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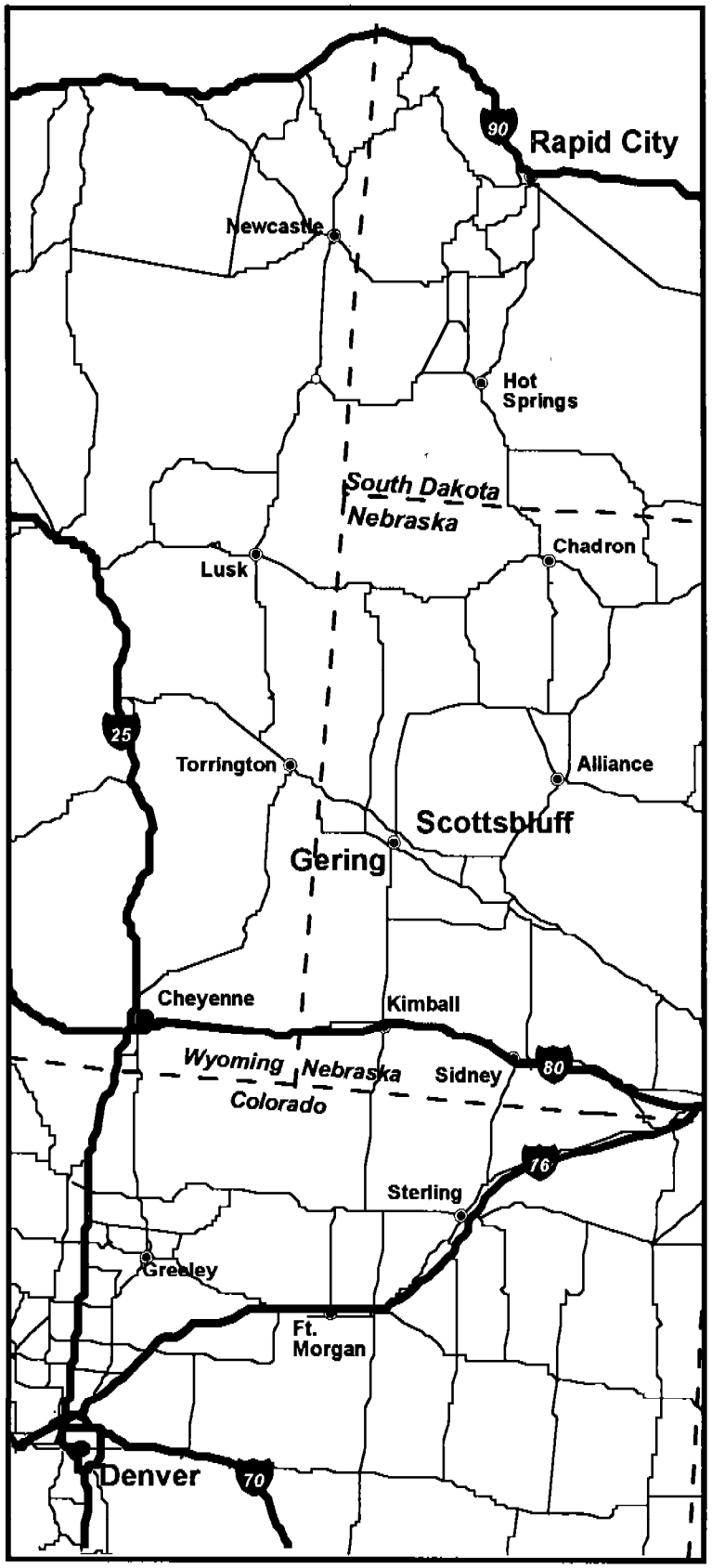

Final Report

HEARTLAND EXPRESSWAY

Economic and Engineering Feasibility Study

Scottsbluff, NE - Rapid City, SD

submitted to:
NEBRASKA DEPARTMENT OF ROADS
and
SOUTH DAKOTA DEPARTMENT
OF TRANSPORTATION

submitted by:
WILBUR SMITH ASSOCIATES
in association with
WELLS ENGINEERS
BAKER & ASSOCIATES

1993

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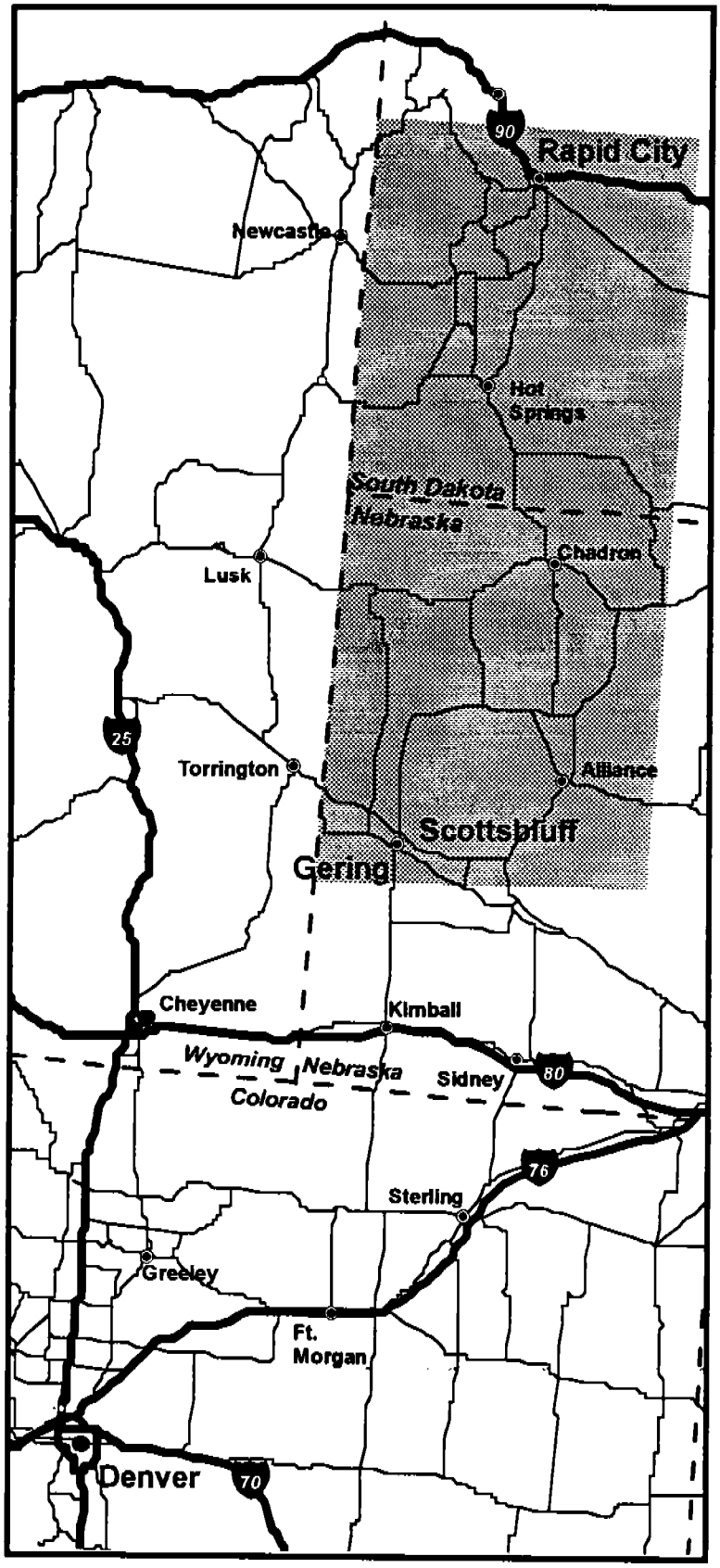

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ENGINEERS • ARCHITECTS • ECONOMISTS • PLANNERS
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December 31, 1993

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Dear Messrs. Yonkey and Jenssen:

Wilbur Smith Associates is pleased to submit the Heartland Expressway Study Final Report. This report describes an 18-month examination of the Rapid City to Scottsbluff/Gering corridor. The study concludes that certain highway investments in the corridor are feasible.

We would like to thank the study's Advisory Committee, the Nebraska Department of Roads, the South Dakota Department of Transportation, and the Federal Highway Administration for their extensive contributions to this highway corridor evaluation.

Respectfully submitted,

WILBUR SMITH ASSOCIATES

Robert J. Zuelsdorf
Senior Vice President

RJZ/pms

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CONGRESSIONAL MANDATE

The "Intermodal Suface Transportation Efficiency Act of 1991" (ISTEA - Public Law 102-240) calls for the development of High Priority Corridors on a National Highway System. The Act of Congress states that the "development of the transportation corridors is the most efficient and effective way of integrating regions and improving efficiency and safety of commerce and travel and further promoting economic development." The Act also calls for the preparation of long-range plans and feasibility studies for these high priority corridors.

The Act identifies the Heartland Expressway from Denver through Scottbluff to Rapid City as a high priority corridor. The Act also authorizes a feasibility study of an expressway or other highway improvements from Rapid City to Scottsbluff. The study, as called for in the Act, is to make recommendations concerning the feasibility and the best route for the Heartland Expressway. This brief document summarizes the feasibility study called for in the Act. For greater information concerning the feasibility study, please refer to the study's Final Report.

STUDY ISSUES

Many residents of the panhandle of Nebraska and western South Dakota have long wanted a four-lane highway connecting their regions to Interstates 80 and 90. They believe that such a highway would stimulate economic development and tourism in the region. The expressway is perceived as a natural draw for tourists into the Black Hills of South Dakota and the national parks and recreational areas in western Nebraska. In addition, the region's communities need to diversify their economic base by attracting new industry to the area.

Western South Dakota's desire for a four-lane expressway is different from that of western Nebraska. Over the last several decades, Rapid City's economy has been outperforming the rest of South Dakota and much of the nation. A doubling of the manufacturing sector and a large increase in the tourism industry has strained the area's transportation system. This area has excellent east-west travel via Interstate 90. However, the region does not have four-lane access to the south, primarily to Denver, which is the nearest large metropolitan area. Construction of a four-lane Heartland Expressway would overcome this north-south access deficiency.

STUDY PURPOSES

Currently, north-south highways in western Nebraska and western South Dakota are not operating at congested levels, are not over capacity, and most have quite low traffic volumes. Therefore, this study does not evaluate the feasibility of the Heartland Expressway simply based on existing levels of traffic or solely on travel efficiency improvments. Instead, the study examines alternative transportation roles for the Heartland Expressway, and determines whether such a highway might assist the region to develop economically. The study includes reviews of alignment options, road standards, traffic demands, conceptual design, costs, economic benefits, and environmental impacts and implications. The primary study focus, however, is economics, and what the Heartland Expressway might do for the area's economy, and the area's general well-being. The study concludes that a major investment is economically feasible, and identifies the route that is expected to provide the greatest economic development benefit.

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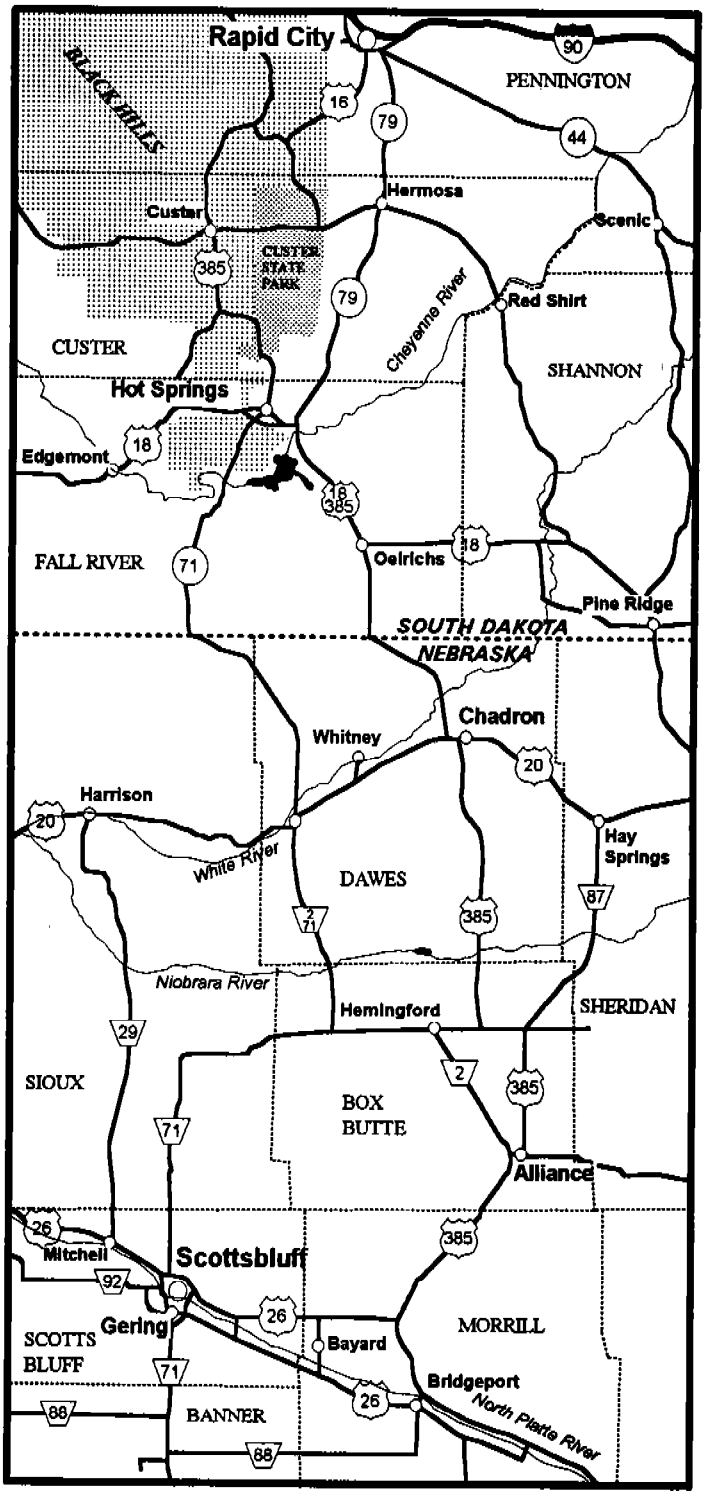
HEARTLAND EXPRESSWAY CORRIDOR REGION

The Heartland Expressway Feasibility Study explores a variety of highway route options between Rapid City and Scottsbluff/Gering. The corridor extends from Rapid City, South Dakota on the north to Scottsbluff/Gering, Nebraska on the south, to the Wyoming border on the west, and to Nebraska Highway 27 and eastern Shannon and Pennington Counties in South Dakota on the east. The corridor area is approximately 200 miles long and 100 miles wide, and contains thirteen counties, seven in South Dakota and six in Nebraska. The thirteen-county corridor area is overwhelmingly rural, with a 1990 total population of approximately 227,000 persons. The corridor area community populations greater than 5,000 are: Rapid City (54,523), Scottsbluff/Gering (21,657), Alliance (9,765), Spearfish (6,966), Chadron (5,588), and Sturgis (5,330).

Regardless of the proximity of the two regions, western Nebraska and western South Dakota are two very diverse areas with different economic bases and different reasons for desiring the Heartland Expressway. The economy of western South Dakota has been flourishing over the last couple of decades. The area has grown significantly in population, which is primarily caused by the growth of the tourism industry as well as a doubling of the manufacturing sector. The desire for a Heartland Expressway from western South Dakota's perspective is to improve north-south travel, connecting the region to Interstate 80 and Denver, thereby expanding its tourist market and ability to attract additional industry. Western Nebraska, on the other hand, has experienced a declining population and slow growth in employment. The Heartland Expressway, from the panhandle region of Nebraska's perspective, is seen as an investment to stimulate the region's economy.

The Heartland Expressway region is currently served by numerous rather indirect two-lane north-south highways (see adjoining map). There is no north-south four-lane highway in the region.



HEARTLAND CORRIDOR

The existing system of highways was designed to serve local access needs of the area's communities, businesses and residents. It was not designed for longer distance, higher speed north-south travel. As a result the existing highway system serves a very different purpose than would the Heartland Expressway, and existing travel volumes are therefore less relevant. A review of the existing highway system suggests a number of things relative to the Heartland Expressway:

- There is currently no direct highway between Scottsbluff/Gering and Rapid City. Therefore any traffic between the two endpoints either uses a mix of existing 2-lane roads in the corridor, or uses north-south routes to the west in Wyoming or further east.

- The existing network is a myriad of two-lane highways designed for local access purposes. The existing network was never designed for longer-distance, higher speed travel. If a Heartland Expressway is to be built, it will comprise a totally new travel option to the region.

HEARTLAND EXPRESSWAY HIGHWAY ROLES

The Heartland Expressway could significantly improve transportation and mobility in the panhandle of Nebraska and western South Dakota. The existing north-south highways in the corridor play a predominantly local access function. If the Heartland Expressway is built, the local access function would be improved; in addition, longer distance traffic would be introduced to the corridor, with its accompanying economic benefits.

If the Heartland Expressway is constructed, it could accomplish a number of objectives:

- It would improve access to communities, recreational and tourist sites, and economic activities in proximity to the highway.

- It might influence longer distance multi-state travel, by diverting traffic to the highway, and inducing additional travelers and tourist to the region.

- It would help the region's communities to be better able to compete for new industries and new types of economic development.

This study finds that these changes will generate economic benefits not only to western Nebraska and western South Dakota, but also to both States statewide.

Most residents and businesses of the corridor area would benefit directly because they would have a significantly improved highway upon which to travel. Transportation benefits would include:

- Better access to the Interstate Highway System.

- Better access to communities for shopping, educational, work and social purposes.

- Improved accessibility for emergency medical care and overall better access to health facilities.

- Easier and more efficient goods transportation.

- A potentially safer highway.

- An improved all weather highway, especially for school buses, emergency vehicles, etc.

- Better access to the region's tourist and recreation sites.

In addition to these obvious direct benefits, the highway will assist in the region's attempts to diversify its economic base, by reducing the costs of doing business in the corridor, by making the area more accessible to tourists, and by generally making the area more competitive.

HEARTLAND EXPRESSWAY ROUTE AND HIGHWAY ALTERNATIVES

The ISTEA of 1991 specified that the Heartland Expressway Feasibility Study explore the feasibility of a new highway between Scottsbluff/Gering, Nebraska and Rapid City, South Dakota. This study responds to that congressional directive by exploring all practical routes between the two designated cities. The logical corridor region includes routes within a 50 mile band either side of a direct line between Scottsbluff and Rapid City. Any route outside of this area would yield a severely circuitous highway and was not considered.

HIGHWAY OPTIONS STUDIED

This study examines the feasibility of three highway type alternatives:

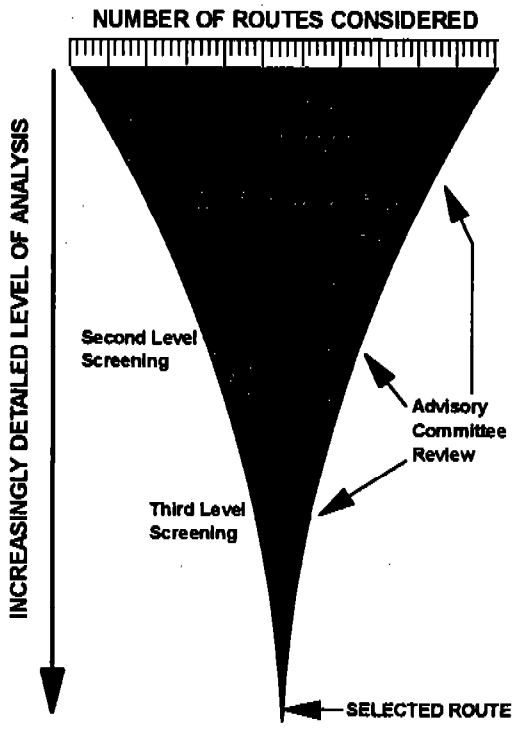
4-lane freeway type highway (65 mph) - This alternative is a four-lane divided highway with complete access control and grade separations at all intersections. This alternative would be comparable to Interstates 80 and 90.

4-lane expressway type highway (55 mph) - This alternative is four-lane divided highway with partial access control. The majority of intersections and crossings would be at-grade.

2-lane highway with some 4-lane sections - This alternative would provide a four-lane expressway type highway where traffic volumes are greatest, and the remaining portions of the highway would be an improved two-lane with uphill passing lanes, paved shoulders and turning lanes where necessary. All sections would have partial access control.

ROUTE SCREENING PROCESS

The routes considered for the Heartland Expressway add to over 50 route combinations, which is too many to evaluate in detail. To enable a reasonable evaluation, this study follows a formalized "screening process," whereby the route options were considered and, as evidence accumulated, the less desirable options were eliminated.



The screening process is divided into three sequential "analysis levels":

- In Analysis Level #1, all routes are considered and, based principally on logic and in concert with the study's Steering and Advisory Committees, many routes and route segments are eliminated.
- In Analysis Level #2, the options that survived Analysis Level #1 are examined in terms of cost, travel time, route length, accessibility, tourism, and economic development potential. This analysis selected three "finalist" route options to be studied in detail.
- In Analysis Level #3, the three "finalist" options are analyzed in terms of more detailed economic feasibility, environmental issues, and other criteria.

Based on these analyses, one "selected" route is defined.

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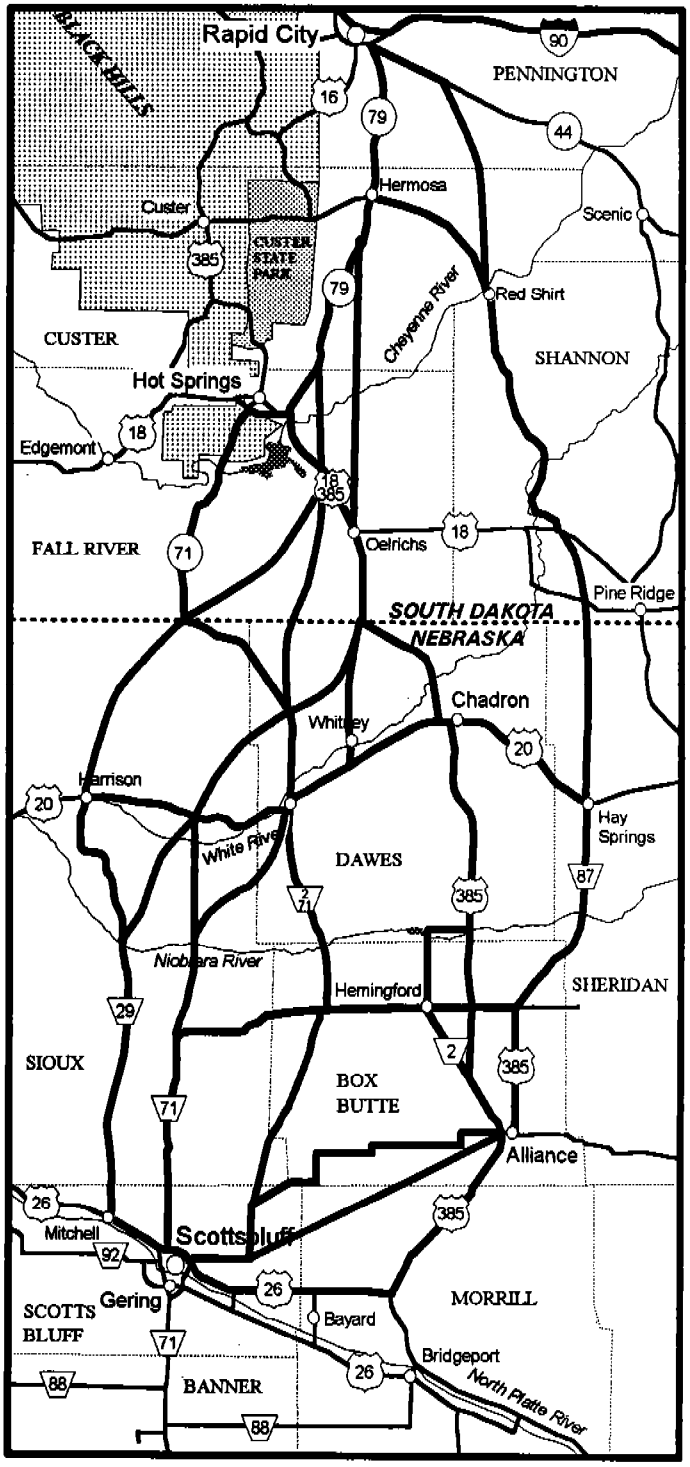
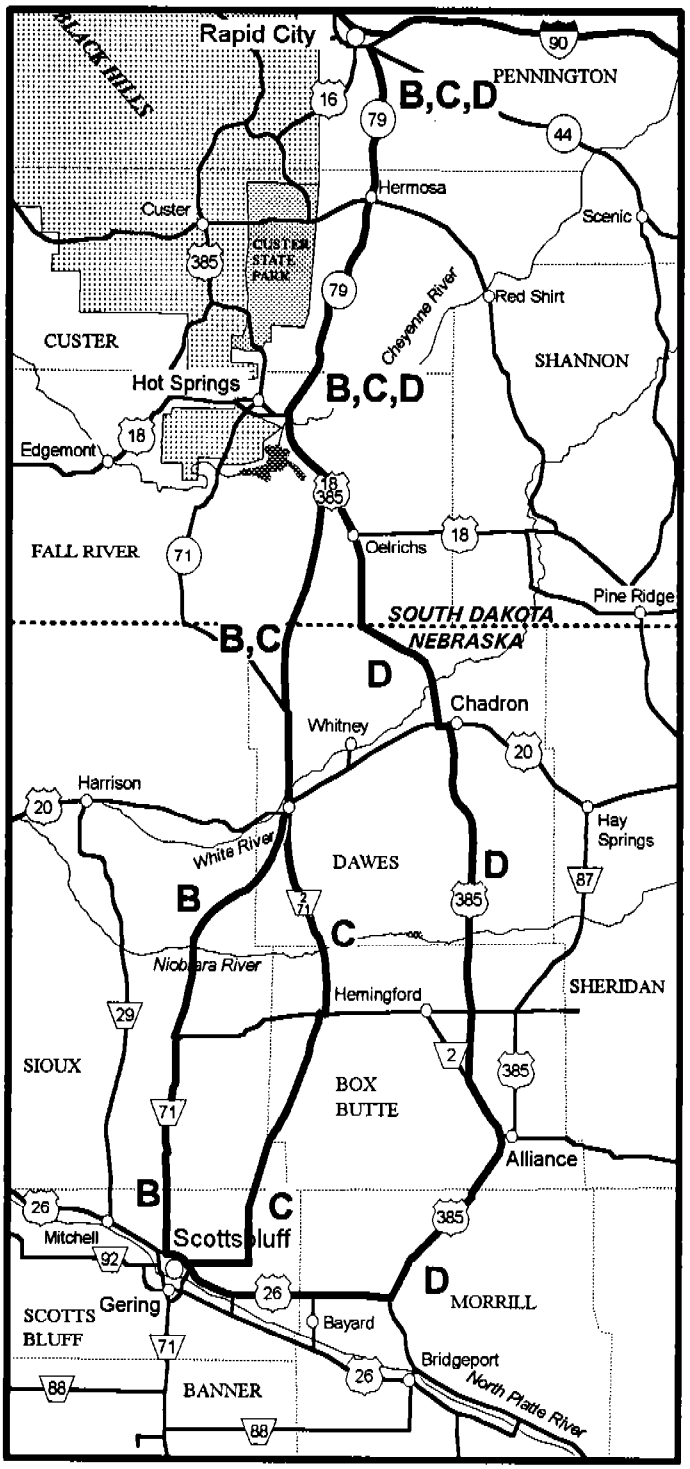


ROUTE OPTIONS CONSIDERED



THREE "FINALIST" ROUTE OPTIONS

Existing Highway Alignment
New Highway Alignment

CONVENTIONAL FEASIBILITY EVALUATION

The primary issue in the study is whether the Heartland Expressway is feasible. To measure the feasibility of the Heartland Expressway, five "tests of feasibility" are applied:

- **Need Based on Traffic** - Is the Heartland Expressway warranted based on current and forecast traffic volumes?
- **Engineering and Cost Feasibility** - Are there any unusual engineering difficulties, and what would the Heartland Expressway cost to build and operate?
- **Environmental Feasibility** - Can the Heartland Expressway be constructed without undue harm to the environment?
- **Travel Efficiency Feasibility** - Will the Heartland Expressway cause sufficient road user benefits to justify the investment?
- **Economic Development Feasibility** - Will the Heartland Expressway cause sufficient economic activity to justify the investment?

The three "finalist" route options and three highway standard options are subjected to the five feasibility tests.

NEED BASED ON TRAFFIC

Both automobile and commercial truck traffic were extensively studied. Roadside surveys were conducted, a computerized traffic model was developed, and surveys were conducted of trucking firms, shipping firms, and other businesses in the region that rely on highway transportation. Traffic estimates were made for all Heartland Expressway alternatives. The traffic forecasts suggest the following concerning feasibility based solely on traffic:

- Most states start planning to widen rural two-lane highways to four-lanes when existing daily traffic volumes reach 5,000 to 6,000 vehicles per day. Based on the current highway system in western Nebraska and South Dakota, none of the highways in the region (other than the interstate highways) presently meet that threshold and, only South Dakota Highway 79 between Rapid City and Hermosa is forecast to reach this threshold by the year 2015.
- However, during peak times of the year (summer tourist and fall harvest seasons), the segment between Scottsbluff/Gering and Alliance and the segment between Rapid City and Hermosa currently reach this traffic threshold.
- From the more tourst-oriented South Dakota northern end of the corridor perspective, the more direct western alignments (Route Options B and C) are more effective in attracting traffic than is the more circuitous eastern alignment (Route Option D). This is because the more direct alignments are better able to attract the Denver area tourist traffic to the Black Hills.
- From the perspective of the Nebraska communities, the eastern alignment (Route Option D) has greater traffic volumes at the southern end than do the western alignments (Route Option B and Route Option C). This is because of traffic routing patterns on the south plus the ability of Route Option D to serve the Alliance and Chadron population centers in addition to Scottsbluff/Gering.
- From the Wyoming perspective, the eastern alignment (Route Option D) is best because it diverts the least traffic from eastern Wyoming. This is important to Wyoming because its communities rely on that traffic for sizeable shares of their economic activity.

ENVIRONMENTAL FEASIBILITY

Regardless of the alignment and highway option selected for the development of the Heartland Expressway, there will likely be impacts in almost every category of the natural, human, and cultural environments. The intensity of such impacts will depend, to a great extent, on the following:

- **Highway Type** - A freeway will require more right-of-way than either an expressway or an upgraded two-lane facility. As a result, related impacts are likely to be greater.

- **New Location** - Improvements made on existing highway alignments are likely to have less impact on the environment than highways on new locations.

- **Bridges** - Rivers and their associated floodplains and riparian environments constitute an area of potential impact when new bridges are introduced.

The study's environmental overview suggests that it is not likely that any environmental impacts will be so critical that they cannot be avoided or mitigated during construction.

The primary reason for the relatively low level of anticipated impacts is the fact that most alignments are being proposed along existing highway routes. Land use patterns, transportation patterns, and ecological functions have adapted to the presence of the existing highways. As a result, expansion, upgrade, or modest realignment of these highways is likely less harmful to the natural and manmade environments than would a new highway on new alignment. However, there are numerous environmentally sensitive areas in western Nebraska and western South Dakota where proper care needs to be taken to avoid these areas or minimize negative impacts.

Additional environmental work will be needed if the Heartland Expressway moves into its more detailed alignment and engineering phases.

ENGINEERING AND COST FEASIBILITY

Each route was field inspected, key construction and engineering issues were identified, and costs of highway construction were estimated. While the terrain in western Nebraska and western South Dakota can be quite severe, it was determined that any of the options can be constructed from an engineering perspective. However, final determination of engineering feasibility will require detailed alignment investigations which are beyond the scope of this planning study.

The Heartland Expressway, regardless of the route alignment or highway standard, will be quite expensive to build and maintain. In order to evaluate each alternative, cost estimates were developed for each "finalist" route option and each highway standard. The total construction cost estimates for the different improvement options include right-of-way acquisition, planning, design, and construction. These cost estimates should be viewed as "order of magnitude" estimates, suitable for feasibility testing purposes, but certainly subject to refinement in any future study.

In addition to the costs of constructing the highway, there will be more road to upkeep and maintain. This includes additional snow removal, mowing, striping, crack sealing, and other work activities. The capital costs and annual maintenance costs are shown below.

COST SUMMARY
($ Million)

	Total Construction	Annual Maintenance
Route Option B		
Freeway	$310.6	$1.35
Expressway	257.6	1.11
Two/Four Lane	145.2	0.55
Route Option C		
Freeway	$327.7	$1.28
Expressway	264.7	0.95
Two/Four Lane	147.3	0.33
Route Option D		
Freeway	$326.9	$1.53
Expressway	260.0	1.03
Two/Four Lane	147.7	0.50

TRAVEL EFFICIENCY FEASIBILITY

According to the Act, high priority corridors are an efficient and effective way of integrating regions and improving efficiency and the safety of commerce. This is true, since four-lane highways create a more economically efficient method of vehicle transportation than do two-lane highways. By eliminating unnecessary vehicle stops and by making passing easy and safe, four-lane highways create a safer travel environment. The travel efficiency evaluation measures these direct improvements in terms of car and truck vehicle cost savings and compares those travel efficiencies with the cost of the improvement. The highway user benefits are measured in terms of vehicle operating cost savings (fuel, tires, vehicle maintenance, etc), value of travel time saved, and accident reduction.

Transportation efficiency is a legitimate local, state, and national goal. If a new highway creates road user benefits that, over time, exceed the cost of the highway, then the road should be built.

Travel efficiency assessment is the traditional method of determining whether or not a highway improvement is economically feasible. According to this test of feasibility, a highway improvement must be quite successful in reducing per vehicle operating costs, travel time, and accident risk; and, it needs to have sufficient traffic volumes on the highway to attain the ncessary level of highway user economic benefits.

To determine whether or not a specific highway investment is economically feasible from the travel efficiency perspective, the user cost savings (cost, time, accidents) are compared with the highway's life cycle costs.

According to this travel efficiency economic feasibility measure, any highway improvement with a "benefit/cost ratio" of 1.0 or more, a positive "net present value," and a "rate of return" of seven percent or more, is economically feasible and should be built.

The table at the bottom of this page identifies the relative economic feasibility of each Heartland Expressway route and design standard in terms of travel efficiency. The travel efficiency feasibility calculations suggest the following conclusions:

- None of the Heartland Expressway route options are feasible from the travel efficiency perspective. This is because none of the alternatives have sufficient traffic volumes to produce user benefits greater than the highway improvement costs.

- The combination two/four lane options are more feasible than the freeway and expressway alternatives from the travel efficiency perspective. This is primarily caused by the lower construction costs required by the two/four lane options. In addition, the four-lane section portions of the two/four lane options are placed only in areas where the most traffic is found, thereby creating increased net highway user benefits.

It should be noted that travel efficiency is only one indicator of economic feasibility; the other test is economic development feasibility.

TRAVEL EFFICIENCY ECONOMIC FEASIBILITY RESULTS

	Net Present Value ($ Million)	Internal Rate of Return	Discounted Benefit/ Cost
Route Option B			
Freeway	-141.3	2.8%	0.59
Expressway	-141.9	1.7%	0.48
Two/Four Lane	-53.6	3.7%	0.65
Route Option C			
Freeway	-199.9	1.2%	0.45
Expressway	-151.9	1.6%	0.44
Two/Four Lane	-69.9	2.6%	0.53
Route Option D			
Freeway	-168.8	2.3%	0.56
Expressway	-101.2	3.5%	0.63
Two/Four Lane	-24.2	5.6%	0.84

ECONOMIC DEVELOPMENT FEASIBILITY

A key issue in this study is whether or not the Heartland Expressway will generate sufficient economic development activity in the two States to warrant the investment.

ECONOMIC OBJECTIVE

One objective of this study is to determine what level of highway investment, if any, is warranted between Scottsbluff/Gering and Rapid City. There are economic consequences of either underinvesting or overinvesting in the highway corridor. If the two States underinvest in the corridor, economic development will be inhibited because real and perceived travel costs will be greater, competitive position will be hindered, etc. There is therefore an economic cost associated with underinvestment in the Heartland Corridor. If the two States overinvest in the corridor, overall efficiency will suffer because those funds could have been put to better and more efficient use elsewhere. There is therefore an economic cost associated with overinvestment in the Heartland Corridor.

Recognizing these facts, this study seeks to define those highway investments, and those levels of investment, that are efficient (neither underinvested nor overinvested). This implies efficient and feasible use of tax dollars. The proper level of investment is calculated in terms of travel efficiency and economic development benefits, compared with the highway's costs.

ECONOMIC BASIS FOR A FEASIBLE HIGHWAY PROJECT

Investment in the Heartland Expressway contributes to economic development in that it will lower transportation costs which makes the corridor region increasingly attractive to other forms of investment. Such changes may be realized in numerous ways, including improved traffic safety, decreases in fuel and other vehicle operating costs, increased tourism, attraction of new industry, revised logistics, and changes in noise and air pollution. But in the final analysis, all of the direct benefits from the Heartland Expressway, and therefore the justification for investing in it, flow from using it for transportation.

Benefits from the Heartland Expressway may not only accrue to persons and businesses whose vehicles use the highway. Lower transportation costs may be passed on to consumers as lower prices for consumer goods, to workers as higher wages, or to owners of businesses as higher net income. Persons may thus benefit from the Heartland Expressway without traveling on it.

It is important to keep in mind that for any of these benefits to occur, the highway investment must either enable significant reductions in transportation costs or cause revised perceptions of the area. If the amount of these savings is small for each trip, if the number of vehicles using the highway is not sufficiently large, or if perceptions do not change dramatically, the investment will not produce benefits that exceed its cost. Highway investment must be based on reasonable estimates of traffic volumes they will service, the cost savings travelers will experience, and a realistic assessment of revised business practices.

Investing in a highway improvement that produces benefits which are less than the associated costs of the improvements inhibit economic development. The costs will be paid by users and other taxpayers in the form of higher taxes, or would be paid in a lost opportunity (an alternative highway would not get improved). These higher taxes work against economic growth within the taxing jurisdiction because they reduce post-tax return to businesses and households by lowering disposable income, and investment in the "wrong" highway project similarly inhibits overall economic growth. Therefore it is imperative that the highway investment be economically feasible; if it is not, it is economically counterproductive.

FEASIBILITY PERSPECTIVES

Which Heartland Expressway alternative is best depends on one's perspective.

Corridor Area Perspective - The corridor's residents and businesses are interested in efficiency, but they are also interested in the economic development and economic diversification of their region. The study examines the Heartland Expressway's economic feasibility from the perspective of the communities located in proximity to the highway corridor.

Nebraska and South Dakota Statewide Perspectives - The two States perspective is that efficiency is important, and so is statewide economic development. The two States are concerned with their ability to be competitive with other states. The study also examines the Heartland Expressway's economic feasibility from this perspective.

Included in the economic feasibility calculations are all quantifiable public sector costs needed to build and operate the highway and all quantifiable economic benefits including road user travel efficiency benefits (vehicle operating cost savings, value of time savings, accident cost savings) and also including economic development benefits (competitive advantage benefits, increased visitor/tourism benefits, etc). Excluded from the cost/benefit calculations are the road improvement implications that cannot reasonably be tabulated in monetary terms.

CORRIDOR ECONOMIC DEVELOPMENT FEASIBILITY

From the perspective of the people in the corridor, all Heartland Expressway alternatives are economically feasible. The benefit/cost ratios are all greater than 1.0 (1.15 to 1.52), the internal rates of return are in the range of 9.3 to 13.5 percent, and the net present values

ECONOMIC DEVELOPMENT FEASIBILITY RESULTS

	Two States Perspective			Corridor Area Perspective		
	B/C	IRR	NPV ($ Million)	B/C	IRR	NPV ($ Million)
Route Option B						
Freeway	0.83	5.5%	−57.4	1.30	11.4%	103.1
Expressway	0.71	4.4%	−79.6	1.21	10.0%	57.8
Two/Four Lane	0.99	6.9%	−1.4	1.48	13.1%	72.7
Route Option C						
Freeway	0.66	3.7%	−121.8	1.15	9.3%	53.0
Expressway	0.66	3.9%	−93.8	1.18	9.5%	48.3
Two/Four Lane	0.86	5.6%	−20.6	1.40	12.1%	59.3
Route Option D						
Freeway	0.76	4.6%	−91.1	1.20	10.2%	75.6
Expressway	0.79	5.2%	−57.8	1.27	10.6%	73.2
Two/Four Lane	1.07	7.6%	11.0	1.52	13.5%	80.3

are all positive, indicating that the region would benefit by between $48 and $103 million if the Heartland Expressway is constructed. Clearly, from the perspective of those in the corridor, the Heartland Expressway is an economically beneficial and feasible undertaking.

STATES OF NEBRASKA AND SOUTH DAKOTA ECONOMIC DEVELOPMENT FEASIBILITY

From the two States' perspective, only one Heartland Expressway alternative is economically feasible. Route Option D, which connects Scottsbluff/Gering and Rapid City via Alliance, Chadron and Hot Springs, constructed partially as a four-lane expressway (between Scottsbluff/Gering and Alliance, and between Rapid City and Hot Springs) and partially as an improved two-lane (between Alliance and Hot Springs), is economically feasible from the states' perspective. This alternative has a benefit/cost ratio of 1.07, an internal rate of return of 7.6 percent, and a positive net present value of $11.0 million. According to this calculation, the economies of the two-state region will be better off by $11.0 million if the highway is built than if the highway is not built.

Route Option B (Two/Four Lanes) is nearly feasible with a benefit/cost ratio of 0.99. However, compared to Route Option D, Route B is not nearly as attractive. While Route B is a more direct alignment between Scottsbluff/Gering and Rapid City, it would carry less traffic and serve fewer people than Route D. Also, since Route D connects the larger cities in the Region, it has a greater ability to foster economic development.

PRIORITY SEGMENTS

In South Dakota the highest priority segment is Rapid City to Hermosa. The second highest priority in South Dakota is Hermosa to Hot Springs. In Nebraska the highest priority segment is the connection of existing four-lanes between Scottsbluff and Alliance. Alliance to Hot Springs would be the next priority.

ECONOMIC FEASIBILITY AS A NATIONAL HIGH PRIORITY CORRIDOR

The feasibility study indicates that Route Option D (Two/Four Lane) is economically feasible from the perspective of the two States. However, the benefit/cost ratio of 1.07 indicates that, if the two States were to fund the entire project, the project would have to compete with other feasible state projects for limited funds and, based on the 1.07 benefit/cost ratio, the Heartland Expressway might be a low priority project among feasible projects. However, the Heartland Expressway Corridor is a National High Priority Corridor and qualifies for federal demonstration funds. If the project were to receive 80 percent federal funding, and including the economic impact of these federal demonstration funds, the project is more feasible and should therefore receive a higher state priority. Using demonstration funds, this alternative has a statewide benefit/cost ratio of 1.6, an internal rate of return of 13.7 percent, and a net present value of $92.6 million.

