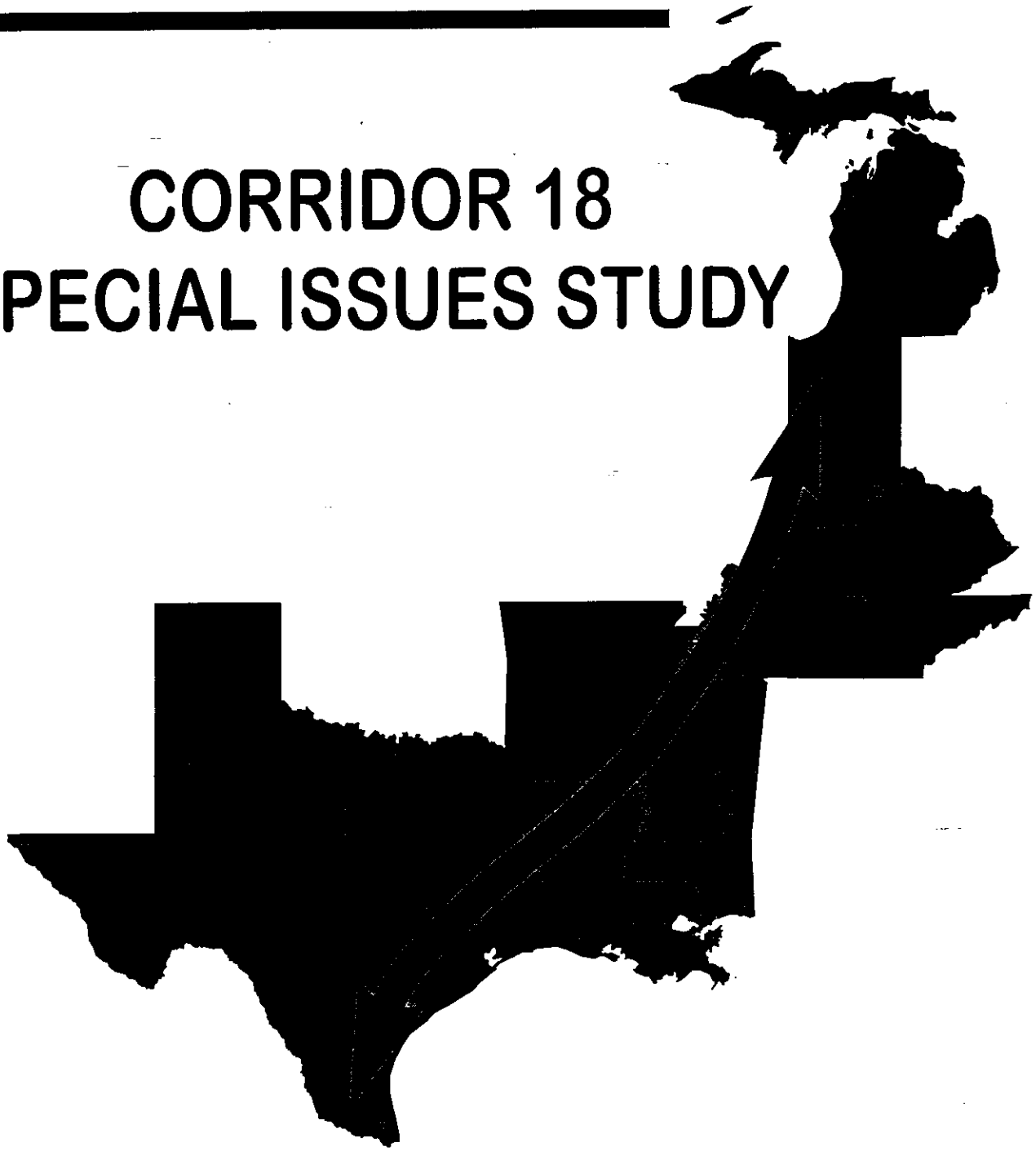
FINAL REPORT

CORRIDOR 18 SPECIAL ISSUES STUDY



Submitted by
WILBUR SMITH ASSOCIATES
with
HNTB Corporation

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July 22, 1997

Mr. Dan Flowers, Director
Arkansas State Highway &Transportation Department
P.O. Box 2261
10324 Interstate 30
Little Rock, AR 72203

RE: Corridor 18 Special Issues Study - 316050
Final Report

Dear Mr. Flowers:

On behalf of the Wilbur Smith Associates/HNTB Corp. Team, we are pleased to submit the Final Report of the Corridor 18 Special Issues Study. The report describes the study analyses, findings and conclusions regarding three topics. These are:

- Economic feasibility of the redefined corridor (from Indianapolis to the Lower Rio Grande Valley)
- Impacts upon I-35 traffic
- Certain issues regarding potential locations for Corridor 18.

The Public Meeting Involvement process undertaken during the study also is described herein.

We sincerely appreciate the opportunity to work with and for the Steering Committee on this interesting assignment.

Respectfully submitted,

WILBUR SMITH ASSOCIATES

James L. Covil, P.E.
Senior Vice President
Transportation Policy & Planning

JLC/hes

cc Corridor 18 Steering Committee

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CORRIDOR 18 SPECIAL ISSUES STUDY
Executive Summary

The Corridor 18 Special Issues Study built upon and extended the work of two earlier studies; Corridor 18 Feasibility Study and the Corridor 20 Feasibility Study. Findings from these two studies indicate that both Corridor 18 and Corridor 20 are feasible projects.

The Corridor 18 Feasibility Study (1994-1995) was based upon the then existing Congressional definition of the corridor between Indianapolis and Houston. The Special Issues Study (1996-1997) addressed the currently defined corridor from Indianapolis to the Lower Rio Grande Valley. The corridor, as now defined, is depicted in Exhibit 1, along with its relationship to the Congressional definition of Corridor 20.

STATEMENT OF PURPOSE

Corridor 18 is designated, by Congress, as a High Priority Corridor. It also has been described as a "North American trade route," an "international trade route" and as a "NAFTA corridor." In recognition of the important role it could play, the Corridor 18 Steering Committee officially adopted the following statement of purpose:

To improve international and interstate trade in accordance with national and state goals; to facilitate economic development in accordance with state, regional, and local policies, plans, and surface transportation consistent with national, state, regional, and local needs and with the Congressional designation of the corridor.

I-69 CONNECTION

As considered in this study, Corridor 18 would connect to I-69 in Indianapolis. As depicted in Exhibit 1, I-69 currently exists north of Indianapolis through Michigan via Lansing and Flint to Port Huron, Michigan/Sarnia, Ontario, Canada. At this point, I-69 joins an Interstate-quality road that connects to Toronto, Montreal and Quebec.

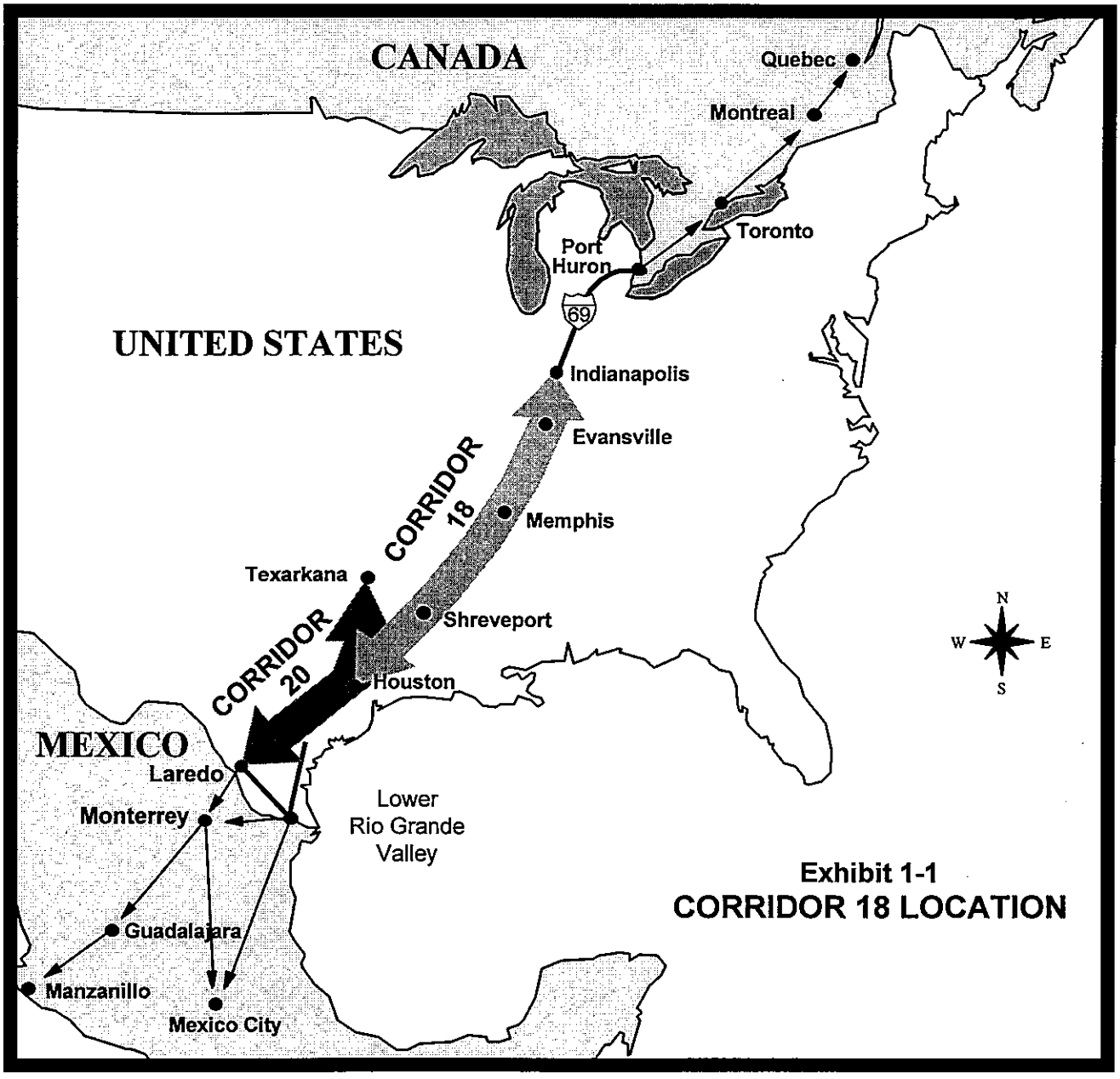


Exhibit 1-1
CORRIDOR 18 LOCATION

The Michigan Department of Transportation has proposed that Corridor 18 be redefined to include the extension from the northern terminus at Indianapolis to dual termini at Port Huron and Detroit. This proposal would include all of the existing I-69 plus a portion of I-94 (from Marshall, Michigan to Detroit).

The continuity of Corridor 18 and I-69 is a major element contributing to the overall feasibility of the Corridor 18 facility. I-69 north of Indianapolis provides an important linkage to an Interstate-quality road that connects to Toronto, Montreal and Quebec. The I-69 continuity would permit Corridor 18 to serve transportation needs of the three countries which have adopted the North American Free Trade Agreement.

The Michigan proposal has been endorsed by the other seven states included in the Corridor 18 Steering Committee. The proposal has been referred to Michigan's Congressional delegation. Congressional action is required before Corridor 18 can be officially redefined to include this important linkage.

PURPOSES OF THE CORRIDOR 18 SPECIAL ISSUES STUDY

The Corridor 18 Special Issues Study addressed three matters which will facilitate future location and environmental studies. It was not the intent to identify the final location and design of any part of the route.

The following three special issues were addressed as the current steps in the sequence of activities leading up to the final design:

- Determine the impact on the project's economic feasibility of redefining Corridor 18 to include an extension from Houston to the Lower Rio Grande Valley;
- Determine the traffic impacts Corridor 18 would have on I-35; and
- Evaluate major river crossings, connections between states, and connections to urban areas that will be key considerations for future location and environmental studies.

PUBLIC PARTICIPATION

On August 29, 1996, a meeting was held in Memphis, Tennessee, to permit those individuals and organizations interested in the outcome of this study to present their ideas to

the Study Team. Although not a formal public hearing, this was an important opportunity for all interested parties to be heard regarding Corridor 18.

During this important meeting, the Steering Committee received information from 38 presenters from various areas of the corridor. Additionally, considerable presentation materials were received from the participants. These materials provided useful background information for the Study Team.

On May 28, 1997, a second public meeting was held in Memphis, Tennessee. At this meeting, results of the study were presented and questions were addressed concerning the study process, the results it yielded, and expectations for follow-up activities.

REPRESENTATIVE CORRIDOR

During the Corridor 18 Feasibility Study, 93 route segments were identified as potential candidates for Corridor 18 between Indianapolis and Houston. For each of these 93 route segments, information was compiled as part of a comprehensive evaluation process. Each route segment was given equal consideration as part of the evaluation process. Based upon these assessments, a Representative Corridor was determined to be superior to the other alternatives. These assessments were based upon a series of 17 individual comparisons in which different emphases (weightings) were assumed for a range of evaluation criteria.

The Steering Committee has unanimously supported the Representative Corridor as the general location which best serves the purposes of the Corridor and yields the most benefits relative to facility costs.

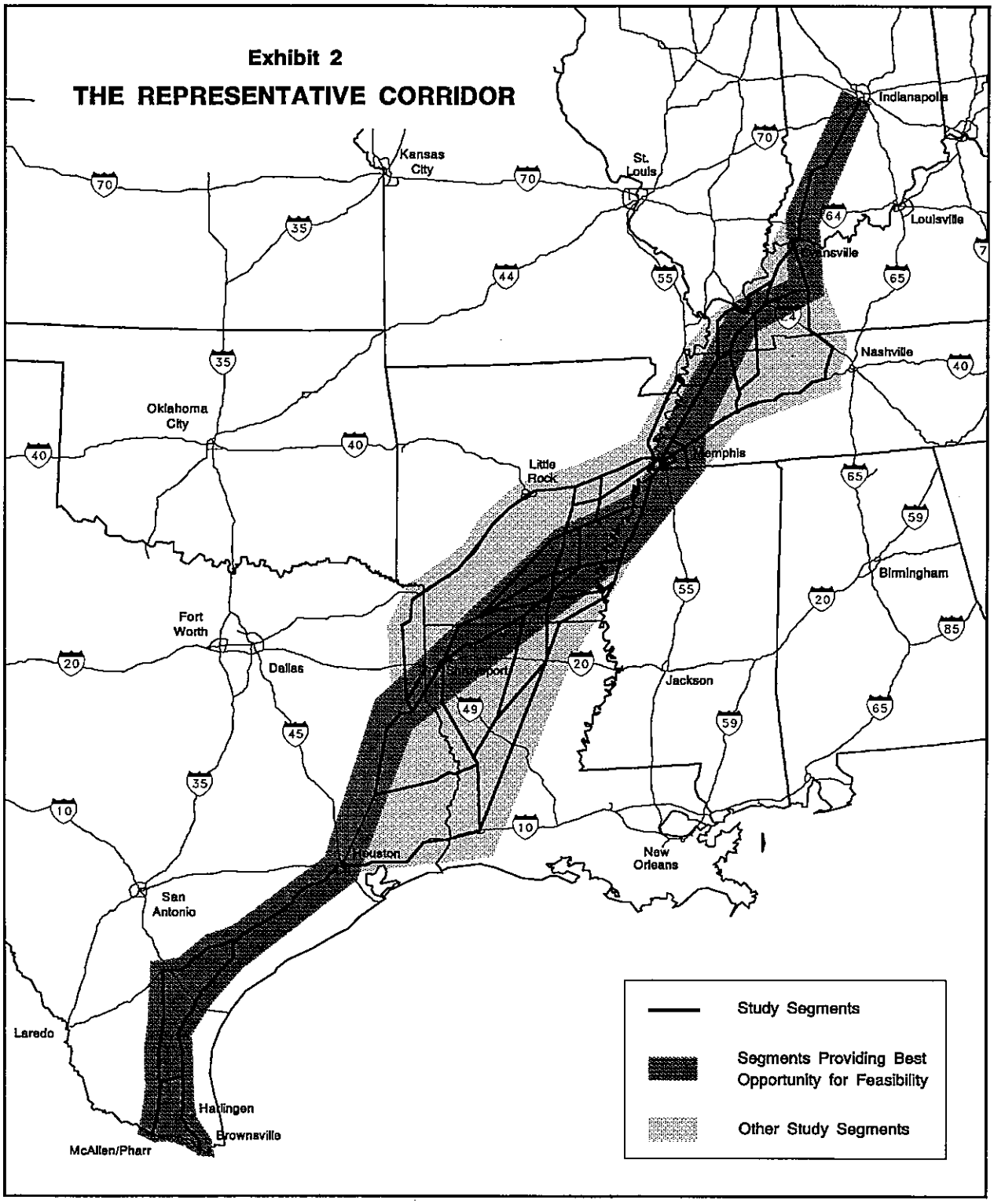
Extension To The Lower Rio Grande Valley

Since the Corridor 18 Feasibility Study was completed, the Congressional designation of Corridor 18 has added a segment from Houston to the Lower Rio Grande Valley. The Corridor 20 Feasibility Study has already evaluated alternative routes to the Valley in connection with a Corridor 20 facility extending from Texarkana to Laredo. The Valley routes included (1) US 77, (2) US 281 and (3) a connector between these two routes in the vicinity of Sarita and Rachal.

Each of the alternatives evaluated by the Corridor 20 Feasibility Study was found to be feasible. Accordingly, the Corridor 18 Steering Committee adopted, as a part of the

Exhibit 2

THE REPRESENTATIVE CORRIDOR



Corridor 18 Representative Corridor, all three of the routes to the Valley addressed by the Corridor 20 Feasibility Study. This is consistent with the policy position of the Texas Transportation Commission, as adopted at its August 29, 1996, meeting. The Representative Corridor, as modified to include these three routes, is depicted in Exhibit 2.

REPRESENTATIVE PROJECT COSTS

Construction cost estimates were developed upon the basis of generalized conditions within the Representative Corridor. While these estimates would vary somewhat based on specific features of the final alignment selected for a Corridor 18 facility, they provide a reasonable and realistic approximation for the Representative Corridor.

The construction cost estimate includes the mainline facility, bridges, right-of-way, environmental mitigation, and other elements. The cost of the 2300 km (1430 miles) facility was estimated to be about $7.2 billion in current day dollars. Annual maintenance and operations costs were estimated to average about $21 thousand per km ($34 thousand per mile).

ECONOMIC FEASIBILITY

While economic feasibility assessments were conducted as part of the Corridor 18 Feasibility Study, they were based upon a facility from Indianapolis to Houston. The purpose of the economic analyses undertaken in the Special Issues Study was to determine the economic feasibility of the corridor from Indianapolis to the Lower Rio Grande Valley.

Definition of Economic Efficiency

The economic benefits measured by this study of Corridor 18 are those derived from increased transportation efficiency. Transportation cost savings that result from improvements to a corridor are true benefits to society as a whole. When travelers experience time savings, greater safety, or reduced vehicle operating costs, these are "net" gains which are not offset by losses incurred by other people. From an economic standpoint, these cost savings are the same as a direct increase in income which makes resources available for other purposes. If the effective increase in income brought about by the project exceeds its cost, the project is said to be "economically efficient" and "economically feasible."

Procedures

With one modest exception, the procedures used in the Special Issues Study analyses are the same as those used in the Corridor 18 Feasibility Study. These procedures determined the savings in travel time, accidents and vehicle operating costs

that would occur if a Corridor 18 facility is built. For purposes of the Special Issues Study, a refinement was made in the manner whereby the effects of traffic congestion were taken into account. This was the only change in analytical procedures versus the Corridor 18 Feasibility Study.

Additionally, in order to maintain comparability between the two studies, unit monetary values assigned to travel time savings, accident reductions and decreased vehicle operating costs were kept the same. This is a conservative approach to benefit valuations.

Efficiency Benefits

Based upon these analyses, total transportation efficiency benefits, discounted at seven percent per annum, are presented in Exhibit 3.

Exhibit 3
TOTAL EFFICIENCY BENEFITS

BENEFITS OVER 31 YEAR ANALYSIS PERIOD(a)(millions)	
Time Savings	$3,861.8
Vehicle Operating Cost Savings	$1,824.5
Accident Savings	$5,287.4
TOTAL EFFICIENCY BENEFITS	$10,973.8

(a) 1999-2029 economic benefits discounted at 7%

ECONOMIC FEASIBILITY

As part of these computations, all costs and benefits in constant (1995) dollars were determined from 1999 to 2029, and then discounted back to 1999 using a discount rate of 7 percent. The benefits were then compared with the costs using the conventional feasibility indicators. Exhibit 4 presents the economic feasibility indicators for Corridor 18.

Exhibit 4
CORRIDOR 18
ECONOMIC FEASIBILITY INDICATORS

Feasibility Indicator	
Net Present Value (a)	$3,972.9 (millions)
Internal Rate of Return	10.7%
Discounted Benefit/Cost Ratio (a)	1.57
(a) Discounted at 7 percent per year	

All three of these indicators imply that Corridor 18 is economically feasible. Corridor 18 has a benefit/cost ratio of 1.57, indicating that $1.57 in transportation efficiency benefits would be derived for each $1.00 invested. Corridor 18 also has a very large Net Present Value, meaning that the National economic productivity will be increased by nearly $4 billion. The Internal Rate of Return of 10.7 percent exceeds the minimum value of 7 percent recommended by the federal government, thus indicating a feasible project.

It is considered that this is a very conservative estimate, consistent with the approach taken in the Feasibility Study. For instance, it is anticipated that the U.S. Department of Transportation will issue guidelines in the near future that will suggest higher values for travel time savings than were used in these analyses. The analyses also are based upon what some may consider to be very conservative forecasts of future population and employment in the study region by the U.S. Bureau of Economic Analysis (BEA).

TRAFFIC IMPACTS OF CORRIDOR 18 UPON I-35

I-35 is an existing Interstate Highway extending from Laredo, Texas, to Duluth, Minnesota. Like Corridor 18, it has been declared by Congress to be a High Priority Corridor.

Analyses were undertaken in the Special Issues Study to identify the impacts on I-35 that would result from development of Corridor 18. These analyses were undertaken by expanding the Corridor 18 highway network travel demand model to encompass all or part of 20 states.

These analyses concluded the following:

- North of Dallas, Texas, projected volumes on I-35 are essentially the same whether or not Corridor 18 is implemented.

- Reductions in I-35 volumes are projected to be less than one percent in the section between Dallas and Austin, Texas, if Corridor 18 is built.

- South of San Antonio, I-35 daily traffic in 2020 is projected to be reduced by about 17 percent if Corridor 18 is built.

  — The reduction in I-35 traffic primarily results from movements between the Laredo area and Houston being diverted to US 59 and Corridor 18, rather than using I-35 from Laredo to San Antonio and then I-10 to Houston.

SIGNIFICANT LOCATIONAL ISSUES

The Representative Corridor, as initially defined in the Feasibility Study and extended in the Special Issues Study, is very general in nature and, in some sections, contains multiple potential locations for a Corridor 18 facility. The Representative Corridor generally ranges in width from 20 to 50 miles.

Before undertaking more specific studies regarding preferred locations for a Corridor 18 facility, it is important that a number of significant locational issues be identified. Included in the Special Issues Study was an identification and evaluation of some of these issues. Proposals were developed for three categories of location issues. These categories are:

- Major River Crossings
- State Line and International Border Crossings
- Connections to Urban Areas

It was not the intent of the Special Issues Study to resolve all locational issues regarding a Corridor 18 facility. Unresolved issues will be addressed in subsequent investigations leading up to and including location and environmental studies.

Exhibit 5
SIGNIFICANT LOCATIONAL ISSUES

LOCATION	ISSUE/OPPORTUNITY
MAJOR RIVER CROSSINGS	
■ Ohio River	■ Likely requirement for new bridge
■ Mississippi River	■ Preferred site in the general vicinity of Rosedale, Mississippi
STATE LINE AND INTERNATIONAL BORDER CROSSINGS	
■ Canadian Border	■ I-94, Ambassador Bridge congestion
■ Michigan/Indiana	■ Existing I-69
■ Indiana/Kentucky	■ Ohio River Crossing at Evansville
■ Kentucky/Tennessee	■ Purchase Parkway/U.S. 51
■ Tennessee/Mississippi	■ Alternative Memphis routings
■ Mississippi/Arkansas	■ Preferred site in the vicinity of Rosedale, Mississippi
■ Arkansas/Louisiana	■ El Dorado, Arkansas/ Haynesville, Louisiana connection
■ Louisiana/Texas	■ New location between U.S. 79 and U.S. 84 preferred
■ Mexican Border	■ Connections to U.S. 77 and/or U.S. 281
URBAN AREA CONNECTIONS	
■ Detroit, Michigan	■ I-94 congestion, surface street access to Ambassador Bridge
■ Indianapolis, Indiana	■ Congestion on I-465 beltway, alternative system additions
■ Evansville, Indiana	■ East vs. West side loop, Ohio River Bridge
■ Memphis, Tennessee	■ Congestion on existing connections, alternative routings/system additions
■ Greenville, Mississippi	■ Potential for spur connection
■ Pine Bluff, Arkansas	■ U.S. 65 connection
■ Monroe, Louisiana	■ Potential for spur connection
■ Shreveport/Bossier City, Louisiana	■ 1992 proposed location
■ Houston, Texas	■ Congestion on U.S. 59, alternative system additions
■ Corpus Christi, Texas	■ I-37 connection
■ Brownsville/McAllen, Texas	■ U.S. 77 and/or U.S . 281

The key issues and opportunities identified thus far regarding these three locational topics are summarized in Exhibit 5.

MAJOR RIVER CROSSINGS

The Representative Corridor crosses two major rivers, the Ohio and the Mississippi.

Ohio River Crossing

Evansville, Indiana is one of the urban areas named in the Congressional designation of Corridor 18. It is located on the Ohio River, across from Henderson, Kentucky. Consequently, the location of this Ohio River crossing must be determined within the context of the comprehensive planning process for the urbanized area.

Mississippi River Crossing

The crossing of the Mississippi River has been viewed throughout the Corridor 18 studies as a major factor in determination of a route location. Because of the environmentally sensitive nature of the Mississippi River floodplain, sites with an existing bridge or a new location where significant progress has been made on location and environmental clearances were targeted as potential Corridor 18 alignments.

Within the Representative Corridor, two sites with either an existing or proposed bridge across the Mississippi River were identified. These are the existing U.S. 49 crossing at Helena, Arkansas, and alternatives near Rosedale, Mississippi, including the proposed Great River Bridge.

A Corridor 18 alignment from Memphis to Shreveport that utilizes a crossing in the general vicinity of Rosedale, Mississippi, would be of a similar length and cost as one using a crossing in the general vicinity of Helena. A Rosedale alignment for Corridor 18 would avoid the White River National Wildlife Refuge which is a major obstacle to an alignment using a crossing in the general vicinity of Helena. It would serve existing and emerging economic development in the Mississippi Delta. It would provide a new river crossing in a section of the Mississippi River which currently does not have a crossing for a stretch of 140 kilometers (90 miles). It would serve slack water harbors on both sides of the River. A Rosedale crossing would also permit Corridor 18 to utilize a section of existing freeway on U.S. 61 around Clarksdale, Mississippi, thus providing some cost savings. In addition, environmental studies and public hearings have been completed for the Great River Bridge being studied as a potential Rosedale crossing. For these reasons, a Missis-

sippi River crossing in the general vicinity of Rosedale, Mississippi, taking advantage of work already done on the Great River Bridge project, is preferable to a crossing in the general vicinity of Helena, Arkansas crossing.

STATE LINE AND INTERNATIONAL BORDER CROSSINGS

In the context of the Special Issues Study, this topic includes international crossings into Canada and Mexico.

Canadian Border Crossings - The I-69 crossing into Canada occurs at the Blue Water Bridge in Port Huron. Construction of a second span is virtually complete as of June 1997.

Michigan DOT's proposal for redefinition of Corridor 18 includes I-94 from its interchange with I-69 to Detroit, Michigan. Via surface streets, I-94 connects to the Ambassador Bridge and Windsor Tunnel in Detroit, both of which extend across the Detroit River into Canada. I-94 has been declared by the Department to be the most congested corridor in the entire State. Improvements needed in the connections to the Detroit River crossings, as well as the crossings themselves, have been identified.

Michigan/Indiana Crossing - The existing I-69 facility enters Indiana in the far northeast corner of the State.

Indiana/Kentucky Crossing - The Ohio River Crossing, mentioned above, will require consideration of the total transportation system needs of the Evansville urban area.

Kentucky/Tennessee Crossing - The Representative Corridor includes the U.S. 51 facility from its connection to the Purchase Parkway in Kentucky to the Memphis urban area.

Tennessee/Mississippi Crossing - A major challenge yet to be undertaken is the identification of a preferred location for a Corridor 18 facility through Memphis. This determination also will establish the location of the state line crossing.

Mississippi/Arkansas Crossing - As noted, a crossing of the Mississippi River in the vicinity of Rosedale, Mississippi, is preferred.

Arkansas/Louisiana Crossing - A corridor connecting to the preferred Rosedale crossing of the Mississippi River would

extend to the vicinity of El Dorado, Arkansas, and thence to Haynesville, Louisiana.

Louisiana/Texas Crossing - The preferred location of Corridor 18 in the Shreveport/Bossier City area (discussed subsequently) projects a state line crossing between U.S. 79 and U.S. 84. Significant adverse travel distance would be involved if either of these two existing routes was upgraded to provide a Corridor 18 facility. In order to avoid environmentally sensitive areas between U.S. 79 and U.S. 84, a new location facility from Shreveport and connecting to U.S. 59 at or near Carthage, Texas appears preferable.

Mexican Border Crossing - The Representative Corridor encompasses both the U.S. 77 and the U.S. 281 connections to the Mexican road system at the international border. Upgrading of these border crossings is receiving continuing attention by the Texas Department of Transportation and other agencies.

