NICTI Alternatives Analysis

Evaluation Methodology

Prepared for:

Northern Illinois Commuter Transportation Initiative

Northern Illinois Commuter Transportation Initiative

Rockford Area Transportation Study

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January 17, 2007

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Section 1: Introduction

This document describes the evaluation framework that will be used to conduct the alternatives screening for the NICTI Alternatives Analysis. The evaluation approach presented here is based on the study team's current understanding of the issues within the study area as well as transportation, employment, and economic development in the Rockford and Chicago Metropolitan areas. It also reflects the transportation needs expressed by local decision makers and representatives of NICTI. The evaluation procedure follows the guidance provided by the Federal Transit Administration (FTA) for alternatives analyses.

This basis for evaluation allows the benefits and impacts of each alternative to be evaluated with an objective set of criteria that relate to the specific needs of this project. As the evaluation progresses, through a comparison of the performance of the alternatives with respect to these criteria, the most suitable, efficient transportation options will emerge for detailed analysis, eventually leading to the adoption of a Locally Preferred Alternative (LPA) by local transportation decision makers.

The evaluation criteria were selected to correspond to the identified needs within the study area and to address the following project goals:

Goal 1: Enhance Mobility Through and Within the Corridor

Goal 2: Provide Efficient, High Quality Transit Improvements

Goal 3: Develop a Cost Effective Transportation Solution

Goal 4: Support Business, Transportation and Residential Investments

Goal 5: Support Effective Land Use and Development Patterns

Goal 6: Provide a Cleaner, Safer Environment

While the methodology offers an objective procedure for comparing potential transit solutions in this specific corridor, it also takes into consideration FTA's criteria for evaluating transit projects competing for New Starts funding. The criteria also provide a foundation for the federally mandated environmental review processes that will occur in the future.

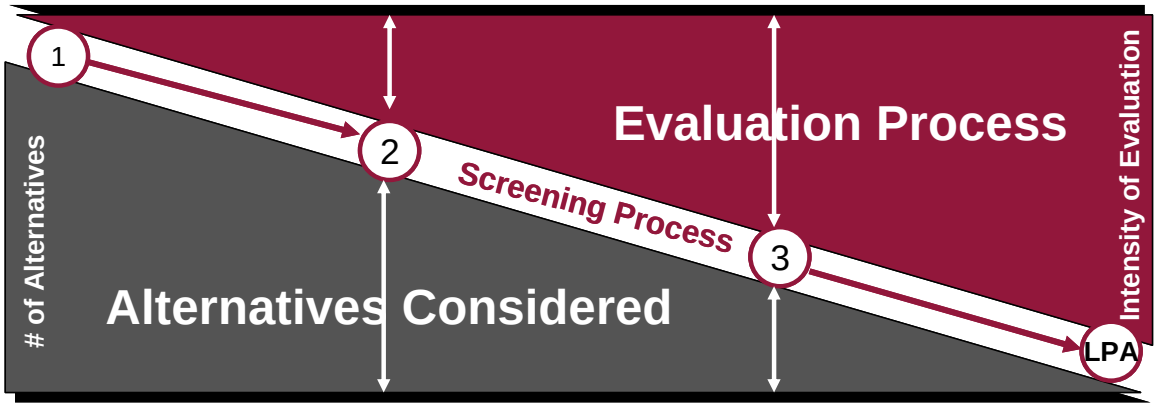
This report consists of three sections. Section 2 describes the evaluation process and how it relates to the eventual selection of the Locally Preferred Alternative. Section 3 describes the project goals and objectives and how they relate to the evaluation criteria. The goals and objectives provide the context within which the purpose and need was established. Section 4.0 discusses the next steps in the alternatives analysis process.

Section 2: Evaluation Process

The proposed evaluation methodology for the NICTI Alternatives Analysis is a three-step process in which *increasingly* detailed and comprehensive measures of effectiveness (MOEs) are applied to a *decreasing* number of modal and alignment alternatives identified as the best potential transportation investments.