ECONOMIC IMPACT AND FEASIBILITY INCLUDING FEDERAL DEMONSTRATION FUNDS

Route Option D (Two/Four–Lane)

ECONOMIC IMPACT OF FEDERAL CONSTRUCTION MONEY

Impact Terms	5–Year Construction Period
Value Added	$75.4 Million
Wages	$58.5 Million

ECONOMIC FEASIBILITY

Feasibility Indicators	
Benefit/Cost	1.60
Net Present Value	$92.6 Million
Internal Rate of Return	13.7%

STUDY FINDINGS

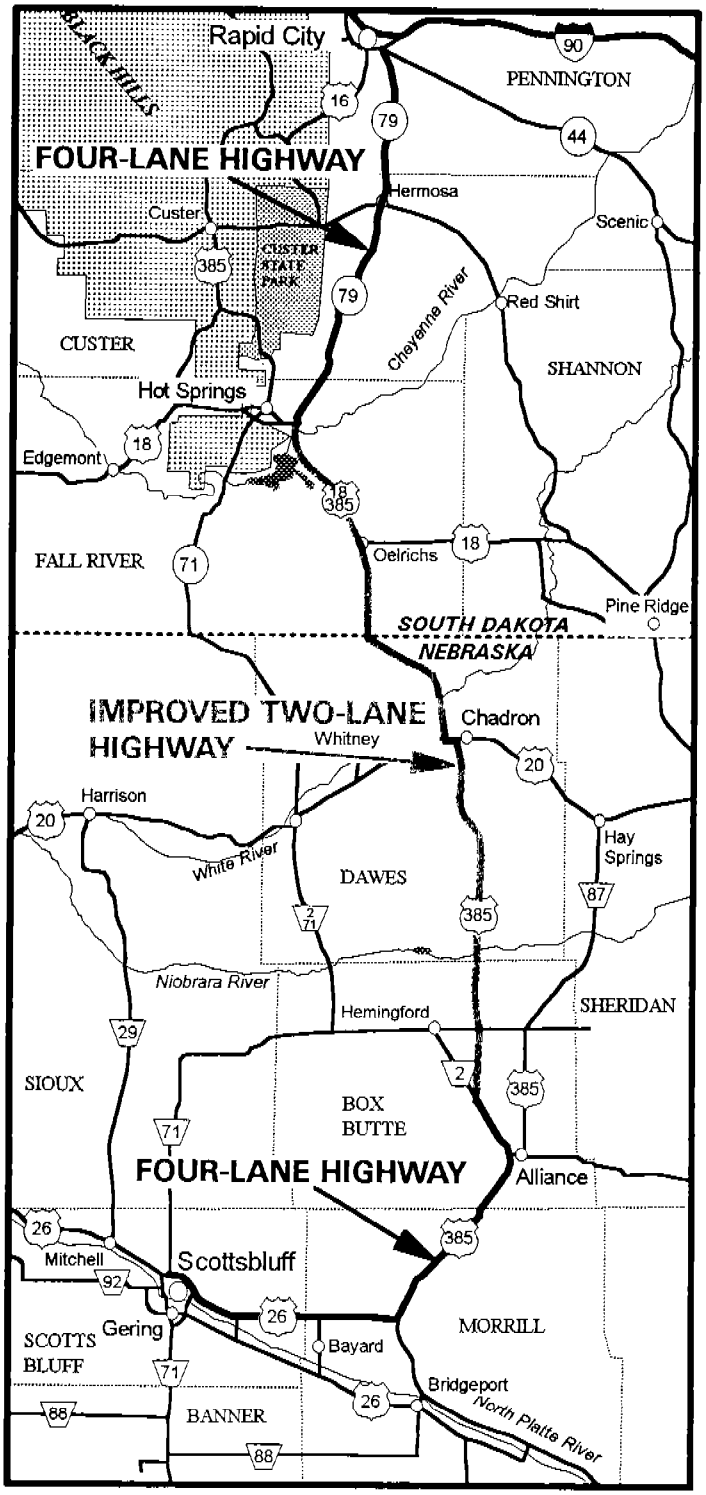
This Heartland Expressway Feasibility Study explored all possible routes and different highway standard alternatives between Rapid City and Scottsbluff/Gering. The feasibility results indicate that a combination four-lane/two-lane highway is feasible from the standpoint of Nebraska, South Dakota, and Wyoming. The Heartland Expressway's most feasible route would connect Rapid City to Scottsbluff/Gering via Hot Springs, Chadron, and Alliance. The segments from Rapid City to Hot Springs and from Scottsbluff/Gering to Alliance are feasible as four-lane highways. The segment between Hot Springs and Alliance via Chadron would be an improved two-lane highway with appropriate turning and passing lanes. The project would cost an estimated $147.7 million (at 1992 price levels), and is believed to be feasible from the engineering, environmental, and economic development perspectives.

STUDY RESULTS: ANALYSES AND COMPARISONS ONLY

This study identified alternative route options and highway alternatives between Scottsbluff/Gering and Rapid City. It developed traffic, economic and other statistics for each option.

Based on these statistics and comparisons, the Nebraska Department of Roads and the South Dakota Department of Transportation will make their detemination as to what improvements, if any, should be built between Scottsbluff/Gering and Rapid City. This study does not make that decision. The study only presents information which might be useful to the two States in making their decision.

While this study analyzed the Heartland Expressway as to cost and benefits, it must be recognized that any decision must be made within the context of available funds and competing uses for those limited funds.



SELECTED ROUTE

Chapter 1
STUDY INITIATIVE AND INTRODUCTION

The "Intermodal Surface Transportation Efficiency Act of 1991" (ISTEA - Public Law 102-240) calls for the development of High Priority Corridors on a National Highway System. ISTEA states that the "development of these transportation corridors is the most efficient and effective way of integrating regions and improving efficiency and safety of commerce and travel and further promoting economic development." ISTEA also calls for the preparation of long-range plans and feasibility studies for these high priority corridors.

ISTEA identified the Heartland Expressway from Denver, Colorado through Scottsbluff, Nebraska, to Rapid City, South Dakota as a high priority corridor. The act also authorized a feasibility study of an expressway or other highway improvements from Rapid City, South Dakota to Scottsbluff, Nebraska and states that the report must include recommendations concerning the feasibility and the best route for such an expressway or other corridor improvements. This Final Report responds to that congressional mandate.

STUDY ISSUES

Many residents of the panhandle of Nebraska and western South Dakota have long wanted a four-lane highway connecting their regions to Interstates 80 and 90. It has always been a goal for many of the residents in the area to connect Denver, Colorado, with Rapid City, South Dakota, via Kimball, Scottsbluff/Gering, Alliance, and Chadron, Nebraska with a four-lane expressway.

Many residents and merchants in the Panhandle Region of Nebraska believe the Heartland Expressway could stimulate economic development and tourism in the region. The expressway is perceived as a natural draw for tourists into the Black Hills of South Dakota and the national parks and recreational areas in the Panhandle Region. Improvements in Scottsbluff National Monument, Chimney Rock visitor center, Agate Fossil Beds and Fort Robinson are underway, and many residents believe these tourist areas cannot be adequately accessed without a four-lane expressway.

Western South Dakota's appeal for a four-lane expressway is different from western Nebraska's. Over the last several decades, Rapid City's economy has been outperforming the national economy in manufacturing and tourism. The merchants and residents of this area believe this growth has been putting strains on the area's transportation system. This area has adequate east-west travel via Interstate 90. However, the region does not have four-lane access to the south, primarily connecting this area to Denver, Colorado, the nearest large Metropolitan Area. Many local officials believe the lack of a north-south four-lane highway is inhibiting growth in their manufacturing and tourism industries.

STUDY PURPOSES

Currently, north-south highways in western Nebraska and western South Dakota are not operating at congested levels, and are not over capacity. Most have quite low traffic volumes. Therefore, this study did not evaluate the feasibility of a new four-lane expressway (Heartland Expressway) simply based on existing levels of traffic or solely on travel efficiency improvements.

Instead, the study determines whether it makes economic development sense to invest large sums of money in the improvement of existing roadways, or a combination of existing roadways, or the construction of a new highway on new alignment. The study included reviews of alignment options, road standards, traffic demands, conceptual design, costs, economic benefits, and environmental impacts and implications. The primary focus, however, was on economics, and what the envisaged highway might do for the area's economy, and the area's general well being. The study determined if a major investment is needed, and detailed what route would provide the greatest economic development benefit and the best return on investment.

STUDY INTERIM REPORTS

The Heartland Expressway Feasibility Study between Rapid City and Scottsbluff/Gering was divided into several work tasks. As the study progressed, the Study Team produced several interim reports which documented various phases of the study. These reports were then reviewed by the Study's Advisory and Steering Committees. The following list summarizes the Interim reports. All of these reports are incorporated into this Final Report.

- **Report A: Existing Conditions and Route Options (November, 1992)** - The initial report summarized existing highway and economic conditions. The report also identified the highway options and alignments to be studied.

- **Report B: Travel Patterns and Traffic Forecasts (April, 1993)** - This report summarized survey results, demographic forecasts, the tourism industry and the Heartland Expressway traffic forecasts. This interim report also discussed the screening of route alternatives and described the three "finalist" alternatives.

- **Report C: Economics, Environmental and Cost Analyses (September, 1993)** - This report contained the study's cost estimates, economic feasibility analyses, and environmental overview.

STUDY PARTICIPANTS

The Heartland Expressway study was conducted by a team of technical consultants. The surveys, analyses, interpretation and documentation are therefore the work of the technical consultant team. The work was done under contract to the Nebraska Department of Roads, with

participation from the South Dakota Department of Transportation, and the Federal Highway Administration.

Steering Committee - A Steering Committee, made up of transportation professionals from the Nebraska Department of Roads, South Dakota Department of Transportation and the Federal Highway Administration was established to advise, guide and steer the technical consultant team. The five member committee consisted of:

- **Mr. Art Yonkey** - Project Director and Project Development Engineer, Nebraska Department of Roads
- **Mr. Tom Wais** - Deputy Director of Planning and Administration, Nebraska Department of Roads
- **Mr. James Jenssen** - Director of Planning, South Dakota Department of Transportation
- **Mr. Joel Jundt** - Senior Road Design Engineer, South Dakota Department of Transportation
- **Mr. Peter Picard** - Assistant Division Administrator, Federal Highway Administration

Advisory Committee - An Advisory Committee, with members from Nebraska, South Dakota, and Wyoming, was established to provide local information and input needed throughout the study. Members of the Advisory Committee included:

Nebraska

- Mr. Carl Dierks, City Manager, Chadron (replaced Don Woods who moved from Chadron)
- Mr. John Harms, President, Western Nebraska Community College, Scottsbluff
- Mr. Travis Hiner, Scottsbluff
- Mr. John Paris, Crawford
- Mr. Richard Robb, Alliance

South Dakota

- Dr. James Goodman, South Dakota School of Mines, Rapid City
- Mr. Robert Helmer, Belle Fourche
- Mr. Roger Johnsen, Rapid City
- Mr. Carl Oberlitner, Hot Springs
- Mr. Chuck Vanderziel, Black Hills Council of Governments, Rapid City

Wyoming

- Mr. Dan Epperson, Director, Weston County Development Board, Newcastle
- Ms. Leslie Kee, Chamber of Commerce, Lusk

Technical Consultant Team - A competitive evaluation process resulted in the selection of Wilbur Smith Associates to conduct the Heartland Expressway Study. Wilbur Smith Associates was assisted by: Wells Engineers, Omaha, NE; Baker and Associates, Scottsbluff, NE; and Dr. David Forkenbrock, University of Iowa.

PUBLIC MEETINGS

Two sets of public meetings were held in the Corridor. The public meetings were held to provide information to the public and to receive any comments individuals in the area had about the project. The first round of public meetings were held February 8-11, 1993, in Scottsbluff, Alliance, Chadron, Hot Springs and Rapid City. The second round of public meetings were held November 15-16, 1993, in Rapid City and Scottsbluff.

Chapter 2
CORRIDOR REGION AND ITS HIGHWAY NETWORK

The intent of the Heartland Expressway is to provide an improved highway between the Rapid City area and the Scottsbluff/Gering area. Western South Dakota and the panhandle of Nebraska are currently served by numerous two-lane north-south highways. However, there is not a direct, linear route connecting the two endpoints, nor is there a four-lane highway connecting the two cities.

The Heartland Expressway could drastically change transportation and mobility in the panhandle of Nebraska and western South Dakota. The existing north-south highways in the corridor play a predominantly local access function. If the Heartland Expressway is built, the local access function would be improved; in addition, long distance traffic would be introduced to the corridor, with its accompanying economic benefits.

HIGHWAY ROLES

The existing highways and roads in the corridor are designed to provide access to the area's communities, businesses, ranches, residences, and shippers and receivers. The existing north-south highways, for the most part, were not designed for long-distance, multi-state travel.

Heartland Expressway Transportation Roles - If the Heartland Expressway is constructed, it could accomplish two overall transportation functions;

1. It would improve the access to all communities, recreational and tourist sites, and economic activities in proximity to the highway.

2. It might influence longer distance multi-state travel, by diverting traffic to the highway, and inducing additional travelers and tourists to western Nebraska and western South Dakota.

Either of these could generate economic benefits to western Nebraska and western South Dakota and conceivably the entire States of Nebraska and South Dakota.

Regional Transportation Role - If the Heartland Expressway were built, the residents and businesses of the coridor area would benefit directly simply because they would have a significantly improved highway upon which to travel. Transportation benefits would include:

- Better access to the Interstate Highway System.
- Better access to communites for shopping, educational, work and social purposes.
- Improved accessibility for emergency ambulatory care and overall better access to health facilities.
- Easier and more efficient goods transportation
- A potentially safer highway.
- An improved all weather highway, especially for school buses, emergency vehicles, etc.
- Better access to the region's tourist and recreational sites.

REGIONAL CHARACTERISTICS

A new highway could conceivably be built on almost any alignment between Rapid City and Scottsbluff/Gering. However, recognizing funding, topography, land use, and environmental constraints, the study also investigated the use of existing highway corridors. This section reviews the existing corridor, first examining the socio-economic condition of the area, followed by a review of the existing highway system.

The Heartland Expressway Feasibility Study is exploring a variety of highway route options between Rapid City and Scottsbluff/Gering. The corridor area extends from Rapid City, South Dakota on the north to Scottsbluff/Gering, Nebraska on the south and to the Wyoming border on the west to generally Nebraska Highway 27 and eastern Shannon and Pennington Counties in South Dakota on the east (Exhibit 2-1). The corridor area is approximately 200 miles long and 100 miles wide, and contains thirteen counties, seven in South Dakota and six in Nebraska. These thirteen counties in Nebraska and South Dakota contain the area that would most be directly influenced by the Heartland Expressway (Primary Impact Area). These thirteen counties include:

South Dakota	Nebraska
Butte	Box Butte
Custer	Dawes
Fall River	Morrill
Lawrence	Scottsbluff
Meade	Sheridan
Pennington	Sioux
Shannon	

Before an economic evaluation could be determined for the Heartland Expressway, a review of the existing condition of the local economy was needed. The following is a brief overview of economic trends for the thirteen-county primary impact area. A more detailed description can be found in Appendix A.

Population - In 1990 the thirteen-county primary impact area had a total population of 227,122. More than two-thirds of the total corridor population is located in South Dakota and approximately half of that population is located at either of the two end points (Rapid City and Scottsbluff/Gering). While Rapid City and Scottsbluff/Gering are the largest urban areas in the region, there are many other communities that the Heartland Expressway could impact. Exhibit 2-2 graphically displays the 1990 population for the communities located throughout the thirteen-county primary impact area.

The thirteen-county primary impact area is overwhelmingly rural. Besides Rapid City and Scottsbluff/Gering there are only four communities with a population greater than 5,000 persons; Spearfish (6,966) and Sturgis (5,330) in South Dakota, and Alliance (9,765) and Chadron (5,588) in Nebraska.

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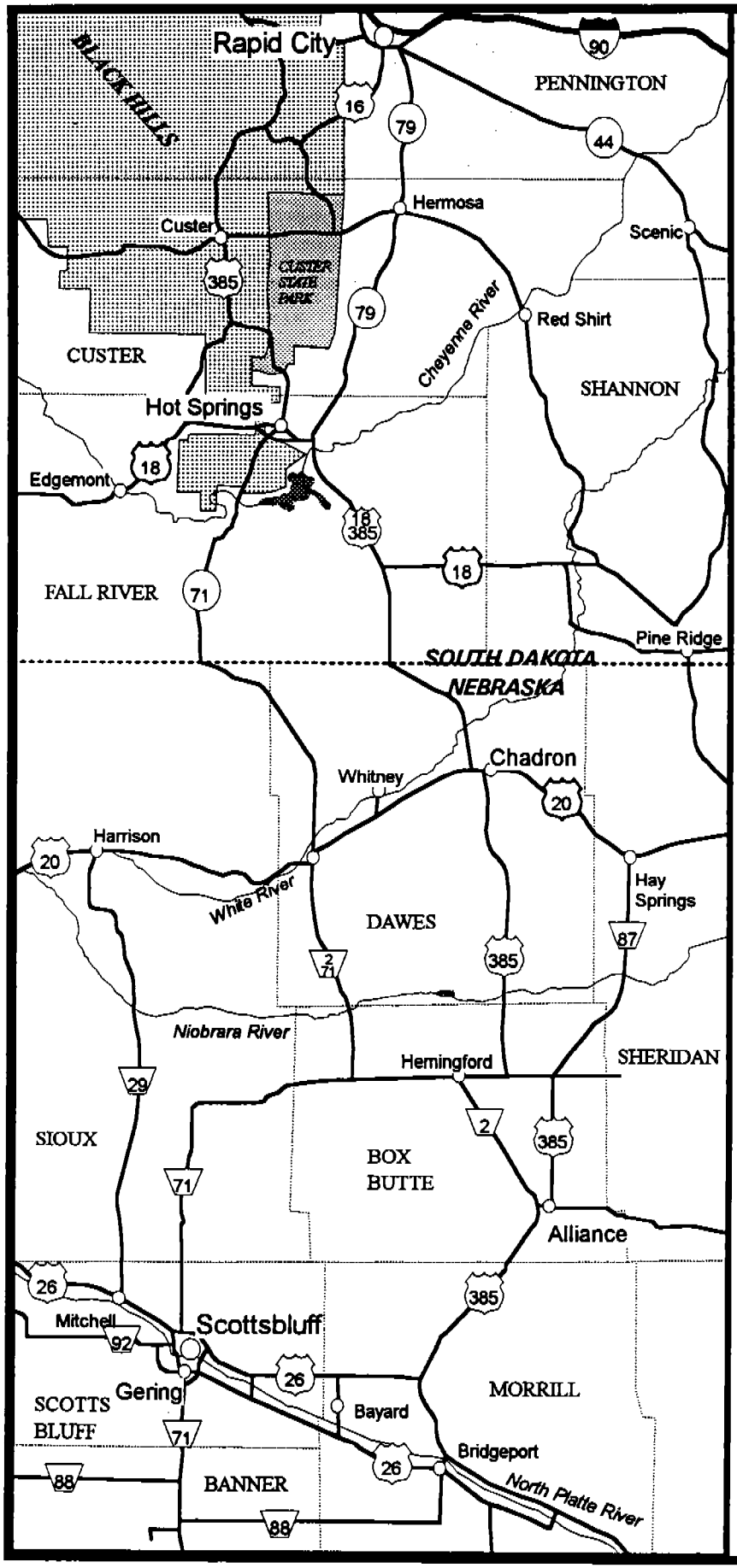


North

HEARTLAND EXPRESSWAY STUDY AREA

Heartland Expressway

0 5 10 20
Miles

Exhibit 2-1

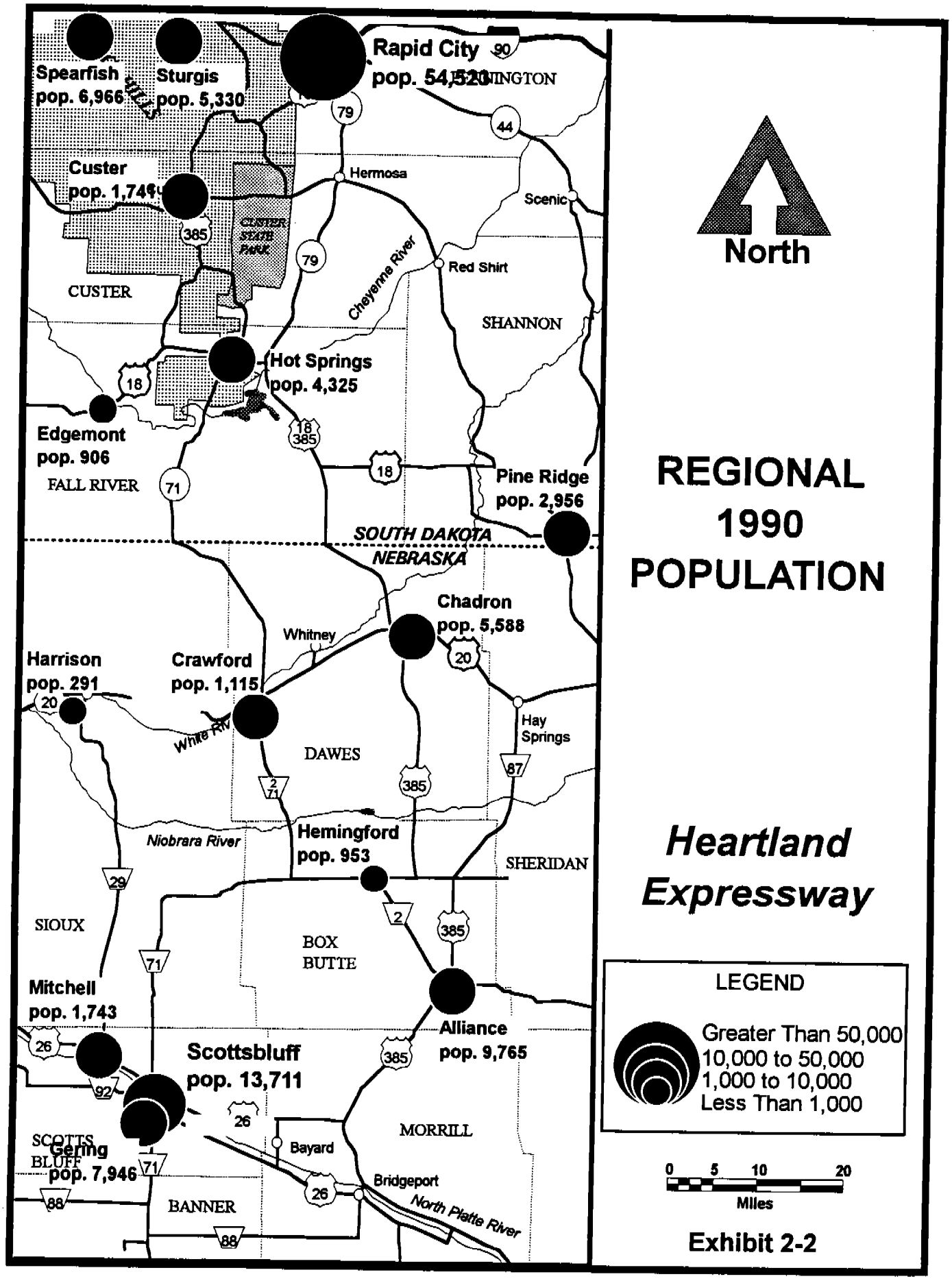

Spearfish
pop. 6,966
Sturgis
pop. 5,330
Rapid City
pop. 54,523
Custer
pop. 1,749
Hermosa
Scenic
CUSTER STATE PARK
CUSTER
Cheyenne River
Red Shirt
SHANNON
Hot Springs
pop. 4,325
Edgemont
pop. 906
FALL RIVER
Pine Ridge
pop. 2,956
SOUTH DAKOTA
NEBRASKA
Chadron
pop. 5,588
Whitney
Harrison
pop. 291
Crawford
pop. 1,115
White R.
DAWES
Hay Springs
Niobrara River
Hemingford
pop. 953
SHERIDAN
SIOUX
BOX BUTTE
Mitchell
pop. 1,743
Alliance
pop. 9,765
Scottsbluff
pop. 13,711
Gering
pop. 7,946
SCOTTS BLUFF
Bayard
MORRILL
Bridgeport
North Platte River
BANNER
North
REGIONAL
1990
POPULATION
Heartland
Expressway
LEGEND
Greater Than 50,000
10,000 to 50,000
1,000 to 10,000
Less Than 1,000
0 5 10 20
Miles

Exhibit 2-2

South Dakota's statewide population as of April 1, 1990 was 696,004, an increase of 0.8 percent since 1980 and a 4.6 percent increase since 1970 (Exhibit 2-3). The seven counties within the Heartland Expressway primary impact area had a 1990 population of 155,224, 22.3 percent of the total population in South Dakota. The seven counties have increased at a much faster rate that the State. Since 1980 the seven counties in the primary impact area have increased by 8.1 percent, and 27.7 percent since 1970. The largest population increase in the seven counties occurred in the northern end of the corridor, primarily in Pennington County (Rapid City), which gained nearly 22,000 persons since 1970. The remaining six counties, except for Fall River and Butte, have all experience significant increases in population over the last two decades.

Nebraska's population as of 1990 was 1,578,385, an increase of 0.5 percent from 1980 and 6.4 percent since 1970 (Exhibit 2-3). The six counties within the Heartland Expressway primary impact area had a 1990 population of 71,898, a 6.8 percent decrease from 1980 and moderate increase of 0.8 percent from 1970. All six counties experienced population declines during the 1980's, and only Box Butte County has experienced an increase in population over the last two decades. The population of the six counties within the primary impact area has also been declining compared to the rest of Nebraska. In 1970, the six primary impact area counties accounted for 4.8 percent of the total population in the State of Nebraska; by 1990 this percent has decreased to 4.6 percent.

Employment - Employment trends are usually a good indicator of the overall soundness of a local economy. Employment growth is usually indicative of an expanding economy; and in this era of a national expansion in overall employment, an employment decline signifies a very sluggish economy.

In 1990, the thirteen-county primary impact area's total employment was 121,370, an increase of 45.3 percent since 1970, and a 9.3 percent increase from 1980 (Exhibit 2-4). The largest portion of the employment growth has occurred in the South Dakota section of the primary impact area. The seven counties in South Dakota have increased 58.6 percent in total employment since 1970, with the largest increase occurring in Pennington County (Rapid City). Pennington County has almost doubled its employment base over the last 20 years, increasing nearly 75 percent during that period. The largest growth has occurred in the manufacturing and tourism sectors. Manufacturing employment for the seven counties in South Dakota has more than doubled. This seven-county area has also been increasing at a much faster rate than the rest of South Dakota. Since 1970, the seven South Dakota counties within the primary impact area have increased their employment base by 59 percent compared to the rest of the State's 26 percent.

The six Nebraska counties within the primary impact area have also increased its employment base over the last two decades. However, the majority of the employment growth in the Nebraska primary impact aea occurred during the 1970's in the wholesale and retail trade industries. Since that time, total employment has stabilized or even declined in most of the Nebraska Panhandle counties. The majority of the employment growth in the Nebraska primary impact area has occurred in Scotts Bluff and Box Butte Counties. Over the last 20 years,

Exhibit 2-3
TOTAL POPULATION
1970-1990

Nebraska Counties	1970	1980	1990	% Change 1970-1990	% Change 1980-1990
Box Butte	10,094	13,696	13,130	30.1%	-4.1%
Dawes	9,693	9,609	9,021	-6.9%	-6.1%
Morrill	5,813	6,085	5,423	-6.7%	-10.9%
Scottsbluff	36,432	38,344	36,025	-1.1%	-6.0%
Sheridan	7,285	7,544	6,750	-7.3%	-10.5%
Sioux	2,034	1,845	1,549	-23.8%	-16.0%
Nebraska Study Area	71,351	77,123	71,898	0.8%	-6.8%
State of Nebraska	1,483,493	1,569,825	1,578,385	6.4%	0.5%
Percent of State	4.8%	4.9%	4.6%		
South Dakota Counties					
Butte	7,770	8,370	7,914	1.9%	-5.4%
Custer	4,698	6,000	6,179	31.5%	3.0%
Fall River	7,505	8,439	7,353	-2.0%	-12.9%
Lawrence	17,453	18,339	20,655	18.3%	12.6%
Meade	16,618	20,717	21,878	31.7%	5.6%
Pennington	59,349	70,361	81,343	37.1%	15.6%
Shannon	8,198	11,323	9,902	20.8%	-12.5%
S.D. Study Area	121,591	143,549	155,224	27.7%	8.1%
State of S.D.	665,507	690,768	696,004	4.6%	0.8%
Percent of State	18.3%	20.8%	22.3%		

SOURCE: U.S. Census Bureau, Wilbur Smith Associates

Exhibit 2-4
TOTAL EMPLOYMENT
1970-1990

Nebraska Counties	1970	1980	1990	% Change 1970-1990	% Change 1980-1990
Box Butte	4,410	7,830	7,390	67.6%	-5.6%
Dawes	4,240	4,560	4,410	4.0%	-3.3%
Morrill	2,350	2,720	2,430	3.4%	-10.7%
Scottsbluff	16,470	20,550	20,200	22.6%	-1.7%
Sheridan	3,250	4,120	3,700	13.8%	-10.2%
Sioux	890	950	840	-5.6%	-11.6%
Nebraska Study Area	31,610	40,730	38,970	23.3%	-4.3%
State of Nebraska	706,970	868,080	952,470	34.7%	9.7%
Percent of State	4.5%	4.7%	4.1%		
South Dakota Counties					
Butte	3,430	3,690	3,480	1.5%	-5.7%
Custer	2,050	2,580	3,190	55.6%	23.6%
Fall River	3,200	4,090	3,750	17.2%	-8.3%
Lawrence	6,690	8,750	10,730	60.4%	22.6%
Meade	4,620	5,550	6,250	35.3%	12.6%
Pennington	30,160	42,950	52,750	74.9%	22.8%
Shannon	1,790	2,660	2,250	25.7%	-15.4%
S.D. Study Area	51,940	70,270	82,400	58.6%	17.3%
State of S.D.	297,600	349,150	393,080	32.1%	12.6%
Percent of State	17.5%	20.1%	21.0%		

SOURCE: U.S. Census Bureau, Wilbur Smith Associates

these two counties have accounted for over 91 percent of the total growth in employment for the entire six-county primary impact area in Nebraska. These six-counties have also been increasing at a slower rate than the rest of Nebraska. From 1970, six-county primary impact area has increased its employment base at 23.3 percent, while the rest of the State has witnessed a 35.3 percent in increase in employment.

Regional Characteristics Summary - Regradless of the proximity of the two regions, western Nebraska and western South Dakota are two very diverse areas with different economic bases and different desires for the Heartland Expressway. The economy of western South Dakota has been flourishing over the last couple of decades. The area has grown significantly in population, which is primarily caused by the growth of the tourism industry as well as a doubling of the manufacturing sector. The desire of the Heartland Expressway from western South Dakota's perspective is to improve north-south travel, connecting the region to Interstate 80 and Denver, thereby expanding its tourist market and ability to attract additional industry. Western Nebraska on the other hand, has experienced a declining population and slow growth in employment. The Heartland Expressway, from the panhandle of Nebraska's perspective, is seen as a investment to stimulate the local economy.

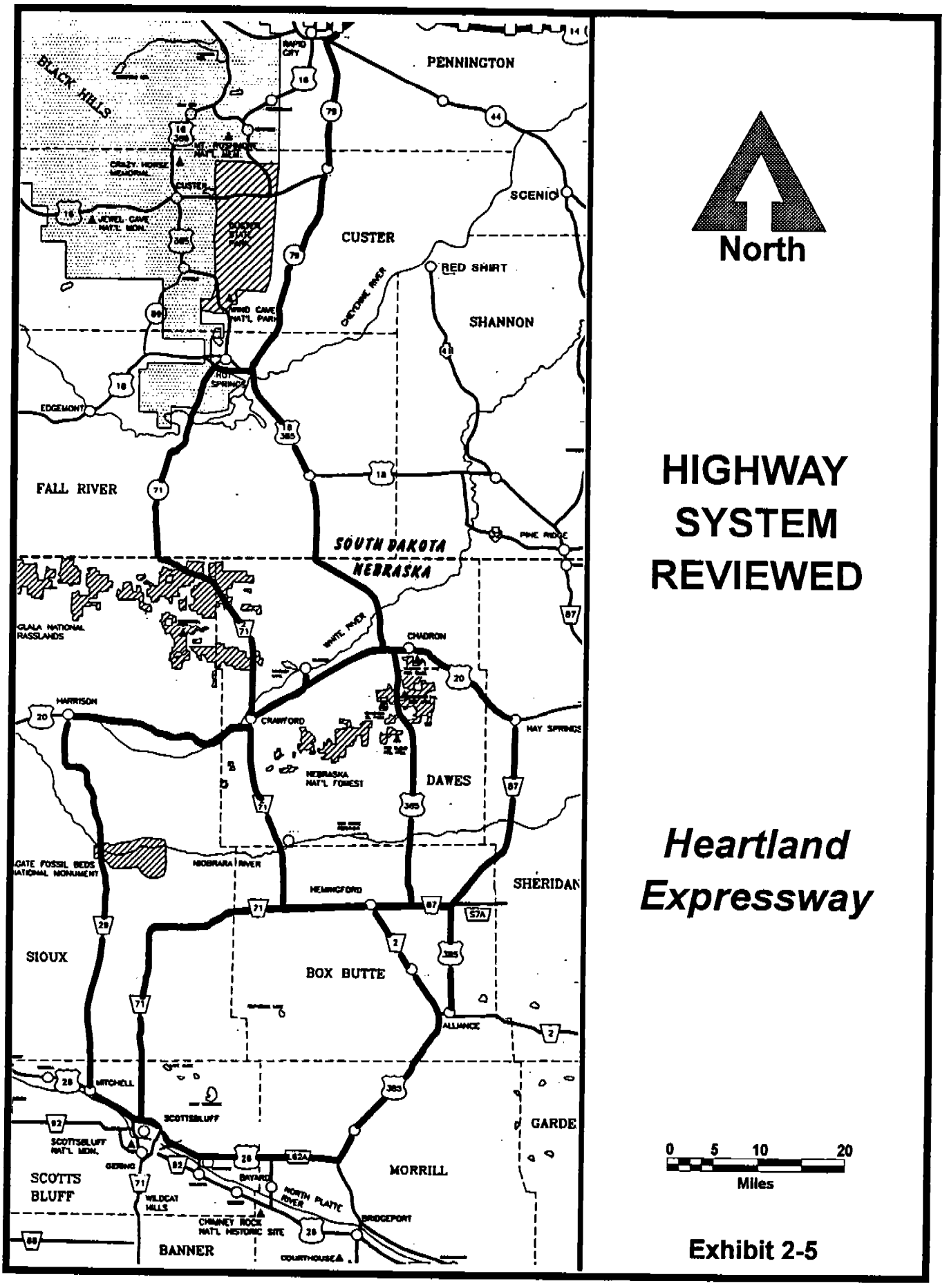
EXISTING HIGHWAY NETWORK

The existing system of highways were designed to serve local access needs of the communities, businesses and residents. It was not designed for high speed travel between Scottsbluff/Gering and Rapid City. In this sense, the existing highway system serves a very different purpose than would the Heartland Expressway. The existing highways are predominantly two-lane, and they wind through the coriridor serving the area's local uses.

To understand the corridor area's transportation needs and issues, the study started with a field review of the existing highway system. The reviewed identified highway issues that involve standards that may not achieve the economic objective of the Heartland Expressway. These "issues" do not represent substandard conditions. They only identify locations where existing conditions would need to be improved. The review not only identified physical issues for a characteristic of the existing highway system; it also identified which existing highways might be a part of the Heartland Expressway. Exhibit 2-5 depicts the highway system that was reviewed.

In the process of this highway system review, a number of physical and operational issues were identified that are relevant to the study's analyses. These issues, by highway, are described as follows:

Nebraska Highway 2 - Within the corridor, Nebraska Highway 2 begins at the east edge of Alliance where it co-exists with U.S. 385 to the west edge of Alliance. From the west edge of Alliance it extends northwesterly to Hemingford, then west to its junction with Nebraska 71. From this point it co-exists with Nebraska 71 and extends northerly through Crawford and on to the South Dakota border.


BLACK HILLS
PENNINGTON
CUSTER
SCENIC
RED SHIRT
SHANNON
EDGEMONT
FALL RIVER
SOUTH DAKOTA
NEBRASKA
CHADRON
HARRISON
CRAWFORD
HAY SPRINGS
DAWES
SHERIDAN
SIOUX
BOX BUTTE
ALLIANCE
MITCHELL
SCOTTSBLUFF
SCOTTS BLUFF
MORRILL
GARDE
BAYARD
BRIDGEPORT
BANNER
North
HIGHWAY SYSTEM REVIEWED
Heartland Expressway
0 5 10 20
Miles
Exhibit 2-5

Nebraska 2 crosses under the Burlington Northern Railroad in Alliance and then parallels the railroad between Alliance and Hemingford. It also overpasses the Burlington Northern Railroad in Crawford. After becoming Nebraska 2/71 it extends through 4 miles of the Nebraska National Forest near Crawford. The segment through the National Forest has steep grades and two areas where reduced speeds are advised due to winding curves. Nebraska 2/71 also crosses the Niobrara River near Marsland.

Length	86 miles
Road Surface Issues	40 miles
Road Shoulder Issues	32 miles
Vertical Curve Issues	9 miles
Structure Issues	6
Traffic Signals/Stops	6

U.S. Highway 20 - Within the corridor, U.S. Highway 20 begins at Hay Springs and extends westerly to Harrison. It co-exists with Nebraska Highway 2/71 through a portion of Crawford and with U.S. 385 for approximately 3 miles west of Chadron.

U.S. 20 parallels the Chicago and Northwestern Railroad between Hay Springs and Chadron and crosses it at-grade at the west edge of Crawford. U.S. 20 crosses the White River west of Crawford. It passes through Fort Robinson, which is a major historical and recreational area. West of Fort Robinson, U.S. 20 extends through approximately 2 miles of forested area with steep grades and winding curves. Within this area there is a third passing lane for approximately 1/2 mile.

Length	70 miles
Road Surface Issues	34 miles
Road Shoulder Issues	50 miles
Structure Issues	10
Traffic Signals/Stops	1

U.S. Highway 26 - Within the corridor, U.S. Highway 26 begins north of Bayard at its junction with L62A and extends westerly to its junction with Nebraska 29 in Mitchell.

U.S. 26 parallels the Burlington Northern Railroad between Minatare and the east edge of Scottsbluff and again from the west edge of Scottsbluff to Mitchell. There are numerous irrigation facility crossings between Minatare and the junction with L62A. U.S. 26 exists as a 4-lane facility between its junction with Nebraska 71 southwest of Scottsbluff and its junction with Nebraska 29 in Mitchell (approximately 8 miles).

Length	28 miles
Insufficient Width	11 miles
Road Shoulder Issues	10 miles
Vertical Curve Issues	10 miles

Road Surface Issues	4 miles
Structure Issues	5
Traffic Signals/Stops	6

Nebraska Highway 29 - Within the corridor, Nebraska Highway 29 begins in Mitchell at its junction with U.S. 26 and extends northerly to Harrison at its junction with U.S. 20.

Nebraska 29 crosses the Niobrara River at Agate Fossil Beds National Monument and crosses the Chicago and Northwestern Railroad at-grade in Harrison. South of Harrison there is a 5-mile stretch of Nebraska 29 designated as a Swift Fox endangered species crossing area. There are several irrigation facility crossings in the first 8 miles north of Mitchell.

Length	56 miles
Insufficient Width	30 miles
Road Shoulder Issues	16 miles
Vertical Curve Issues	7 miles
Road Surface Issues	22 miles
Structure Issues	3
Traffic Signals/Stops	2

Nebraska Highway 71 - Within the corridor, Nebraska Highway 71 begins at the south edge of Gering, extends around the west edge of Scottsbluff and then northeasterly to its junction with Nebraska 2 west of Hemingford. From there it co-exists with Nebraska 2 and extends northerly through Crawford to the South Dakota line.

Nebraska 71 passes near the Scottsbluff National Monument at the west edge of Gering and crosses the North Platte River between Gering and Scottsbluff. It passes under the Union Pacific Railroad near Gering and crosses the Burlington Northern Railroad west of Scottsbluff at-grade. After becoming Nebraska 2/71, it extends through approximately four miles of Nebraska National Forest near Crawford. The segment through the National Forest has steep grades and two areas where reduced speeds are advised due to winding curves. Nebraska 2/71 crosses the Niobrara River near Marsland and passes over the Burlington Northern Railroad in Crawford.

Length	111 miles
Insufficient Width	8 miles
Road Shoulder Issues	35 miles
Vertical Curve Issues	16 miles
Road Surface Issues	48 miles
Structure Issues	6
Traffic Signals/Stops	5

Nebraska Highway 87 - Within the corridor, Nebraska Highway 87 begins at the east edge of Hemingford and extends easterly to its junction with U.S. 385 south. Nebraska 87 co-exists

with U.S. 385 for approximately five miles between junctions with U.S. 385 north and U.S. 385 south. From the junction with U.S. 385 south, Nebraska 87 extends northerly to its junction with U.S. 20 at the west edge of Hay Springs.

Nebraska 87 crosses the Burlington Northern Railroad at-grade in Hemingford and crosses the Niobrara River south of Hay Springs.

Length	39 miles
Structure Issues	1
Road Shoulder Issues	15 miles
Road Surface Issues	39 miles
Traffic Signals/Stops	2

U.S. Highway 385 - Within the corridor, U.S. Highway 385 begins at its junction with L62A south of Angora and extends northerly to Alliance where it co-exists with Nebraska 2 through Alliance. It then extends northerly to its junction with Nebraska 87, then westerly in co-existence with Nebraska 87 for approximately five miles. U.S. 385 then extends northerly past the west edge of Chadron and on to the South Dakota border.

U.S. 385 parallels the Burlington Northern Railroad from Angora to Alliance, crosses under the railroad in Alliance and crosses the Chicago and Northwestern Railroad at-grade northwest of Chadron. It also crosses the Niobrara River northeast of Hemingford and the White River northwest of Chadron. South of Chadron, U.S. 385 passes through approximately nine miles of Nebraska National Forest which includes steep grades and winding curves.

Length	103 miles
Structure Issues	6
Road Shoulder Issues	60 miles
Road Surface Issues	63 miles
Insufficient Width	0 miles
Traffic Signals/Stops	7

Link L62A - Within the corridor, L62A begins at its junction with U.S. 26 north of Bayard and extends easterly to its junction with U.S. 385 south of Angora. The facility has a third passing lane for approximately one mile near its east end.

Length	9 miles
Traffic Signals/Stops	1

U.S. Highway 18 - Within the corridor, U.S. Highway 18 begins at the west edge of Oelrichs where it co-exists with U.S. 385, extends northwesterly to its junction with South Dakota Highway 79 then westerly to Hot Springs.