CONNECTIONS TO URBAN AREAS

The analyses undertaken in the Special Issues Study regarding urban areas was limited to the identification of connections to them. Detailed analyses were not undertaken regarding routes through urbanized areas. Such matters are anticipated to be addressed within the context of the overall local, regional, and statewide planning processes. For example, where new freeway capacity is anticipated in an urbanized area (over 50,000 population), existing joint regulations of the Federal Highway Administration and the Federal Transit Administration indicate that a Major Investment Study (MIS) be undertaken as part of the transportation planning process.

Detroit, Michigan - The I-94 corridor suffers from extremely high levels of congestion.

Indianapolis, Indiana - I-69 currently connects to I-465 on the northeast side of Indianapolis. The Representative Corridor begins on the southwest side of the urban area at the interchange connecting I-465 and S.R. 37. Segments of I-465 between the I-69 and S.R. 37 interchanges currently are experiencing congestion.

Evansville, Indiana - The Representative Corridor follows I-164 around the east and south of the Evansville urban area to a crossing of the Ohio River. There are alternative proposals for this Ohio River crossing which, in turn, could affect the location of a Corridor 18 facility in this urbanized area.

Memphis, Tennessee - The Representative Corridor enters the Memphis area from the north on U.S. 51 and leaves the area on the south via U.S. 61 in Mississippi. Identification of a preferred connection within the Memphis urbanized area has yet to be undertaken.

Greenville, Mississippi - The Representative Corridor extends to the vicinity of the Bolivar/Washington county line. Assuming selection of a crossing of the Mississippi River in the vicinity of Rosedale, Mississippi, there may be justification for development of a spur-type route to the Greenville urban area.

Pine Bluff, Arkansas - The Representative Corridor passes to the south of the Pine Bluff urbanized area. U.S. 65 would provide a connection from Corridor 18 to Pine Bluff.

Monroe, Louisiana - There are proposals for a spur route from Corridor 18 to the Monroe urbanized area. This connection is part of a proposal for a north/south oriented freeway extending from Monroe to Lake Charles, via Alexandria.

Shreveport/Bossier City, Louisiana - A 1992 study identified a preferred location for a Corridor 18 facility. It would enter the urbanized area from the northeast, pass along the eastern edge of Barksdale Air Force Base, pass just north of the Caddo-Bossier Port, and interchange with I-49 and U.S. 171 on the south side of the urbanized area.

Houston, Texas - The Representative Corridor includes U.S. 59, a congested freeway that extends through the Houston urbanized area on a northeast-southwest orientation. U.S. 59 is capacity constrained and has limited expansion capability. There are alternative concepts for a Corridor 18 routing in this area, generally involving circumferential routing along either Beltway 8 or the Grand Parkway(a proposed facility).

Corpus Christi, Texas - I-37 provides access to Corpus Christi from its intersection with U.S. 77.

Brownsville/McAllen, Texas - The Representative Corridor includes U.S. 77 which enters the Lower Rio Grande Valley through Harlingen and into Brownsville. It also includes U.S. 281 which serves the Hildalgo urbanized area, including McAllen, Edinburg and Pharr.

Chapter 1
INTRODUCTION

The Corridor 18 Special Issues Study addressed several matters which will facilitate future location and environmental studies. It built upon and extended the work of the earlier Corridor 18 Feasibility Study[1] while also drawing upon results of the Corridor 20 Feasibility Study.[2]

The Corridor 18 Feasibility Study determined that Corridor 18, as then defined, is feasible and that, on balance, the Nation and the corridor would be better off if it is built. Likewise, the Corridor 20 Feasibility Study concluded that it too was a feasible project. There is significant overlap and interconnection between Corridor 18 and Corridor 20.

CORRIDOR DESIGNATIONS

From time to time, High Priority Corridors, as initially defined by the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, have been redefined. Corridor 18 has been redefined multiple times.

Corridor 18 Feasibility Study

In the ISTEA of 1991, Congress designated certain highway corridors of national significance to be included in the National Highway System. In this legislation, Corridor 18 was defined as extending from Indianapolis, Indiana, to Memphis, Tennessee, via Evansville, Indiana.

Subsequent legislation in 1993 amended this definition to extend the corridor from Memphis, Tennessee, to Houston, Texas, via Shreveport-Bossier City, Louisiana. The Corridor 18 Feasibility Study specifically addressed the Indianapolis/Evansville/Memphis/Shreveport-Bossier City/Houston definition of Corridor 18.

Corridor 18 Special Issues Study

The National Highway System Designation Act of 1995 redefined Corridor 18 by including an extension from Houston to the Lower Rio Grande Valley at the Mexican border. It also specified that Corridor 18 should include Mississippi and Arkansas in its definition. The corridor, as now defined, is depicted in Exhibit 1-1, along with its relationship to Corridor 20.

Because of the legislative language relating to this corridor, no alternatives to a highway type facility were considered in either the Feasibility Study or the Special Issues Study.

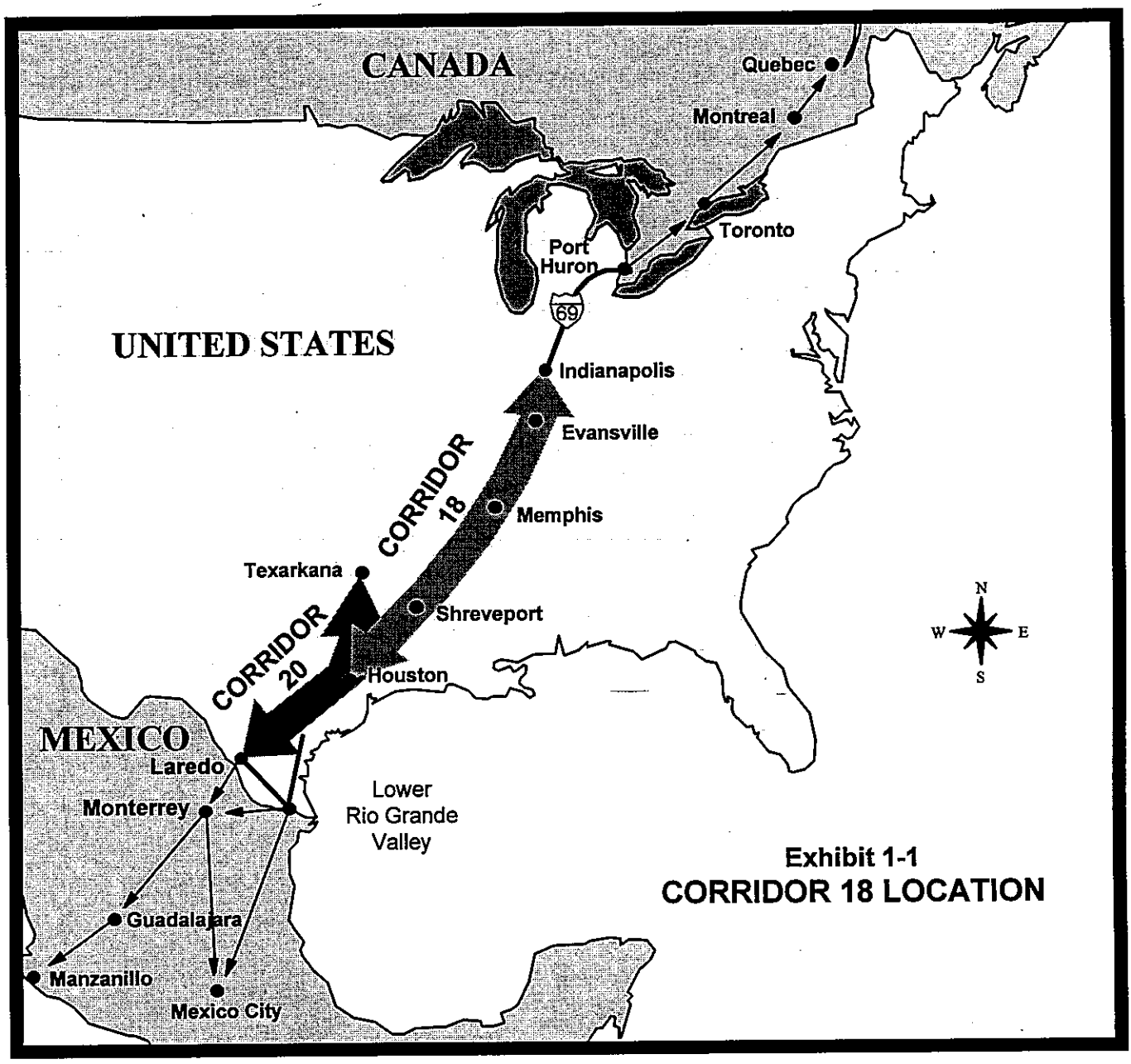


Exhibit 1-1
CORRIDOR 18 LOCATION

I-69 Connection

As considered in this study, Corridor 18 would connect to I-69 in Indianapolis. As depicted in Exhibit 1-1, I-69 currently exists north of Indianapolis through Michigan via Lansing and Flint to Port Huron, Michigan/Sarnia, Ontario, Canada. At this point, I-69 joins an Interstate-quality road that connects to Toronto, Montreal and Quebec.

The Michigan Department of Transportation has proposed that Corridor 18 be redefined to include the extension from the northern terminus at Indianapolis to dual termini at Port Huron and Detroit. This proposal would include all of existing I-69 plus a portion of I-94 (from Marshall, Michigan, to Detroit).

The continuity of Corridor 18 and I-69 is a major element contributing to the overall feasibility of the Corridor 18 facility. I-69 north of Indianapolis provides an important linkage to an Interstate-quality road that connects to Toronto, Montreal and Quebec. The I-69 continuity would permit Corridor 18 to serve transportation needs of the three countries which have adopted the North American Free Trade Agreement.

The Michigan proposal has been endorsed by the other seven states included in the Corridor 18 Steering Committee. The proposal has been referred to Michigan's Congressional delegation. Congressional action is required before Corridor 18 can be officially redefined to include this important linkage.

Corridor 20 Feasibility Study

The Congressional definition for Corridor 20 encompasses a connection from Texarkana to the Mexican border at Laredo, via Houston. U.S. 59 currently provides this connection and a significant portion overlaps with the likely location for a Corridor 18 facility, as discussed subsequently in this report.

The Corridor 20 Feasibility Study examined the feasibility of the Texarkana/Houston/Laredo location which currently is served by U.S. 59. It also examined route alternatives from U.S. 59 to the Mexican border in the Lower Rio Grande Valley. In all, seven alternatives were addressed in the study report. All seven were found to be economically feasible.[3]

Statement of Purpose

Corridor 18 is designated, by Congress, as a High Priority Corridor. It also has been described as a "North American trade route," an "international trade route" and as a "NAFTA corridor." In recognition of the important role it could play, the Corridor 18

Steering Committee (see subsequent discussion) officially adopted the following statement of purpose:

To improve international and interstate trade in accordance with national and state goals; to facilitate economic development in accordance with state, regional, and local policies, plans, and surface transportation consistent with national, state, regional, and local needs and with the Congressional designation of the corridor.

PURPOSES OF THE CORRIDOR 18 SPECIAL ISSUES STUDY

The Corridor 18 Special Issues Study addressed three matters which will facilitate future location and environmental studies. It was not the intent to identify the final location and design of any part of the route.

The following three special issues were addressed as the current steps in the sequence of activities leading up to final design:

- Determine the impact on the project's economic feasibility of redefining Corridor 18 to include an extension from Houston to the Lower Rio Grande Valley (see Chapter 2);
- Determine the traffic impacts Corridor 18 would have on I-35 (see Chapter 3); and
- Evaluate major river crossings (see Chapter 4), connections between states (see Chapter 5), and connections to urban areas (see Chapter 6) that will be key considerations for future location and environmental studies.

REPRESENTATIVE CORRIDOR

During the Corridor 18 Feasibility Study, 93 route segments were identified as potential candidates for Corridor 18 between Indianapolis and Houston. For each of these 93 route segments, information was compiled as part of a comprehensive evaluation process. Each route segment was given equal consideration as part of the evaluation process. Based upon

these assessments, a Representative Corridor was determined to be superior to the other alternatives. These assessments were based upon a series of 17 individual comparisons in which different emphases (weightings) were assumed for a range of evaluation criteria.

On several occasions, information was provided to the Steering Committee advocating departures from the Representative Corridor. The Steering Committee considered such information but found no convincing or compelling reason for accepting the proposed departures. In the absence of convincing or compelling reasons, the Steering Committee has continued to unanimously support the Representative Corridor as the general location which best serves the purposes of the Corridor and yields the most benefits relative to facility costs.

Extension To The Lower Rio Grande Valley

Since the Corridor 18 Feasibility Study was completed, the Congressional designation of Corridor 18 has added a segment from Houston to the Lower Rio Grande Valley. The Corridor 20 Feasibility Study has already evaluated alternative routes to the Valley in connection with a Corridor 20 facility extending from Texarkana to Laredo. The Valley routes included (1) US 77,(2) US 281 and (3) a connector between these two routes in the vicinity of Sarita and Rachal.

Each of the alternatives evaluated by the Corridor 20 Feasibility Study was found to be feasible. Accordingly, the Corridor 18 Steering Committee adopted, as a part of the Corridor 18 Representative Corridor, all three of the routes to the Valley addressed by the Corridor 20 Feasibility Study. This is consistent with the policy position of the Texas Transportation Commission, as adopted at its August 29, 1996, meeting. The Representative Corridor, as modified to include these three routes, is depicted in Exhibit 1-2.

REPRESENTATIVE PROJECT COSTS

Construction cost estimates were developed upon the basis of generalized conditions within the Representative Corridor. While these estimates would vary somewhat dependent upon specific features of the final alignment selected for a Corridor 18 facility, they provide a reasonable and realistic approximation for the Representative Corridor.

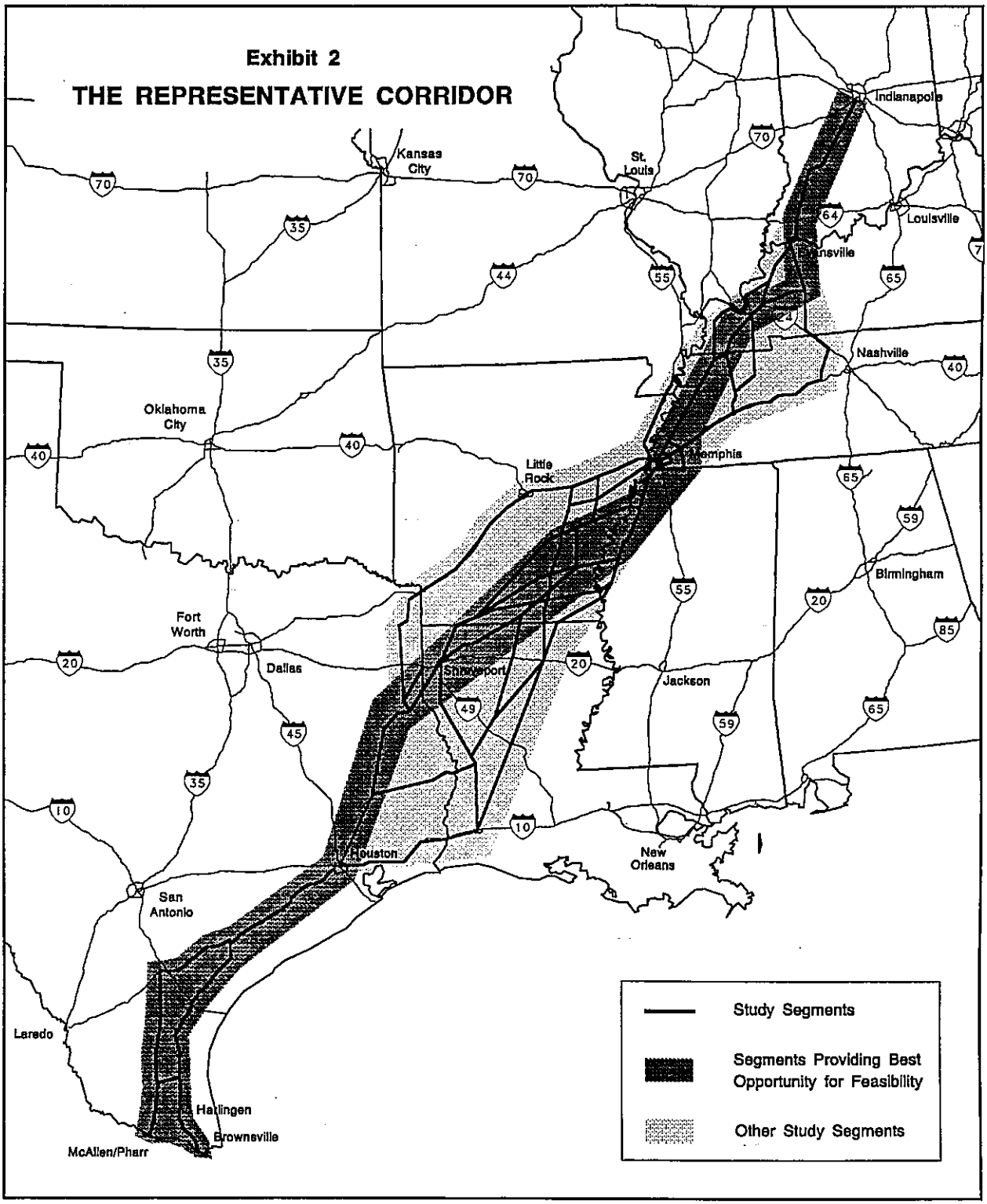


Exhibit 2
THE REPRESENTATIVE CORRIDOR
Indianapolis
Kansas City
St. Louis
Louisville
Nashville
Oklahoma City
Memphis
Little Rock
Birmingham
Fort Worth
Dallas
Shreveport
Jackson
Houston
New Orleans
San Antonio
Laredo
Harlingen
Brownsville
McAllen/Pharr
Study Segments
Segments Providing Best Opportunity for Feasibility
Other Study Segments

The construction cost estimate includes the mainline facility, bridges, right-of-way, environmental mitigation, and other elements. As noted in Exhibit 1-3, the cost of the 2300 km (1430 miles) facility was estimated to be about $7.2 billion in current day dollars. Annual maintenance and operations costs were estimated to average about $21 thousand per km ($34 thousand per mile).

EXHIBIT 1-3
CAPITAL COST SUMMARY

COST ITEM	COST ($ millions)
Construction	$4,852
Right-of-Way	444
Engineering	878
Mitigation[1]	331
Contingency	709
TOTAL COST	$7,214

[1] This estimate is for direct cost associated with mitigation of the environmental impacts of construction, operation, and maintenance of the proposed facility and with any measures found to be appropriate to enhance the environment as part of the construction. The estimate does not include secondary or indirect environmental, social, or economic costs or benefits. Such costs and benefits would be more appropriately characterized, typically in a non-quantified manner, during more detailed environmental studies.

PUBLIC PARTICIPATION

On August 29, 1996, a meeting was held in Memphis, Tennessee, to permit those individuals and organizations interested in the outcome of this study to present their ideas to the Study Team. Although not a formal public hearing, this was an important opportunity for all interested parties to be heard regarding Corridor 18.

During this important meeting, the Steering Committee received information from 38 presenters from various areas of the corridor. Additionally, considerable presentation materials were received from the participants. These materials provided useful background information for the Study Team.

On May 28, 1997, a second public meeting was held in Memphis, Tennessee. At this meeting, results of the study were presented and questions were addressed concerning the study process, the results it yielded, and expectations for follow-up

activities. A variety of questions and statements from participants were addressed. These included concerns about environmental impacts and mitigation costs, property access provisions, international trade, safety concerns related to large trucks, job creation, displacement of residents and the public participation process. Additionally, significant and enthusiastic support for the work accomplished thus far on Corridor 18 was voiced.

During the course of the study, newsletters were distributed at important stages to keep all interested parties informed regarding the study's status and findings. Each newsletter identified contacts on the Steering Committee and the Consultant Team who were available to receive comments and information. Many parties took advantage of this opportunity. Each submission was duly recorded and information thus received was reviewed and kept on file throughout the study.

STUDY TEAM

The Corridor 18 Study Team was composed of representatives of each of the eight participating states, the Federal Highway Administration and a Consultant Team experienced in multi-state corridor feasibility studies.

Public Sector

Representatives of the eight participating states and the Federal Highway Administration were organized into a Steering Committee which reviewed study products as the study progressed, made key decisions regarding the directions to be taken, and provided overall guidance to ensure that relevant considerations were addressed. Steering Committee participants are identified in Exhibit 1-4.

The Arkansas State Highway and Transportation Department was the administrative agency for the study.

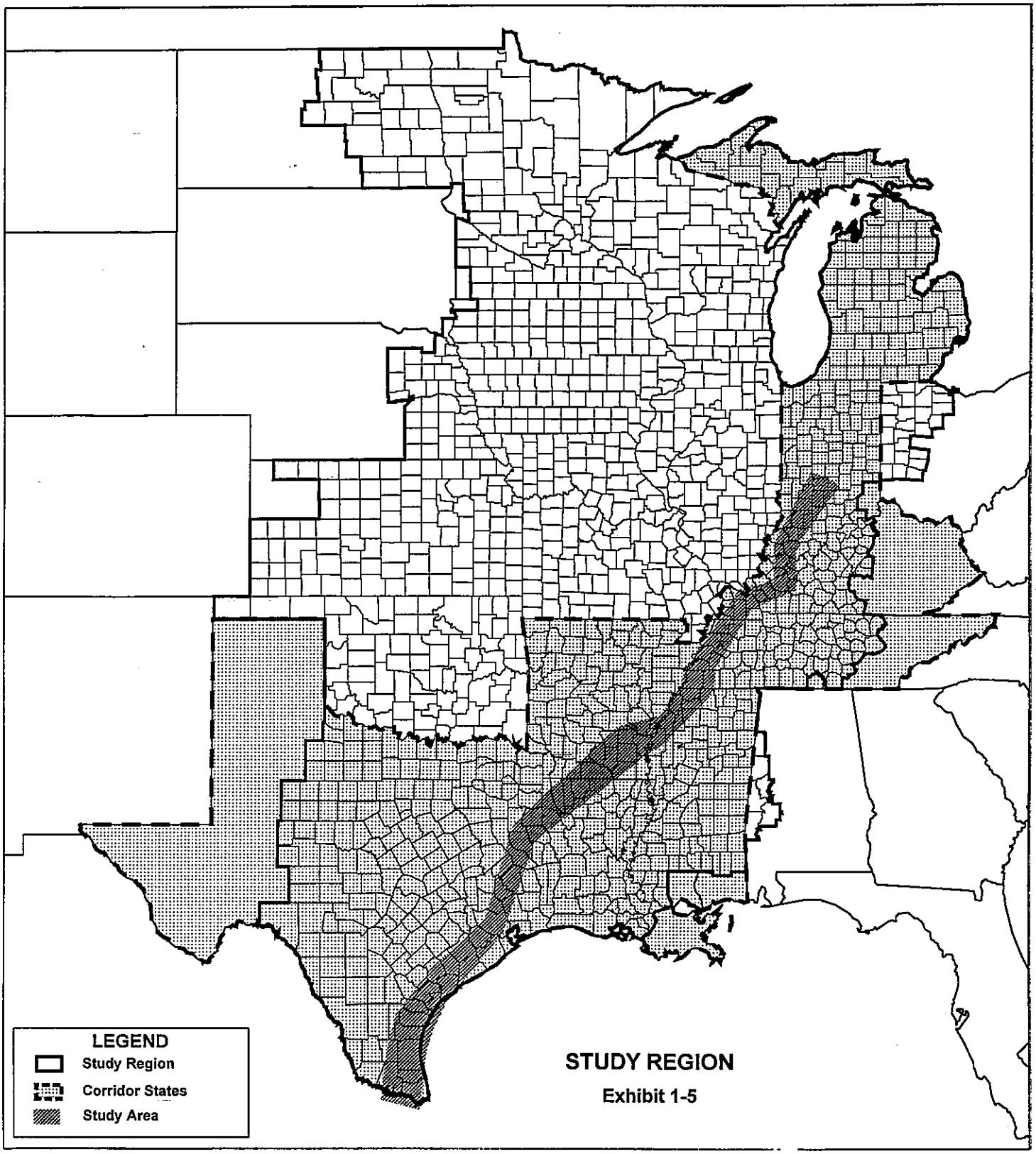
Consultant Team

The Consultant Team was comprised of:

- Wilbur Smith Associates (WSA), the prime contractor for the study. WSA is an international consulting, engineering, economics and planning firm which specializes in the transportation sector. Mr. James L. Covil, P.E., Senior Vice President, was the WSA Project Manager.

Exhibit 1-4
STEERING COMMITTEE

STATE	PRINCIPAL MEMBER	ALTERNATE MEMBER	FORMER PARTICIPANT
Arkansas	Dan Flowers Director Arkansas State Highway & Transportation Department	Roger Almond Deputy Director & Chief Engineer Arkansas State Highway & Transportation Department	
Indiana	Debra Simmons Wilson Deputy Commissioner Indiana Department of Transportation	Steven Wuertz Development Specialist Indiana Department of Transportation	
Kentucky	John Carr Deputy State Highway Engineer Office of Intermodal Planning Kentucky Transportation Cabinet	Mohammed Taqui Transportation Engineer Specialist Kentucky Transportation Cabinet	
Louisiana	Frank Denton Secretary Louisiana Department of Transportation	Lacey A. Glascock Deputy Secretary Louisiana Department of Transportation	
Michigan	Susan Hohl Administrator of the Project Planning Division Michigan Department of Transportation	Gloria Siwek Transportation Planner Bureau of Transportation Planning Michigan Department of Transportation	William Hartwig
Mississippi	Kenneth Warren Deputy Executive Director/ Chief Engineer Mississippi Department of Transportation	Marlin D. Collier State Planning Engineer Planning Division Mississippi Department of Transportation	
Tennessee	J. Bruce Saltsman, Sr. Commissioner of Transportation Tennessee Department of Transportation	William L. Moore. Jr. Executive Director Tennessee Department of Transportation	
Texas	Al Luedecke Director, Transportation Planning Texas Department of Transportation	Augustin Chavez Engineer of Intermodal Planning Texas Department of Transportation	
Federal Highway Administration	Peter A. Lombard Director, Office of Planning & Program Development Ft. Worth, Texas Martin Weiss National Highway System Team Washington, DC	Ken Perret Division Administrator Little Rock, AR	William D. Richardson Thomas R. Weeks


LEGEND
Study Region
Corridor States
Study Area
STUDY REGION
Exhibit 1-5

- HNTB Corporation, the principal subcontractor, is an international engineering, architecture, and planning firm. Mr. Joseph W. Guyton, P.E., Vice President, was the Deputy Project Director for the study.

- Garver + Garver, P.A., provided engineering technical support.

ANALYSES AREA DEFINITIONS

For the purposes of this study, Corridor 18 was defined in terms of corridor region, corridor states and study area. The area referred to by each term is illustrated in Exhibit 1-5.

Corridor Region

During the Corridor 18 Feasibility Study, a fourteen state area was defined to indicate the general region of potential influence of a Corridor 18 project. This area was used to study Corridor 18 from a high-level perspective, such as major urban areas in the region, overall travel patterns, and connectivity of Corridor 18 to the U.S. borders with Mexico and Canada. The fourteen states were Michigan, Wisconsin, Ohio, Indiana, Illinois, Kentucky, Missouri, Tennessee, Arkansas, Oklahoma, Alabama, Mississippi, Louisiana, and Texas.

For the purpose of the Special Issues Study, six additional states were added to encompass the area served by Interstate Route 35 from Laredo, Texas, to Duluth, Minnesota. These additional states are North Dakota, South Dakota, Nebraska, Kansas, Iowa and Minnesota. The Corridor Region is defined as consisting of all or part of these 20 states.

Corridor States

Corridor 18 crosses portions of seven states: Indiana, Kentucky, Tennessee, Mississippi, Arkansas, Louisiana, and Texas. Michigan is included as a corridor state because an existing Interstate highway, I-69, extends north from Indianapolis through Michigan to Canada. The resulting eight states are the Corridor States addressed in this report.

Study Area

The immediate study area is that part of the corridor region which is most likely to contain all practical alternative route locations. Thus the primary study effort was focused in the study area to determine general route locations and local impacts.

METRICATION

Quantities are presented in this report in metric units. Where practical the equivalent English units are also shown in parentheses in text and exhibits. Most existing data gathered from governmental and private sources are in English units. The conversion factors used to convert these data to metric measurements are shown in Exhibit 1-6.

Exhibit 1-6
METRIC MEASUREMENT CONVERSION CHART

QUANTITY	FROM ENGLISH UNITS	TO METRIC UNITS	MULTIPLY BY
Mass	lb ton (2,000 lb)	kg metric ton (1,000 kg)	0.453592 0.907184
Length	mile foot inch	km m mm	1.609344 0.3048 25.4
Area	square mile acre acre	km^2 m^2 ha (10,000 m^2)	2.5900 4,046.856 0.4046856
Mass x Length	ton-miles	ton-km	1.45997
Volume	gallon	liter (L)	3.78541

END NOTES

(1) Corridor 18 Feasibility Study, Final Report, prepared by Wilbur Smith Associates and HNTB Corp., November 1995.

(2) Corridor 20 Feasibility Study Report, prepared by Rust Lichliter/Jamison, Wilbur Smith Associates, HNTB Corp., et. al., August 1996.

(3) Traffic and Economic Feasibility Report, Corridor 20, prepared by Wilbur Smith Associates, September 1996.

Chapter 2
ECONOMIC FEASIBILITY ANALYSES

The Corridor 18 Feasibility Study determined that the project was feasible as it was then defined, i.e., from Indianapolis to Houston. As noted in Chapter 1, Corridor 18 has since been redefined.

This chapter reports the findings of the economic analyses, the objective of which was to determine the economic feasibility of Corridor 18 between Indianapolis and the Lower Rio Grande Valley, i.e., the current definition of the corridor.

