Metropolitan Transportation Commission San Francisco Bay Area

Developing Regional Objectives and Performance Measures to Improve System Operations

The Metropolitan Transportation Commission (MTC) uses an objectives-driven, performance-based approach in its transportation planning for the San Francisco Bay Area. This approach focuses attention on transportation investments of highest priority. The agency assesses not only project-level performance, but also wide-ranging regional performance in relation to ambitious targets set by the agency. Project-level analysis using metrics defined for regional objectives results in a quantitative assessment of a project's costs and benefits. To date, management and operations strategies, such as the agency's Freeway Performance Initiative, have proven the most cost-effective. This type of freeway and arterial coordination can yield major benefits, though numerous challenges remain including data inconsistencies and reaching consensus on appropriate analysis tools. The agency recognizes that a range of strategies is needed to improve traffic in one of the Nation's most congested areas.

Background

The Metropolitan Transportation Commission (MTC) is the transportation planning, coordinating, and financing agency for the nine-county San Francisco Bay Area. MTC's region includes the nine counties of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma, and 101 municipalities. The region has a population of approximately 7 million people with a projected growth of nearly 30 percent from 2000 to 2030. The region is already the second most congested nationally as measured by the Texas Transportation Institute in 2007. The region is highly developed, and there is limited capacity-addition planned for the future. As a result, system management is a priority.

MTC functions as the regional transportation planning agency, a State of California designation, and the region's metropolitan planning organization (MPO), a Federal designation. The Commission's work is guided by a 19-member policy board and carried out by a staff of approximately 130 persons in Oakland, California.

Figure 1. Map of the MTC planning area.
Source: MTC.

Developing a Performance-Based Metropolitan Transportation Plan

MTC began work in the summer of 2007 on the regional transportation plan update for 2035. It is anticipated to be complete in March 2009. The plan emphasizes performance, including quantifiable performance objectives and program and project assessment. MTC recognized that a performance-based planning approach would help focus attention on desired outcomes and would support investment decisionmaking to achieve measurable results. Developing regional performance objectives would allow for a more analytic approach to achieving policy objectives that relies on analytic methods to predict impacts of investments on system performance. This would set up an analytic framework for monitoring of system performance.

MTC used performance measures to evaluate projects in the past as part of the development of the regional transportation plan (RTP). In fact, the Commission is required under Senate Bill 1492 to establish performance measurement criteria on both a project and corridor level to evaluate and prioritize new investments for consideration in the RTP. In 2003, MTC conducted the required performance assessment for the Transportation 2030 Plan, but the evaluation results were available only after many of the key RTP investment decisions had been made. MTC

Policy Framework		
E'S	GOALS	PERFORMANCE OBJECTIVES
ECONOMY	Maintenance & Safety	Improve maintenance Local streets & roads: Pavement Condition Index of 75 or better State highways: distressed lane-miles no more than 10% of system Transit: average asset age no more than 50% of useful life *Source: State and local strategic plans*
		Reduce injuries and fatalities Motor-vehicle: 15% from today; bike/ped: 25% from 2000 levels *Source: State Strategic Highway Safety Plan*
	Reliability Freight	Reduce delay 20% per capita from today (recurring and non-recurrent) *Source: Governor's Strategic Plan*
ENIVIRON.	Clean Air Climate Protection	Reduce VMT and emissions VMT: 10% per capita from today Particulate matter: 10% to 45% from today CO2: 40% below 1990 levels *Source: State regulations and laws*
EQUITY	Access Livable Communities	Improve affordability 10% reduction in housing and transportation costs from today (low-income households)

Figure 2. MTC's overarching principles, goals, and related performance objectives that form its policy framework.
Source: MTC.

decided that to inform investment trade-off discussions in the updated plan, it would be useful not only to conduct project-level performance assessments, but also to establish regional performance objectives with quantitative targets early in the process to help guide investment analysis.

The 2035 RTP seeks to achieve three overarching principles referred to as the Three E's: Economy, Environment, and Equity. To help inform policy and assess investment scenarios, MTC developed a set of performance targets for each of these key principles, shown in Figure 2. Although the targets are viewed as ambitious, the Commission supported the use of these measurable objectives as "stretch" targets. The targets are intended to be used as a basis for comparison of plan alternatives and would be monitored over time. In January 2008, the Commission provisionally approved these performance targets.