U.S. 18/385 crosses the Cheyenne River just south of its junction with South Dakota 79. From the junction of South Dakota 79 to Hot Springs, U.S. 18/385 winds through Fall River Canyon in the Black Hills for approximately 4 miles, 2.5 miles being a 4-lane undivided roadway. This 4-mile section is essentially all at reduced speeds due to the winding nature of the roadway. There are short segments of 4-lane divided roadway at Oelrichs and at the junction with South Dakota 79.

Length	21 miles
Road Surface Issues	9 miles
Structure Issues	2
Traffic Signals/Stops	1

South Dakota Highway 71 - Within the corridor, South Dakota Highway 71 begins at the Nebraska state line and extends northeasterly to its junction with U.S. 18/385 in Hot Springs.

South Dakota 71 exists in its entirety as a substandard roadway with approximately 18 miles being gravel surfaced. There are numerous sharp curves with advisory speeds as low as 25 mph. South Dakota 71 crosses the Cheyenne River near Angostura Reservoir and parallels the Burlington Northern Railroad for approximately 7 miles near Ardmore. It passes through the Buffalo Gap National Grassland and the southern portion of the Black Hills.

Length	35 miles
Road Surface Issues	35 miles
Road Shoulder Issues	35 miles
Structure Issues	4
Traffic Signals/Stops	1

South Dakota Highway 79 - Within the corridor, South Dakota Highway 79 begins at its junction with U.S. 18/385 east of Hot Springs and extends northerly to Rapid City.

South Dakota 79 parallels the east edge of the Black Hills for its entire length within the corridor. It parallels the Chicago and Northwestern Railroad for approximately 2 miles near Fairburn, again for approximately 3 miles near Hermosa and then overpasses the C&NW at the south edge of Rapid City. There are short segments of 4-lane divided roadway at Hermosa and at the junction with U.S. 18/385 and approximately 1.5 miles of 4-lane divided highway at Rapid City.

Length	48 miles
Road Surface Issues	8 miles
Structure Issues	1
Traffic Signals/Stops	1

U.S. Highway 385 - Within the corridor, U.S. Highway 385 begins at the Nebraska state line and extends northerly to Oelrichs where it co-exists with U.S. 18 to Hot Springs.

U.S. 385 crosses the Chicago and Northwestern Railroad at-grade south of Oelrichs. It passes through the Buffalo Gap National Grasslands. U.S. 18/385 crosses the Cheyenne River just south of its junction with South Dakota 79. From the junction of South Dakota 79 to Hot Springs, U.S. 18/385 winds through Fall River Canyon in the Black Hills for approximately 4 miles, 2.5 miles being a 4-lane undivided roadway. This 4-mile section is essentially all at reduced speeds due to the winding nature of the roadway. There are short segments of 4-lane divided roadway at Oelrichs and at the junction with South Dakota 79.

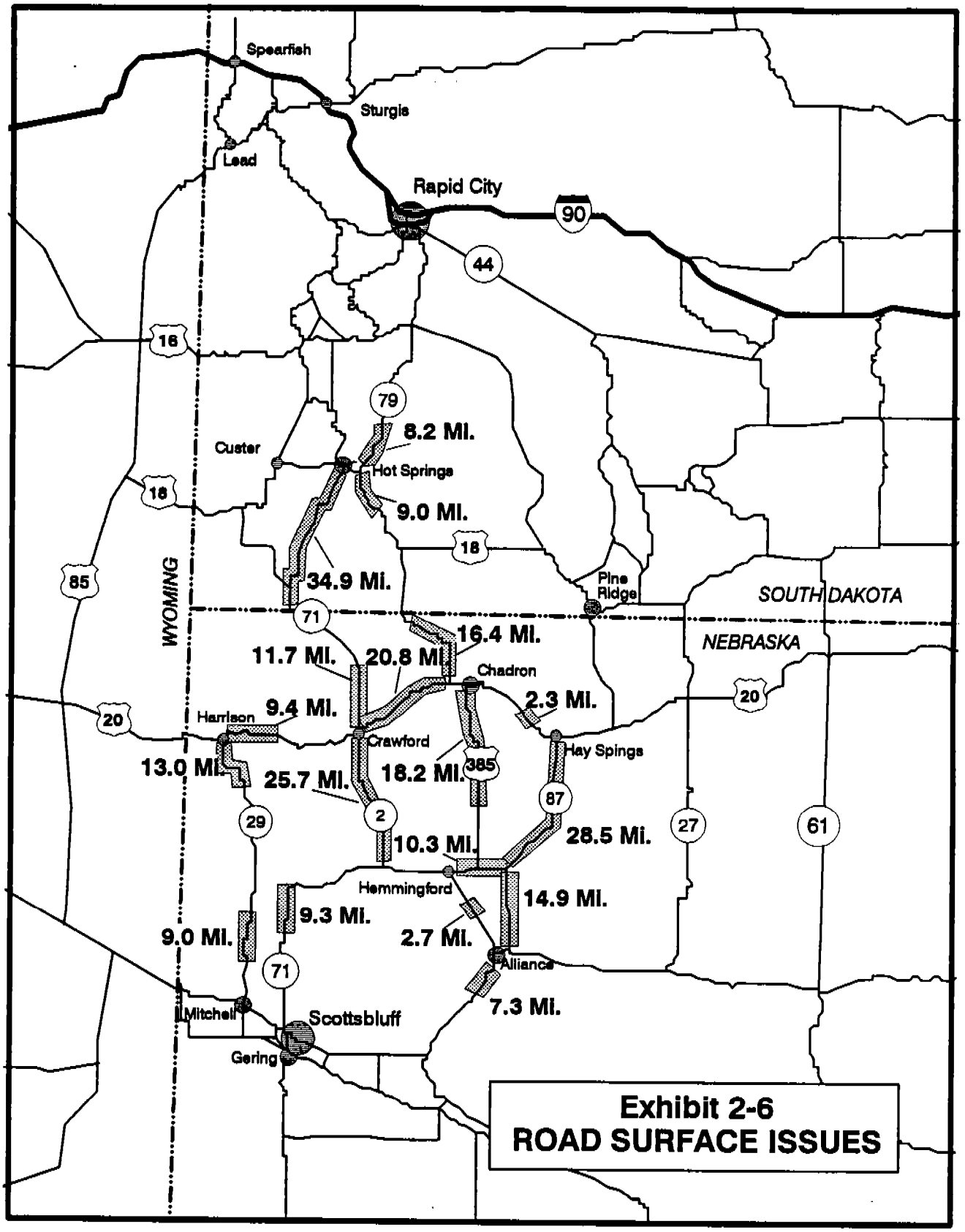
Length	34 miles
Road Surface Issues	9 miles
Structure Issues	2
Traffic Signals/Stops	1

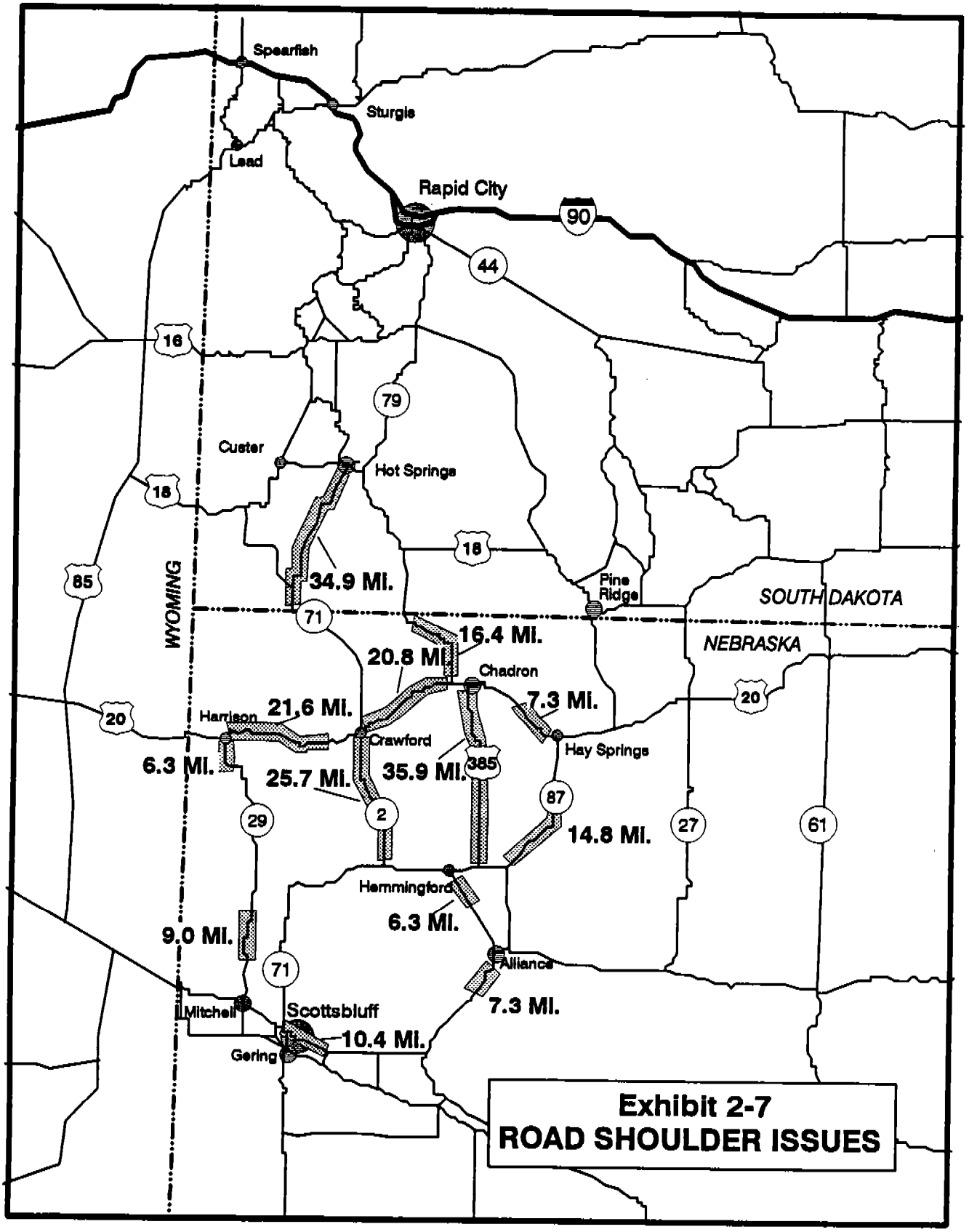
Existing Highway System Implications

Exhibits 2-6 through 2-9 summarize the issues found on the corridor area's existing highway network. This review of the existing highway system suggests a number of things relevant to the Heartland Expressway.

1. The existing network is a myriad of 2-lane highways designed for local access purposes. The existing network was never designed for longer- distance, higher speed travel. If a Heartland Expressway is to be built, it will comprise a totally new travel option to the region.

2. The highway system's issues (road surface, shoulders, structures, widths, stop signs, etc.) suggest that major investments will be needed even if the Heartland Expressway is to use portions of the existing highways.


Spearfish
Sturgis
Lead
Rapid City
90
44
16
79
8.2 Mi.
Custer
Hot Springs
18
9.0 Mi.
18
85
WYOMING
34.9 Mi.
Pine Ridge
SOUTH DAKOTA
71
16.4 Mi.
11.7 Mi.
20.8 Mi.
NEBRASKA
Chadron
20
2.3 Mi.
20
Harrison
9.4 Mi.
Crawford
Hay Spings
13.0 Mi.
25.7 Mi.
18.2 Mi.
385
87
29
2
10.3 Mi.
28.5 Mi.
27
61
Hemmingford
14.9 Mi.
9.3 Mi.
9.0 Mi.
2.7 Mi.
71
Alliance
Mitchell
Scottsbluff
7.3 Mi.
Gering
Exhibit 2-6
ROAD SURFACE ISSUES


Spearfish
Sturgis
Lead
Rapid City
90
44
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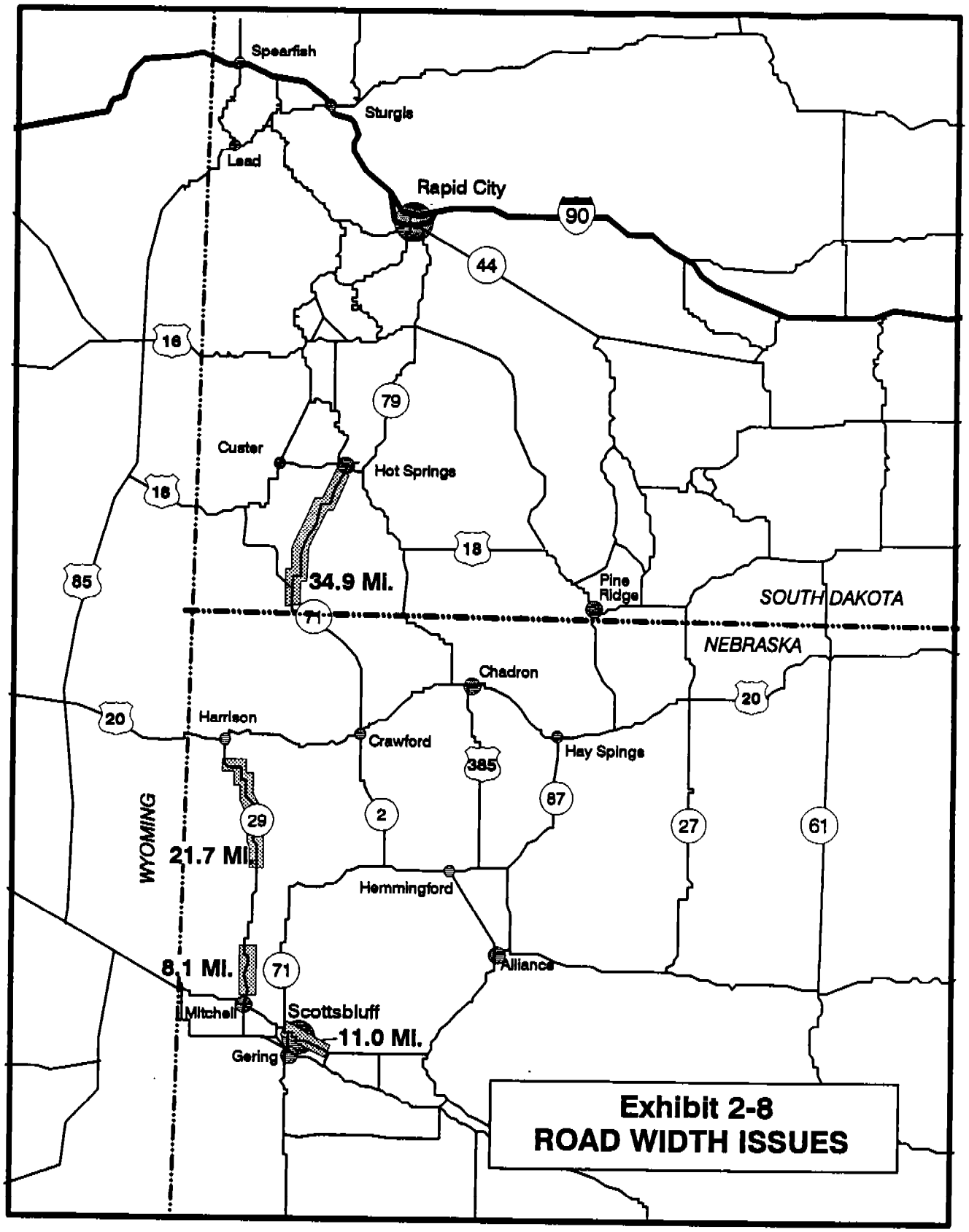
79
Custer
Hot Springs
18
18
85
WYOMING
34.9 Mi.
71
Pine Ridge
SOUTH DAKOTA
NEBRASKA
16.4 Mi.
20.8 Mi.
Chadron
20
Harrison
21.6 Mi.
7.3 Mi.
20
Crawford
Hay Springs
6.3 Mi.
25.7 Mi.
35.9 Mi.
385
87
29
2
14.8 Mi.
27
61
Hemmingford
6.3 Mi.
9.0 Mi.
71
Alliance
7.3 Mi.
Mitchell
Scottsbluff
10.4 Mi.
Gering
Exhibit 2-7
ROAD SHOULDER ISSUES


Spearfish
Sturgis
Lead
Rapid City
90
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Custer
Hot Springs
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18
85
34.9 Mi.
71
Pine Ridge
SOUTH DAKOTA
NEBRASKA
Chadron
20
20
Harrison
Crawford
385
Hay Springs
87
29
2
27
61
WYOMING
21.7 Mi.
Hemmingford
8.1 Mi.
71
Alliance
Mitchell
Scottsbluff
11.0 Mi.
Gering
Exhibit 2-8
ROAD WIDTH ISSUES

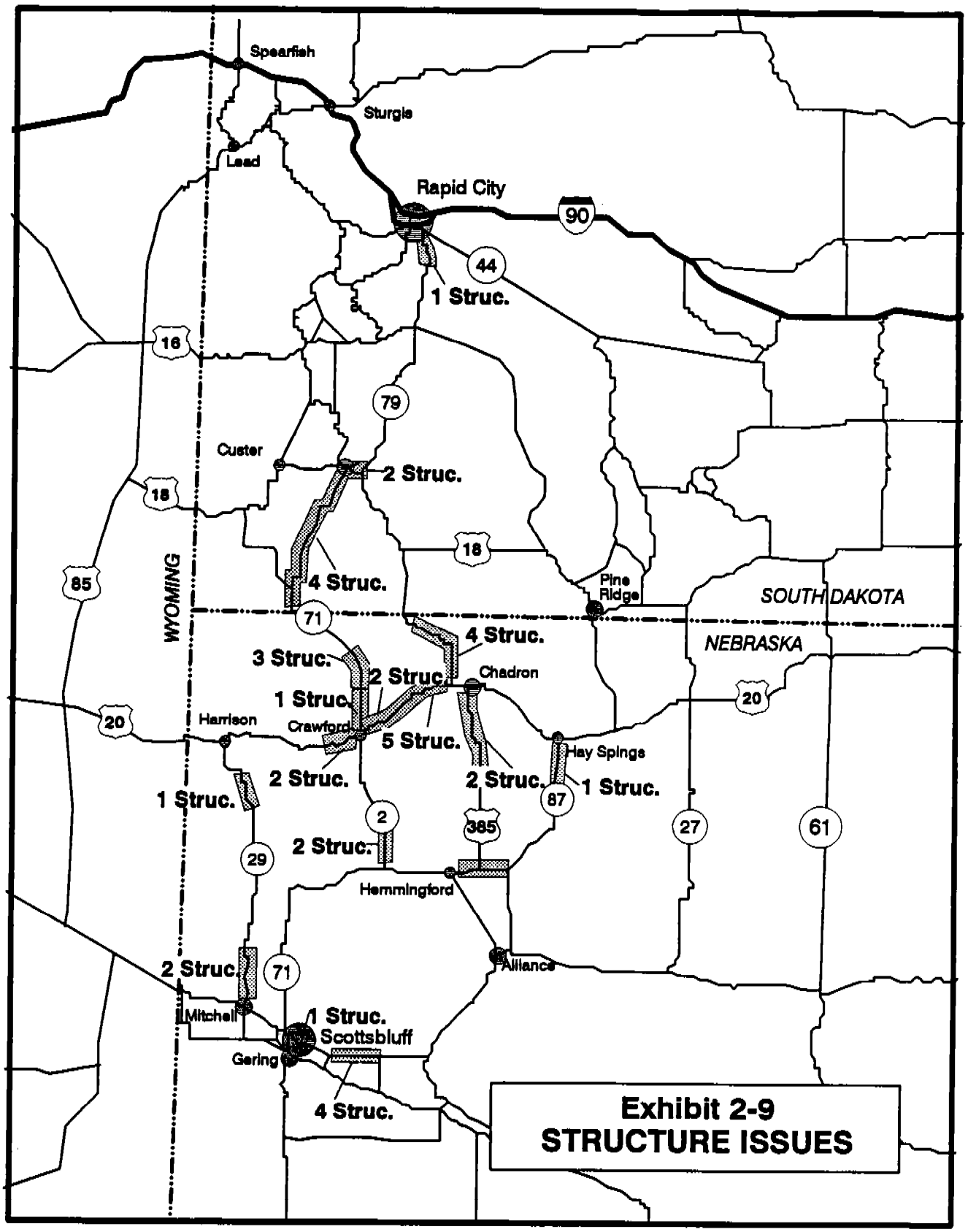

Spearfish
Sturgis
Lead
Rapid City
90
44
1 Struc.
16
79
Custer
2 Struc.
18
18
85
WYOMING
4 Struc.
71
Pine Ridge
SOUTH DAKOTA
NEBRASKA
4 Struc.
3 Struc.
2 Struc.
Chadron
1 Struc.
20
20
Harrison
Crawford
5 Struc.
Hay Springs
2 Struc.
2 Struc.
1 Struc.
87
1 Struc.
2
385
27
61
29
2 Struc.
Hemmingford
2 Struc.
71
Alliance
Mitchell
1 Struc.
Scottsbluff
Gering
4 Struc.
Exhibit 2-9
STRUCTURE ISSUES

Table of Contents

Chapter 3
HEARTLAND EXPRESSWAY ROUTE AND HIGHWAY ALTERNATIVES

The Heartland Expressway Study examined a concept; that is, the concept of constructing a major highway between Scottsbluff/Gering and Rapid City. The study explored the feasibility of such a highway.

The Heartland Expressway Study was not a detailed alignment study. As a result, it has not selected or even recommended a specific alignment. Such selection would occur well after the Heartland Study is complete. Instead, the study analyzed the highway concept so that alignment analyses could follow later if the concept proved feasible.

Yet, to analyze the highway concept and its economic development feasibility, the alternative locations on which the highway might be built had to be considered, so as to reasonably estimate the highway's costs, traffic use, and economic implications.

This chapter identifies various generalized routes which might be considered. These generalized route alternatives were identified in liaison with the study's Steering and Advisory Committees, they were evaluated in general terms; and most of the alternative routes were eliminated from further consideration. Those that were selected as "finalist" routes were subjected to the study's traffic analyses.

This chapter identifies the route options, identifies those route options that were subjected to the traffic analyses, and explains why certain route options were eliminated from further consideration.

The overall process of route evaluation was designed to consider all reasonable route options, to study them and, as evidence accumulated, to eliminate those options which did not merit further consideration.

UNIVERSE OF ROUTE OPTIONS

The ISTEA of 1991 specified that the Heartland Expressway Feasibility Study was to explore the feasibility of a new highway between two points: between Scottsbluff/ Gering, Nebraska and Rapid City, South Dakota. This study responded to that Congressional directive by exploring all possible route alternatives between those two designated end points. The logical corridor region was considered to be the Wyoming state line on the west, and Routes 87 and 41 to the east. Any route outside of these two boundaries would yield a severely circuitous highway.

The route options initially identified are depicted on Exhibit 3-1. Included are routes and route segments that would utilize existing highways, as well as routes and route segments that would be on new highway alignment.

HIGHWAY OPTIONS STUDIED

This study examined the feasibility of three highway type alternatives:

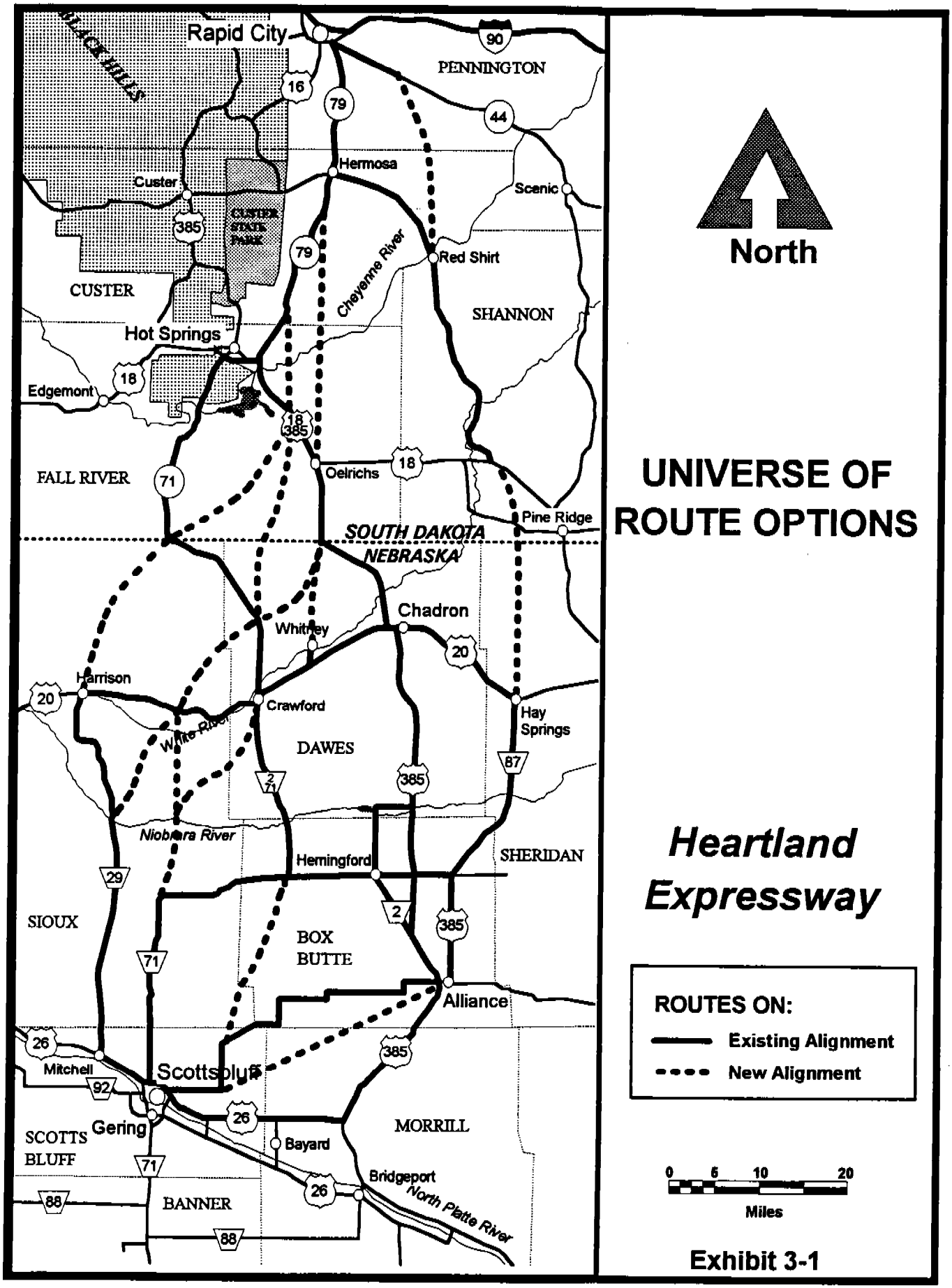

Rapid City
BLACK HILLS
PENNINGTON
90
16
79
44
Hermosa
Custer
Scenic
385
CUSTER STATE PARK
79
Cheyenne River
Red Shirt
CUSTER
SHANNON
Hot Springs
18
Edgemont
18
385
FALL RIVER
71
Oelrichs
18
Pine Ridge
SOUTH DAKOTA
NEBRASKA
Chadron
Whitney
20
Harrison
20
Crawford
White River
Hay Springs
DAWES
87
2
71
385
Niobrara River
Hemingford
SHERIDAN
29
SIOUX
2
385
BOX BUTTE
71
Alliance
26
Mitchell
385
92
Scottsbluff
SCOTTS BLUFF
Gering
26
Bayard
MORRILL
71
Bridgeport
North Platte River
88
BANNER
26
88
North
UNIVERSE OF ROUTE OPTIONS
Heartland Expressway
ROUTES ON:
Existing Alignment
New Alignment
0 5 10 20
Miles

Exhibit 3-1

1. **Four-lane freeway type highway (65 mph)** - This alternative is a four-lane divided highway with complete access control and grade separations at all intersections. This alternative would be comparable to Interstates 80 and 90.

2. **Four-lane expressway type highway (55 mph)** - This alternative is a four-lane divided highway with partial access control. The majority of intersections and crossings would be at-grade.

3. **Two-lane highway with some four-lane sections** - This alternative would provide for a four-lane expressway type highway where traffic volumes are greatest, and the remaining portions of the highway would be an improved two-lane with uphill passing lanes, paved shoulders and turning lanes where necessary. All sections would have partial access control.

Exhibits 3-2 through 3-4 display the typical highway standards and cross sections for the three highway types.

ROUTE TRADE-OFFS

In general, no single route is best in terms of every analysis criterion. For example, the route that offers the most direct alignment between the two endpoints is not necessarily the least expensive, and/or it does not serve the most population centers. On the other hand, the least cost route makes the most use of existing highways, which is a very circuitous route. Similarly, the routes that serve the most population, or the greatest tourism potential, may also be circuitous.

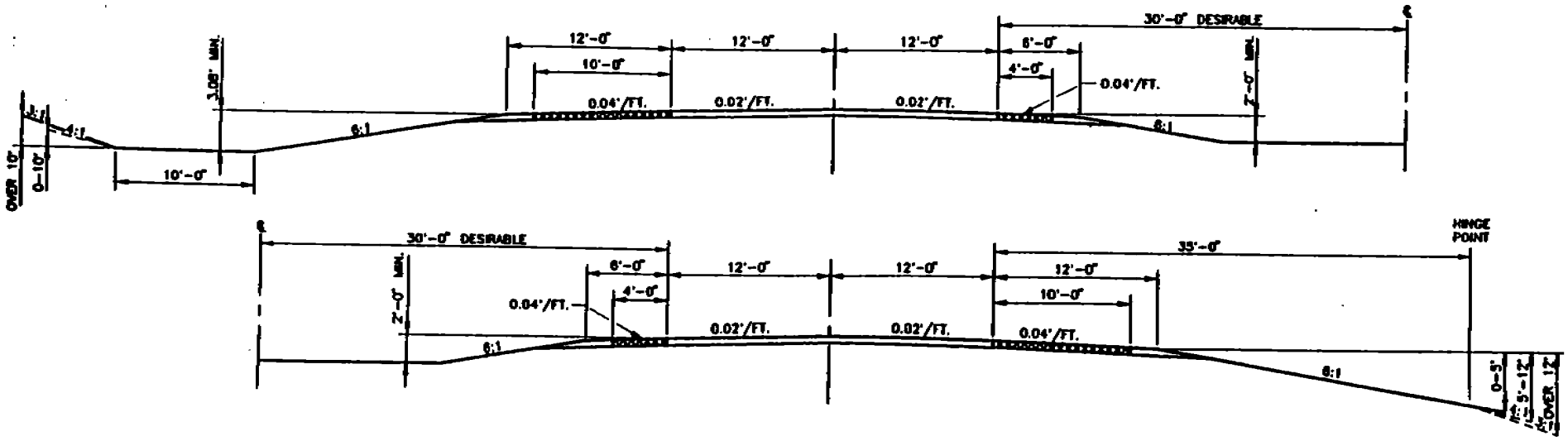
It was the role of this study to analyze these various tradeoffs, and to explain those tradeoffs so that informed decisions could be made possible.

ROUTE SCREENING PROCESSES

The routes on Exhibit 3-1 add to over 50 route combinations, which was too many to evaluate in detail. Furthermore, some options are clearly not as good as others. To enable a reasonable evaluation, this study followed a formalized "screening process," whereby the route options were considered and, as evidence accumulated, the less desirable options were eliminated from further consideration.

The screening process was divided into four sequential "analysis levels," as depicted on Exhibit 3-5.

Exhibit 3-2
TYPICAL SECTION
(Freeway Type Highway)

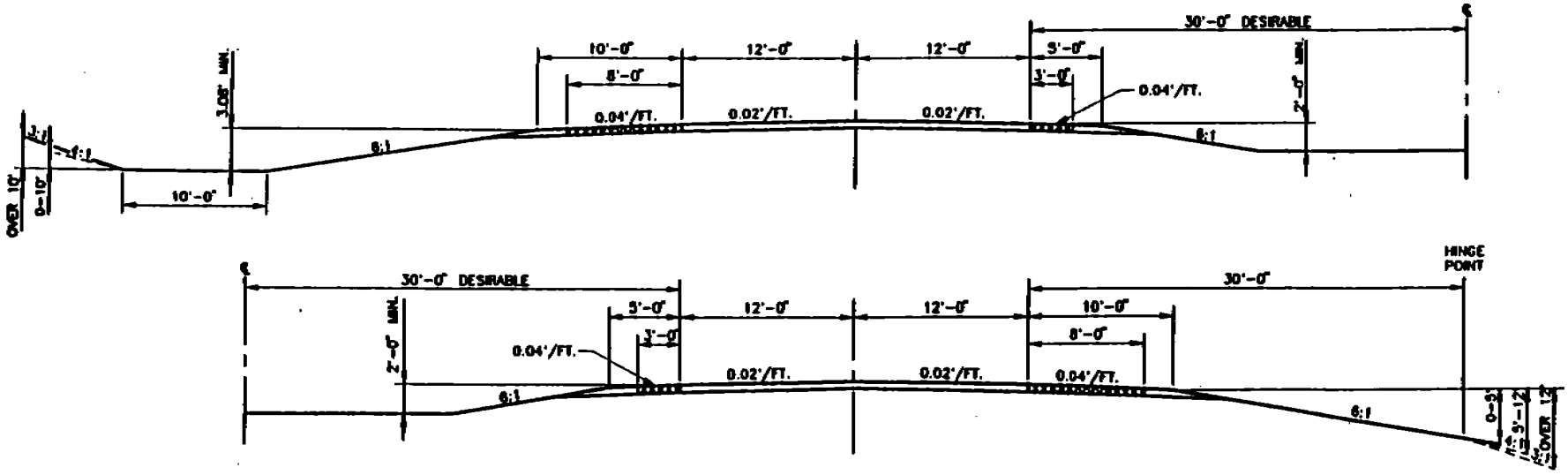


HIGHWAY TYPE	TERRAIN	DESIGN SPEED MPH	HORIZONTAL CURVE DEGREE		MAXIMUM GRADE PERCENT	NUMBER OF LANES	LANE WIDTH (FEET)	MEDIAN WIDTH (FEET)	SHOULDER WIDTH (FEET)	WIDTH OF SHOULDER SURFACING (FEET)	HINGE POINT DISTANCE (FEET)	LATERAL OBSTACLE CLEARANCE (FEET)	NORMAL ROW WIDTH (FEET)	ACCESS CONTROL
			DESIRABLE	MAXIMUM										
INTERSTATE	ALL	70	3	3	3	4 OR.	12	60*	6 LT. 12 RT.	4 LT. 10 RT.	30	35	300	FULL

* DESIRABLE WIDTH

TYPICAL HIGHWAY STANDARDS (INTERSTATE)

Exhibit 3-3
TYPICAL SECTION
(Expressway Type Highway)



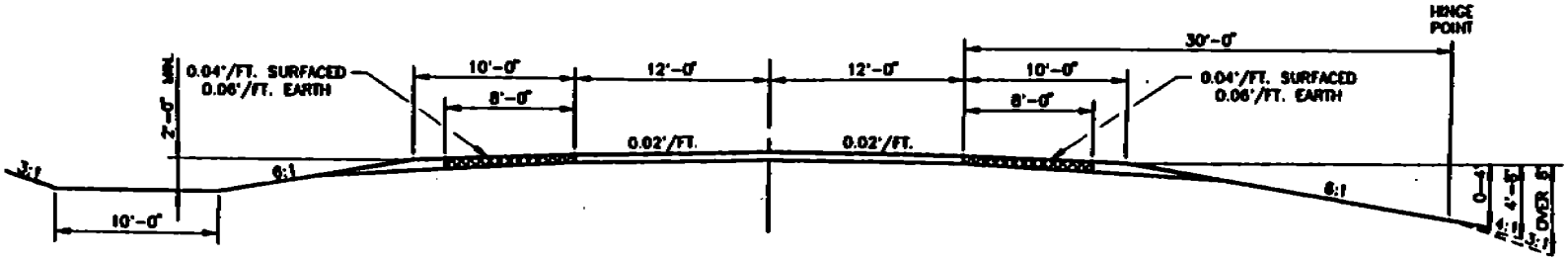
HIGHWAY TYPE	TERRAIN	DESIGN SPEED MPH	HORIZONTAL CURVE DEGREE		MAXIMUM GRADE PERCENT	NUMBER OF LANES	LANE WIDTH (FEET)	MEDIAN WIDTH (FEET)	SHOULDER WIDTH (FEET)	WIDTH OF SHOULDER SURFACING (FEET)	HINGE POINT DISTANCE (FEET)	LATERAL OBSTACLE CLEARANCE (FEET)	NORMAL ROW WIDTH (FEET)	ACCESS CONTROL
			DESIRABLE	MAXIMUM										
EXPRESSWAY	LEVEL	70	3	3	3	4 DIV.	12	60•	5 LT. 10 RT.	3 LT. 8 RT.	30	30	200	•
	ROLLING	60	3.5	4.75	4	4 DIV.	12	60•	5 LT. 10 RT.	3 LT. 8 RT.	30	30	200	

• DESIRABLE WIDTH

TYPICAL HIGHWAY STANDARDS (EXPRESSWAY)

• IN ACCORDANCE WITH CONTROLLED ACCESS POLICY

Exhibit 3-4
TYPICAL SECTION
(Improved Two-Lane Type Highway)



HIGHWAY TYPE	TERRAIN	DESIGN SPEED MPH	HORIZONTAL CURVE DEGREE		MAXIMUM GRADE PERCENT	NUMBER OF LANES	LANE WIDTH (FEET)	MEDIAN WIDTH (FEET)	SHOULDER WIDTH (FEET)	WIDTH OF SHOULDER SURFACING (FEET)	HINGE POINT DISTANCE (FEET)	LATERAL OBSTACLE CLEARANCE (FEET)	NORMAL ROW WIDTH (FEET)	ACCESS CONTROL
			DESIRABLE	MAXIMUM										
TWO-LANE ARTERIAL	LEVEL	70	3	3	3	2	12	NONE	10	6	30	30	120	*
	ROLLING	60	3.5	4.75	4	2	12	NONE	10	8	30	30	120	

* DESIRABLE WIDTH

* IN ACCORDANCE WITH CONTROLLED ACCESS POLICY

TYPICAL HIGHWAY STANDARDS (2-LANE ARTERIAL)

Exhibit 3-5
FOUR-PHASE SCREENING PROCESS
Heartland Expressway Study

ANALYSIS LEVEL	OPTIONS STUDIED	EVALUATION CRITERIA	PRODUCT
#1	All possible routes	Mapping Review Field Studies Land Obstacles Land Use Opportunities Logic	Delete some sub-options from further evaluation
#2	Compare each strategic alternatives' remaining sub-options	Travel Time Route Length Capital Cost Accessibility Tourism Traffic	Select the best several strategic alternatives
#3	Three finalist route options	Cost Economic Efficiency Economic Development	Compare alternatives one with each other
#4	Selection of a recommended route	Life Cycle Cost Traffic Economic Efficiency Economic Development Engineering Environmental	Ranking the alternatives according to the criteria

- In Analysis Level #1, all routes on Exhibit 3-1 were considered and, based principally on logic and in concert with the study's Steering and Advisory Committees, several routes and route segments were eliminated.
- In Analysis Level #2, the options that survived Analysis Level #1 were examined in terms of cost, traffic use and other criteria. This analysis selected the three "finalist" route options.
- In Analysis Level #3, the options were analyzed in terms of economic feasibility, environmental issues, and other criteria.
- Analysis Level #4 comprised a comparison of the three "finalist" routes and the designation of the recommended route.

FIRST ANALYSIS LEVEL SCREENING RESULTS

It was determined that a number of the route options did not logically belong as alignment candidates for the Heartland Expressway between Scottsbluff/Gering and Rapid City. The majority of these routes were along the fringes of the corridor and were seen as too circuitous. Based on recommendations from the Steering and Advisory Committees a number of route options were therefore dropped from further consideration. Exhibit 3-6 identifies the route options that were eliminated in the Analysis Level #1 evaluation process.

SECOND LEVEL ROUTE SCREENING CRITERIA

The first analysis level screening eliminated some route options. The next step involved evaluating the remaining route options in terms of the Analysis Level #2 criteria. To focus the evaluation of the many route options, the alignment alternatives were divided into four distinct "strategic" route options. These strategic route options allowed for a better comparison between alignments that have similar characteristics. For analysis purposes, the remaining routes were identified as Route Options "A," "B," "C," and "D"; with their sub-options differentiated through numerical suffixes.

To evaluate the remaining options, the second screening level used the following criteria:

Travel Time and Route Length - These indicators included total length of the route option (between Scottsbluff/Gering and Rapid City) and the total estimated travel time between Scottsbluff/Gering and Rapid City. The mileages for segments on existing routes were taken from the appropriate State's needs study. Mileages for new segments were scaled from 1:24,000 USGS maps, accounting for the most logical cross country routings. Total travel times were based on estimated actual average speed for the length of the route option.

Construction Costs - Capital costs were developed for each route option. The cost estimates included concept costs for roadway and bridge improvements from per mile estimates and the slope of the terrain. For route comparison purposes, all cost estimates were for a four-lane expressway.

