The I-69 Evansville-to-Indianapolis Study
Tier 1 Environmental Impact Statement

Task 3.2 Report

Project Issues and Performance Measures

Technical Report

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1 Introduction

This technical report was prepared for the I-69 Evansville-to-Indianapolis Study Tier 1 Environmental Impact Statement (EIS), Task 3.2, Develop Project Goals and Performance Measures. The objective of this task is to examine possible goals of I-69 in Indiana and define a set of performance factors to be used to evaluate whether proposed alternatives satisfy the Purpose and Need statement. Performance factors are the indicators that will be considered in the decision making process. Specific decision rules will be developed in Task 5.

This technical report is organized as follows:

- **Section 2** enumerates the project's major goals, and gives issue statements associated with each major goal. These issue statements will be used to guide the regional needs analysis, and eventually produce project goals;
- **Section 3** briefly reviews the purpose of establishing performance factors and summarizes the proposed framework for the performance factors in this EIS;
- **Section 4** identifies the proposed ***transportation*** performance factors for this project;
- **Section 5** identifies the proposed ***economic development*** performance factors for the project;
- **Section 6** identifies proposed performance factors related to each alternative's consistency with the ***Corridor 18*** project.
- **Section 7** restates the project's major goals and relates the performance factors to the project issues.

Section 3 establishes criteria for performance factors, also called Factors of Effectiveness (FOEs), which can evaluate how well alternatives satisfy these goal statements. Sections 4, 5, and 6 analyze performance factors which can be applied to these issue statements, by using the criteria put forth in Section 3. Then, in Section 7, these issue statements are repeated, along with the proposed FOEs which will be used to evaluate how well alternatives meet each of these issue statements.

This report represents the culmination of a screening process in which numerous FOEs were studied for their applicability to this project and its goals. This report is a consolidation of two previous reports, *Technical Report 3.2.1, Transportation Performance Factors*; and *Technical Report 3.2.2, Economic Performance Factors*. In these previous technical reports, complete documentation is provided regarding the formulation of these performance factors, and a complete rationale as to why some are recommended while others are not.

2 Project Goals - Introduction

I-69 is a component of the Indiana Department of Transportation's (INDOT's) long-range vision based on the project's potential to fulfill three overarching purposes. These include:

- Strengthening the transportation network in Southwestern Indiana;
- Supporting economic development within Southwestern Indiana; and
- Completing Indiana's portion of Corridor 18, the international trade corridor planned between Canada and Mexico.

These overarching purposes are derived from previous studies, as well as a long history of public input. We recognize that a needs analysis, within the context of determining the Statement of Purpose and Need, Must occur to determine whether, and to what extent, these needs exist within the project area.

The following issue statements are proposed to support each of the three major project purposes. They are grouped according to the primary purpose statement with which they are associated. These issue statements which guide the needs analysis which will produce specific project goal statements

Transportation Issues Summary

- Issue 1: Travel between Evansville and Indianapolis
- Issue 2: Personal Accessibility
- Issue 3: Travel Efficiency
- Issue 4: Safety

Economic Issues Summary

- Issue 5: Business Costs
- Issue 6: Business Accessibility
- Issue 7: Sustainable Economic Development
- Issue 8: Widely Distributed Economic Benefits

Corridor 18 Issues Summary

- Issue 9: Characteristics Required for the Corridor 18 Facility
- Issue 10: Efficient Movement of Freight and People

Following is an explanation for each of these issues

Transportation Issues Explanation

Issue 1: Travel between Evansville and Indianapolis

This issue was articulated by INDOT Commissioner Cristine Klika in her statement, *INDOT Policies Concerning the Tier 1 EIS for the Proposed Extension of I-69 from Indianapolis to Evansville*, dated February 24, 2000. She stated, "… the basic purpose of this project has already been established: it is intended to provide an improved transportation link between Evansville and Indianapolis as part of the proposed Corridor 18 / I-69 high priority corridor." This acknowledges the directives of the U.S. Congress for approximately the last decade. It also recognizes that an Evansville-Indianapolis high speed ground transportation facility has long been recognized as a "missing link" in Indiana's transportation network.

Issue 2: Personal Accessibility

Residents of Southwest Indiana have long stated their desires for better and safer access to major centers of commerce, employment, education, health care, and culture. Many such attractions are found throughout Southwest Indiana, particularly in the cities of Indianapolis, Evansville, Bloomington, and Terre Haute.

Issue 3: Travel Efficiency

It is expected, with the resurgence in population and job growth in Southwestern Indiana, that over the next two decades growth in travel demand will begin to place a strain on the region. This will require enhancements to the system in order to sustain and / or improve existing levels of service. In addition, improved levels of service result in more predictable and dependable travel times for commercial traffic. This supports economic development, as well as serving residents making non business-related trips.

Issue 4: Safety

Compared to other parts of the state, Southwest Indiana has relatively limited access to higher quality, multi-lane facilities, especially those build to Interstate standards. Only I-64 & I-164 (at the far southern end of the study area) and I-70 (at the far northern end of the study area) are built to these standards. Typically, roads built to Interstate standards have crash rates which are a fraction of those which other facilities have. Further, there have been many public statements requesting improved, safer roads in Southwest Indiana.

Economic Issues Explanation

Issue 5: Business Costs

An important trigger for economic development is the ability of a highway project (or other transportation improvement) to reduce transportation costs in a region. Reduced business costs increase productivity, and make businesses more competitive. This leads to greater sales, profits, employment, and an enhanced business climate.

Issue 6: Business Accessibility

This issue deals with access of businesses to labor, supplier, and markets for their goods and services. It is an important factor in the ability of businesses to become more competitive by reducing costs of the goods and services which are inputs to production. It also is important in the ability of businesses to expand the markets for their end products.

Issue 7: Sustainable Economic Development

Most public investments have as an important goal economic growth. It is not enough, however, that more dollars flow through the economy of a region or state. It is important that that growth be sustainable for the long run. This means that not only must economic growth occur, but it must be broadly diversified across the economy.

Issue 8: Widely-Distributed Economic Benefits

Economic growth is of little value without its benefits being realized throughout the region by a broad spectrum of its residents. Any project which has the goal of economic development should benefit the population of a state or region as a whole. These factors will assess whether growth is shared by the many, not simply the few.

Corridor 18 Issues Explanation

Issue 9: Characteristics Required for the Corridor 18 Facility

Legislation enacted by the Congress provides that Corridor 18 connect Evansville and Indianapolis. It further provides that this facility accommodate vehicular traffic with a facility built to Interstate design standards.

Issue 10: Efficient Movement of Freight and People

Corridor 18 is a high-priority corridor for business and commercial travel. It is important that business-related travel, in particular truck traffic, be accommodated efficiently.

3 Background

This section provides a brief overview of the organization and flow of the environmental study process. It will also discuss the rationale for identifying performance factors, and the framework for use of the performance factors.

Project Background

The fundamental purpose of this study is to identify and evaluate alternatives for improvements to the transportation corridor between Evansville and Indianapolis. The study will evaluate a full range of geographic alternatives, including upgrades to existing highways and various new alignments in the region. It also will consider potential non-highway modes.

Due to the large size of the study corridor, the study is being conducted as a "tiered" EIS. Tier 1 will resolve major planning issues, including evaluating the impacts of taking no action (the "no-build" alternative) and making decisions regarding mode, preferred corridors, and any projects of independent utility. Tier 2, which will be conducted after Tier 1, will complete the environmental process, including determining an exact alignment, detailed impacts, and mitigation strategies.

The major steps in the Tier 1 process include:

- Purpose and need;
- Scoping;
- Screening;
- Environmental analysis / refinements;
- Draft EIS; and
- Final EIS.

This technical report- was prepared as part of Task 3 of the project, which will develop a Purpose and Need statement that describes the need for and purpose of the I-69 Evansville-to-Indianapolis Project.