Since the performance targets are at a regional level and are designed to support objectives-based investment decision-making, they cover a wide range of issues of importance to the region including congestion, air quality, and greenhouse gas emissions. Several of the specific performance targets reflect guidance from existing State regulations and plans. For instance, the target to reduce delay by 20 percent per capita reflects goals in the Governor's Strategic Plan. However, because the performance objectives do not constitute legal mandates, the Commission may in the future consider changes, substitution, or deletion of the performance objectives.

In the spring of 2008, MTC began conducting project-level analysis using the metrics that have been defined for the regional performance targets. Using metrics defined for the regional targets ensures that investment tradeoffs focus on determining which projects are most cost-effective in meeting the regional objectives. Individual projects and programs in the financially constrained plan do not have to help achieve each and every performance objective. However, the purpose of this analysis was to identify and advance high-performing, cost-effective projects for consideration in the fiscally constrained plan. The result was a quantitative analysis of project costs and benefits, relying largely on data generated through the regional travel demand model. One of the key measures used in this analysis was a combined benefit-cost measure capturing several elements:

- Reductions in delay (based on value of time associated with the regional wage rate).
- Particulate matter emissions (based on health effects) and greenhouse gas emissions.
- Collisions.
- Direct user vehicle operating costs.

Although each effect was also reported separately, all benefits were monetized for purposes of developing a benefit-cost ratio. In this calculation, when considering recurring and non-recurring delay (typically 80 to 90 percent of the monetized benefit), delay reduction was by far the biggest component. Additional quantitative evaluation metrics were also used, such as cost per reduction in vehicles miles traveled (VMT).

An initial summary of some of these results are shown in Figure 3.

As can be seen from this figure, MTC explored the overall benefits, benefit/cost ratio, and number of goals addressed by a wide range of different types of projects and programs. The initial analysis suggests that management and operations (M&O) strategies, including freeway management, high occupancy toll (HOT) lanes, and transit efficiency measures such as bus rapid transit and transit priority projects, are among the most cost-effective strategies.

Through the summer and fall of 2008, MTC analyzed investment alternatives. This process involved developing scenarios or packages of investments and policy approaches to explore how close MTC can get to achieving the regional performance objectives within a financially constrained plan. Although the planning process is still underway, the performance-based approach that is being taken in the metropolitan transportation planning process reflects an overall focus on performance metrics that has already been integrated into several of MTC's investment programs. One of the most notable of these is the Freeway Performance Initiative.