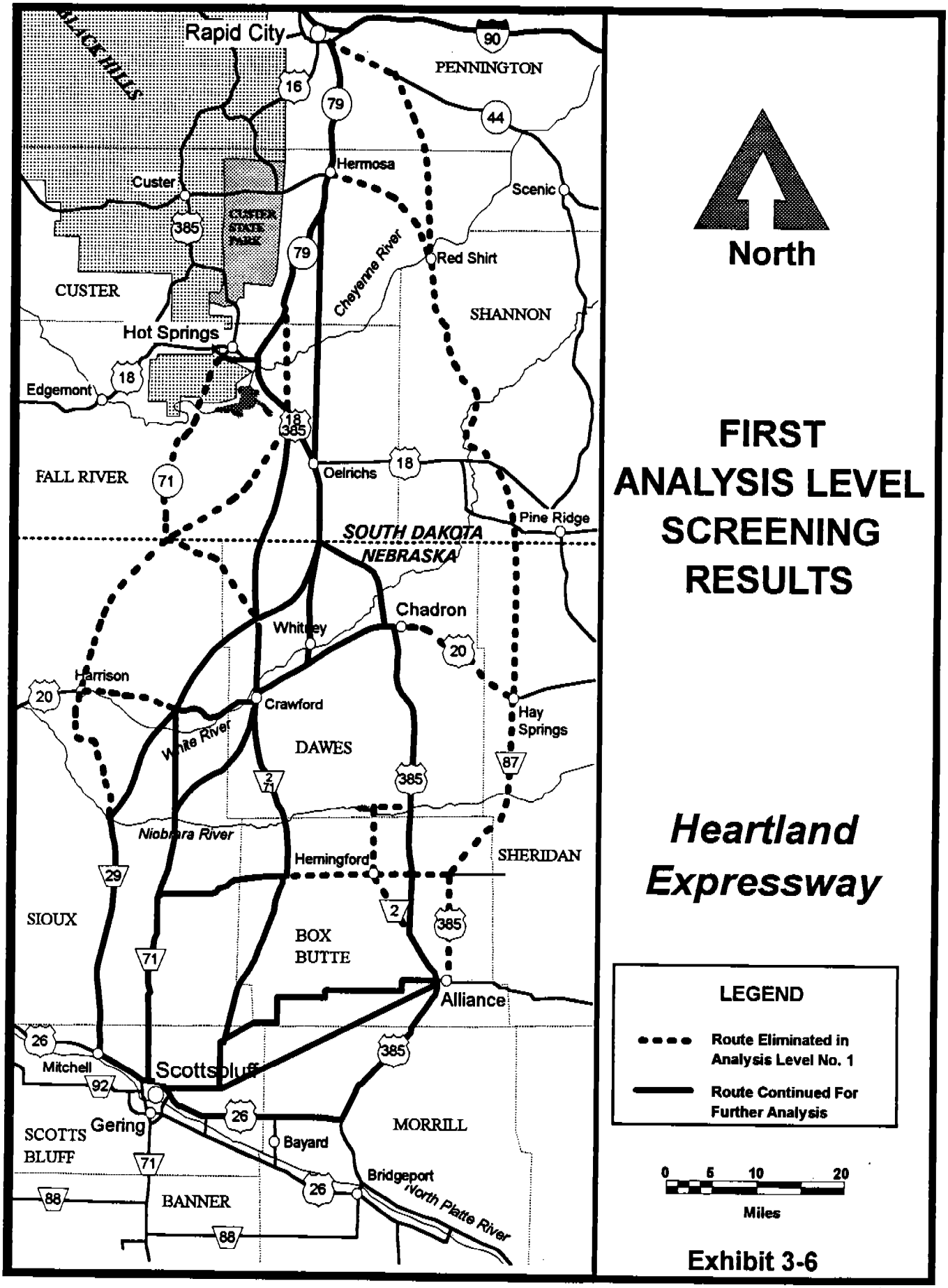

Rapid City
BLACK HILLS
PENNINGTON
90
16
79
44
Hermosa
Custer
Scenic
385
CUSTER STATE PARK
79
Cheyenne River
Red Shirt
CUSTER
SHANNON
Hot Springs
18
Edgemont
18
385
FALL RIVER
71
Oelrichs
18
Pine Ridge
SOUTH DAKOTA
NEBRASKA
Chadron
Whitney
20
Harrison
20
Crawford
Hay Springs
White River
DAWES
87
385
Niobrara River
Hemingford
SHERIDAN
29
2
385
SIOUX
BOX BUTTE
71
Alliance
26
385
Mitchell
Scottsbluff
92
26
SCOTTS BLUFF
Gering
MORRILL
Bayard
71
Bridgeport
North Platte River
88
BANNER
26
88
North
FIRST ANALYSIS LEVEL SCREENING RESULTS
Heartland Expressway
LEGEND
Route Eliminated in Analysis Level No. 1
Route Continued For Further Analysis
0 5 10 20
Miles

Exhibit 3-6

Accessibility - Service to population centers was measured by quantifying total resident population located within a 20-mile band (10 miles on each side) of each route option. This total population was calculated by setting up a geographical information system (GIS) for the corridor using 1990 census population at the block level and creating a 20 mile buffer zone around each route option. Through the use of polygon overlay analysis, the GIS system accumulated the total population surrounding each route option.

Tourism - A tourism index was created to determine which route options best serve the area tourist attractions. The index was based upon proximity to the attraction and the number of annual visitors each tourism site attracts.

The screening evaluation also utilized a combination of the above criteria. For example, total cost per person served, persons served by mile of highway, and total cost per mile of highway were also used as criteria in evaluating the route options.

To allow for comparisons between route options, a proportional rating system was created. This rating system assigned a 0 point to the least desirable route and a value of 10 to the most desirable route option for each criterion. The points awarded to the other route options were determined based on their value's distribution between the two extremes. Such an arrangement standardized the scoring differentials within the various factors. Each factor was given an equal weight; therefore the values for each criterion were summed to compare the alternatives within each strategic route option.

STRATEGIC ROUTE OPTION A

Strategic Route Option A would utilize Nebraska Highway 29 on the southern end of the corridor before branching off into a variety of sub-options towards Rapid City. There were a total of seven route options within Strategic Option A. Exhibit 3-7 displays the route options and the sub-option suffixes. The issue considered in these investigations is which of the seven Option A alignments is superior to the others.

Exhibit 3-8 displays the characteristics for each evaluation criterion for the Route A Options. On the basis of the rating system and the evaluation criteria, Route A-2-3-6-9 (Using U.S. 20 from Ft. Robinson State Park to Crawford and then north on SR 71 before using SR 79 just south of Hot Springs, South Dakota) appeared to be the superior Strategic A Route Option. This route option scored 61.6 out of a total of 70 points, far more than any of the other route A options. This route had the lowest capital cost, the lowest cost per person served along the route and was more cost-effective per mile than any other Strategic A Route Option. The route is also located near many of the large tourist attractions in the area. On the basis of the above information, the other 6 route A options were eliminated from further consideration.

STRATEGIC ROUTE OPTION B

The Strategic Route Option B alignments would use Nebraska Highway 71 north out of Scottsbluff and then at the 90 degree turn 28 miles north of Scottsbluff, the options would either

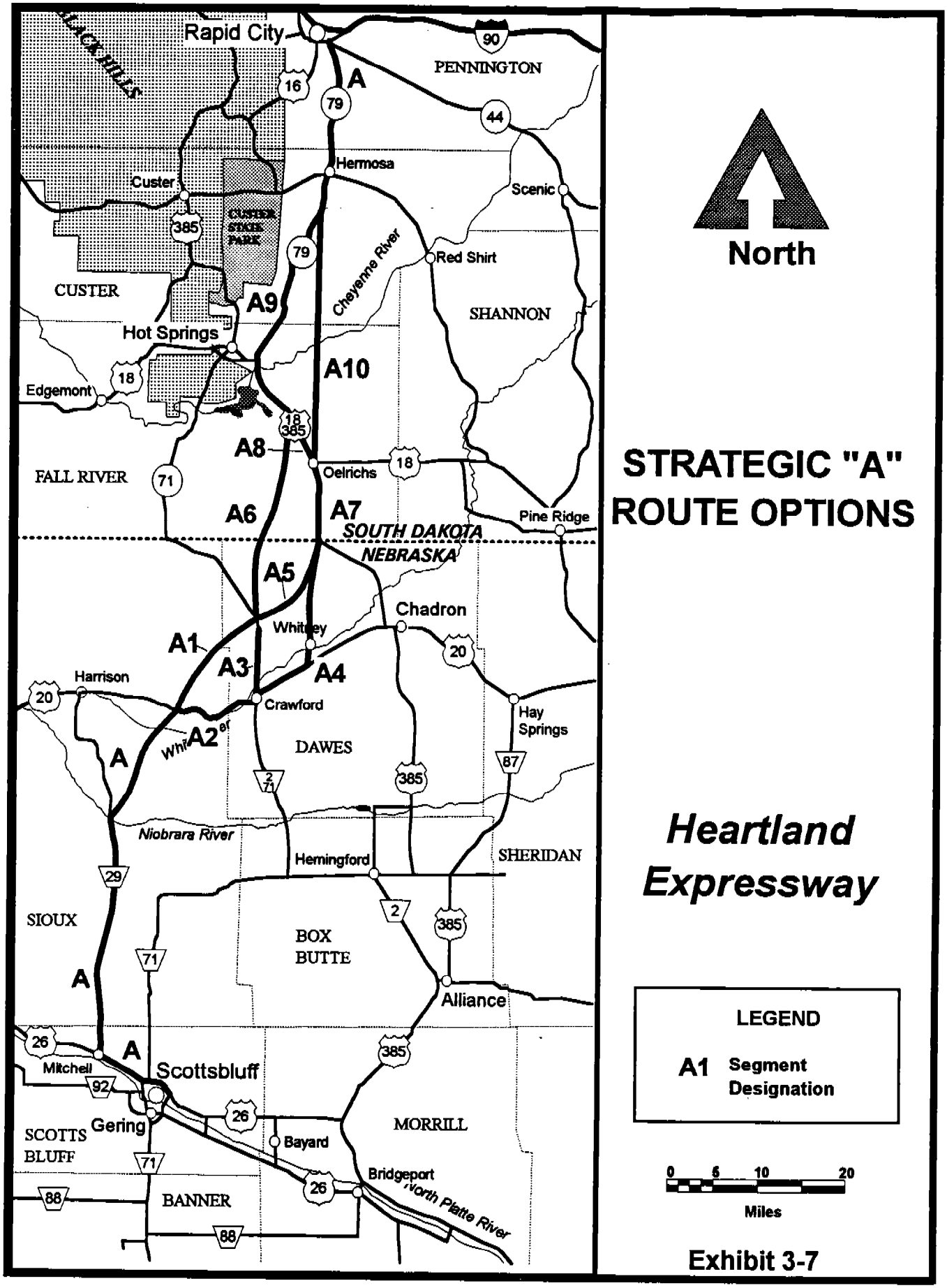

Rapid City
BLACK HILLS
PENNINGTON
90
16
79
A
44
Hermosa
Custer
Scenic
385
CUSTER STATE PARK
79
Cheyenne River
Red Shirt
CUSTER
A9
SHANNON
Hot Springs
A10
18
Edgemont
18
385
A8
Oelrichs
18
FALL RIVER
71
A6
A7
Pine Ridge
SOUTH DAKOTA
NEBRASKA
A5
Chadron
Whitney
A1
A3
A4
20
Harrison
20
Crawford
Hay Springs
A
A2
DAWES
87
385
2
71
Niobrara River
29
Hemingford
SHERIDAN
SIOUX
2
385
BOX BUTTE
71
A
Alliance
26
A
385
Mitchell
Scottsbluff
92
26
MORRILL
SCOTTS BLUFF
Gering
Bayard
71
Bridgeport
North Platte River
26
88
BANNER
88
North
STRATEGIC "A" ROUTE OPTIONS
Heartland Expressway
LEGEND
A1 Segment Designation
0 5 10 20
Miles
Exhibit 3-7

Exhibit 3-8
END TO END CHARACTERISTICS AND RANKINGS OF ROUTE A OPTIONS
Expressway Standards

ROUTE OPTION	LENGTH (a) (Miles)	TRAVEL TIME (b) (Minutes)	CAPITAL COST (c) ($ Million)	POPULATION SERVED (d) (Residents)	COST PER PERSON (e) ($ Dollars)	PERSONS PER MILE	COST PER MILE ($ Thousands)	TOURISM INDEX (f)	
A-1-5-7-10	180.8	197	303.2	113,290	2,676	627	1,677.0	0.307	
A-1-6-9	182.0	199	293.5	118,200	2,483	649	1,612.7	0.509	
A-2-3-5-7-10	183.6	200	293.4	113,440	2,587	618	1,598.3	0.304	
A-2-3-5-7-8-9	190.1	207	308.0	118,390	2,602	623	1,620.2	0.506	
A-2-3-6-9	184.8	202	283.7	118,370	2,397	641	1,535.2	0.506	
A-2-4-7-10	181.8	198	291.7	113,650	2,566	625	1,604.3	0.304	
A-2-4-7-8-9	188.3	205	306.2	118,600	2,582	630	1,626.2	0.506	
RANKING (g)									**TOTAL (h)**
A-1-5-7-10		10.0	2.0	0.0	0.0	2.8	0.0	0.2	14.9
A-1-6-9		8.0	6.0	9.2	6.9	10.0	4.5	10.0	54.6
A-2-3-5-7-10		7.0	6.0	0.3	3.2	0.0	5.5	0.0	22.0
A-2-3-5-7-8-9		0.0	0.0	9.6	2.7	1.6	4.0	9.8	27.7
A-2-3-6-9		5.0	10.0	9.6	10.0	7.2	10.0	9.8	61.6
A-2-4-7-10		9.0	6.7	0.7	3.9	2.3	5.1	0.0	27.8
A-2-4-7-8-9		2.0	0.7	10.0	3.4	3.8	3.6	9.8	33.3

(a) Total highway length between Scottsbluff and Rapid City.
(b) Travel time estimated on 55 mph average speed.
(c) Preliminary cost estimate of 4-lane expressway between Scottsbluff and Rapid City.
(d) 1990 Resident population within 10 miles of either side of route option.
(e) Average cost per person served (within 10 miles) of route option.
(f) Index is based on the number of annual visitors to major tourist attractions within 10 miles of the route option.
(g) Ranking is a proportional value, with the highest ranking equaling 10 and the lowest ranking equaling 0.
(h) Out of a possible of 70 points.

SOURCE: Wilbur Smith Associates, Wells Engineering, and Baker & Associates

travel along a new alignment straight north to the west of Fort Robinson State Park or along existing SR 71 to Crawford. From these two points there were several sub-options towards Rapid City. Exhibit 3-9 illustrates the 14 separate route options and the corresponding sub-option suffixes.

The characteristics for each Strategic B Route Option are listed in Exhibit 3-10. On the basis of the second analysis level screening criteria, Route Option B-3-6-9-12 was believed to be the superior route (62.5 out a total of 70 points). Compared to the other 13 Strategic B Route Options, this alignment has one of the lowest travel times between Scottsbluff and Rapid City and is the most cost effective per person served along the route. This Route Option also would serve a large majority of the area's tourist attractions. Therefore, based on the screening results, Route Option B-3-6-9-12 was carried forward for further analyses, and the other 13 Strategic Route Option B alignments were eliminated from further consideration.

STRATEGIC ROUTE OPTION C

The Strategic Route C Options would utilize a portion of both county roads and new alignments northeast of Scottsbluff to the intersection of Nebraska Highways 2 and 71 in western Box Butte County. From this point the C options would travel along SR 2/71 north to Crawford before branching off into a variety of sub-options towards Rapid City. Exhibit 3-11 displays the five Strategic Route C Options and the corresponding sub-option suffixes.

Exhibit 3-12 displays the characteristics for each evaluation criterion for the Route C Options. On the basis of the rating system and the evaluation criteria, Route C-1-4-7 is believed to be the superior route option (64.7 out of a total of 70 points). This alignment has the lowest capital cost, it is the most cost effective per mile and per person served, and it serves the most population per mile and travels near the most tourist attractions of any of the Strategic C Route Options. On the basis of the screening results, Route Option C-1-4-7 was carried forward for additional analyses and the remaining Route C options were eliminated from further consideration.

STRATEGIC ROUTE OPTION D

Strategic Route Option D would connect Scottsbluff/Gering and Rapid City via Alliance and Chadron. There are three alignment alternatives between Scottsbluff and Alliance, the existing route US 26 and US 385, a new alignment utilizing new right-of-way and an option which utilizes existing county roads between Scottsbluff and Alliance. The remaining route to Rapid City would travel for the most part along US 385 until Oelrichs, South Dakota, where there are two separate sub-options. Exhibit 3-13 displays the six Route D Options.

The characteristics for each Strategic D Route Option are listed in Exhibit 3-14. On the basis of the evaluation criteria Route Option D-1-4 (existing alignment between Scottsbluff and Alliance, existing alignment between Alliance and Rapid City) appeared to be the superior alignment (52.3 out of a total of 70 points).

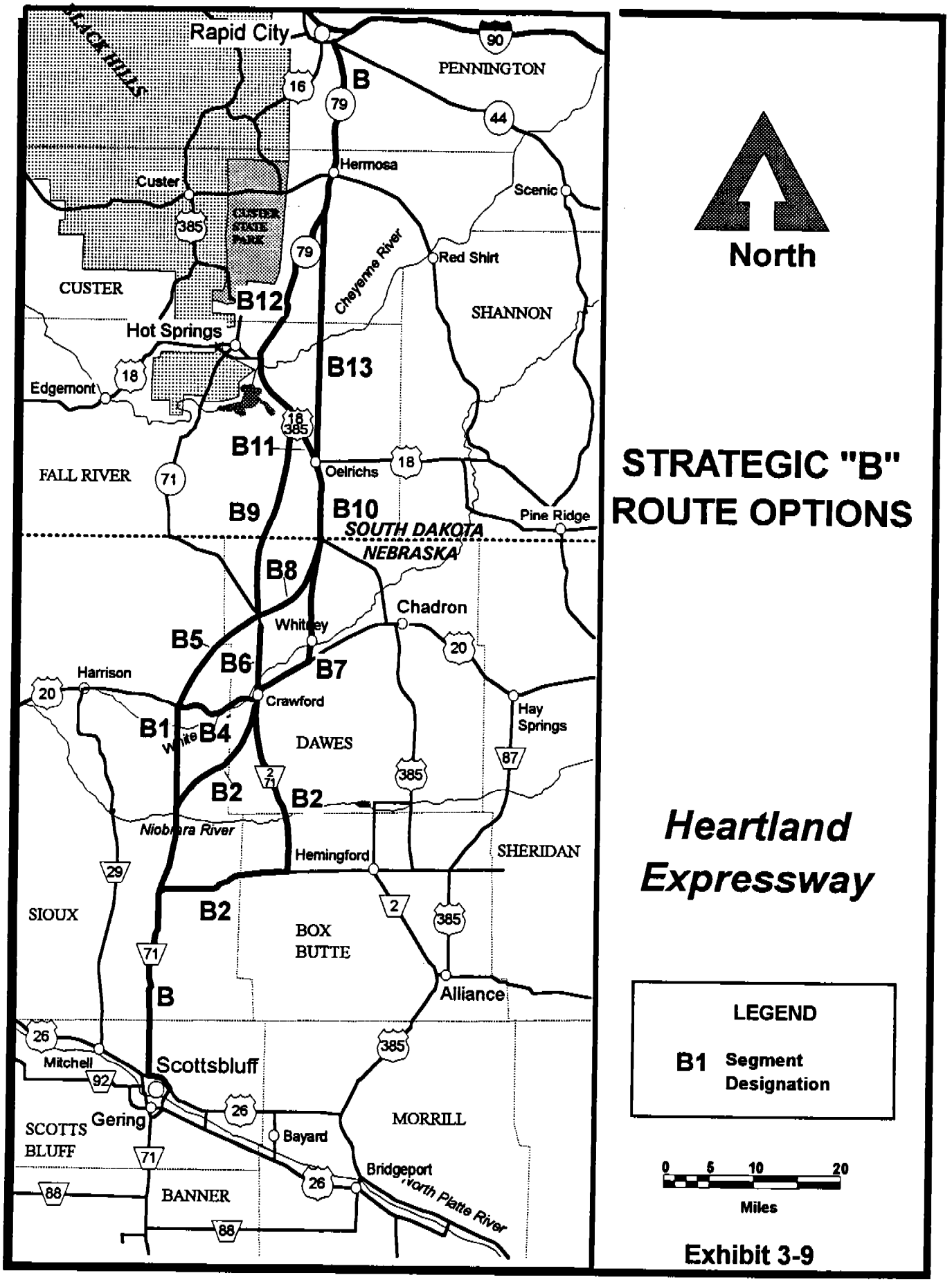

Rapid City
BLACK HILLS
PENNINGTON
Hermosa
Custer
Scenic
CUSTER STATE PARK
Cheyenne River
Red Shirt
CUSTER
SHANNON
Hot Springs
Edgemont
FALL RIVER
Oelrichs
Pine Ridge
SOUTH DAKOTA
NEBRASKA
Chadron
Whitney
Harrison
Crawford
Hay Springs
DAWES
White River
Niobrara River
Hemingford
SHERIDAN
SIOUX
BOX BUTTE
Alliance
Mitchell
Scottsbluff
Gering
SCOTTS BLUFF
Bayard
MORRILL
BANNER
Bridgeport
North Platte River
B
B1
B2
B5
B6
B7
B8
B9
B10
B11
B12
B13
North
STRATEGIC "B" ROUTE OPTIONS
Heartland Expressway
LEGEND
B1 Segment Designation
0 5 10 20
Miles

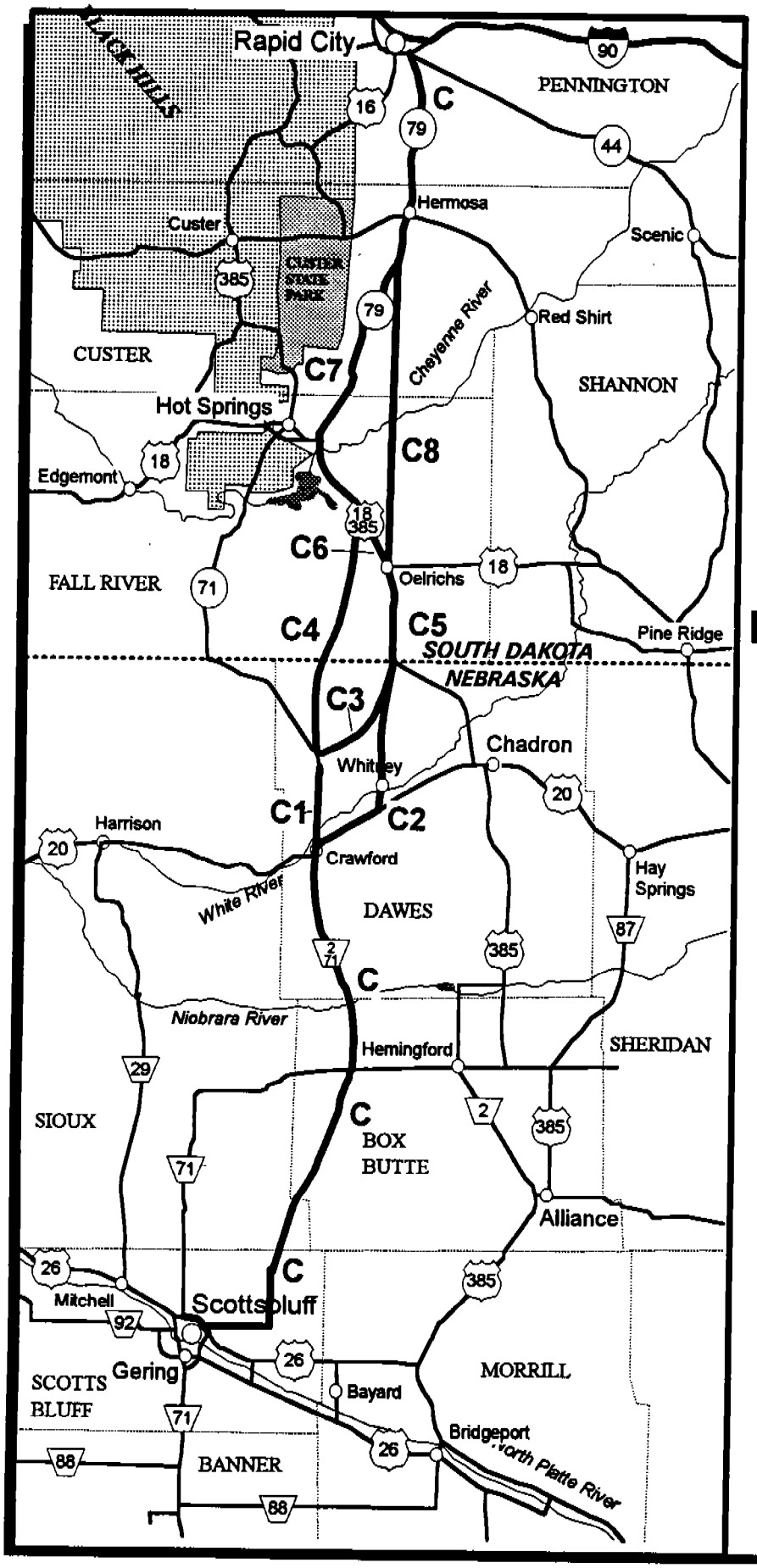
Exhibit 3-9

Exhibit 3-10
END TO END CHARACTERISTICS AND RANKINGS OF ROUTE B OPTIONS
Expressway Standards

ROUTE OPTION	LENGTH (a) (Miles)	TRAVEL TIME (b) (Minutes)	CAPITAL COST (c) ($ Million)	POPULATION SERVED (d) (Residents)	COST PER PERSON (e) ($ Dollars)	PERSONS PER MILE	COST PER MILE ($ Thousands)	TOURISM INDEX (f)	
B-1-4-6-8-10-13	169.5	185	265.2	111,620	2,376	659	1,564.3	0.304	
B-1-4-6-9-12	170.7	186	255.5	116,530	2,192	683	1,496.6	0.506	
B-1-4-7-10-11-12	174.2	190	278.0	116,800	2,380	670	1,595.8	0.506	
B-1-4-7-10-13	167.7	183	263.4	111,820	2,356	667	1,570.9	0.304	
B-1-5-8-10-13	166.7	182	275.0	111,460	2,467	669	1,649.5	0.307	
B-1-5-9-12	167.9	183	265.3	116,390	2,279	693	1,580.1	0.509	
B-2-6-8-10-13	175.2	191	274.2	111,890	2,451	639	1,565.2	0.300	
B-2-6-9-12	176.4	192	264.5	116,810	2,265	662	1,499.6	0.502	
B-2-7-10-11-12	179.9	196	287.1	117,040	2,453	651	1,595.7	0.502	
B-2-7-10-13	173.4	189	272.5	112,080	2,431	646	1,571.5	0.300	
B-3-6-8-10-13	164.1	179	267.4	112,020	2,387	683	1,629.2	0.300	
B-3-6-9-12	165.3	180	257.6	117,020	2,201	708	1,558.4	0.502	
B-3-7-10-11-12	168.8	184	273.3	117,250	2,331	695	1,618.8	0.502	
B-3-7-10-13	162.3	177	265.6	112,290	2,365	692	1,636.3	0.300	
RANKING (g)									**TOTAL (h)**
B-1-4-6-8-10-13		5.9	6.9	0.3	3.3	2.9	5.6	0.2	25.1
B-1-4-6-9-12		5.2	10.0	8.8	10.0	6.4	10.0	9.8	60.2
B-1-4-7-10-11-12		3.2	2.9	9.2	3.2	4.6	3.5	9.8	36.5
B-1-4-7-10-13		6.9	7.5	0.6	4.0	4.1	5.1	0.2	28.5
B-1-5-8-10-13		7.5	3.8	0.0	0.0	4.3	0.0	0.3	16.0
B-1-5-9-12		6.8	6.9	8.5	6.8	7.9	4.5	10.0	51.5
B-2-6-8-10-13		2.7	4.1	0.7	0.6	0.0	5.5	0.0	13.6
B-2-6-9-12		2.0	7.1	9.2	7.4	3.4	9.8	9.7	48.6
B-2-7-10-11-12		0.0	0.0	9.6	0.5	1.7	3.5	9.7	25.1
B-2-7-10-13		3.7	4.6	1.1	1.3	1.1	5.1	0.0	16.9
B-3-6-8-10-13		9.0	6.2	1.0	2.9	6.3	1.3	0.0	26.8
B-3-6-9-12		8.3	9.3	9.6	9.7	10.0	6.0	9.7	62.5
B-3-7-10-11-12		6.3	4.4	10.0	5.0	8.1	2.0	9.7	45.4
B-3-7-10-13		10.0	6.8	1.4	3.7	7.7	0.9	0.0	30.5

(a) Total highway length between Scottsbluff and Rapid City.
(b) Travel time estimated on 55 mph average speed.
(c) Preliminary cost estimate of 4-lane expressway between Scottsbluff and Rapid City.
(d) 1990 Resident population within 10 miles of either side of route option.
(e) Average cost per person served (within 10 miles) of route option.
(f) Index is based on the number of annual visitors to major tourist attractions within 10 miles of the route option.
(g) Ranking is a proportional value, with the highest ranking equaling 10 and the lowest ranking equaling 0.
(h) Out of a possible of 70 points.

SOURCE: Wilbur Smith Associates, Wells Engineering, and Baker & Associates



North

STRATEGIC "C" ROUTE OPTIONS

Heartland Expressway

LEGEND

C1 Segment Designation

0 5 10 20

Miles

Exhibit 3-11

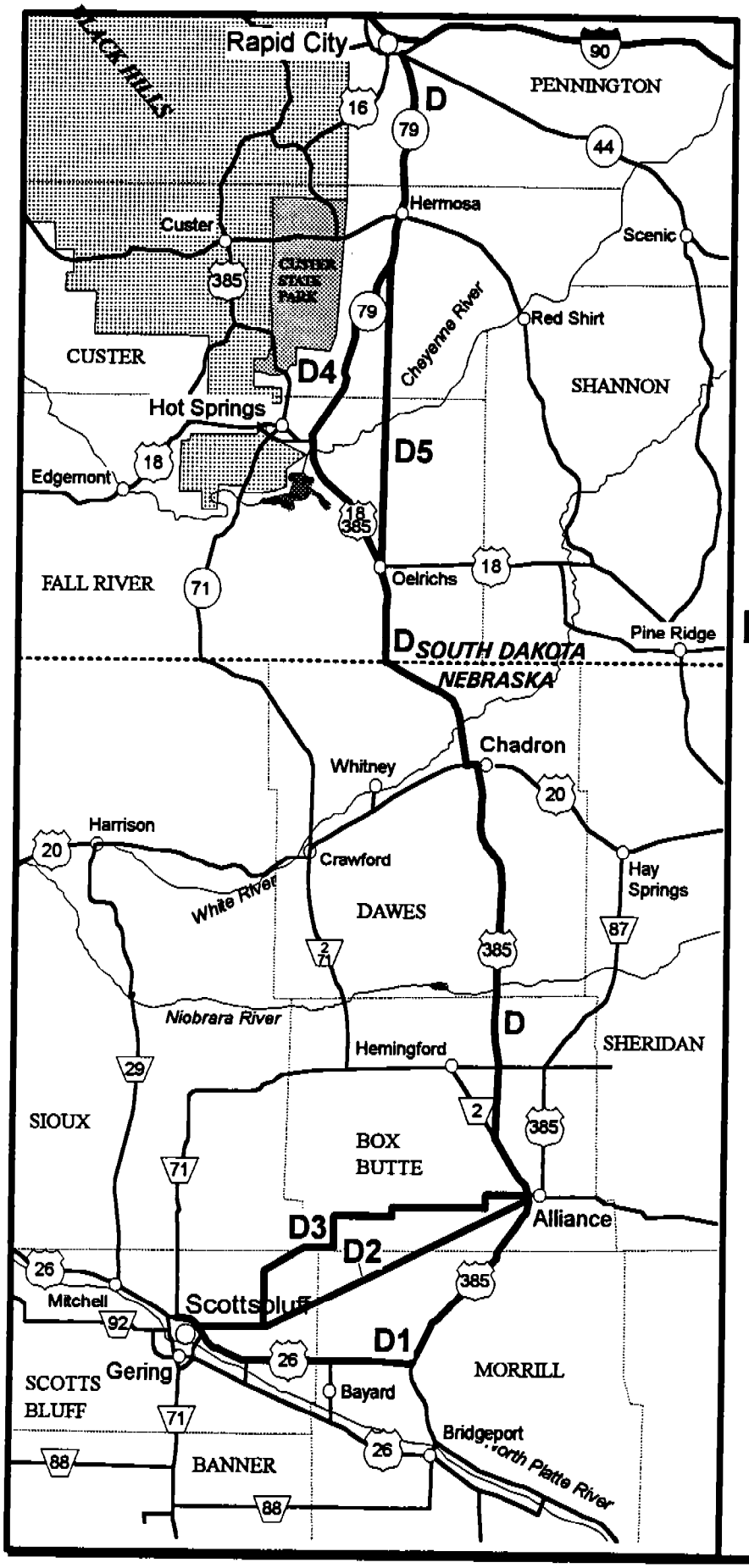
Exhibit 3-12
END TO END CHARACTERISTICS AND RANKINGS OF ROUTE C OPTIONS
Expressway Standards

ROUTE OPTION	LENGTH (a) (Miles)	TRAVEL TIME (b) (Minutes)	CAPITAL COST (c) ($ Million)	POPULATION SERVED (d) (Residents)	COST PER PERSON (e) ($ Dollars)	PERSONS PER MILE	COST PER MILE ($ Thousands)	TOURISM INDEX (f)
C-1-3-5-8	174.8	191	274.8	109,820	2,502	628	1,572.0	0.300
C-1-4-7	176.0	192	264.7	114,740	2,307	652	1,504.0	0.502
C-1-3-5-6-7	177.7	194	273.4	114,910	2,379	647	1,538.7	0.502
C-2-5-6-7	179.5	196	268.1	115,100	2,503	641	1,604.9	0.502
C-2-5-8	173.0	189	272.9	110,040	2,480	636	1,577.6	0.502

RANKING (g)								TOTAL (h)
C-1-3-5-8	7.2	5.7	0.0	0.0	0.0	3.3	0.0	16.2
C-1-4-7	5.4	10.0	9.3	10.0	10.0	10.0	10.0	64.7
C-1-3-5-6-7	2.8	6.3	9.6	6.3	7.8	6.6	10.0	49.3
C-2-5-6-7	0.0	0.0	10.0	0.0	5.5	0.0	10.0	25.5
C-2-5-8	10.0	6.5	0.4	1.2	3.3	2.7	10.0	34.1

(a) Total highway length between Scottsbluff and Rapid City.
(b) Travel time estimated on 55 mph average speed.
(c) Preliminary cost estimate of 4-lane expressway between Scottsbluff and Rapid City.
(d) 1990 Resident population within 10 miles of either side of route option.
(e) Average cost per person served (within 10 miles) of route option.
(f) Index is based on the number of annual visitors to major tourist attractions within 10 miles of the route option.
(g) Ranking is a proportional value, with the highest ranking equaling 10 and the lowest ranking equaling 0.
(h) Out of a possible of 70 points.

SOURCE: Wilbur Smith Associates, Wells Engineering, and Baker & Associates



North

STRATEGIC "D" ROUTE OPTIONS

Heartland Expressway

LEGEND

D1 Segment Designation

0 5 10 20

Miles

Exhibit 3-13

Exhibit 3–14
END TO END CHARACTERISTICS AND RANKINGS OF ROUTE D OPTIONS
Expressway Standards

ROUTE OPTION	LENGTH (a) (Miles)	TRAVEL TIME (b) (Minutes)	CAPITAL COST (c) ($ Million)	POPULATION SERVED (d) (Residents)	COST PER PERSON (e) ($ Dollars)	PERSONS PER MILE	COST PER MILE ($ Thousands)	TOURISM INDEX (f)	
D–1–4	195.7	213	260.0	134,940	1,927	690	1,328.6	0.494	
D–1–5	189.2	206	246.1	129,970	1,893	687	1,300.7	0.292	
D–2–4	192.6	210	265.0	133,070	1,991	691	1,375.9	0.491	
D–2–5	186.1	203	251.1	128,100	1,960	688	1,349.3	0.289	
D–3–4	194.3	212	284.7	132,390	2,150	681	1,465.1	0.491	
D–3–5	187.8	205	270.8	127,430	2,125	679	1,441.7	0.289	
RANKING (g)									**TOTAL (h)**
D–1–4		0.0	6.4	10.0	8.7	8.9	8.3	10.0	52.3
D–1–5		6.8	10.0	3.4	10.0	6.8	10.0	0.1	47.1
D–2–4		3.2	5.1	7.5	6.2	10.0	5.4	9.9	47.3
D–2–5		10.0	8.7	0.9	7.4	7.9	7.0	0.0	42.0
D–3–4		1.5	0.0	6.6	0.0	2.3	0.0	9.9	20.2
D–3–5		8.2	3.6	0.0	1.0	0.0	1.4	0.0	14.2

(a) Total highway length between Scottsbluff and Rapid City.
(b) Travel time estimated on 55 mph average speed.
(c) Preliminary cost estimate of 4–lane expressway between Scottsbluff and Rapid City.
(d) 1990 Resident population within 10 miles of either side of route option.
(e) Average cost per person served (within 10 miles) of route option.
(f) Index is based on the number of annual visitors to major tourist attractions within 10 miles of the route option.
(g) Ranking is a proportional value, with the highest ranking equaling 10 and the lowest ranking equaling 0.
(h) Out of a possible of 70 points.

SOURCE: Wilbur Smith Associates, Wells Engineering, and Baker & Associates

Since Route Option D-1-4 uses existing alignment between Scottsbluff and Rapid City, it serves the greatest number of persons and travels near more tourists and recreational sites. Therefore, based on the screening results, Route Option D-1-4 was carried forward for additional analyses and the remaining Route D options were eliminated from further consideration.

FINALIST ROUTE OPTIONS

By determining the best alignment within each "strategic option," the number of options was reduced to four end-to-end alignments. However, if one compares Route A with Route B, the only difference in the two alignments is that Route A uses Nebraska Highway 29 north of Scottsbluff and Route B utilizes Nebraska Highway 71. Since these two routes are very similar, the characteristics of each route are compared in Exhibit 3-15. As can be seen on Exhibit 3-12, Route Option B has the advantages that it is shorter, faster and costs less than does Route A. The only clear advantage Route Option A has is that it directly serves the community of Mitchell, thereby serving a larger share of the area's population. Based on this comparison of Routes A and B, the Route A Strategic Option was eliminated from further consideration.

SECOND ANALYSIS LEVEL SCREENING RESULTS

The second analysis level route screening process determined that the number of end-to-end route options from Scottsbluff/Gering to Rapid City be limited to three finalist route options (Exhibit 3-16). The finalist route options provided for two direct, least travel time alignments between Scottsbluff/Gering and Rapid City (Routes B and C), and an intercity route connecting Scottsbluff/Gering and Rapid City via Alliance and Chadron (Route D).

The feasibility of the "three finalist" route options are compared in the following chapters. The three routes were subjected to five tests of feasibility:

- Need based on traffic
- Engineering and cost feasibility
- Environmental feasibility
- Travel efficiency feasibility
- Economic development feasibility

Exhibit 3–15
END TO END CHARACTERISTICS AND COMPARISON OF ROUTES A AND B
Expressway Standards

ROUTE OPTION	LENGTH (a) (Miles)	TRAVEL TIME (b) (Minutes)	CAPITAL COST (c) ($ Million)	POPULATION SERVED (d) (Residents)	COST PER PERSON (e) ($ Dollars)	PERSONS PER MILE	COST PER MILE ($ Thousands)	TOURISM INDEX (f)	
A–2–3–6–9	184.8	202	283.7	118,370	2,397.0	641	1,535.2	0.506	
B–3–6–8–12	165.3	180	257.6	117,020	2,201.0	708	1,558.4	0.502	
RANKING (g)									**TOTAL (h)**
A–2–3–6–9		0.0	0.0	10.0	0.0	0.0	10.0	5.0	25.0
B–3–6–8–12		10.0	10.0	0.0	10.0	10.0	0.0	5.0	45.0

(a) Total highway length between Scottsbluff and Rapid City.
(b) Travel time estimated on 55 mph average speed.
(c) Preliminary cost estimate of 4–lane expressway between Scottsbluff and Rapid City.
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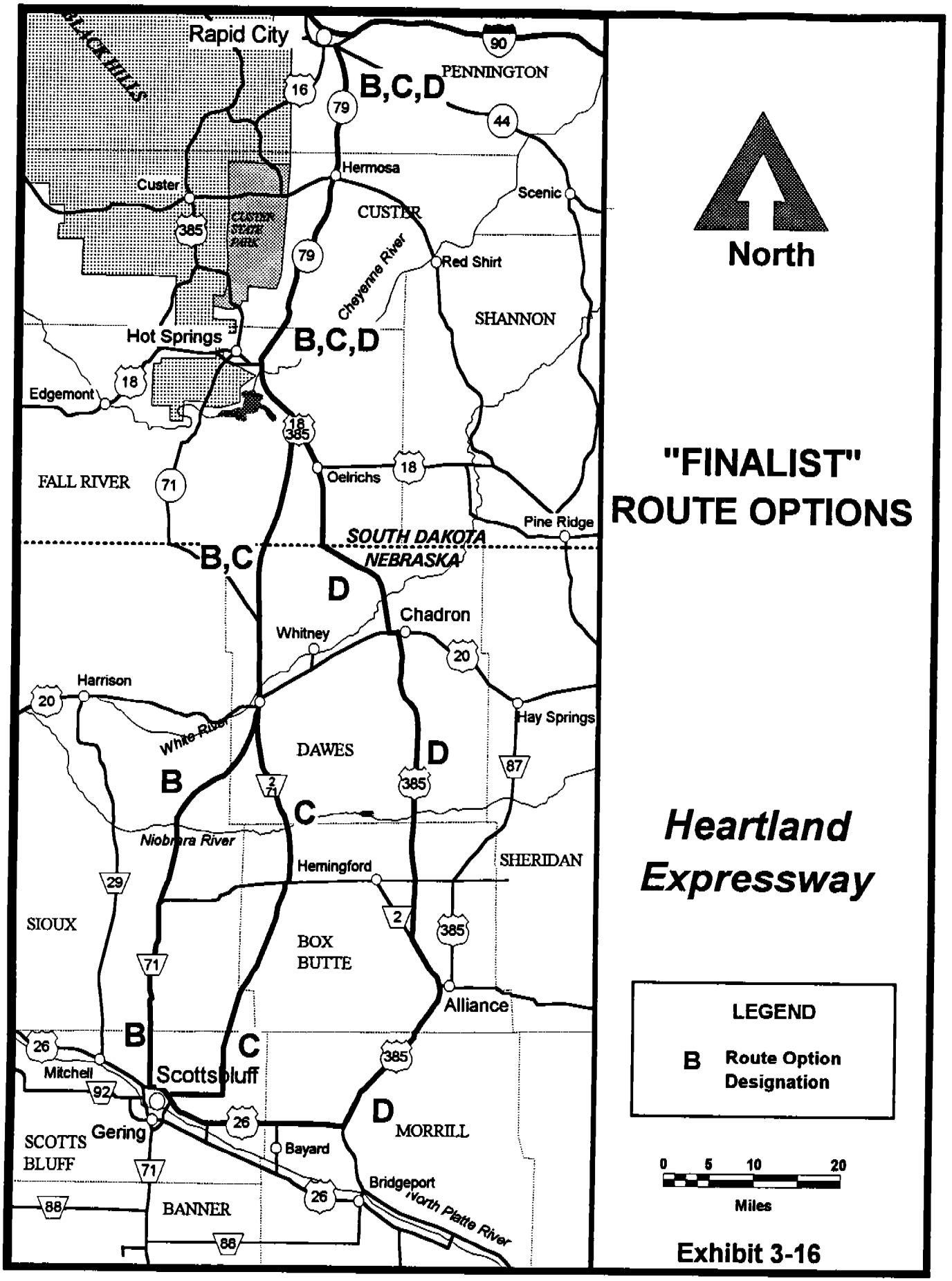
(e) Average cost per person served (within 10 miles) of route option.
(f) Index is based on the number of annual visitors to major tourist attractions within 10 miles of the route option.
(g) Ranking is a proportional value, with the highest ranking equaling 10 and the lowest ranking equaling 0.
(h) Out of a possible of 70 points.

