Use of SHRP2 Products in the Real World

Transportation Research Board
93rd Annual Meeting – Washington, D.C.
January 12, 2014

Presented by: Matt Shands
Minnesota Department of Transportation
GR Complete Streets Plan
- Developed a collaborative Complete Streets Plan utilizing the active participation of a wide variety of stakeholders

TCAPP Evaluation
- To conduct a rigorous analysis / evaluation, and to identify specific opportunities for improvement to the TCAPP tool.
Project Partners and Stakeholders
Complete Streets Plan of Grand Rapids

- In addition to the Complete Street policy recommendations that were incorporated into the city’s Comprehensive Plan, TCAPP provided guidance on collaborating on many site-specific improvements.
Favorite TCAPP Functions

- “Decision Making Questions” Tab
  - “Who should be involved?” and “What issues need to be considered?”
  - Identify opportunities and deficiencies in the system
  - Provided list of questions to be posed in stakeholder meetings and focus groups
Favorite TCAPP Functions

- “Technical Support” Tab
  - Helped us identify key data needs.
Value of TCAPP at MnDOT

1. Cultivated a culture of collaboration. Created a synergy with the right people together at the right time.

2. Transformed the perceived role of MnDOT from inflexible behemoth to good neighbor.

3. MnDOT TCAPP tool (and the “spirit of collaboration”) is being used for other planning initiatives (International Falls, Zumbrota, Duluth)

4. Learned that collaboration is important, not just with external partners and stakeholders, but internally as well (District staff, modal staff)
Lessons Learned: Applying the TCAPP tool in Minnesota

- Take advantage of opportunities to promote the tool.
  - With individuals
  - To small working groups
  - At conferences
SHRP 2 Project C–33:
Pilot Projects to Validate the Results of T–PICS

1. Address the diversity of the tool’s registry of case studies that T–PICS utilizes to predict economic impacts.

2. Address the relationship between the economic impact output from the case study examples to the proposed project whose economic potential is being estimated.
C33A Project Team

- Matt Shands – MnDOT project manager
- John Wilson – MnDOT economist
- Neal Young – Mn Dept. of Employment and Economic Development (DEED)
- Weston Merrick – DEED
- Michael Iacono – University of Minnesota
- Scott Nystrom – Regional Economic Models, Inc. (REMI)
- Ahmed Mustafa – REMI
Transportation Project Impact Case Studies (T-PICS) is a web-based tool that allows the user to gather useful information on the potential economic impacts of a proposed transportation project.

www.tpics.us
T-PICS Basics: Case Search Module

You enter data characteristics of your own project. Then you can view projects that are similar to yours, and use the data to estimate the likely impacts of your project.

Potential Matches: 3

View Results
Download Search Results
Print Search Results

Compare Projects

<table>
<thead>
<tr>
<th>Compare</th>
<th>Title</th>
<th>Description</th>
<th>Project Type</th>
<th>State</th>
<th>BEA Region</th>
<th>Project Cost (2008)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Commerce Parkway Interchange</td>
<td>The Commerce Parkway Interchange is one of three interchanges connecting Hays to Interstate 70 (I-70), which is Kansas' most important east-west travel route.</td>
<td>Interchange</td>
<td>KS</td>
<td>Great Lakes/Plains</td>
<td>$4,732,710</td>
</tr>
<tr>
<td></td>
<td>I-435 &amp; Nall/Roe Ave. Interchange</td>
<td>The Nall/Roe Avenue Interchange, built specifically to keep Sprint office jobs in the Kansas City area, provides east-west access from Interstate 435 to Wall Avenue, which previously bridged Interstate 435, and reconfigures the interchange with Roe Avenue. The project also included widening I-435 from 6 lanes to 8 lanes to accommodate traffic growth.</td>
<td>Interchange</td>
<td>KS</td>
<td>Great Lakes/Plains</td>
<td>$68,377,661</td>
</tr>
<tr>
<td></td>
<td>I-394 Minnesota</td>
<td>I-394 Minnesota is an eight-mile stretch of US Highway 12 connecting downtown Minneapolis with its central western suburbs. It was built to accommodate future growth in Minneapolis' central western suburbs.</td>
<td>Widening</td>
<td>MN</td>
<td>Great Lakes/Plains</td>
<td>$520,894,35</td>
</tr>
</tbody>
</table>
Case Search generates useful project information

