Purpose

- Agencies struggling through project selection process
  - Widespread need for improvements on system
  - Limited funding
  - *Which projects are most beneficial?*
- Trying to understand life-cycle department costs and user cost of projects
  - Provide analysis process that evaluates both cost categories
  - Select project alternatives that provide the most regional benefit for each dollar spent
Project Evaluation Overview

Traditional Benefit-Cost Analysis
Assesses whether societal project benefits outweigh delivery costs
Includes: travel time, safety, fuel savings, emissions, etc.

Life-Cycle Cost Analysis
Evaluates department expenditures required to keep asset serviceable
Includes: construction, rehabilitation and maintenance

Evaluating all costs collectively:
• Life-cycle department costs and user costs
  • Department costs
    • Initial construction
    • Ongoing preservation and maintenance
  • User costs associated with recurring and nonrecurring congestion
  • Construction impacts on users
    • Duration of work zone
    • Frequency of maintenance/rehab activities

Process for Evaluating Alternatives

• Travel time and BCA tool adopted by WisDOT for project prioritization
• Predicts travel times for each hour of each year in analysis period (i.e. project life-cycle)
  • Sensitive to traffic operating conditions (e.g. work zones)
• Project Alternative Costs
  • Include all project life-cycle costs
**Some alternatives may require less initial construction but more rehabilitation**
Travel Time Model Process

Example Project

Study Corridor
• Urban/suburban four-lane freeway
• 23 directional miles
• Traffic is highly directional during peaks
• Concrete roadway
  • Major rehab requires several months of lane closures to repair pavement and perform bridge work

Alternatives
• Base – replace in-kind
• Perpetuation – spread costs over project lifespan as components deteriorate (do-minimal alternative)
• Build – add one lane in each direction
Project Costs Over Time

Comparing User Costs between Alternatives
Comparing User Costs between Alternatives

- Comparing to the Perpetuation Scenario
- Minimize department costs
- Increased user costs during rehabilitation years
Alternative Benefit-Cost Comparison

- Monetization of user costs and department costs over benefit-cost analysis period

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Base</th>
<th>Perpetuation</th>
<th>Build</th>
<th>Perpetuation vs Base*</th>
<th>Build vs Base*</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Costs ($ Million)</td>
<td>$13,430</td>
<td>$14,280</td>
<td>$12,000</td>
<td>$850</td>
<td>-$2,280</td>
</tr>
<tr>
<td>Department Expenditures ($ Million)</td>
<td>$565</td>
<td>$540</td>
<td>$855</td>
<td>-$25</td>
<td>$315</td>
</tr>
<tr>
<td>Total ($ Million)</td>
<td>$13,995</td>
<td>$14,820</td>
<td>$12,855</td>
<td>$825</td>
<td>-$1,965</td>
</tr>
</tbody>
</table>

*Negative costs reflect savings compared to Base Scenario

Additional Results

- Cumulative cost stream
  - Shows when return will be realized and magnitude of return at end of project life-cycle
Conclusion

• Comprehensive understanding of departmental and user costs are critical for funding decisions
• Agencies can plan projects to achieve regional goals
  • Maximize return for a given project location (net present value)
  • Optimize return system-wide (opportunity costs)
  • Determine optimal time to implement project

Questions?

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