SOURCE: Wilbur Smith Associates, Wells Engineering, and Baker & Associates


Rapid City
BLACK HILLS
PENNINGTON
B,C,D
Hermosa
Custer
CUSTER
Scenic
CUSTER STATE PARK
Cheyenne River
Red Shirt
SHANNON
Hot Springs
B,C,D
Edgemont
FALL RIVER
Oelrichs
Pine Ridge
SOUTH DAKOTA
NEBRASKA
B,C
D
Whitney
Chadron
Harrison
White River
Hay Springs
DAWES
B
C
D
Niobrara River
Hemingford
SHERIDAN
SIOUX
BOX BUTTE
Alliance
B
C
D
Mitchell
Scottsbluff
Gering
SCOTTS BLUFF
Bayard
MORRILL
Bridgeport
North Platte River
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North
"FINALIST" ROUTE OPTIONS
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LEGEND
B Route Option Designation
0 5 10 20
Miles

Exhibit 3-16

Table of Contents

Chapter 4
COST ESTIMATES

The Heartland Expressway, regardless of the route alignment or highway standard alternative, will be quite expensive to build and maintain. This chapter presents the cost estimates for each Heartland Expressway alternative. The highways have not been designed, nor have detailed environmental and location studies been conducted. Consequently, the cost estimates should be viewed as "order-of-magnitude" estimates suitable for feasibility testing purposes, but certainly subject to refinement in any future more detailed study.

ROUTE ANALYSIS

Conceptual alignments for each route were evaluated using U.S.G.S. maps and field observations. U.S.G.S. maps provided information on topography, while the field observations noted the location of drainage structures, road intersections, pavement conditions, and roadway shoulders. Improvement costs per mile were estimated for each highway type alternative considering the topography and utilization of existing alignments.

The estimates for the freeway alternative included assumed interchanges located at a minimum interval of 10 miles. Access to minor county roads and private drives was provided to these interchanges through the construction of new gravel frontage roads.

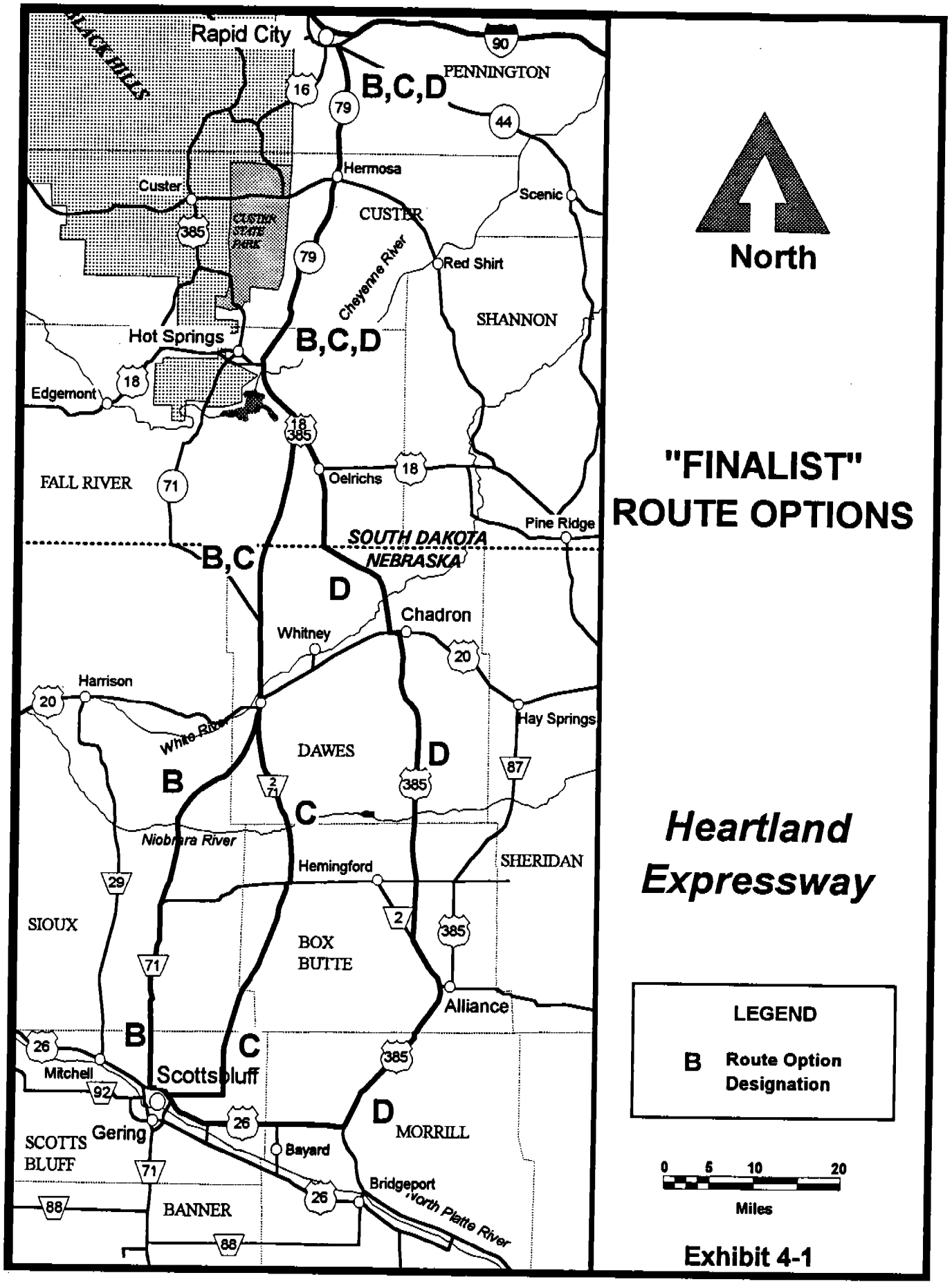
The expressway alternative included costs for at-grade intersections at most major county roads. New interchanges were assumed where the route alignment passed through or near the larger municipalities located in the corridor.

The two-lane with some four lane alternative utilized a standard two lane arterial highway with turn lanes provided at intersections with major county roads and municipalities. The roadway was expanded to four lanes where the projected traffic volumes justified the expansion or where economic development potential was greater. The sections identified as having these characteristics includd the roadway section between Scottsbluff and Alliance in Nebraska, and the roadway section between Rapid City and the intersection with Highway 18 near Hot Springs.

Bypass projects were considered at the cities of Scottsbluff and Rapid City. The route alternatives considered in this study tie onto the Scottsbluff By-Pass and include the Rapid City Southeast Truck Route.

CAPITAL COSTS

Capital costs were developed for each of the three route alternatives indicated on Exhibit 4-1. Cost estimates for each of the three classifications of highway type alternatives were developed for each of the finalist routes.


Rapid City
BLACK HILLS
PENNINGTON
B,C,D
Hermosa
Custer
CUSTER
Scenic
CUSTER STATE PARK
Cheyenne River
Red Shirt
SHANNON
Hot Springs
B,C,D
Edgemont
FALL RIVER
Oelrichs
Pine Ridge
SOUTH DAKOTA
NEBRASKA
B,C
D
Chadron
Whitney
Harrison
Hay Springs
White River
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D
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Niobrara River
Hemingford
SHERIDAN
SIOUX
BOX BUTTE
Alliance
B
C
Mitchell
Scottsbluff
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SCOTTS BLUFF
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Bayard
Bridgeport
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B Route Option Designation
0 5 10 20
Miles

Exhibit 4-1

Cost estimates developed for this report are concept level, and utilize average 1992 constant price level unit costs for construction multiplied by an estimated number of units per alternative. Each alternative was analyzed and consistent assumptions were made for all to estimate the construction units. The relative accuracy of these concept level cost estimates is believed to be adequate for feasibility analysis purposes.

UNIT CAPITAL COSTS

The unit cost data used in the estimates were taken from the State of Nebraska Department of Roads "Awarded Bids Average Unit Prices, January through December 1992," with adjustments based on South Dakota Department of Transportation cost data. A summary of these unit cost data is provided in Exhibit 4-2.

The cost of right-of-way varied throughout the project. For this analysis, a cost of $250.00 per acre was used for right-of-way acquisitions. Costs for each highway type alternative were developed considering the topography, number of structures, and utilization of new or existing alignment.

Bridges were classified as stream crossings, railroad crossings, or grade separations. These bridges were assumed to have lengths of 100 feet, 150 feet, and 200 feet, respectively. The overall width of the bridges were assumed to be 42 feet for an expressway two-lane bridge; 45 feet for a freeway, two-lane bridge; and 47 feet for a two-way, two-lane bridge. The bridge section consisted of two lanes each 12 feet, a 10 to 12-foot shoulder on the right, a 5 to 10-foot shoulder on the left, and 1.5 feet on each side for concrete barrier curb. A unit cost of $55.00 per square foot was applied for bridge construction on stream crossings and grade separations. Railroad crossing structures were estimated at $60.00 per square foot. Bridge widening costs were estimated $65.00 per square foot.

Engineering costs (including planning, design, contract administration, construction surveying, and inspection work) were included in each of the improvement costs, at 15% of the estimated construction cost. In addition, 7% was added to the total construction and engineering costs to cover in-house administration costs.

A summary of highway improvement costs used for the cost analysis is included in Exhibit 4-3.

Exhibit 4-2
CAPITAL COST UNIT COST DATA

Item Description	Units	Unit Cost
Earthwork		
a) Excavation	C.Y.	$ 1.00
b) Embankment	C.Y.	$ 1.00
Culverts		
a) R.C.P.	L.F.	$ 42.50
b) Box	L.F.	$426.00
Fencing	L.F.	$ 0.75
Seeding	Acre	$535.00
Pavement Base	Ton	$ 13.40
Concrete Pavement	S.Y.	$ 16.90
Asphalt Shoulder	Ton	$ 17.95

SOURCE: Nebraska Department of Troads, South Dakota Department of Transportation, Wells Engineers.

Exhibit 4-3
HIGHWAY IMPROVEMENT UNIT COSTS
1992 Constant Price Levels

Improvement Type	Estimated Unit Costs
Roadway	
Shoulder Improvements	$ 180,000/mile
Turn Lane	$ 69,000/each
Passing Lane	$ 324,000/each
Construct Two-Lane	
Level Terrain	$ 621,000/mile
Moderate Terrain	746,800/mile
Rolling Terrain	$1,076,000/mile
Construct Four-Lane	
Level Terrain	$1,127,400/mile
Moderate Terrain	$1,353,000/mile
Rolling Terrain	$1,885,000/mile
Resurfacing	$ 95,000/mile
Pavement Reconstruction - Asphalt	$ 325,000/mile
Pavement Reconstruction - Concrete	$ 764,092/mile
Frontage Road - Granular Surface	$ 234,000/mile
Structures	
River Bridge (two-lane, one-way traffic)	$ 650,000/each
River Bridge (two-lane, two-way traffic)	$ 700,000/each
Stream Crossing (two-lane, one-way traffic - freeway)	$ 325,600/each
Stream Crossing (two-lane, one-way traffic - expressway)	$ 304,000/each
Grade Separation (two-lane, one-way traffic)	$ 925,000/each
Grade Separation (two-lane, two-way traffic)	$1,183,000/each
Overpass of Railroad (two-lane, one-way traffic)	$1,183,000/each
Overpass of Railroad (two-lane, two-way traffic)	$1,214,000/each
Diamond Interchange (one two-lane structure)	$2,036,000/each
Diamond Interchange (two two-lane structures)	$2,575,000/each
Bridge Widening	$ 59,000/each
Box Culverts	
Two-lane crossing	$ 41,000/each
Four-lane crossing	$ 76,000/each

SOURCE: Nebraska Department of Roads, South Dakota Department of Transportation, Wells Engineers.

CAPITAL COST SUMMARY

Exhibit 4-4 summarizes the estimated capital cost for each route option and highway type option:

Table 4-4
ESTIMATED CAPITAL COST SUMMARY
1992 Constant Price Levels
($ Millions)

Route Alternatives	Four-Lane Freeway	Four-Lane Expressway	Two/ Four-Lane
Alternative B	$310.6	$257.6	$145.2
Alternative C	$327.7	$264.7	$147.3
Alternative D	$326.9	$260.0	$147.7

SOURCE: Wells Engineers.

The capital costs of each improvement alternative were estimated on a segment by segment basis. A detailed summary of each alternative is included in Exhibits 4-5 through 4-7.

MAINTENANCE COSTS

Maintenance costs were subdivided into two types: on-going, and periodic. On-going maintenance comprises those costs experienced on a year-to-year basis including such expenses as sign maintenance, snow removal, and minor pavement repair. Periodic maintenance comprises costs associated with resurfacing or reconstruction projects necessary to keep the roadway in a safe driving condition.

On-going maintenance costs were obtained from each state's records for each of the highway types considered for this study. Maintenance costs experienced over a 10-year interval were averaged and a present annual value calculated. The on-going maintenance costs used in this study are listed in Exhibit 4-8.

Exhibit 4–5
CAPITAL COST BY ROUTE SEGMENT AND HIGHWAY TYPE
Route Option B

ROUTE B FREEWAY

Highway Segment From		To	Length (Miles)	Pavement Reconst. ($/1000)	New 2–Lane Construct. ($/1000)	New 4–Lane Construct. ($/1000)	Bridges & Boxes ($/1000)	New R.R. Viaduct ($/1000)	New Interchange ($/1000)	New Overpass ($/1000)	New Front. Road ($/1000)	R.O.W. ($/1000)	Total Const. Cost ($/1000)
Scottsbluff	to	N71 Split W.	27.2	3,348	13,109	17,196	456	0	4,072	0	4,797	296	43,274
N71 Split W.	to	Hwy 20 W. Ft. Rob.	25.9	0	0	40,626	7,040	2,366	6,108	0	1,357	312	57,809
Hwy 20 W. Ft. Rob.	to	Crawford	9.8	0	0	8,650	1,760	2,366	4,072	0	0	95	16,943
Crawford	to	Hwy 71 to West	11.8	2,124	5,154	3,945	2,949	3,549	0	0	1,895	105	19,721
Hwy 71 to West	to	N. of Oelrichs	28.6	0	0	39,514	3,672	0	4,072	1,183	655	308	49,404
N. of Oelrichs	to	Jct. 18 W.	12.9	0	6,269	7,577	1,113	0	6,108	1,183	1,942	180	24,372
Jct. 18 W.	to	Jct. 36	31.9	0	15,598	13,349	4,562	0	8,144	0	2,176	330	44,159
Jct. 36	to	R.C. SE Truck Rt.	13.5	0	9,697	5,655	4,295	0	4,072	1,183	1,357	147	26,406
R.C. SE Truck Rt.			3.7										28,510
TOTAL			165.3	5,472.0	49,827.5	136,511.2	25,847.0	8,281.0	36,648.0	3,549.0	14,180.4	1,771.8	310,597.9

ROUTE B EXPRESSWAY

Highway Segment From		To	Length (Miles)	Pavement Reconst. ($/1000)	New 2–Lane Construct. ($/1000)	New 4–Lane Construct. ($/1000)	Bridges & Boxes ($/1000)	New R.R. Viaduct ($/1000)	New Intersection ($/1000)	New Interchange ($/1000)	New Front. Road ($/1000)	R.O.W. ($/1000)	Total Const. Cost ($/1000)
Scottsbluff	to	N71 Split W.	27.2	3,348	14,603	14,490	456	0	1,656	2,036	0	132	36,721
N71 Split W.	to	Hwy 20 W. Ft. Rob.	25.9	0	0	40,626	6,688	2,366	1,104	0	0	156	50,942
Hwy 20 W. Ft. Rob.	to	Crawford	9.8	0	0	8,650	1,672	2,366	0	0	0	36	12,724
Crawford	to	Hwy 71 to West	11.8	2,124	5,465	3,381	2,550	3,549	828	2,036	0	65	19,998
Hwy 71 to West	to	N. of Oelrichs	28.6	0	0	39,514	3,496	0	0	0	0	174	43,184
N. of Oelrichs	to	Jct. 18 W.	12.9	0	9,182	2,165	1,047	0	1,932	0	0	45	14,371
Jct. 18 W.	to	Jct. 36	31.9	0	18,334	8,389	4,053	0	552	2,036	0	136	33,500
Jct. 36	to	R.C. SE Truck Rt.	13.5	0	12,925	0	3,808	0	828	0	0	41	17,602
R.C. SE Truck Rt.			3.7										28,510
TOTAL			165.3	5,472.0	60,507.7	117,214.7	23,770.0	8,281.0	6,900.0	6,108.0	0.0	787.6	257,551.0

ROUTE B TWO/FOUR LANE

Highway Segment From		To	Length (Miles)	Pavement Reconst. ($/1000)	New 2–Lane Construct. ($/1000)	New 4–Lane Construct. ($/1000)	Bridges & Boxes ($/1000)	New R.R. Viaduct ($/1000)	New Intersection ($/1000)	New Interchange ($/1000)	New Front. Road ($/1000)	R.O.W. ($/1000)	Total Const. Cost ($/1000)
Scottsbluff	to	N71 Split W.	27.2	3,348	0	0	287	0	0	0	0	16	3,651
N71 Split W.	to	Hwy 20 W. Ft. Rob.	25.9	0	22,889	0	3,712	1,214	552	0	0	95	28,462
Hwy 20 W. Ft. Rob.	to	Crawford	9.8	1,638	0	0	118	1,214	1,242	0	0	8	4,220
Crawford	to	Hwy 71 to West	11.8	2,124	0	0	236	1,214	552	0	0	8	4,134
Hwy 71 to West	to	N. of Oelrichs	28.6	0	21,956	0	1,938	0	0	0	0	104	23,998
N. of Oelrichs	to	Jct. 18 W.	12.9	0	0	0	118	0	966	0	0	9	1,093
Jct. 18 W.	to	Jct. 36	31.9	0	18,334	8,389	4,053	0	552	2,036	0	136	33,500
Jct. 36	to	R.C. SE Truck Rt.	13.5	0	12,925	0	3,808	0	828	0	0	41	17,602
R.C. SE Truck Rt.			3.7										28,510
TOTAL			165.3	7,110.0	76,104.2	8,388.6	14,270.0	3,642.0	4,692.0	2,036.0	0.0	417.4	145,170.2

Source: Wells Engineers

Exhibit 4–6
CAPITAL COST BY ROUTE SEGMENT AND HIGHWAY TYPE
Route Option C

ROUTE C FREEWAY

Highway Segment From		To	Length (Miles)	Pavement Reconst. ($/1000)	New 2–Lane Construct. ($/1000)	New 4–Lane Construct. ($/1000)	Bridges & Boxes ($/1000)	New R.R. Viaduct ($/1000)	New Interchange ($/1000)	New Overpass ($/1000)	New Front. Road ($/1000)	R.O.W. ($/1000)	Total Const. Cost ($/1000)
Scottsbluff	to	S. Jct. 2/71	48.3	12,912	9,874	44,850	1,988	0	10,180	1,183	7,839	584	89,410
S. Jct. 2/71	to	Crawford	25.3	5,238	13,581	15,901	2,557	0	4,072	1,183	2,785	252	45,569
Crawford	to	Hwy 71 to West	11.8	2,124	5,154	3,945	2,949	3,549	0	0	1,895	105	19,721
Hwy 71 to West	to	N. of Oelrichs	28.6	0	0	39,514	3,672	0	4,072	1,183	655	308	49,404
N. of Oelrichs	to	Jct. 18 W.	12.9	0	6,194	7,577	1,113	0	6,108	1,183	1,942	179	24,296
Jct. 18 W.	to	Jct. 36	31.9	0	15,598	12,249	4,562	0	8,144	0	2,176	330	43,059
Jct. 36	to	R.C. SE Truck Rt.	13.5	0	9,697	5,655	4,295	0	4,072	1,183	1,357	147	26,406
R.C. SE Truck Rt.			3.7										28,510
TOTAL			176.0	20,273.6	60,388.1	130,789.8	21,136.0	3,549.0	36,648.0	5,915.0	18,649.8	1,904.2	327,743.5

ROUTE C EXPRESSWAY

Highway Segment From		To	Length (Miles)	Pavement Reconst. ($/1000)	New 2–Lane Construct. ($/1000)	New 4–Lane Construct. ($/1000)	Bridges & Boxes ($/1000)	New R.R. Viaduct ($/1000)	New Intersection ($/1000)	New Interchange ($/1000)	New Front. Road ($/1000)	R.O.W. ($/1000)	Total Const. Cost ($/1000)
Scottsbluff	to	S. Jct. 2/71	48.3	12,912	9,874	44,850	1,900	0	1,656	2,036	0	266	73,494
S. Jct. 2/71	to	Crawford	25.3	5,238	13,787	11,310	2,491	0	1,104	0	0	95	34,025
Crawford	to	Hwy 71 to West	11.8	2,124	5,465	3,381	2,550	3,549	828	2,036	0	65	19,998
Hwy 71 to West	to	N. of Oelrichs	28.6	0	0	39,514	3,496	0	0	0	0	174	43,184
N. of Oelrichs	to	Jct. 18 W.	12.9	0	9,182	2,165	1,047	0	1,932	0	0	45	14,371
Jct. 18 W.	to	Jct. 36	31.9	0	18,334	8,389	4,053	0	552	2,036	0	136	33,500
Jct. 36	to	R.C. SE Truck Rt.	13.5	0	12,925	0	3,808	0	828	0	0	41	17,602
R.C. SE Truck Rt.			3.7										28,510
TOTAL			176.0	20,273.6	69,564.5	109,608.3	19,345.0	3,549.0	6,900.0	6,108.0	0.0	822.1	264,680.5

ROUTE C TWO/FOUR LANE

Highway Segment From		To	Length (Miles)	Pavement Reconst. ($/1000)	New 2–Lane Construct. ($/1000)	New 4–Lane Construct. ($/1000)	Bridges & Boxes ($/1000)	New R.R. Viaduct ($/1000)	New Intersection ($/1000)	New Interchange ($/1000)	New Front. Road ($/1000)	R.O.W. ($/1000)	Total Const. Cost ($/1000)
Scottsbluff	to	S. Jct. 2/71	48.3	5,492	24,267	0	1,733	0	966	0	0	126	32,584
S. Jct. 2/71	to	Crawford	25.3	5,238	0	0	118	0	552	0	0	16	5,924
Crawford	to	Hwy 71 to West	11.8	2,124	0	0	236	1,214	552	0	0	8	4,134
Hwy 71 to West	to	N. of Oelrichs	28.6	0	21,956	0	1,938	0	0	0	0	104	23,998
N. of Oelrichs	to	Jct. 18 W.	12.9	0	0	0	118	0	966	0	0	9	1,093
Jct. 18 W.	to	Jct. 36	31.9	0	18,334	8,389	4,053	0	552	2,036	0	136	33,500
Jct. 36	to	R.C. SE Truck Rt.	13.5	0	12,925	0	3,808	0	828	0	0	41	17,602
R.C. SE Truck Rt.			3.7										28,510
TOTAL			176.0	12,854.5	77,482.0	8,388.6	12,004.0	1,214.0	4,416.0	2,036.0	0.0	440.3	147,345.4

Source: Wells Engineers

Exhibit 4-7
CAPITAL COST BY ROUTE SEGMENT AND HIGHWAY TYPE
Route Option D

ROUTE D FREEWAY

Highway Segment From		To	Length (Miles)	Pavement Reconst. ($/1000)	New 2-Lane Construct. ($/1000)	New 4-Lane Construct. ($/1000)	Bridges & Boxes ($/1000)	New R.R. Viaduct ($/1000)	New Interchange ($/1000)	New Overpass ($/1000)	New Front. Road ($/1000)	R.O.W. ($/1000)	Total Const. Cost ($/1000)
Scottsbluff	to	Minitare	7.3	437	3,912	1,127	461	0	0	0	2,808	81	8,826
Minitare	to	Jct. 26	9.0	0	4,968	1,127	2,525	0	2,036	0	3,276	116	14,048
Jct. 26	to	Jct. 385	8.3	0	2,670	4,508	456	0	2,036	0	1,287	98	11,055
Jct. 385	to	Alliance	23.4	0	13,482	5,412	304	0	2,036	0	3,089	210	24,533
Alliance	to	Berea	9.2	1,989	5,750	2,030	76	0	0	0	1,404	77	11,326
Berea	to	Jct. 87/385	6.4	0	0	8,659	880	2,366	2,036	0	0	78	14,019
Jct. 87/385	to	Chadron	34.9	5,980	17,471	29,128	3,177	0	6,108	1,183	3,604	366	67,017
Chadron	to	Fall River Co.	18.3	0	9,328	9,245	1,265	2,366	6,108	1,183	3,042	188	32,725
Fall River Co.	to	N. of Oelrichs	16.9	0	10,903	3,112	1,189	2,366	6,108	0	4,516	183	28,377
N. of Oelrichs	to	Jct. 18 W.	12.9	0	9,182	2,165	1,113	0	6,108	0	1,942	127	20,637
Jct. 18 W.	to	Jct. 36	31.9	0	18,334	8,389	4,562	0	6,108	0	2,176	298	39,867
Jct. 36	to	R.C. Truck Rt.	13.5	0	12,925	0	4,295	0	6,108	1,183	1,357	98	25,966
R.C. Truck Rt.			3.7										28,510
TOTAL			195.7	8,406.0	108,924.9	74,900.5	20,303.0	7,098.0	44,792.0	3,549.0	28,501.2	1,919.1	326,903.7

ROUTE D EXPRESSWAY

Highway Segment From		To	Length (Miles)	Pavement Reconst. ($/1000)	New 2-Lane Construct. ($/1000)	New 4-Lane Construct. ($/1000)	Bridges & Boxes ($/1000)	New R.R. Viaduct ($/1000)	New Intersection ($/1000)	New Interchange ($/1000)	New Front. Road ($/1000)	R.O.W. ($/1000)	Total Const. Cost ($/1000)
Scottsbluff	to	Minitare	7.3	437	3,912	1,127	439	0	1,380	2,036	0	46	9,377
Minitare	to	Jct. 26	9.0	0	5,589	0	2,170	0	828	0	0	28	8,615
Jct. 26	to	Jct. 385	8.3	0	3,291	3,381	456	0	276	0	0	34	7,438
Jct. 385	to	Alliance	23.4	0	14,228	4,059	304	0	552	2,036	0	100	21,279
Alliance	to	Berea	9.2	1,989	5,750	2,030	76	0	276	0	0	32	10,153
Berea	to	Jct. 87/385	6.4	0	0	8,659	836	2,366	0	0	0	39	11,900
Jct. 87/385	to	Chadron	34.9	6,160	20,788	23,184	2,778	0	1,656	2,036	0	165	56,767
Chadron	to	Fall River Co.	18.3	0	10,696	6,765	1,199	2,366	276	0	0	71	21,373
Fall River Co.	to	N. of Oelrichs	16.9	0	11,650	1,759	1,123	2,366	2,208	0	0	57	19,163
N. of Oelrichs	to	Jct. 18 W.	12.9	0	9,182	2,165	1,047	0	1,932	0	0	45	14,371
Jct. 18 W.	to	Jct. 36	31.9	0	18,334	8,389	4,053	0	552	2,036	0	136	33,500
Jct. 36	to	R.C. Truck Rt.	13.5	0	12,925	0	3,808	0	828	0	0	41	17,602
R.C. Truck Rt.			3.7										28,510
TOTAL			195.7	8,586.0	116,344.7	61,516.5	18,289.0	7,098.0	10,764.0	8,144.0	0.0	794.9	260,047.1

Source: Wells Engineers

Exhibit 4–7 (cont.)
CAPITAL COST BY ROUTE SEGMENT AND HIGHWAY TYPE
Route Option D

ROUTE D TWO/FOUR LANE

Highway Segment From		To	Length (Miles)	Pavement Reconst. ($/1000)	New 2–Lane Construct. ($/1000)	New 4–Lane Construct. ($/1000)	Bridges & Boxes ($/1000)	New R.R. Viaduct ($/1000)	New Intersection ($/1000)	New Interchange ($/1000)	New Front. Road ($/1000)	R.O.W. ($/1000)	Total Const. Cost ($/1000)
Scottsbluff	to	Minitare	7.3	437	3,912	1,127	439	0	1,380	2,036	0	46	9,377
Minitare	to	Jct. 26	9.0	0	5,589	0	2,170	0	828	0	0	28	8,615
Jct. 26	to	Jct. 385	8.3	0	3,291	3,381	456	0	276	0	0	34	7,438
Jct. 385	to	Alliance	23.4	0	14,228	4,059	304	0	552	2,036	0	100	21,279
Alliance	to	Berea	9.2	1,989	0	0	0	0	138	0	0	6	2,133
Berea	to	Jct. 87/385	6.4	0	4,780	0	805	1,214	0	0	0	23	6,822
Jct. 87/385	to	Chadron	34.9	6,160	0	0	236	0	966	0	0	22	7,384
Chadron	to	Fall River Co.	18.3	0	0	0	118	1,214	138	0	0	11	1,481
Fall River Co.	to	N. of Oelrichs	16.9	0	0	0	118	1,214	1,104	0	0	12	2,448
N. of Oelrichs	to	Jct. 18 W.	12.9	0	0	0	118	0	966	0	0	9	1,093
Jct. 18 W.	to	Jct. 36	31.9	0	18,334	8,389	4,053	0	552	2,036	0	136	33,500
Jct. 36	to	R.C. Truck Rt.	13.5	0	12,925	0	3,808	0	828	0	0	41	17,602
R.C. Truck Rt.			3.7										28,510
TOTAL			195.7	8,586.0	63,059.9	16,955.6	12,625.0	3,642.0	7,728.0	6,108.0	0.0	469.3	147,683.8

Source: Wells Engineers

Exhibit 4-8
ON-GOING MAINTENANCE COSTS

Highway Type	Annual Cost Per Mile
Freeway	$ 9,500
Four-Lane Expressway	$ 9,500
Two-Lane Arterial	$ 4,100
Frontage Road	$ 4,100

The highway improvement programs for Nebraska and South Dakota were obtained, and known improvement projects within the study corridor were identified. Projects which have received a funding commitment were assumed to be complete, and therefore not included in this analysis. The periodic maintenance costs calculated for this study were those costs which require programming in the future. For the purpose of this study, it was assumed that under the two-lane and four-lane expressway alternatives, all existing asphalt highways to remain in service under these alternatives will require resurfacing. These resurfacing costs were considered periodic maintenance. The capital cost estimates for all new roadway construction utilized concrete as the pavement surface. No on-going maintenance costs were assigned to new concrete surfaces.

Chapter 5
TRAFFIC ANALYSES

One of the major components of the study is the travel demand for the Heartland Expressway. This chapter reviews existing and historical travel patterns in Western Nebraska, Western South Dakota, and Eastern Wyoming, then assesses the impact the Heartland Expressway would have on traffic in the region.

EXISTING HIGHWAY TRAFFIC

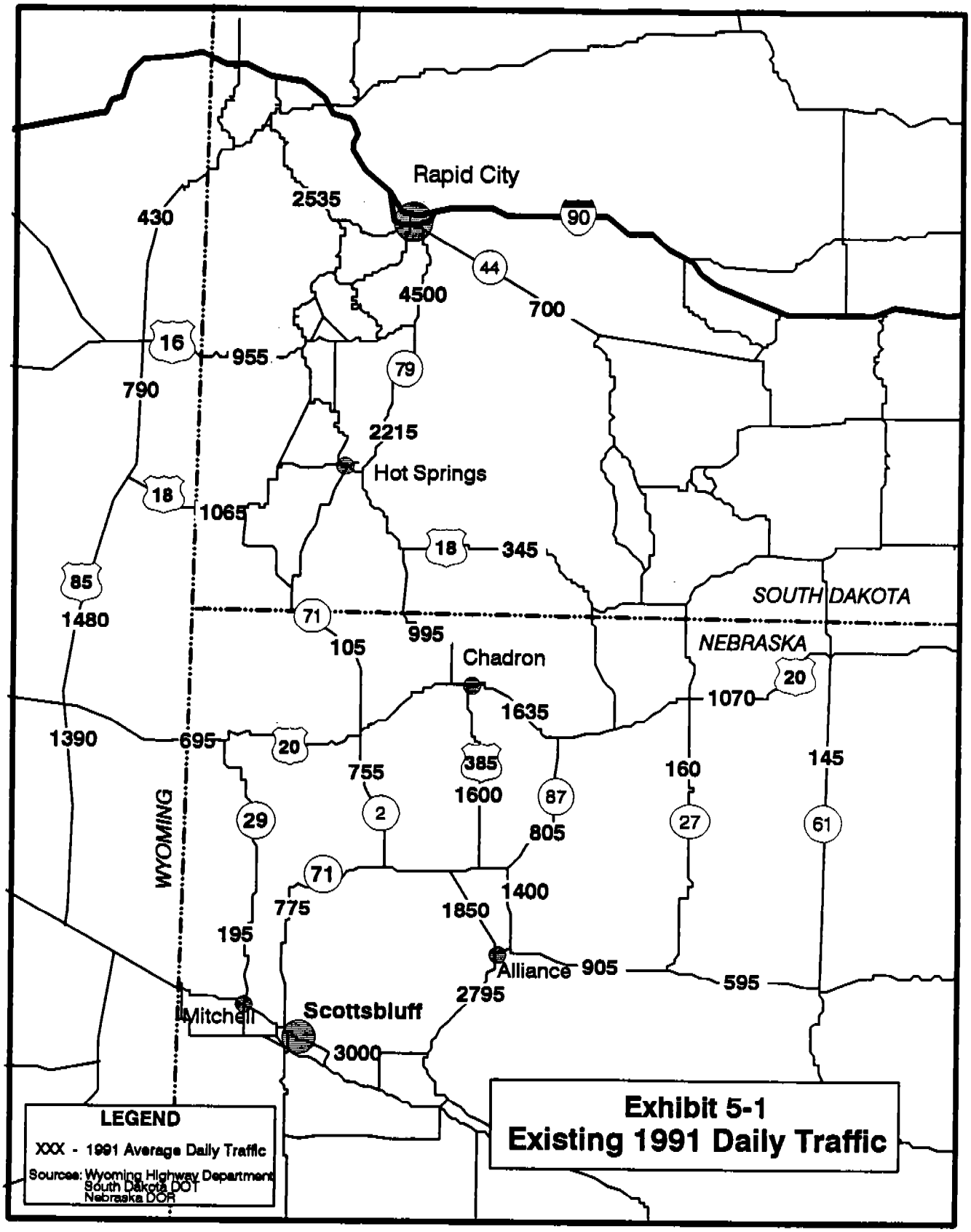
Exhibit 5-1 depicts existing (1991) average annual 24-hour traffic volumes for various highway segments throughout the corridor. Current traffic levels in corridor are relatively low. Based on these traffic volumes, there are no level of service or capacity problems on existing corridor highways. The highest traffic volumes in the corridor can be found near the two endpoints of Rapid City and Scottsbluff/Gering. Approximately 4,500 vehicles per day can be found on South Dakota Highway 79 near Rapid City and 3,000 vehicles on U.S. 26 near Scottsbluff.

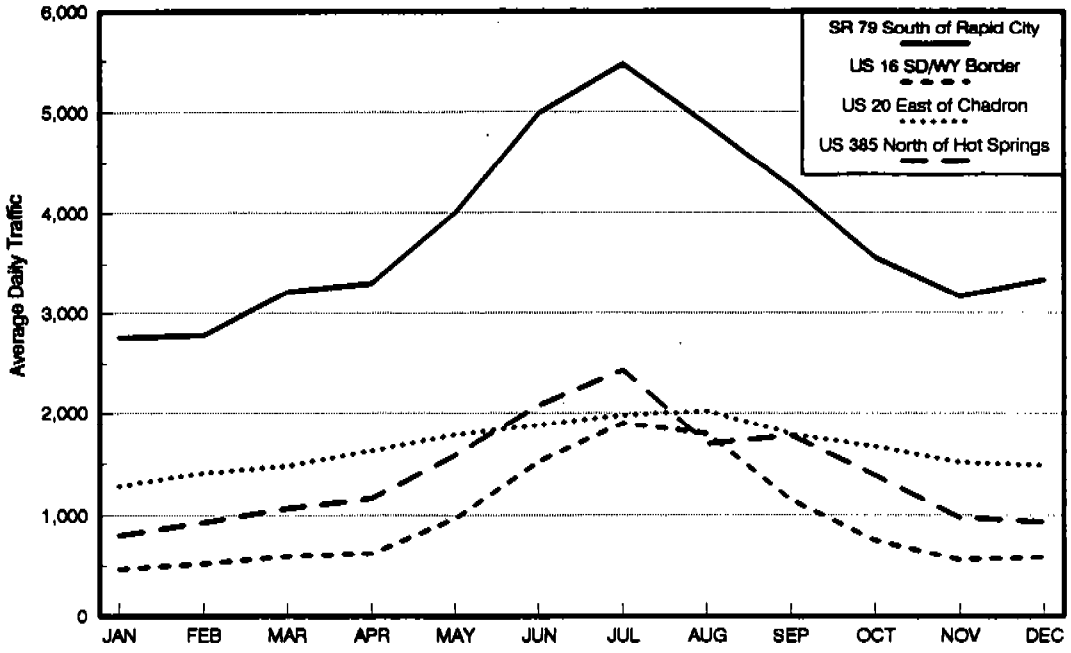
Most state highway agencies do not start to plan widening 2-lane highways to 4-lane until rural highway traffic volumes reach 5,000 - 6,000 per day. Because the volumes throughout the corridor are only a fraction of this, the statistics verify that the Heartland Expressway was not considered because of traffic volume or congestion. Rather it was considered because of what it might enable -- longer-distance traffic traveling through the area, visiting the area's businesses and tourism places, and helping the corridor economy.

Seasonal Variations - While the average daily traffic volumes on the existing highways in the corridor are low, there are seasonal variations which entail higher volumes during the summer months. Exhibit 5-2 displays these seasonal variations for four highways in the corridor. During 1991, U.S. 16 near the South Dakota/Wyoming border had a 98 percent higher traffic volume in the month of July than is the average annual traffic volume - AADT for the highway, compared to the South Dakota statewide average of 23 percent for the peak month. U.S. 20 east of Chadron had a 22 percent higher volume in August compared to the Nebraska statewide average of 11.5 percent. This increase in seasonal traffic is partially caused by the volumes of tourist traffic during the summer months. This tourist traffic is quite important to this study especially since much of the traffic that might be diverted to the Heartland Expressway will be tourst travel. Therefore, a "peak" season traffic model was developed, and roadside surveys were conducted in both August and October to delineate between seasonal origins and destinations (see Appendix B for roadside survey results).

BASE CASE TRAFFIC FORECASTS

The Base Case alternative assumed that the Heartland Expressway highway improvements would not be made, but did include all improvements planned and programmed by the Nebraska


Rapid City
2535
430
90
44
4500
700
16
955
79
790
2215
Hot Springs
18
1065
18
345
85
1480
71
995
105
SOUTH DAKOTA
NEBRASKA
Chadron
20
1070
1635
1390
695
20
755
385
1600
87
805
160
27
145
61
29
2
WYOMING
71
775
1850
1400
195
Alliance
905
595
2795
Mitchell
Scottsbluff
3000
LEGEND
XXX - 1991 Average Daily Traffic
Sources: Wyoming Highway Department
South Dakota DOT
Nebraska DOR
Exhibit 5-1
Existing 1991 Daily Traffic



1991 SEASONAL TRAFFIC VARIATION

Heartland Expressway Exhibit 5-2

Department of Roads, the South Dakota Department of Transportation and the Wyoming Department of Transportation. The highway improvements included in the Base Case contain all improvements in the area specified by each State's 1993 Transportation Improvement Program. All Heartland Expressway alternatives were compared against the Base Case to determine economic benefits and feasibility.

The only major highway construction improvement planned or programmed for the Heartland Expressway Corridor is the widening of Nebraska Highway 71 to four-lanes from Kimball to Scottsbluff/Gering, including a bypass of Scottsbluff/Gering. Because of this major improvement, the Base Case is expected to have some traffic differences compared with the existing situation. The Base Case traffic estimates contained in this chapter recognize these differences. In this chapter the estimated Base Case traffic volumes for the years 1990 and 2015 imply the volumes that would exist if the currently planned highway improvements were already in place. The difference in traffic between 1990 and 2015 reflects what should be construed as "normal growth."

Automobile Traffic Model - A computerized corridor region traffic procedure was used to simulate existing as well as future automobile traffic in the Heartland Expressway Corridor. The TRANPLAN transportation modeling software was used to assist in the traffic simulation.

Based on the significance of tourist traffic and large fluctuations in seasonal traffic, a peak season traffic model was developed. This peak season model was used to forecast traffic conditions at the year's highest volume levels. Results from the off-peak roadside survey were then used to annualize the model results to represent total vehicle miles of travel and total vehicle hours of travel for the entire year.

Roadway Network - The computerized roadway network developed for this study embodied a three-state, twenty-two county area, including all of the Panhandle of Nebraska, Southwest South Dakota, and the most eastern row of counties in Wyoming. The large regional network was developed to improve the forecasts and to enable the inclusion of long distance divertable trips from parallel routes.

Network Model Calibration - An automobile trip table was developed based on the peak season roadside surveys. An initial traffic assignment of the trip table was made on the existing network, and the following checks were made to validate the survey trip table assignment:

- As much as possible all origin and destination pairs were crossing at least one of the survey station links.
- Origin and destination paths (long distance and short distance) were traced to verify the speeds and distances coded in the network and to check for reasonableness.

Once the survey trip table was assigned and calibrated, a gravity model was used to synthesize the internal trips that did not pass through one of the ten survey locations. For these internal trips, a proprietary computer program developed by Wilbur Smith Associates was used. This program adjusted all zone to zone trips whose path goes through a specific link so that the total number of trips using the link matches the existing ground count for that link. As the adjustment for a specific link will interfere with the adjustment for another link, the process is repeated several times until the overall discrepancies between assigned and observed traffic volumes are within acceptable limits or additional iterations do not significantly improve the results.

The next step was to combine the internal trip table with the survey trip table. The assignment of this new trip table results in a fully calibrated network, representing total peak season trips in the entire corridor.

Exhibit 5-3 displays the model assignment compared with the existing (1990) peak season traffic counts for the ten survey locations and for other miscellaneous links throughout the corridor.

Automobile Growth Trends and Growth Rates - With the calibrated automobile traffic model available, the next step was to analyze the future growth rate in automobile travel in the Heartland Corridor. Exhibit 5-4 displays automobile average daily traffic (Auto ADT) counts for eleven locations from 1970 to 1990.

Overall, automobile traffic volumes in the Heartland Corridor vary significantly. For example at just the survey locations, the average auto daily traffic volumes (not peak season) range from nearly 3,000 just south of Rapid City to only 250 autos per day north of Mitchell, Nebraska. For most of the highways in the corridor, auto traffic volumes have been increasing over the last decade. At some locations, such as Nebraska Highway 71 north of Scottsbluff and South Dakota 79 south of Rapid City, auto traffic levels have been increasing at a significant rate. On average, auto traffic in the Heartland Corridor has increased at an approximate annual rate of 2.1 percent.