Performance Factors Framework

A critical step in developing the Purpose and Need statement and laying the groundwork for the ensuing alternatives analysis is to identify the key factors to be used in evaluating the needs of the Southwestern Indiana region and the ability of proposed alternatives to address those needs. This evaluation process includes both major goals for the project and a series of performance factors (or factors of effectiveness) which assess how well each alternative satisfies these goals.

Performance factors are used for decision-making by agencies or organizations (or for external audits of an agency or organization). Agencies use performance factors to rank capital investment alternatives, evaluate programs, or allocate a given level of resources among program or projects. Typical activities include long-range strategic planning, near-term project programming, and alternatives evaluation at the corridor or facility level.1

Overall Project Goals

Defining performance objectives that relate clearly to agency or program goals or is central to an effective planning process. Performance factors may be identified that describe a rather large number of dimensions or issues. For example, performance factors may be related to broad goal categories such as mobility, safety, or economic development. For the I-69 Evansville-to-Indianapolis Study, performance factors must be defined that correspond to the project's Purpose and Need statement. Project issues generally fall under three headings:

- Strengthening the transportation network in Southwestern Indiana;
- Supporting economic development within Southwestern Indiana; and
- Completing Indiana's portion of Corridor 18, the planned international trade corridor designed to link Canada and Mexico.

In addition, as shown in Section 2, there are proposed issues which will be used to expand each of these goals.

Accordingly, performance factors have been recommended in three categories — transportation (see Task 3.2.1 report), economic development (see Task 3.2.2 Report), and Corridor 18.

1 *Performance-Based Planning Manual*, prepared for the National Cooperative Highway Research Program, Project 8-32 (2), *Multimodal Transportation: Development of a Performance-Based Planning Process*, by Cambridge Systematics, Inc., November 1999.

Performance Factor Dimensions

Performance factors also may be classified according to several dimensions. The following dimensions are critical to this project:

- **Perspective** — In addition to measuring current conditions, performance factors should be able to compare the benefits and impacts of alternative improvement strategies.
- **Mode** — Performance factors should address highway impacts, with the flexibility to address other surface transportation modes.
- **System level** -- Performance factors should address facility, corridor, and network-wide conditions.
- **Spatial perspective** -- Performance factors should address regional, state, and when appropriate, national goals / impacts.
- **Time-frame** – Performance factors should address long-term future conditions at a particular point in time.

It is useful to consider these dimensions in selecting and implementing a set of performance factors, not only to reduce analytical effort by eliminating some irrelevant performance factors, but also to ensure that adequate breadth is instilled in the planning process so that all relevant issues are addressed.

Selection Criteria

Other common criteria for selecting performance factors for a planning process include:

- **Measurability –** Is it possible to generate the performance factor with the tools and resources available? How much would it cost to adequately quantify this factor? What level of accuracy is needed for this factor to be useful? How reliable are the sources of data for this factor? Are needed data available?
- **Forecastability –** Can we realistically compare future alternative projects or strategies using this factor? Is it difficult to define this factor using existing forecasting tools?
- **Differentiation** – Can the factor differentiate among alternatives? Will significantly different alternatives have significantly different values?
- **Usefulness –** Is this factor useful? Is it a direct measure of an issue or concern? Is it primarily an indicator of condition, or is it capable of diagnosing transportation or economic deficiencies and their causes?
- **Clarity –** Is this factor understandable to policymakers? To transportation professionals? To the public? The ultimate decision markers for this project will not be transportation professionals. The study's recommendations and rationale for those recommendations must be acceptable to a non-technical audience.

4 Transportation Performance Factors

This section evaluates potential transportation performance factors for this project. These performance factors primarily are intended to address the following question:

- ***Which alternatives satisfy the element of the project's draft purpose and need statement related to strengthening the transportation network within Southwest Indiana?***

Most of the performance factors described in this section would be used to compare improvements to a "no-build" alternative that involves no changes to the transportation system in Southwestern Indiana beyond the improvements that currently are committed for construction.

The potential performance factors have been grouped into four categories. These are as stated below:

- Evansville-Indianapolis Travel
- Personal Accessibility
- Travel Efficiency
- Safety

The first category reflects issues related to improving connections between Indianapolis and Evansville. The next two relate to mobility throughout Southwestern Indiana. The last relates to travel safety in Southwestern Indiana. Each of these, in order, pertain to Issue Statements 1 – 4 in Section 2.

For each category, this section identifies and describes performance factors, and screens performance factors by criteria given in Section 3. Technical Report 3.2.1 contains more detailed information, including data sources, analytical approaches, and geographic scale for the analysis. For each category of performance factor, it contains a table summary and key traits of each factor. In each category, multiple performance factors may be suitable for assessing current conditions and / or differentiating among alternatives. Alternatives are recommended based upon screening criteria .

For some of the proposed performance factors, it was necessary to determine whether they would be capable of differentiating among alternatives. For these factors, statistical tests were conducted to determine whether they could meaningfully differentiate among different

alternatives. Section 4 of Technical Report 3.2.1 summarizes the results of these statistical tests. All factors recommended for inclusion show a medium to high sensitivity in their ability to differentiate among alternatives.

In the remainder of Section 4, a number of technical measures are referred to. Following is a glossary defining some key terms.

Accessibility Index – A computation which estimates the ease or difficulty for the "typical" transportation system user to reach a desired destination. "Accessibility" indices can be defined in different ways, to emphasize geographic areas, and / or different users (residents, employees, or combinations of residents and employees).

Congested Travel Time – The "real world" time it takes a vehicle to travel a given distance, taking into account delays due to the presence of other vehicles. This "congested" travel time is an average for the entire day, and does not represent peak period travel time delays.

Congestion – The condition in which a road is used in excess of its capacity. This corresponds to a volume-to-capacity ratio in excess of 1.0. Roads can serve traffic levels in excess of capacity, but this results in significant delays for persons using those roads. Measures of congestion used in this analysis use "practical" capacity of Level of Service C. See the subsequent section, ***Travel Efficiency***, for a discussion of Levels of Service.

Free Flow Travel Time – The time it would take a vehicle to make a trip if it experiences no meaningful delay due to the presence of other vehicles.

Functional Classification – A system of grouping roads based upon the kinds of trips they are designed to serve.

Vehicle Hours of Travel (VHT) – The sum of the time spent by all vehicles traveling on a given facility, or in a given geographical area.

Vehicle Miles of Travel (VMT) – The sum of the mileages by all vehicles traveling on a given facility, or in a given geographic area.

Volume-to-Capacity Ratio – The ratio of traffic volume to the nominal capacity of the facility. A volume-to-capacity ratio of 0.8 would indicate that a facility is being used by traffic which represents 80% of its capacity.

Evansville-Indianapolis Travel

An important aspect of strengthening the region's transportation network is to provide an improved, Interstate-type connection between Evansville and Indianapolis. Over the past decade, directives of the U.S. Congress have designated the Evansville to Indianapolis link as a high priority transportation corridor. In addition, the need for a high speed ground transportation link between Indianapolis and Evansville has long been recognized. Indianapolis is the state capital, its center of business and commerce, as well as the location of many medical, cultural, and other key resources. Evansville is Indiana's third largest city; a high quality transportation link between it and Indianapolis has long been recognized as a "missing link" in the state's transportation network.

Potential Evansville-Indianapolis Travel Efficiency Factors include:

- Free flow travel time between Evansville and Indianapolis
- Congested travel time between Evansville and Indianapolis
- Free flow travel time savings between Evansville and Indianapolis
- Congested travel time savings between Evansville and Indianapolis

Each of these factors may be calculated from the Indiana State Travel Model. Each calculation is made with respect to travel between a pair of reference points, one in Indianapolis and one in Evansville. They are calculated as follows:

- "Free flow travel time" is the time a vehicle would require to travel in the absence of any roadway congestion, or delays due to traffic signals.
- "Congested travel time" is the time a vehicle requires to travel under typical weekday driving conditions. It takes into account congestion caused by normal traffic levels, as well as delays at traffic signals.
- "Free flow travel time savings" is the difference in free flow travel time between the no-build network, and a network including a proposed alternative.
- "Congested travel time savings" is the difference in congested travel time between the no-build network, and a network including a proposed alternative.