DEFINITION OF ECONOMIC EFFICIENCY

A major public investment such as a new highway in Corridor 18 is "economically feasible" if the economy is better off with the new highway than without it. It is almost without question that any well planned highway investment, like Corridor 18, will provide its users with benefits. Highway investments are designed with the intent of improving the mobility and quality of life of their users. The economic feasibility process examines these benefits and compares them with the cost of building and operating the highway improvement. If the value of the benefits is greater than the cost of the new Corridor 18 highway, it is considered an "economically feasible" investment.

The economic benefits measured for this study of Corridor 18 are those derived from transportation efficiency. Transportation cost savings that result from improvements to a corridor are true benefits to society as a whole. When travelers experience time savings, greater safety, or reduced vehicle operating costs, these are "net" gains which are not offset by losses incurred by other people. From an economic standpoint, these costs savings are the same as a direct increase in income which makes resources available for other purposes. If the effective increase in income brought about by the project exceeds its cost, the project is said to be "economically efficient" and "economically feasible."

OVERVIEW OF THE ECONOMIC EVALUATION PROCESS

The economic analysis process used to evaluate the Corridor 18 highway investment, while tailored to this particular study, is one which has been used on many other corridor studies (including the Corridor 18 Feasibility Study), and one which has evolved over the years. The methodology is reasonably comprehensive and credible, it is consistent with the

current state-of-the-practice, and it is one which utilizes accepted economic principles. This approach includes the following steps:

- Development of a "base case" (i.e., the existing highway system plus committed improvements) against which Corridor 18 is compared.
- A generalized estimate of Corridor 18's life cycle cost.
- Estimated use (passenger and freight) that will be made of the new highway.
- Quantification of estimated travel efficiency economic benefits attributable to a Corridor 18 investment.
- A comparison of the economic costs and economic benefits attributable to a Corridor 18 investment.
- Sensitivity tests of key parameter values.
- Conclusions concerning the economic feasibility of investing in Corridor 18.

Conservative Evaluation Approach

With one modest exception, the procedures used in these analyses are the same as those used in the Corridor 18 Feasibility Study. For purposes of the Special Issues Study, a redefinement was made in the manner whereby the effect of traffic congestion was taken into account. This was the only change in analytical procedures versus the Corridor 18 Feasibility Study.

Additionally, in order to maintain comparability between the two studies, unit monetary values assigned to travel time savings, accident reductions and decreased vehicle operating costs were kept the same.

It is considered that this is a very conservative estimate, consistent with the approach taken in the Feasibility Study. For instance, it is anticipated that the U.S. Department of Transportation will issue guidelines in the near future that will suggest higher values for travel time savings than were used in these analyses. The analyses also are based upon what some may consider to be very conservative forecasts of future population and employment in the study region by the U.S.

Bureau of Economic Analysis (BEA).

ECONOMIC EVALUATION PRINCIPLES

The economic analysis of Corridor 18 followed a consistent set of evaluation principles.

Comparison with "Do-Nothing" Base Case

The economic benefits of Corridor 18 were calculated by comparing the "improved case" highway situation with the "base case" situation. The " economic feasibility" of Corridor 18 is a reflection of the differences that would occur in travel conditions with and without the new highway.

Discount Rate

Benefits and costs (present and future) were tabulated in constant dollars (i.e. inflation was not factored in). At the same time, it is important to recognize that future benefits and costs do not have the same value as the same amounts do today. Therefore, all future costs and benefits were "discounted back" to the base year. Because future inflation was not included, the selected discount rate also excluded future inflation. A constant dollar discount rate of seven percent was used in this study, as recommended by the US Office of Management and Budget (OMB).

Residual Value

A 31-year period (1999-2029) was used to analyze the economic feasibility of Corridor 18. By the year 2029, some of the facility elements will have depreciated (used some or all of their useful lives) while others will have longer life spans. To recognize this, portions of the cost of the Corridor 18 elements that will last longer than 2029 were added as economic benefits at the end of the last study year. For example, a bridge might be expected to have a life of 75 years, and therefore its residual value is equal to 45/75ths of its original cost. Similarly, earthworks have a long useful life (assumed to be 100 years). On the other hand, pavements would have virtually no residual value at the end of the analysis period.

INDICATORS OF "ECONOMIC FEASIBILITY"

The comparison of costs and benefits of a Corridor 18 highway investment yielded three indicators of "economic feasibility".

- **Net Present Value** - All costs and benefits in future years were discounted back to the base year. When the sum of the discounted benefits is greater than the sum of the discounted costs, the "net present value" is positive

and Corridor 18 is deemed to be "economically feasible."

- **Discounted Benefit/Cost Ratio** - This economic indicator was calculated as the sum of the discounted benefits divided by the sum of the discounted costs. When the result is 1.0 or greater (i.e. benefits exceed costs), the highway is considered to be "economically feasible."

- **Internal Rate of Return** - This calculation determines that discount rate at which the net present value is zero (the sum of the discounted benefits is equal to the sum of the discounted costs). If the rate of return is greater than or equal to the recommended discount rate (seven percent in this study), then the investment is deemed to be "economically feasible."

ECONOMIC EFFICIENCY EVALUATION

In this assessment of economic feasibility, a life cycle approach was used. The costs of planning, designing, building, and maintaining a conventional Interstate-type highway in the Corridor 18 area over a 31 year period (1999-2029) were estimated. Then, the transportation efficiency gains (or losses) over that period were estimated. Efficiency benefits were then compared with the costs in order to determine whether or not Corridor 18 is economically feasible.

Corridor 18 Economic Costs

The cost element of the benefit/cost evaluation includes two major cost categories: (1) the costs of constructing Corridor 18, and (2) the costs of operating and maintaining an Interstate type highway in Corridor 18.

- **Construction Costs** for the Interstate-type highway include right-of-way acquisition, planning, design and construction. Corridor 18 construction costs were estimated to be $7,214 million. For purposes of these economic evaluations only, the construction costs were assumed to be incurred in 1999 even though it is recognized that actual construction would be spread over a number of years. After 30 years of operation the residual value of Corridor 18 was estimated to be $2,352 million based on the useful lives of the various construction cost elements, and exclusive of engineering, administration and contingencies costs.

- **Operations and Maintenance Costs** were estimated based upon average historical costs experienced by various state highway agencies across the country on a per route mile basis. Annual operating and maintenance costs were estimated to be about $21 thousand per kilometer ($34 thousand per mile).

Economic Efficiency Benefits

Transportation investments contribute to economic prosperity within an area by reducing the cost and improving the efficiency of moving people and goods.

The transportation efficiency benefits Corridor 18 would create are of three types: travel time savings, vehicle operating cost savings, and accident reduction savings. Transportation efficiency benefits were calculated for the two principal vehicle types: passenger vehicles (automobiles) and commercial vehicles (trucks). Benefits initially were estimated for the two analysis years, 1994 and 2020, using results of the travel demand model (described in the Appendix). The results are indicated in Exhibit 2-1.

Exhibit 2 - 1
TOTAL ANNUAL TRAVEL EFFICIENCY BENEFITS
($ million)

TRAVEL BENEFITS	YEAR 1994 Auto	Truck	Total	YEAR 2020 Auto	Truck	Total
Vehicle Operating Cost Savings	40.0	109.4	149.4	51.3	172.9	224.2
Travel Time Savings	145.6	143.6	289.2	248.5	241.8	490.3
Accident Cost Savings			402.3			667.5
TOTAL CORRIDOR 18			**841.0**			**1,382.0**

By interpolating between 1994 and 2020 and extrapolating beyond 2020, it was possible to derive benefit estimates for other years. An assumption was made that benefits could not begin until 2003 even though construction costs were assumed to be incurred in 1999. This assumption

accounts for the time lag between the commencement of construction and opening of a facility to traffic. That is, funds expended in one year typically will yield benefits several years later. Therefore, there is a time lag between the investment year and the realization of travel efficiency benefits.

Travel Time Savings

One objective of a Corridor 18 highway is to reduce the time required to travel within the corridor. There are potentially three different ways to reduce travel time: (1) reducing mileage to reach one's destination by offering a more direct route; (2) increasing the speed at which one can travel by providing facilities with higher design standards; and/or (3) reducing congestion by providing additional high capacity facilities. The study methodology took into account all three elements of time savings. It used the results of two applications of the travel demand model (see the Appendix for a description of this model), i.e. with and without the new Corridor 18.

For each trip that could potentially use Corridor 18, travel time with and without the new facility was calculated and summarized. Excess travel time due to congestion was calculated for each segment using the Highway Performance Monitoring System (HMPS) Analytical Process methodology and data developed by FHWA. This methodology recognizes that excess travel time due to congestion-induced speed change cycles varies according to the level of congestion (expressed in terms of volume/capacity ratios) and varies by type of vehicle (e.g. it takes longer for a truck to resume original speed).

Inclusion of time savings benefits in the transportation efficiency evaluation required that a monetary value be placed on time saved. The value of time varies by person and situation. Most non-business travelers are less concerned about time, and hence value their savings less, than those on business trips. To account for the difference in "willingness to pay" for time savings, different monetary values were placed on time for business and non-business travelers.

For purposes of this study, the values used were the same as those used in the Corridor 18 Feasibility Study. For auto business travelers, a value of $6.00 for each passenger-hour saved was used. For non-business travelers a value of $3.00 per passenger-hour was used. All values were adjusted to reflect 2.238 persons per auto. In addition, average wage

rates in the U.S. have, over time, increased in real terms (excluding inflation). To account for this, the per hour time values were increased by one percent per year. Commercial truck time savings were valued at $18.90 per truck hour. This value is predominantly the driver's total cost to the employer.

Vehicle Operating Cost Savings

The costs of operating motor vehicles can be a significant portion of the total cost of transportation. Vehicle operating costs include a number of components, some of which are variable costs or use related costs, while others are fixed costs (e.g. insurance and license fees). Only use related costs -- engine oil, gasoline, maintenance, and tires -- are directly affected by an improved highway. Vehicle operating costs, like travel time, vary with the characteristics of the trip made including trip length, running speeds, and speed change cycles.

Using results of the travel demand model, vehicle operating costs with and without Corridor 18 were calculated for each trip. Again, the methodology and data of the HPMS model was used. With this methodology, vehicle operating costs vary with the length of the trip, the various speeds on different portions of the trip, and the type of vehicle. Excess vehicle operating costs due to speed change cycles also were calculated by type of vehicle.

Accident Reduction Cost Savings

Improvements in highway safety are another reason for considering a new Interstate-type highway. Because Interstate highways are safer than roadways of a lesser standard, Corridor 18 could reduce accident potentials compared to the existing highway system. National average accident rates by type of accident (fatal, injury, property damage only) and by type of highway facility were used to calculate accident potentials in the corridor with and without a new Corridor 18 facility.

During the analysis period, it is estimated that Corridor 18, as currently defined, would produce the following safety benefits:

- 3,100 lives saved
- 158,000 injuries avoided
- 409,000 property damage accidents avoided

To include the impact of reducing accidents in the transportation efficiency evaluation, a monetary value was estimated for each type of accident. The values used in the Corridor 18 Feasibility Study also were used in these analyses; i.e.:

- $2,904,000 per fatality
- $58,000 per injury accident
- $5,000 per property damage accident.

Total Transportation Efficiency Benefits

Total estimated transportation efficiency benefits over the analysis period, discounted at seven percent, are presented in Exhibit 2-2:

Exhibit 2-2
TOTAL EFFICIENCY BENEFITS

BENEFITS OVER 31 YEAR ANALYSIS PERIOD(a) ($ millions)	
Travel Time Savings	$3,861.8
Vehicle Operating Cost Savings	$1,824.5
Accident Savings	$5,287.4
TOTAL EFFICIENCY BENEFITS	$10,973.8

(a) 1999-2029 economic benefits discounted at 7%

It is estimated that by the end of 31 years from the beginning of construction, Corridor 18 will have saved users approximately $11 billion.

ECONOMIC FEASIBILITY

To calculate the economic feasibility of Corridor 18 in terms of transportation efficiency, all costs and benefits in constant (1995) dollars were determined from 1999 to 2029, and then discounted back to 1999 using a discount rate of 7 percent. The benefits were then compared with the costs using the conventional feasibility indicators. Exhibit 2-3 presents the economic feasibility indicators for Corridor 18.

Exhibit 2-3
CORRIDOR 18
ECONOMIC FEASIBILITY INDICATORS
Travel Efficiency Feasibility

FEASIBILITY INDICATOR	
Net Present Value(a)	$3,972.9 (millions)
Internal Rate of Return	10.7%
Discounted Benefit/Cost Ratio(a)	1.57
(a) Discounted at 7 percent per year	

Exhibit 2-3 suggests that Corridor 18 is economically feasible. Corridor 18 has a benefit/cost ratio of 1.57, indicating that $1.57 in transportation efficiency benefits would be derived for each $1.00 invested. Corridor 18 also has a very large Net Present Value, revealing that the National economic productivity will be increased by nearly $4 billion. The Internal Rate of Return of nearly 11 percent exceeds the recommended minimum value of 7 percent, thus indicating a feasible project.

It is considered that this is a very conservative estimate of economic feasibility, as previously noted.

Comparison with the Corridor 18 Feasibility Study

These results are higher ("more feasible") than those in the original Corridor 18 Feasibility study. The Feasibility Study reported an Internal Rate of Return of 9.9 percent, a Net Present Value of $2.2 billion, and a discounted Benefit/Cost Ratio of 1.39. The differences are due to a variety of reasons including:

- The new Corridor 18 is about 40 percent longer than the original Corridor 18. The additional portion corresponds to parts of facilities included in the Corridor 20 Feasibility Study. Economic efficiency results for Corridor 20 were higher than Corridor 18 in terms of Internal Rate of Return (12.4 percent) and Benefit/Cost Ratio (1.72). So, one would expect higher results for the redefined Corridor 18 than for the facility evaluated in the Corridor 18 Feasibility Study.

- Population and employment forecasts for the redefined Corridor 18 are higher than in the Feasibility Study. This translates into more overall travel in this study than in the

previous one. So, benefits increase because there are more users to benefit from Corridor 18 and more congestion relief (the higher volumes generate more congestion on the road network if Corridor 18 is not built).

- This Special Issues Study used a new methodology to calculate time savings and operating costs savings. This methodology (based on the FHWA HPMS model) analyzes the impact of congestion in more detail than the one used in the original Corridor 18 Feasibility Study. As a result, benefits due to congestion relief in the corridor are probably better accounted for in this study.

- This study used a higher speed limit for the Interstate-type Corridor 18 than was used in the Feasibility Study. As a result, travel time savings are higher. While vehicle operating costs also increase (vehicle operating costs increase as speed increases in the 55 to 70 MPH range), they did not increase as much as travel time savings.

Exclusion of Economic Development Impacts

Included in the above economic feasibility calculations are all quantifiable direct economic costs attributable to the highway project (cost of planning, designing, building, mitigating environmental impacts, maintaining and operating the highway) and all quantifiable economic benefits relating to efficiency (operating costs savings, value of time savings, accident cost savings). Excluded from the economic cost-benefit calculations are the corridor economic development impacts (e.g. jobs created, value added and wages) as well as those implications that cannot reasonably be tabulated in monetary terms (e.g. environmental or social implications, impacts on other modes of transportation, etc.). While the economic feasibility calculation is important to the Corridor 18 investment decision, it should not be viewed as the only criterion.

SENSITIVITY TESTS

The feasibility results are based on a number of calculations, estimates, and assumptions. Sensitivity tests were conducted to determine the extent to which study findings might be dependent on these approximations. These sensitivity tests were as follows:

- 25 percent reduction in capital costs,
- 25 percent increase in capital costs,
- Determination of that capital cost at which the

investment is economically feasible (B/C=1),
- Use of 4 percent discount rate,
- Use of 10 percent discount rate,
- 25 percent increase in benefits,
- 25 percent decrease in benefits.

Overall, varying the assumptions and estimates, as shown above, did not change the conclusion that Corridor 18 is economically feasible. Results of the sensitivity tests are summarized in Exhibit 2-4.

Exhibit 2-4
TRAVEL EFFICIENCY SENSITIVITY TESTS

SENSITIVITY TEST	B/C RATIO	NPV ($ million)	IRR (percent)
Study Results	1.57	$3,973	10.7
25% Less Capital Cost	2.04	$5,591	13.3
25% More Capital Cost	1.27	$2,355	8.9
Capital Cost for a B/C Ratio=1	+62%	--	--
4% Discount Rate	2.46	$10,249	10.7
10% Discount Rate	1.08	$534	10.7
25% More Benefits	1.96	$6,716	12.8
25% Less Benefits	1.18	$1,229	8.2

These sensitivity tests clearly show that even if actual costs and benefits are different from the values estimated in this study, the project still would be feasible over a wide range of circumstances. For example, even if costs are 62 percent higher than study estimates, the project still would produce $1.00 in benefits for every $1.00 spent on it.

ECONOMIC FEASIBILITY CONCLUSIONS

This chapter analyzed the Interstate-type Corridor 18 from an economic feasibility perspective to determine whether or not it represents a good, reasonable project. The analyses conclude the following:

1. An Interstate-type highway built in the Corridor 18 area from Indianapolis to the Lower Rio Grande Valley is an economically feasible project.

2. An investment of tax dollars in the corridor is a reasonable use of tax dollars.

3. Corridor 18 is sufficiently viable that the sensitivity tests found that the project is feasible under a range of scenarios.

4. This feasibility conclusion applies to the Corridor 18 in the location which was analyzed. Other alternative routings may be more feasible or less feasible.

5. Conservative evaluation principles were used in these analyses.

Chapter 3
TRAFFIC IMPACTS OF CORRIDOR 18 ON I-35

In addition to redefining Corridor 18, the National Highway System Designation Act of 1995 declared I-35 from Laredo, Texas to Duluth, Minnesota to be a High Priority Corridor also. As a centrally-located north-south freeway, linking the three NAFTA partners (Canada, Mexico and the United States), proposals are being considered to upgrade the capacity, safety and transportation technology of I-35.

Because both Corridor 18 and I-35 are High Priority Corridors, it was appropriate that the Special Issues Study determine the possible effects Corridor 18 would have on traffic using I-35. This chapter reports the results of those analyses.

THE I-35 CORRIDOR

I-35 is an existing Interstate Highway stretching from Laredo, Texas to Duluth, Minnesota. This Interstate corridor passes through six states, namely, Texas, Oklahoma, Kansas, Missouri, Iowa, and Minnesota.

I-35 Urban Areas

The I-35 Corridor passes through a number of urban areas between Laredo, TX and Duluth, MN. The most populous of these are:

- San Antonio, Texas;
- Dallas and Ft. Worth, Texas;
- Oklahoma City, Oklahoma;
- Wichita, Kansas;
- Kansas City, Kansas/Missouri;
- Des Moines, Iowa; and
- Minneapolis and St. Paul, Minnesota.

FUTURE TRAVEL VOLUMES

The travel demand model developed for the Corridor 18 Feasibility Study was expanded and recalibrated as part of the Special Issues Study. The principal reason for the expansion of the model was to encompass the area through which I-35 passes. The current model now encompasses all or part of 20 states.

The travel demand model was applied to two future year highway networks for purposes of these analyses. The Existing + Committed (E+C) Network consists of existing facilities plus any new major highways for which a reasonable degree of

funding commitment exists on the part of state transportation agencies.

The second future year network consisted of the E+C Network plus Corridor 18. By comparing results from the two traffic assignments it was possible to determine the effect that Corridor 18 would have in diverting traffic from I-35.

CORRIDOR 18 IMPACTS

Comparisons of forecast 2020 traffic volumes on I-35 both with and without Corridor 18 are tabulated in Exhibit 3-1. They are also depicted in Exhibit 3-2.

Exhibit 3-1
I-35 AND CORRIDOR 18 PROJECTED VOLUMES

	Distance (1)		Future Year (2020) Traffic Projections (ADT)			
			On I-35		On Corridor 18	
Cut Line	Kms	Miles	E+C Network	Corridor 18 Network	E+C Network	Corridor 18 Network
A	N/A	N/A	19,500	19,500	N/A	N/A
B	N/A	N/A	26,300	26,300	N/A	N/A
C	676	420	22,200	22,200	42,200 (2)	42,300 (2)
D	556	345	17,300	17,300	17,400	26,300
E	600	372	43,100	43,100	7,000	21,300
F	228	142	64,000	63,700	39,200	45,900
G	192	119	15,200	12,600	15,100	16,900

(1) Approximate straight line distance along the cut line between I-35 and Corridor 18.
(2) On I-69, north of Indianapolis, Indiana.

North of Dallas, Texas projected traffic volumes along I-35 are essentially the same whether or not Corridor 18 is implemented. North of Dallas, I-35 and Corridor 18 are typically between 550 and 680 kms (340 and 420 miles) apart.

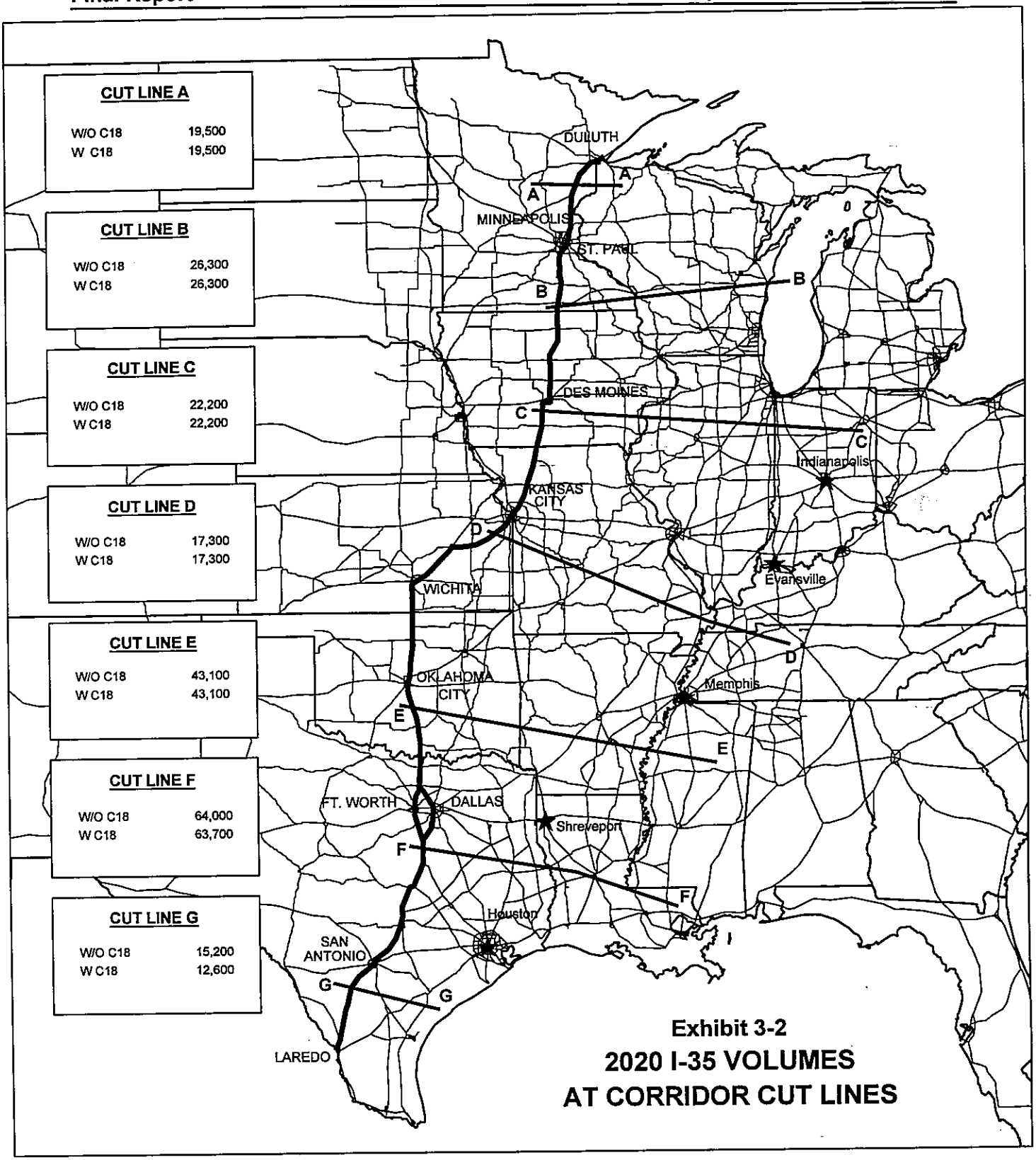


Exhibit 3-2
2020 I-35 VOLUMES AT CORRIDOR CUT LINES

Between Dallas and Austin, Texas projected traffic volumes on I-35 are very slightly lower in the Corridor 18 network. The change in I-35 ADT is projected to be less than one percent. In this area, I-35 and Corridor 18 are approximately 230 kms (140 miles) apart.

South of San Antonio, I-35 daily traffic in 2020 is projected to be 15,200 without Corridor 18 and 12,600 with Corridor 18. In this area the two corridors are approximately 190 kms (120 miles) apart. The reduction in I-35 traffic results from movements between the area of Starr, Zapata and Webb counties (including the City of Laredo) and the Houston area using US 59 to Victoria and then Corridor 18, rather than I-35 to San Antonio, then I-10 to Houston.

Implementation of Corridor 18 would reduce total vehicle-kilometers of travel on I-35 by approximately 1.1 percent. Almost all of this reduction would occur along the segment between Laredo and San Antonio, Texas.

Chapter 4
MAJOR RIVER CROSSINGS

Corridor 18 is about 2300 km (1430 miles) in length from Indianapolis to the Lower Rio Grande Valley as a single, continuous facility. It crosses two major rivers, the Ohio and the Mississippi.

Locational issues concerning these two crossings are discussed below. A principal objective of the Corridor 18 Special Issues Study was to address certain of these issues so as to facilitate future location and environmental studies. This includes identification of preferred locations at a broad level of analysis as a forerunner of more detailed studies that will focus upon the selection of specific locations. These analyses identified the preferred general location of the two major river crossings, as noted in the subsequent discussions.

OHIO RIVER

Evansville, Indiana, is one of the urban areas named in the Congressional designation of Corridor 18. Evansville is located on the Ohio River, across from Henderson, Kentucky.

Between Indianapolis and Evansville, the Representative Corridor includes S.R. 37 (Indianapolis to Bloomington) and the Southwest Indiana Highway Corridor (Bloomington to the I-64/ I-164 interchange). It then follows I-164 around the east and south of the Evansville urban area to a crossing of the Ohio River.

Selection of a crossing location in the Evansville area must be made within the context of the overall urban area transportation plan. This matter is addressed more fully in Chapter 6 of this report. Basically, the issues may be summarized as follows:

- Potential upgrading of the twin bridges carrying US 41 across the Ohio River.
  - Including needs for other improvements to US 41 in Kentucky.
- Potential new bridge on the east side of Evansville, connecting to I-164 on the north and a bypass around Henderson, Kentucky on the south.

- Proposals, mainly by interests in Mt. Vernon, for a new bridge on the west side of Evansville.

A bridge across the Ohio River at this location would be largely located in the Commonwealth of Kentucky because the state line generally is near the north side of the river. Indeed, the existing U.S. 41 structures are wholly located within Kentucky.

MISSISSIPPI RIVER

The crossing of the Mississippi River has been viewed throughout the Corridor 18 studies as a major factor in determination of a route location. Because of the environmentally sensitive nature of the Mississippi River floodplain, sites with an existing bridge or a new location where significant progress has been made on location and environmental clearances were targeted as potential Corridor 18 alignments.

The Representative Corridor crosses the Mississippi River south of Memphis, Tennessee, generally between Helena, Arkansas, and a point near the Bolivar/Washington County lines north of Greenville, Mississippi. Through northwest Mississippi, the Corridor basically follows U.S. 61. Within this Representative Corridor, two sites with either an existing or proposed bridge across the Mississippi River were identified. These are the existing U.S. 49 crossing at Helena, Arkansas, and alternatives near Rosedale, Mississippi, including the proposed Great River Bridge.

Helena, Arkansas/ Tunica, Mississippi Crossing

There are a number of options for crossing the Mississippi River in the vicinity of Helena, Arkansas. For purposes of the Special Issues Study, this crossing was considered to be a general corridor extending about 10 miles on either side of the existing bridge.

The U.S. 49 crossing at Helena, Arkansas, is an existing 2-lane bridge and is inadequate to serve as a Corridor 18 facility. Therefore, a new four-lane bridge would need to be constructed in this vicinity. There are no current plans for improvement or supplement to the existing U.S. 49 bridge.

A crossing in the vicinity of Helena, Arkansas, and Tunica, Mississippi, (improvement of the existing bridge or a new bridge) has the smallest potential impact on wetlands associated with the Mississippi River floodplain. However, an alignment in this area would need to address the potential impacts upon

urban development at Helena, as well as the St. Francis National Forest (north of Helena in Arkansas), the White River National Wildlife Refuge, and the Bayou Meto Wildlife Management Area (east of Pine Bluff) without introducing out-of-direction travel which could result in reductions in travel benefits.

The White River National Wildlife Refuge is an extensive area, reportedly being one of the largest refuges in the United States and having expansive swamp and wetland areas as well as Indian mounds and historic sites. It is about 80 km (50 miles) long by up to 15 km (10 miles) wide, stretching from Clarendon, Arkansas, to its southern tip, which is about on the same latitude as Shelby, Mississippi, and a few miles north of Rosedale, Mississippi. Utilizing a crossing of the Mississippi River near Helena may only be feasible by making use of an existing highway through the area such as Arkansas Route 1.

The St. Francis National Forest is located immediately north of Helena. Growth in Helena has occurred in the northern and western parts of the city and this growth and the existence of the National Forest hinder locating an alignment for Corridor 18 north of Helena.

Another constraint for this general crossing location is the Bayou Meto Wildlife Management Area which is situated east of Pine Bluff. A corridor connecting to a river crossing in the vicinity of Helena would have to stay south of this Wildlife Management Area.