The process begins with the project goals and objectives, and identifies criteria and measures of effectiveness for each. A large number of alternatives are evaluated using a generalized set of criteria. As screening progresses, certain alternatives will be retained by virtue of successfully passing the screening and the number of alternatives will decrease. For the next level of screening, the MOEs and the definition of the alternatives both become more detailed. Each step in the evaluation process is thus designed to focus the analysis on progressively fewer alternatives.

The figure below illustrates this methodology showing how the number of criteria increases as the number of alternatives decreases, and also how the three screenings will be conducted in the context of the project development process.



As the AA study progresses and the evaluation criteria are applied, options within the "Universe of Alternatives" are eliminated until, at the end of the process, there is a Locally Preferred Alternative (LPA)

It is anticipated that the environmental review phase of the project will be initiated during the third level of the alternatives evaluation (Screen 3) and will then be followed by preliminary engineering. Conceptual engineering will be conducted during Screens 2 and 3 of the Alternatives Analysis to provide necessary design specificity to aid the evaluation process, including capital cost estimating.

As part of the alternatives design process, the study team will also identify potential sites for stations and transit stops and yards and shops, as required.

Section 3: Project Goals

To address the purpose of the proposed Alternatives Analysis, six goal statements were developed to serve as the goals for the NICTI Alternatives Analysis.

Goal 1: Enhance Mobility Through and Within the Corridor

- Expand mobility opportunities for all users moving through and within the Elgin to Rockford Corridor.
- Provide access to jobs and job markets in the corridor.
- Provide for growth in travel demand.
- Reduce peak period traffic demands on I-90.
- Provide additional level of corridor/area security specifically relating to evacuation.

Goal 2: Provide Efficient, High Quality Transit Improvements

- Provide high quality modal alternatives.
- Attract new transit riders from lower occupancy vehicles, particularly single-occupancy vehicles.

Goal 3: Develop a Cost-Effective Transportation Solution

- Provide an efficient transit system that minimizes costs per new transit rider.
- Minimizing construction, right-of-way and operating and maintenance costs.
- Leverage federal and state funding.

Goal 4: Support Business, Transportation and Residential Investments

- Support previous business investments in the Elgin to Rockford Corridor.
- Support previous public investment in transportation infrastructure.
- Support public and private investment in residential communities.
- Support connections between major transportation systems and job centers

Goal 5: Support Effective Land Use and Development Patterns

- Promote a reliable transit system that allows efficient, effective land use development patterns and facilitates the highest and best use of properties adjacent to transit facilities.
- Provide consistency with Long Range Transportation Plans and land use plans.
- Encourage economic growth.
- Discourage unplanned growth.
- Enhance quality of life.

Goal 6: Provide a Cleaner, Safer Environment

- Support regional goals for: cleaner air and water, more efficient energy use and a safer and healthier environment.
- Increase the safety and security of the transportation system for motorized and non-motorized users.

The screening of alternatives uses a series of criteria that evaluate the degree to which each alternative achieves a specific goal. Since each goal addresses different factors, such as cost effective transportation and supportive land use and development, criteria specific to each goal are identified. Benefits derived from transportation improvements are frequently not mutually exclusive but rather they often overlap. In these cases a common criterion or set of criteria might be assigned to measure more than one goal.

Section 4: Evaluation Criteria

The next step is to associate evaluation criteria with the identified goals and determine an appropriate way to measure performance at each step of the screening process. The screening process is based on a comprehensive set of evaluation criteria and MOEs that become more detailed as the number of alternatives decreases. These criteria and measures have been selected to reflect the need for the project; the study goals and objectives; similar analyses from other similar projects; and the FTA's guidance on alternatives analysis as well as New Starts evaluation criteria.