Recommended Factors

Each of these is a clear and understandable measure of an alternative's ability to improve the transportation connection between Evansville and Indianapolis. Each is highly sensitive in its ability to differentiate among alternatives. All four factors are recommended for inclusion.

Personal Accessibility

A variety of factors are available to assess the relative ease or difficulty with which residents and / or employees can travel within the Study Area, as well as between the Study Area and portions of Indiana outside of the Study Area. Four of these factors quantify the magnitude and efficiency of

travel. Eight other factors compare the ease or difficulty in traveling between different parts of the state. Finally, four measure the accessibility to major destination in the study area.

The factors of the amount and relative efficiency of travel undertaken include:

- Vehicle Miles of Travel (VMT)
- Vehicle Hours of Travel (VHT)
- VMT by Functional Classification
- VHT by Functional Classification

The factors of accessibility are given below. Definitions of each factor are provided in subsequent text:

- Pure Accessibility Index
- Population-Weighted Pure Accessibility Index
- Accessibility-to-Employment Index
- Population-Weighted Accessibility-to-Employment Index
- Proportion of Pure Accessibility Index for the Study Area
- Proportion of Population-Weighted Pure Accessibility Index for the Study Area
- Proportion of Accessibility-to-Employment Index for the Study Area
- Proportion of Population-Weighted Accessibility-to-Employment Index for the Study Area

The factors of accessibility to major trip generators include:

- Population within 1, 2, and/or 3 hours of Indianapolis
- Population within 1 hour of a major health care facility
- Population within 1 hour of a major institution of higher learning
- Population within 1 hour of a major urban area (50,000+ population)

Vehicle Miles of Travel

This is a basic output of a travel model assignment. The estimated traffic volume on each link in the network is multiplied by the length of that link to estimate vehicle miles of travel (VMT) on that link. The sum of VMT for all links produces estimated VMT for the entire transportation network.

Vehicle Hours of Travel

This is calculated by dividing the VMT on each link by the congested speed on that link. The resulting quotient, vehicle hours of travel (VHT) estimates the number of vehicle hours traveled on that link on a typical day. The sum of VHT for all links produces estimated VHT for the entire transportation network.

VMT by Functional Classification

Roads are classified by the function which they perform in a transportation network. The "higher" a road's functional classification, it is intended to carry more traffic for longer distances. For this indicator, VMT on each link is calculated in the manner described above. However, VMT totals are summed separately for each functional classification. This indicator is a measure of accessibility in that the greater the proportion of traffic which is carried on higher classes of facilities, the greater the accessibility afforded by that traffic network.

VHT by Functional Classification

VHT is calculated for each link in the network, and summed separately for each functional classification.

Pure Accessibility Index

For each county in the calculations, the estimated travel time to all other counties in the statewide network was calculated. This index represents a measure of the average travel times among all counties in the travel network.

Population-Weighted Pure Accessibility Index

This index is computed in the same manner as the pure accessibility index, weighted by the population of each county. This means that accessibility from counties with a high population is more important than accessibility from counties with a low population.

Accessibility-to-Employment Index

This index is computed in the same manner as the pure accessibility index, weighted by the employment in each county. This means that accessibility to counties with high employment is more important than accessibility to counties with low employment.

Population-Weighted Accessibility-to-Employment Index

This index is computed in the same manner as the pure accessibility index, weighted by both population and employment in each county. This means that accessibility to counties with high population and/or employment is more important than accessibility to counties with low population and employment.

Comparative Accessibility Improvement Factors

Each of these indices is computed by calculating the contribution of the project to improving accessibility in the study area as compared with the entire state. It determines whether the project results in better accessibility in the focus area than in the rest of the state.

- Proportion of Pure Accessibility Index for the Study Area
- Proportion of Population-Weighted Pure Accessibility Index for the Study Area
- Proportion of Accessibility-to-Employment Index for the Study Area
- Proportion of Population-Weighted Accessibility-to-Employment Index for the Study Area

Isoline Factors of Accessibility

Each of these statistics can be computed by the travel model on the basis of congested travel conditions. It determines what improvements are provided to major cultural, governmental, medical, and educational destinations.

- Population within 1, 2, and/or 3 hours of Indianapolis
- Population within 1 hour of a major health care facility
- Population within 1 hour of a major institution of higher education
- Population within 1 hour of a major urbanized area (50,000 + population)

Recommended Factors

The following eleven factors are recommended:

- Vehicle Miles of Travel (VMT)
- Vehicle Hours of Travel (VHT)
- VMT by Functional Classification
- VHT by Functional Classification
- Population-Weighted Pure Accessibility Index
- Accessibility to Employment Index
- Population-Weighted Accessibility-to-Employment Index
- Population within 1, 2, and / or 3 hours of Indianapolis
- Population within 1 hour of a major health care facility
- Population within 1 hour of a major institution of higher education
- Population within 1 hour of a major urbanized area (50,000 + population)

Travel Efficiency

Travel Efficiency refers to the ease or difficulty of using transportation facilities. Most measures of travel efficiency make use of the concept of "Level of Service." "Level of Service" measures the amount of congestion and delay on transportation facilities. Motorists using facilities which operate at high levels of service encounter little or no delay in making their trips. Conversely, motorists using facilities which operate at low levels of service encounter significant delays in making their trips.

Levels of service are measured using letter designations, A - F. These designations describe the volume of traffic, as compared with the capacity of the facility. Following is an approximate description of how levels of traffic correspond to levels of service.2

- **Level of Service A.** This describes completely free-flow operation. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream.
- **Level of Service B.** This describes reasonably free-flow operation. The ability to maneuver within the traffic stream is only slightly restricted, and the general level of physical and psychological comfort provided to drivers is still high.

2 These descriptions are taken from the *Highway Capacity Manual, Third Edition, 1998.* Page 3-9. These descriptions are for freeway operation, but are comparable for other types of roads.

- **Level of Service C.** This provides for traffic flow with speeds at or near free-flow conditions. However, the freedom to maneuver within the traffic stream is noticeably restricted.
- **Level of Service D.** This is the level at which speeds begin to decline slightly as traffic flows increase. The ability to maneuver within the traffic stream is noticeably limited. Drivers experience increasing physical and psychological discomfort.
- **Level of Service E.** This is the level at which roads operate at maximum capacity. There are virtually no usable gaps in the traffic stream. Maneuverability within the traffic stream is limited.
- **Level of Service F.** This describes operation where there are significant delays in vehicle flow. The demand for roadway use is in excess of its physical capacity. Significant queuing and stop and go conditions occur.

"Congestion" occurs when traffic levels exceed a given level of service. For purposes of specifying performance indicators, traffic operating at level of service D – F is considered to be congested. Capacity is defined as the volume of traffic which can be served at Level of Service C.

A number of estimates of congestion, both within the study area and throughout the travel network, are available. They include:

- Volume to Capacity (V/C) ratio
- V/C by Functional Classification
- Percentage of Road Miles Congested
- Percentage of Road Lane-Miles Congested
- Average Congested Speed
- Severe Congestion Improvement Measure by VMT
- Severe Congestion Improvement Measure by VHT
- Severe Congestion Improvement Measure for Trucks by VMT
- Severe Congestion Improvement Measure for Trucks by VHT
- Efficient System Performance Index by VMT
- Efficient System Performance Index by VHT
- Efficient System Performance Index for Trucks by VMT
- Efficient System Performance Index for Trucks by VHT
- Percentage of High Congestion by VMT
- Percentage of High Congestion by VHT

Volume to Capacity (V/C) Ratio

For each link in the travel network, the ratio between the traffic volume and the capacity of that link is calculated. The system-wide V/C ratio is computed as the weighted average (by VMT) for all links in the system.