Rosedale, Mississippi/ Dumas, Arkansas Crossing

There are several options for a crossing of the Mississippi River in the vicinity of Rosedale. For purposes of these analyses, the Rosedale crossing was considered to include the Great River Bridge proposal near Rosedale as well as those options within an area about 10 miles on either side of the locations currently being considered for the Great River Bridge. Any future environmental analyses possibly could consider crossings in the vicinity of Rosedale other than the Great River Bridge proposal.

The Great River Bridge crossing at Rosedale, Mississippi, is a proposed highway or combination highway and railroad bridge in the vicinity of the confluence of the Mississippi, Arkansas, and White Rivers. The location and environmental study, which is to result in an Environmental Impact Statement (EIS) and Record of Decision, is currently underway on several

alternative alignments which cross the Mississippi River, as well as Big Island and the Arkansas River. A preferred alternative was not identified in the Draft EIS, which was circulated to agencies and the public in October 1996, or at a location public hearing held in December 1996. One of the alternatives follows a southern alignment which has an orientation more favorable to a potential Corridor 18 alignment.

This crossing alignment has a greater potential for impact on Mississippi River floodplain wetlands than the Helena crossing, but the anticipated use of structures throughout the length of the Great River Bridge project significantly lowers the anticipated wetlands impact. In the case of Big Island, the structure would be in the air and only the footings would actually touch the island itself.

This alignment has the additional advantage of avoiding most of the national forests, preserves, and refuges in eastern Arkansas.

Summary

A Corridor 18 alignment from Memphis to Shreveport that includes a crossing in the general vicinity of Rosedale would be of a similar length and cost as one using a crossing in the general vicinity of Helena. This alignment for Corridor 18 would avoid the White River National Wildlife Refuge which is a major obstacle to an alignment using a crossing in the vicinity of Helena. It would serve existing and emerging economic development in the Mississippi Delta. It would provide a new river crossing in a section of the Mississippi River which currently does not have a crossing for a stretch of 140 kilometers (90 miles). It would serve slack water harbors on both sides of the River. A Rosedale crossing would also permit Corridor 18 to utilize a section of existing freeway on U.S. 61 around Clarksdale, Mississippi, thus providing some cost savings. In addition, environmental studies and public hearings have been completed for the Great River Bridge being studied as a potential Rosedale crossing. For these reasons a Mississippi River crossing in the general vicinity of Rosedale, Mississippi/ Dumas, Arkansas, taking advantage of work already done on the Great River Bridge project, is preferable to a crossing in the general vicinity of Helena, Arkansas/Tunica, Mississippi.

Memphis to Shreveport Alternatives

Crossing Location	Length km (miles)	Cost ($M)	Must Cross Wetlands (number of areas)	Likely to Cross Wetlands (number of areas)	Environ. Concerns (number of areas)
Rosedale	480 (300)	$2,281	6	9	1*
Helena	440 (275)	$2,311	11	14	2**

* Oil and Gas Fields near El Dorado, Arkansas

** Oil and Gas Fields near El Dorado, Arkansas and Crossing of White River National Wildlife Refuge

NOTE: Both routes have river crossings of Mississippi, Arkansas, and Saline Rivers. The Helena crossing also has a crossing of the White River.

Alternative Greenville Crossing

A third alternative for crossing the Mississippi River has been suggested at various points throughout the study. An upgraded U.S. 82 crossing of the Mississippi River near Greenville, Mississippi is currently being designed. Proposals have been made to incorporate this improved crossing or one farther north with Corridor 18.

The Corridor 18 Representative Corridor currently reaches to the vicinity of the Bolivar/Washington county line in Mississippi. Extending the Representative Corridor south to include the new U.S. 82 bridge initially was considered in the Feasibility Study. However, it was not included in the Representative Corridor because of the negative impacts on travel efficiencies, economic feasibility, and overall project viability. After further consideration in the Special Issues Study no convincing or compelling reason was found to extend the Representative Corridor further south. The Representative Corridor, as defined, continues to be the most feasible alternative identified by these studies.

Chapter 5
STATE LINE AND INTERNATIONAL BORDER CROSSINGS

The two major river crossings discussed in Chapter 4 involve crossings from one state into another state. For purposes of completeness, these two crossings are included in the discussion which follows for all crossings of state lines.

To provide an even more complete perspective, the following discussion also addresses the existing section of I-69 north of Indianapolis plus international crossings into Canada and Mexico.

CANADIAN BORDER CROSSING

The Michigan Department of Transportation (MDOT) has proposed that existing I-69 be included in the official definition of Corridor 18. This proposal has been supported by the state transportation agencies of the Corridor 18 states. Additionally, Michigan has been an active participant on the Corridor 18 Steering Committee. Therefore, it is appropriate that the Special Issues Study consider the issues and opportunities associated with I-69, particularly since I-69 provides the continuity for an international trade route extending from Canada to Mexico.

MDOT has noted that, within Michigan, I-69 has pavement conditions currently rated as poor. The Department notes that upgrading and maintenance on I-69 will be required to reach the high level of service that Corridor 18 hopes to attain. Localized rehabilitation and construction needs also have been identified by MDOT.

I-69 connects to the Canadian road network via the Blue Water Bridge at Port Huron. Dedication of a second span in July 1997 is the result of a joint venture between MDOT and the Blue Water Bridge Authority of Canada. Upgrading of the original bridge will be undertaken afterwards.

The Blue Water Bridge is a toll facility. Toll rates are set jointly by the Canadian Government and the State of Michigan.

I-94 IN DETROIT

MDOT's proposal for redefinition of Corridor 18 includes I-94 from Marshall, Michigan to Detroit, Michigan. Via surface streets, I-94 provides a connection to both the Ambassador Bridge and Windsor Tunnel in Detroit which extend across the

Detroit River into Canada. Hazardous materials are prohibited on the Ambassador Bridge. This traffic tends to divert to the Blue Water Bridge at Port Huron.

Detroit has been designated as one of the sites to be used for the North American Trade Automation Prototype. This project involves expedited border processing procedures which would be an advantage to trucks using the Ambassador Bridge.

The Windsor Tunnel is a toll facility located just north of the Ambassador Bridge. It has height limitations which restrict the vehicles which can use it. A need exists for structural and technical improvements to the Windsor Tunnel.

MICHIGAN/INDIANA CROSSING

I-69 extends from Port Huron, Michigan to Indianapolis, Indiana. Entry into Indiana is in the far northeast corner of the State.

The Representative Corridor begins at the interchange between S.R. 37 and I-465 on the southwest side of Indianapolis and follows S.R. 37 to the southwest side of Bloomington. Upgrading of S.R. 37 is required.

The Representative Corridor then follows the Southwest Indiana Highway Corridor to the I-64/I-164 interchange northeast of Evansville. This is a new four-lane freeway which is being planned by Indiana DOT.

INDIANA/KENTUCKY CROSSING

The crossing of the Ohio River is anticipated to occur in the Evansville, Indiana urban area. This aspect was discussed in Chapter 4: Major River Crossings and, for purposes of completeness, also is addressed in Chapter 6: Connections to Urban Areas.

The Representative Corridor in Kentucky has been assumed to:

- Follow the Pennyrile Parkway from Henderson to the interchange with the Western Kentucky Parkway;
- Follow the Western Kentucky Parkway to the interchange with I-24;
- Follow I-24 to the interchange with the Purchase Parkway; and

- Follow the Purchase Parkway to the Tennessee state line.

Alternative Location

In the Corridor 18 Feasibility Study, a location was considered that would involve a new Interstate-type highway from the Henderson area to the vicinity of the I-24/Purchase Parkway interchange west of Eddyville. This concept (modified to connect to the Purchase Parkway near the I-24 interchange) currently is receiving renewed attention, partially as a means of fostering economic development in the area through which it would pass. It would reduce the travel distance for through traffic by its more direct routing. However, it also would involve higher development costs.

While this concept was considered in the analysis of preliminary locations for the Representative Corridor, it was not contained within the Representative Corridor analyzed in the Corridor 18 Feasibility Study or the Special Issues Study.

KENTUCKY/TENNESSEE CROSSING

Near the Kentucky/Tennessee state line, the Purchase Parkway connects to U.S. 51. The Representative Corridor follows U.S. 51 along the east side of the Mississippi River, from the Kentucky/Tennessee state line to the vicinity of Memphis. The section between the state line and Dyersburg includes two existing freeway sections, separated by a stretch around Union City and southward that would need to be upgraded to freeway standards.

From Dyersburg to Memphis, existing U.S. 51 is a four-lane divided at-grade facility. Further investigations are required to determine whether it would be best to upgrade the existing facility or build a new freeway paralleling U.S. 51.

TENNESSEE/MISSISSIPPI CROSSING

Memphis is one of the urban areas specifically named in the Congressional definition of Corridor 18. Different concepts have been advanced for passage of Corridor 18 through the Memphis urban area, a matter discussed further in Chapter 6 of this report.

Determination of a location for Corridor 18 within the Memphis urban area will also determine the location of a crossing into Mississippi. This determination must await further study.

South of Memphis, the Representative Corridor follows U.S. 61, generally paralleling the Mississippi River. The dramatic growth in casino development in northwestern Mississippi has spurred upgrading of the northern portions of U.S. 61 to a four-lane divided at-grade cross section. Incorporation of this portion of U.S. 61 into Corridor 18 would require consideration of the merits of further upgrading to freeway status versus construction of a new freeway paralleling U.S. 61.

As noted in Chapter 4: Major River Crossing , a crossing of the Mississippi River in the general vicinity of Rosedale, Mississippi would have more positive attributes than would an improved or new crossing in the general vicinity of Helena, Arkansas. Selection of this location would permit Corridor 18 to utilize the short section of U.S. 61 already built to freeway standards and passing around the eastern portion of Clarksdale, Mississippi. Between Clarksdale and the Mississippi River, a new freeway appears more logical than upgrading the existing two-lane section of U.S. 61.

MISSISSIPPI/ARKANSAS CROSSING

The Mississippi/Arkansas state line crossing corresponds with the crossing of the Mississippi River by the Corridor 18 as discussed in Chapter 4: Major River Crossings. Investigations suggest the preferred location for a crossing would be in the general vicinity of Rosedale, Mississippi.

This crossing permits definition of a relatively narrow corridor location for Corridor 18 from Memphis to Shreveport/Bossier City. Proceeding southerly from Memphis, the corridor would generally follow U.S. 61 to the vicinity of Rosedale.

Proceeding west-southwesterly from the Mississippi River crossing in the general vicinity of Rosedale, a suggested route would pass south of Winchester, Arkansas, and proceed toward Monticello, generally paralleling Arkansas Highway 4. From Monticello, the corridor would continue west-southwesterly skirting south of Warren generally along Highway 4, proceeding to a crossing of the Ouachita River north of El Dorado. From El Dorado, the corridor then continues southwesterly to the Arkansas/Louisiana state line basically along Highway 15. This corridor avoids the Felsenthal National Wildlife Refuge, east of El Dorado, and other environmental constraints in southern Arkansas.

ARKANSAS/LOUISIANA CROSSING

The Representative Corridor extends from the preferred Mississippi River crossing in the vicinity of Rosedale to the vicinity of El Dorado. A suggested 10-mile wide corridor connecting to the preferred crossing of the Mississippi River would extend from the vicinity of El Dorado, Arkansas, to Haynesville, Louisiana. In northern Louisiana, the corridor would extend from Haynesville to Shreveport/Bossier City, proceeding in a southwesterly direction and traversing between the Lake Claiborne/Kisatchie National Forest area and the Bayou Bodcau Reservoir. The corridor would connect with the preferred route around Shreveport in the vicinity of the I-20/Louisiana Route 157 interchange.

A Corridor 18 location around the east and south sides of the Shreveport/Bossier City urbanized area was established through a 1992 study, *"Interstate 69 and Inner Loop Extension,"* and is discussed in more detail in Chapter 6: Connections to Urban Areas.

LOUISIANA/TEXAS CROSSING

The Representative Corridor crossing of the state line between Texas and Louisiana spans an area from U.S. 79 to U.S. 84, a distance of about 51 kilometers (32 miles). The potential locations include:

- U.S. 79, upgraded to Interstate standards
- U.S. 84, upgraded to Interstate standards
- A new Interstate-type facility located somewhere between these two existing highways.

The location of Corridor 18 in the Shreveport/Bossier City area is a significant factor that affects the selection of a Louisiana/ Texas crossing. As noted elsewhere, a recommended location in this area has been identified in a 1992 study. It includes a section on the south side of the urban area, passing close to the Caddo-Bossier Port, and interchanging with I-49 and U.S. 171.

U.S. 79 Alternative

Regarding the U.S. 79 alternative for a Louisiana/Texas state line crossing, the preferred alignment around the south of the Shreveport/Bossier City urban area suggests a westward extension on new location to tie into U.S. 79, perhaps on the Texas side of the Louisiana/Texas state line.

Southwest of this location, U.S. 79 would have to be upgraded to Interstate standards all the way to Carthage, Texas where it connects to U.S. 59.

U.S. 84 Alternative

Use of the existing U.S. 84 state line crossing for Corridor 18 would require a north-south connection from the Shreveport/Bossier City location to U.S. 84. Part of this connection potentially could use a section of U.S. 171, and then proceed along S.R. 5 to U.S. 84 at Logansport, Louisiana.

From Logansport, located on the northern portion of the Toledo Bend Reservoir, this alternative would cross into Texas and connect to U.S. 59 at the City of Tenaha, Texas, located approximately 24 kilometers (15 miles) west of the state line.

New Facility Alternatives

There are two principal alternatives for a completely new facility between Shreveport/Bossier City and a connection with U.S. 59 in Texas. Both would proceed from the recommended Corridor 18 alignment in the Shreveport/Bossier City area and its interchange with U.S. 171 and would connect to U.S. 59 at either:

- Carthage, Texas (6,800 population); or
- Tenaha, Texas (1,200 population).

The state line crossings for these alternatives are within about eight kilometers (five miles) of each other, in the mid-section between the U.S. 79 and U.S. 84 crossings.

Both alternatives involve a crossing of the Sabine River in Texas. The Tenaha alternative, because of its more southerly location, could impinge upon upper portions of the Toledo Bend Reservoir along the Sabine River. There is a wildlife refuge on the upper end of the Reservoir and there likely are wetland constraints close to it.

The Carthage alternative would involve somewhat less length of new facility than would the Tenaha alternative. However, because of the "dog-leg" in U.S. 59 (between Carthage, Tenaha and Nacogdoches), the travel distance for through traffic on Corridor 18 would be somewhat less with the Teneha alternative.

Another possibility for a new location facility would be to cross the U.S. 59 "dog-leg" between Carthage and Tenaha and connect to it again somewhere west of Tenaha, enroute to Nacogdoches. This alternative would have higher construction costs because of the greater length of new location facility. It is felt that further consideration of this possibility should take into account the plans for upgrading all of U.S. 59 from Texarkana to Laredo as part of the Corridor 20 project.

Summary

Compared to the New Facility Alternatives, both the U.S. 79 and the U.S. 84 alternatives involve adverse travel distance for Corridor 18 traffic. They also involve higher construction costs. Therefore, one of the New Facility Alternatives is preferable. Because of the environmentally sensitive areas associated with the Tenaha alternative, a new location facility connecting to U.S. 59 at or near Carthage appears preferable. The Carthage option also is the least costly of the four options.

STATELINE CROSSING LOCATION	LENGTH km (miles)	COST ($ M)	ENVIRONMENTAL CONCERNS (number of areas)
US 79 Alternative	49.9 (31.0)	$111.6	2*
US 84 Alternative	107.8 (67.0)	$241.2	2**
New Facility Alternative (to Carthage, TX)	47.6 (29.6)	$106.6	2*
New Facility Alternative (to Tenaha, TX)	57.9 (36.0)	$151.2	2**

* Oil and gas fields near Carthage, Texas, and potentially impacted wetlands.
** Crossing of Toledo Bend Reservoir and potentially impacted wetlands.

U.S. 59 and Lower Rio Grande Valley Portion of Corridor 18

From the connection to U.S. 59, the Representative Corridor in Texas would follow the existing route to Houston, then to connections with U.S. 77 and U.S. 281. From U.S. 59 to the Lower Rio Grande Valley, the Representative Corridor includes both U.S. 77 and U.S. 281, and a new connector route in the vicinity of Sarita and Rachal. The Representative Corridor is consistent with the policy position of the Texas Transportation Commission as adopted at its August 29, 1996 meeting. By

minute order, the Commission adopted Alternative 7 of the Corridor 20 Feasibility Study which encompasses these three routes in the section from U.S. 59 to the Lower Rio Grande Valley.

MEXICAN BORDER CROSSING

The Representative Corridor encompasses both the U.S. 77 and the U.S. 281 connections to the Mexican road network at the international border. Upgrading of these border crossings is receiving continuing attention by the Texas DOT and other agencies.

U.S. Highway 77

U.S. 77 is a north-south principal highway, which connects the Cities of Dallas, Waco, Victoria, Harlingen, Brownsville, and several other small to medium-size Cities in Texas. U.S. 77 is a divided four-lane highway between the Cities of Brownsville and Victoria, where it intersects U.S. Highway 59.

Existing Border Crossings - The Free Trade Bridge at Los Indios is located 16 kilometers (10 miles) east of the cities of Harlingen and San Benito, and 29 kilometers (18 miles) west of the City of Brownsville. Direct access between the U.S. 77/83 Expressway and the crossing is provided by Loop 509. The Los Indios Bridge is predicted to serve increasing portions of international truck traffic between the Lower Valley and Mexico.

The Gateway International Toll Bridge in the City of Brownsville currently carries about 70 percent of the Brownsville-Matamoros traffic. The immediate access and egress for the Gateway Bridge consists of International Boulevard and Washington Street. As the primary border crossing in the area, there is significant congestion within the Central Business District of Brownsville, Texas and Matamoros, Tamaulipas, which are located immediately adjacent to the crossing.

In May 1997, legislation was adopted that would create a special overweight transportation zone running from the Gateway International Bridge to the Port of Brownsville. This is intended as a temporary measure to ease constraints on bilateral trade. The concept is to become effective September 1, 1997 and to be in effect for 3 1/2 years. It is hoped that by then a new Port of Brownsville Bridge will be completed. This bridge would permit overweight vehicles to cross the Mexican border and proceed directly to the Port of Brownsville.

A second binational entry between Brownsville, Texas and Matamoros, Tamaulipas is the B&M Bridge, located south and west of the Gateway Bridge. The B&M Bridge is two lanes with a single railroad track over the structure. A parallel bridge was recently constructed which improved traffic capacity. On the U.S. side, the B&M Bridge direct access/egress is supplied by Mexico Street, which intersects Sam Pearl Boulevard and Palm Boulevard. Carrying the remaining 30 percent of the sector traffic, the B&M Bridge is not as well utilized as the Gateway Bridge due primarily to less convenient access to and from U.S. Highway 77.

Proposed New Crossings - Another international border crossing is in the advanced stages of planning and design and early stages of construction. The U.S. 77 Expressway will be extended to connect with the new Los Tomates International bridge. Final diplomatic notes for construction of the Los Tomates Bridge were exchanged in May 1997. The Expressway extension will provide traffic congestion relief to International Boulevard and the Central Business District of Brownsville, situated immediately adjacent to the Gateway International Bridge.

In addition to the new Los Tomates International Bridge, there are two proposed future bridge sites, including a Port of Brownsville Bridge and Flor De Mayo Bridge. The Brownsville Navigation District (BND) is seeking a Presidential Permit, submitted in 1991, to build an international bridge over the Rio Grande River to carry truck and rail traffic to and from the Republic of Mexico. There are reports that the permit is in the final stages of review by the U.S. State Department.

The Flor De Mayo bridge is shown as a proposed international bridge within the 1995-2015 Brownsville Metropolitan Transportation Plan. Although this bridge is included in the plan's 20-year horizon, all efforts are currently concentrated toward the completion of the Los Tomates Bridge. Consequently, development of the Flor De Mayo Bridge is not anticipated in the near future.

U.S. Highway 281

Similar to U.S. 77, U.S. 281 is a north-south principal highway which connects the Cities of Wichita Falls, San Antonio, Alice, McAllen, Edinburg, Pharr, and several other small to medium-size cities in Texas. U.S. 281 is a divided four-lane highway between McAllen and San Antonio, with some undi-

vided sections. U.S. 281 intersects U.S. 59 in the City of George West, Texas, which is located 8 kilometers (5 miles) west of Interstate 37.

Existing Border Crossings - The existing international border crossings in the Hidalgo County area include the Progreso-Nuevo Progreso or B&P bridge, Hidalgo-Reynosa Bridge, and the Pharr International Bridge. The Pharr International Bridge was completed in December 1994.

The Progreso-Nuevo Progreso or B&P bridge is a privately owned, two-lane toll facility connecting the towns of Progreso and Progreso Lakes on the U.S. side with Nuevo Progreso on the Mexican side. The bridge directly connects FM 1015 to U.S. 281, and is located south of Progreso. On the Mexican side, the bridge leads to MEX2, and from there to downtown Nuevo Progreso, Mexico.

The Hidalgo-Reynosa bridge system, operated by the United States and the City of McAllen, Texas, connects the urbanized area of Hidalgo County with the City of Reynosa, Mexico. The closest U.S. highways to the bridge are Spur 115, U.S 281/Spur 241, and U.S. 83. On the Mexican side, the primary connections to the bridge are MEX2, MEX97, and MEX40.

The Pharr-Reynosa bridge, owned by the City of Pharr, Texas and the Mexican Government, was opened in 1996. The bridge is located at the southern terminus of U.S. 83, which extends east to U.S. 77 at Harlingen and west to Laredo.

Proposed Border Crossings - Planned or proposed border crossings include the Donna Bridge, Anzalduas Bridge, and Mission Bridge.

The proposed Anzalduas Bridge is located approximately 5 kilometers (3 miles) west of the Hidalgo-Reynosa Bridge. This bridge was initially proposed in a joint agreement between the Cities of McAllen, Mission, and Hidalgo, Texas. As an alternative to the Anzalduas Bridge, the Cities of McAllen, Mission, and Hidalgo are considering another border crossing location.

The City of Donna, Texas proposed a four-lane bridge approximately 22 kilometers (14 miles) east of Hidalgo and 11 kilometers (7 miles) west of Progreso, which links FM 493 on the U.S. side with MEX2 on the Mexican side. The Department of State issued a Presidential Permit on August 22, 1979, but the Mexican Government has no plans for a bridge at this location.

The City of Mission received a Presidential Permit on December 20, 1978. There are no pending plans for the construction of this bridge, particularly if the Anzalduas proposed is approved. The Mexican Government does not support this bridge since it would require a new road to connect with MEX2.

Chapter 6
CONNECTIONS TO URBAN AREAS

The analyses undertaken in the Special Issues Study regarding locational issues for major urban areas were limited to the identification of connections to them. Analyses were not undertaken regarding routes through major urban areas. Such matters must be addressed within the context of each area's overall transportation planning process. This was not possible within the scope of the Special Issues Study.

Nevertheless, certain issues and opportunities within urban areas were identified in the course of the analyses performed in the Special Issues Study. The following discussions identify these to the extent that they were encountered.

DETROIT, MICHIGAN

As noted earlier, the Michigan Department of Transportation (MDOT) has proposed that Corridor 18 be redefined to include dual termini, viz:

- Port Huron, via I-69
- Detroit, via I-94

MDOT has identified I-94 in Detroit as the most congested corridor in the entire State. It was built early in the Interstate program and has conditions which are below current design standards. The I-94 Rehabilitation Project is studying needs which are expected to be in the range of $1 billion.

Currently, access from I-94 to the Ambassador Bridge which links Detroit with Windsor, Canada is via surface streets. A Major Investment Study (MIS) has been undertaken to determine the best location for improving access on the Detroit side of the bridge. A preferred alternative has been identified which has an estimated construction cost of $100 million.

INDIANAPOLIS, INDIANA

Indianapolis is designated as the northern terminus of Corridor 18 based upon existing Congressional definitions of this high priority corridor.

Currently the southern terminus of I-69 is an interchange with I-465 on the northeast side of Indianapolis. A southbound through trip on Corridor 18 logically would proceed around the eastern and southern portions of the I-465 beltway to connect

with S.R. 37 on the southwest side of Indianapolis. Segments of this portion of I-465 currently are experiencing congestion.

There appears to be three principal alternatives for routing Corridor 18/ I-69 traffic through the Indianapolis area. These are:

- Provision of an additional lane in each direction on I-465 plus associated interchange improvements from I-69 on the northeast, to S.R. 37 on the southwest.
  - — Estimated order of magnitude cost = $300 million.
  - — Possibly, more than one additional lane in each direction could be required.
- Provision of a new 4-lane Interstate-type facility from I-69/I-465 on the northeast to Downtown Indianapolis, connecting to I-65. Provision of an additional lane in each direction on I-65 from Downtown to I-465 on the south. Provision of an additional lane in each direction on I-465 to S.R. 37.
  - — Estimated order of magnitude cost = $333 million.
  - — This facility may need to be built as a 6-lane freeway.
- Provision of new Interstate-type facility as a partial outer loop around the east and south of the area, generally along S.R. 9 (eastern portion) and S.R. 44 (southern portion).
  - — Estimated order of magnitude cost = $1,200 million.

EVANSVILLE, INDIANA

Evansville is one of the urbanized areas designated in the Congressional definition of Corridor 18.

The Evansville Urban Transportation Study (EUTS is the MPO for the area) has examined the potential for the existing

twin bridges carrying US 41 across the Ohio River to meet future needs. In conducting its analysis, EUTS noted "... *if the proposed interstate directly linking Indianapolis with Evansville becomes a reality, it will continue southward and connect with the Kentucky Parkway system southwest of Henderson* [Kentucky]." It was concluded that if the existing bridges were widened to meet future demands, *"...significant improvements will likely be needed farther south on US Highway 41."* EUTS also considered a new bridge on the east side of Evansville, connecting to I-164 on the north and a by-pass around Henderson, Kentucky on the south. *"EUTS recommends that a comprehensive study be conducted to determine the best long term solution, considering the options available."* It is noted that a bridge across the Ohio River at this location would be largely located in the Commonwealth of Kentucky because the state line generally is near the north side of the river.

Interests in Mt. Vernon, located west of Evansville, have proposed a bridge on their side of Evansville.

The Metropolitan Evansville Chamber of Commerce has proposed bridges on both sides of the city to create a beltway around Evansville and Henderson, Kentucky.

MEMPHIS, TENNESSEE

Memphis is one of the urbanized areas designated in the Congressional definition of Corridor 18.

The Representative Corridor enters the Memphis area from the north on U.S. 51 and leaves the area on the south via U.S. 61 in Mississippi. There are two principal alternatives for Corridor 18 through the Memphis area, viz:

- Use of I-40/I-240 through mid-town, connecting to I-55 south of the Central Business District (CBD).
- Completion of a partially developed outer loop around the eastern side of the urban area and passing near the Shelby/Fayette county line.

There are three basic options for the transition of Corridor 18 from the Memphis area to the northwestern portion of Mississippi. These are:

- US 61 from its connection with the I-55 portion of Memphis' inner loop.

- I-55 south out of Memphis, connecting with S.R. 304 at Hernando, thence westward on S.R. 304 which is being upgraded to freeway standards, to connect with US 61.

- A continuation of the potential Memphis outer loop around the east and south of Memphis, possibly connecting to the S.R. 304 upgrading at its I-55 interchange.

The Mississippi DOT has expressed concern that, even with the current plans to expand I-55 to eight lanes, future traffic forecasts indicate high levels of congestion on this facility.

New Mississippi River Bridge

The Tennessee DOT feels that a east-west oriented spur on the north of Memphis is needed to connect Corridor 18 to I-55 in Arkansas. This would include a new bridge across the Mississippi River, designed to withstand seismic forces. This bridge would divert some traffic off the I-40 bridge.

At the August 23, 1996, Corridor 18 Public Meeting in Memphis, another concept for a new bridge was presented by the West Memphis MPO. This would be a combined highway and rail crossing meeting seismic requirements. The proposal is for an "intermodal connector route" to tie I-40 west of West Memphis to potential locations for Corridor 18 on the south of Memphis.

GREENVILLE, MISSISSIPPI

The Representative Corridor extends to the vicinity of the Bolivar/Washington county line.

While there has been much interest in extending the Representative Corridor further south to include Greenville, Mississippi, this has been considered to be detrimental to the overall viability and economic feasibility of the Corridor 18 project.

Assuming selection of a crossing of the Mississippi River for Corridor 18 in the general vicinity of Rosedale, Mississippi, there may be justification to develop a spur-type route to the Greenville urban area. Potentially this could tie into the U.S. 82 bridge across the Mississippi River. Currently there is a proposal to upgrade the U.S. 82 bridge.

If the U.S. 82 bridge is upgraded and a crossing in the general vicinity of Rosedale, Mississippi is selected for Corridor 18, this would provide two high quality bridges about 60 km (40 miles) apart. Currently, the closest Mississippi River bridge to the north of Greenville is at Helena, Arkansas, about 140 km (90 miles) away (straight line distance).

PINE BLUFF, ARKANSAS

The Representative Corridor passes to the south of Pine Bluff, Arkansas, which is served by U.S. 65, a northwest-to-southeast route, and U.S. 79, a northeast-to-southwest route. From a suggested 10-mile wide corridor extending from the preferred crossing of the Mississippi River in the general vicinity of Rosedale, U.S. 65 would be used as a connection to Pine Bluff, 60 to 70 km (40-45 miles) to the northwest.

Although a crossing of the Mississippi River in the vicinity of Helena would provide a significantly shorter connection to Pine Bluff, the environmental considerations associated with the White River National Wildlife Refuge, etc., make this Helena alignment less attractive than the Rosedale crossing.

MONROE, LOUISIANA

The Representative Corridor passes to the north of Monroe which is served by I-20, an east/west freeway.

There have been expressions of interest in a spur route from Corridor 18 to the Monroe urbanized area. There also are proposals to develop a new freeway from Monroe to Alexandria and thence to Lake Charles. Taken together, this would provide a north/south oriented freeway extending from Corridor 18 in southern Arkansas, across I-20, and connecting to I-10 in the Lake Charles area.