Exhibit 5–3
COMPARISON OF OBSERVED VERSUS ESTIMATED AUTO TRAFFIC VOLUMES
Peak Season Traffic Volumes

LOCATION	NETWORK LINK	OBSERVED PEAK DAILY VOLUME (Autos Only)	MODEL APPLICATION (Autos Only)	
Nebraska				
NE 71	1515 – 1580	1,862	1,767	
NE 71	1450 – 1453	670	615	
NE 29	1505 – 1507	280	309	
US 26	1526 – 1528	3,082	3,001	
US 385	1450 – 1470	2,066	2,126	
US 385	1464 – 1467	1,400	1,455	
US 385	1440 – 1460	1,282	1,282	
US 385	1168 – 1170	1,550	1,596	
NE 2	1470 – 1471	1,830	1,980	
NE 2	1442 – 1444	684	745	
US 20	1404 – 1405	590	677	
US 20	1420 – 1422	1,776	1,686	
Subtotal		17,072	17,239	1.01
South Dakota				
US 18	1054 – 1270	1,400	1,451	
US 16	1152 – 1266	1,550	1,575	
US 85	1001 – 1130	560	609	
US 385	1138 – 1140	1,828	1,808	
US 18	1166 – 1248	807	802	
SD 79	1164 – 1184	3,092	2,860	
SD 79	1212 – 1213	4,500	4,797	
SD 44	1214 – 1352	546	548	
Subtotal		14,283	14,450	1.01
TOTAL		**31,355**	**31,689**	**1.01**

SOURCE: Wilbur Smith Associates

Exhibit 5–4
AUTOMOBILE ADT FOR VARIOUS LOCATIONS
1970 – 1990

Location	1970	1972	1974	1976	1978	1980	1982	1984	1986	1988	1990	Avg. Annual % Increase	Regression % Increase
1 SR 29 North of Mitchell	215	200	210	265	280	260	280	295	230	315	250	0.76%	1.37%
2 SR 71 North of Scottsbluff	240	275	335	385	400	495	490	590	630	630	595	4.64%	4.99%
3 US 385 North of Alliance	805	840	850	870	1,105	1,030	1,010	1,100	1,090	1,180	1,240	2.18%	2.13%
4 SR 2 North of Alliance	780	830	900	1,210	1,320	1,535	1,280	1,365	1,250	1,620	1,625	3.74%	3.34%
5 US 385 Near NE/SD Border	590	535	700	610	635	775	925	845	750	870	975	2.54%	2.63%
6 US 20 West of Harrison	460	435	415	435	480	250	455	450	375	315	525	0.66%	−0.29%
7 US 18 East of SD/WY Border	501	490	500	585	710	610	570	590	600	600	730	1.90%	1.37%
8 US 16 East of SD/WY Border	653	705	610	750	860	610	705	710	755	800	860	1.39%	1.02%
9 US 85 East of SD/WY Border	234	225	230	295	365	380	405	430	285	355	315	1.50%	2.04%
10 SR 79 South of Rapid City	1,489	1,738	1,645	1,895	2,180	2,035	2,045	2,310	2,665	2,960	2,910	3.41%	3.49%
11 US 26 East of Scottsbluff	2,095	2,080	2,060	2,130	2,145	1,985	2,175	2,340	2,340	2,420	2,300	0.47%	0.77%
											Average	2.11%	2.08%

NOTE: Locations include the ten survey sites plus US 26 east of Scottsbluff

SOURCES: Nebraska Department of Roads
South Dakota Department of Transportation
Wilbur Smith Associates

Base Case Year 2015 Automobile Traffic Forecasts - Exhibit 5-5 displays the average annual daily automobile traffic assignments (AADT) at eleven locations throughout the corridor for the 1990 base network and the year 2015 base forecast. The "base network" includes highway improvements (such Nebraska Highway 71 widened to four-lanes between I-80 and Scottsbluff/Gering) programmed for completion in the near future.

Exhibit 5-5
BASE CASE AUTOMOBILE TRAFFIC ASSIGNMENT
Average Annual Daily Traffic

		PER DAY AUTO VOLUMES		
		1990 Base	2015 Base [a]	ANNUAL GROWTH RATE %
1.	SR 29 North of Mitchell, NE	275	360	1.08
2.	SR 71 North of Scottsbluff, NE	550	830	1.66
3.	US 385 North of Alliance, NE	1,290	2,020	1.81
4.	SR 2 North of Alliance, NE	1,755	2,925	2.06
5.	US 385 Near NE/SD Border	900	1,490	1.78
6.	US 20 West of Harrison, NE	600	750	0.90
7.	US 18 East of SD/WY Border	815	1,515	2.51
8.	US 16 East of SD/WY Border	875	1,440	2.01
9.	US 85 East of SD/WY Border	340	570	2.09
10.	SR 79 South of Rapid City, SD	3,560	7,060	2.78
11.	US 26 East of Scottsbluff	2,660	3.930	1.57
	Average			1.84

(a) Auto volumes if Heartland Expressway is not built.

SOURCE: Wilbur Smith Associates

On average, automobile traffic levels in the Heartland Corridor are forecast to increase 1.84 percent annually over the next 25 years. However, year 2015 auto traffic forecasts display a somewhat larger increase in traffic volumes for the South Dakota portion than the Nebraska portion of the Heartland Corridor. This is primarily due to the larger population and employment

growth and large increases in tourism activity forecast for South Dakota (See Appendia A for demographic forecasts and Appendix D for tourism activity).

Exhibit 5-6 graphically displays 1990 and 2015 average annual daily and peak season Base Case automobile traffic estimates for various locations throughout the Heartland Corridor.

Commercial Truck Volume Trends - Truck volumes have been recorded, or estimated, on all major highway links in Nebraska and in South Dakota. This was done by the Nebraska Department of Roads (NDOR) and the South Dakota Department of Transportation (SDDOT) for even-numbered years. Trends in these volumes, measured over a 20-year period, provided one basis for projecting truck volumes to 2015; the other basis comprised the results of this study's surveys of trucking firms and shippers/receivers.

Definition of Truck Vehicles - Traffic counts recorded by NDOR and SDDOT have two classifications: "total traffic" volume and "heavy commercial traffic" volume. Commercial traffic is defined as vehicles with 2 axles/6 tires and larger. This differs from the definition used at the survey stations in this study, which had two classifications: "light" trucks and "heavy" trucks. "Light" trucks include all truck vehicles with two axles, while "heavy" trucks include all truck vehicles with three or more axles. For the purpose of this analysis -- which was to identify long range trends -- the NDOR/SDDOT definition were used.

Commercial Truck Volumes - Average daily traffic volumes for commercial trucks are listed in Exhibit 5-7 for each of the 10 survey station locations. These volumes are given for each even-numbered year, from 1970 to 1990. They vary from less than 30 to nearly 500 trucks per day. The highest volumes occur at Station 10, located on South Dakota Highway 79 south of Rapid City. This is followed by Station 7 (U.S. Highway 18 east of the SD/WY border) and Station 4 (Nebraska Highway 2 north of Alliance, NE).

Average daily commercial truck volumes are summarized by survey station group in Exhibit 5-8. All station groups exhibit a positive overall growth trend in the 1970-1990 period, although the pattern is somewhat irregular. For example, there is a pronounced peak in truck volumes in the 1984-86 period, dropping sharply in 1988 for most groups.

Base Case Year 2015 Commercial Truck Forecasts - The commercial truck forecasts were based on trend analyses. Truck volumes depend on a variety of economic factors that vary significantly. Therefore, a regression analysis provided the basis for the forecasts.

The regression analysis, based on 1970-1990 track traffic counts, is summarized in Exhibit 5-9. The coefficient correlation, "R-squared", is above seventy percent for three of the four survey station groups. The average annual change of the regression line for the 1970-1990 ranges from plus 1.3 to plus 3.2 percent.

Using the regression line slopes, a Base Case (without the Heartland Expressway) projection of truck traffic volumes would increase volumes by approximately 66 percent in the 1990-2015 period at the southern station group. The central station group would increase by approximately 32 percent, the northern group by approximately 34 percent and the western group by approximately 56 percent. The projections are graphically presented in Exhibit 5-10. Based on the percent increases by geographical area, overall commercial truck volumes were forecast for

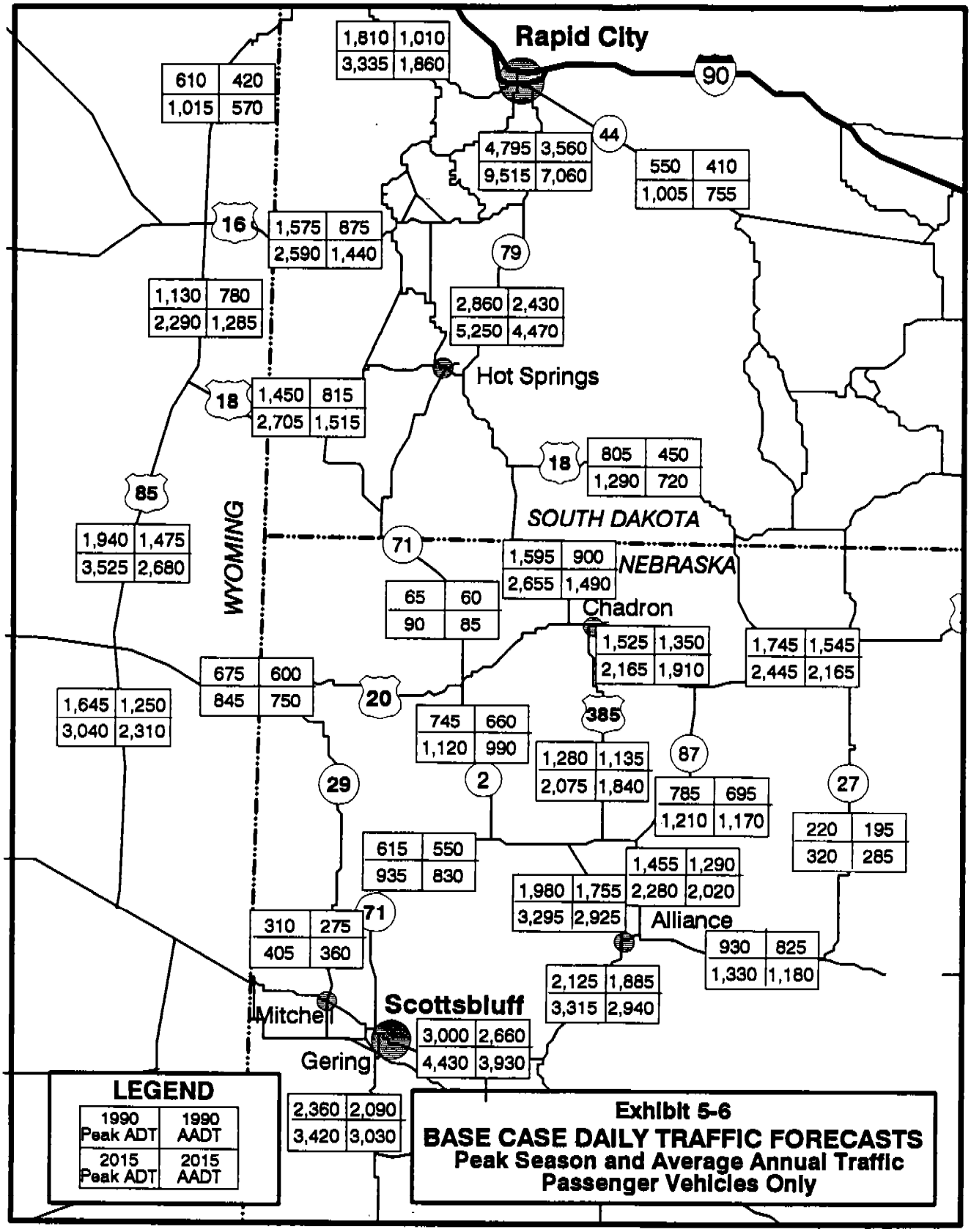

Rapid City
Hot Springs
Chadron
Alliance
Scottsbluff
Mitchell
Gering
WYOMING
SOUTH DAKOTA
NEBRASKA
90
44
16
79
18
85
71
20
385
87
29
2
27
1,810 1,010
3,335 1,860
610 420
1,015 570
4,795 3,560
9,515 7,060
550 410
1,005 755
1,575 875
2,590 1,440
1,130 780
2,290 1,285
2,860 2,430
5,250 4,470
1,450 815
2,705 1,515
805 450
1,290 720
1,940 1,475
3,525 2,680
1,595 900
2,655 1,490
65 60
90 85
1,525 1,350
2,165 1,910
1,745 1,545
2,445 2,165
675 600
845 750
1,645 1,250
3,040 2,310
745 660
1,120 990
1,280 1,135
2,075 1,840
785 695
1,210 1,170
220 195
320 285
615 550
935 830
1,455 1,290
2,280 2,020
1,980 1,755
3,295 2,925
310 275
405 360
930 825
1,330 1,180
2,125 1,885
3,315 2,940
3,000 2,660
4,430 3,930
2,360 2,090
3,420 3,030
LEGEND
1990 Peak ADT
1990 AADT
2015 Peak ADT
2015 AADT
Exhibit 5-6
BASE CASE DAILY TRAFFIC FORECASTS
Peak Season and Average Annual Traffic
Passenger Vehicles Only

Exhibit 5-7

AVERAGE DAILY COMMERCIAL TRUCK VOLUMES

BY SURVEY STATION

1970 - 1990

SURVEY STATION	1970	1972	1974	1976	1978	1980	1982	1984	1986	1988	1990
1	25	25	25	25	30	30	30	30	25	35	30
2	25	45	45	50	60	95	95	105	110	110	105
3	135(a)	140	145	150	185	160	190	200	200	215	160
4	80(a)	90	120	150	170	170	175	205	260	200	225
5	92	110	145	125	130	155	145	145	145	95	145
6	90	85	115	115	120	120	140	160	165	145	170
7	70	100	110	165	200	170	130	200	200	200	260
8	115	90	80	130	90	150	175	175	175	90	100
9	35	35	30	55	60	60	65	60	35	35	30
10	285	345	340	410	385	360	360	405	480	375	400

(a) Estimated count

SOURCE: Nebraska Department of Roads
South Dakota Department of Transportation
Wilbur Smith Associates

Exhibit 5-8

AVERAGE DAILY COMMERCIAL TRUCK VOLUMES

BY SURVEY STATION GROUP

1970 - 1990

SURVEY STATION GROUP	1970	1972	1974	1976	1978	1980	1982	1984	1986	1988	1990
Southern	265	300	335	375	445	455	490	540	595	560	520
Central	92	110	145	125	130	155	145	145	145	95	145
Northern	285	345	340	410	385	360	360	405	480	375	400
Western	300	310	335	485	470	500	510	575	575	470	560

SOURCE: Nebraska Department of Roads
South Dakota Department of Transportation
Wilbur Smith Associates

Exhibit 5-9
REGRESSION ANALYSIS OF COMMERCIAL TRUCK TRAFFIC COUNTS BY SURVEY STATION GROUP

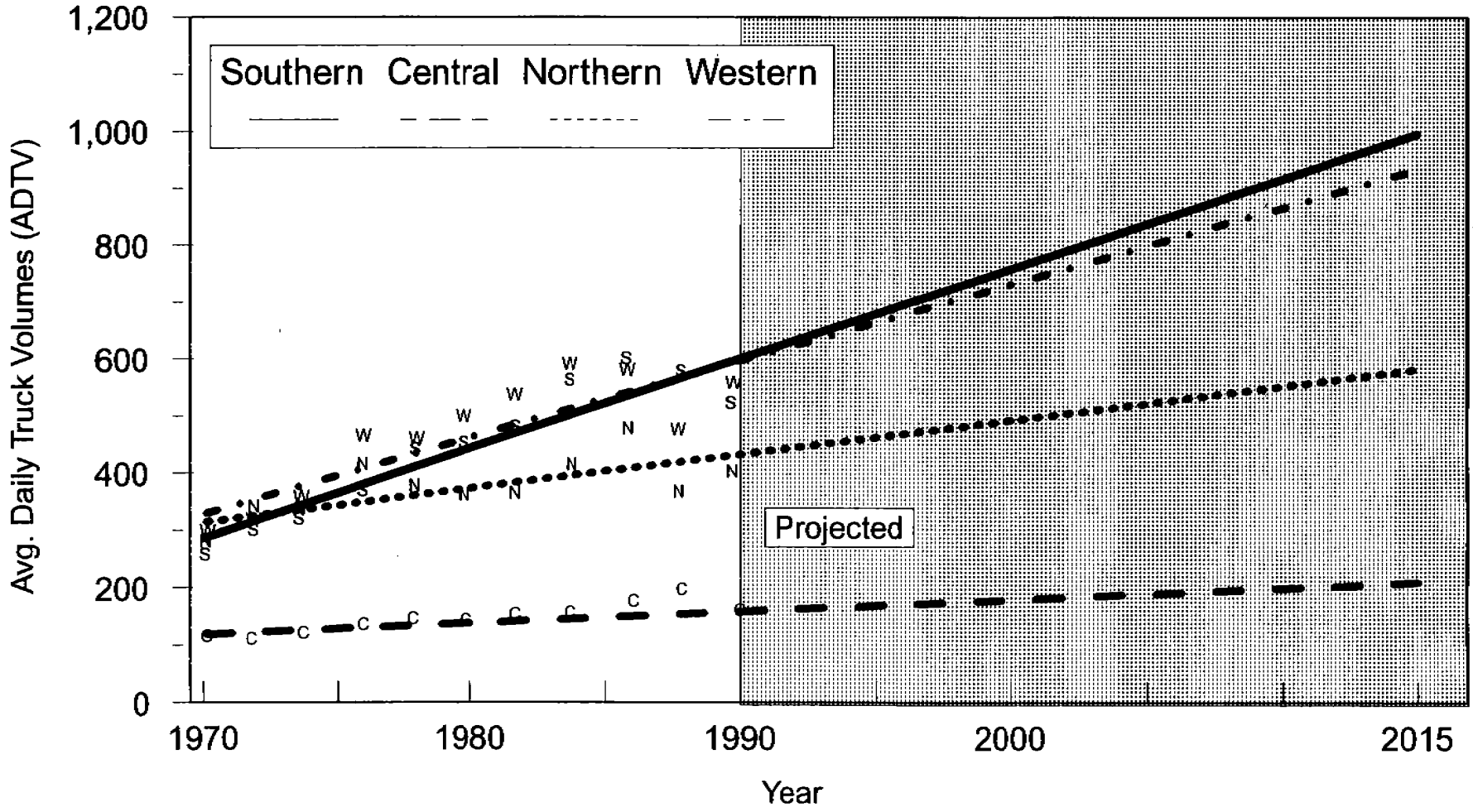
SURVEY STATION GROUP	REGRESSION ANALYSIS RESULTS		
	Standard Error	R-Squared	Average Annual Change 1970-1990
Southern	38.6	0.89	+3.2%
Central	21.7	0.13	+1.3%
Northern	39.3	0.43	+1.6%
Western	57.4	0.72	+2.6%

SOURCE: Wilbur Smith Associates

Exhibit 5-10

PROJECTED AVERAGE DAILY TRUCK VOLUMES

Years 1990-2015



the Heartland Corridor area. Exhibit 5-11 displays the Base Case forecast truck volumes for various locations throughout the corridor. While there are peak seasons for trucks in the corridor, such as sugar beet trucks in the Fall near Scottsbluff and Alliance, there is not one peak season for trucks in the entire corridor; therefore, Exhibit 5-11 only shows average annual daily truck volumes.

Base Case Traffic Forecasts - The composite automobile and commercial truck daily volume estimates for the Base Case are displayed in Exhibit 5-12. The exhibit displays both peak season and average annual daily traffic volumes. Overall, vehicle miles of travel in the Heartland Corridor are estimated to increase by 70.1% between 1990 and 2015.

The Base Case alternative assumes that the Heartland Expressway is not constructed; however, it does include planned and programmed highway projects including the 4-lane improvement from Kimball to Scottsbluff. Therefore, the Base Case traffic forecasts were used to compare and measure the traffic impact of the various Heartland Corridor route alternatives.

MULTI-STATE REGIONAL HIGHWAY PROSPECTS

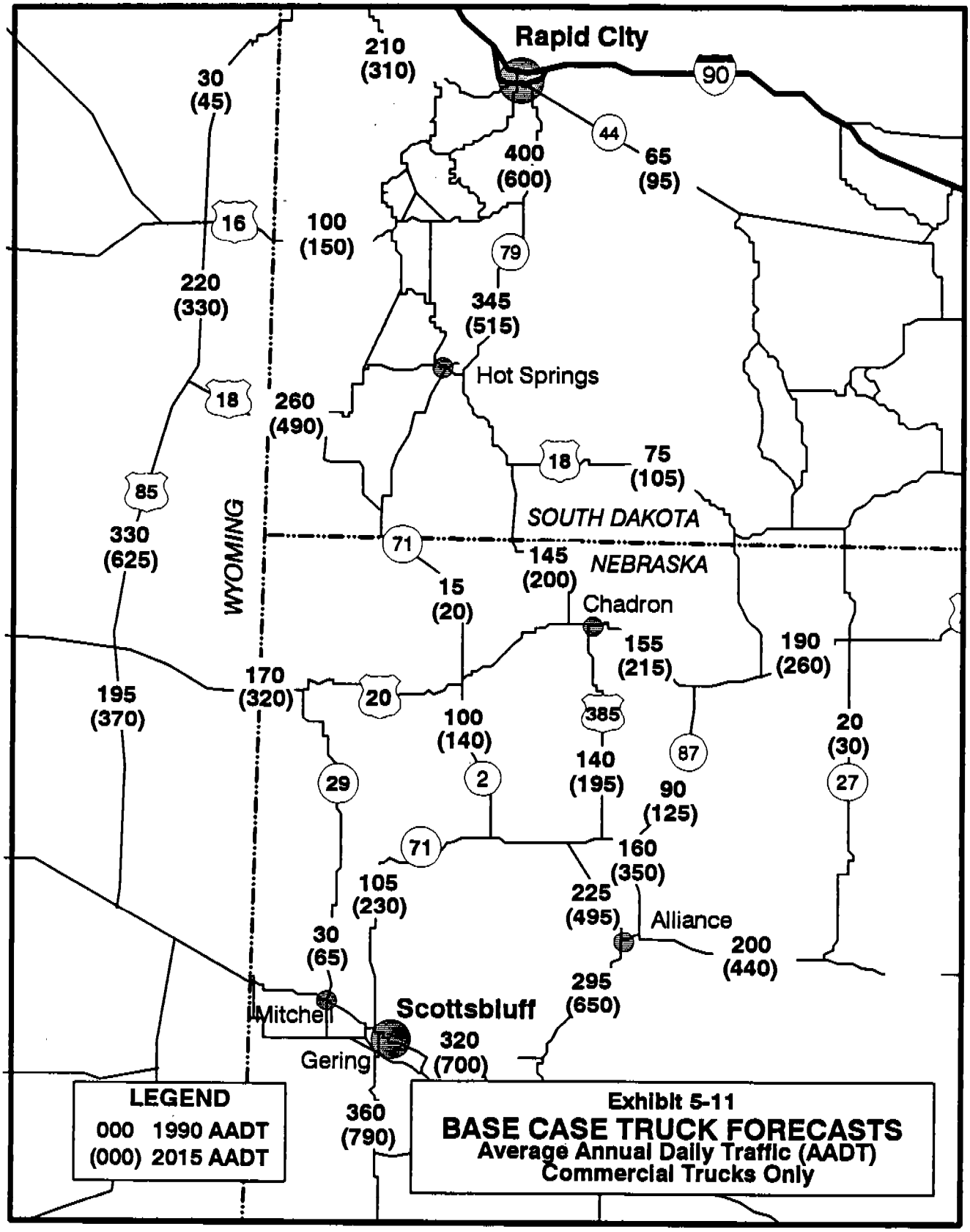
A key to the feasibility of the Heartland Expressway is whether a four-lane corridor through western Nebraska and western South Dakota could attract sufficient traffic to make it worth while. One component of the traffic analysis is the potential for such a four-lane highway to attract long-distance through travel.

With 4-lane improvements programmed between Kimball, Nebraska and Scottsbluff/ Gering, the Heartland Expressway between Rapid City and Scottsbluff/Gering would connect Interstates 80 and 90 (Exhibit 5-13). This connection could conceivably divert long distance truck and automobile traffic desiring to travel between Interstates 80 and 90. If such diversion did occur, this multi-regional highway could change the region's highway role from one which emphasizes local access to a more multi-state highway making long distance travel more efficient in the midwest. To allow this to happen, the multi-state highway concept would require that the Heartland Expressway be constructed to four-lanes, either to freeway (65 mph) or expressway standards (55 mph). The extent to which such long distance traffic might divert to the Heartland Corridor is examined in this chapter.

Universe of Traffic Potential - The first step in analyzing the impact of the Heartland Expressway on interstate travel was to identify how many vehicles (automobiles and trucks) have origin/destination pair combinations such that they could use the Heartland Expressway to minimize travel time. Once this universe of travel was known, then the next step was to estimate how much of this traffic would use the Heartland Expressway.

To estimate this universe of long-distance travel, surveys were conducted on Interstates 80 and 90. These included automobile license plate observations, auto surveys at rest areas, and truck driver surveys in weigh stations.

Exhibit 5-14 displays the highway distances on various links in the multi-state area. Based on these distances, Exhibit 5-15 illustrates the estimated distances and travel times for various route options between potential divertable origin and destination pairs.


Rapid City
210
(310)
30
(45)
90
44
400
(600)
65
(95)
16
100
(150)
79
220
(330)
345
(515)
Hot Springs
18
260
(490)
18
75
(105)
85
SOUTH DAKOTA
330
(625)
WYOMING
71
145
(200)
NEBRASKA
15
(20)
Chadron
155
(215)
190
(260)
170
(320)
20
195
(370)
100
(140)
385
87
20
(30)
140
(195)
29
2
27
90
(125)
71
160
(350)
105
(230)
225
(495)
Alliance
30
(65)
200
(440)
295
(650)
Mitchell
Scottsbluff
320
(700)
Gering
360
(790)
LEGEND
000 1990 AADT
(000) 2015 AADT
Exhibit 5-11
BASE CASE TRUCK FORECASTS
Average Annual Daily Traffic (AADT)
Commercial Trucks Only

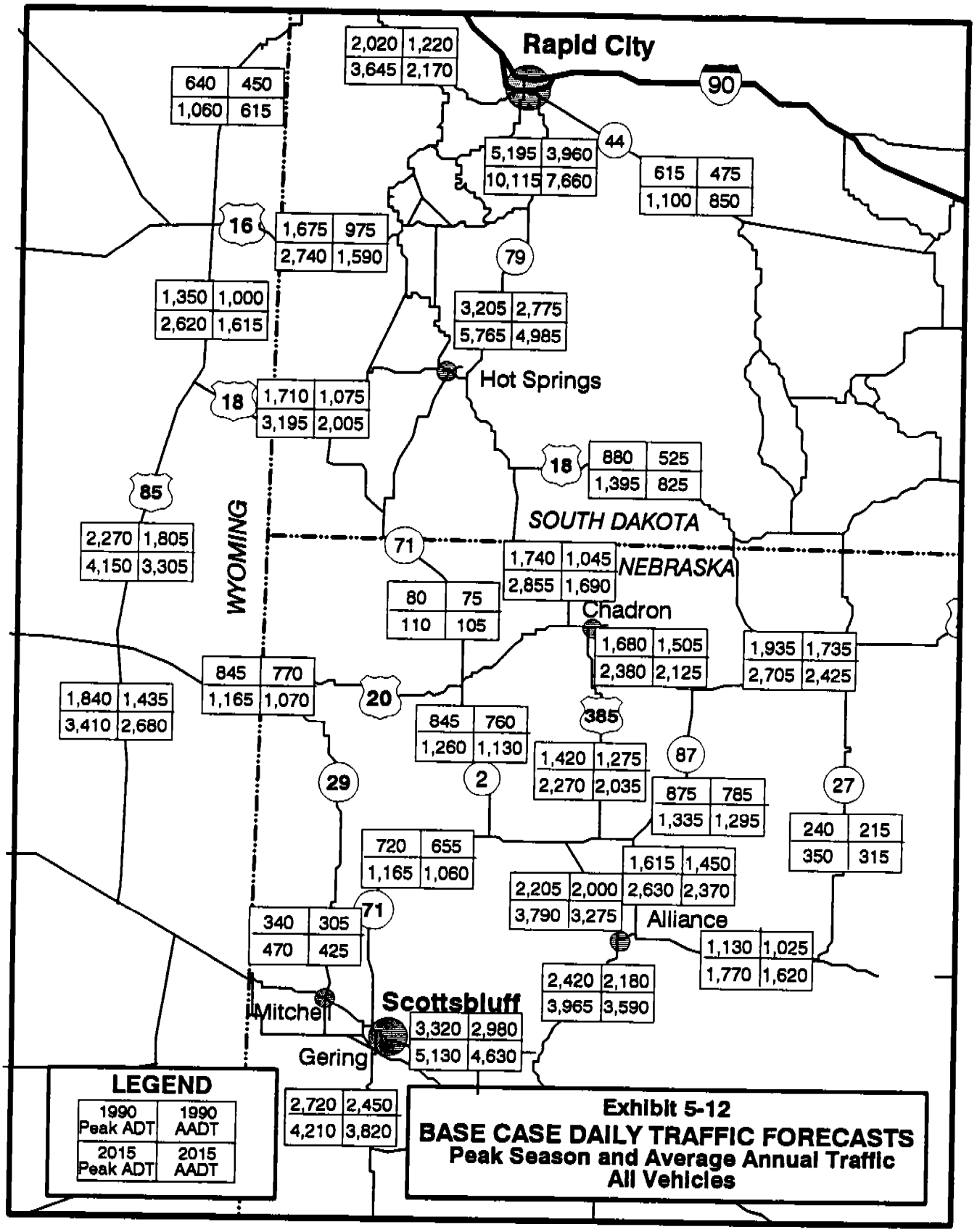


Exhibit 5-12
BASE CASE DAILY TRAFFIC FORECASTS
Peak Season and Average Annual Traffic
All Vehicles

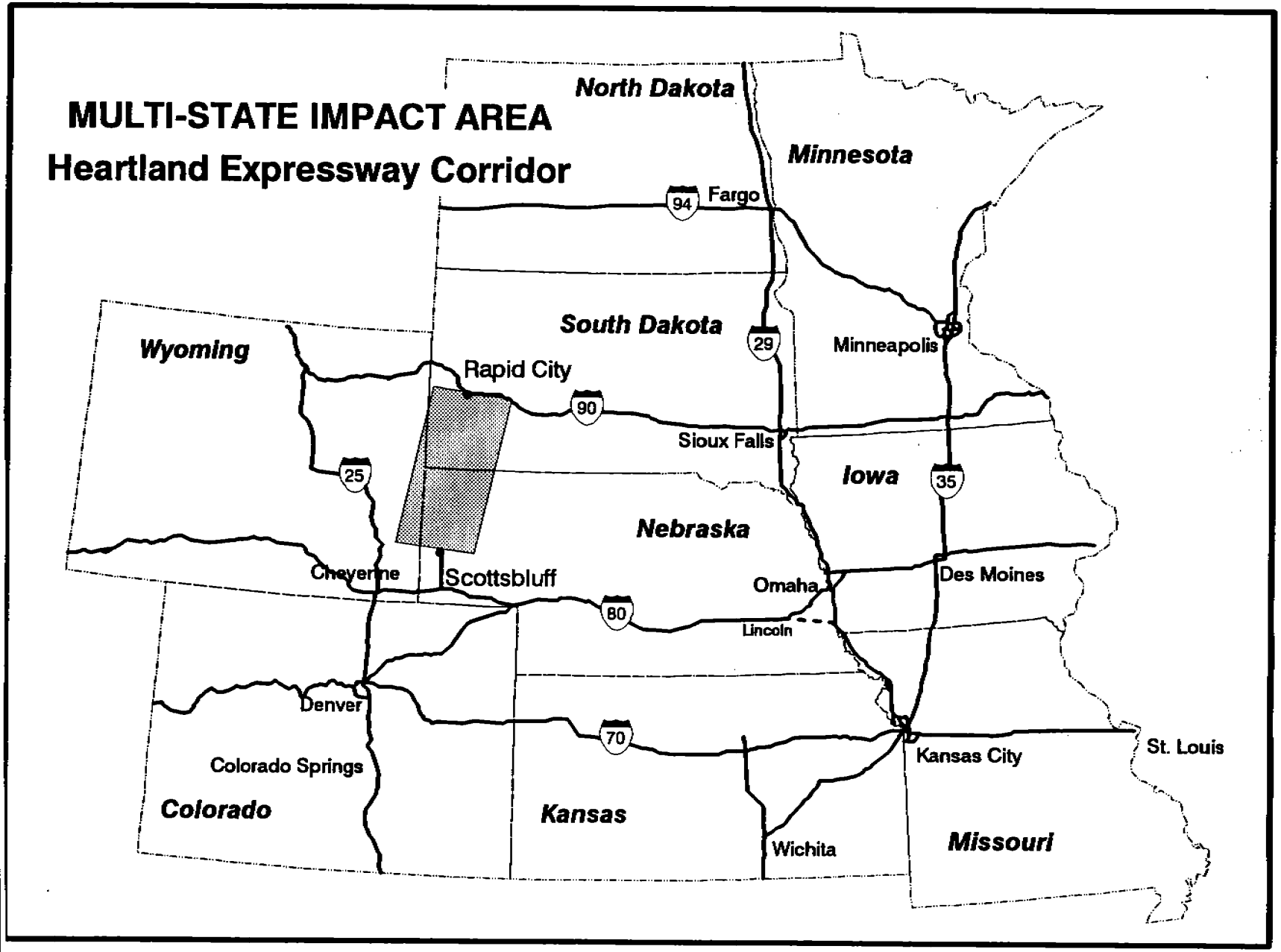

MULTI-STATE IMPACT AREA
Heartland Expressway Corridor
North Dakota
Minnesota
Fargo
94
South Dakota
29
Minneapolis
Wyoming
Rapid City
90
Sioux Falls
25
Iowa
35
Nebraska
Cheyenne
Scottsbluff
Omaha
Des Moines
80
Lincoln
Denver
70
Kansas City
St. Louis
Colorado Springs
Colorado
Kansas
Wichita
Missouri

Exhibit 5-13

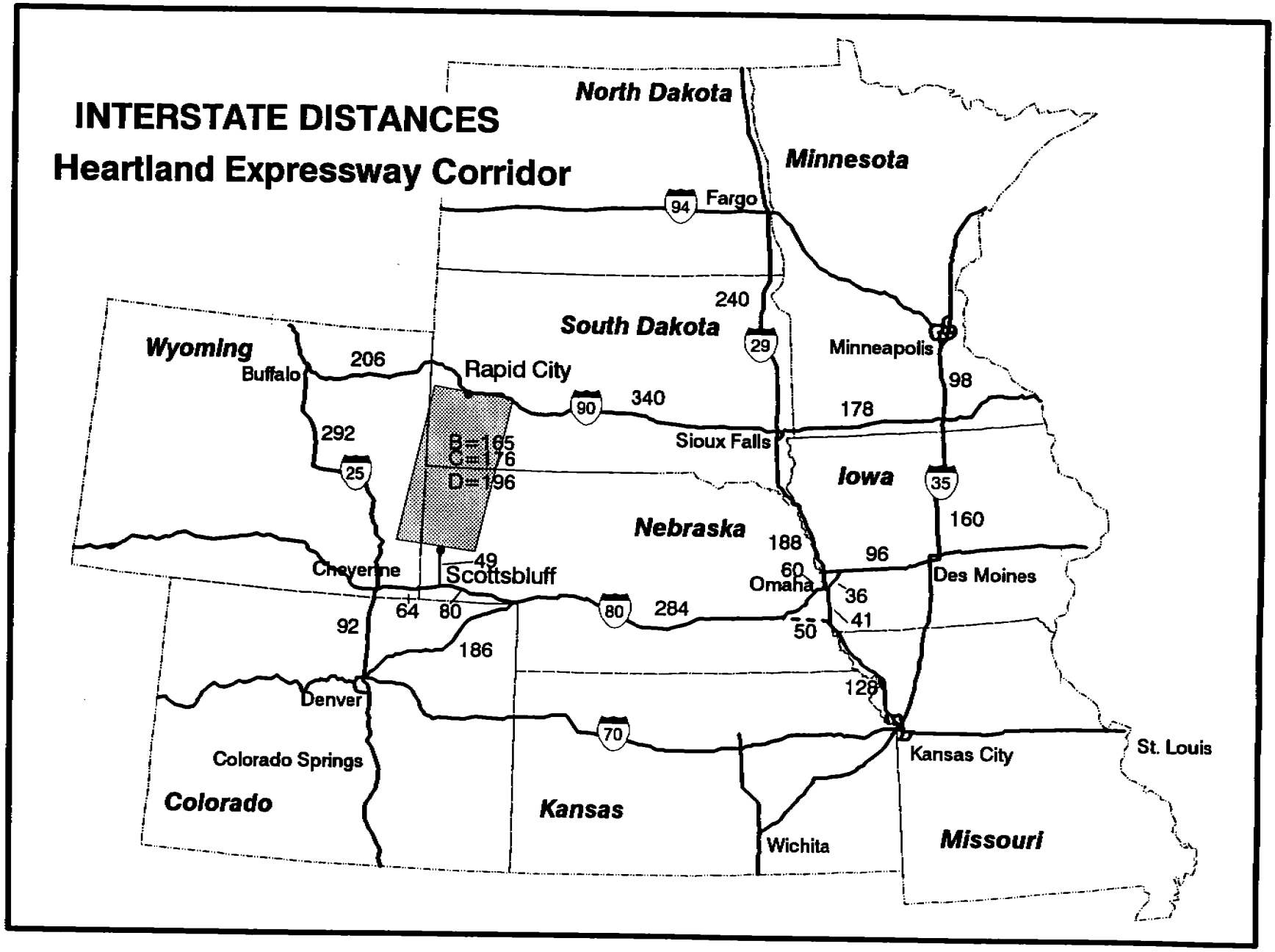

INTERSTATE DISTANCES
Heartland Expressway Corridor
North Dakota
Minnesota
Fargo
94
240
South Dakota
29
Minneapolis
Wyoming
Buffalo
206
Rapid City
90
340
98
178
292
Sioux Falls
B=165
C=176
D=196
25
Iowa
35
160
Nebraska
188
96
49
Cheyenne
Scottsbluff
60
Omaha
Des Moines
36
64
80
80
284
41
92
50
186
128
Denver
70
Kansas City
St. Louis
Colorado Springs
Colorado
Kansas
Wichita
Missouri

Exhibit 5-14

Exhibit 5-15
ESTIMATED DISTANCES FOR VARIOUS ORIGIN/DESTINATION PAIRS

Origin/Destination Pairs	DISTANCE (miles) Existing	Alt. B	Alt. C	Alt. D
Omaha, NE - Buffalo, WY (I-80)	780	844	855	875
Omaha, NE - Buffalo, WY (I-90)	734	844	855	875
Minneapolis, MN - Denver, CO (I-80)	920	986	997	1,017
Minneapolis, MN - Cheyenne, WY (I-80)	878	894	905	925
Sioux Falls, SD - Denver, CO (I-80)	718	710	721	741
Sioux Falls, SD - Cheyenne, WY (I-80)	676	618	629	649
Kansas City, MO - Buffalo, WY (I-80) *	898	962*	971*	991*
Kansas City, MO - Buffalo, WY (I-90)	903	962*	971*	991*
Kansas City, MO - Rapid City, SD (I-90)	697	756*	767*	787*

* Includes planned 4-lane between Lincoln, NE and Nebraska City, NE

SOURCE: Wilbur Smith Associates

Based on these distance and travel time calculations, significant volumes of long distance trips are not likely to divert to the Heartland Expressway from Interstates 80 and 90. The travel times for other north-south connectors to both the east and west of the Heartland Expressway create more direct connections between the two interstates. The only trips likely to divert are trips with a destination in or near the Heartland Corridor, or through trips that are already traveling on the two lane roads between Rapid City and Scottsbluff, or long distance trips that now bypass the Black Hills but, due to the Heartland Expressway, might go out of their way to visit the Black Hills and then use the new expressway.

Since the Black Hills Region of South Dakota and Western Nebraska have large tourist attractions, there is a potential to attract vacation and other tourist travelers on Interstates 80 and 90 to the Heartland Expressway. During the Summer months there are a number of trips on the two Interstates traveling to Yellowstone National Park and other recreational sites in the area. The Heartland Expressway could attract a share of these trips into the area on their way to their final destinations. Based on this information, Exhibit 5-16 indicates the estimated number of vehicles that could conceivably divert to the Heartland Expressway from Interstates 80 and 90.

Exhibit 5-16
DAILY VEHICLE VOLUMES THAT COULD DIVERT FROM I-80 AND I-90
2015

	DAILY VOLUMES THAT COULD DIVERT		
	I-80	I-90	Total
Automobiles	168	247	415
Trucks	1,611	319	1,930
Total Vehicles	1,779	566	2,345

SOURCE: Wilbur Smith Associates

The above vehicles represent trip origin/destination pairs that have the potential to divert to a four-lane Heartland Expressway. Only a fraction of them would be expected to actually divert.

Estimated Traffic That Would Divert - The previous section examined the total number of vehicles which had origin and destination pairs that could conceivably divert to the Heartland Expressway from Interstates 80 and 90. The next step involved evaluating the origin and destination pairs based on time and distance to determine the likely number of vehicles that will divert from the two interstates to the three Heartland Expressway alternatives.

The estimation methodology used the origin and destination information from the interstate surveys and the estimated time and distance factors between the various locations within the multi-state region. The analysis assumed that all segments of the Heartland Expressway are of comparable interstate or expressway speeds and standards.

Exhibits 5-17 thorugh 5-22 depict the estimated average annual and peak season diverted daily traffic by origin and destination pair for both Interstate 80 and 90 for the four route options and the two highway standards. The universe of potential autos and trucks from the previous section are also shown to illustrate the difference between the potential and estimated diverted traffic.

The greatest amount of traffic diversion is expected to occur on the freeway options, because at 65 mph it is the most competitive of the options. The more direct alternatives, Route Options B and C, are also estimated to attract more diversions from Interstate 80 and 90 than is Route Option D. However, the Heartland Expressway alternatives do not create much of a time or distance savings for vehicles on the two Interstates. Therefore it is not likely that significant volumes of pass-through traffic will be diverted to the Heartland Corridor from the two Interstate highways. The two-lane with some four-lane section options for the Heartland Expressway, because of lower travel speeds, are not expected to divert traffic from Interstates 80 and 90.