V/C by Functional Classification

This is system-wide V / C for each functional class, computed as a weighted average (by VMT) for all links in that functional class.

Percentage of Road Miles Congested

This index calculates the ratio of road miles with high V / C ratios to total road miles.

Percentage of Road Lane-Miles Congested

This index calculates the ratio of lane miles with high V / C ratios to total lane miles.

Average Congested Speed

This is the "average" speed for all vehicles traveling in the network. It is computed by taking a weighted average of congested speeds on all links. Speeds on each link are weighted by the VMT on that link.

Severe Congestion Improvement Measures

These measures use the total VMT / VHT operating at or over V / C ratios 0.75 and 1.00. VMT / VHT subject to a V / C ratio of between 0.75 and 1.00 is counted once; VMT / VHT subject to a V / C ratio of over 1.00 is counted twice. Thus, these indices place heavy weight on VMT / VHT which is subject to severe capacity deficiencies. The congested VMT / VHT is added in the denominator of these indices, so that higher values indicate a system which is performing better.

- Severe Congestion Improvement Measure by VMT
- Severe Congestion Improvement Measure by VHT
- Severe Congestion Improvement Measure for Trucks by VMT
- Severe Congestion Improvement Measure for Trucks by VHT

Efficient System Performance Indices

These indices uses the Severe Congestion Improvement Measures, and multiplies the value by total VMT / VHT. This has the effect of enabling networks of different sizes (e.g., the Study Area and the entire Statewide network) to be compared, since it produces a smaller index which falls

within a certain range. As with the Severe Congestion Improvement Measure, higher values indicate a system which is performing better.

- Efficient System Performance Index by VMT
- Efficient System Performance Index by VHT
- Efficient System Performance Index for Trucks by VMT
- Efficient System Performance Index for Trucks by VHT

Percentage of High Congestion by VMT
Percentage of High Congestion by VHT

These indices are weighted averages which estimate the percentage of VMT/VHT in the system which operates at high levels of congestion.

Recommended Factors

The following factors are recommended.

- V/C by Functional Classification
- Percentage of Road Lane-Miles Congested
- Severe Congestion Improvement Measure for Trucks by VMT
- Severe Congestion Improvement Measure by Trucks for VHT
- Efficient System Performance Index by VHT
- Efficient System Performance Index by Trucks for VMT
- Efficient System Performance Index by Trucks for VHT
- Percentage of High Congestion by VMT
- Percentage of High Congestion by VHT

When the alternatives analysis is conducted, these factors will be evaluated for multicollinearity. "Multicollinearity" is a statistical measure which determines whether different statistics are, in fact, measuring the same thing. If high levels of multicollinearity are found between factors, certain factors will be eliminated to avoid double-counting.

Safety

One result of a major transportation improvement is that significant amounts of travel will be diverted to higher class, safer facilities. Motorists using higher classifications of facilities experience fewer accidents. Accidents, especially those involving injuries or fatalities, have a significant economic cost. Potential safety factors include:

- Fatal and Injury Crash Rates by Highway
- Reduction in Number of Fatal Crashes
- Reduction in Number of Injury Crashes
- Reduction in Number of Property Damage Only Crashes
- Cost Savings from Reduced Fatal Crashes
- Cost Savings from Reduced Injury Crashes
- Cost Savings from Reduced Property Damage Only Crashes

Fatal and Injury Crash Rates by Highway

As part of the baseline assessment for this study, crash rates are being computed for all state highway facilities in the statewide travel network within the 26 county study area. All crashes which occurred on these facilities in the most recent three year period available will be tallied, and crash rates (expressed as number of crashes per 100 million vehicles miles will be computed. Facilities which have unusually high crash rates will be identified.

Crash Frequency Reductions

These factors estimate the reductions in accidents which will occur as a result of the proposed improvements. Estimates are made of the following:

- Reduction in Number of Fatal Crashes
- Reduction in Number of Injury Crashes
- Reduction in Number of Property Damage Only Crashes

The analysis tools for the Major Corridor Investment Benefit Analysis System (MCIBAS) estimate the number of accidents which occur throughout the transportation network. These estimates are based upon national norms for number of accidents, given a facility's functional classification and average daily traffic. As transportation improvements divert traffic onto higher class facilities, the number of accidents are reduced, since travel is safer on higher class facilities. Separate crash rates are used for fatal, injury-only, and property damage only accidents.

Safety Improvement Savings

These factors estimate the cost savings which result from reduced numbers of accidents. Estimates are made for:

- Cost Savings from Reduced Fatal Crashes
- Cost Savings from Reduced Injury Crashes
- Cost Savings from Reduced Property Damage Only Crashes

The MCIBAS analysis tools also estimate the economic impact of each type of accident, using national averages for the cost of each type of accident.

Recommended Factors

It is recommended that each of these factors be included in the analysis of alternatives. All except the first are computed as part of the MCIBAS suite of analysis tools, and the first (Fatal and Injury Crash Rates by Highway) is specified as a part of the work program for Task 3.2.

Summary

Table 4.1 summarizes the characteristics of each recommended performance factor. These include each factor's category (shown in parentheses), geographic scale, measurability, forecastability, ability to assess current conditions, ability to compare alternatives, and clarity.

Table 4.1 (Part 1) Summary of Recommended Transp. Performance Factors

Performance Factor	Geographic Scale[1]	Measurable[2]	Forecastable[2]	Assesses Current Condition[3]	Assesses Altern.[3]	Clear[3]
Evansville-Indy Free Flow Travel Time (Evans. – Indy. Travel Efficiency)	R	●	●	●	●	●
Evansville-Indy Congested Travel Time (Evans. – Indy. Travel Efficiency)	R	●	●	●	●	●
Evan.-Indy Free Flow Travel Time Savings (Evans. – Indy. Travel Efficiency)	R	●	●		●	●
Evan.-Indy Congested Travel Time Savings (Evans. – Indy Travel Efficiency)	R	●	●		●	●
Vehicle Miles of Travel (Regional Accessibility)	S, R	●	●	●	●	●
Vehicle Hours of Travel (Regional Accessibility)	S, R	●	●	●	●	●
VMT by Functional Classification (Regional Accessibility)	S, R	●	●	●	●	●
VHT by Functional Classification (Regional Accessibility)	S, R	●	●	●	●	●
Population-Weighted Pure Accessibility Index (Regional Accessibility)	S, R	●	❍		●	●
Accessibility to Employment Index (Regional Accessibility)	S, R	●	❍		●	●
Population-Weighted Accessibility to Employment Index (Reg. Accessibility)	S, R	●	❍		●	●
Population within 1, 2, and/or 3 hours of Indianapolis	R	●	●	●	●	●
Population within 1 hour of a major health care facility	R	●	●	●	●	●
Population within 1 hour of major institution of higher education	R	●	●	●	●	●
Population within 1 hour of major urbanized area	R	●	●	●	●	●

[1] National (N), state (S), regional (R)

[2] ● data produced as part of Major Corridor Investment-Benefit Analysis System; ❍ data could be produced with moderate additional effort based on anticipated scope of work

[3] ● factor meets criteria; blank cells indicate that factor does not meet criteria