- Characteristics
- Setting
- Pre–Post Conditions
- Narrative
- Impacts
- Images

### Characteristics

<table>
<thead>
<tr>
<th>Pre/Post Conditions Scale:</th>
<th>Local</th>
<th>County</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measure</strong></td>
<td><strong>Pre-Project</strong></td>
<td><strong>Post-Project</strong></td>
<td><strong>Change</strong></td>
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<tr>
<td>Personal Income</td>
<td>$38,431.1</td>
<td>$35,370.1</td>
<td>-$1,061</td>
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<tr>
<td>Economic Distress</td>
<td>0.57</td>
<td>0.59</td>
<td>0.02</td>
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<tr>
<td>Total Hours of Jobs</td>
<td>19,950</td>
<td>23,718</td>
<td>4,768</td>
</tr>
<tr>
<td>Population</td>
<td>26,553</td>
<td>27,373</td>
<td>820</td>
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<tr>
<td>Property Value</td>
<td>N/A</td>
<td>$117,855</td>
<td>N/A</td>
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<tr>
<td>Business Sales (MBs)</td>
<td>N/A</td>
<td>$2,030.49</td>
<td>N/A</td>
</tr>
<tr>
<td>Tax Revenue (MBs)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Density (all sizes)</td>
<td>25.41</td>
<td>30.42</td>
<td>-4.91%</td>
</tr>
</tbody>
</table>

### Narrative

#### 1.0 SYNOPSIS

The Commerce Parkway Interchange is one of the three interchanges connecting Hwy 70 to Interstate 94, which is the state’s most important east-west travel route. After the interchange was completed in 1983, its location prompted the development of the Airport Industrial Park. This construction was supported by a strong position of local business leaders and backers with the intention of improving access to developable land slated for industrial and commercial development. Over the last ten years, the Commerce Parkway has played a key role in the growth of Hwy 70’s economy, adding an estimated 7,275 jobs from 1985 to 1995. Additionally, an arterial road has been built to connect Downtown Hwy 70 with the Commerce Parkway, further enhancing opportunities for development within the corridor in years to come.

#### 2.0 BACKGROUND

**2.1 LOCATION & TRANSPORTATION CONNECTIONS**

Hwy 70, the state’s number one east-west highway, is a major north-south highway connecting byways from St. Paul to Green Bay, Wisconsin. The Commerce Parkway is the most important north-south highway in Minnesota. It connects to I-94, which leads to the west and Minneapolis City, Kansas City to the east. The Commerce Parkway is the most important part of the freeway system in Minnesota, and it is the one that is to the west. The State Highway 70, two-lane motorway in the Commerce Parkway, supports the fastest traffic and provides access to high-speed roads, railroads, and restaurants.

**2.2 COMMUNITY CHARACTER & PROJECT CONTEXT**

Hwy 70, in the largest city in northwestern Wisconsin, has an approximate population of 20,000. In the 1900s, the city of Hwy 70 and Eau Claire County were primarily rural, and they were focused on farming, agriculture, and an economy. As the late 1990s, the Hwy 70 region experienced declining economic fortunes. Thus, to further the economic opportunities, the Commerce Parkway project was proposed, and it was constructed to improve transit, to enhance the freeway system, and to create a corridor. Since the completion of the project, the city has become more diversified, and it is now a hub for manufacturing and distribution. The project’s success has established Hwy 70 as the retail and trade center for.

### Images

- [Image 1] Transportation Infrastructure Development and Economic Growth: Commerce Parkway Case Study
- [Image 2] Commerce Parkway Interchange
- [Image 3] Characteristics
- [Image 4] Setting
- [Image 5] Pre–Post Conditions
- [Image 6] Narrative
- [Image 7] Impacts
- [Image 8] Images
T-PICS Basics: My Project Tools Module

You enter data characteristics of your own project. On the View Results Screen you can see the likely ranges of economic impacts from your project, and estimates of project cost and traffic volume. You will have the opportunity to adjust cost and traffic estimates, and to adjust complementary regional economic development factors to properly reflect your region. In turn, these adjustments will drive changes in expected economic impacts of your project.

Project Type:
- Bypass
- Limited Access Road
- Beltway
- Interchange
- Bridges
- Access Road
- Widening
- Connector

Region:
- New England/Mid-Atlantic
- Southwest
- Southeast
- Rocky Mountain/Far West
- Great Lakes/Plains
- International