Only the section from Monroe to Alexandria is designated for funding in Louisiana's Freeway Expansion Program (designated as Highway Infrastructure Projects: Tiers 1,2 and 3).

SHREVEPORT/BOSSIER CITY, LOUISIANA

Shreveport is one of the named urbanized areas in the Congressional definition of Corridor 18.

The City of Shreveport sponsored a 1992 study entitled *"Interstate 69 and Inner Loop Extension: Compatibility Report."* The study produced a proposed location for a Corridor 18 facility which:

- Interchanges with I-20 on the east side of the urban area (near Haughton);
- Passes along the eastern edge of Barksdale Air Force Base;
- Crosses S.R. 1 just north of the Caddo-Bossier Port;
- Interchanges with I-49 south of the urban area; and
- Continues westerly to an interchange with U.S. 171.

The mayors of both Shreveport and Bossier City have given their support to this location and route configuration. Accordingly, it has been adopted for purposes of the Special Issues Study.

HOUSTON, TEXAS

Houston is one of the urban areas specifically designated by the Congressional description of Corridor 18.

The Representative Corridor includes US 59, which is a congested freeway extending through the Houston area on a northeast - southwest alignment. There are several alternatives for the Corridor 18 connections to and through the Houston area, including the following possibilities:

- Through routing along the existing US 59 corridor;
- Circumferential routing along Beltway 8 or the Grand Parkway around the east (or west) side of the Houston area;
- Connectors for goods movement to major truck traffic origins and destinations within the greater Houston area, including the Port of Houston, Houston Intercontinental Airport, Ellington Field, and major manufacturing centers; and ,
- Truckway facility with dedicated through lanes to accommodate truck traffic.

Under current conditions, US 59 is capacity constrained and has limited expansion capability. Increasing auto and truck traffic may require elevated through lanes constructed within the existing or widened right-of-way.

Circumferential routing of Corridor 18 around the Houston area to the east or west sides would require analysis of major traffic generators and intermodal facilities. On the west side, Beltway 8 is currently a six lane tollway which is designed to accommodate future expansion to add an additional travel lane in each direction. The eastern portion of Beltway 8 currently has frontage roads only with the tollway main lanes to be developed later.

Envisioned as an outer loop facility, the Grand Parkway is largely still under study and affords opportunity for considerable flexibility in its ultimate design and development. Environmental considerations will include impacts on residential areas, economic development, and overall growth patterns. Changes in air quality requirements will need to be monitored and assessed as they relate to travel corridor development.

CORPUS CHRISTI, TEXAS

The National Highway System Designation Act of 1995 amended the definition of Corridor 18 to include:

> *"...the Corpus Christi Northside Highway and Rail Corridor from the existing intersection of United States Route 77 and Interstate Route 37 to United States Route 181..."*

The Representative Corridor includes U.S. 77, which is 25 kilometers (15 miles) northwest of Corpus Christi. The designated segment of the Northside Highway and Rail Corridor extends along Interstate Highway 37 from its intersection with US 77 to the intersection with US 181 near downtown Corpus Christi. This route provides direct access to the intermodal facilities at the Port of Corpus Christi and, via S.H. 44, to Corpus Christi International Airport.

BROWNSVILLE/Mc ALLEN, TEXAS

The Representative Corridor includes U.S. 77, which enters the Lower Rio Grande Valley through the City of Harlingen and continues south to the City of Brownsville. The U.S. 77 Expressway traverses the City of Brownsville and terminates at State Highway 4/International Boulevard. As stated in the "Mexican Border Crossings" section of this report,

the existing border crossings include the Gateway International Bridge in downtown Brownsville, accessed from International Boulevard, and the B&M Bridge, accessed by Palm Boulevard and Mexico Street. The Los Tomates Bridge, a third binational crossing, is in the advanced stages of planning and design and early stages of construction and will be accessed by way of an extension of U.S. 77 to the Rio Grande River.

The National Highway System Designation Act of 1995 expanded the definition of Corridor 18 to include:

> *"...FM 511 from United States Route 77 to the Port of Brownsville..."*

FM 511 is located along the north and east sides of the City of Brownsville and provides a connection between U.S. 77 and the Port of Brownsville. The 1995-2015 Brownsville Metropolitan Transportation Plan identifies a proposed border crossing at the Port of Brownsville, consistent with the National Highway System Designation Act. FM 511 is a two-lane highway which serves primarily as an industrial roadway leading to the Port of Brownsville and is designated as a hazardous materials transportation corridor.

The Representative Corridor also includes U.S. 281, which parallels U.S. 77 through the Rio Grande Valley as well as the State of Texas. In the Valley, U.S. 281 serves the Hidalgo urbanized area including the Cities of McAllen, Edinburg, and Pharr. The Pharr International Bridge serves as one of the international border crossings between Texas and Mexico, which is an extension of U.S. 281. As described in the "United States - Mexico Border Crossings" section of this report, there are two other border crossings existing within the Hidalgo urbanized area, including the Hidalgo-Reynosa Bridge and the Progreso-Nuevo Progreso or B&P Bridge. In addition, the Los Indios Bridge serving the Harlingen-San Benito area is located approximately 40 kilometers (25 miles) east of U.S. 281.

APPENDIX
CORRIDOR 18 TRAVEL DEMAND MODEL

In the Corridor 18 Feasibility Study, the Travel Demand Model was used to develop forecasts of future travel within the Corridor 18 region.

For purposes of the Special Issues Study, the model was significantly expanded. It also was recalibrated to be consistent with the most recent traffic data available for the states within the corridor region. Summary attributes of the expanded and recalibrated model are presented in Exhibit A-1.

Exhibit A-1
EXPANSION AND RECALIBRATION
CORRIDOR 18 MODEL

Attribute	Feasibility Study	Special Issues Study	Difference
Zones	693	1535	+122%
Miles	60,740	86,240	+42%
States	14	20	+43%
Calibration Year	1992	1994	NA

MODEL CONCEPTS

Efficient and effective modeling of transportation networks requires that the level of detail contained within the model be consistent with the overall study and model objectives. Urban area models may contain all roads with a functional class of "Collector" or higher and may define traffic analysis zones as groupings of census tracts. A national strategic study may use a network based on Interstate highways and a zone system based on states or convenient subdivisions of states.

Corridor 18 serves local, regional, national and international demands for transportation. To reflect such a wide range of impacts, the Corridor 18 model was developed in a manner which provides a higher level of detail within the study region than outside the study region.

HIGHWAY NETWORK

As indicated above, the highway network within the study region was modeled at a higher level of detail than outside the study region.

Inside the Study Region

Inside the study region all existing roads in the National Highway System (NHS) were included in the highway network model. The reasons for selecting the NHS as the basis for the network model relate to the stated role of the NHS and the similarity between this role and the overall objectives of Corridor 18. Including all highways in the NHS ensures that the main existing routes for intercity travel in the study region will be included in the model process. These existing routes act as the principal "competitors" to a new (or improved) Corridor 18 highway.

The NHS

The National Highway System includes:

- The Interstate System (including mileage added pursuant to Title 23, U.S.C. 139);
- Other principal arterials, both urban and rural, and highways providing access to major intermodal facilities (e.g., ports, airports, public transportation, railroad terminals);
- The Strategic Highway Network (STRAHNET) and major STRAHNET connectors important for the essential movement of defense-related personnel, materials, and equipment; and
- High-priority corridors identified in Section 1105(c) of ISTEA, as amended.

Trade Routes - In developing the NHS, the Federal Highway Administration (FHWA) gave substantial attention to including significant trade routes linking the United States with Canada and Mexico. Specifically, the NHS connects with the Canadian National Highway System at U.S./Canadian border crossings and with major north-south corridors leading into the

heartland of Mexico at U.S./Mexican border crossings. In addition, the NHS connects with nonborder ports of entry, such as major ports and airports.

Intermodal Facilities and Connections - In considering connections to intermodal facilities, two factors were viewed as important in developing the NHS:

- Routes that are connections to intermodal facilities need not be classified as principal arterials to be included in the NHS; and
- Intermodal facilities connected to the NHS must be major facilities.

High Priority Corridors - The NHS includes the high priority corridors specified in Section 1105(c) of ISTEA, as amended by Section 351 of P. L. 102-388 (the 1993 DOT and Related Agencies Appropriations Act, enacted October 6, 1992). Specific alignments are shown for most of the corridors; however, a few are not specifically identified pending the completion of feasibility studies required by Section 1105(h) of ISTEA. Corridor 18 is one of the corridors for which a specific alignment is not shown in the NHS.

Outside the Study Region

The potential impact of Corridor 18 extends beyond the immediate study area and study region. For example, movements between the northeast of the United States and south Texas/Mexico will pass through a portion of the corridor. The network of feeder routes connecting other areas of the United States to the study corridor is based upon the existing Interstate system.

National Highway Planning Network

The highway network models used in this study are based on FHWA's National Highway Planning Network Version 2.0 (NHPNV2).

The NHPNV2, which is the cornerstone of the FHWA GIS, is a 676,000-km (420,000-mile), centerline network representing rural arterial, urban principal arterial and remaining National Highway System roads, plus limited miscellaneous roads.

NETWORKS MODELED

Three highway networks were modeled during development of traffic forecasts:

- Base year network;
- Existing + Committed network; and
- Corridor 18 network.

Base Year Network

The base year network consisted of the NHS within the study region (except for segments of the NHS not yet open to traffic), and the Interstate System outside the study region. The base year network was used to calibrate the model, and to provide the basis for future year highway networks.

The majority (69 percent) of traffic counts available to calibrate the model was for the year 1994. This year was, therefore, selected as the base year for model development purposes.

Existing + Committed Network

The Existing + Committed (E+C) Network is a future year highway network against which a network containing Corridor 18 is compared. The E+C network consists of the base year network plus any new major highways for which a reasonable degree of funding commitment exists on the part of state transportation agencies.

Corridor states were requested to provide information on such projects. Information was received in a variety of forms and at varying levels of detail. Most major projects involved the addition of lanes and other improvements to existing highways on the NHS, rather than construction of totally new facilities. Other projects involved improvements to roads not on the NHS. Information received did not reveal any major new highway facilities critical to the study corridor network.

The E+C network was created from the base year network by re-defining roads involved in major improvement projects. These roads were re-defined as 4-lane or 6-lane highways, with a consequent increase in capacity.

Consistent with the methodology used during the Corridor 18 Feasibility Study, the E+C network did not include Corridor 20 (Texarkana to Laredo) as an Interstate type facility. Funding has not yet been committed for development of the Corridor 20 facility.

Corridor 18 Network

The Corridor 18 Network consisted of the E+C network plus Corridor 18. For purposes of this study, Corridor 18 was assumed to follow the Representative Corridor defined in the

Corridor 18 Feasibility Study between Indianapolis and Houston and to follow Alternative 4 defined in the Corridor 20 Feasibility Study between Houston and the Lower Rio Grande Valley.

Roadway segments along Corridor 18 were assumed to have the characteristics of an Interstate-type facility, with four lanes in rural areas and six lanes in urban areas.

Link Speeds

The NHPNV2 identifies the functional class of roadway segments. The functional class was used as a means to assign a free-flow speed to each link in the modeled networks.

As a result of the lifting of national speed limits by Congress, the maximum speed permitted on interstates and principal arterials in the Corridor States varies. Further changes in speed limits may be anticipated in the future as state legislatures continue to react to this freedom from national limits and receive feedback from constituents on changes already made in their own or neighboring states.

For purposes of developing traffic forecasts a single set of maximum speeds by functional class were used throughout the model network, as shown in Exhibit A-2. The values used for the E+C and Corridor 18 networks followed a review of maximum speeds currently permitted in the Corridor States and constitutes a representative set of maximum speeds for modeling purposes.

Exhibit A-2
REPRESENTATIVE MAXIMUM SPEEDS BY FUNCTIONAL CLASS

HIGHWAY NETWORK				
Functional Class		**Base Year**	**E+C**	**Corridor 18**
1	Rural, Interstate	65	70	70
2	Rural, Principal Arterial	55	60	60
6	Rural, Minor Arterial	45	45	45
11	Urban, Interstate	55	60	60
12	Urban, Freeway or Expressway	55	60	60
14	Urban, Other Principal Arterial	55	55	55

TRAFFIC ANALYSIS ZONES

In parallel with the two levels of detail used to model the highway network, two levels of traffic analysis zone were also employed.

Inside the Study Region

Within the study region, traffic analysis zones (TAZs) were based on counties or parishes. Socioeconomic and other data are readily available by county. The average size (in area) of counties is also consistent with the level of detail contained within the highway network. Most counties in the study region are directly served by at least one NHS roadway. Study region zones are shown in Exhibit A-3.

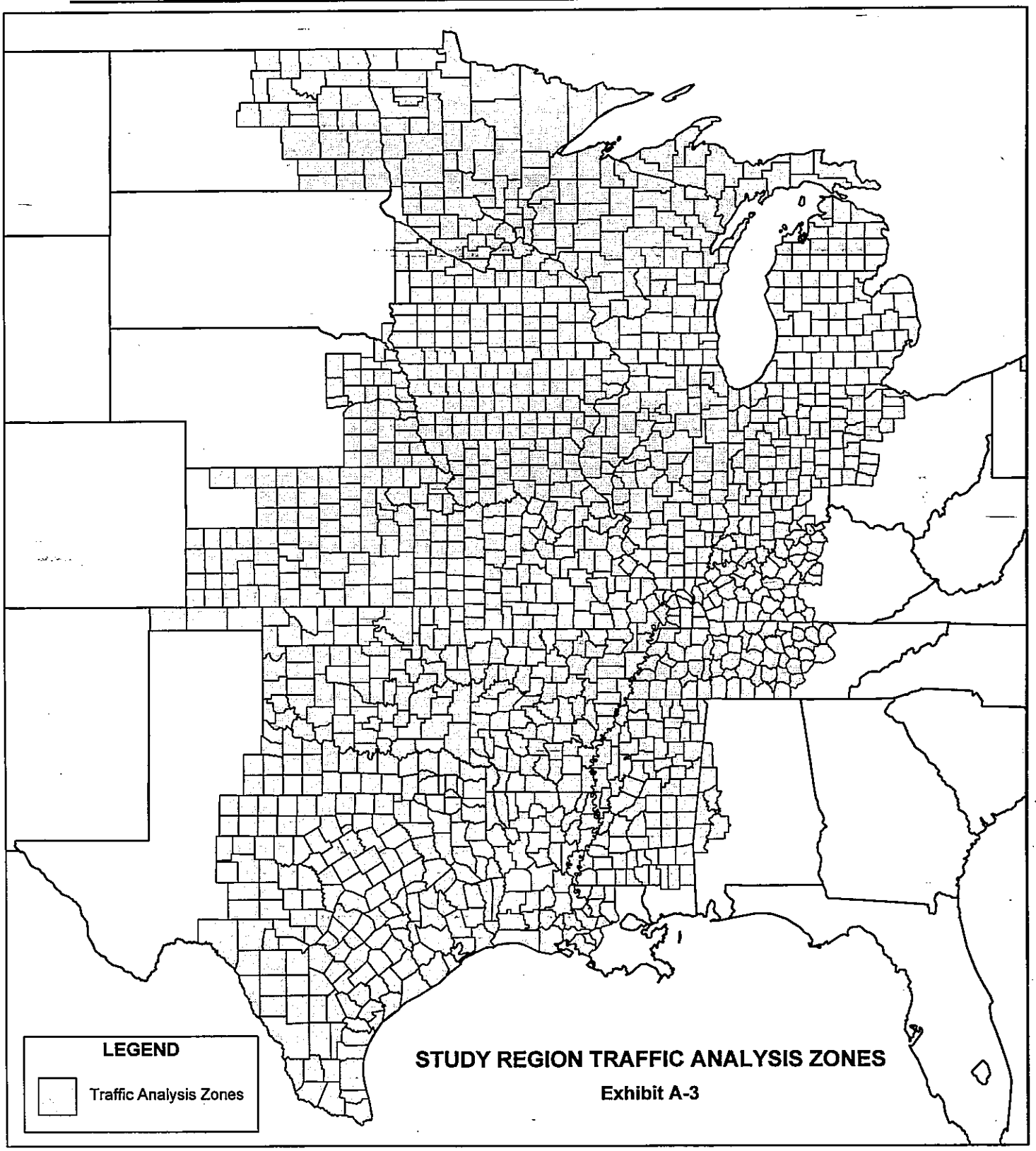
Outside the Study Region

Outside the study region TAZ boundaries followed the zoning system defined by the Bureau of Economic Analysis, and are referred to as BEA zones. BEAs are economic areas defined to facilitate regional economic analysis. Each BEA zone consists of a metropolitan statistical area (MSA) or a similar area that serves as a center of economic activity, and the surrounding counties that are economically related to the center.

Commuting patterns are a major factor used in determining the economic relationships among counties, and, to the extent possible, each economic area includes the main place of work and place of residence of its labor force. As a consequence most commuter travel will be intra zonal to a BEA zone. TAZs based on BEA zones are, therefore, most appropriate for analysis of interurban travel.

Each BEA zone consists of a number of complete counties or parishes. BEA zone boundaries follow county lines, but do not necessarily follow state borders. A BEA zone may include counties in two or more states.

The methodology of utilizing BEA zones outside the study region was also used during the Corridor 18 Feasibility Study. However, it should be noted that in 1995 the Bureau redefined BEA zone boundaries. Prior to 1995 the USA was represented by a total of 183 zones (181 in the contiguous 48 states). In the new scheme, 172 zones have been defined (170 covering the contiguous 48 states). The new scheme of BEA zones was used during the current Special


LEGEND
Traffic Analysis Zones
STUDY REGION TRAFFIC ANALYSIS ZONES
Exhibit A-3

Issues Study, while the earlier BEA definitions were used in the original Corridor 18 Feasibility Study.

As noted above, the 48 contiguous states contain 170 BEA zones. Of these 104 lie outside the study region. The remaining 66 BEA zones are represented by their constituent counties as described previously. The zone system outside the study region is shown in Exhibit A-4.

External Zones

To model cross border movements (i.e. movements across international borders) a number of "external" zones were defined. These generally connect to the Interstate highway network at the U.S./Canadian or U.S./Mexican borders. Five of the external zones connect Interstate and non-Interstate segments of the NHS in South Texas at Del Rio, Eagle Pass, Laredo, Hildago and Brownsville, while three of the external zones connect to Interstate segments of the NHS in Michigan at Sault Ste. Marie, Port Huron and Detroit.

Number of Zones

A total of 1,535 traffic analysis zones were used in the traffic forecast models for this study. These zones consisted of:

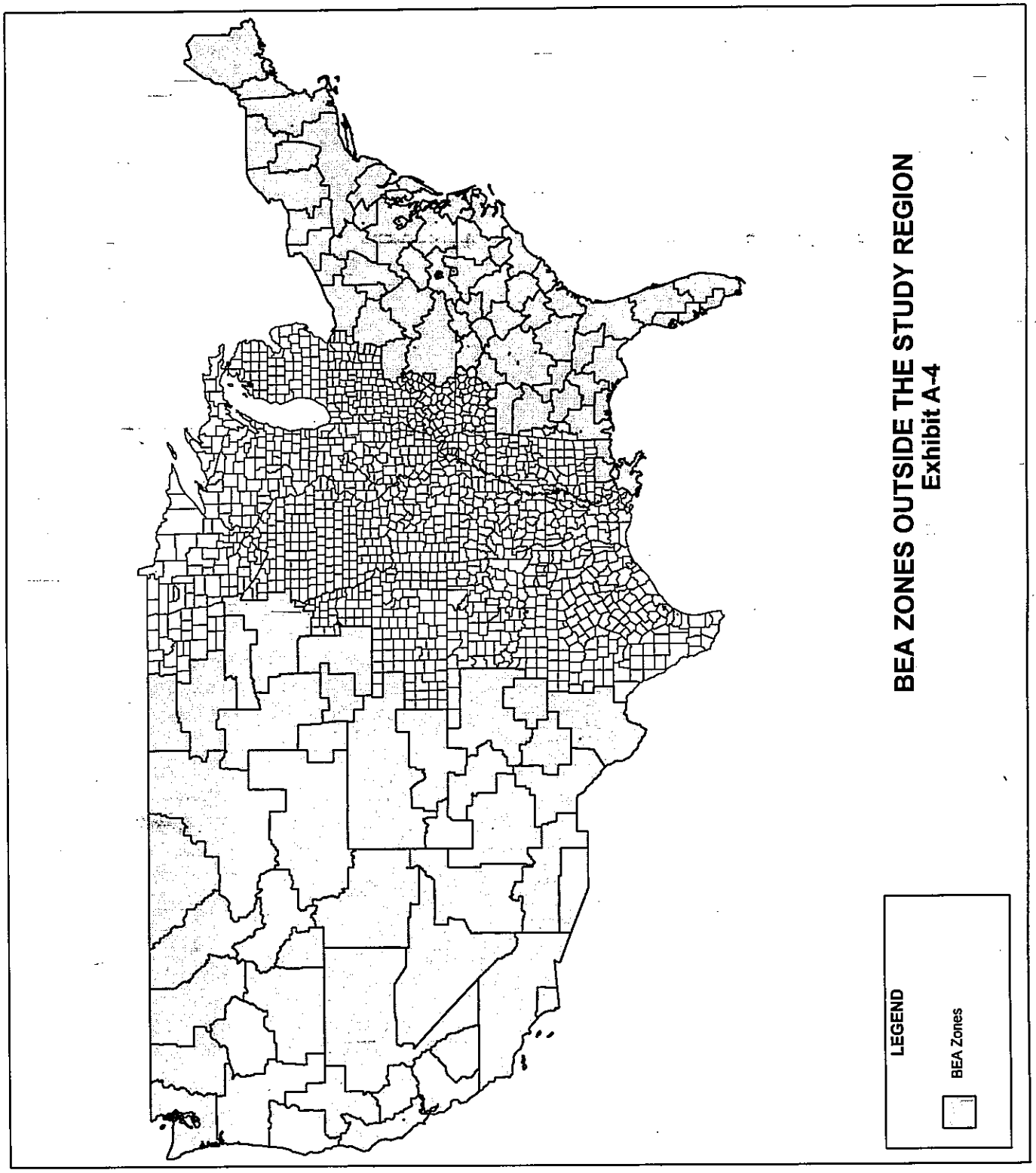
- 1,410 county-based zones in the study region;
- 104 BEA based zones outside the study region; and
- 21 external zones at US/Mexico/Canada border crossings.

DEVELOPMENT OF TRIP MATRICES

Separate trip matrices were developed for auto and truck traffic for subsequent assignment to the highway network models.

Auto Trips

An initial estimate of auto trips between Traffic Analysis Zones (TAZs) was calculated using a model developed by the Volpe National Transportation Systems Center (VNTSC) for inter-urban travel up to distances of 725 km (450 miles). For longer trips the results were adjusted to match the trip length distributions obtained from the 1990 National Personal Travel Survey (NPTS). The initial trip matrix was further adjusted to better match the ground counts at calibration points throughout the network.


BEA ZONES OUTSIDE THE STUDY REGION
Exhibit A-4
LEGEND
BEA Zones

Truck Trips

An initial estimate of national truck trips with origin and destination within the United States was estimated from truck movement data used in the Corridor 18 Feasibility Study. These data were adjusted to reflect both the different zone schemes used in the two studies and the change in study base year.

Initial international truck trips across the U.S./Mexico and U.S./Canada borders were estimated using cross border truck volumes and data provided by the Bureau of Transportation Statistics (BTS). Based on BTS data, freight O/D movements, in terms of dollar value, were generated between each Port of Entry (POE) in East Texas and Michigan and each of the 48 contiguous states. This information was transformed into truck movements using an estimated "Value per Truck" specific to each POE. The truck movements to and from the 48 states were then expanded to the 1,535 zone system used in the highway network model.

The initial national and international truck trip matrices were combined and the resulting matrix adjusted to better match the ground counts of truck volumes at all calibration points.

Model Calibration

Initial base year auto and truck trip matrices were separately assigned to the base year highway network. These matrices were adjusted to more closely match car and truck ADT counts on rural highway segments throughout the network. Where classified counts were not available at a specific location, truck percentages were estimated based on State and Functional Class as shown in Exhibit A-5 on the following page.

The calibrated car and truck trip matrices were added together to provide a base year total vehicle trip matrix.

Study Area "Cut" Lines

The volumes of traffic crossing six "cut" lines across the study area were compared to assigned volumes in the base year network, as shown in Exhibit A-6. The base year assigned volumes at these cut lines are illustrated in Exhibit A-7.

Exhibit A-5
Percent Truck Vehicle Distance by State and Functional Class

Percent Trucks (Single-unit 2-axle, 6-tire or more and Combination Trucks)

State	Rural Highways			State	Rural Highways		
	Interstate	O. Prin. Art	Min. Art.		Interstate	O. Prin. Art	Min. Art
Alabama	27.5%	12.0%	7.4%	Nebraska	29.9%	13.0%	12.1%
Arizona	27.0%	13.2%	9.1%	Nevada	30.0%	13.4%	13.7%
Arkansas	36.0%	15.5%	22.1%	New Hampshire	6.9%	9.1%	7.2%
California	16.5%	14.3%	10.2%	New Jersey	11.4%	8.4%	8.4%
Colorado	19.4%	13.6%	14.1%	New Mexico	23.4%	17.4%	10.9%
Connecticut	13.7%	4.8%	4.1%	New York	16.9%	11.2%	6.2%
Delaware	0.0%	4.8%	8.4%	North Carolina	21.7%	16.9%	14.9%
Florida	18.3%	12.4%	8.8%	North Dakota	18.3%	12.4%	14.0%
Georgia	23.1%	11.0%	7.0%	Ohio	25.5%	22.9%	10.5%
Idaho	21.6%	10.3%	6.4%	Oklahoma(1)	0.0%	0.0%	0.0%
Illinois	25.4%	8.5%	6.4%	Oregon	19.7%	10.9%	8.4%
Indiana	28.1%	16.0%	10.8%	Pennsylvania	27.4%	10.7%	8.4%
Iowa	31.0%	16.0%	13.5%	Rhode Island	2.2%	2.9%	3.5%
Kansas	20.1%	10.4%	14.5%	South Carolina	15.1%	7.2%	5.0%
Kentucky	24.9%	10.9%	7.1%	South Dakota	14.0%	9.7%	9.7%
Louisiana	23.0%	18.2%	17.3%	Tennessee	29.2%	9.2%	7.4%
Maine	16.4%	5.9%	5.0%	Texas	24.4%	15.6%	13.6%
Maryland	24.2%	10.0%	11.0%	Utah	22.1%	10.2%	10.5%
Massachusetts	17.2%	3.5%	1.8%	Vermont	13.0%	8.2%	6.8%
Michigan	16.0%	11.0%	6.9%	Virginia	17.9%	14.3%	6.5%
Minnesota	13.6%	11.7%	8.2%	Washington	13.0%	10.8%	9.1%
Mississippi	22.6%	16.2%	12.2%	West Virginia	24.9%	4.3%	10.9%
Missouri	28.1%	12.4%	9.8%	Wisconsin	15.5%	12.2%	8.6%
Montana	18.5%	10.7%	9.6%	Wyoming	28.3%	9.2%	6.8%

Source: Table VM-4, 1994 Highway Statistics, U.S. Department of Transportation, FH WA
Note: (1) Values from an adjacent state (Arkansas) were used for Oklahoma.

Exhibit A-6

COMPARISON OF ADT AND ASSIGNED VOLUMES AT CORRIDOR CUT LINES

	Traffic Count	Model Estimate	Ratio
Cut line A	115,200	113,100	0.98
Cut line B	91,500	91,700	1.00
Cut line C	60,700	60,700	1.00
Cut line D	84,300	84,700	1.00
Cut line E	43,500	43,400	1.00
Cut line F	30,700	31,000	1.01

TRIP PROJECTIONS

The base year auto and truck trip matrices were independently projected to the Year 2020.

Auto Trip Projections

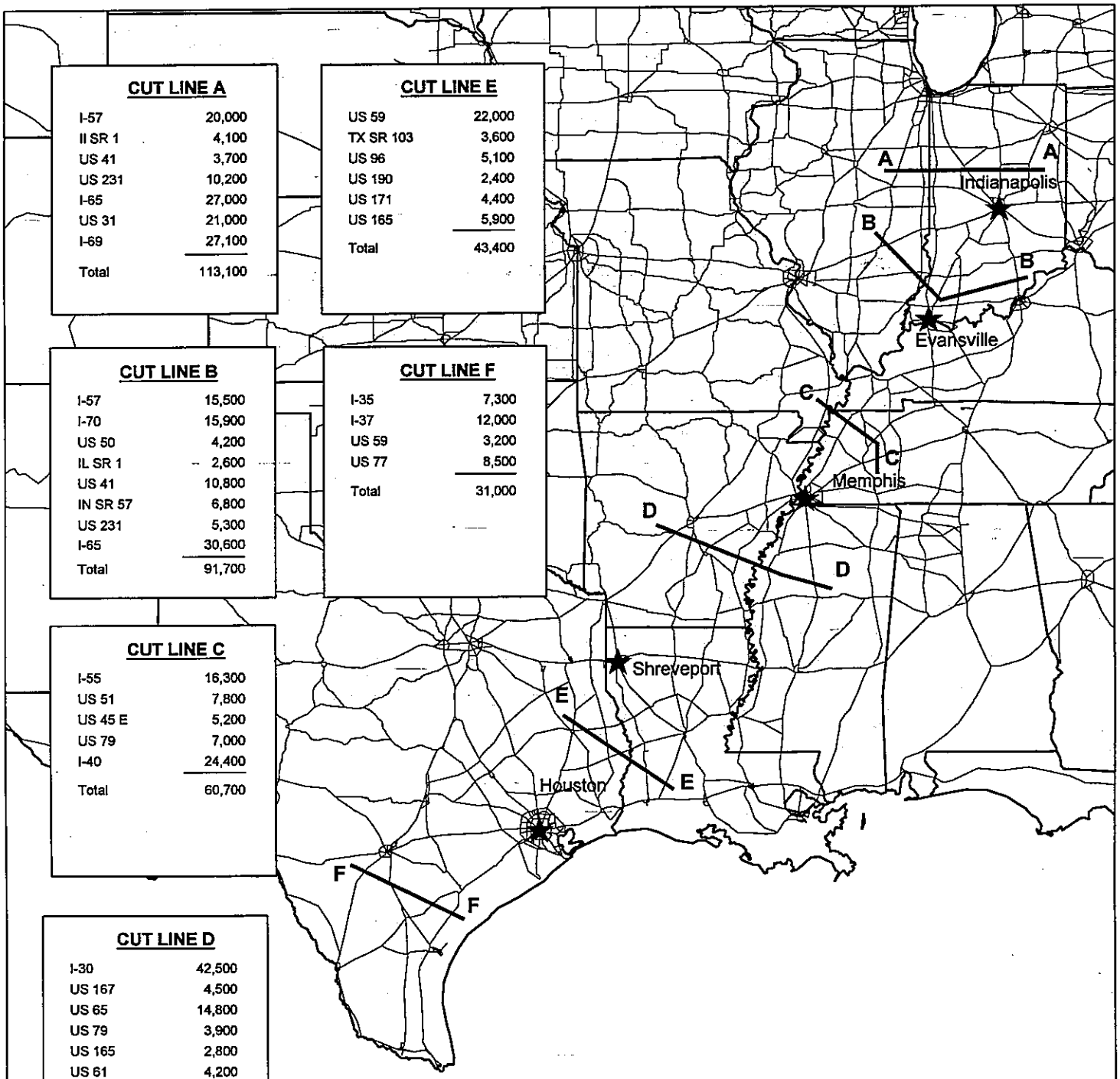
Auto trips were projected to increase as a result of two factors - population growth and the trend towards increasing vehicle-miles of travel per person.