Table 4.1 (Part 2) Summary of Recommended Transp. Performance Factors

Performance Factor	Geographic Scale[1]	Measurable[2]	Forecastable[2]	Assesses Current Condition[3]	Assesses Altern.[3]	Clear[3]
V/C by Functional Classification (Regional Level of Service)	S, R	●	●	●	●	●
Pct. Road Lane-Miles Congested (Regional Level of Service)	S, R	●	●	●	●	●
Severe Congestion Improvement Measure by VMT for Trucks (Regional Level of Service)	S, R	●	❍		●	
Sever Congestion Improvement Measure by VHT for Trucks (Regional Level of Service)	S, R	●	❍		●	
Efficient System Performance Index by VHT (Regional LOS)	S, R	●	●		●	
Efficient System Performance Index for Trucks by VMT (Regional Level of Service)	S, R	●	❍		●	
Efficient System Performance Index for Trucks by VHT (Regional Level of Service)	S, R	●	❍		●	
Pct. of High Congestion by VMT (Regional Level of Service)	S, R	●	❍	●	●	
Pct. of High Congestion by VHT (Regional Level of Service)	S, R	●	❍	●	●	
Fatal and Injury Crash Rates by Highway (Regional Travel Safety)	R	●		●		●
Reduction in Number of Fatal Crashes (Regional Travel Safety)	S, R	●	●		●	●
Reduction in Number of Injury Crashes (Regional Travel Safety)	S, R	●	●		●	●
Reduction in Number of PDO Crashes (Regional Travel Safety)	S, R	●	●		●	●
Cost Savings from Reduced Fatal Crashes (Regional Travel Safety)	S, R	●	●		●	●
Cost Savings from Reduced Injury Crashes (Regional Travel Safety)	S, R	●	●		●	●
Cost Savings from Reduced PDO Crashes (Regional Travel Safety)	S, R	●	●		●	●

[1] National (N), state (S), regional (R)

[2] ● data produced as part of Major Corridor Investment-Benefit Analysis System; ❍ data could be produced with moderate additional effort based on anticipated scope of work; blank cells indicate that the factor does not meet criteria

[3] ● factor meets criteria; blank cells indicate that factor does not meet criteria

5 Economic Performance Factors

This section evaluates potential economic performance factors for this project. These performance factors primarily are intended to address the following question:

- ***Which alternatives satisfy the element of the project's draft purpose and need statement related to supporting economic development within Southwestern Indiana?***

Some of the performance factors described in this section would be used to compare improvements to a "no-build" alternative that involves no changes to the transportation system in Southwestern Indiana beyond the improvements that currently are committed as part of state and local long-range plans.

The potential performance factors have been grouped into eight categories. The first three categories reflect different factors that *contribute* to economic development opportunities and the next four categories reflect different *outcomes* of economic development. The categories are as follows:

- Cost Savings;
- Accessibility;
- Reliability;
- Economic Growth;
- Industry Mix;
- Regional Economic Equity; and
- Social Welfare.

Cost Savings pertains to Issue Statement 5 in Section 2; Accessibility pertains to Issue Statement 6 in Section 2; Reliability pertains to both Issue Statements 5 & 6 in Section 2; Economic Growth and Industry Mix pertain to Issue Statement 7 in Section 2; and Regional Economic Equity and Social Welfare pertain to Issue Statement 8 in Section 2.

For each category, this section identifies and describes example performance factors, and screens performance factors by the criteria identified in Section 3. Technical report 3.2.2 contains more detailed information, including data sources, analytical approaches, and geographic scale for the analysis. For each category of performance factor, it contains a table summary and key traits of each.

In each category, multiple performance factors may be suitable for assessing current conditions and/or differentiating among alternative transportation investment strategies. However, one or more performance factors are recommended in each category, based on the screening criteria as well as the experience of previous EISs.

Cost Savings

An important trigger of economic development is the ability of a highway project or other transportation improvement to reduce transportation costs in a region. Transportation cost savings are an important catalyst for economic development because reduced business costs increase productivity and make businesses more competitive. These productivity increases can lead to greater sales, profits, employment, and an enhanced business climate. This enhanced business climate also can attract new business growth to the region. Potential cost savings performance factors include the following:

- Value of monetary user benefits (i.e., those which affect income flows in the economy); and
- Value of non-monetary user benefits (i.e., those which have value to people but do not directly affect income flows in the economy).

Value of monetary user benefits

Transportation improvements create user benefits such as changes in travel time, cost, and safety. Techniques have been developed to value all of these benefits in monetary terms, but only some of these user benefits actually generate changes in income flows in the economy. These are the user benefits that reduce costs or increase sales for businesses and/or provide additional income for spending by households, such as the following:

- Business cost savings or productivity increases from reductions in driver time for truck deliveries and on-the-clock auto trips;
- Business cost savings from accident cost reductions for truck and on-the-clock auto trips;
- Household spending savings from accident cost reductions for non-work auto trips; and
- Business and household spending changes from vehicle operating cost changes for all types of trips.

Value of non-monetary benefits

These include:

- Value of travel time savings for personal auto trips (i.e., those not on-the-clock for business purposes). Personal time savings do not increase household income, but these savings can still be directly translated into a dollar-equivalent value, based on studies of personal willingness to pay for time savings.
- Quality of environment factors, such as quality of air, water, noise, and visual environment. While these factors are directly covered in the separate analysis of environmental impacts, they in some cases also have longer-term positive or negative effects on a region's economic growth potential.

Recommended Factor

The following cost savings performance factor is recommended:

- Value of monetary user benefits, which represents the change in income flows associated with changes in travel time, cost, or safety due to transportation improvements. This is a measure of the performance of alternatives, but not of the baseline condition, and will be assessed from a national, state, and regional perspective.

The non-monetary user benefits are significant for understanding the full impact of the alternatives, but will not be used as performance factors because they are better captured through other factors, such as the environmental impact analysis that will take place in level 3 of the screening process.

Accessibility

Access to markets is another trigger of economic development for a region. Accessibility factors assess the extent to which a transportation improvement enhances the connections between regional businesses and suppliers, customer markets, labor markets, or other types of activities.

Potential accessibility factors include the following:

- Access of businesses to labor and consumer markets;
- Access to freight buyer / supplier markets;
- Access of population to jobs;
- Access of businesses to intermodal facilities; and
- Access of population to recreational, educational, cultural, health care, or other amenities.

Access of businesses to labor and consumer markets

This factor assesses the size of the local labor and consumer markets available to businesses. An expanded labor market can improve the productivity of existing businesses as well as attract new businesses to the region. While benefits are primarily regional, the productivity gains can have positive net effects at the state and national levels as well. The simplest form of this factor is the population within x minutes (typically, 30 to 45 minutes) of the average business in the region.

One-day freight access to buyer/supplier markets

This factor is based on the same principle as access to labor and consumer markets, but measures broader inter-regional accessibility to buyer and supplier markets for freight, goods, and services. Improving this accessibility also can reduce costs and improve productivity, thereby improving the potential for business expansion and attraction within the region. Again, effects primarily will be regional, but there may be some net state-level and national-level benefits as well.

Access of population to jobs

This factor is similar to the "access to labor markets" factor described above, but reflects employment opportunities from an individual perspective. For example, this factor would describe the number of jobs within 30 minutes of the average resident.

Access to intermodal facilities

This factor would describe the accessibility of study area businesses to key intermodal facilities such as ports or airports. It could be measured as the average travel time to such a facility, or as the percentage of employment within x minutes of a certain facility type.

Access to recreational, educational, cultural, health care, or other amenities

This is an important indicator relating to quality of life for area residents. It is somewhat more difficult to measure, however, as these amenities may be difficult to identify and define from a quantitative standpoint.

Recommended Factors

The recommended accessibility factors include:

- Access of businesses to labor and consumer markets, which captures project benefits for attracting workers and shoppers; and
- One-day freight access to buyer / supplier markets, which captures project benefits related to improved freight connections.

These accessibility factors are those most closely associated with a direct impact on economic growth. The remaining factors may be considered as well, since they also measure the ability of the transportation system to provide residents with access to jobs, education, health care, and similar amenities.