Urban/Class Level:
- Rural
- Mixed
- Metro

Economic Distress:
- Distressed Only
- Non Distressed Only

Length of Project: 1 Miles

Estimated Project Cost ($): $60.8 million
Estimated AADT: 2,520

<table>
<thead>
<tr>
<th></th>
<th>Jobs</th>
<th>Wages (mil.)</th>
<th>Output (mil.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Impacts</td>
<td>350 - 583</td>
<td>$16.4 - $27.3</td>
<td>$52 - $86.7</td>
</tr>
<tr>
<td>Supplier and Wage Impacts</td>
<td>201 - 335</td>
<td>$9.5 - $16.8</td>
<td>$29.5 - $49.2</td>
</tr>
<tr>
<td>Total Impacts</td>
<td>551 - 918</td>
<td>$25.9 - $43.1</td>
<td>$81.6 - $136</td>
</tr>
<tr>
<td></td>
<td>TPICS</td>
<td>Method 2: Regional Econometric Models, Inc. Run</td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>----------------------</td>
<td>--------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Employment</td>
<td>Wages ($1,000)</td>
<td>Output ($1,000)</td>
</tr>
<tr>
<td>Direct Impacts</td>
<td>850 – 1,410</td>
<td>$39,720 – $66,200</td>
<td>$122,798 – $204,664</td>
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<tr>
<td>Supplier and Wage Impacts</td>
<td>560 – 930</td>
<td>$26,215 – $43,692</td>
<td>$81,047 – $135,078</td>
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<tr>
<td>Total Impacts</td>
<td>1,410 – 2,340</td>
<td>$65,935 – $109,892</td>
<td>$203,845 – $339,742</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Comparison (Method 2 to TPICS: Within Range, Under, or Over)</th>
<th>Direct Impacts</th>
<th>Supplier and Wage Impacts</th>
<th>Total Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Impacts</td>
<td>Under</td>
<td>Under</td>
<td>Within</td>
</tr>
<tr>
<td>Supplier and Wage Impacts</td>
<td>Over</td>
<td>Over</td>
<td>Over</td>
</tr>
<tr>
<td>Total Impacts</td>
<td>Within</td>
<td>Within</td>
<td>Within</td>
</tr>
</tbody>
</table>
Potential T–PICS Applications in Minnesota

- Transportation funding programs targeting economic development objectives:
  - Corridors of Commerce Program (2013 $300 million state bonding authority)
Recommended Uses of T–PICS (by the Economic Development Research Group, Inc.)

- Early-stage policy or strategy development—T–PICS can identify the magnitude and types of impact tradeoffs to be considered.

- Early-stage “sketch planning” processes—T–PICS can identify the types of local barrier and success factors that will need to be addressed in later, more detailed planning steps.

- Public hearings—the case studies provide a way of responding to the hopes of proponents and fears of opponents, with information on the range of impacts that have actually occurred in the real world.
Transportation Economic Development (TED) Program Overview

- Collaboration between MnDOT and DEED for transportation infrastructure improvement projects that support economic development
- Seeking projects that will assist development of new business or expanding existing businesses
  - Target industries: manufacturing, technology, warehousing and distribution, research and development, agricultural processing, bioscience, tourism/recreation, industrial park development
- Projects should improve the statewide transportation network
TED Projects Selected:
• 24 projects;
• $59 million in grants;
• $100 million in other public and private funds leveraged
Corridors of Commerce Program Objectives

- Construction, reconstruction and improvement of trunk highways
- Provide additional highway capacity on segments where there are bottlenecks in the system
- Improve the movement of freight and reduce barriers to commerce.
Thank you.

Matt Shands

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SHRP 2 Project L38
Pilot Testing of Reliability Data and Analytical Products
SHRP 2 Project Examples

TRB Annual Conference
January 12, 2014
Introduction

• SHRP 2 = Strategic Highway Research Program
  – Authorized by Congress to address some of the most pressing needs related to the nation’s highway system
    • Safety
    • Renewal
    • Capacity
    • Reliability
SHRP 2 Project L38

- Numerous reliability studies completed to-date
- RFP issued for L38 – Pilot Testing of Reliability Data and Analytical Tools
- MnDOT submitted proposal in October 2012, in partnership with SRF
- Minnesota selected as 1 of 4 pilot sites from among 7 proposals
  – Others are Florida, California, Washington
Reliability tools under evaluation at SHRP 2 pilot test sites

- Project L02: Establishing Monitoring Systems for Travel Time Reliability
- Project C11: Improved Economic Analysis Tools
- Project L08: Non-Recurrent Congestion Factors in HCM Methods
- Project L07: Evaluation of Highway Design Features to Improve Reliability
- Project L05: Incorporating Reliability into Planning & Programming Process

Identifying Issues → Prioritizing Solutions → Institutionalizing Reliability
SHRP 2 Reliability Tools

Identifying Issues:
Data collection and analysis of reliability performance

Project L02: Establishing Monitoring Systems for Travel Time Reliability
Project C11: Improved Economic Analysis Tools
Project L08: Non-Recurrent Congestion Factors in HCM Methods
Project L07: Evaluation of Highway Design Features to Improve Reliability
Project L05: Incorporating Reliability into Planning & Programming Process

Pie chart: None 49%, Event 24%, Weather 4%, Crash 5%
Prioritizing Solutions:
Economic benefits of transportation improvements