The evaluation criteria that were selected for this comparison of alternatives were organized within four categories as follows:

Social Factors

- Land Use and Development
- Neighborhoods and Community
- Visual and Aesthetics
- Historic and Archeological Resources
- Parklands and Recreational Areas
- Environmental Justice/Equity

Economic Factors

- Project Costs
- Regional Economic Effects

Environmental Factors

- Air Quality
- Noise and Vibration
- Wetlands and Water Quality
- Protected Species and Habitat

Transportation Factors

- Transit System Usage
- Ridership
- Travel Time and Service Quality
- Accessibility
- Compatibility
- Efficiency

The following is a more detailed discussion of the criteria and how they relate to the transportation needs of the study area as well as the project's goals and objectives. It should also be noted that, when determining which projects are recommended for funding, the FTA places the greatest value on the cost effectiveness and land use ratings discussed below.

4.1 Social Factors Evaluation Criteria

Social factors deal with the surrounding "context" of the project area, and relate to the ability of an alternative to be tailored to the needs of the regions and local community, while identifying any negative impacts.

- *Land use and development*: The land use criterion is intended to show each alternative's compatibility with existing and future development and thus best support community development initiatives and other objectives within Goals 4 and 5.

- *Neighborhoods and community*: The community effects of the alternatives may be assessed by a variety of factors including the number of neighborhoods served versus the number of impacted neighborhoods, community cohesion, businesses and community facilities that are served. This criterion addresses project Goal 1.

- *Visual and aesthetics*: Visual and aesthetic changes within the project area could have an effect on communities' context and identity and alternatives would be considered based on the relative visual effect they may have. This measure supports Goal 5.

- *Historic and archeological resources*: Existing historic and archeological resources are an important part of any community's assets and adverse effects on these resources would be contradictory to the project's objective of respecting community context. This objective is within Goal 5.

- *Parklands and recreation areas*: Similar to cultural resources, parklands and recreational areas are essential elements of any neighborhood and alternatives that negatively impact these resources will rate lower than those alternatives that have no or minimal impact. Goal 5 includes this measure.

- *Environmental justice/equity*: This criterion directly relates to the project's objective of balancing the benefits and impacts of alternatives and is used in Goal 1. This criterion would be measured by identifying low-income and minority communities within the project area and identifying both the benefits of public transportation and any disproportionate impacts on these communities.

4.2 Economic Factors Evaluation Criteria

Economics are another critical consideration for each alternative, and project cost effectiveness will be a key determinant of which alternatives move forward through the screening. These measures are key factors in Goal 3.

- *Project costs*: Both capital and operating costs must be considered to compare the cost effectiveness of alternatives.

- *Regional economic effects*: Major capital transit projects can provide the potential for local development and job growth. This criterion will be used to compare how well alternatives promote regional economic initiatives and support local economic development initiatives.

4.3 Environmental Factors Evaluation Criteria

Environmental evaluation criteria are intended to examine the extent to which alternatives affect various elements of the natural environment. Environmental sensitivity is a requirement for any chosen alternative, and environmental considerations can impact alignment decisions during later stages of the project development process. Environmental criteria will be applied at a generalized level during the Alternatives Analysis process and will not include the detail that will be required during the environmental evaluation phase. All of these factors are included in Goal 6.

- *Air quality*: alternatives will be evaluated to determine their relative effectiveness in contributing to air quality improvements in the Rockford and Chicago metropolitan areas.

- *Noise and vibration*: Proximity of the alternatives to sensitive receptors could lead to noise and vibration impacts.

- *Wetlands and water quality*: Identification of potential impacts to these important resources, including river and their branches.

- *Protected species and habitat*: An initial screening will be made to determine the potential presence of protected species and habitat in the study area.

4.4 Transportation Factors Evaluation Criteria

The ability to improve transportation service between the two project areas is a major factor in addressing project needs and will play a large role in differentiating the possible transportation solutions in the study area.

- *Transit system usage*: Use of transit is measured by how well alternatives provide service to activity centers within the corridor and in the region as well as the quality of that trip. Elements of transit system usage are included in Goals 1 and 4.

- *Ridership*: Increasing system ridership and transit competitiveness is an important measure of the effectiveness of an alternative. In addition to addressing the project's goal of improving the performance of the regional transit system, ridership is a key component of FTA's evaluation of a project. Ridership is one of the measures used to establish an alternative's cost effectiveness rating (others are capital and operating costs and travel time savings.) Ridership is a key element of Goal 2.