Reliability

Transportation improvements increasingly are driven by public and business interest in providing reliable connections between markets. This is particularly true in many industries today, as the shift toward just-in-time manufacturing and electronic commerce makes an increasing number of freight shipments time-sensitive, with the risk of increased costs if delivery windows are not met. Like accessibility, reliability often is an important precursor to economic development. However, this concept is difficult to measure, given the limitations of existing data and modeling tools.

Potential reliability performance factors include the following:

- Percent of vehicle-miles traveled (VMT) on four-lane divided highways; and
- Percent of employment within X minutes of a four-lane divided highway.

Percent of VMT on four-lane highways

Four-lane highway access is a proxy for reliability. Some businesses will consider only locations along four-lane, limited-access highways, and others strongly prefer these locations. One reason is the greater travel time reliability and safety associated with truck movements along

these routes, which is particularly important for businesses dependent on time-sensitive deliveries.

Percent of employment within X minutes of a four-lane highway

Similarly, the percent of employment within a particular threshold (e.g., 30 minutes) of a four-lane highway could be calculated in a similar manner as accessibility factors described earlier. This concept may more closely represent the thinking that goes into business location decisions than the simple allocation of VMT among four-lane and two-lane facilities.

Recommended Factor

It would be desirable to accurately calculate reliability. The proposed factors are the best which can be calculated using available tools; however, both serve merely as a proxy for estimating improved reliability. Further, the proposed factors might be biased against certain alternatives. Therefore, none of these factors are recommended.

Economic Growth

Economic growth performance factors are designed to capture different aspects of overall economic growth. Potential factors include the following:

- Net change in employment;
- Net change in real disposable income;
- Per capita change in real disposable income;
- Net change in real output or business sales; and
- Net change in gross regional product or value added.

Net change in employment

Change in employment is a standard economic performance measure that captures the net increase or decrease in jobs in the economy. This factor is easily understandable to policymakers and the public. However, the number of jobs does not necessarily reflect the important economic benefits of increasing personal income.

Net change in real disposable income

This factor primarily reflects the change in wage income earned by workers within the region. 'Real' income refers to income adjusted for inflation and 'disposable' income refers to income net of taxes. 'Net' income refers to the accounting of any sub regional income reductions due to geographic shifts in economic activity. Personal income is broader than user benefit measures, since it includes benefits to non-users of the transportation system.

Per capita change in real disposable income

In addition to the previous factor that reflects aggregate real disposable income changes, this concept estimates income changes per resident. It is calculated by simply dividing real disposable income by population. This factor is preferable in some circumstances because it more directly accounts for any changes in financial well-being of the average person and is more understandable to the general public.

Net change in real output or business sales

This factor estimates the change in regional business output, production, or business sales. This indicates how the cost savings or productivity gains associated with the transportation improvement would affect business decisions to expand production or increase sales in the region. The dollar value of regional business output reflect the cost of making products and providing services, which may not necessarily benefit the region's economy.

Net change in gross regional product or value added

Value added essentially is the sum of wage income and corporate profit generated in the study area. Value added can overestimate the true benefit to a region, because it includes all business profit generated in the region, including that which is paid out as dividends to owners of the business who do not reside in the region, and that which is reinvested in corporate facilities outside of the region.

Recommended Factors

The following economic growth performance factors are recommended:

- Net change in employment, which is the most easily understood growth factor;
- Net change in real disposable income, which is the most conservative factor of the total income impact of a project;
- Change in real disposable income per capita, which allows interpretation of how much better off the average individual in the region is in dollar terms;
- Net change in real output. Although not all of the benefits shown here accrue to the study region, or even the State of Indiana, it is an important measure of benefit at the national level; and
- Net change in gross regional product. As with net change in real output, this is an important measure of benefit at the national level.

Each of these three factors will be computed in two ways: one method calculating only the benefits associated with business efficiency gains, and one method that includes attraction of new business investment and tourism spending, much of which represent transfers from other parts of the country. Net change in real output and gross regional product, while valid measures of economic growth, are recommended as lower-priority factors.

Industry Mix

It may not be sufficient to simply estimate the total economic growth that could be expected from a transportation improvement; it also may be of interest to understand how this growth will affect particular industries within the economy. Potential industry mix factors include the following:

- Economic diversity;
- Economic stability;
- Percent of jobs in high-growth / slow-growth industries;
- Percent of jobs in high-paying / low-paying industries;
- Net job growth in particular target industries;
- Net change in farm income;
- Net change in forest income;
- Net change in tourist visitor-days; and
- Net change in roadside business sales.

Economic diversity

Conceptually, economic diversity factors the distribution of employment in a region by industry and firm. Flint, Michigan is a classic example of a city that lacks economic diversity because such a large proportion of the area employment is in the auto industry (specifically, General Motors). A simple approach to calculate this index would be to estimate the percentage of workers employed in the region's 5 or 10 largest industries.

Economic stability

Economic stability factors capture the volatility of a regional economy – for example, the variation in growth rates from year to year or the susceptibility of the economy to recession. A transportation improvement could make a regional economy more stable by diversifying its economic base or by introducing new types of industries that are more insulated from business cycles.

Employment in high-growth industries

These factors capture the share of regional employment (or the change in jobs) in high-growth industries. If the transportation improvement is able to attract high-growth industries to the region, then this factor would increase. The factor would be estimated by analyzing United States employment growth trends to identify the most rapidly growing industries.

Employment in high-paying industries

A successful economic development initiative will not only increase overall employment, but also improve the quality of these jobs and raise wages. One way to measure this effect is by estimating the percentage of jobs in high-paying industries. High-paying industries can be identified using average wage data by industry for the nation and for Indiana.

Job growth in target industries

Frequently, economic development strategies target specific industries to promote the growth and well-being of the region. Examples of target industries often include high-technology manufacturing and services, professional services, and automotive manufacturing. Target industries usually are selected because a region wants to attract higher-paying jobs, higher-skilled jobs, industries that complement existing regional businesses, or growth industries.

Net change in farm income

A major transportation improvement, particularly one involving a new terrain facility, may require a loss of farmland. This loss not only has environmental disbenefits, but also represents an economic loss because land may be taken out of production. In order to accurately estimate any farm income losses, it is important to know how the land is being used (for crops, livestock, etc.)

Net change in forest income

Similarly, the transportation improvement may require the use of land that currently is forested. Again, the economic impact could be estimated if data exist on how the forest currently is used and the value of any forest products produced from this land.

Net change in visitor-days

This concept measures the difference in visitor-days to the region and/or state due to the transportation project. Theoretically, improved access to a region will make it more attractive and easy to visit, and will increase the number of visitor-days. Increases in visitor days to a region will increase spending in the local area and contribute to expanding the overall economy.

Total change in roadside business sales or employment

This factor estimates the impact of highway improvements on sales or employment of businesses located along the roadway. Such impacts occur due to changes in access patterns, such as left turn prohibitions, or eliminating driveways and curb cuts. These types of impacts tend to cancel each other out at a broad regional or statewide level, but can be significant for individual corridors. Given the multiple corridors that will be studied in this EIS, it is recommended that this factor be included.

Recommended Factors

The following industry mix performance factors are recommended:

- Employment in high-growth industries, which indicates the extent to which the transportation improvement supports regional economic development goals;
- Employment in high-paying industries, which highlights the extent to which new jobs are high-paying, quality jobs;

- Net change in farm income and forest income, which address important local issues; and
- Estimated change in roadside business sales, which is significant given the potential for some alternatives to involve access restrictions on existing corridors or shifts in travel patterns among corridors.

Regional Economic Equity

This category of performance factors addresses the differences in economic conditions among geographic areas. It is important to know how well the Southwestern Indiana economy compares with conditions in the state and the United States and to quantify the effect that the transportation improvement might have on narrowing existing equity gaps.

Potential regional economic equity factors include the following:

- Ratio of persons employed / labor force; and
- Per capita real disposable income.

