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Any error and all interpretations are the responsibility of Smart Growth America. Please direct questions about this report to Roger Millar, PE, AICP, Vice President, Smart Growth America’s Leadership Institute: rmillar@smartgrowthamerica.org, 406.544.1963.
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... support job creation and economic development in the state.
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Supporting Development of Minnesota’s Transportation Investment Options

Technical Memorandum #1:
Approaches to Evaluating Investment Options

Introduction

The purpose of this project is to assist the Minnesota Department of Transportation (MnDOT) with the development of transportation investment options that expand flexible and efficient ways to move people and goods throughout Minnesota and support job creation and economic development in the state. Along with Minnesota GO, the state’s 50-year transportation vision and multimodal transportation plan, and a number of supporting modal plans and programs maintained by MnDOT, the project will build on the work and recommendations recently completed by Minnesota’s Transportation Finance Advisory Committee (TFAC). The project’s final product will be a statewide transportation investment strategy that advances Minnesota’s quality of life, environmental health, and economic competitiveness, and incorporates the state’s eight guiding principles for transportation policy and investment decision making:

- Leverage public investments to achieve multiple purposes
- Ensure accessibility
- Build to a maintainable scale
- Ensure regional connections
- Integrate safety
- Emphasize reliable and predictable options
- Strategically fix the system
- Use partnerships

This initial technical memorandum provides an overview of the state of the practice at MnDOT and nationally for setting transportation investment priorities, and identifies potential alternative approaches and criteria for measuring different levels of transportation investments. Based on input and guidance from the project’s stakeholder group, the next phase of the project will then evaluate alternative transportation investment packages against the selected criteria.
Meeting the demand for transportation improvements requires a careful balance . . .

MnDOT Investment Framework

MnDOT has an extensive and highly regarded framework for policy and investment decision making, with investment related decisions broadly occurring in three functional areas: policy and systems planning, project development, and programming. Taken together, the three areas offer multiple and iterative opportunities to evaluate and prioritize transportation investments in Minnesota.

Policy and Systems Planning

Underlying the existing transportation investment framework in Minnesota are the vision, policy, system, and various supporting plans that comprise MnDOT’s “Family of Plans.” These plans are organized in four tiers:

- Minnesota GO 50-Year Statewide Vision
- Minnesota GO Statewide Multimodal Transportation Plan – policy direction and objectives, strategies, and performance measures/ indicators and targets
- System Investment Plans – aviation, bicycle, freight, highway, ports and waterways, freight and passenger rail, and transit
- Supporting Plans – safety, operations, freight, transit/ human services coordination, and other studies and plans

Complementing the core set of MnDOT plans are regional and local plans undertaken by Minnesota’s tribes, Metropolitan Planning Organizations (MPOs), and Regional Development Commissions (RDCs). Figure 1 summarizes the relationship among the various transportation plans and subsequent improvement programs.

Meeting the demand for transportation improvements requires a careful balance among statewide, regional, and local needs. Accordingly, MnDOT relies on legislative direction, system performance measures, and stakeholder input to link the policy direction established in the statewide multimodal transportation plan and the various system investment plans. System performance measures, in particular, have long played a
key role in objectively identifying transportation deficiencies and prioritizing investment needs at MnDOT. The statewide multimodal transportation plan and the system investment plans utilize a broad range of performance measures to monitor the transportation system, set investment goals, evaluate risk-based tradeoffs, and achieve policy objectives. At the statewide level, MnDOT’s ongoing performance management program monitors the following measures (Table 1).

Project Development
An additional area where investment related decisions occur is in project development, and an important tool available to compare alternative solutions in the project development process is benefit-cost analysis. MnDOT has in place valuable guidance, “Benefit-Cost Analysis for Transportation Projects,” to direct benefit-cost analysis at different stages of