- *Travel time and service quality*: Travel time savings are a key measure in evaluating the performance of a given transportation improvement. Although it is not anticipated that this project will have a measurable effect compared to forecasted highway travel times, alternatives are likely to provide different ranges of transit travel time savings. This is included in Goal 2.

- *Accessibility*: The accessibility criterion is measured by the ability of passengers to make convenient connections between different transit modes and routes and reflects how alternatives facilitate connections and linkages between the different transit modes currently in service in the study area. This is used in Goal 2.

- *Compatibility*: Alternatives that are compatible with existing transportation infrastructure are more likely to meet the project's goals. This measure is used in Goal 2.

- *Efficiency/ Effectiveness*: One of the most important criteria for the project, both for NICTI and the FTA, will be the efficiency of the transit system as measured by the cost effectiveness of each alternative and is measured in Goal 3. FTA measures cost-effectiveness by comparing the costs of a project against the transportation benefits generated by the project. Costs include the sum of: (1) capital costs annualized to an equivalent annual payment over the life of the project; and (2) annual operating and maintenance costs. Benefits include faster travel times and other improvements in service characteristics for new and existing transit riders, expressed in terms of hours of travel time savings. Consequently, the cost-effectiveness measure expresses the relative costs and benefits of the project in terms of costs per hour of travel time savings. This is defined as:

$$\text{Costs per hour} = \frac{\text{Annualized capital costs + Change in annual operating/ maintenance cost}}{\text{Hours of transportation Benefits}}$$

- *Traffic*: Alternatives that would negatively impact vehicular and pedestrian movements, potentially affecting the quality of life in the study area. Goals 1 and 4 incorporate traffic issues.

Table 1 on the following page presents a draft alternatives evaluation framework that combines the project goals and the criteria. The first column contains the project goal. The next two columns include the evaluation criteria and their specific corresponding MOEs. The remaining three columns identify the criteria used for each screening level.

At the beginning of each screen these criteria will be further refined. For example, to determine cost-effectiveness of the various alternatives, the ratio of project costs (including annualized capital costs and annual operating/ maintenance costs) to transportation benefits, such as system capacity, would be calculated and compared across all alternatives.

The evaluation process will be both *quantitative* and *qualitative*. To the extent possible, quantitative measures will be used. For most qualitative measures, performance for a given alternative will be rated "high, medium, or low" or "substantial effect likely, moderate effect likely, effects not likely" based on information about the presence or absence of a given resource.

At each step in the screening process, the study team will develop a technical memorandum that documents each alternative's performance with respect to the criteria and the corresponding MOEs. The memorandum will include a table, that presents the quantitative and qualitative data developed for each alternative and MOE. These memoranda will also include text that summarizes the relative advantages and disadvantages of each alternative and highlights the essential differences between alternatives.

Table 1: Alternatives Evaluation Framework

Goals	Evaluation Criteria	Measures of Effectiveness	First Screen	Second Screen	Third Screen
Goal 1 **Enhance Mobility through and within the Corridor**	**Neighborhoods and Community**	Communities Served	X	X	X
		Communities Impacted		X	X
		Degree of Potential Effect on Communities			X
		Effects on Community Cohesion			X
		Community Facilities Served		X	X
		Community Facilities Impacted		X	X
		Degree of Potential Effect on Community Facilities			X
		Business Community Served		X	X
		Property Acquisition		X	X
		Public Comments	X	X	X
	Environmental Justice/Equity	Low-income or Minority Population Concentrations Served	X	X	X
		Low-income or Minority Population Concentrations Impacted		X	X
		Low-income or Minority Business Communities Served		X	X
		Potential for Displacement of Low-Income and Minority Households		X	X
		Potential for Displacement of Low-Income and Minority Businesses		X	X
		Potential for Community Facilities Impacts in Low-income or Minority Areas		X	X
	Transit System Usage	Service to Activity Centers within Study Area	X	X	X
		Quality and Convenience of Trip		X	X
	Accessibility	Intermodal Connection Opportunities	X	X	X
		Quality of Intermodal Connections		X	X
	Traffic	Impacts to Vehicular Traffic	X	X	X
		Impacts to Pedestrian Traffic		X	X
Goal 2 **Provide Efficient, High Quality Transit Improvements**	**Ridership**	Opening Year Preliminary Daily Ridership (Origin-Destination Pairs)		X	X
		Forecast Year Preliminary Daily Ridership (Origin-Destination Pairs)		X	X
		Opening Year Annual Riders (System-wide)		X	X
		Forecast Year Annual Riders (System-wide)		X	X
		Daily Station/Stop Boardings			X
	Travel Time and Service	Transit Travel Times between Representative Origin-Destination Pairs		X	X
		Quality and Convenience of Trip	X	X	X
	Accessibility	Intermodal Connection Opportunities	X	X	X
		Quality of Intermodal Connections		X	X
	Compatibility with Existing Transportation System and Plans	System Criteria Compatibility		X	X
		Interoperability with Existing Service			X
		Impacts to Planned Transportation Improvement	X	X	X
		Consistency with Existing Infrastructure	X	X	X