Ratio of persons employed to the labor force

This factor is calculated by dividing the number of jobs in the economy by the labor force. The labor force includes those working and those looking for work (unemployed) but does not include persons not actively seeking work. The more common factor, unemployment rate, is note easily forecasted with existing tools.

Real disposable income per capita

As discussed in previously, real disposable income per capita is calculated by dividing real disposable income by population. This concept measures growth, but also can be used for comparison of economic well-being between the region, state, and nation.

Recommended Factors

Two spatial equity performance factors are recommended:

- Ratio of employment to labor force, which is the best method available to forecast the unemployment rate concept.

- Per capita real disposable income, which provides a simple comparison of economic well-being of the region with the state and nation.

Social Welfare and Age Distribution

Some of the more challenging issues facing Southwestern Indiana relate to the distribution of economic opportunities among age groups and income groups in the region. A common goal of economic development is to increase the chances for success of those individuals struggling in the local economy. Potential socioeconomic equity factors include the following:

- Working-age population;
- Percent of population below the poverty level; and
- Transfer payments.

Working age population

Southwestern Indiana, like many primarily rural areas, has struggled to retain high school and college graduates during the past few decades. This performance factor would calculate the percentage of Southwestern Indiana's population that is in the prime working age, typically defined as 16 to 64.

Percent of population below poverty level

Perhaps the most common economic performance factor for this category is the percent of the population living below the poverty line. The poverty line is defined by the federal government for different household sizes. Unfortunately, both historical trend data and accurate forecasts of this data are difficult to develop.

Transfer payments

Transfer payments are primarily government transfers of income for programs such as unemployment insurance, welfare income-maintenance programs, and education and training programs. Total transfer payments increase if more people in a regional economy are unemployed, not looking for work, or otherwise dependent on government support.

Recommended Factors

Two socioeconomic equity factors are recommended:

- Working age population, and
- Transfer payments, which provide a rough estimate quantifying benefits of the transportation improvement to lower-income, less-privileged groups.

The other factor that people might more readily demand, the poverty level, is not easily estimated using the current generation of modeling tools.

Summary

Table 5.1 summarizes the characteristics of each recommended performance factors. These include each factor's category (show in parentheses), geographic scale, measurability, forecastability, ability to assess current conditions, ability to compare alternatives, and clarity.

Table 5.1 Summary of Recommended Economic Performance Factors

Performance Factor	Geographic Scale[1]	Measurable[2]	Forecastable[2]	Assesses Current Condition[3]	Assesses Altern.[3]	Clear[3]
Monetary user benefits (Cost Savings)	N, S, R	●	●		●	●
Access of businesses to labor & consumer markets (Accessibility)	S, R	❍	❍	●	●	●
One-day freight access to buyer/supplier markets (Accessibility)	S, R	❍	❍	●	●	●
Net change in employment (Economic Growth)	N, S, R	●	●	●	●	●
Net change in real disposable income (Economic Growth)	N, S, R	●	●	●	●	●
Per capita change in real disposable income (Economic Growth, Regional Economic Equity)	N, S, R	●	●	●	●	●
Net change in real output or business sales (Economic Growth)	N, S, R	●	●	●	●	●
Net change in gross regional product or value added (Economic Growth)	N, S, R	●	●	●	●	
Employment in high-growth industries (Industry Mix)	S, R	❍	❍	●	●	●
Employment in high-paying industries (Industry Mix)	S, R	❍	❍	●	●	●
Net change in farm and forest income (Industry Mix)	R	❍	❍	●	●	●
Net change in roadside business sales (Industry Mix)	R	❍	❍		●	
Ratio of persons employed/labor force (Regional Economic Equity)	R v S, R v N	●	●	●	●	●
Working age population (Social Welfare)	S, R	●	●	●	●	●
Transfer payments (Social Welfare)	S, R	●	●	●	●	●

[1] National (N), state (S), regional (R)

[2] ● data produced as part of Major Corridor Investment-Benefit Analysis System; ❍ data could be produced with moderate additional effort based on anticipated scope of work.

[3] ● factor meets criteria; blank cells indicate that factor does not meet criteria

6 Corridor 18 Performance Factors

The third set of performance factors address the national goal of the proposed project: completing Indiana's portion of Corridor 18.

Corridor 18 is a federally designated "high-priority corridor" that eventually would become a continuous highway linking Canada and Mexico. Corridor 18 includes the existing I-69 from Port Huron, Michigan to Indianapolis, and would continue through Southwestern Indiana and other states to end at the Mexican border in the lower Rio Grande Valley. A feasibility study, completed in 1995, demonstrated the potential benefits of making this highway connection. A multi-state coalition is continuing to study the proposed highway.

While the I-69 Corridor in Southwestern Indiana will serve an important transportation and economic development purpose even if Corridor 18 as a whole is not completed, the national objective of completing Corridor 18 as a continuous north-south corridor running through Indiana is an additional need that must be taken into account when evaluating alternatives. Potential performance factors include the following:

- **Termini –** Do the termini of the alternative correspond to the proposed end points for the adjoining segments of Corridor 18?
- **Connectivity –** Does the alternative represent the most efficient way for pass-through trips to move through the region? Will business-related travel be served in the most efficient way possible? For this criterion, some of the transportation MOEs from Section 3 are also applicable.

The performance factor for Termini pertain to Issue 9 in Section 2. The performance factor for Connectivity pertain to Issue 10 in Section 2.

The first proposed performance factor, termini, can be determined with relative ease by reviewing Corridor 18 planning and design documents and comparing this information to the proposed alternatives for this project. The second performance factor, connectivity, would involve determining which alternative offers the greatest user benefits for pass-through trips that would follow Corridor 18 -- e.g., for those trips that enter the study area from the north near Indianapolis, and leave the study area through the south near Evansville. These user benefits can be estimated by processing the data provided from the Indiana Statewide Travel Model runs through NET_BC. Alternatively, one could use travel time for external-to-external trips from Indianapolis to Evansville as a proxy for these user benefits, since the total user benefits will be driven primarily by the travel time savings.

It should be noted that the Purpose and Need analysis for Corridor 18 will be limited to whether each alternative addresses Indiana's goal of completing its portion of Corridor 18, and does not extend to a full analysis of the transportation or economic impacts of completing this Corridor in Indiana. These cumulative impacts will be addressed in the Level 3 (environmental) analysis.

Summary

Each of the recommended factors is able to assess the performance of alternatives with respect to the relevant issue. All are recommended. These factors are summarized in Table 6.1.

Table 6.1 Summary of Recommended Corridor 18 Performance Factors

Performance Factor	Geographic Scale[1]	Measurable[2]	Forecastable[2]	Assesses Current Condition[3]	Assesses Altern.[3]	Clear[3]
Termini	R	●	●		●	●
Evansville – Indy Congested Travel Time (Connectivity)	N, S, R	●	●		●	●
Evansville – Indy Congested Travel Time Savings (Connectivity)	N, S, R	●	●		●	●
Severe Congestion Improvement Measure by VMT for Trucks (Connectivity)	S, R	●	❍		●	
Severe Congestion Improvement Measure by VHT for Trucks (Connectivity)	S, R	●	❍		●	
Efficient System Performance Index by VMT for Trucks (Connectivity)	S, R	●	❍		●	
Efficient System Performance Index by VHT for Trucks (Connectivity)	S, R	●	❍		●	

[1] National (N), state (S), regional (R)

[2] ● data produced as part of Major Corridor Investment-Benefit Analysis System; ❍ data could be produced with moderate additional effort based on anticipated scope of work; blank cells indicate that the factor does not meet criteria

[3] ● factor meets criteria; blank cells indicate that factor does not meet criteria

7 Project Issues – Summarized With Performance Factors

The Indiana Department of Transportation (INDOT) has designated this project as having three overarching goals. These include:

- Strengthening the transportation network in Southwestern Indiana;
- Supporting economic development within Southwestern Indiana; and
- Completing Indiana's portion of Corridor 18, the international trade corridor planned between Canada and Mexico.