BEA Population Projections

Population estimates for 2020 were derived from BEA projections for the Years 2015 and 2025.[1] A constant annual rate of population growth between these two years was assumed to determine a value for 2020. The Bureau provided projections for BEA zones. All counties within a BEA zone were assumed to experience the same rate of growth.

Between 1980 and 1994 the overall population of the Untied States increased by 14.9 percent from 226.5 to 260.3 million, an average increase of 1.0 percent per year. While population growth in many of the corridor states was considerably lower than the national average, Texas' population increased by 29.2 percent during the period. Between 1980 and 1994 the overall increase in population in the eight corridor states amounted to 12.6 percent. This represents an average increase of 0.85 percent per year.

BEA projects a slower rate of population growth during the 26 years between 1994 and 2020. During this period the



BASE YEAR ASSIGNED VOLUMES AT CORRIDOR CUT LINES

Exhibit A-7

population of the USA is projected to grow by 25 percent to 325.5 million, while the population in corridor states is anticipated to grow 21 percent. The annual growth rate in population in corridor states during this period amounts to 0.75 percent. This growth rate in corridor population exceeds the rate of 0.41 percent used in the Corridor 18 Feasibility Study, reflecting BEA's increased population projections. Previous BEA projections implied a 2020 population in the eight corridor states of 55.7 million. Their current projection is 63.2 million, which is 13.5 percent higher.

Vehicle Kilometers of Travel

During the 1980's, rural Vehicle Kilometers of Travel (VKT) grew considerably faster than population. To develop a future year auto trip matrix, base year trips to and from each zone were increased according to the projected population increase in each zone. Trips were then further increased to reflect the projected growth in VKT.

The average annual growth rate in VKT in the U.S. was 3.3 percent between 1970 and 1990. The growth rate fell to 2.3 percent during the first five years of the 1990s. The Office of Highway Information Management of FHWA reports that the lower growth rates are consistent with the current Highway Performance Monitoring System (HPMS) forecasts provided by the states, which show a 2.37 percent annual growth rate over the next 20 years.

Using this rate of growth (2.37 percent) between 1995 and 2015, and half of this rate of growth during the remaining five years to 2020, results in an overall increase in VKT of 69 percent between 1995 and 2020. The auto trip matrix for the year 2020 was adjusted to be consistent with this projected growth in VKT.

Truck Trip Projections

Truck trips with origin and/or destination in the 1,514 zones within the USA were projected to increase in line with U.S. Gross Domestic Product (GDP). Cross border truck trips were forecast separately.

Domestic Truck Movements

The Bureau of Economic Analysis provided projections of Gross Domestic Product (GDP), as shown in Exhibit A-8.

Based on BEA projections, GDP is anticipated to grow between 1994 and 2020 by 56.6 percent. This rate of growth

was used to estimate the growth in truck travel due to freight movements within the United States.

Exhibit A-8
HISTORICAL AND PROJECTED VALUES OF GROSS DOMESTIC PRODUCT

Year	Gross Domestic Product (Billions of 1987 Dollars)
1993	5,134.5
1994(1)	5,260.2
1998	5,794.5
2000	6,036.4
2005	6,646.9
2010	7,232.4
2015	7,768.4
2020(2)	8,239.6
2025	8,739.3

Source: Bureau of Economic Analysis.

(1) Estimated from 1993 and 1998 values.
(2) Estimated from 2015 and 2025 values.

The growth in domestic truck movements used in this study is higher than the 37.2 percent increase between 1992 and 2015 assumed in the Corridor 18 Feasibility Study. The latter study used BEA projections of GNP current at that time.

Cross Border Truck Movements

Projections of truck movements across U.S./Mexico and U.S./Canada borders are based on estimates made during the Corridor 18 Feasibility Study. These projections were extended to the forecast year of 2020. These projections result in growth factors between 1994 and 2020 of 2.62 and 1.57 for U.S./Mexico and U.S./Canada movements respectively.

FUTURE YEAR ASSIGNMENTS

As described earlier, two future year networks were developed.

- Existing + Committed Network; and
- Corridor 18 Network.

Future year (2020) trip matrices were assigned to both networks, using an Equilibrium Traffic Assignment process. The resulting projected traffic volumes across study area cut lines are shown in Exhibits A-9 and A-10 for both the E+C and Corridor 18 networks, respectively.

For purposes of economic analyses described in Chapter 2, base year (1994) trip matrices were also assigned to the Existing + Committed and the Corridor 18 networks.

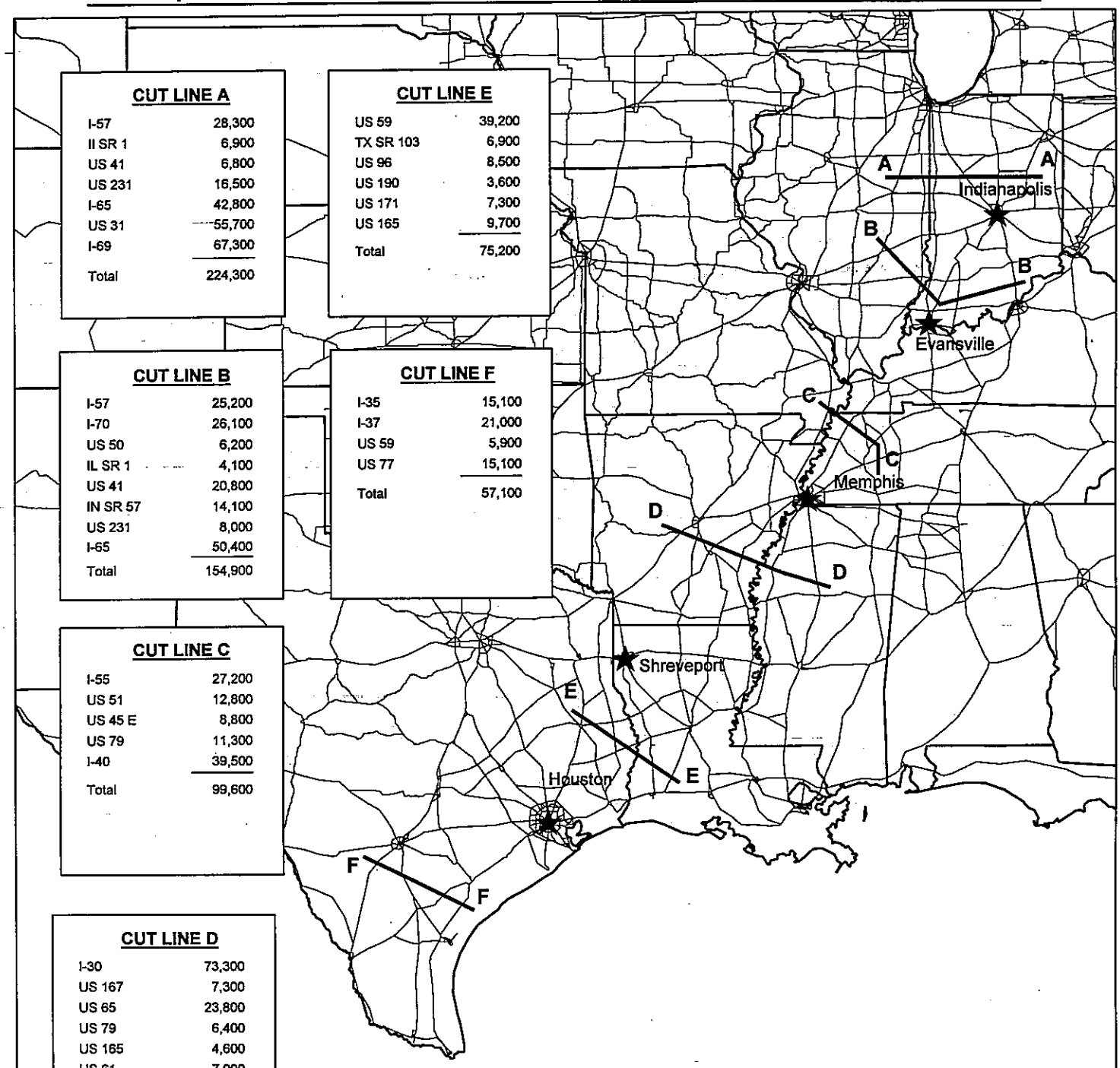
Comparison with Feasibility Study Projections

Four cut lines (B, C, D and E) cross Corridor 18 at the same locations in both the original Corridor 18 Feasibility Study and the current Corridor 18 Special Issues Study. The total future year volume at these four Corridor 18 locations is projected to be 11 percent higher in the current study compared to the earlier study. Higher traffic projections may be anticipated as a result of higher growth rates in population and the change in future year from 2015 to 2020.

Traffic projections at Cut Line F, south of Houston, between Victoria and the Lower Rio Grande Valley, are somewhat lower than obtained in the Corridor 20 study--16,900 vehicles per day compared to 19,800 (Corridor 20, Alternative 4). This may be explained in part by the different population projections used in two studies. In the Corridor 20 Study, the 145 Texas counties in that study's model area were projected to grow an average of 34 percent between 1995 and 2015. BEA projections used in the current Special Issues Study estimate Texas as a whole (254 counties) will grow at a slower rate, totaling 28 percent between 1994 and 2020.

ENDNOTES

1. BEA Regional Projections to 2045, August 1995.



CUT LINE A

I-57	28,300
Il SR 1	6,900
US 41	6,800
US 231	16,500
I-65	42,800
US 31	55,700
I-69	67,300
Total	224,300

CUT LINE B

I-57	25,200
I-70	26,100
US 50	6,200
IL SR 1	4,100
US 41	20,800
IN SR 57	14,100
US 231	8,000
I-65	50,400
Total	154,900

CUT LINE C

I-55	27,200
US 51	12,800
US 45 E	8,800
US 79	11,300
I-40	39,500
Total	99,600

CUT LINE D

I-30	73,300
US 167	7,300
US 65	23,800
US 79	6,400
US 165	4,600
US 61	7,000
I-55	19,200
Total	141,600

CUT LINE E

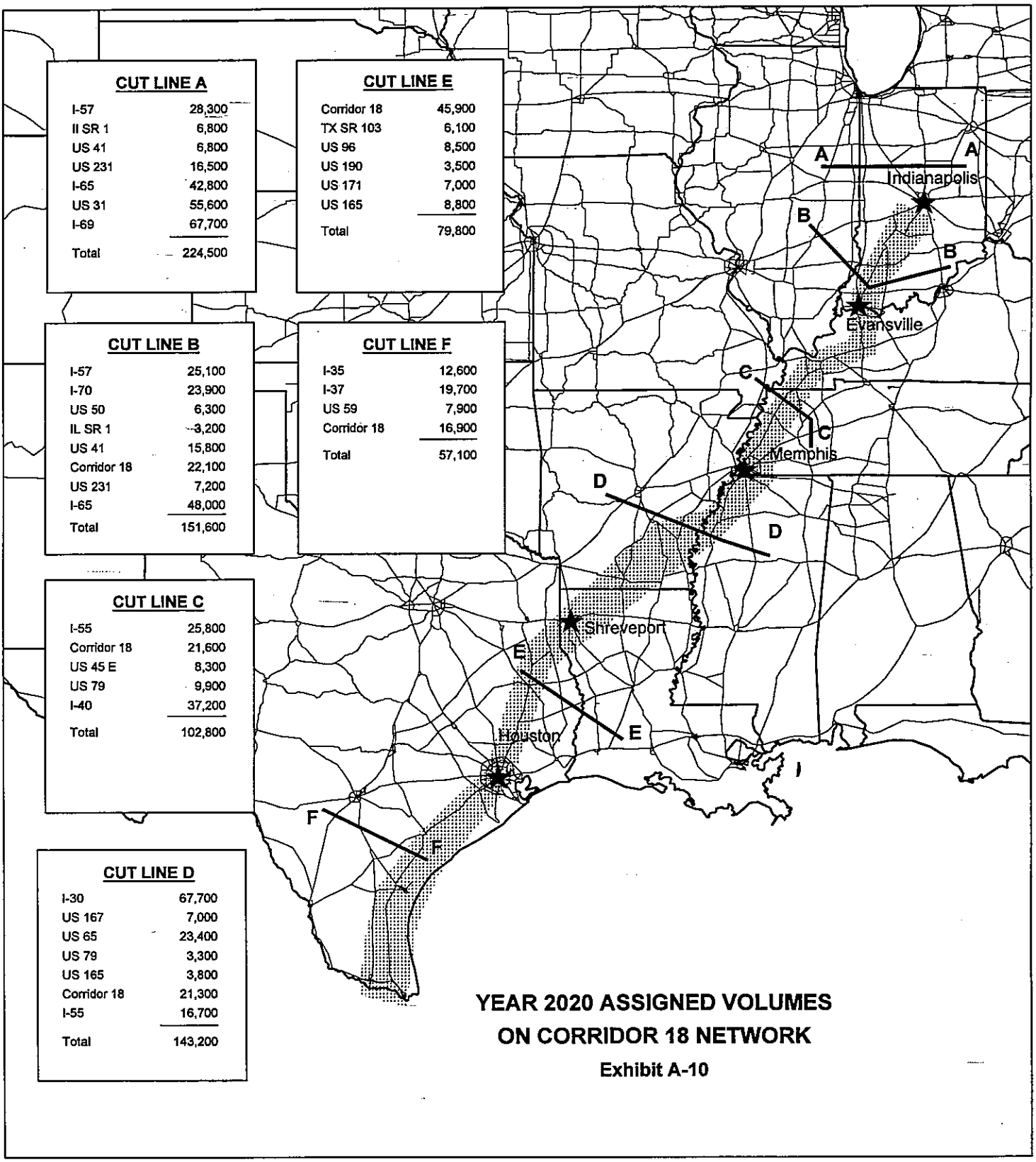
US 59	39,200
TX SR 103	6,900
US 96	8,500
US 190	3,600
US 171	7,300
US 165	9,700
Total	75,200

CUT LINE F

I-35	15,100
I-37	21,000
US 59	5,900
US 77	15,100
Total	57,100

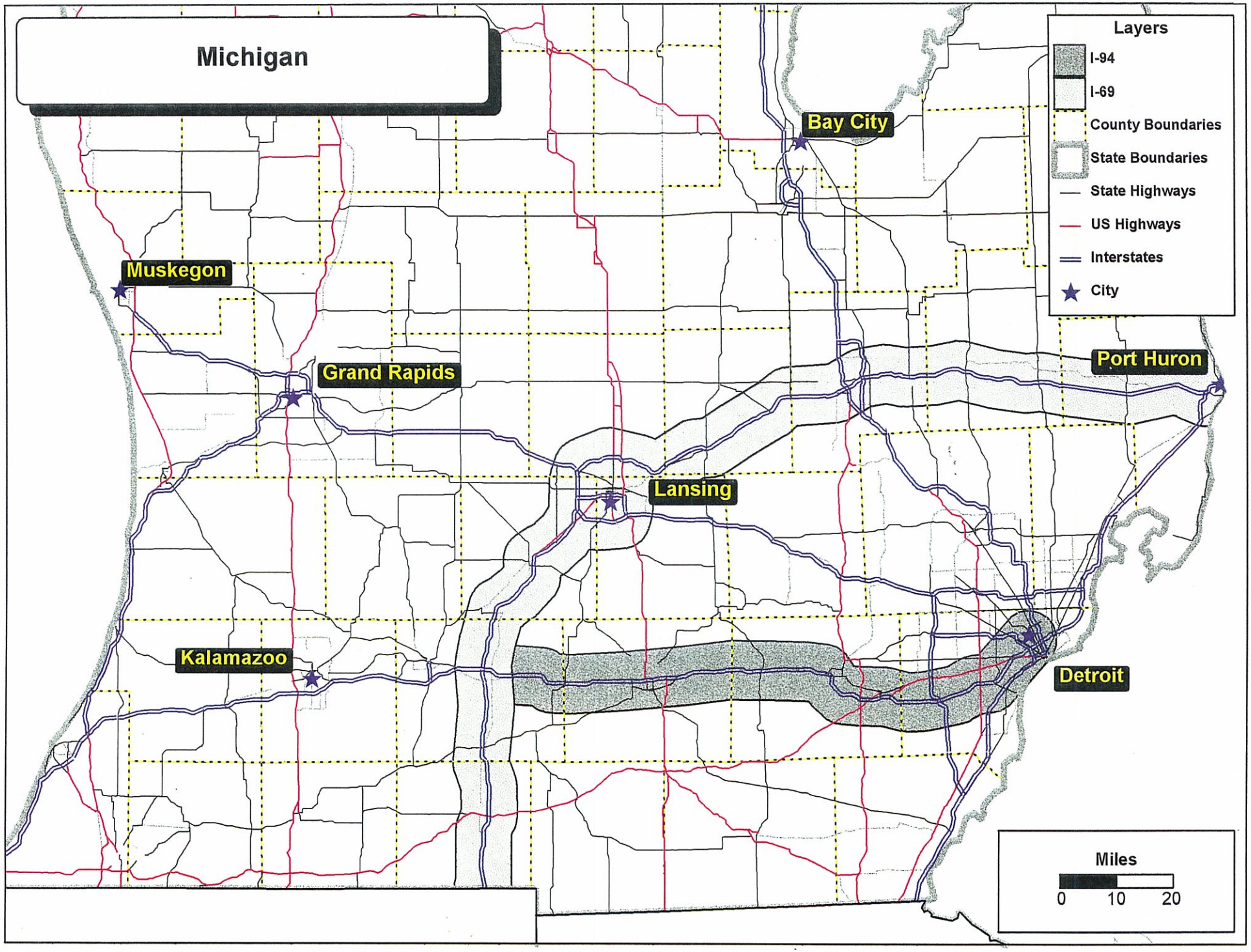
YEAR 2020 ASSIGNED VOLUMES
ON EXISTING + COMMITTED NETWORK

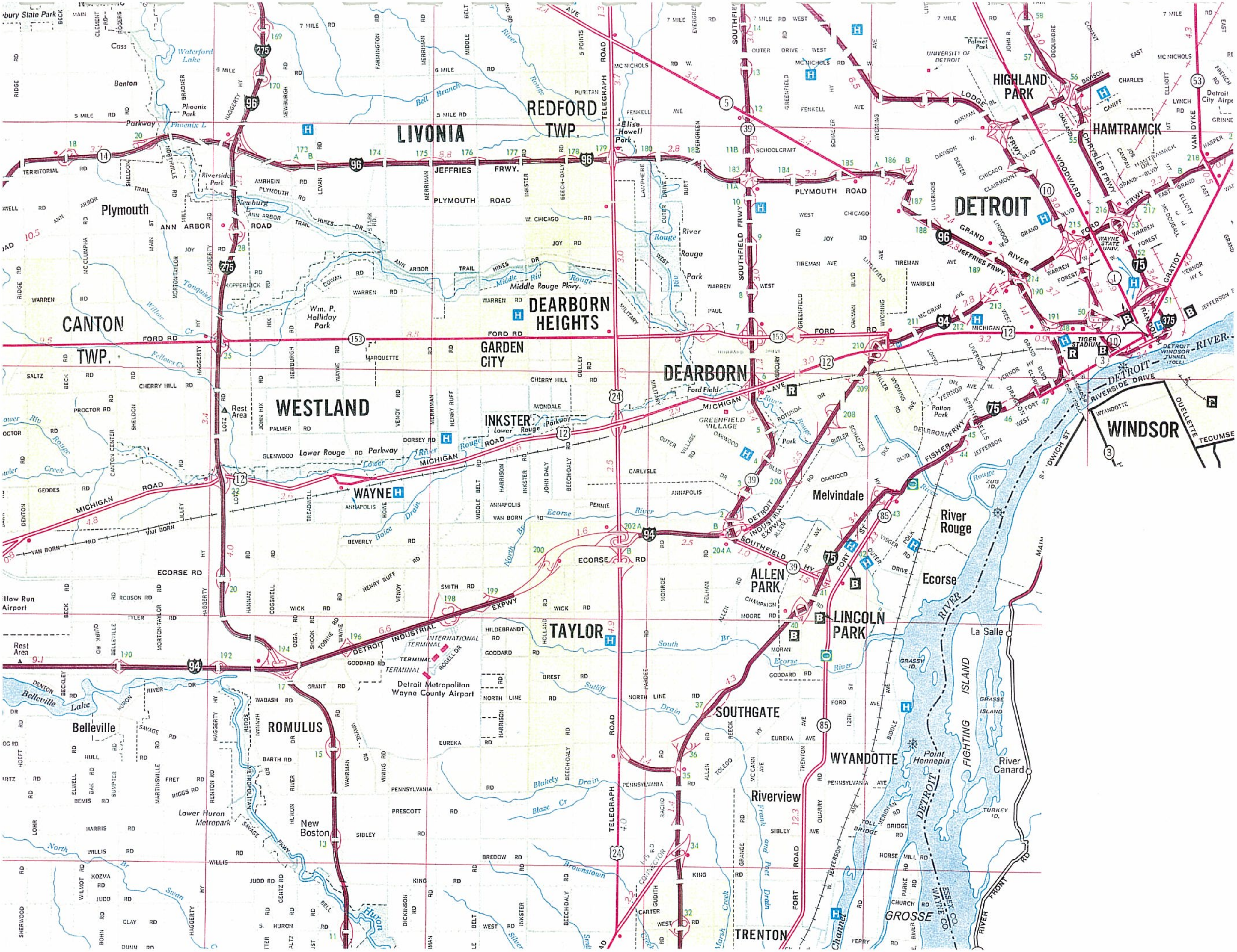
Exhibit A-9


CUT LINE A
I-57 28,300
II SR 1 6,800
US 41 6,800
US 231 16,500
I-65 42,800
US 31 55,600
I-69 67,700
Total 224,500
CUT LINE E
Corridor 18 45,900
TX SR 103 6,100
US 96 8,500
US 190 3,500
US 171 7,000
US 165 8,800
Total 79,800
CUT LINE B
I-57 25,100
I-70 23,900
US 50 6,300
IL SR 1 3,200
US 41 15,800
Corridor 18 22,100
US 231 7,200
I-65 48,000
Total 151,600
CUT LINE F
I-35 12,600
I-37 19,700
US 59 7,900
Corridor 18 16,900
Total 57,100
CUT LINE C
I-55 25,800
Corridor 18 21,600
US 45 E 8,300
US 79 9,900
I-40 37,200
Total 102,800
CUT LINE D
I-30 67,700
US 167 7,000
US 65 23,400
US 79 3,300
US 165 3,800
Corridor 18 21,300
I-55 16,700
Total 143,200
Indianapolis
Evansville
Memphis
Shreveport
Houston
A
B
C
D
E
F
YEAR 2020 ASSIGNED VOLUMES
ON CORRIDOR 18 NETWORK
Exhibit A-10

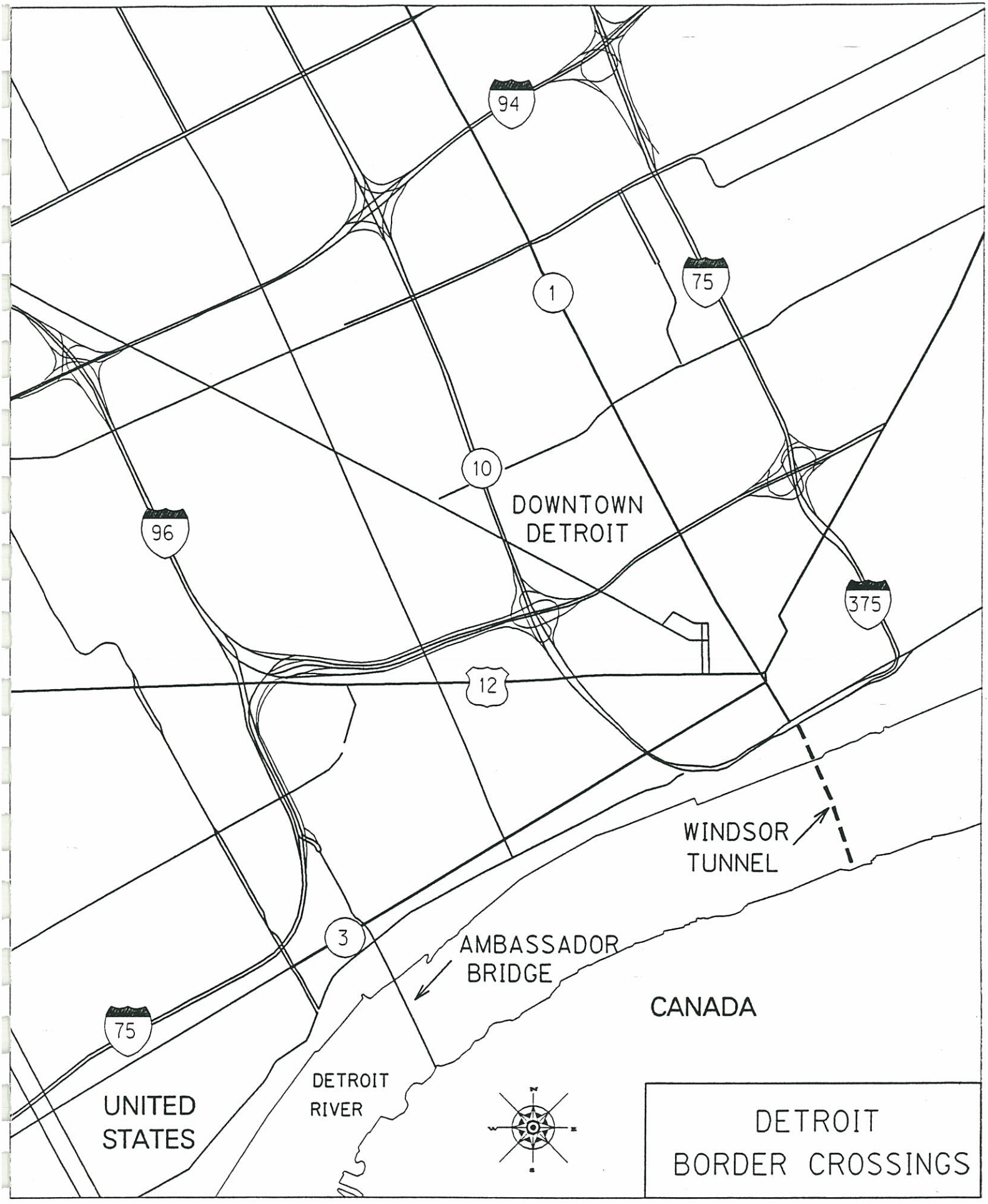
APPENDIX - MAPS

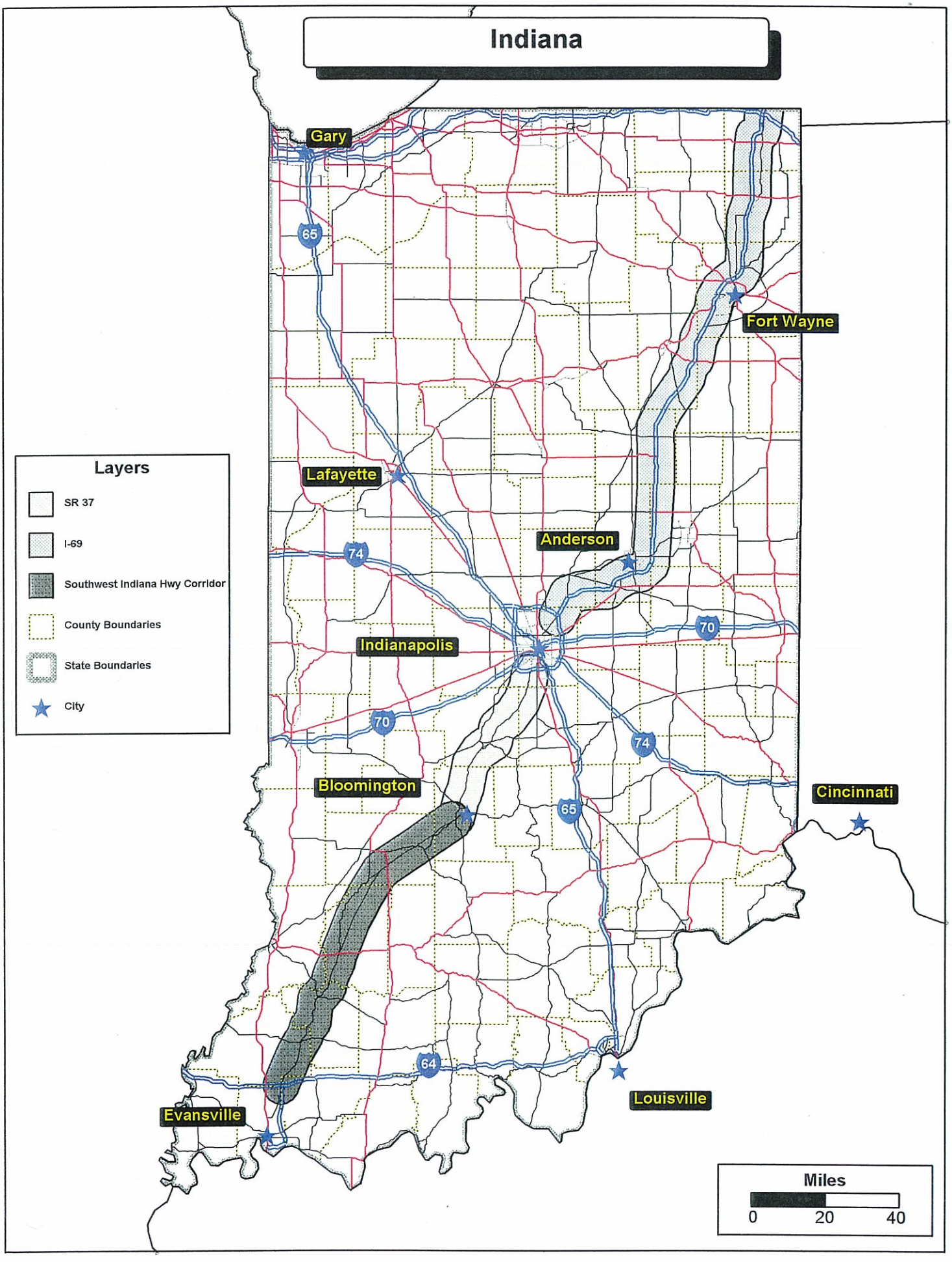
- **MICHIGAN**
  - Detroit
  - Detroit/Canada Border Crossing
- **INDIANA**
  - Indianapolis
  - Evansville
- **KENTUCKY**
- **TENNESSEE**
  - Memphis: Nonconnah Parkway and Paul Barnett Parkway
- **MEMPHIS TO SHREVEPORT**
  - Mississippi River Crossing
  - Shreveport/Bossier City
  - Expansion of Freeway System in Louisiana
- **SHREVEPORT TO U.S. 59, TEXAS**
- **TEXAS**
  - Houston
  - Connections to Corpus Christi
  - Connection to the Lower Rio Grande Valley
  - US / Mexico Border Crossing

