Phase II Options Feasibility Study

Draft Evaluation Methodology and Options Evaluation Matrix

August 24, 2006
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1.0 Overview

The options evaluation methodology will be used to assess how well potential transportation system improvement options address corridor mobility problems; and to highlight for decision-makers the strengths and weaknesses of each option. A two stage evaluation process will be used in which increasingly detailed and comprehensive performance measures are applied to a decreasing number of options identified as the best potential transportation system improvements.

First, the Level I screening will be used to evaluate a relatively large group of conceptual options and eliminate from further consideration those that are not reasonable for addressing the purpose and need for corridor mobility improvements. The basis for the evaluation is the Statement of Purpose and Need, or corridor transportation improvements translated to a set of goals and objectives. The evaluation criteria take the form of goals for potential transportation improvement options; each goal is further defined by a set of specific objectives. A metric (quantitative performance score) or a qualitative performance score is then defined for a set of performance measures related to each objective. Scoring of transportation improvement options, against each objective, establishes the extent to which a given option supports or does not support an objective and its related goal. Based upon the Corridor's approved purpose and need and upon a comprehensive slate of goals and objectives for potential improvement options, appropriate performance measures are then developed and each conceptual option is then evaluated according to the procedures described below. In the example presented subsequently in this document, the relationship of performance measures to the objectives is illustrated as is the relationship of performance objectives to the transportation improvement option goals, which they define.

Next, the Level II screening process will be applied to the reduced set of detailed options advanced from the analysis of the larger number of conceptual options analyzed in the Level I screening process.

2.0 Development of Performance Measures

A preliminary list of performance measures will be identified based on the goals and objectives for potential improvements. The intent is that each of the performance measures will provide a relative indication of how well an option performs with respect to a particular goal and relative to the other options under consideration. Performance measures will be defined, ideally, so that a quantitative metric may be established; however, some measures must be qualitative (e.g., good, moderate, poor) requiring the use of professional judgment by stakeholders and by project planners and engineers. The set of performance measures will constitute one axis of the evaluation matrix, with the transportation options that are being considered constituting the other axis. This matrix is a tool used to evaluate the performance of each of the options relative to the goals and objectives. Typically, one or more performance measures will be used to score an option relative to each objective.

A one-for-one relationship exists between each performance measure, and the specific transportation system development objective associated with that performance measure. In the evaluation methodology, this precise relationship of performance measures and the objective associated with each grouping of performance measures is clear. The performance measures (that collectively provide the quantitative scores for evaluating the performance of a given option) permit the assessment of the extent to which that option solves defined corridor mobility problems. Such metrics span the range of concerns (such as environmental justice, improvement of air quality, access to employment centers, travel times, and cost effectiveness).
A listing of each of the proposed goals and objectives is found below in **Table 1**:

**Table 1: Goals and Objectives**

<table>
<thead>
<tr>
<th>Goals</th>
<th>Objectives</th>
</tr>
</thead>
</table>
| 1 Increase Availability and Efficiency of Transit for **Reverse** Commuters to Major Suburban Employment Centers | 1 Increase transit access to identified Corridor employment centers for current and future Reverse commuters.  
2 Increase access to additional potential places of employment.  
3 Increase connectivity between employment centers and residential locations of significant existing and future origin density.  
4 Increase opportunity to serve multiple or overlapping Corridor travel markets.  
5 Increase opportunity to serve other work-related and non-work trips.  
6 Increase benefit to users of existing multimodal transportation system.  
7 Reduce the number of transfers. |
| 2 Increase Availability and Efficiency of Transit for **Intersuburban** Commuters to Major Suburban Employment Centers | 1 Increase transit access to identified Corridor employment centers for current and future commuters of Intersuburban travel markets.  
2 Increase access to additional potential places of employment.  
3 Maximize connectivity between employment centers and residential locations of significant existing and future origin density.  
4 Increase opportunity to serve multiple or overlapping Corridor travel markets.  
5 Increase opportunity to serve other work-related and non-work trips.  
6 Increase benefit to users of existing multimodal transportation system.  
7 Reduce the number of transfers. |
| 3 Improve Roadway and Transit Service Quality in I-290 Travel Corridor | 1 Reduce travel times on I-290 (eastbound and westbound) for auto and transit users.  
2 Reduce travel times on other key transportation system elements (facilities and services) relied upon by Intersuburban and Reverse commuters.  
3 Reduce adverse impacts on users of the existing multimodal transportation system.  
4 Reduce travel times for multi-modal/multi-vehicle trips.  
5 Increase use of traffic / transportation management techniques and technology strategies.  
6 Improve travel experience and safety of transportation system users. |
| 4 Increase Community and Corridor Benefits | 1 Reduce adverse impacts on and promote positive benefits on existing communities, neighborhoods and people.  
2 Enhance economic development / redevelopment opportunities.  
3 Consider extent of and minimize adverse impacts of land acquisition.  
4 Maximize achievement of Corridor Planning Standards (supplemental criteria that reflect shared local values and preferences). |
| 5 Increase Regional Benefits | 1 Increase use of and integration with regional transportation system.  
2 Ensure consistency with regional goals presented in the 2030 RTP and 2040 Regional Framework Plan.  
3 Reduce negative impacts on environmental justice communities / populations.  
4 Increase access to disadvantaged communities / populations. |
| 6 Reduce Adverse Environmental Impacts | 1 Ensure all applicable air quality standards are met.  
2 Avoid / reduce adverse impacts to wetlands, floodplains, and critical habitats.  
3 Reduce operating noise and vibration levels. |
Avoid / reduce adverse impacts to sensitive land uses, historic properties and open spaces.

Increase system value by balancing costs and benefits.