The analysis of Factors of Effectiveness (FOEs) has been guided by these overall goals. In order to more effectively apply them, they have been grouped by issue statements. Each issue statement supports one of the three main goals for the Study. These issue statements will be incorporated into the Statement of Purpose and Need.

Following is the listing of the Project Issues from Section 2. Following is a listing of FOEs from Sections 3, 4, and 5 which may be used to analyze each of these issues. The explanation of each of these issues is repeated from section 2.

Transportation Issues Summary

- Issue 1: Travel between Evansville and Indianapolis
- Issue 2: Personal Accessibility
- Issue 3: Improve Existing and Forecasted Levels of Service in Southwest Indiana
- Issue 4: Enhance Traffic Safety in Southwest Indiana

Economic Issues Summary

- Issue 5: Provide Transportation Improvements Which Reduce Business Costs
- Issue 6: Improve Regional Accessibility to Enhance the Economic Competitiveness of Southwestern Indiana

- Issue 7: Support Economic Development Which Includes a Sustainable Variety of Businesses and Industries
- Issue 8: Support Economic Development Which Benefits A Wide Spectrum of Southwest Indiana Residents

Corridor 18 Issues Summary

- Issue 9: Provide a transportation facility with the termini and design standards required for the Corridor 18 facility.
- Issue 10: Provide for the efficient movement of freight and people, consistent with the aims of Corridor 18.

Transportation Issues with Performance Factors

Issue 1: Travel between Evansville and Indianapolis

This issue was articulated by INDOT Commissioner Cristine Klika in her statement, *INDOT Policies Concerning the Tier 1 EIS for the Proposed Extension of I-69 from Indianapolis to Evansville,* dated February 24, 2000. She stated, "… the basic purpose of this project has already been established: it is intended to provide an improved transportation link between Evansville and Indianapolis as part of the proposed Corridor 18/I-69 high priority corridor." This issue acknowledges the directives of the U.S. Congress for approximately the last decade. It also recognizes that an Evansville-Indianapolis high speed ground transportation facility has long been recognized as a "missing link" in Indiana's transportation network.

FOEs which support analysis of this issue include:

- Free flow travel time between Evansville and Indianapolis
- Congested travel time between Evansville and Indianapolis
- Free flow travel time savings between Evansville and Indianapolis
- Congested travel time savings between Evansville and Indianapolis

Issue 2: Personal Accessibility

Residents of Southwest Indiana have long stated their desires for better and safer access to major centers of commerce, employment, education, health care, and culture. Many such attractions are found throughout Southwest Indiana, particularly in the cities of Indianapolis, Evansville, Bloomington, and Terre Haute.

FOEs which support analysis of this issue include:

- Vehicle Miles of Travel (VMT)
- Vehicle Hours of Travel (VHT)
- VMT by Functional Classification
- VHT by Functional Classification
- Population-Weighted Pure Accessibility Index
- Accessibility to Employment Index
- Population-Weighted Accessibility-to-Employment Index
- Population within 1, 2, and / or 3 hours of Indianapolis
- Population within 1 hour of a major health care facility
- Population within 1 hour of a major institution of higher education
- Population within 1 hour of a major urbanized area (50,000 + population)

Issue 3: Travel Efficiency

Population growth and increased travel demand are beginning to increase in Southwest Indiana. In addition, improved levels of service result in more predictable and dependable travel times for commercial traffic. This supports economic development, as well as serving residents making non business-related trips.

FOEs which support analysis of this issue include:

- V / C by Functional Classification
- Percentage of Road Lane-Miles Congested
- Severe Congestion Improvement Measure for Trucks by VMT
- Severe Congestion Improvement Measure by Trucks for VHT
- Efficient System Performance Index by VHT
- Efficient System Performance Index by Trucks for VMT
- Efficient System Performance Index by Trucks for VHT
- Percentage of High Congestion by VMT
- Percentage of High Congestion by VHT

Issue 4: Safety

Compared to other parts of the state, Southwest Indiana has fairly limited access to higher quality, multi-lane facilities, especially those build to Interstate standards. Only I-64 & I-164 (at the far southern end of the study area) and I-70 (at the far northern end of the study area) are built to these standards. Typically, roads built to Interstate standards have crash rates which are a fraction of those which other facilities have. Further, there has many public statements requesting improved, safer roads in Southwest Indiana.

FOEs which support analysis of this issue include:

- Fatal and Injury Crash Rates by Highway
- Reduction in Number of Fatal Crashes
- Reduction in Number of Injury Crashes
- Reduction in Number of Property Damage Only Crashes
- Cost Savings from Reduced Fatal Crashes
- Cost Savings from Reduced Injury Crashes
- Cost Savings from Reduced Property Damage Only Crashes

Economic Issues with Performance Factors

Issue 5: Business Costs

An important trigger for economic development is the ability of a highway project (or other transportation improvement) to reduce transportation costs in a region. Reduced business costs increase productivity, and make businesses more competitive. This leads to greater sales, profits, employment, and an enhanced business climate.

The FOE which supports analysis of this issue is the *value of monetary user benefits.* These user benefits include:

- Business costs savings (or productivity increases) from reductions in driver time for truck deliveries and on-the-clock auto trips;
- Business costs savings from accident reductions for truck and on-the-clock auto trips;
- Household spending savings from accident cost reductions for non-work auto trips; and
- Business and household spending changes from vehicle operating cost changes for all types of trips.

Issue 6: Business Accessibility

This issue deals with access of businesses to labor, suppliers, and markets for their goods and services. It measures a different kind of accessibility than is described in Issue 2.

FOEs which support analysis of this issue include:

- Access of businesses to labor and consumer markets, which captures project benefits for attracting workers and shoppers; and
- One-day freight access to buyer / supplier markets, which captures project benefits related to improved freight connections

Issue 7: Sustainable Economic Development

Most public investments have as an important goal economic growth. It is not enough, however, that more dollars flow through the economy of a region or state. It is important that that growth be sustainable for the long run. This means that not only must economic growth occur, but it must be broadly diversified across the economy.

FOEs which support analysis of this issue include:

- Net change in employment;
- Net change in real disposable income;
- Employment in high-growth industries;
- Employment in high-paying industries;
- Net change in farm income and forest income;
- Estimated change in roadside business sales;

Issue 8: Widely-Distributed Economic Benefits

Economic growth is of little value without its benefits being realized throughout the region by a broad spectrum of its residents. An project which has as its goal economic development should benefit the population of a state or region as a whole. These factors will assess whether growth is shared by the many, not simply the few.

FOEs which support analysis of this issue include:

- Ratio of employment to labor force;
- Change in real disposable income per capita, (both as an absolute measure, as well as by comparison with the rest of Indiana, and the nation);
- Working age population,
- Transfer payments, which provide a rough estimate quantifying benefits of the transportation improvement to lower-income, less-privileged groups

Corridor 18 Issues with Performance Factors

Issue 9: Characteristics Required for the Corridor 18 Facility

The US Congress has provided that that the Corridor 18 facility connect Evansville and Indianapolis. It further provides that this facility accommodate vehicular traffic with a facility built to Interstate design standards.

The FOE which support analysis of this issue is:

- Do the termini of the alternative correspond to the proposed end points for the adjoining segments of Corridor 18?

Issue 10: Efficient Movement of Freight and People

Corridor 18 is a high-priority corridor for business and commercial travel. It is important that business-related travel, in particular truck traffic, be accommodated efficiently.

FOEs which support analysis of this issue include:

- Evansville to Indianapolis congested travel time.
- Evansville to Indianapolis congested travel time savings.
- Severe Congestion Improvement Measure by VMT for Trucks
- Severe Congestion Improvement Measure by VHT for Trucks
- Efficient System Performance Index by VMT for Trucks
- Efficient System Performance Index by VHT for Trucks