Exhibit 5–17
ESTIMATED DAILY DIVERTED ORIGIN AND DESTINATION PAIRS
Route Option B – Freeway Standard
2015

Origin/Destination Pairs	Interstate 80 Potential Autos (a)	Potential Trucks (a)	Est. Mileage Savings (b)	Diverted Autos (c)	Diverted Trucks (c)	Peak Autos (d)
Canada – Northwest U.S.	--	41	–71 mi.	0	0	0
East U.S. – Canada	--	27	–71 mi.	0	0	0
East U.S. – Northwest U.S.	24	314	–71 mi.	0	0	0
East U.S. – Yellowstone	23	--	–71 mi.	6	0	8
Midwest U.S. – Eastern WY.	19	--	–71 mi.	0	0	0
Midwest U.S. – Northwest U.S.	19	355	–71 mi.	0	0	0
Midwest U.S. – Yellowstone	25	--	–71 mi.	0	0	0
Upper Midwest – Eastern WY.	51	--	–23 mi.	14	0	19
Upper Midwest – West U.S.	7	874	–23 mi.	1	86	1
Total	**168**	**1,611**		**21**	**86**	**28**

Origin/Destination Pairs	Interstate 90 Potential Autos (a)	Potential Trucks (a)	Est. Mileage Savings (b)	Diverted Autos (c)	Diverted Trucks (c)	Peak Autos (d)
East U.S. – Eastern Wyoming	29	15	49 mi.	29	15	50
East U.S. – Northwest U.S.	57	85	–99 mi.	0	0	0
East U.S. – West U.S.	27	--	49 mi.	27	0	47
Midwest U.S. – Canada	33	8	–99 mi.	0	0	0
Midwest U.S. – East Wyoming	--	34	49 mi.	0	34	0
Midwest U.S. – Northwest U.S.	70	177	–99 mi.	0	0	0
Midwest U.S. – Yellowstone	31	--	–99 mi.	3	0	5
Total	**247**	**319**		**59**	**49**	**102**
GRAND TOTAL	**415**	**1,930**		**80**	**135**	**130**

(a) Vehicles currently using I–80 and I–90 that have origin/destination pairs such that they could, conceivably, divert over to the Heartland Expressway.

(b) Negative value indicates that use of the Heartland Expressway would actually be longer for this particular origin/destination trip.

(c) Estimated daily number of average annual vehicles that would divert to the new Heartland Expressway.

(d) Estimated daily number of vehicles during the peak season that would divert to the new Heartland Expressway.

SOURCE: Wilbur Smith Associates

Exhibit 5–18
ESTIMATED DAILY DIVERTED ORIGIN AND DESTINATION PAIRS
Route Option C – Freeway Standard
2015

Origin/Destination Pairs	Interstate 80 Potential Autos (a)	Potential Trucks (a)	Est. Mileage Savings (b)	Diverted Autos (c)	Diverted Trucks (c)	Peak Autos (d)
Canada – Northwest U.S.	--	41	–76 mi.	0	0	0
East U.S. – Canada	--	27	–76 mi.	0	0	0
East U.S. – Northwest U.S.	24	314	–76 mi.	0	0	0
East U.S. – Yellowstone	23	--	–76 mi.	6	0	8
Midwest U.S. – Eastern WY.	19	--	–76 mi.	0	0	0
Midwest U.S. – Northwest U.S.	19	355	–76 mi.	0	0	0
Midwest U.S. – Yellowstone	25	--	–76 mi.	0	0	0
Upper Midwest – Eastern WY.	51	--	–28 mi.	14	0	19
Upper Midwest – West U.S.	7	874	–28 mi.	1	86	1
Total	**168**	**1,611**		**21**	**86**	**28**

Origin/Destination Pairs	Interstate 90 Potential Autos (a)	Potential Trucks (a)	Est. Mileage Savings (b)	Diverted Autos (c)	Diverted Trucks (c)	Peak Autos (d)
East U.S. – Eastern Wyoming	29	15	44 mi.	29	15	50
East U.S. – Northwest U.S.	57	85	–104 mi.	0	0	0
East U.S. – West U.S.	27	--	44 mi.	27	0	47
Midwest U.S. – Canada	33	8	–104 mi.	0	0	0
Midwest U.S. – East Wyoming	--	34	44 mi.	0	34	0
Midwest U.S. – Northwest U.S.	70	177	–104 mi.	0	0	0
Midwest U.S. – Yellowstone	31	--	–104 mi.	3	0	5
Total	**247**	**319**		**59**	**49**	**102**
GRAND TOTAL	**415**	**1,930**		**80**	**135**	**130**

(a) Vehicles currently using I–80 and I–90 that have origin/destination pairs such that they could, conceivably, divert over to the Heartland Expressway.

(b) Negative value indicates that use of the Heartland Expressway would actually be longer for this particular origin/destination trip.

(c) Estimated daily number of average annual vehicles that would divert to the new Heartland Expressway.

(d) Estimated daily number of vehicles during the peak season that would divert to the new Heartland Expressway.

SOURCE: Wilbur Smith Associates

Exhibit 5–19
ESTIMATED DAILY DIVERTED ORIGIN AND DESTINATION PAIRS
Route Option D – Freeway Standard
2015

Origin/Destination Pairs	Interstate 80 Potential Autos (a)	Potential Trucks (a)	Est. Mileage Savings (b)	Diverted Autos (c)	Diverted Trucks (c)	Peak Autos (d)
Canada – Northwest U.S.	--	41	–107 mi.	0	0	0
East U.S. – Canada	--	27	–107 mi.	0	0	0
East U.S. – Northwest U.S.	24	314	–107 mi.	0	0	0
East U.S. – Yellowstone	23	--	–107 mi.	2	0	3
Midwest U.S. – Eastern WY.	19	--	–107 mi.	0	0	0
Midwest U.S. – Northwest U.S.	19	355	–107 mi.	0	0	0
Midwest U.S. – Yellowstone	25	--	–107 mi.	0	0	0
Upper Midwest – Eastern WY.	51	--	–59 mi.	2	0	3
Upper Midwest – West U.S.	7	874	–59 mi.	0	34	0
Total	**168**	**1,611**		**4**	**34**	**6**

Origin/Destination Pairs	Interstate 90 Potential Autos (a)	Potential Trucks (a)	Est. Mileage Savings (b)	Diverted Autos (c)	Diverted Trucks (c)	Peak Autos (d)
East U.S. – Eastern Wyoming	29	15	15 mi.	21	10	35
East U.S. – Northwest U.S.	57	85	–135 mi.	0	0	0
East U.S. – West U.S.	27	--	15 mi.	20	0	34
Midwest U.S. – Canada	33	8	–135 mi.	0	0	0
Midwest U.S. – East Wyoming	--	34	15 mi.	0	26	0
Midwest U.S. – Northwest U.S.	70	177	–135 mi.	0	0	0
Midwest U.S. – Yellowstone	31	--	–135 mi.	0	0	0
Total	**247**	**319**		**41**	**36**	**69**
GRAND TOTAL	**415**	**1,930**		**45**	**70**	**75**

(a) Vehicles currently using I–80 and I–90 that have origin/destination pairs such that they could, conceivably, divert over to the Heartland Expressway.

(b) Negative value indicates that use of the Heartland Expressway would actually be longer for this particular origin/destination trip.

(c) Estimated daily number of average annual vehicles that would divert to the new Heartland Expressway.

(d) Estimated daily number of vehicles during the peak season that would divert to the new Heartland Expressway.

SOURCE: Wilbur Smith Associates

Exhibit 5–20
ESTIMATED DAILY DIVERTED ORIGIN AND DESTINATION PAIRS
Route Option B – Expressway Standard
2015

Origin/Destination Pairs	Interstate 80 Potential Autos (a)	Potential Trucks (a)	Est. Mileage Savings (b)	Diverted Autos (c)	Diverted Trucks (c)	Peak Autos (d)
Canada – Northwest U.S.	--	41	–71 mi.	0	0	0
East U.S. – Canada	--	27	–71 mi.	0	0	0
East U.S. – Northwest U.S.	24	314	–71 mi.	0	0	0
East U.S. – Yellowstone	23	--	–71 mi.	4	0	6
Midwest U.S. – Eastern WY.	19	--	–71 mi.	0	0	0
Midwest U.S. – Northwest U.S.	19	355	–71 mi.	0	0	0
Midwest U.S. – Yellowstone	25	--	–71 mi.	0	0	0
Upper Midwest – Eastern WY.	51	--	–23 mi.	6	0	8
Upper Midwest – West U.S.	7	874	–23 mi.	0	45	0
Total	**168**	**1,611**		**10**	**45**	**14**

Origin/Destination Pairs	Interstate 90 Potential Autos (a)	Potential Trucks (a)	Est. Mileage Savings (b)	Diverted Autos (c)	Diverted Trucks (c)	Peak Autos (d)
East U.S. – Eastern Wyoming	29	15	49 mi.	14	8	24
East U.S. – Northwest U.S.	57	85	–99 mi.	0	0	0
East U.S. – West U.S.	27	--	49 mi.	14	0	24
Midwest U.S. – Canada	33	8	–99 mi.	0	0	0
Midwest U.S. – East Wyoming	--	34	49 mi.	0	17	0
Midwest U.S. – Northwest U.S.	70	177	–99 mi.	0	0	0
Midwest U.S. – Yellowstone	31	--	–99 mi.	2	0	3
Total	**247**	**319**		**30**	**25**	**51**
GRAND TOTAL	**415**	**1,930**		**40**	**70**	**65**

(a) Vehicles currently using I–80 and I–90 that have origin/destination pairs such that they could, conceivably, divert over to the Heartland Expressway.

(b) Negative value indicates that use of the Heartland Expressway would actually be longer for this particular origin/destination trip.

(c) Estimated daily number of average annual vehicles that would divert to the new Heartland Expressway.

(d) Estimated daily number of vehicles during the peak season that would divert to the new Heartland Expressway.

SOURCE: Wilbur Smith Associates

Exhibit 5–21
ESTIMATED DAILY DIVERTED ORIGIN AND DESTINATION PAIRS
Route Option C – Expressway Standard
2015

Origin/Destination Pairs	Interstate 80 Potential Autos (a)	Potential Trucks (a)	Est. Mileage Savings (b)	Diverted Autos (c)	Diverted Trucks (c)	Peak Autos (d)
Canada – Northwest U.S.	--	41	–76 mi.	0	0	0
East U.S. – Canada	--	27	–76 mi.	0	0	0
East U.S. – Northwest U.S.	24	314	–76 mi.	0	0	0
East U.S. – Yellowstone	23	--	–76 mi.	4	0	6
Midwest U.S. – Eastern WY.	19	--	–76 mi.	0	0	0
Midwest U.S. – Northwest U.S.	19	355	–76 mi.	0	0	0
Midwest U.S. – Yellowstone	25	--	–76 mi.	0	0	0
Upper Midwest – Eastern WY.	51	--	–28 mi.	6	0	8
Upper Midwest – West U.S.	7	874	–28 mi.	0	45	0
Total	**168**	**1,611**		**10**	**45**	**14**

Origin/Destination Pairs	Interstate 90 Potential Autos (a)	Potential Trucks (a)	Est. Mileage Savings (b)	Diverted Autos (c)	Diverted Trucks (c)	Peak Autos (d)
East U.S. – Eastern Wyoming	29	15	44 mi.	14	8	24
East U.S. – Northwest U.S.	57	85	–104 mi.	0	0	0
East U.S. – West U.S.	27	--	44 mi.	14	0	24
Midwest U.S. – Canada	33	8	–104 mi.	0	0	0
Midwest U.S. – East Wyoming	--	34	44 mi.	0	17	0
Midwest U.S. – Northwest U.S.	70	177	–104 mi.	0	0	0
Midwest U.S. – Yellowstone	31	--	–104 mi.	2	0	3
Total	**247**	**319**		**30**	**25**	**51**
GRAND TOTAL	**415**	**1,930**		**40**	**70**	**65**

(a) Vehicles currently using I–80 and I–90 that have origin/destination pairs such that they could, conceivably, divert over to the Heartland Expressway.

(b) Negative value indicates that use of the Heartland Expressway would actually be longer for this particular origin/destination trip.

(c) Estimated daily number of average annual vehicles that would divert to the new Heartland Expressway.

(d) Estimated daily number of vehicles during the peak season that would divert to the new Heartland Expressway.

SOURCE: Wilbur Smith Associates

Exhibit 5–22
ESTIMATED DAILY DIVERTED ORIGIN AND DESTINATION PAIRS
Route Option D – Expressway Standard
2015

Origin/Destination Pairs	Interstate 80 Potential Autos (a)	Potential Trucks (a)	Est. Mileage Savings (b)	Diverted Autos (c)	Diverted Trucks (c)	Peak Autos (d)
Canada – Northwest U.S.	--	41	–107 mi.	0	0	0
East U.S. – Canada	--	27	–107 mi.	0	0	0
East U.S. – Northwest U.S.	24	314	–107 mi.	0	0	0
East U.S. – Yellowstone	23	--	–107 mi.	1	0	1
Midwest U.S. – Eastern WY.	19	--	–107 mi.	0	0	0
Midwest U.S. – Northwest U.S.	19	355	–107 mi.	0	0	0
Midwest U.S. – Yellowstone	25	--	–107 mi.	0	0	0
Upper Midwest – Eastern WY.	51	--	–59 mi.	1	0	1
Upper Midwest – West U.S.	7	874	–59 mi.	0	17	0
Total	**168**	**1,611**		**2**	**17**	**2**

Origin/Destination Pairs	Interstate 90 Potential Autos (a)	Potential Trucks (a)	Est. Mileage Savings (b)	Diverted Autos (c)	Diverted Trucks (c)	Peak Autos (d)
East U.S. – Eastern Wyoming	29	15	15 mi.	9	5	17
East U.S. – Northwest U.S.	57	85	–135 mi.	0	0	0
East U.S. – West U.S.	27	--	15 mi.	9	0	16
Midwest U.S. – Canada	33	8	–135 mi.	0	0	0
Midwest U.S. – East Wyoming	--	34	15 mi.	0	13	0
Midwest U.S. – Northwest U.S.	70	177	–135 mi.	0	0	0
Midwest U.S. – Yellowstone	31	--	–135 mi.	0	0	0
Total	**247**	**319**		**18**	**18**	**33**
GRAND TOTAL	**415**	**1,930**		**20**	**35**	**35**

(a) Vehicles currently using I–80 and I–90 that have origin/destination pairs such that they could, conceivably, divert over to the Heartland Expressway.

(b) Negative value indicates that use of the Heartland Expressway would actually be longer for this particular origin/destination trip.

(c) Estimated daily number of average annual vehicles that would divert to the new Heartland Expressway.

(d) Estimated daily number of vehicles during the peak season that would divert to the new Heartland Expressway.

SOURCE: Wilbur Smith Associates

The long distance diversions estimated from Interstate 80 and 90 for the four finalist route options were combined with the local traffic and induced traffic estimates discussed in the next section.

TRAFFIC USE OF THE HEARTLAND EXPRESSWAY

Earlier in this chapter the 1990 and 2015 "Base Case" traffic volumes were presented; that is, the number of vehicles expected in the corridor if the Heartland Expressway is not built. This section utilizes that traffic forecast information and analyzes each Heartland Expressway route option and each highway standard option from the traffic perspective. This evaluation addresses the traffic volumes that the Heartland Expressway is estimated to carry under each highway improvement type and each alternative alignment.

Causes of Heartland Expressway Traffic Use - Future traffic use of the Heartland Expressway is a function of the following causes of traffic use:

1. **Normal Traffic Growth** - Some growth in traffic will occur in the region due to population growth, increased visitation of tourist places, increased business and economic activity, increased per capita trip making, etc.

2. **Diversion from Other Roads** - If the highway is built, it will offer faster, more efficient and safer travel for vehicles in the region. This will cause some cars and commercial trucks to divert to the Heartland Expressway from other roads and highways in the South Dakota, Nebraska and Wyoming region.

3. **Long-Distance Traffic Rerouting** - Some traffic that now travels on I-80 and I-90 that uses other more distant connecting highways between the two Interstate Highways could, in some instances, choose to use the Heartland Expressway. This includes some vacationers who now bypass the Black Hills area to visit the Heartland Expressway area's tourist attractions.

4. **Induced Traffic** - In addition, there could be more traffic on the Heartland Expressway merely because the new highway exists. For example, by making travel faster between Denver and the Black Hills, more visitors from Denver might be attracted to the Black Hills (and to other tourist attractions in both Nebraska and South Dakota).

All of these traffic sources were investigated and included in this study.

Summer and Annual Traffic - There are two very different travel seasons of relevance to the corridor. In the Summer months over 2.5 million visitors descend on the northern end of the corridor, and 92 percent of them arrive by car. This creates significantly higher traffic volumes during the Summer vacation months. During the remainder of the year traffic comprises principally local traffic, resulting in much lower traffic volumes.

For this reason, this study estimated traffic use of the Heartland Expressway for two periods:

1. The peak season Summer months
2. The full year 12 month period.

Heartland Expressway Traffic Estimates - The Heartland Expressway could be built to any of three highway design standards:

- Freeway
- Expressway
- Improved 2-Lane with some 4-lane sections

In addition, the highway could be built on any of the three route options (B, C, and D). Year 2015 traffic estimates were developed for each of these alternatives.

Exhibits 5-23 through 5-25 present the year 2015 traffic volume estimates for the various Heartland Expressway alignment and design standard combinations. These traffic estimates suggest a number of things:

1. On an annual average daily traffic volume basis (AADT), none of the alignment options depict sufficient traffic to warrant an end-to-end 4-lane highway. Average daily volumes in the 4,000 to 5,000 range would imply that, from a traffic standpoint, the states need not consider the 4-lane for a decade or two. (This, of course, does not yet reflect the economic evaluation).

2. However, the peak period Summer months are estimated to have daily traffic volumes which are considerably higher. Therefore, if there is to be a traffic volume basis for a 4-lane highway, it will be on the basis of peak period Summer travel, rather than AADT travel.

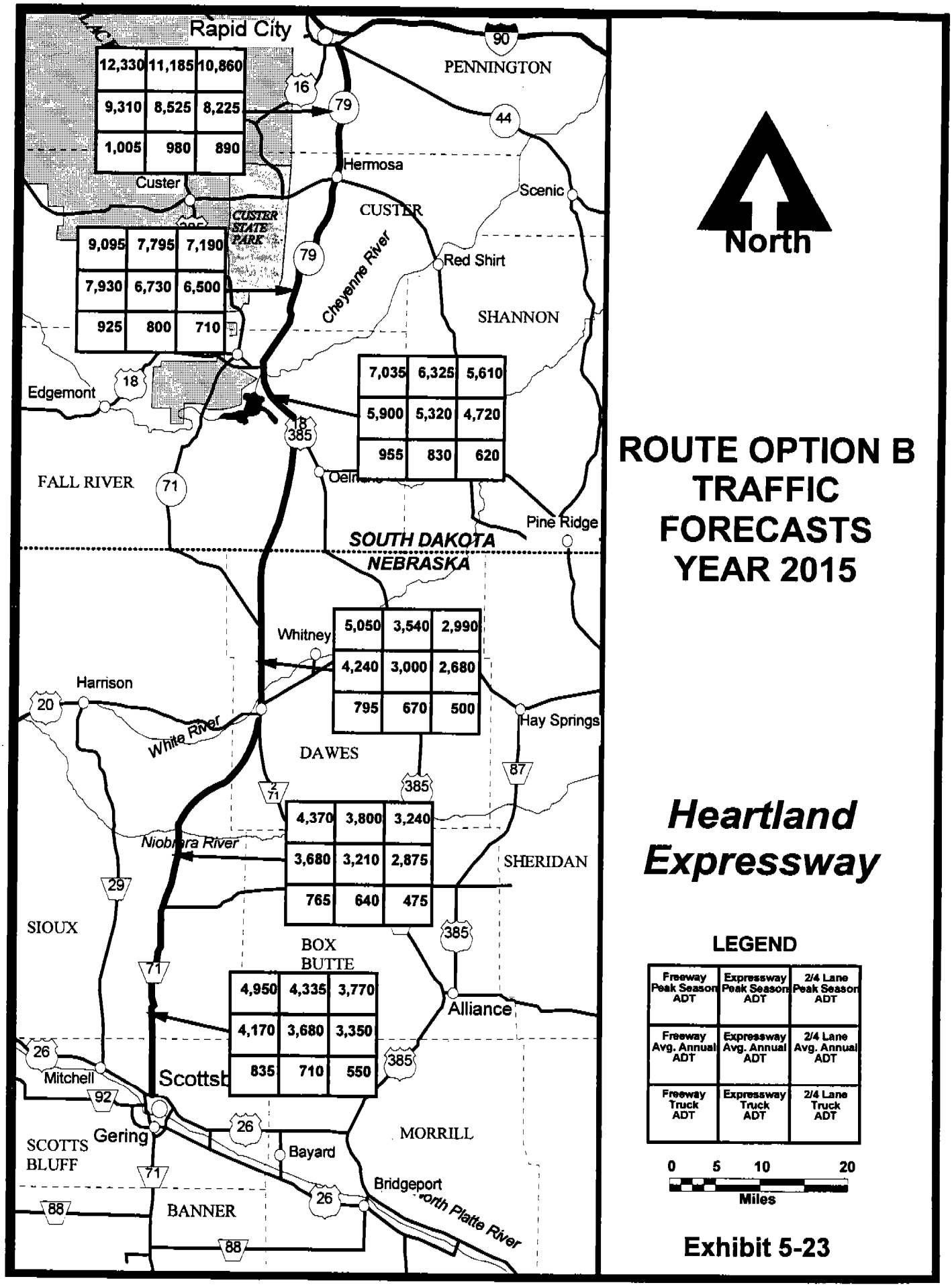
3. As expected, the 4-lane Expressway is estimated to carry more traffic than would the 2-lane, and the 4-lane Freeway is estimated to carry more traffic than does the Expressway.

4. While these volumes may be low, the Freeway volumes are as high as are the volumes on some existing rural Interstate Highways in the states.

5. Truck volumes typically comprise 15-20 percent of total volumes, indicating some truck diversion potential.

6. From the tourist-oriented South Dakota northern end of the corridor perspective, the more direct western alignments (Route Options B and C) are more effective in attracting traffic than are the more circuitous eastern alignment (Route Option D). This is because the more direct alignments are better able to attract the Denver area to Black Hills area tourist traffic.

7. However, from the perspective of the Nebraska communities, the eastern alignments (Route Option D) has greater volumes at the south end than do the western alignments (Routes B and C). This is because of traffic routing patterns on the south end plus the ability of Route Option D to serve the Alliance and Chadron population centers.


Rapid City
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9,310 8,525 8,225
1,005 980 890
Custer
CUSTER STATE PARK
9,095 7,795 7,190
7,930 6,730 6,500
925 800 710
Hermosa
CUSTER
PENNINGTON
Scenic
Red Shirt
Cheyenne River
SHANNON
7,035 6,325 5,610
5,900 5,320 4,720
955 830 620
Edgemont
FALL RIVER
Pine Ridge
SOUTH DAKOTA
NEBRASKA
Whitney
5,050 3,540 2,990
4,240 3,000 2,680
795 670 500
Harrison
White River
Hay Springs
DAWES
4,370 3,800 3,240
3,680 3,210 2,875
765 640 475
Niobrara River
SHERIDAN
SIOUX
BOX BUTTE
4,950 4,335 3,770
4,170 3,680 3,350
835 710 550
Alliance
Mitchell
Scottsb
Gering
SCOTTS BLUFF
Bayard
MORRILL
Bridgeport
North Platte River
BANNER
16
79
44
90
18
385
71
20
87
29
26
92
88
North
ROUTE OPTION B
TRAFFIC
FORECASTS
YEAR 2015
Heartland
Expressway
LEGEND
Freeway Peak Season ADT
Expressway Peak Season ADT
2/4 Lane Peak Season ADT
Freeway Avg. Annual ADT
Expressway Avg. Annual ADT
2/4 Lane Avg. Annual ADT
Freeway Truck ADT
Expressway Truck ADT
2/4 Lane Truck ADT
0 5 10 20
Miles

Exhibit 5-23

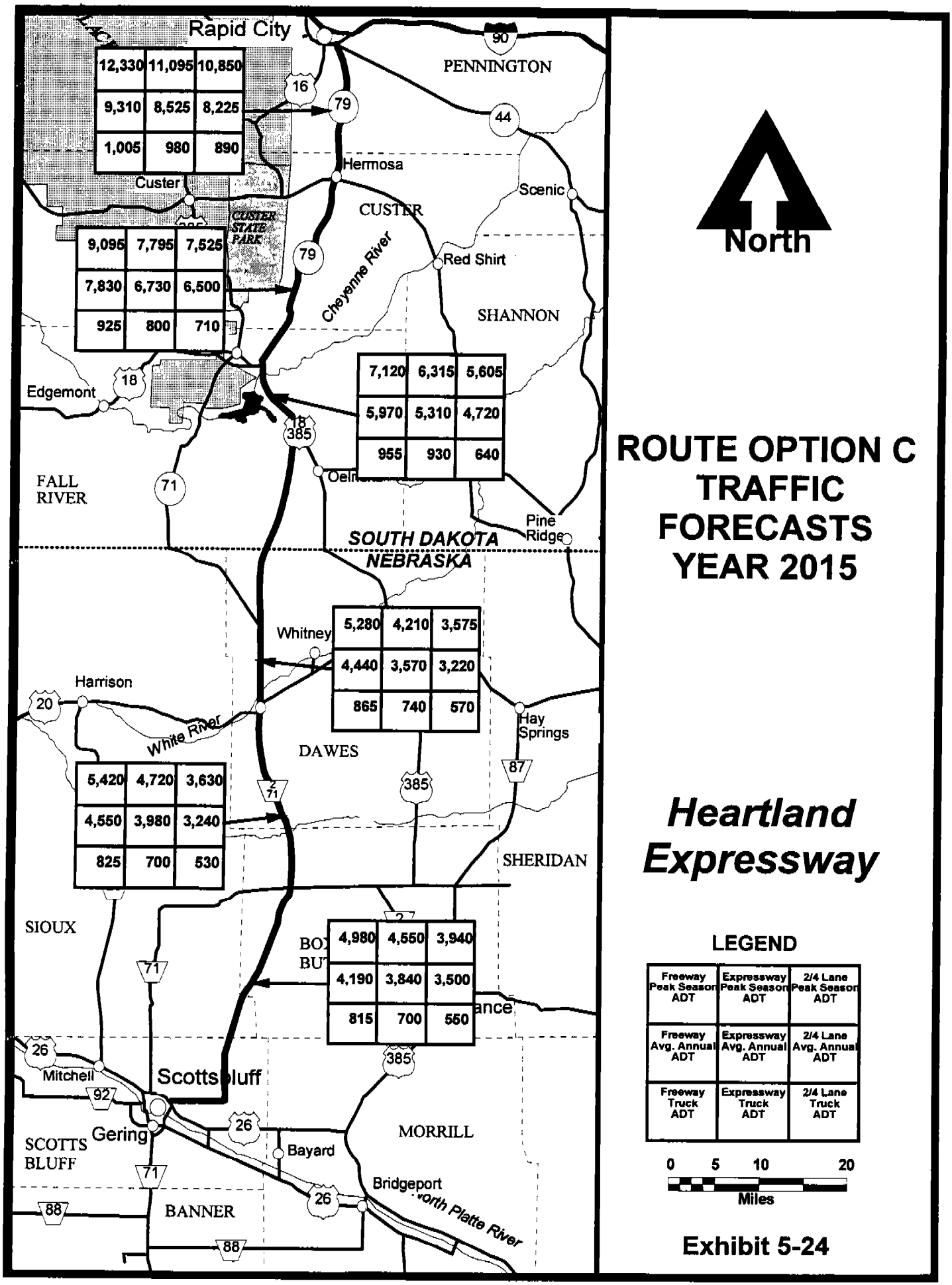
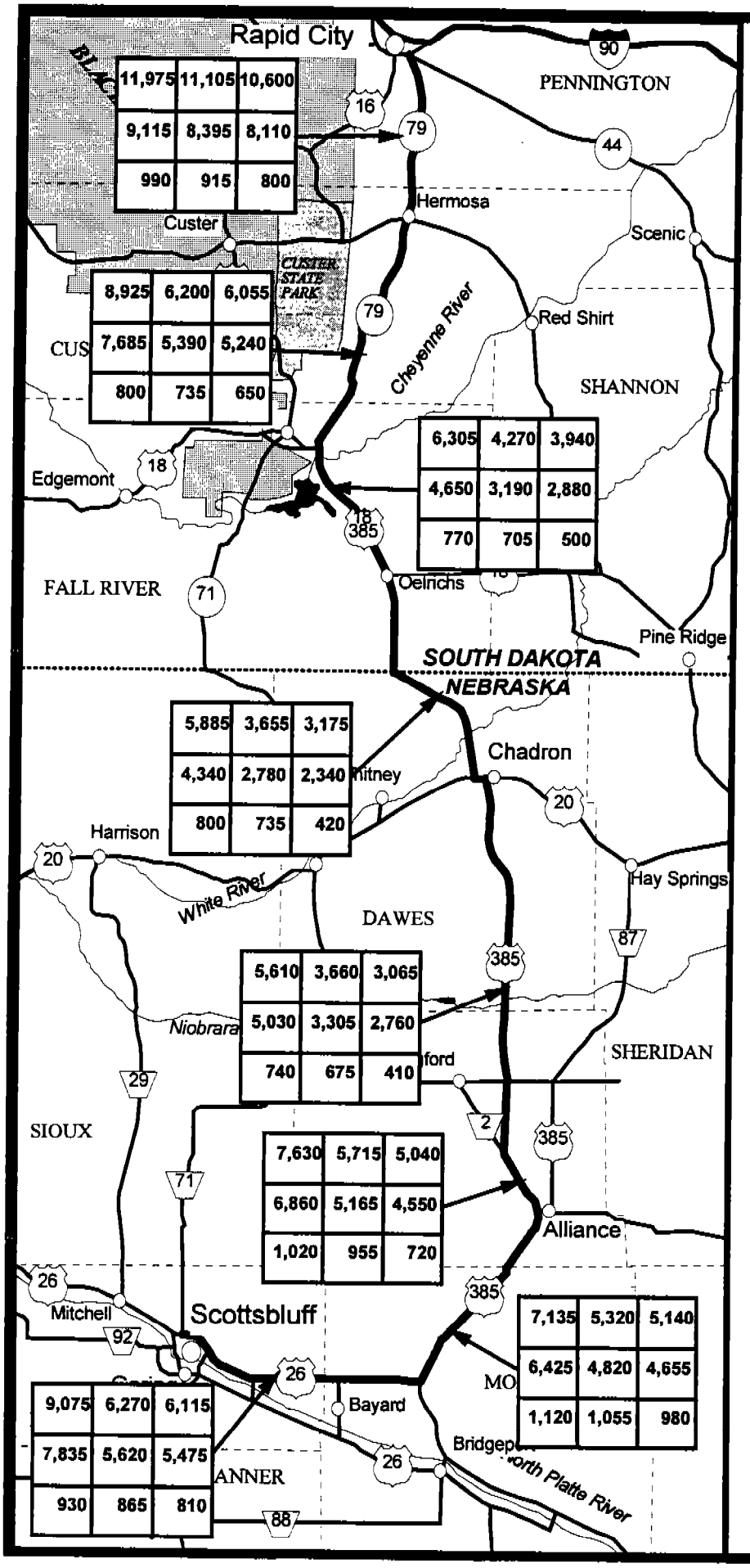

Rapid City
12,330 11,095 10,850
9,310 8,525 8,225
1,005 980 890
PENNINGTON
Custer
Hermosa
Scenic
CUSTER
CUSTER STATE PARK
9,095 7,795 7,525
7,830 6,730 6,500
925 800 710
Cheyenne River
Red Shirt
SHANNON
7,120 6,315 5,605
5,970 5,310 4,720
955 930 640
Edgemont
FALL RIVER
Pine Ridge
SOUTH DAKOTA
NEBRASKA
Whitney
5,280 4,210 3,575
4,440 3,570 3,220
865 740 570
Harrison
White River
Hay Springs
DAWES
5,420 4,720 3,630
4,550 3,980 3,240
825 700 530
SHERIDAN
SIOUX
4,980 4,550 3,940
4,190 3,840 3,500
815 700 550
Mitchell
Scottsbluff
Gering
SCOTTS BLUFF
Bayard
MORRILL
Bridgeport
North Platte River
BANNER
North
ROUTE OPTION C
TRAFFIC
FORECASTS
YEAR 2015
Heartland
Expressway
LEGEND
Freeway Peak Season ADT
Expressway Peak Season ADT
2/4 Lane Peak Season ADT
Freeway Avg. Annual ADT
Expressway Avg. Annual ADT
2/4 Lane Avg. Annual ADT
Freeway Truck ADT
Expressway Truck ADT
2/4 Lane Truck ADT
0 5 10 20
Miles

Exhibit 5-24



North

ROUTE OPTION D TRAFFIC FORECASTS YEAR 2015

Heartland Expressway

LEGEND

Freeway Peak Season ADT	Expressway Peak Season ADT	2/4 Lane Peak Season ADT
Freeway Avg. Annual ADT	Expressway Avg. Annual ADT	2/4 Lane Avg. Annual ADT
Freeway Truck ADT	Expressway Truck ADT	2/4 Lane Truck ADT

0 5 10 20
Miles

Exhibit 5-25

8. A significant amount of auto and truck traffic is expected to be diverted to the Heartland Expressway 4-lane options. Most of the diversion involves trips that are already using the northern portion of the corridor -- from US 18/SR 79 junction to Rapid City via SR 79. These trips are currently using I-25 and US 18 in Wyoming, crossing the Wyoming/South Dakota border near Edgemont on US 18. An improved highway between Scottsbluff and Rapid City, coupled with the planned improvement on SR 71 between I-80 and Scottsbluff, offers a route that is not only shorter, but also provides a continuous four-lane route when freeway or expressway standards are used for the Heartland Expressway. Additionally, it would no longer be necessary to pass through the communities located along US 18 that impose speed restrictions.

Traffic Impact on Eastern Wyoming - The Heartland Expressway has the potential to divert car and truck traffic from US 85 in Wyoming. From the traffic origin and destination surveys, it was learned that the majority of long distance north-south traffic traveling to/from the Black Hills region of South Dakota is using the highways in Wyoming. Also, the major truck route between Rapid City and Denver includes a combination of Interstate 25 and US 85 in eastern Wyoming.

Exhibits 5-26 and 5-27 summarize the estimated traffic impact on Eastern Wyoming by each Heartland Expressway route option and each highway standard alternative. The freeway option is estimated to divert the largest amount of traffic from Wyoming. Route Options B and C would divert approximately one-third of the total vehicle miles traveled (VMT) in Eastern Wyoming. On the highest traffic segment on US 85, approximately 3,000 vehicles per day during the peak season may be diverted by Routes B and C and approximately 2,000 vehicles by Route Option D.

The expressway option would divert significantly less traffic from Eastern Wyoming, especially Route Option D. By traveling to Alliance and Chadron, Route Option D would not save the motorists in Wyoming a significant amount of time under the expressway alternative. It is estimated that this route (Route Option D) would have a minimal impact on traffic in Eastern Wyoming. However, Routes B and C would still divert a significant number of vehicles from Wyoming under the expressway alternative.

The improved two-lane highway with some four-lane sections option would divert the least amount of traffic from Eastern Wyoming. Route Options B and C, because of their direct alignment, could still divert considerable traffic from Eastern Wyoming (between 1,500 to 2,000 vehicles per day) on the highest volume links.

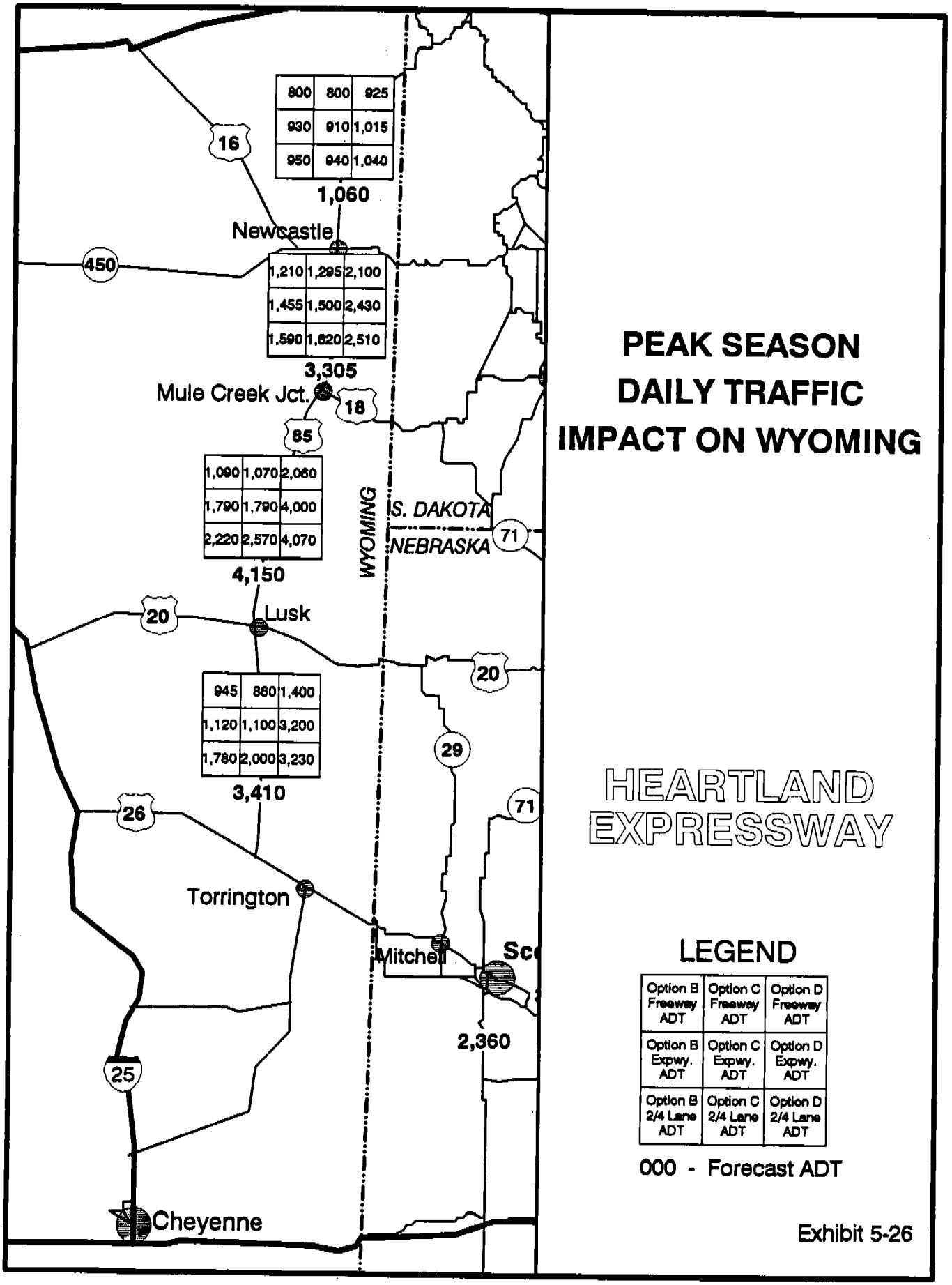
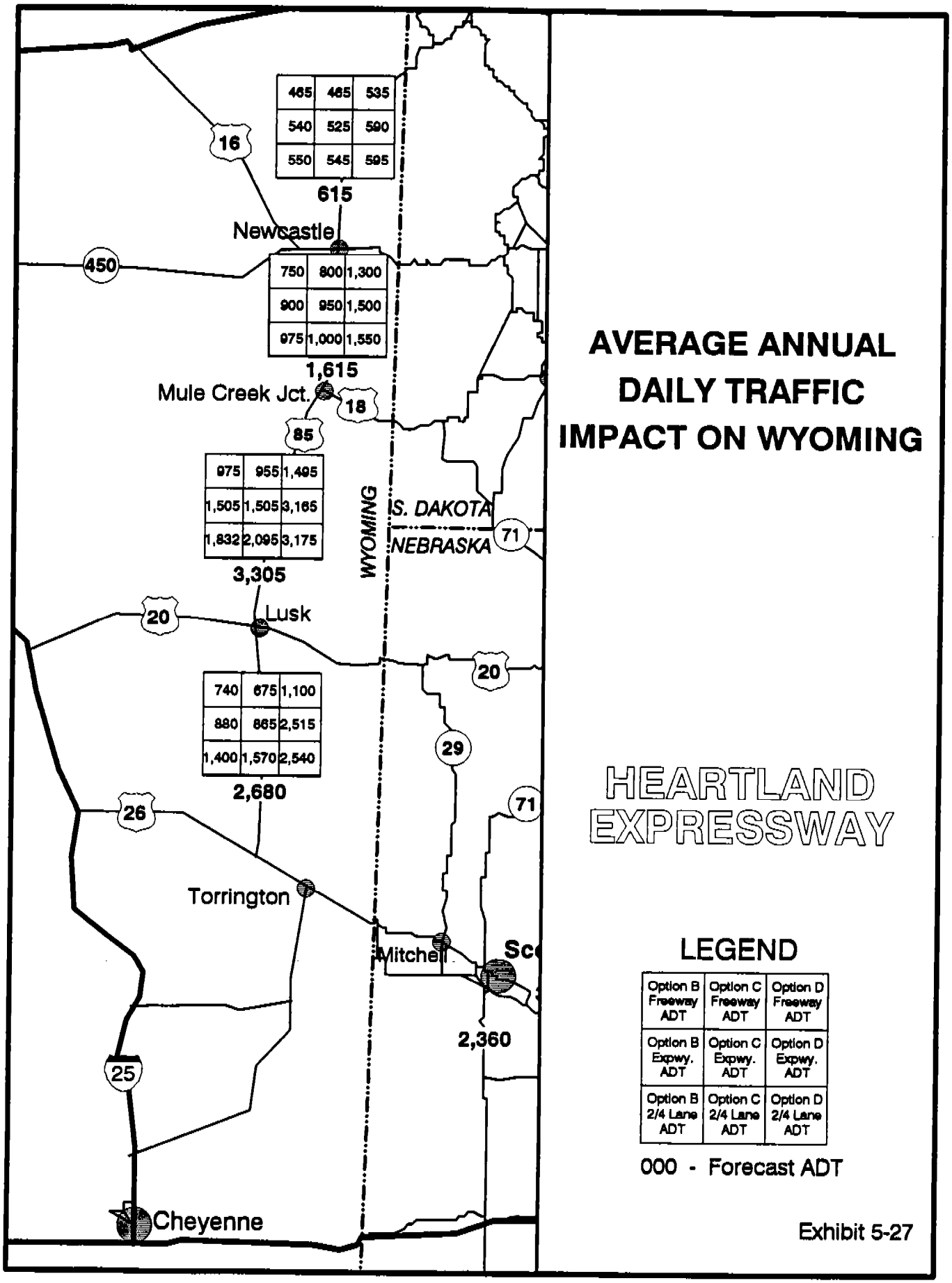

800 800 925
930 910 1,015
950 940 1,040
1,060
Newcastle
16
450
1,210 1,295 2,100
1,455 1,500 2,430
1,590 1,620 2,510
3,305
Mule Creek Jct.
18
85
1,090 1,070 2,060
1,790 1,790 4,000
2,220 2,570 4,070
4,150
WYOMING
S. DAKOTA
NEBRASKA
71
20
Lusk
945 860 1,400
1,120 1,100 3,200
1,780 2,000 3,230
3,410
20
29
71
26
Torrington
Mitchell
Sc
2,360
25
Cheyenne
PEAK SEASON
DAILY TRAFFIC
IMPACT ON WYOMING
HEARTLAND
EXPRESSWAY
LEGEND
Option B Freeway ADT
Option C Freeway ADT
Option D Freeway ADT
Option B Expwy. ADT
Option C Expwy. ADT
Option D Expwy. ADT
Option B 2/4 Lane ADT
Option C 2/4 Lane ADT
Option D 2/4 Lane ADT
000 - Forecast ADT

Exhibit 5-26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S. DAKOTA
NEBRASKA
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Lusk
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880 865 2,515
1,400 1,570 2,540
2,680
29
26
Torrington
Mitchell
2,360
25
Cheyenne
AVERAGE ANNUAL DAILY TRAFFIC IMPACT ON WYOMING
HEARTLAND EXPRESSWAY
LEGEND
Option B Freeway ADT
Option C Freeway ADT
Option D Freeway ADT
Option B Expwy. ADT
Option C Expwy. ADT
Option D Expwy. ADT
Option B 2/4 Lane ADT
Option C 2/4 Lane ADT
Option D 2/4 Lane ADT
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Exhibit 5-27

Chapter 6
PRINCIPLES OF ECONOMIC FEASIBILITY

A public investment such as a two- or four-lane highway improvement is "economically feasible" if the economy is better off with the highway improvement than without it. Without question, a well planned Heartland Expressway investment will be a significant asset to the corridor, and will be of help to the economic future of communities and activities located in proximity to the highway. Ample evidence exists to support the contention that the corridor's economy will benefit from the highway.