- Project L02: Establishing Monitoring Systems for Travel Time Reliability
- Project C11: Improved Economic Analysis Tools
- Project L08: Non-Recurrent Congestion Factors in HCM Methods
- Project L07: Evaluation of Highway Design Features to Improve Reliability
- Project L05: Incorporating Reliability into Planning & Programming Process
Prioritizing Solutions: Cost-effectiveness of improving reliability

- Project L02: Establishing Monitoring Systems for Travel Time Reliability
- Project C11: Improved Economic Analysis Tools
- Project L08: Non-Recurrent Congestion Factors in HCM Methods
- Project L07: Evaluation of Highway Design Features to Improve Reliability
- Project L05: Incorporating Reliability into Planning & Programming Process

Cost-Benefit Defaults

- Value of Time (VOT), $/hr: 15.68
- Reliability Ratio: 0.793
- Value of Reliability (VOR), $/hr: 12.43
- Discount Rate: 7.00%

01/12/2014
INSTITUTIONALIZING RELIABILITY: INCORPORATING CONSIDERATION OF RELIABILITY INTO STANDARD PRACTICE
Minnesota Pilot Site evaluating these reliability tools
TH 100 Northbound Corridor

Recent Changes:
• 2005 – Additional lane near TH 7 and Minnetonka Blvd
• 2008 – Diversion route following I–35W bridge collapse
• Late 2008 – Ramp metering deployed north of I–394
Travel Time (minutes)

- 62.5-70
- 55-62.5
- 47.5-55
- 40-47.5
- 32.5-40
- 25-32.5
- 17.5-25
- < 17.5

Minimum Travel Time = 13.0 min
Speed Limit Travel Time = 15.5 min
45 mph Travel Time = 19.5 min
Reliability – CDF Curves

The diagram shows cumulative distribution function (CDF) curves for different categories affecting travel time:

- **None**
- **Weather**
- **Event**
- **Crash**
- **Incident**
- **Roadwork**
- **Other**

*Other includes combinations of categories.*

The x-axis represents travel time in minutes, ranging from 10 to 60, and the y-axis represents the cumulative percentage from 0% to 100%.

Key points:
- At 10 minutes, all categories are below 20%
- At 16 minutes, the **Weather** category is below 50% and **Event** and **Crash** are below 40%
- At 26 minutes, all categories are below 90%
Reliability
Non-Recurring Conditions

(N) = # of time periods
X% = % of time periods
Reliability – Delay by Condition

None 52%

Event_Incident 23%

Incident 7%

Crash 5%

Weather 4%

Event_Crash 2%

_X% = % of total delay

01/12/2014
TH 100 NB – Delay

01/12/2014

00000

2006 2007 2008 2009 2010 2011 2012

None Weather Event Crash Incident Roadwork Other Volume
Example Project

I-94: I-494 to TH 101
Example Application

Travel Time Reliability Evaluation

• Measures/Data Sources
  – Corridor Traffic Volumes (VMT)
  – Average Travel Times

• Analysis Timeframe/Location
  – Every 5-minute period during 2012
  – I–94 westbound from I–494 to TH 101
Existing Conditions

I-94 WB 2012 - Travel Time
I-494 to TH 101

Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec

- > 4.0 TTI
- 3.5 TTI - 4.0 TTI
- 3.0 TTI - 3.5 TTI
- 2.5 TTI - 3.0 TTI
- 2.0 TTI - 2.5 TTI
- 1.5 TTI - 2.0 TTI
- 1.25 TTI - 1.5 TTI
- Speed Limit TT - 1.25 TTI
- < Speed Limit TT

Speed Limit TT = 7.9 min

01/12/2014
Planning & Programming

Agency funding model examples from L05 Guide.

- Federal
- State
- Other

- Capacity, Safety, Preservation, Operations, and Management
- Project Prioritization

- Federal
- State
- Other

Setting the Size of the Programs

- Capacity
- Safety
- Preservation
- O&M

- Project Prioritization
- Project Prioritization
- Project Prioritization
- Project Prioritization
Planning & Programming

• How many/what type of funding sources does your agency receive for system investments?
• What programs (pots) does your agency provide or manage with those funds?
• What does your agency do to allocate funding among programs?
Planning & Programming

• What data sources are used to inform the allocation process?
• How does your agency prioritize projects/corridors within each funding category?
  – Data sources
  – Analysis tools
• How are alternatives evaluated within corridors identified for funding?
  – Data sources and tools
• Can we use evaluation of travel time reliability to influence decision-making at each/any of these levels?
• What audience(s) is your agency responsible for reporting to?
  – What type of tools can be used to communicate with these audiences?
Discussion

- I94 example for project work
- Education/communicate issues
- LO 7 tool predictability tools
- Magnitude of effort
- Pie charts for prioritization
- Identify specific issues
- Potentially with specific programs
- Scoping vs. Programing, due to corridor based/magnitude
Questions?

Thank you!