Table 1: Alternatives Evaluation Framework (continued)

Goals	Evaluation Criteria	Measures of Effectiveness	First Screening	Second Screening	Third Screening
Goal 3 **Develop a Cost Effective Transportation Solution**	**Efficiency/ Effectiveness**	Capital Costs per Passenger Mile		X	X
		Cost Effectiveness Index			X
	Project Costs	Order of Magnitude Capital Costs	X	X	
		Total Project Capital Costs			X
		Order of Magnitude Operating Costs		X	
		Total Project Operating Costs			X
Goal 4 **Support Business, Transportation and Residential Investments**	**Land Use**	Consistent with Local Adopted Future Land Use Plans	X	X	X
		Consistent with Comprehensive Plans	X	X	X
		Consistent with Planned Development		X	X
	Transit System Usage	Service to Activity Centers within Study Area	X	X	X
	Traffic	Impacts to Vehicular Traffic	X	X	X
		Impacts to Pedestrian Traffic		X	X
Goal 5 **Support Effective Land Use and Development Patterns**	**Land Use**	Compatible with Existing Land Use	X	X	X
		Consistent with Local Adopted Future Land Use Plans	X	X	X
		Consistent with Comprehensive Plans	X	X	X
		Consistent with Planned Development		X	X
		Consistent with Local Zoning			X
	Regional Economic Effects	Consistency with Regional Planned Developments		X	X
		Joint Development Potential		X	X
		TOD Potential			X
		Potential for Job Creation			X
		Business Community Comments		X	X
	Visual and Aesthetics	Potential for Negative Impact on Visual Quality			X
		Percent of Corridor Having High, Medium, Low Visual Sensitivity		X	X
Goal 6 **Provide a Cleaner, Safer Environment**	**Air Quality**	Consistency with Regional Air Quality Plans	X	X	X
	Noise and Vibration	Anticipated Noise/Vibration Impact Potential for Mode (contour based on FTA guidance)		X	X
	Wetlands and Water Quality	Wetland Impacts		X	X
	Protected Species and Habitat	Critical Habitat Impacts		X	X
	Historic & Archeological Resources	Potential for Archaeological Site Impacts within the Proposed Right-of-Way		X	X
		Buildings Listed or Eligible for Listing on the NRHP Within 200'		X	X
		Districts Listed or Eligible for Listing on the NRHP Within 200'		X	X
	Parklands and Recreation Areas	Parklands Impacted		X	X
		Recreation Areas Impacted		X	X

Section 5: Next Step – First Level Screening

The information generated through this evaluation process will enable decision makers to weigh the costs and benefits of the different alternatives and understand the implications of their choices. It is also a key consideration that the evaluation criteria have been developed with existing FTA New Starts guidelines in mind and that alternatives that perform well in this project evaluation process will ultimately offer the strongest appeal for the FTA.