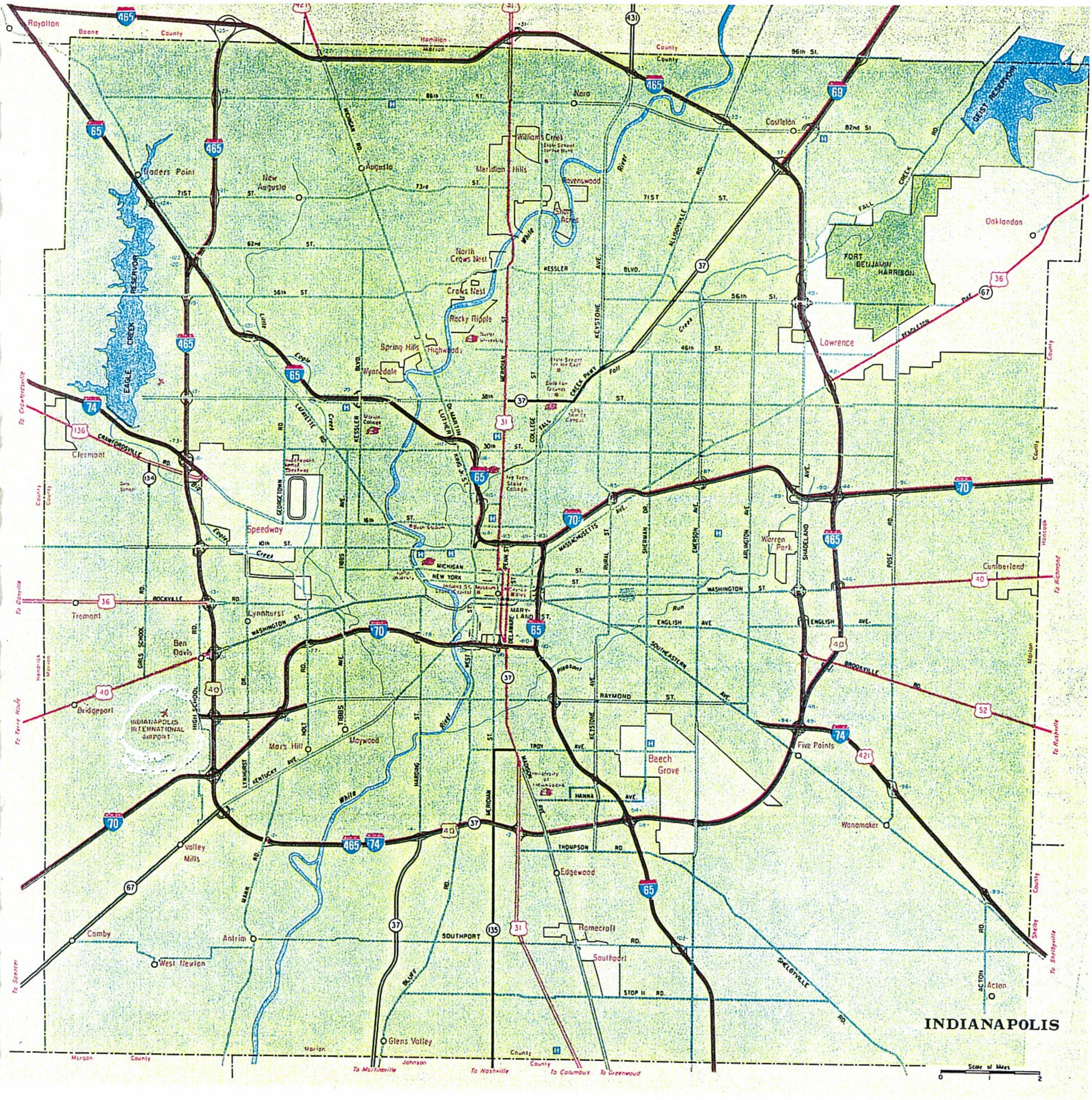

Michigan
Layers
I-94
I-69
County Boundaries
State Boundaries
State Highways
US Highways
Interstates
City
Bay City
Muskegon
Grand Rapids
Port Huron
Lansing
Kalamazoo
Detroit
Miles
0
10
20



DETROIT
HIGHLAND PARK
HAMTRAMCK
LIVONIA
REDFORD TWP.
DEARBORN HEIGHTS
DEARBORN
GARDEN CITY
WESTLAND
INKSTER
WAYNE
CANTON TWP.
Plymouth
ALLEN PARK
Melvindale
River Rouge
Ecorse
LINCOLN PARK
TAYLOR
SOUTHGATE
WYANDOTTE
Riverview
TRENTON
ROMULUS
New Boston
Belleville
WINDSOR
La Salle
River Canard
Detroit Metropolitan Wayne County Airport
Willow Run Airport
Lower Huron Metropark
Wm. P. Holliday Park
Greenfield Village
DETROIT RIVER
FIGHTING ISLAND
GRASSY ID.
GRASSE ISLAND
TURKEY ID.
Point Hennepin
ESSEX CO.
WAYNE CO.
JEFFRIES FRWY.
SOUTHFIELD FRWY
DETROIT INDUSTRIAL EXPWY
FISHER FRWY
CHRYSLER FRWY
LODGE
DETROIT WINDSOR TUNNEL (TOLL)
AMBASSADOR BRIDGE (TOLL)
TIGER STADIUM
WAYNE STATE UNIV.
UNIVERSITY OF DETROIT


94
1
75
10
DOWNTOWN
DETROIT
96
375
12
WINDSOR
TUNNEL
3
AMBASSADOR
BRIDGE
CANADA
75
UNITED
STATES
DETROIT
RIVER
DETROIT
BORDER CROSSINGS


Indiana
Gary
Fort Wayne
Lafayette
Anderson
Indianapolis
Bloomington
Cincinnati
Louisville
Evansville
65
74
70
64
Layers
SR 37
I-69
Southwest Indiana Hwy Corridor
County Boundaries
State Boundaries
City
Miles
0
20
40


INDIANAPOLIS
Scale of Miles
0 1 2
Royalton
Boone County
Hamilton
Marion
96th ST.
86th ST.
82nd St
71ST ST.
62nd ST.
56th ST
46th ST.
38th ST.
30th ST.
16th ST.
10th ST.
Nora
Castleton
Traders Point
New Augusta
Augusta
Meridian Hills
Williams Creek
Ravenswood
North Crows Nest
Crows Nest
Rocky Ripple
Spring Hills
Highwoods
Wynnedale
Clermont
Speedway
Tremont
Lynnhurst
Ben Davis
Bridgeport
INDIANAPOLIS INTERNATIONAL AIRPORT
Mars Hill
Maywood
Valley Mills
Camby
West Newton
Antrim
Glens Valley
Edgewood
Homecroft
Southport
Beech Grove
Five Points
Wanamaker
Acton
Cumberland
Warren Park
Lawrence
Oaklandon
FORT BENJAMIN HARRISON
GEIST RESERVOIR
EAGLE CREEK RESERVOIR
White River
Fall Creek
Eagle Creek
Pleasant Run
KESSLER BLVD.
WASHINGTON ST.
ENGLISH AVE.
RAYMOND ST.
THOMPSON RD.
SOUTHPORT RD.
STOP 11 RD.
HANNA AVE.
TROY AVE.
MICHIGAN
NEW YORK
ROCKVILLE RD.
CRAWFORDSVILLE RD.
BROOKVILLE RD.
SOUTHEASTERN AVE.
SHELBYVILLE RD.
PENDLETON PIKE
KENTUCKY AVE.
MASSACHUSETTS AVE.
MERIDIAN ST.
KEYSTONE AVE.
SHADELAND AVE.
GEORGETOWN RD.
HIGH SCHOOL RD.
GIRLS SCHOOL RD.
MANN RD.
BLUFF RD.
To Crawfordsville
To Danville
To Terre Haute
To Spencer
To Martinsville
To Nashville
To Columbus
To Greenwood
To Shelbyville
To Rushville
To Richmond
Morgan County
Johnson County
Hendricks County
Hancock County
Shelby County
465
65
69
70
74
37
31
36
40
52
67
421
136
134
135
431


To Vincennes
To Oakland City
To I-64
57
MILLERSBURG
RD.
CYNTHIANA
65
RD.
Evansville Regional Airport
41
AVE.
AVE.
Ivy Tech State College
66
DIAMOND AVE.
ST JOSEPH
FIRST
MORGAN AVE.
62
H
VIRGINIA ST.
FRANKLIN ST.
PENN. ST
62
LLOYD EXPRESSWAY
RD.
Court House
P.O.
City Hall
University of Evansville
LINCOLN AVE.
WASHINGTON AVE.
POLLACK AVE.
BOEKE
KENTUCKY AVE.
BROADWAY
VETERANS MEMORIAL PKWY
164
41
OHIO RIVER
To Henderson Ky.
Pigeon
GREEN RIVER
RD.
164
Cr.
County
County
Vanderburgh
Warrick
66
NEW-BURGH
662
RD.
Angel Mounds State Mem.
To Boonville
To Rockport
To Newburgh
EVANSVILLE
Scale of Miles
0
1
2

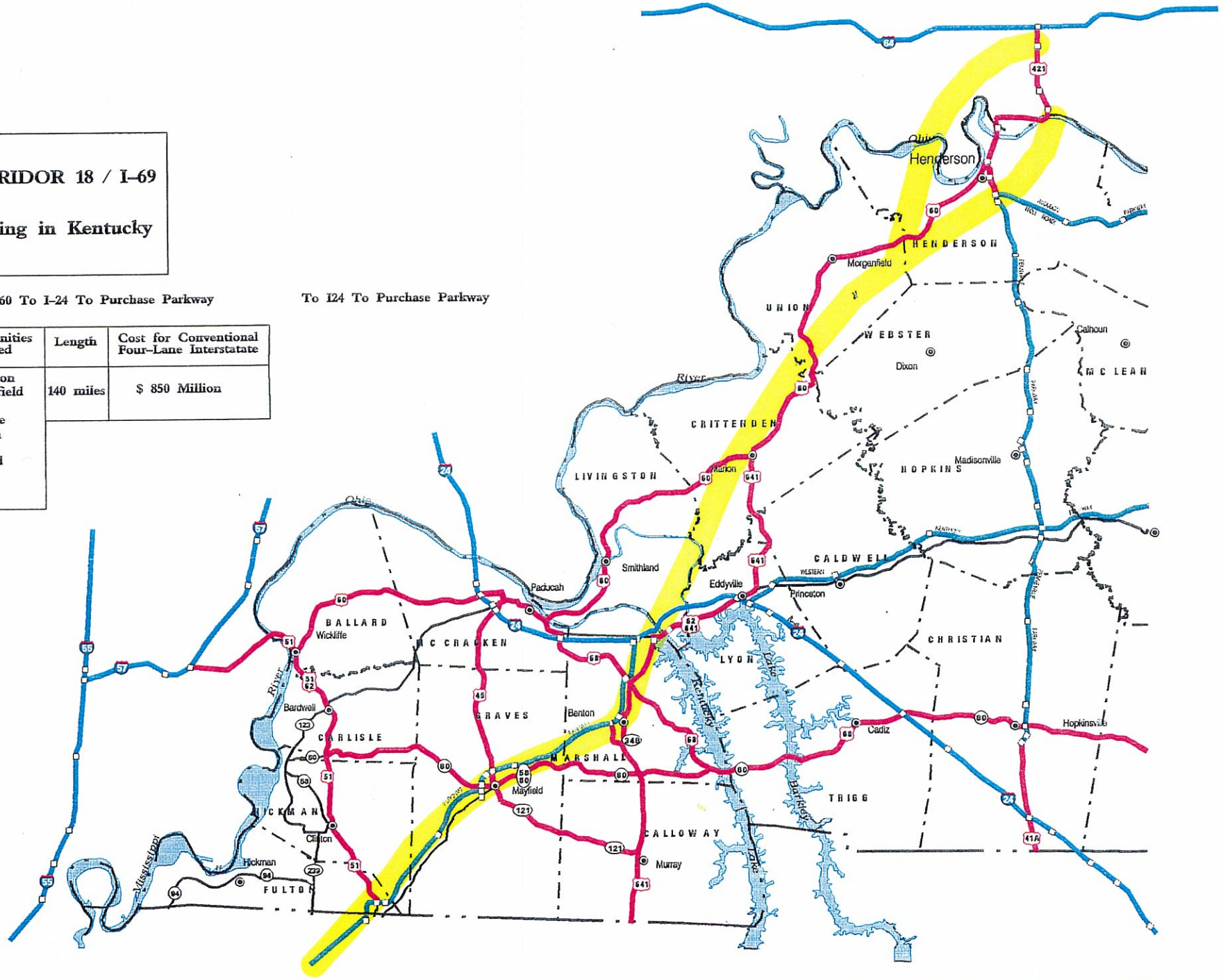
CORRIDOR 18 / I–69

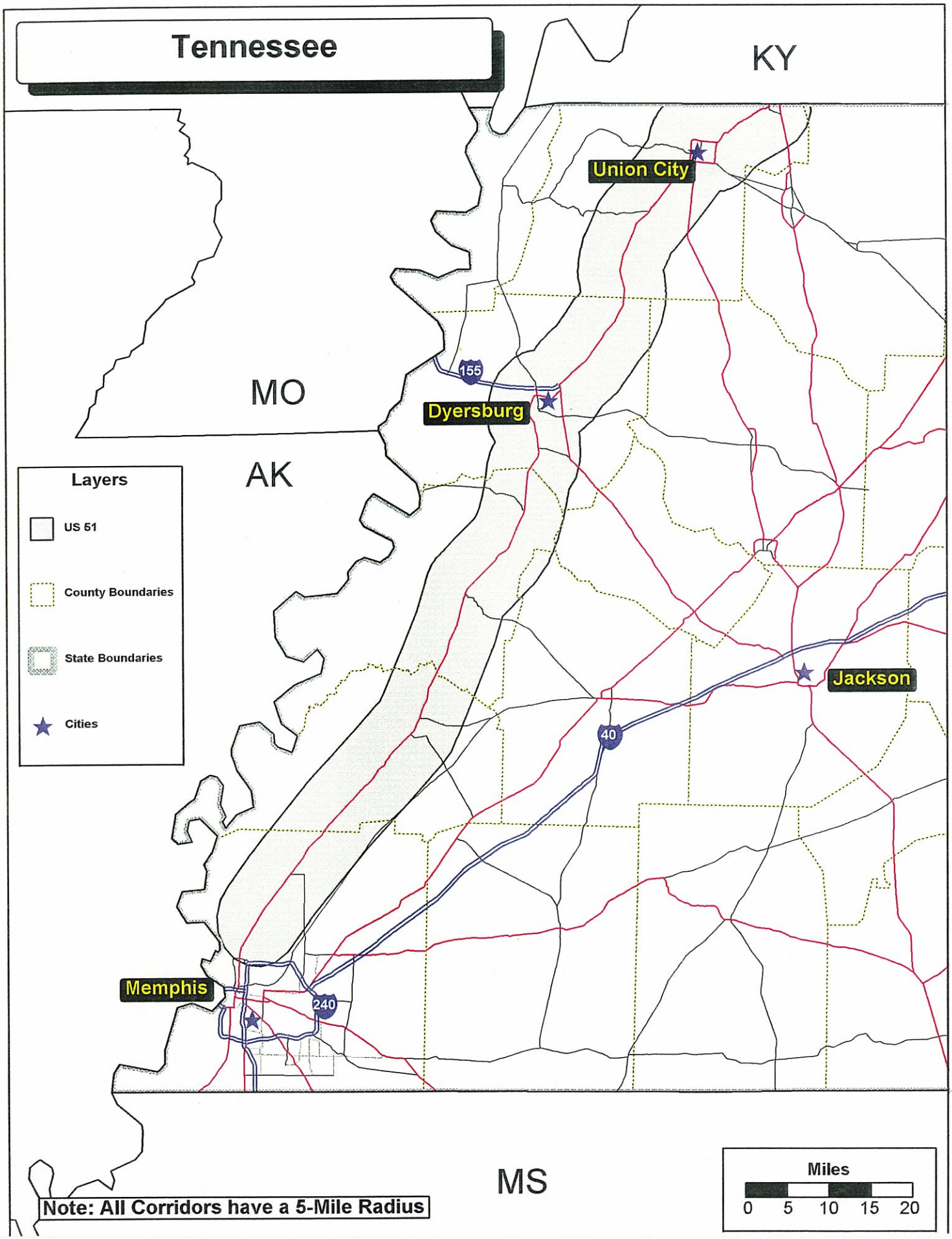
Routing in Kentucky

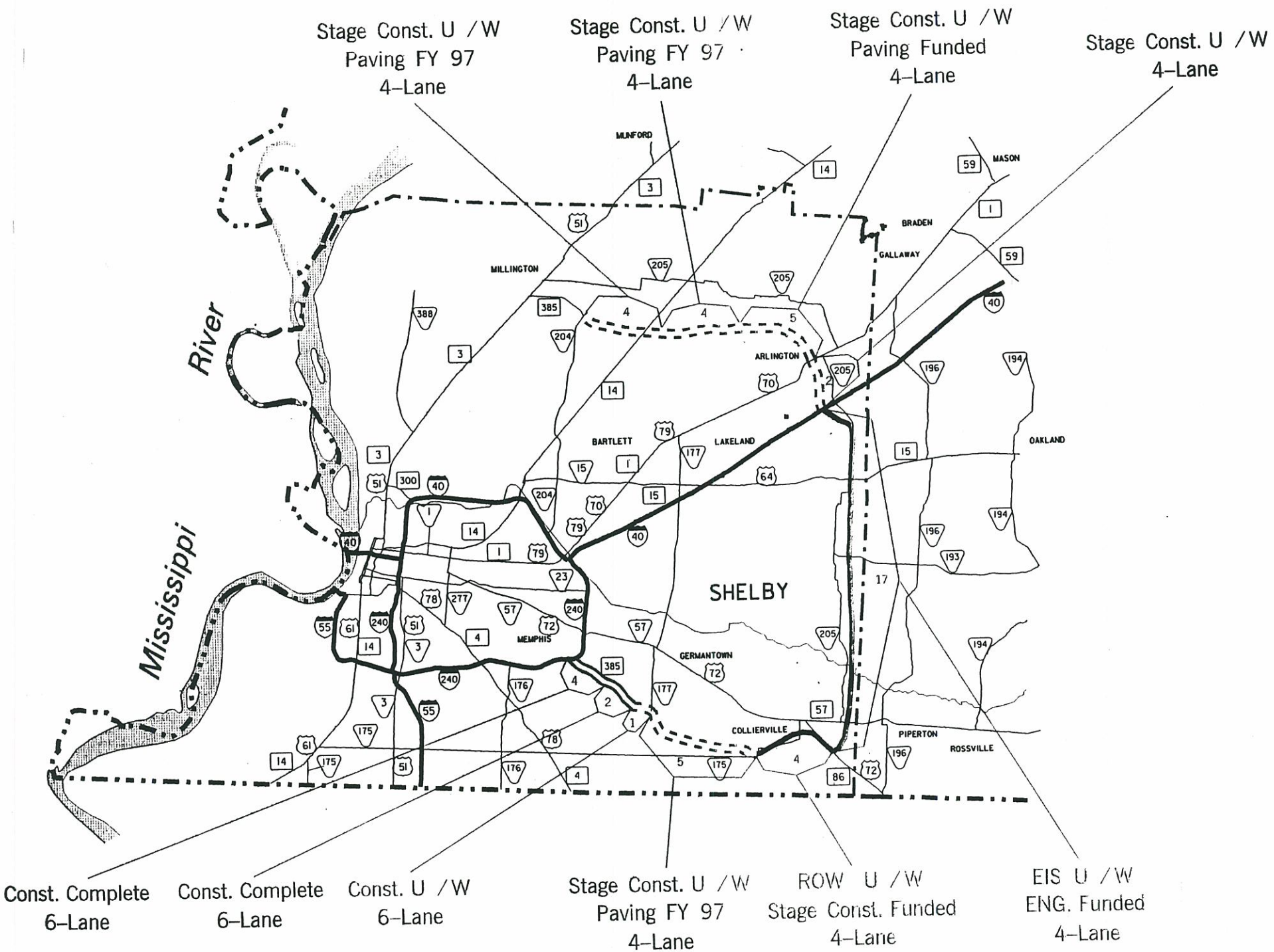
Via US 60 To I-24 To Purchase Parkway

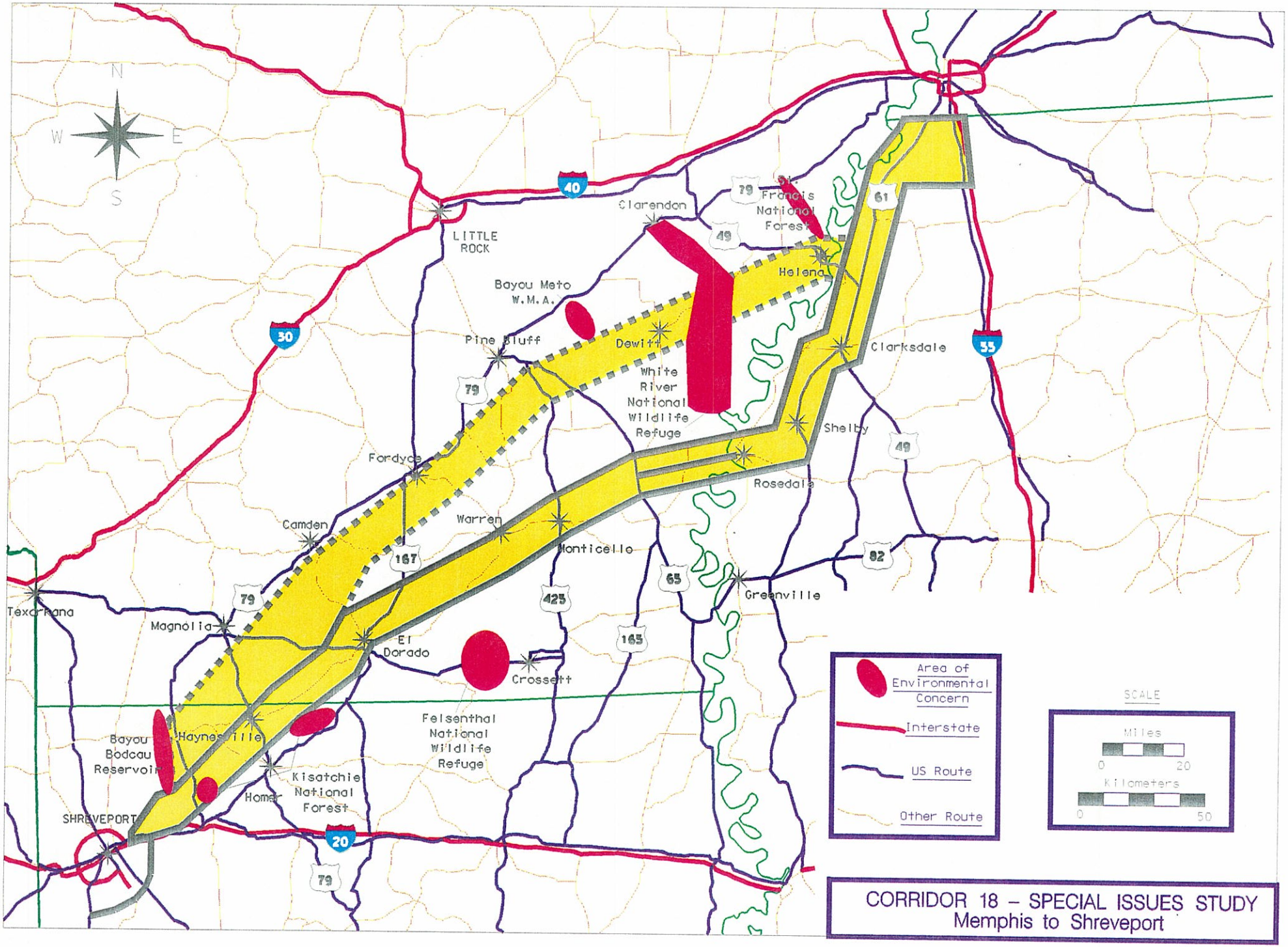
To I24 To Purchase Parkway

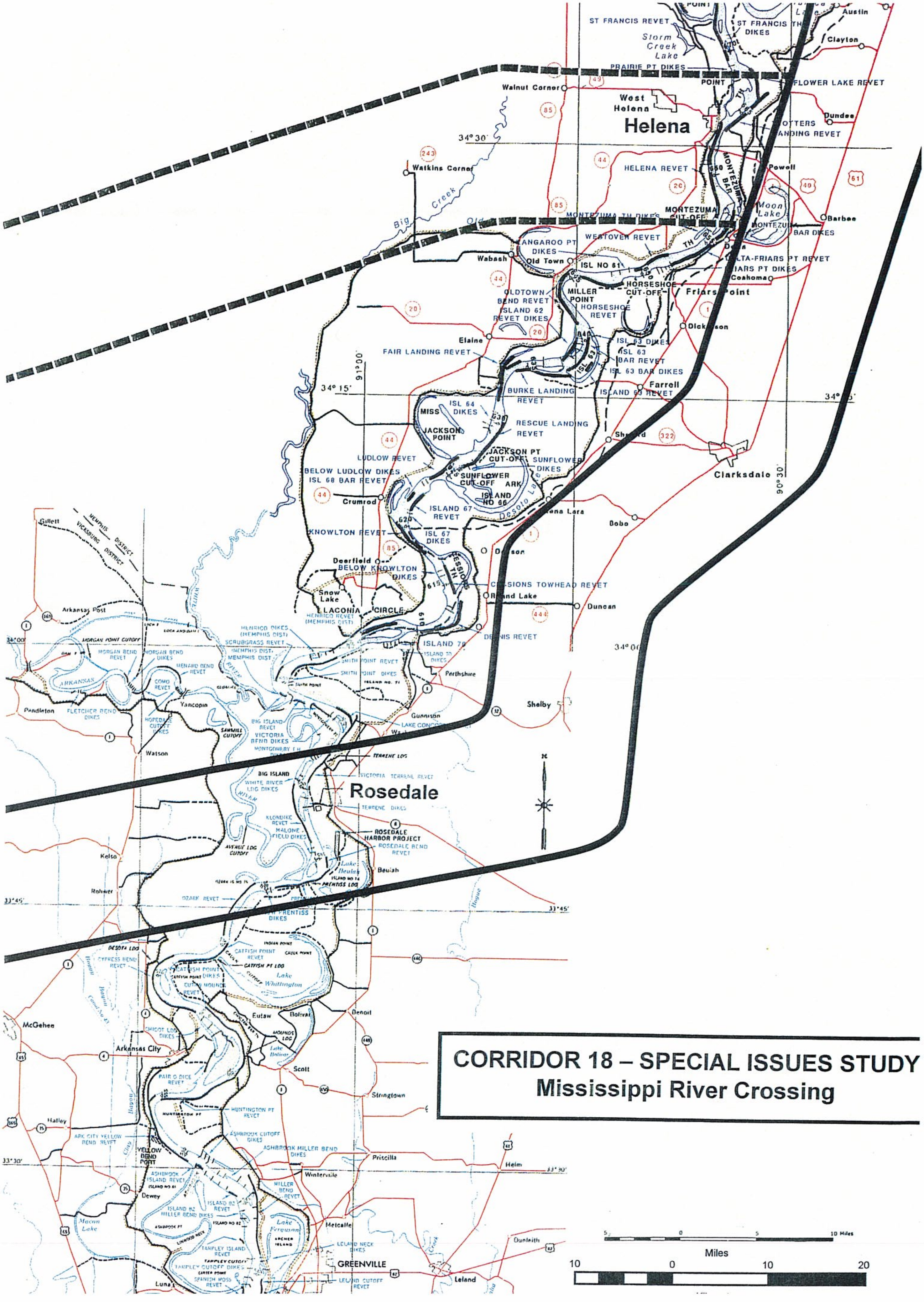
Communities Served	Length	Cost for Conventional Four-Lane Interstatate
Henderson Morganfield Marion Eddyville Paducah Benton Mayfield Fulton	140 miles	$ 850 Million