Reduce construction costs.

Reduce long-term operating costs.

Increase potential benefits.

Increase compatibility with and capacity of existing, local, state, and federal funding sources for both capital and operating costs.

### 3.0 Application of Scoring Methodology

Quantitative procedures for conducting the evaluation of options are described in subsections 3.1 and 3.2

#### 3.1 Level I Screening

The screening of conceptual options will be conducted through an objective evaluation process. A number of data sources will be utilized to provide the necessary information to complete the evaluation. These sources include but are not limited to: existing Geographic Information System (GIS) data, US Census Bureau data, and the professional expertise of project engineers and planners. Field reconnaissance will supplement these existing data sources where additional information is necessary.

Where quantitative evaluation is possible (i.e. a metric exists such as the number of residential displacements required by an option or the number of grade crossings required), evaluations will be based on the relative difference between the score for each conceptual option within each performance measure. The relative differences between the conceptual options will be converted to a 1.0 - 10.0 scale by interpolating the evaluation measure based on the best and worst performers, and then correlating that interpolated value to a rating between 1.0 and 10.0. The poorest performer (or performers) for each performance measure will be given a rating of 1.0 and the best performer(s) will be given a rating of 10.0. The remaining alternatives will be assigned an interpolated rating based upon how well each performs relative to the best and worst performers.

Where quantitative evaluation is not possible, a qualitative evaluation approach will be utilized. This methodology includes performance measures generating a relative response of “Good,” “Moderate” or “Poor.” “Good” responses will be given a rating of 10.0, “Moderate” responses a 5.0, and “Poor” responses a 1.0. For example, a high level of constructability, indicating that an alternative can be built with relative ease, would be given a “good” or 10.0, whereas a significant level of (negative) impacts on street capacity would result in a designation of “poor” or a score of 1.0.

As the evaluations are completed and tabulated, the average overall scores for each of the objectives will be calculated. Then the average scores for all objectives will be calculated, which will yield an average score for the goal. These scores will be summed and the conceptual options with the highest overall scores will be recommended for more intense analysis in the Level II screening of detailed options.

#### 3.2 Level II Screening

The Level II screening process employs precisely the same methodology described above for Level I screening. The detailed options being evaluated in Level II screening will be defined and analyzed in much greater detail than that possible for the more numerous set of conceptual options in the Level I screening. Accordingly, metrics quantifying the
performance of these detailed options will be more refined than the metrics employed in the Level I screening process. The procedure for translating qualitative evaluation into a score for use in the evaluation matrix is the same for Level II screening as described above in Level I screening.

This process of evaluating each detailed option with respect to each performance measure will be replicated for each of the goals and the resulting weighted scores will be summarized for each detailed option. The highest overall weighted scores will reflect the best performing detailed options. The best of the detailed options will either be a) further refined or b) recommended to the Policy Committee for advancing into the Alternatives Analysis (AA) phase of the study.

### 4.0 Example Evaluation of Options

An example of the evaluation of six options: A, B, C, X, Y, and Z, is presented below. Each option is evaluated with respect to the four objectives that comprise Goal No. 4, “Maximize Community and Corridor Benefits.” The example dataset and results are shown in Table 2. The best options in each performance measure are highlighted for clarity.

#### Table 2: Example Scoring Matrix

<table>
<thead>
<tr>
<th>Goal No. 4</th>
<th>MAXIMIZE COMMUNITY AND CORRIDOR BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective 4.1</td>
<td>Objective 4.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measure 4.1.1</th>
<th>Measure 4.1.2</th>
<th>Measure 4.1.3</th>
<th>Measure 4.1.4</th>
<th>Measure 4.2.1</th>
<th>Measure 4.2.2</th>
<th>Measure 4.3.1</th>
<th>Measure 4.4.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>Number</td>
<td>Number</td>
<td>Number</td>
<td>Acres</td>
<td>Acres</td>
<td>Acres</td>
<td>Acres</td>
</tr>
</tbody>
</table>

| OPTION A | 5 | 5 | 5 | 5 | 5 | 5 | 5 | Moderate | 5.0 |
| OPTION B | 5 | 5 | 5 | 5 | 5 | 5 | 5 | Moderate | 5.0 |
| OPTION C | 5 | 5 | 5 | 5 | 5 | 5 | 5 | Moderate | 5.0 |
| OPTION D | 5 | 5 | 5 | 5 | 5 | 5 | 5 | Moderate | 5.0 |
| OPTION E | 5 | 5 | 5 | 5 | 5 | 5 | 5 | Moderate | 5.0 |
| OPTION F | 5 | 5 | 5 | 5 | 5 | 5 | 5 | Moderate | 5.0 |

The score for each of the eight performance measures are summed and averaged for each option. The results of the scoring for Goal No. 4 are shown in Table 3 below.

#### Table 3: Example Scoring Results

<table>
<thead>
<tr>
<th>Option</th>
<th>Total Score</th>
<th>Average Score</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>54.7</td>
<td>6.8</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>49.3</td>
<td>6.2</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>39.5</td>
<td>4.9</td>
<td>5</td>
</tr>
</tbody>
</table>

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This process would be replicated for each of the goals and the resulting averages would be summed. The highest overall total averages would identify the best performing options. These highest performing options will be recommended to the Committees for further refinement or for advancing into the Alternatives Analysis (AA) phase of the Cook-DuPage Corridor study.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>42.2</td>
<td>5.3</td>
<td>4</td>
</tr>
<tr>
<td>Y</td>
<td>48.7</td>
<td>6.1</td>
<td>3</td>
</tr>
<tr>
<td>Z</td>
<td>33.5</td>
<td>4.2</td>
<td>6</td>
</tr>
</tbody>
</table>