Figure 1. MnDOT Plans and Programs
### Table 1. MnDOT Performance Measures

<table>
<thead>
<tr>
<th>Category</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Traveler Safety</strong></td>
<td>• Minnesota Traffic Fatalities: All state and local roads</td>
</tr>
<tr>
<td><strong>Infrastructure Preservation</strong></td>
<td>• Bridge Condition: % Good and Satisfactory – state principal arterials</td>
</tr>
<tr>
<td></td>
<td>• Bridge Condition: % Poor – state principal arterials</td>
</tr>
<tr>
<td></td>
<td>• Pavement: Ride Quality Poor – all state highways, % of miles</td>
</tr>
<tr>
<td></td>
<td>• Pavement: Ride Quality Poor – state principal arterials, % of miles</td>
</tr>
<tr>
<td></td>
<td>• Pavement: Ride Quality Good – state principal arterials, % of miles</td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
<td>• Snow and Ice: Frequency of achieving bare lane within target hours, all storms and routes</td>
</tr>
<tr>
<td></td>
<td>• Bridge Safety Inspections: Percentage completed on time, all state bridges</td>
</tr>
<tr>
<td></td>
<td>• Customer Satisfaction with State Highway Maintenance: on a scale from 1 to 10</td>
</tr>
<tr>
<td><strong>National and Global Connections</strong></td>
<td>• Airline Annual Available Seat Miles from MSP on Scheduled Commercial Flights</td>
</tr>
<tr>
<td></td>
<td>• Port Shipments To and From MN Great Lakes and River Ports: Annual tonnage</td>
</tr>
<tr>
<td></td>
<td>• Shipments on Minnesota Railroads: Annual tonnage from, to, and through MN</td>
</tr>
<tr>
<td><strong>Statewide Connections</strong></td>
<td>• Interregional Corridors: Greater MN, % of Miles +/- 2 mph of target speed (55, 60, or 65 mph) or faster</td>
</tr>
<tr>
<td></td>
<td>• Aviation Access: Percentage of MN population within a 30 minute drive time of an airport with paved and lighted runway</td>
</tr>
<tr>
<td><strong>Twin Cities Mobility</strong></td>
<td>• Twin Cities Urban Freeway System Congestion: Percentage of miles below 45 mph in AM or PM peak</td>
</tr>
<tr>
<td></td>
<td>• Clearance Time for Metro Urban Freeway Incidents: 3 year average</td>
</tr>
<tr>
<td></td>
<td>• Annual Rail and Express Bus Transit Ridership: Express buses (all providers), light rail, commuter rail</td>
</tr>
<tr>
<td><strong>Greater Minnesota Metropolitan and Regional Mobility</strong></td>
<td>• Greater Minnesota Bus Service Hours: Public transportation</td>
</tr>
<tr>
<td><strong>Community Development and Transportation</strong></td>
<td>• ADA: Accessible Pedestrian Signals – percentage of state highway intersections with APS</td>
</tr>
<tr>
<td></td>
<td>• Bike, Walk, and Transit Share of Commuter Trips: Large MN metro areas</td>
</tr>
<tr>
<td><strong>Energy and the Environment</strong></td>
<td>• Transportation Fuel Consumption: Billions of gallons sold in MN</td>
</tr>
</tbody>
</table>
MnDOT clearly has a strong investment decision making framework in place today.

project development, from concept development to environmental review and design. Traditionally, benefit-cost analysis for highway projects focuses on direct user benefits and costs, including:

- Travel time savings
- Vehicle operating cost savings
- Safety benefits
- Capital costs
- Major rehabilitation costs
- Routine annual maintenance costs
- Remaining capital value

More recently, reflecting a growing interest nationally in evaluating additional benefits and costs, MnDOT has used a proprietary tool called PRISM in its new Corridor Investment Management Strategy (CIMS) program to capture multiple social, economic, and environmental factors as a benefit-cost ratio. Accounting for 60% of project scores in CIMS, the PRISM tool organizes the factors as shown in Table 2.

### Programming

For transportation improvements involving federal and state funding, programming identifies project and service commitments over a four-year period in the State Transportation Improvement Program (STIP). Legislative direction, system performance measures, stakeholder input, and project scoping all play an important role in development of the STIP. Ultimately, though, the STIP is a product of an iterative

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**Table 2. Benefit-Cost Factors (PRISM)**

<table>
<thead>
<tr>
<th>Social</th>
<th>Economic</th>
<th>Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Safety</td>
<td>• Travel Time</td>
<td>• Emission (CO₂ + Criteria Pollutants)</td>
</tr>
<tr>
<td>• Bicycle/Pedestrian Health Effects</td>
<td>• Travel Time Reliability</td>
<td>• Wetland Effects</td>
</tr>
<tr>
<td>• Noise</td>
<td>• Vehicle Operating Costs</td>
<td>• Runoff</td>
</tr>
<tr>
<td></td>
<td>• Life Cycle Costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Loss of Agricultural Land</td>
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</tr>
</tbody>
</table>
Transportation Investment Frameworks – State of the Practice

From policy and systems planning to project development and programming, MnDOT clearly has a strong investment decision making framework in place today. Investment decisions balance a thorough assessment of system performance with project benefit-cost analysis and regional and community priorities. Similar to many other state departments of transportation, however, MnDOT faces the combined pressures of aging infrastructure, demand for new facilities and services, and constrained funding, underscoring the need to expand its transportation investment framework.