The next step in the alternatives analysis process is to begin Screen 1. The intent of the initial screening evaluation is to compare the relative performance of a large number of alternatives using a small number of criteria. This level of analysis is intended to identify suitable modes and alignments from which alternatives are identified for further analysis and screening.

At this stage, all reasonable transit technologies or modes have been identified. Technologies have been assessed primarily on their suitability to the project area and whether they meet the purpose and need of the project. Similarly all reasonable alignments within the study area are identified. Alignments were identified to make the best possible use of existing transportation infrastructure. These alternatives are described in a technical memorandum entitled NICTI Alternatives Analysis, Definition of Initial Alternatives.

The initial evaluation of the suitability and applicability of the alternatives was based on the following general considerations.

- *System applicability and capacity*: Transit system implementation is a major investment and the alternatives should realistically address the stated needs of the study area and the project's goals.
- *Study area suitability*: The modal technology needs to match basic project needs and be compatible with the existing transportation system and current plans. Proven technology was a consideration.

The initial alternatives were reviewed with the NICTI Executive Committee, project stakeholders, local public officials and the general public in November 2006. These reviews affirmed the initial alternatives.

These individual alternatives will be evaluated in the second step of Screen 1 to identify the complete array of mode and alignment combinations for the study area. These alternatives will be compared against each other using the evaluation criteria and their corresponding MOEs.

At this level of analysis (Screen 1), most measures will be assessed qualitatively. Table 2 on the following page summarizes the evaluation factors that will be used in the initial screening of alternatives.

The first level screening is done to assess the general ability of the alternatives to serve the markets, have reasonable capital costs, be supportive of development patterns and local infrastructure. Environmental "fatal flaws" will also be identified.

Table 2. First Level Screening Evaluation Measures

Goals	Measures of Effectiveness	First Screen
Goal 1 **Enhance Mobility through and within the Corridor**	Communities Served	X
	Public Comments	X
	Low-income or Minority Population Concentrations Served	X
	Service to Activity Centers within Study Area	X
	Intermodal Connection Opportunities	X
	Impacts to Vehicular Traffic	X
Goal 2 **Provide Efficient, High Quality Transit Improvements**	Quality and Convenience of Trip	X
	Intermodal Connection Opportunities	X
	Impacts to Planned Transportation Improvements	X
	Consistency with Existing Infrastructure	X
Goal 3 **Develop a Cost Effective Transportation Solution**	Order of Magnitude Capital Costs	X
Goal 4 **Support Business, Transportation and Residential Investments**	Consistent with Local Adopted Future Land Use Plans	X
	Consistent with Comprehensive Plans	X
	Service to Activity Centers within Study Area	X
	Impacts to Vehicular Traffic	X
Goal 5 **Support Effective Land Use and Development Patterns**	Compatible with Existing Land Use	X
	Consistent with Local Adopted Future Land Use Plans	X
	Consistent with Comprehensive Plans	X
Goal 6 **Provide a Cleaner, Safer Environment**	Consistency with Regional Air Quality Plans	X

In consideration of the qualitative nature of the first level screening, general conclusions of the alternatives' ability to address the evaluation measures are typically used. For the NICTI Alternatives Analysis it is proposed that symbols indicating relative effectiveness in addressing evaluation measures be used to present the evaluation. The following is proposed:

This symbol indicates an alternative fully addresses the measure, or is the "best" relative to the consideration.

This symbol indicates an alternative somewhat or partially addresses the measure. The alternative is acceptable but not preferred relative to the consideration.

This symbol indicates an alternative fails to address the measure. The alternative is not acceptable relative to the consideration.

Each alternative will be evaluated against the measures in Table 2 and given a rating using the symbols. This technique, sometimes referred to as the "Consumer Reports" method, is consistent with the level of detail and makes it visually apparent which alternatives meet the evaluation considerations. Alternatives with many "empty" symbols or empty symbols in critical areas, likely will not be recommended to be carried into the next level of screening. Alternatives therefore will either be carried into the second level of screening or will be eliminated from further consideration based on how they rate relative to the evaluation considerations.

It is important to keep in mind that it is only necessary to develop information to the level of detail required to differentiate among the alternatives.