway.

**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 MOBILITY 2030 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 the motorists. The program is funded by SANDAG and Caltrans, with field supervision provided by the California Highway Patrol. Currently 26 tow trucks are used for seven FSP “beats” or patrols covering portions of Interstates 5, 8, 15, 805 and State Routes 54, 78, 94, 125, and 163 for a total of 204 miles of coverage. Approximately 60,000 motorists are assisted annually.

In response to changing traffic patterns and traveler behavior, future expansions 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 may include a rotator truck during major traffic incidents (which greatly reduces the duration of the incident) and/or additional FSP service during major capital construction projects. MOBILITY 2030 includes a doubling of current funding levels for expanded FSP.
HIGH OCCUPANCY TOLL (HOT) LANES

MOBILITY 2030 includes a robust network of Managed/HOV lanes. One way to “manage” these lanes is to restrict access to multi-occupancy vehicles. Another management technique is to charge a fee for use of the lanes. This second concept is typically referred to as high occupancy toll or “HOT” lanes.

MOBILITY 2030 includes plans for HOT lanes on our major north-south freeways, including Interstates 5, 15, and 805, and 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 lanes are managed through variable pricing to maintain free flow conditions even during rush hours.

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 award winning I-15 FasTrak™ program is the only facility to employ “dynamic pricing” in the country. It uses electronic toll collection technology to vary solo driver fees in real-time. By state law, the net revenues generated by the program are used to improve transit and carpool services in the I-15 corridor. The program revenues currently fund the Inland Breeze express bus service in the corridor.

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.

The award winning I-15 FasTrak™ program is the only facility to employ “dynamic pricing” in the country.
## ACTIONS

The following actions support the Plan’s System Management Chapter recommendations.

<table>
<thead>
<tr>
<th>Proposed Actions</th>
<th>Responsible Parties</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance Monitoring</strong> - The following proposed actions support the RTP goals of Mobility and Reliability.</td>
<td></td>
</tr>
<tr>
<td>1. Implement a regional system to monitor 100 percent of the region’s urban freeways and on-ramps, and CMP arterial network through use of automated data collection systems.</td>
<td>Caltrans, SANDAG, &amp; 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, &amp; Caltrans</td>
</tr>
<tr>
<td>3. Provide regular transportation system performance reports to the SANDAG Board of Directors and integrate performance monitoring data into ongoing planning and programming activities. Develop an annual State of the Commute report beginning in FY 2004.</td>
<td>SANDAG</td>
</tr>
<tr>
<td>4. Maintain an annual program to monitor bicycle traffic along key bicycle facility corridors, and summarize in annual State of the Commute reports.</td>
<td>SANDAG, local jurisdictions, &amp; transit agencies</td>
</tr>
<tr>
<td>5. Regularly monitor average trip travel times by mode for select travel corridors.</td>
<td>SANDAG</td>
</tr>
<tr>
<td><strong>Congestion Management Program</strong> - The following proposed actions support the RTP goals of Reliability and Efficiency.</td>
<td></td>
</tr>
<tr>
<td>6. Prepare and monitor implementation of deficiency plans as a tool to address congestion “hot spots” in the region.</td>
<td>SANDAG, local jurisdictions, Caltrans, &amp; transit agencies</td>
</tr>
<tr>
<td>7. Assemble, update, and disseminate information on low cost, near-term strategies to better manage congestion.</td>
<td>SANDAG</td>
</tr>
<tr>
<td><strong>Intelligent Transportation Systems</strong> - The following proposed actions support the RTP goals of Mobility, Reliability, and Efficiency.</td>
<td></td>
</tr>
<tr>
<td>8. Complete the ramp metering system in the urban area.</td>
<td>Caltrans</td>
</tr>
<tr>
<td>9. Set metering timing to maximize the efficiency of the overall transportation network, while equitably distributing wait times along freeway corridors.</td>
<td>Caltrans, SANDAG, transit agencies, &amp; local jurisdictions</td>
</tr>
<tr>
<td>10. Regularly update the Regional ITS Plan and maintain a priority list of projects and activities to support the modal agencies’ needs.</td>
<td>SANDAG</td>
</tr>
<tr>
<td>Proposed Actions</td>
<td>Responsible Parties</td>
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<tr>
<td>11. Coordinate development and implementation of ITS projects within the San Diego region and with similar projects elsewhere in Southern California so that the network is interoperable and compliant with the national and regional ITS architecture.</td>
<td>SANDAG</td>
</tr>
<tr>
<td>12. Develop a TMS Action Plan to improve the efficiency and safety of the overall transportation system and modal elements.</td>
<td>SANDAG</td>
</tr>
<tr>
<td><strong>Freeway Service Patrol</strong> – The following proposed actions support the RTP goals of Reliability and Efficiency.</td>
<td></td>
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<tr>
<td>13. Regularly monitor the FSP program and modify as needed in response to changing traffic and commute patterns.</td>
<td>SANDAG</td>
</tr>
<tr>
<td>14. Implement an automated vehicle location (AVL) system to accurately track the location of FSP vehicles.</td>
<td>SANDAG</td>
</tr>
<tr>
<td>15. Seek additional federal, state, and local funding to expand the FSP program to other freeways and roadways and to off-peak commute times. Evaluate implementation of a rotator truck for the program.</td>
<td>SANDAG</td>
</tr>
<tr>
<td><strong>High Occupancy Toll Lanes</strong> – The following proposed actions support the RTP goals of Mobility and Efficiency.</td>
<td></td>
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<tr>
<td>16. 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>
<td>SANDAG &amp; Caltrans</td>
</tr>
<tr>
<td>17. Consider peak period pricing as an alternative whenever major new highway capacity is added.</td>
<td>SANDAG &amp; Caltrans</td>
</tr>
</tbody>
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