To address the combined pressures of increasing costs and limited revenue, transportation agencies throughout the country are increasingly revisiting benefit-cost analysis and presenting the results in terms of return-on-investment, which is one way of presenting benefit-cost results. They are also undertaking economic impact analysis as a way to better understand the economic development impacts.
of different investments. In effect, transportation agencies are attempting to capture and communicate more fully the value of proposed improvements. Table 3, for example, illustrates the range of economic benefits potentially generated by transportation investments.

Importantly, many of the benefits identified in Table 3 correspond closely with the factors considered in the benefit-cost analysis tools currently employed by MnDOT – the “Benefit-Cost Analysis for Transportation Projects” guidance and especially PRISM (see Table 2). While an increasing number of transportation agencies are applying more robust benefit-cost analysis on a regular basis at the project and program level, it is also important to note the limitations associated with the analytical method. These limitations include the inability to monetize all impacts a community values, such as equity, and the possibility that factors that perform particularly well in an analysis may not match local priorities.

Consequently, many benefit-cost analyses are accompanied by qualitative and quantitative information that cannot be monetized. Two strategies for incorporating non-monetized information into the decision making process involve either establishing sensitivity thresholds for those impacts or charting the impacts against both benefit-cost ratios and larger community goals. The latter approach was used by the Metropolitan Transportation Commission, the MPO for the San Francisco Bay Area, in its most recent long range transportation plan update (Figure 2).

This past year, the “Itasca Transit Return on Investment Technical Report” (2012) analyzed the
analyzed the economic return on investment...
economic return on investment for a representative program of transit projects in the Twin Cities region, and provides an example of how benefit-cost analysis can be paired with economic impact analysis. Largely consistent with MnDOT’s guidance on benefit-cost analysis for highway projects, the report estimated the following impacts to determine benefit-cost ratios and then expressed the results in terms of an internal rate of return (IRR):

- Travel times and reliability
- Vehicle operating costs
- Shippers and logistics costs
- Emissions
- Safety costs
- Road pavement conditions
- Capital costs
- Operating and maintenance costs

Because benefit-cost analysis and economic impact analysis answer different questions, i.e., societal benefit versus economic change, the report also considered separately a broader set of economic development impacts associated with the potential transit investments. In addition to job creation related to construction, the report applied the proprietary TREDIS economic model to estimate long-term job creation and gross regional product (GRP) growth stimulated by transportation cost savings.

MnDOT in partnership with the Minnesota Department of Employment and Economic Development has used an economic model, REMI, to evaluate projects in the state’s Transportation Economic Development (TED) program, a competitive grant program available to communities for highway and public infrastructure projects that support economic development. Several other state departments of transportation, including Kansas, Michigan, North Carolina, and Virginia, also analyze proposed transportation and economic development projects or statewide packages of highway improvements with similar regional economic models. Again, in each case, the economic impact analysis is conducted separately, and as with the benefit-cost analysis, is viewed as one additional and important piece of information in the investment decision making process.
Key Findings

Building on its highly regarded performance management program, MnDOT has arguably one of the strongest investment decision making frameworks among state departments of transportation. The performance measures allow MnDOT to evaluate the condition of the state transportation system annually, and importantly, forecast and describe future needs for stakeholders. Through modal investment plans, particularly the 20-year State Highway Investment Plan, MnDOT and its stakeholders are also able to weigh various investment scenarios based on clear performance and risk tradeoffs.

Still, MnDOT, like many other state departments of transportation, faces enormous pressures to balance current and future transportation needs with available funding. Transportation agencies across the country are turning to benefit-cost analysis and economic impact analysis to expand their investment decision making frameworks and communicate the results to the general public, often in terms of a return-on-investment. Fortunately, MnDOT has already taken steps to evaluate individual projects using both tools. As Minnesota develops transportation investment options to meet the growing demand for transportation facilities and services, it will be important for MnDOT and all stakeholders to shape an investment framework that matches the challenges before the state. Some of the key questions to answer moving forward are:

• Should MnDOT apply a return-on-investment analysis at the program or package of projects level?
• If so, what criteria or impacts should be included in that analysis?
• And, should that analysis be supplemented with non-monetized qualitative and quantitative information?