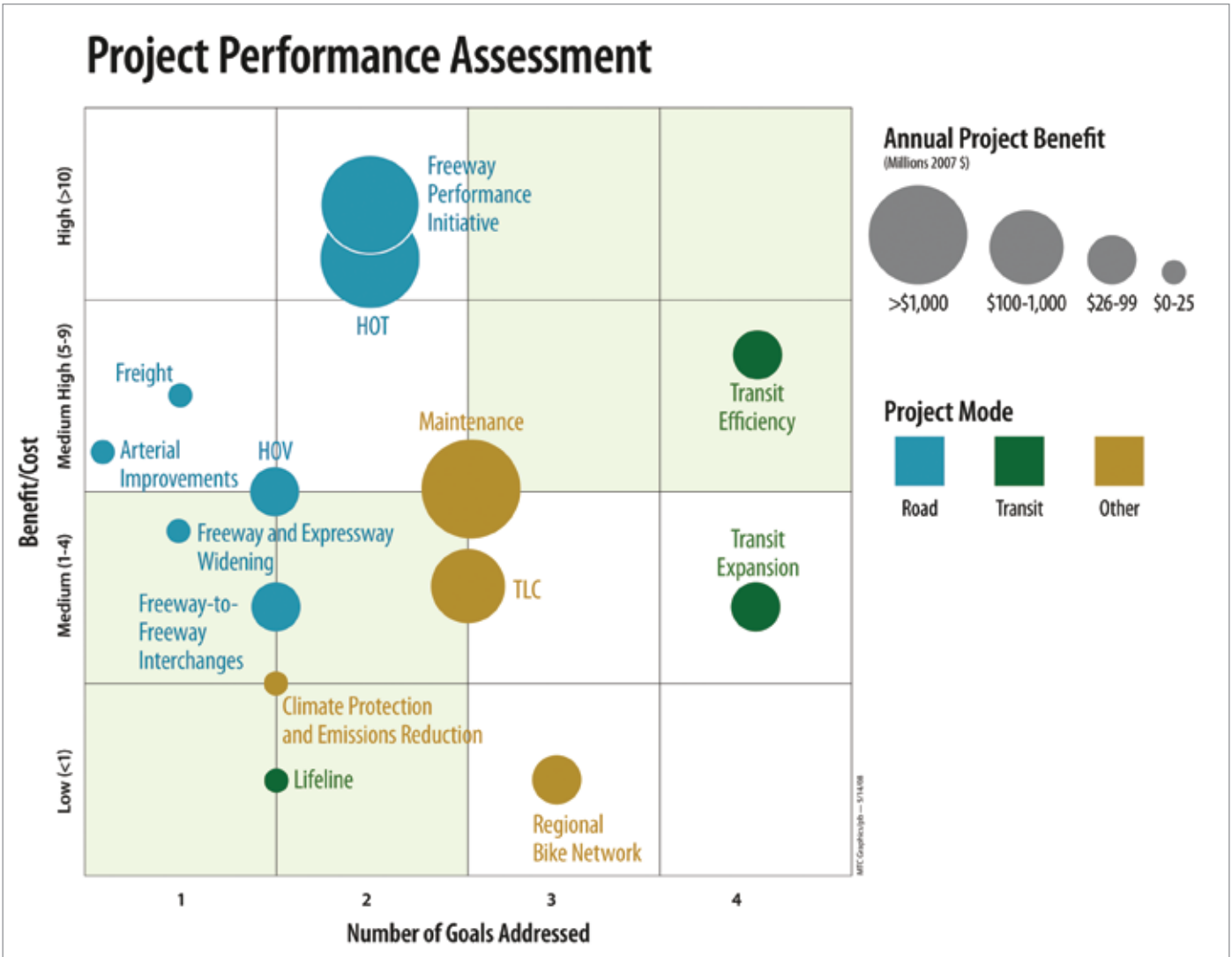

Figure 3. Initial results of project performance assessment by MTC.
Source: MTC.

Benefits of the Freeway Performance Initiative

MTC's Freeway Performance Initiative consists of concurrent corridor studies with an emphasis on effective management and operations as a means to improve system performance.

The Freeway Performance Initiative, a joint effort between the California Department of Transportation (Caltrans) and MTC, aims to improve system efficiency with active system management. The initiative is much like a strategic plan for the freeways. It will identify and prioritize a list of strategies and projects that will improve system performance through system management and by closing key gaps in freeway infrastructure to address bottlenecks effectively. Included in this initiative are strategies such as completing a high-occupancy vehicle (HOV) lane system, addressing freight issues, and infrastructure development and improvement.

The analyses for the Freeway Performance Initiative are different from traditional corridor planning analyses, and focus on existing and future recurrent congestion caused by bottlenecks as well as existing non-recurrent congestion created by incidents. The performance measures used in the initiative include:

- Delay reduction – Vehicle hours reduced.
- Cost effectiveness – Cost/hours saved.
- Reliability – buffer index.
- Safety.
- Others, such as freight impacts, closing HOV gaps, and local support.

The corridor studies are detailed macro- or micro-simulations of each corridor, in contrast to the analysis of regional performance targets, which is based on the regional demand model.

MTC has learned through this process that non-recurrent congestion is a major problem in the region, accounting for 30 to 60 percent of total delay. Additionally, it has seen that coordinating freeways and arterials can yield major benefits. MTC discovered that system management strategies can provide near term congestion relief, and has already had two successful ramp metering deployments. It has realized that the region also needs to better utilize transit and park-and-ride capacity.

Additional Challenges and Lessons Learned

The process of building performance metrics into freeway management and the overall RTP have created a number of challenges, as well as opportunities and lessons. The challenges faced in managing congestion within the San Francisco Bay Area include not having enough data and experiencing issues with data consistency, particularly for purposes of examining the benefits of operational strategies that aim to reduce nonrecurring congestion. Other difficulties include selected appropriate analysis tools, calibrating the micro-simulation model, and achieving consensus on prioritization criteria.

MTC has learned that there is no single solution for congestion and that a range of strategies needs to be implemented. Additionally, it is important that the right people are at the table during planning and that they are committed to the process. Finally, a good detection infrastructure is vital to the collection of accurate traffic performance data from which useful investment decisions can be made. For instance, Caltrans and MTC use strategies such as tracking freeway congestion by county, identifying bottlenecks through detailed speed profiles, and using 511 to make information available to the public.

Moving Forward

MTC will continue to develop the draft of their updated RTP, Transportation 2035, and the investment plan. MTC plans to consider how project performance assessment will weigh in light of local priorities. The agency will continue to monitor progress toward objectives through annual congestion monitoring and refine the state-of-the-system report. MTC will also be implementing a freeway operations program, building off the lessons learned in the Freeway Performance Initiative.

References

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