Tennessee
KY
MO
AK
MS
Union City
Dyersburg
Jackson
Memphis
155
40
240
Layers
US 51
County Boundaries
State Boundaries
Cities
Note: All Corridors have a 5-Mile Radius
Miles
0 5 10 15 20


Stage Const. U /W
Paving FY 97
4–Lane
Stage Const. U /W
Paving FY 97
4–Lane
Stage Const. U /W
Paving Funded
4–Lane
Stage Const. U /W
4–Lane
MUNFORD
MASON
BRADEN
GALLAWAY
MILLINGTON
ARLINGTON
BARTLETT
LAKELAND
OAKLAND
SHELBY
MEMPHIS
GERMANTOWN
COLLIERVILLE
PIPERTON
ROSSVILLE
River
Mississippi
Const. Complete
6–Lane
Const. Complete
6–Lane
Const. U /W
6–Lane
Stage Const. U /W
Paving FY 97
4–Lane
ROW U /W
Stage Const. Funded
4–Lane
EIS U /W
ENG. Funded
4–Lane


N
W
E
S
LITTLE ROCK
Clarendon
St. Francis National Forest
Helena
Bayou Meto W.M.A.
Pine Bluff
Dewitt
White River National Wildlife Refuge
Clarksdale
Shelby
Rosedale
Fordyce
Camden
Warren
Monticello
Greenville
Texarkana
Magnolia
El Dorado
Crossett
Felsenthal National Wildlife Refuge
Bayou Bodcau Reservoir
Haynesville
Kisatchie National Forest
Homer
SHREVEPORT
40
30
20
55
61
79
49
167
425
65
82
165
Area of Environmental Concern
Interstate
US Route
Other Route
SCALE
Miles
0
20
Kilometers
0
50
CORRIDOR 18 – SPECIAL ISSUES STUDY
Memphis to Shreveport



CORRIDOR 18 – SPECIAL ISSUES STUDY
Mississippi River Crossing

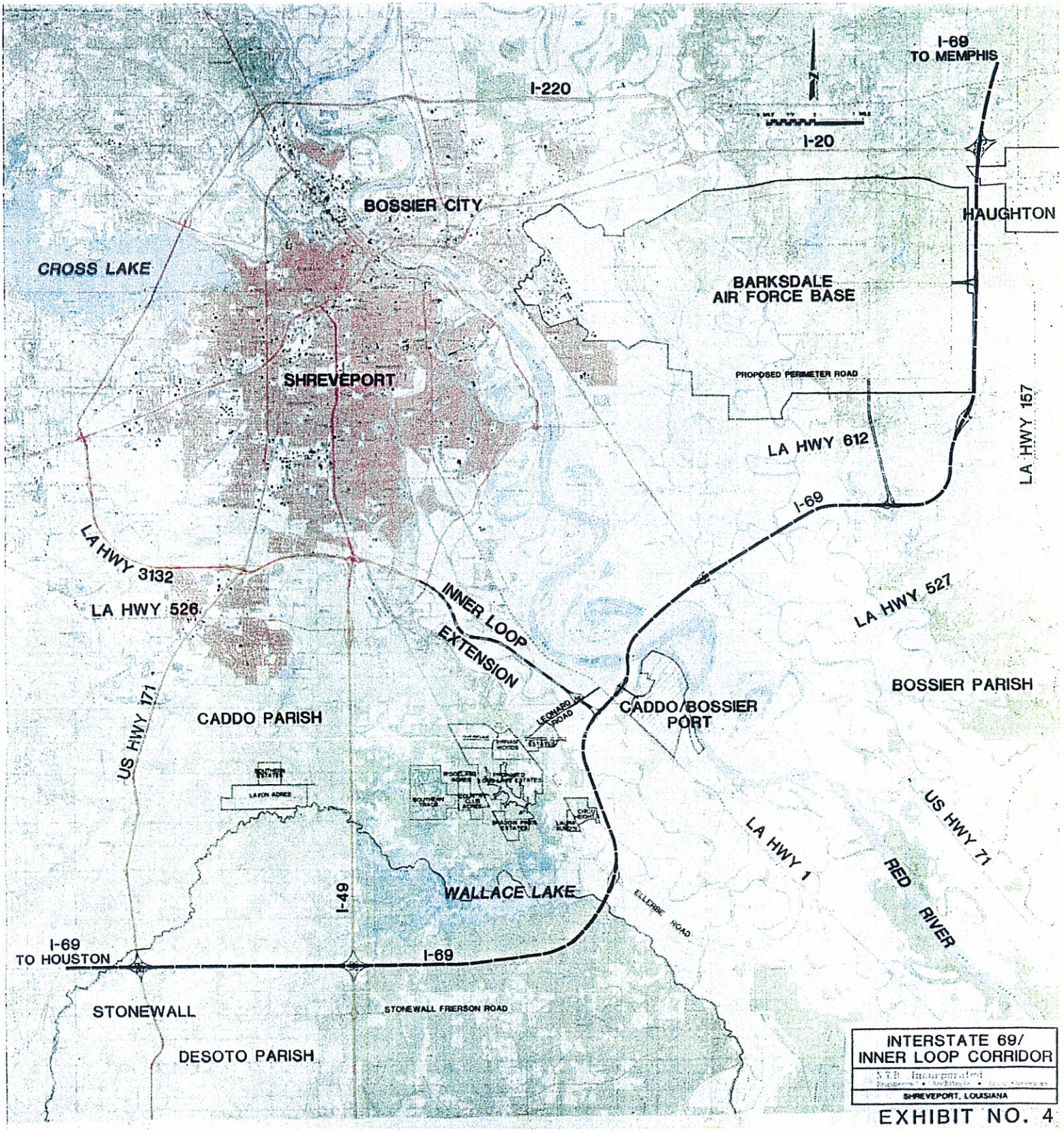
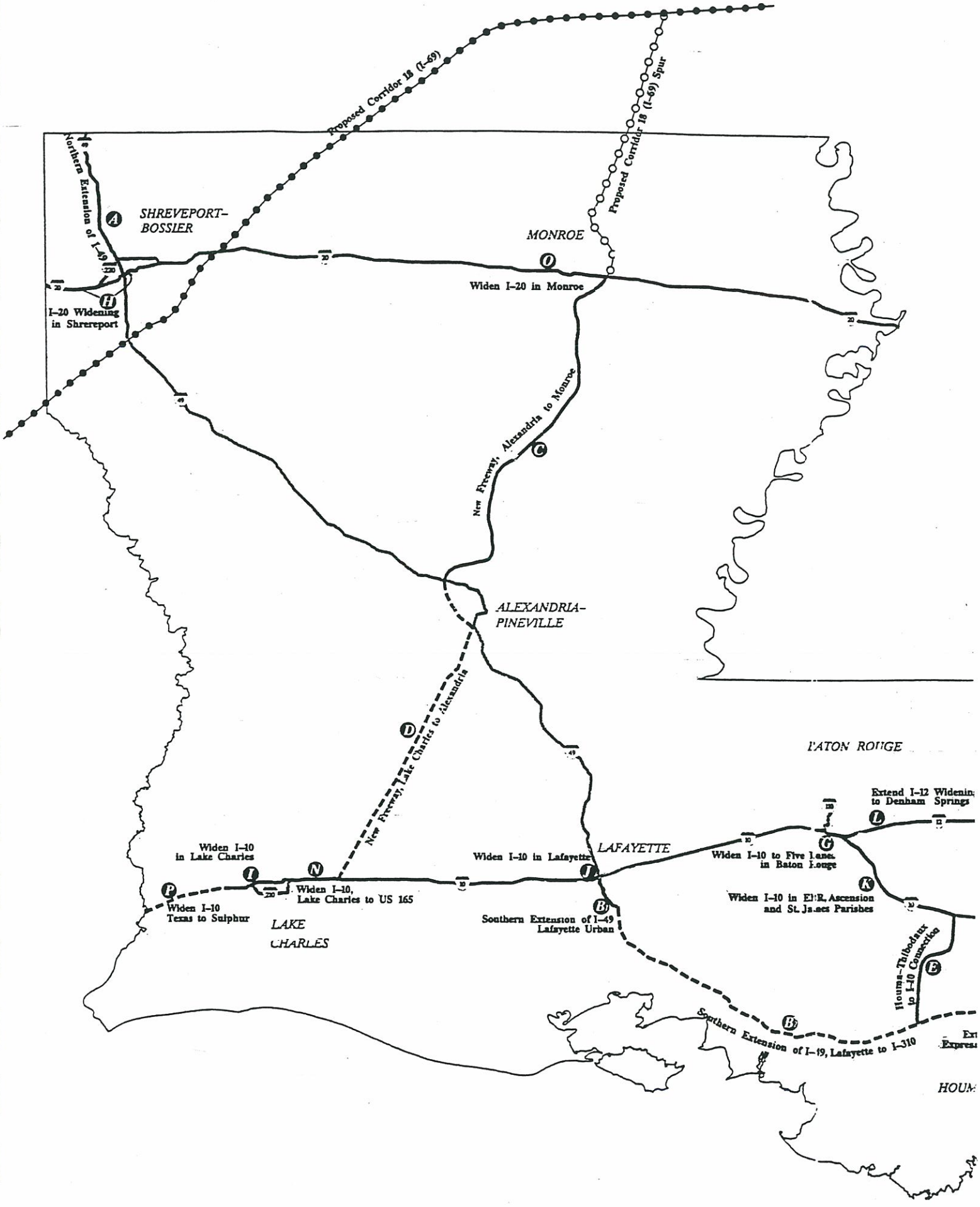
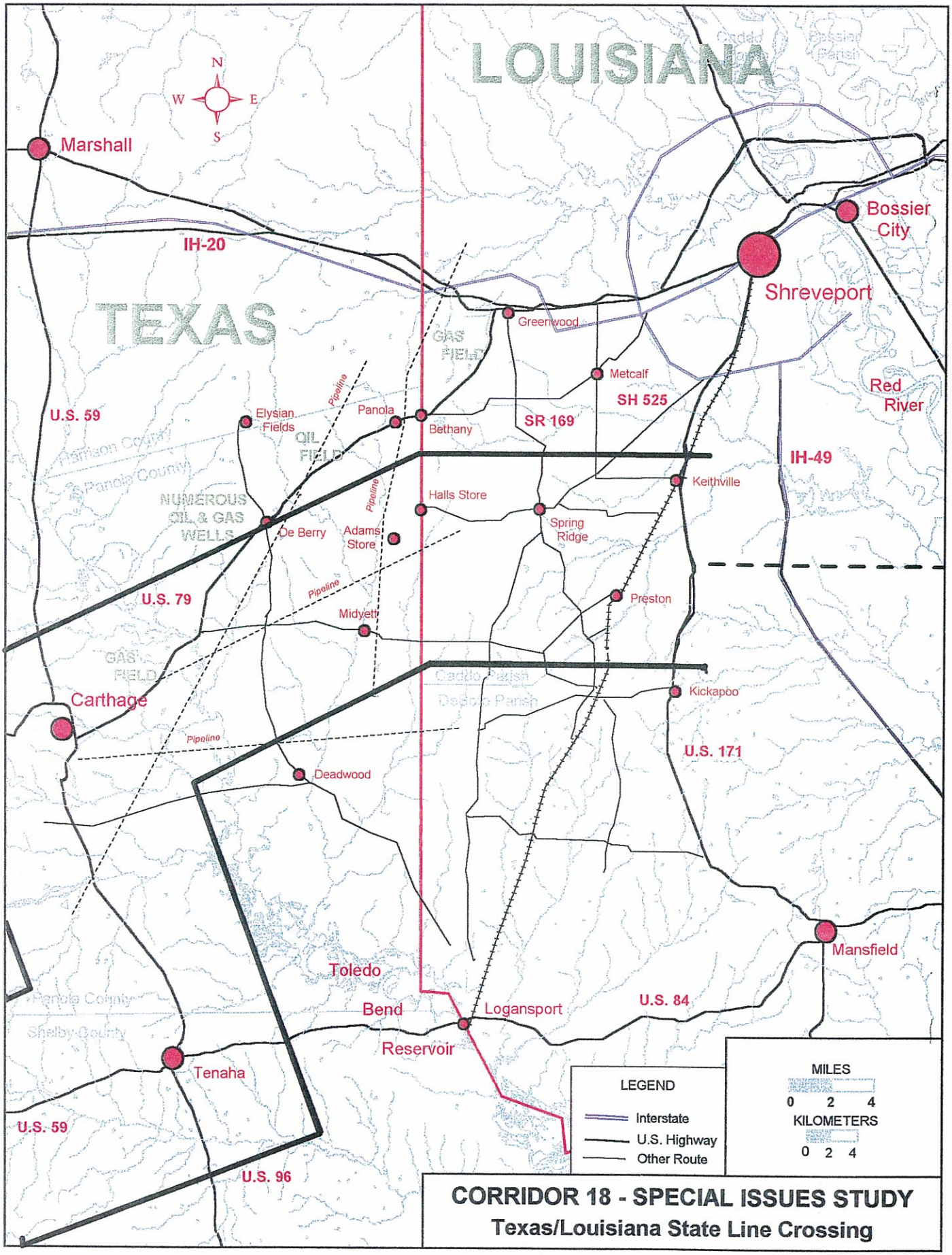

I-69
TO MEMPHIS
I-220
I-20
BOSSIER CITY
HAUGHTON
CROSS LAKE
BARKSDALE
AIR FORCE BASE
PROPOSED PERIMETER ROAD
SHREVEPORT
LA HWY 157
LA HWY 612
I-69
LA HWY 3132
LA HWY 526
INNER LOOP
EXTENSION
LA HWY 527
BOSSIER PARISH
CADDO PARISH
CADDO/BOSSIER
PORT
LEONARD ROAD
US HWY 171
LAYCO ACRES
US HWY 71
LA HWY 1
RED RIVER
I-49
WALLACE LAKE
ELLERBE ROAD
I-69
TO HOUSTON
I-69
STONEWALL
STONEWALL FRIERSON ROAD
DESOTO PARISH
INTERSTATE 69/
INNER LOOP CORRIDOR
SHREVEPORT, LOUISIANA

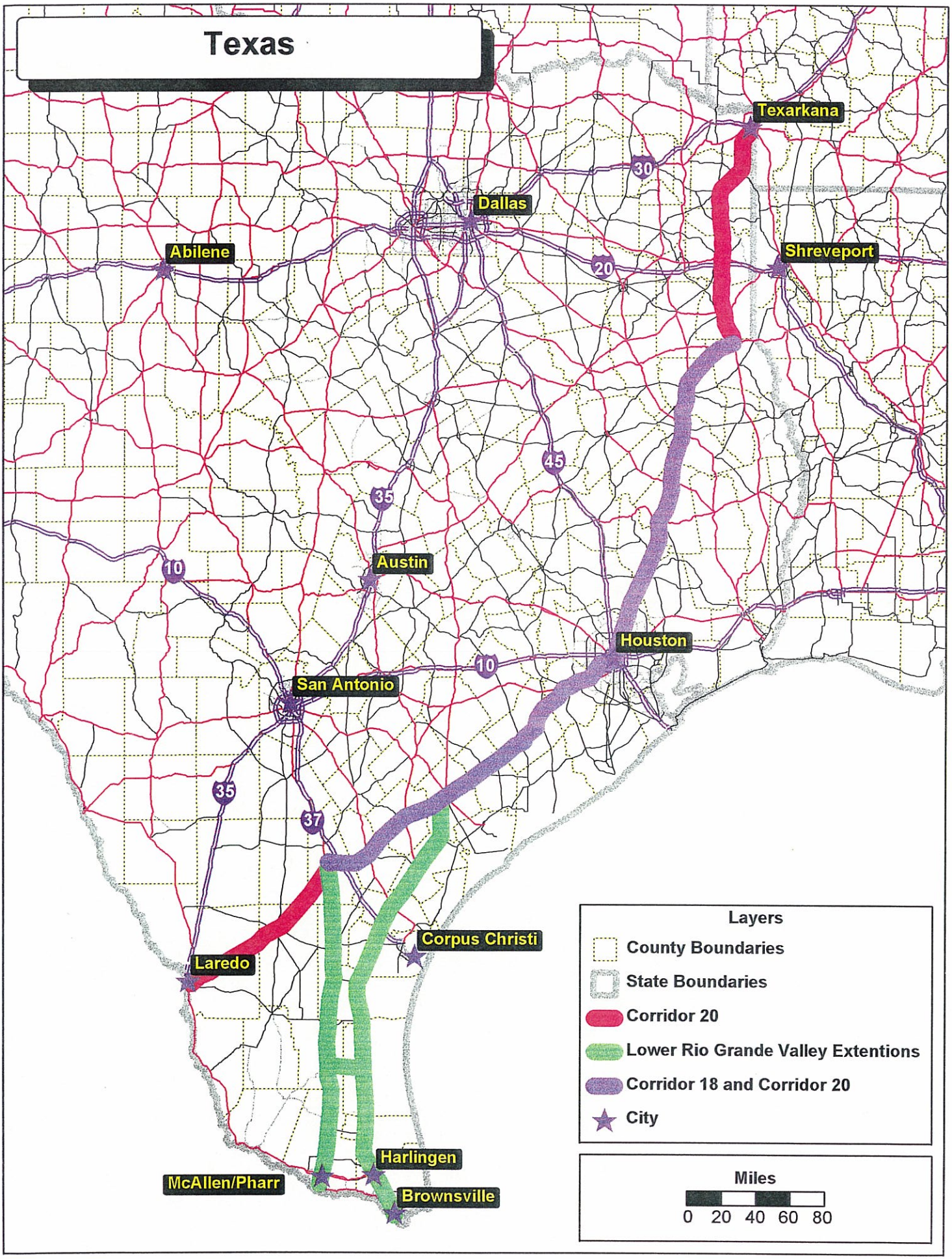
EXHIBIT NO. 4


Proposed Corridor 18 (I-69)
Proposed Corridor 18 (I-69) Spur
Northern Extension of I-49
A
SHREVEPORT-
BOSSIER
MONROE
O
Widen I-20 in Monroe
H
I-20 Widening
in Shrereport
New Freeway, Alexandria to Monroe
C
ALEXANDRIA-
PINEVILLE
D
New Freeway, Lake Charles to Alexandria
BATON ROUGE
Extend I-12 Widening
to Denham Springs
L
G
Widen I-10 to Five Lanes
in Baton Rouge
Widen I-10
in Lake Charles
I
N
Widen I-10 in Lafayette
LAFAYETTE
J
K
Widen I-10 in E.B.R, Ascension
and St. James Parishes
P
Widen I-10,
Lake Charles to US 165
Widen I-10
Texas to Sulphur
LAKE
CHARLES
B
Southern Extension of I-49
Lafayette Urban
Houma-Thibodaux
to I-10 Connection
E
B
Southern Extension of I-49, Lafayette to I-310
HOUMA



CORRIDOR 18 - SPECIAL ISSUES STUDY

Texas/Louisiana State Line Crossing

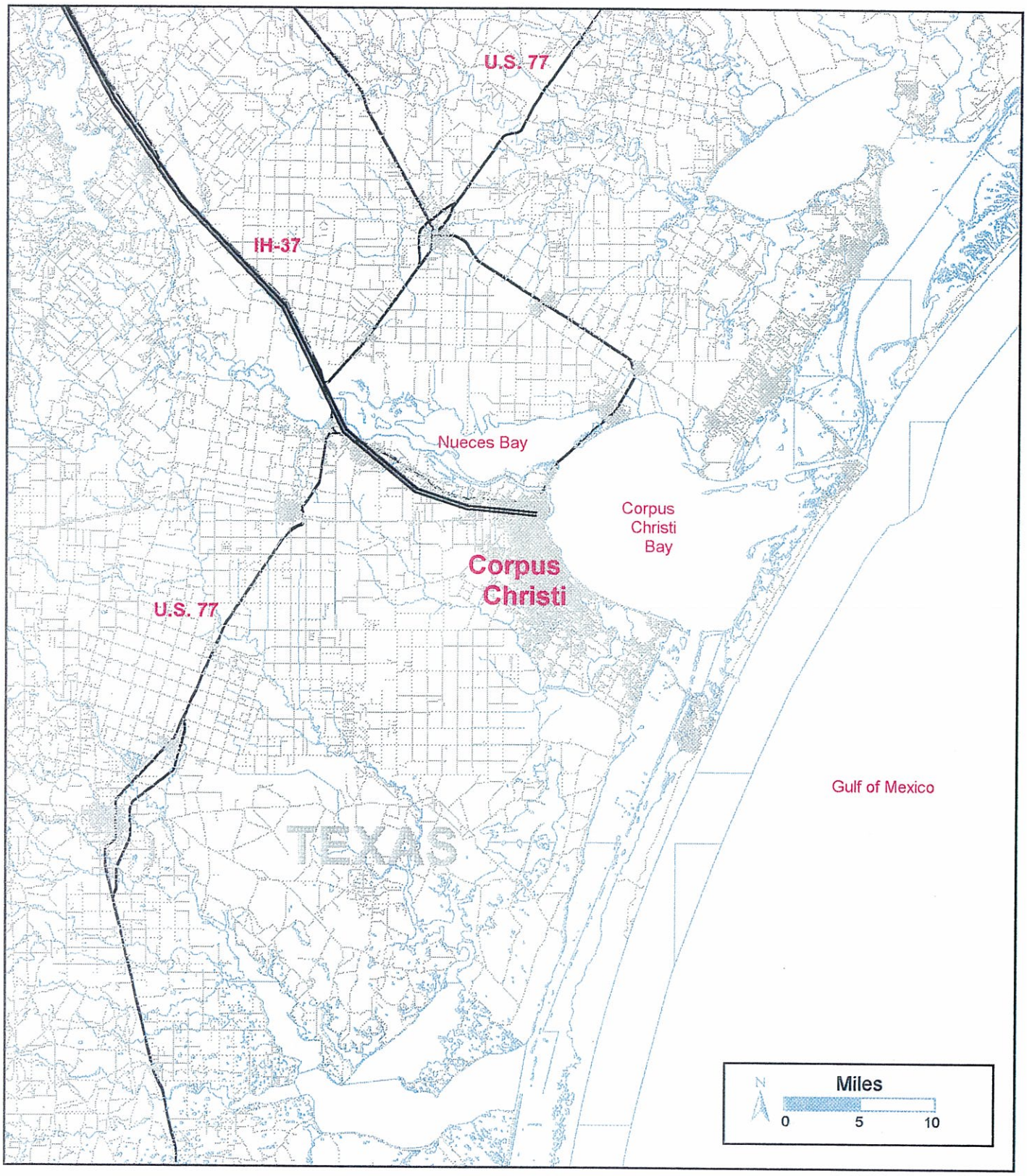

Texas
Texarkana
Dallas
Abilene
Shreveport
Austin
Houston
San Antonio
Corpus Christi
Laredo
Harlingen
McAllen/Pharr
Brownsville
30
20
45
35
10
10
35
37
Layers
County Boundaries
State Boundaries
Corridor 20
Lower Rio Grande Valley Extentions
Corridor 18 and Corridor 20
City
Miles
0 20 40 60 80

HOUSTON
Kingwood
Westfield
Huffman
Kohrville
Bammel
North Harris County College
Houston Intercontinental Airport
Humble
Lake Houston
Jersey Village
North Houston
Aldine
National VA Cemetery
Crosby
Alexander Deussen Park
Eisenhower Park
Sheldon Wildlife Management Area
Sheldon Reservoir
Barrett
Sheldon
Highlands
Bear Creek Park
Addicks Reservoir (Flood Control)
Spring Valley
Hilshire Village
Vehicle Titles Reg. Div. Reg. Office
Texas Dept of Trans Dist Off
Addicks
Hedwig Village
Bunker Hill Village
Piney Point Village
Hunters Creek Village
Memorial Park
City Hall
Channelview
Cedar Bayou
Baytown
Jacinto City
Galena Park
Barker Reservoir (Flood Control)
Alief
Univ of St Thomas
Rice Univ
Hermann Park
Texas MedCen
Univ of Houston
Texas Southern University
West University Place
Bellaire
Southside Place
Astrodome
Houston Baptist University
Battleship Texas
San Jacinto Battleground
Lee College
Alexander Island
Pasadena
Deer Park
La Porte Mun Airport
Morgans Point
La Porte
Shoreacres
Sugar Land
Meadows
Stafford
Missouri City
South Houston
William P Hobby Airport
San Jacinto College
San Jacinto College South
Ellington Field
Brookside Village
Pearland
Almeda
University of Houston at Clear Lake City
NASA (LYNDON B JOHNSON SPACE CENTER)
Taylor Lake Village
El Lago
Seabrook
Nassau Bay
Clear Lake Shores
Clear Lake Area
Kemah
Webster
Manvel
Fresno
Arcola
Booth
FORT BEND COUNTY
BRAZORIA COUNTY
HARRIS COUNTY

CONNECTIONS TO CORPUS CHRISTI, TEXAS

Corridor 18 Special Issues Study

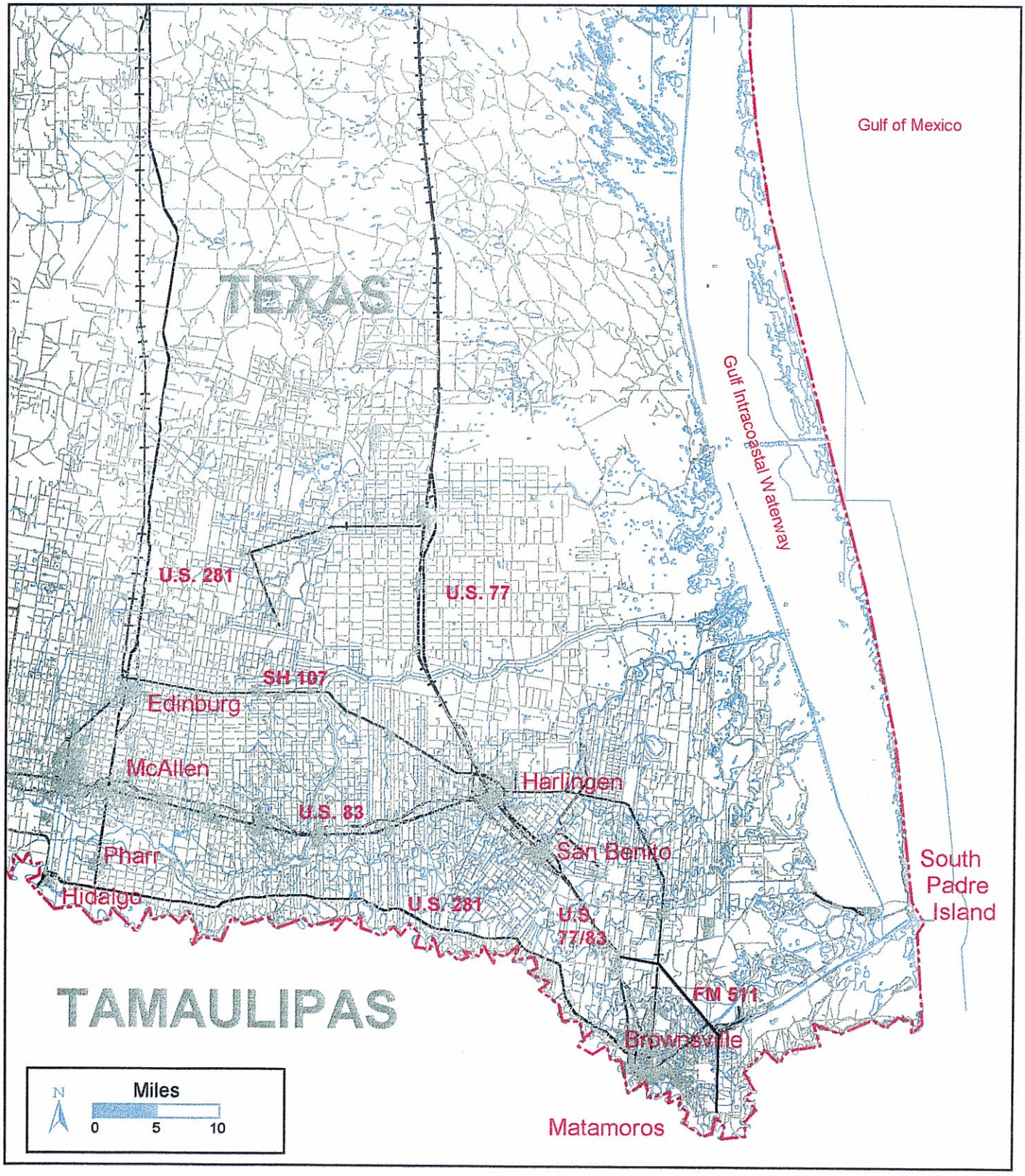
Shreveport, LA to the Lower Rio Grande Valley



CONNECTIONS TO THE LOWER RIO GRANDE VALLEY

Corridor 18 Special Issues Study

Shreveport, LA to the Lower Rio Grande Valley



UNITED STATES/MEXICO BORDER CROSSINGS

Corridor 18 Special Issues Study

Shreveport, LA to the Lower Rio Grande Valley