Government is often asked to make highway investments for "economic development" purposes. The rationale, and it is correct from the corridor perspective, is that the area will be better off due to greater transport efficiency, the possible attraction of additional tourists and new businesses, and the overall improved ability of the corridor region to compete for economic activity. If the improved corridor economy is sufficient to cause the overall economy to be better off, and if that economic improvement is more significant than the cost of the highway, then the highway project is an "economically feasible" investment.

DEFINITION OF ECONOMIC DEVELOPMENT

For purposes of the Heartland Expressway Study, economic development is defined as "an increase in the prosperity and incomes of people and institutions". Economic development of this nature in a given area occurs when the incomes and product generated in the area are caused to increase. Such increases occur in either of two ways:

1. **More Resources** - If output increases in the area, the increased output will require more resources (land, labor, materials, capital) which means that more people are employed, more incomes are earned and more profits are made. If the Heartland Expressway enables the attraction of additional business in the corridor (new firms, or expanded firms), then the highway has aided the economic development process, to the benefit of the corridor area.

2. **Efficiency** - Even if the highway does not help to create increased output, it can still help economic development by causing the area's output to be achieved at less total cost. Reduced transportation costs due to the highway improvement in this way yield increased prosperity and income.

The Heartland Expressway Study suggests that the highway investment will do both: it will enable the attraction of "more resources" and it will create greater "efficiency". As a result, the highway improvement will have very definite "economic development" roles to play. The issue is whether the magnitude of the economic development is sufficiently large to warrant the investment.

ECONOMIC BASIS FOR A FEASIBLE HIGHWAY PROJECT

Highways are essentially "tools" used in transporting goods and people from one place to another. Investments in highways contribute to economic development in that they lower transportation and/or logistics costs and/or improve people's accessibility to and/or perceptions of the corridor thereby causing them to want to settle/invest there, and/or divert traffic. Such changes may be realized in numerous ways, including improved safety, decreases in fuel and other vehicle operations costs, improved awareness of the ability to travel to the corridor, e.g., to the Black Hills, revised logistics or ranching patterns, and reductions in noise or air pollution. But in the final analysis, all of the direct benefits of a highway, and therefore the justification for investing in it, flow from using it for transportation.

Benefits from an expressway may not only accrue to persons and businesses whose vehicles use the highway. Lower transportation costs may be passed on to consumers as lower prices for consumer goods, to workers as higher wages, or to owners of businesses as higher net income. Persons may thus benefit from a highway investment without traveling on the roadway.

It is important to keep in mind that for any of these benefits to occur, the highway investment must either enable significant reductions in transportation costs or cause revised perceptions of the area. If the amount of these savings is small for each trip, if the number of vehicles using the highway is not sufficiently large, or if peoples' perceptions do not change dramatically, the investment will not produce benefits that exceed its cost. Highway investment must be based on reasonable estimates of traffic volumes they will service, the cost savings travelers will experience, and a realistic assessment of revised industrial/tourism/logistics/agriculture/ perceptions.

Investing in a highway improvement that produces benefits which are less than the associated costs of the improvement operates counter to economic development. The costs will be paid by users and other taxpayers in the form of higher taxes than otherwise would be the case, or would be paid in a lost opportunity (an alternative highway would not get improved). These higher taxes work against economic growth within the taxing jurisdiction because they reduce post-tax return to businesses and households, and investment in the "wrong" highway project similarly retards economic growth. Therefore it is imperative that the highway investment be economically feasible; if it is not, it is economically counterproductive.

ECONOMIC STUDY OVERVIEW

The economic approach used to analyze the Heartland Expressway options, while being tailored to the Heartland Expressway study, is one which has been used on previous corridor studies and one which has evolved over the years. For example, this overall methodology has been employed on such highway corridor studies as the following:

- St. Louis to St. Paul (Avenue of the Saints)
- U.S. 20 Sioux City - Ft. Dodge Corridor
- U.S. 63 Waterloo - Minneapolis Corridor
- Branson, MO. Ozark Mountain Highroad

- Carolina Bays Parkway; Myrtle Beach, SC
- Aroostook Co.; Maine Highway Corridor
- Eastern Dakota Expressway Feasibility
- Numerous other studies in other states

The methodology is comprehensive and credible, and it is one which utilizes accepted economic principles. Exhibit 6-1 on the following page summarizes the approach. It includes:

- A definition of the types of improvements to be considered in the corridor (three routes and three highway standards).
- A generalized estimate of those improvements' costs.
- Estimated use that will be made of the improved highway (existing and future use).
- Quantification of estimated economic benefits believed to be attributable to the Heartland Expressway.
- A comparison of the economic costs and economic benefits attributable to the corridor improvement.
- Conclusions concerning the economic impact and feasibility of investing in the defined corridor.

ECONOMIC EVALUATION PRINCIPLES

Economic analysis of the Heartland Expressway corridor followed an established set of evaluation principles.

Comparisons With "Do-Nothing" Base Cases - To calculate the corridor's costs and benefits, the "improved case" is compared with the "base case" (the base case is the existing transportation network plus programmed improvements). The benefits for each improvement option are calculated by comparing the corridor's "improved case" with the corridor's "base case." In this manner each improvement option's "feasibility" is determined and, implicitly, the improvement options can be compared one with the other.

The Economic Impact Area(s) - The Heartland Expressway will contribute to economic development if it significantly reduces transportation costs, or creates other business efficiencies, or makes the area more accessible, or if it diverts significant numbers of vehicles which, in turn, make it possible for businesses to obtain a better return. By helping to attract more people to the region, and by improving the region's competitiveness, the highway investment helps attract new businesses, and expand existing businesses. If the impact area of interest is a rather narrow corridor along the highway, an increase in economic activity is almost certain.

CORRIDOR ECONOMIC EVALUATION PROCESS

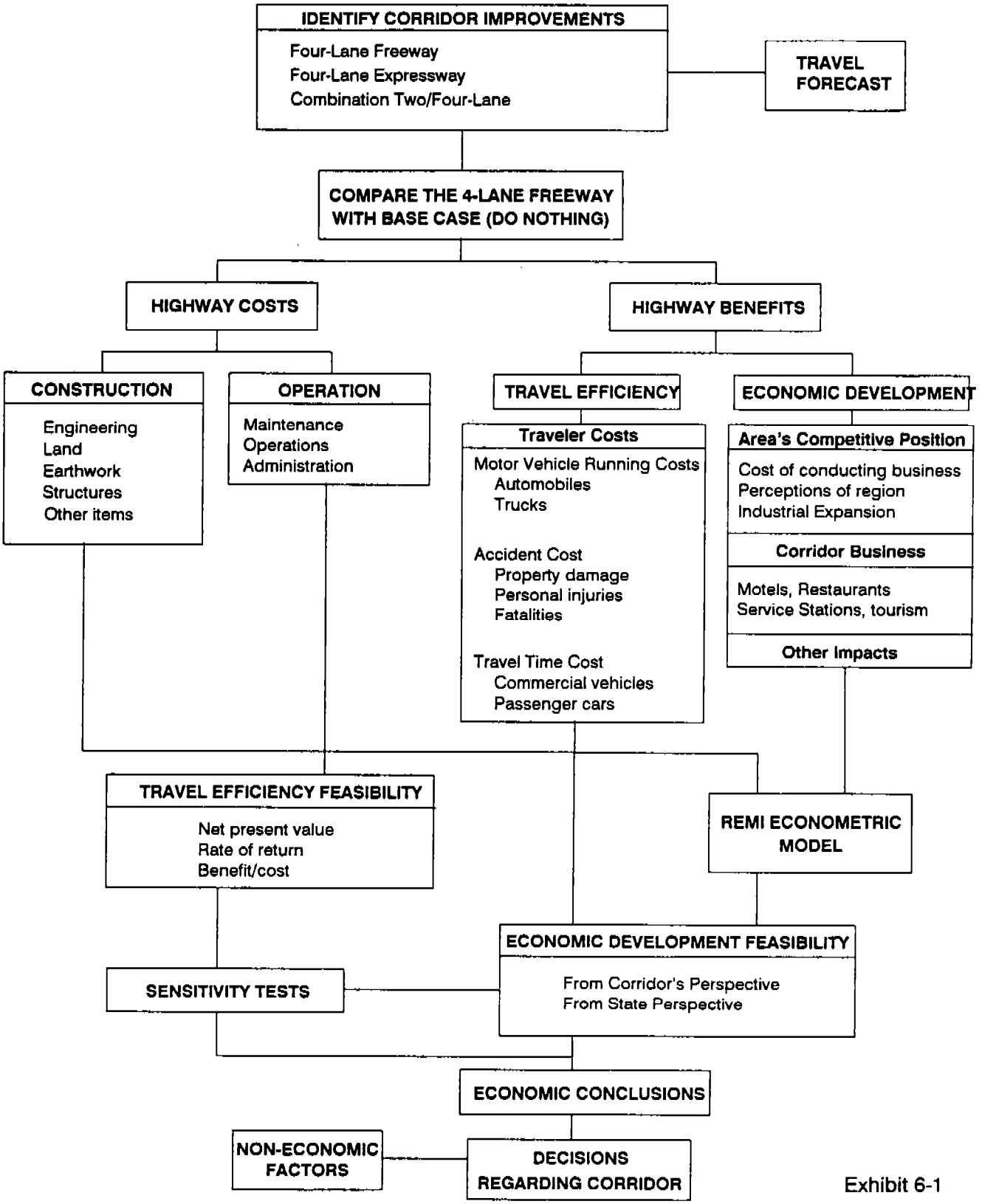


Exhibit 6-1

If instead the impact area of interest is the entire states of Nebraska and South Dakota, the overall amount of economic development resulting from the highway investment might be less. A certain number of businesses within the region, especially those that are relatively mobile, will relocate to higher access sites along the Heartland corridor. While an increase in economic activity may be evident near the highway, it may not be a net gain to the two States if it is only a relocation from within the two States.

From the two states perspective, the highway investment contributes to economic growth if travel costs within the states are reduced or if it creates economic activity within the two states. Lower travel costs help improve productivity which, in turn, increases income to firms and individuals. Productivity gains also help enable Nebraska and South Dakota produced goods and services (e.g., tourism) to be more competitive in other states and even in international markets. The key point here is that for a highway investment to contribute to state economic growth, it must significantly reduce transportation costs, or draw economic activity to the state(s) from other states.

In the Heartland study, the economic development impacts were developed for two regions:

1. **Primary Impact Area** - The economic impacts were estimated for a defined impact region, comprising portions of Nebraska and South Dakota (see Exhibit 6-2 on the next page).

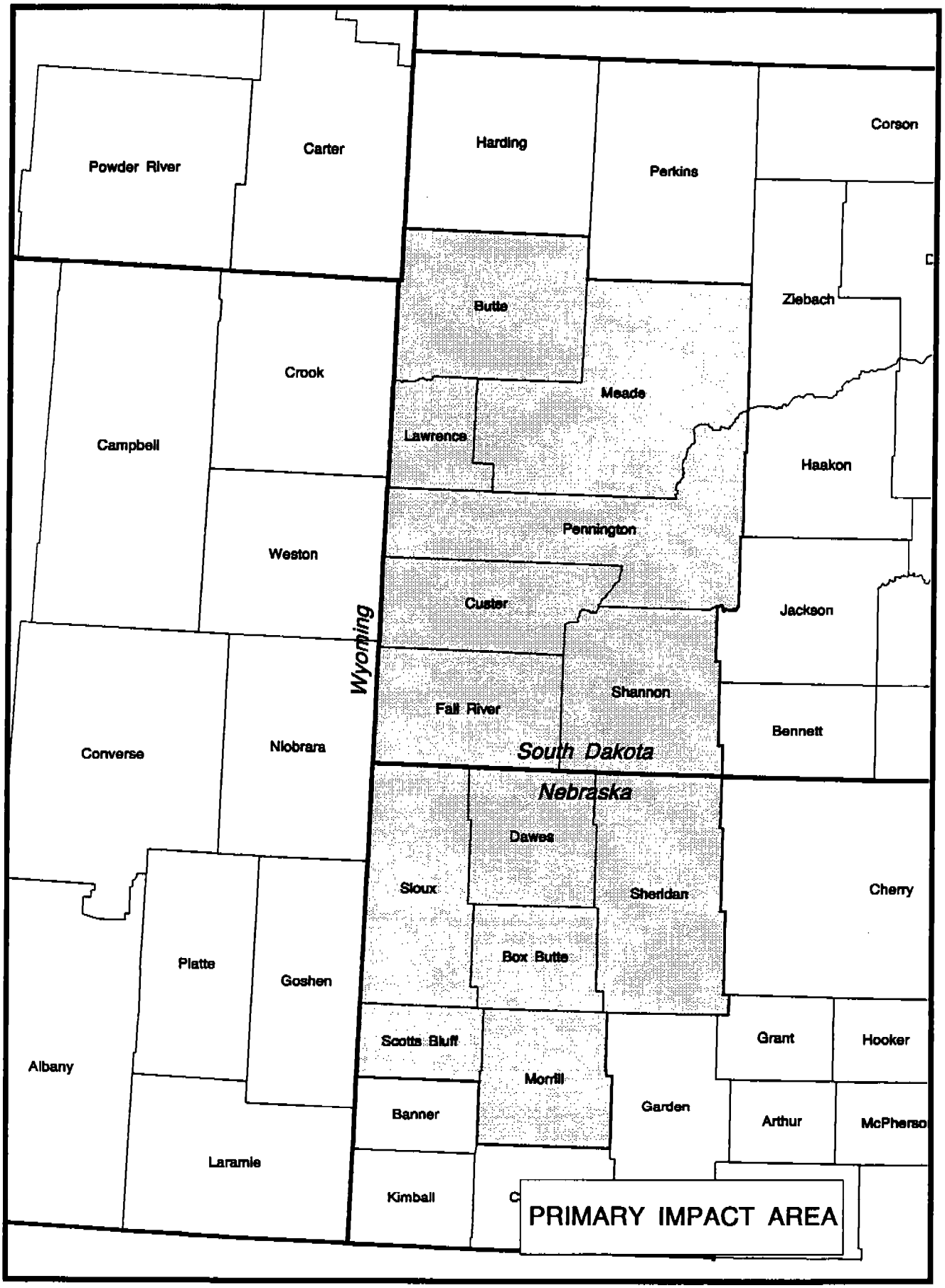
2. **Total States** - The economic impacts were also estimated for the two states (Nebraska and South Dakota) combined.

Impact on Eastern Wyoming - If the Heartland Expressway is built, it could affect traffic volumes in Eastern Wyoming. By so doing, it could have an adverse economic impact on Eastern Wyoming. As part of this analysis, the study estimated the adverse economic impact on Eastern Wyoming

Economic Benefit Types - The study investigated ways that the local corridor economy and the two states combined could benefit from the improved highway. These benefit types include the following.

- **Act of Highway Construction** - State or federal money spent in the corridor region to build the highway is of economic value to the corridor since wages are paid, gravel is purchased, etc. Such money, however, is not a benefit statewide unless there is a "net" inflow of federal funding that, without the highway, would not exist within the two states.

- **Travel Efficiency** - Vehicle users will benefit due to faster average travel speeds (time savings), reduced accident rates (safety), and improved traffic flow (vehicle operating costs). Truck travel will similarly be faster, cheaper and more reliable. Such benefits are valuable to the corridor region, the states, and the nation.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Crook
Meade
Campbell
Lawrence
Haakon
Pennington
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Jackson
Wyoming
Shannon
Fall River
Bennett
Converse
Niobrara
South Dakota
Nebraska
Dawes
Sioux
Sheridan
Cherry
Platte
Box Butte
Goshen
Scotts Bluff
Grant
Hooker
Albany
Morrill
Garden
Banner
Arthur
McPherso
Laramie
Kimball
PRIMARY IMPACT AREA

Exhibit 6-2

- **Improved Competitive Position** - Such transportation improvements will remove one impediment to economic activity attraction and growth. Improved transportation should enable the corridor area to better compete for economic activities, meaning that business activity will be expanded in, or otherwise attracted to, the local economy. Some of these benefits are also valuable at the State level.

- **Tourism Attraction** - If the improved highway helps to attract additional tourists to the area, that will be helpful to the local economy and to the economies of the states due to spending by the attracted tourists.

- **Roadside Business** - Similarly, the highway improvement will divert traffic to the corridor, and this additional traffic will increase the local sales revenues of such roadside businesses as gasoline stations, motels, restaurants and others.

Any and all of the above are of economic value to the primary impact area economy, all have economic development implications, and all were included in this study at the local economy level. Portions are also of value statewide.

Treatment of "Transfer" Impacts - Only "net" changes were recognized. Transfers of economic value from one part of the corridor to another part of the corridor (from one group of people or firms to another) were excluded from the primary impact area calculations, and transfers within the states were excluded in the statewide calculations.

Underinvestment vs. Overinvestment - One objective of this study was to determine that level of highway investment that is warranted (2-lane or 4-lane). There are economic consequences of either underinvesting or overinvesting in the highway corridor. If the two States underinvest in the corridor, economic development will be inhibited because real and perceived travel costs will be greater, competitive position will be retarded, etc. There is therefore an economic cost associated with underinvestment in the corridor. If the States overinvest in the corridor, overall efficiency will suffer because those funds could have been put to better use elsewhere (put to more efficient use) in the States. There is therefore an economic cost associated with overinvestment in the Heartland corridor.

Recognizing these facts, this study sought to define those highway investments, and those levels of investment, that are efficient (neither underinvested nor overinvested). This implies efficient and feasible use of tax dollars. The proper level of investment was calculated in terms of travel efficiency and economic development.

Indicators of "Economic Feasibility" - To determine whether the Heartland Expressway is economically feasible, the costs of building and operating the highway improvement were compared with the economic benefits estimated to be attributable to the highway improvement. This cost and benefit comparison yielded three indicators of "economic feasibility:"

- **Net Present Value** - All costs and benefits in future years were discounted back to the base year using a seven percent discount rate (the constant dollar rate suggested by the Office of Management and Budget (of the U.S. Congress). The future stream of

discounted costs were subtracted from the future stream of discounted benefits. When the sum of the discounted benefits is greater than the sum of the discounted costs, the "net present value" is positive and the highway improvement is deemed to be "economically feasible."

- **Discounted Benefit/Cost Ratio** - After the future streams of costs and benefits were discounted, the sum of the discounted benefits was divided by the sum of the discounted costs. When the result is 1.0 or greater, the highway improvement is "economically feasible."

- **Internal Rate of Return** - This calculation determines that discount rate at which the net present value difference between costs and benefits is zero. If the rate of return, expressed as a percentage, is equal to or greater than seven percent, then the highway improvement is deemed to be "economically feasible."

Included in the above economic feasibility calculations were all quantifiable public sector financial costs attributable to the highway project (cost of planning, designing, building and maintaining the road improvements) and all quantifiable economic benefits including road user benefits (vehicle operating costs savings, value of time savings, accident cost savings) and also including economic development benefits (competitive advantage benefits, roadside business benefits, travel and tourism benefits, and other known benefits). Excluded from the cost-benefit calculations were the road improvement implications that could not accurately be tabulated in monetary terms (environmental or social implications, impacts on other modes of transportation, etc.). As a result, the economic feasibility calculation should be important to the improvement and investment decision, but should not be viewed as the only criterion.

Discount Rate - Benefits and costs (present and future) were tabulated in constant dollars (inflation is not factored in). At the same time, it is important to recognize that future benefits and costs do not have the same value in the future as they do today. Therefore, all future costs and benefits were "discounted back" to a base year. Because future inflation was not included, the selected discount rate should also exclude future price level changes (inflation). In 1992 the Office of Management and Budget (OMB) issued a directive (Revised Circular A-94, October 29, 1992) that specified the use of a 7 perent discount rate. As a result, a constant dollar discount rate of 7 percent was used in the Heartland Expressway analyses.

Residual Value - Economic benefits were calculated over a 30-year future study period. However, many components of the Heartland Expressway highway can be expected to last longer than 30 years. To recognize this, the highway's lifespan was estimated, and the elements that will last longer than 30 years were added as economic benefits in the year 2025. For example, right-of-way can be assumed to have an infinite life, and therefore a residual value equal to its original price. Similarly, the earthworks, bridges and others have considerable remaining life for residual purposes, while pavement has little or no residual value after 30 years.

TRAVEL EFFICIENCY EVALUATION

Transportation efficiency is a legitimate local corridor, regional, state and even national goal. If a road improvement creates road user cost savings that, over time, exceed the cost of the road improvement, then that road improvement should be implemented. Therefore, travel efficiency is relevant to the funding decision for FHWA, the Nebraska Department of Roads, the South Dakota Department of Transportation, and local agencies.

Road Improvement Costs - The cost side of the cost-benefit calculation included two costs: 1) the "capital costs" of constructing the highway, and 2) the annual change in highway maintenance costs. Only the capital costs attributable to the road sections that are not yet programmed for improvement were included. All costs were stated at constant 1992 price levels (exclusive of future inflation).

- **Capital Costs** - Capital costs comprise the cost of improving the "not programmed" road sections, including right-of-way acquisition, planning, design, and construction.

- **Road Maintenance Cost** - Once the highway improvements are in place, there will be more road to maintain than previously. However, that will be "new" road. The resulting net change in maintenance and operations cost was used.

Travel Efficiency Economic Benefits Attributable to Heartland Expressway - The travel efficiency benefits of the highway improvements are of three types: vehicle operating cost savings, accident cost savings, and value of travel time savings. Such benefits were calculated for two vehicle types: cars, and trucks. All benefits were assumed to start in the study's base year (the first year following the capital cost outlays) and were expressed by year of occurrence. Benefits were estimated for two analysis years; intermediate year benefits were interpolated between the two analysis years in straight line fashion.

- **Vehicle Operating Cost Savings** - Car and truck operating cost savings estimates were made using the procedures recommended for use by American Association of State Highway and Transportation Officials (AASHTO). The vehicle operating cost changes reflect differences in vehicle miles of travel, travel speed changes, and other changes that affect vehicle operations.

- **Accident Cost Savings** - Becasue highway standards will be improved, the Heartland Expressway can be expected to reduce accident potentials. Changes in accident rates were established by highway type based on accident histories provided by the two states. Accident rates were established for three accident types (fatal, injury, property damage). Monetary values were established for each.

- **Travel Time Savings** - The Heartland Expressway will save car and truck travel time. Estimates of travel time savings were made for common, diverted and generated traffic. Values of time as suggested by FHWA were utilized.

The calculation of all three types of transportation efficiency impacts (vehicle operating costs, accident costs, time value costs) is consistent with FHWA procedures and policies.

Whenever a highway improvement is expected to cause traffic diversion between roads, or is expected to cause additional trips to be made (generated or induced travel), "Consumer Surplus" is used in estimating operating cost and travel time savings. Consumer Surplus is the price (user cost) that travelers are willing to pay to use the highway improvement, rather than the price actually paid. Some of the diverted or generated traffic would have made the change with only a fraction of the cost change (the cost change created by the highway improvement), while others require the total cost change. Consumer Surplus measures this difference in willingness to pay, and estimates the average cost savings as a measure of economic benefit.

ECONOMIC IMPACT EVALUATION

A highway improvement of the type envisaged for the Heartland corridor will make travel faster, easier and more efficient. In the process it will divert traffic from various other highways to the Heartland corridor, and it will also generate traffic, e.g., additional tourists. All of these events would be most welcome, not only because of the travel efficiencies and the improved perception of the area but also because of what these travel efficiencies and perceptions could mean to the economies along the highway.

Some corridor residents believe that the corridor area will be better off economically with the highway improvements than without them. Most certainly this is true; the issues are: 1) what magnitude of economic impact can be expected? and 2) is that impact sufficient cause to warrant a major highway investment in the Heartland corridor?

REMI Econometric Model - The economic impact portion of the Heartland Expressway study relied on an interregional economic model of the states' counties. The "REMI" set of models are private sector models owned by Regional Economic Models, Inc. of Amherst, Massachusetts. This model package has also been applied to a number of highway corridor evaluations, and this model package has the advantage that it is dynamic in nature in that it adjusts to specific economic and policy changes.

The REMI model is a comprehensive forecasting and simulation system useful for policy and investment analysis in a wide array of issues. The REMI model does have some similarities to Input-Output models. The model is structured to incorporate inter-industry transactions along with feedback from final demand activities. The proportion of intermediate and final demand that is fulfilled by producers in each corridor region is determined by the model. Demand not fulfilled by local production leads to imports. The REMI model differs from regular Input-Output models in its ability to allow substitution among factors of production in response to changes in relative factor costs over time. Within the model, wages are responsive to changes in labor market conditions, migration is responsive to changes in expected income, and the share of local and export markets responds to changes in regional profitability and export costs.

Simulations with the model can be used to estimate the economic and demographic effects of policy and investment interventions in the corridor such as economic development programs, infrastructure investments including new highway construction, energy and natural resource

conservation programs, state and local tax changes, and other policies. The policy simulation compares the performance of a corridor after a policy intervention with the projected performance of the region based on national forecasts of industry growth, changing technology and estimates of the shifting competitive position of each industry in the corridor region compared to that industry elsewhere in the country and elsewhere in the states.

Economic Impact Terms and Definitions - The Heartland Expressway will yield many different forms of benefit to local economies. In order to recognize these diverse impacts in a consistent fashion, a single set of "indicators of impact" and a single set of definitions were used throughout the economic impact calculations. The economic impacts were expressed in terms of four "indicators of economic impact:"

- **Value Added** - The value of the corridor area's firms' output minus the value of the inputs they purchase from other firms. In the corridor study it is the value added by firms located in the defined corridor impact areas, including employee compensation, proprietary income, indirect business taxes, and other property income. The value added estimates were used in the economic development benefit/cost analysis.

- **Wages** - Total increases in payroll costs (wages and salaries and benefits) paid by local industries due to the improved highway.

- **Employment** - Job impacts were expressed as "full-time equivalents" (FTE's) and included the number of person job years due to road construction and road use, plus the share of those that are employed in sectors that directly or indirectly support the construction process, the road users, the tourist industry, and the firms that might expand in or locate to the corridor region.

- **Population** - Total family population dependent on the new jobs created by the highway project.

Economic Development Impact Types - The Heartland Expressway investments could cause a number of events to occur that will be beneficial to local or state economies. These events were categorized into five types.

- Act of Highway Construction
- Corridor Competitive Position
- Roadside Service Industries
- Tourism Activity
- Other Impacts

Economic Impacts of Highway Construction - The Heartland Expressway will cost millions of dollars to build. The very act of spending large sums of construction money in an area is of economic value to that area, since contractors and construction workers are hired, gravel is purchased, etc. Economic value that is created in the impact areas due to the act of spending such construction funds in those impact areas was estimated.

The Heartland Expressway capital costs were estimated in terms of construction cost and right-of-way cost. The construction costs were treated as increases in final demand and input into the REMI model. The right-of-way costs were treated as transfers and not included. The construction costs were assumed to be spent, initially, within the corridor's defined impact areas (the 13 counties in Western Nebraska and South Dakota). The economic impacts due to the act of construction comprise the monies spent in the impact areas and the flow of those monies in terms of respending. The impacts include the labor and expenses associated with planning, design and construction, plus the respending of those funds to the extent that such respending occurs within the impact areas.

Such investments, however, are valuable statewide only if they cause a "net" increase in federal fund inflow into the state.

Impact on Region's Competitive Position - There is a desire for the region to expand existing businesses, to attract new businesses, and to diversify the area's economic base. To attract business, the corridor must be competitive with other areas.

The question arises as to whether and to what extent a highway investment in the corridor would benefit the businesses already in the corridor. A related question is what the highway could do to help foster growth of other, emerging industries. It is clear that competition will be great among regions to maintain as high a level of economic activity as possible and to attract activities demonstrating growth potential nationally. Keeping transportation costs as low as possible is one of the most effective actions government can take to make any corridor competitive.

Stated differently, the major economic transition that is taking place nationally creates unique opportunities because previous centers of economic activity will not necessarily continue to dominate. By reducing the cost of doing business, a state or region strengthens its business climate. Facilitating faster, safer travel along the corridor represents a logical means for increasing the competitive advantage of communities along it.

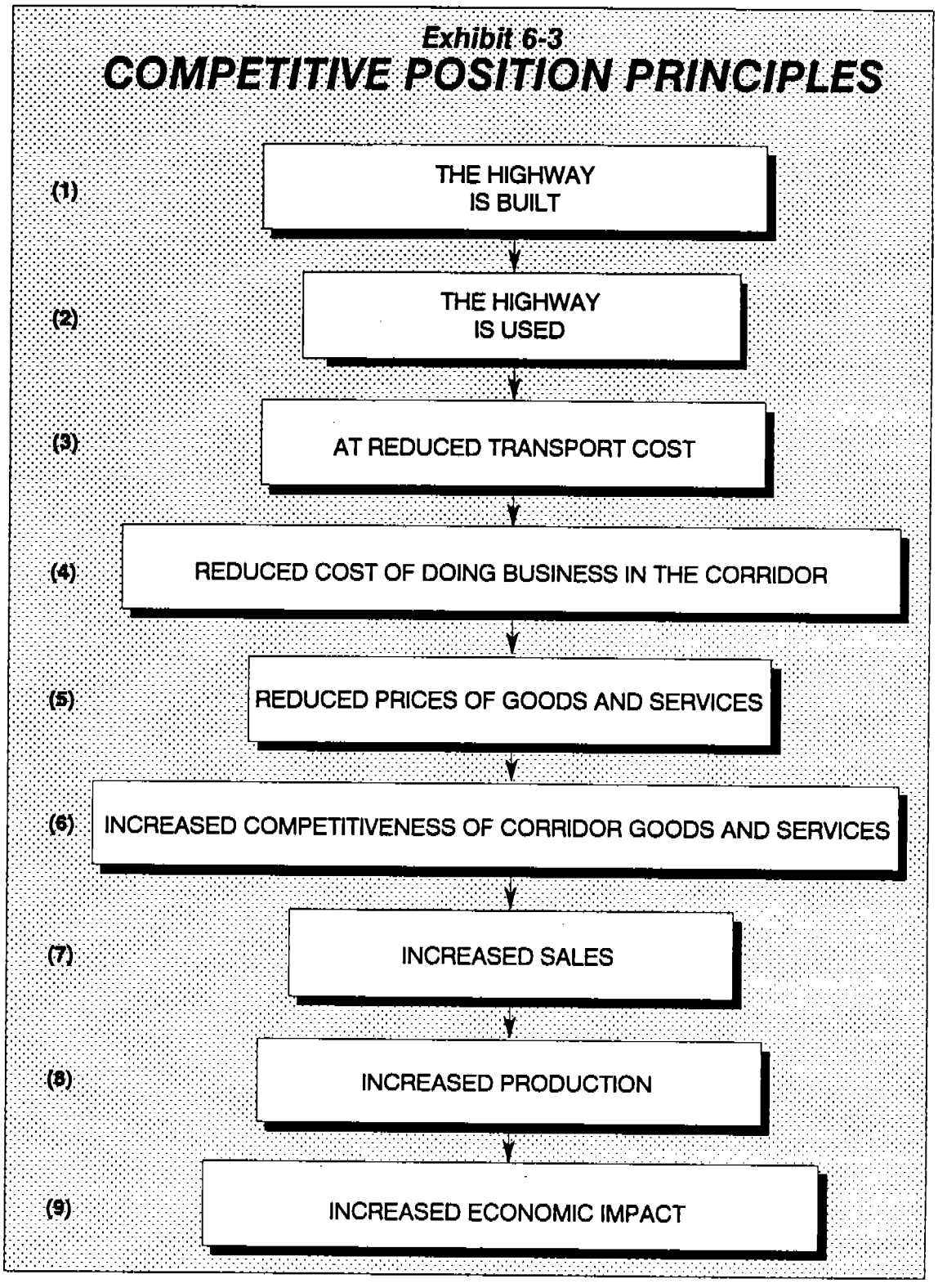
The ability to attain such economic growth is a function of many things, one of which is the ability of the area to compete for such diversification and growth. The ability to compete is also a function of many things, one of which is the cost of doing business in the corridor, and the cost of doing business is a function of many things, one of which is the cost of transportation. By tracing this relationship, it is apparent that transportation does have a role in achieving the Heartland area's economic development goals.

Exhibit 6-3 presents a sequential flow of activities involved in moving from the highway improvement itself to the economic impact of that improvement in terms of what it does for competitive position. The activities themselves are described as follows:

1. **The Highway Improvement** - The act of building the improved highway has a short-term economic impact; that impact was assessed.

Exhibit 6-3

COMPETITIVE POSITION PRINCIPLES



2. **Use of the Improved Highway** - The improved road will be used by existing and diverted and possibly induced traffic. Traffic estimates with and without the highway improvement were developed.

3. **Reduced Transportation Cost** - The highway improvement leads to increased travel efficiency in the form of reduced travel time, increased travel reliability, reduced accidents and revised vehicle operating costs. The efficiencies themselves were quantified in the "user analyses" for cars and trucks.

4. **Reduced Costs of Doing Business in Corridor** - Transportation cost is one factor in the cost of doing business in the corridor. If transportation costs, especially trucking costs, decline in the corridor, this means that the total cost of doing business in the corridor will also decline.

5. **Reduced Prices of Goods and Services** - If costs of production decline due to transportation cost reductions, the result will be reduced prices of goods and services, or increased profits, or both. Such reductions apply to goods produced in the corridor as well as goods shipped into the area.

6. **Increased Competitiveness of Corridor's Goods and Services** - With reduced costs and therefore prices, the goods and services produced in the corridor should be slightly more competitive with the improved highway than without it.

7. **Increased Sales** - If the region's goods and services become more competitive due to price decreases, the region's businesses should be able to make additional sales of those goods and services.

8. **Increased Production** - If sales increase, production of goods and services will increase by a like amount.

9. **Increased Economic Impact** - Increased production generally implies increased payroll, additional jobs, increased tax revenue and increased final demand, value added and output.

The above sequence makes sense, and it does occur.

Impacts Due to Increased Traveler Expenditures - In addition to development caused by improved competitive position, the improved highway could also increase business for businesses along the highway that cater to traffic. For economic evaluation purposes "roadside services" are defined as businesses that serve the cars and trucks and their drivers/passengers such as gasoline stations, hotels/motels, restaurants, etc. There is a general relationship between traffic density (volume), trip characteristics, and the number of roadside service establishments that exist, e.g., the higher the traffic volume, the greater the number of motels, etc. Selection of any of the highway improvements will cause greater traffic density and consequently the attraction of additional roadside services to serve those increased traffic volumes.

The issue to consider is, what increase might be expected due to new/diverted traffic associated with the highway improvement and whether that development represents a net increase suitable for use in the economic impact calculations.

Roadside business increases will be due to traffic increases. Over the next 20 years there will be normal traffic change, even if the road improvement is not made. In addition, there will be increased traffic due to the road improvement, which will principally be diverted from other highways. The percent change in vehicle miles of travel (VMT) is calculated. The traffic changes will bring with them comparable percent increases in roadside business in the form of increased roadside gas station, motel and restaurant activities. This increase could involve the attraction of new businesses, or could accrue in the form of increased sales by existing businesses, or both. In either event, however, the business increases are drawn from other multi-state regional highways and therefore from other regional businesses.

The direct impacts caused by increased traveler expenditures were applied in the REMI model to gauge the value of those expenditures to the local (primary impact area) economy. The REMI model is able to simulate the local (primary impact area) economy and measure the economic impact created by the increased traveler expenditures. Based on the increased demand for roadside services, the REMI model estimates the number of jobs, economic activity, etc., that will be created from additional travelers spending money in the local economy.

Such roadside expenditures are valuable to the impact area to the extent that they are attracted to that area. Similarly, they are valuable to the states to the extent that they are attracted to the two states.

Tourism Attraction Benefits - The Heartland Expressway will also cause a net increase in the number of tourists coming to the Nebraska/South Dakota impact region. This is particularly evident by making the region more accessible to the nearest large metropolitan areas in Colorado. It could also be true by diverting Midwest traffic currently destined for Colorado or elsewhere.

The ability of the Heartland Expressway to divert such tourist traffic to the region was estimated, together with the dollar expenditures attributable to those tourists. These dollar expenditures were then input into the REMI model.

Travel Efficiency Benefits - The accident, time and vehicle operating efficiencies are also valuable. However, those that were input into REMI were excluded as efficiency benefits to avoid the double counting of efficiency and development benefits.

Impact on Employment - The retention of existing jobs and the attraction of new job opportunities is an important goal of all jurisdictions in the Heartland corridor. An improved highway will aid in the achievement of this jobs goal. Jobs will be created in the impact area in four ways.

- **Construction Jobs** - The firms engaged to construct the highway will spend large sums of money in the area. These expenditures will be used to pay contractors,

subcontractors and suppliers of goods and services. These construction caused jobs will exist only during the construction process itself.

- **Competitive Position Jobs** - By making the corridor area more competitive, output will increase and with it existing firms might be expanded and new firms attracted. Both forms of business activity expansion will employ additional people.

- **Traveler and Tourist Expenditure Jobs** - Increased traffic volumes on the improved route will lead to increased business along the route for businesses that cater to vehicular traffic. In addition, more tourists mean more employment in the region's tourism industry. These businesses will therefore employ increasing numbers of people.

- **Consumer Respending Jobs** - In each of the above three cases, the people in the new jobs will spend much of their income within the corridor and within the two states. This respending will in turn create additional jobs.

Chapter 7
TRAVEL EFFICIENCY FEASIBILITY

The Heartland Expressway is identified in the "Intermodal Surface Transportation Efficiency Act of 1991" (ISTEA) as a High Priority Corridor. ISTEA states that these high priority corridors are an efficient and effective way of integrating regions and improving efficiency and the safety of commerce. This is true, since four-lane highways create a more economically efficient method of vehicle transportation than do two-lane highways. By eliminating vehicle stops and by making passing easy and safe, 4-lane highway facilities reduce travel delay and increase vehicle speed. In addition, 4-lane highways create a safer travel environment. This chapter estimates the extent to which the Heartland Expressway would improve travel efficiency, and compares those travel efficiencies with the cost of the highway improvement.

In the travel efficiency assessment, highway user efficiency is measured in terms of vehicle operating cost (fuel, tires, vehicle maintenance, etc.), value of time saved, and accident reduction. All three indicators are measured in monetary terms.

Transportation efficiency is a legitimate local, state and national goal. If a new highway creates road user cost savings that, over time, exceed the cost of the highway, then that road improvement should be implemented. Therefore, travel efficiency is relevant to the funding decision for the Federal Highway Administration, the Nebraska Department of Roads and the South Dakota Department of Transportation. However, travel efficiency is only one of a number of factors to consider when making the investment decision. Other factors include system continuity, the environment and economic development. Note that the travel efficiency component of the Heartland Expressway feasibility study does not include the potential economic development benefits created from the highway improvement (see Chapter 8 for that evaluation).

All of the three finalist route options and all of the three highway standards were subjected to the travel efficiency economic feasibility tests. Conventional benefit/cost indicators (Benefit/Cost Ratio, Net Present Value and Internal Rate of Return) were used to gauge economic feasibility from the travel efficiency perspective.

BENEFIT/COST METHODOLOGY

In this assessment of travel efficiency feasibility, a life cycle cost approach was used. The costs of planning, building, and maintaining the roadway over a 31 year period (1993-2023) were estimated. Then, the travel efficiency gains over that period were estimated, and the efficiency gains were compared with the costs to determine whether or not the highway improvement is economically "feasible", from the travel efficiency perspective. This chapter presents the results of the travel efficiency analysis; it excludes the "economic development impacts".

ECONOMIC COSTS

The cost side of the benefit/cost calculation comprises the costs of constructing and maintaining the new highway. Since the Heartland Expressway would be administered by the

two states, the costs are those that would be incurred by the Nebraska DOR and the South Dakota DOT (utilizing state and/or federal funds).

Construction Costs - The total construction cost for the different improvement options include right-of-way acquisition, planning, design, and construction. Exhibit 7-1 depicts the total construction costs for the three finalist route options and each alternative highway standard. The total construction costs of each route and highway standard were summarized in more detail in Chapter 4.

For benefit/cost purposes only, the capital costs were assumed to be spent in the study's initial analysis year (1993). This allows for an equitable treatment of the three different route options and each highway standard.

Exhibit 7-1
CAPITAL COST SUMMARY
($ Million)

	Total
Route Option B	
Freeway	$310.6
Expressway	257.6
Two/Four Lane	145.2
Route Option C	
Freeway	$327.7
Expressway	264.7
Two/Four Lane	147.3
Route Option D	
Freeway	$326.9
Expressway	260.0
Two/Four Lane	147.7

Source: Wilbur Smith Associates

Residual Value - The period of time over which the highway improvements would be open to travel, as used in this study, is 30 years (1994 to 2023). By 2024 some of the highway improvements will be depreciated (used some or all of their useful life) while other elements have longer lifespans. To account for these differences, a residual value was assigned in the year 2024 as a benefit. The residual value is the value of the useful life of the remaining structures.

Residual is the same as a salvage value without the cost of removing the structures. The residual lives for the major improvement cost components are as follows:

Cost Component	Useful Life
Bridges and Structures	60 years
Earthworks	100 years
Road Base	50 years
Pavement and Shoulders	30 years
Right-of-Way	Infinite

To estimate the residual values, composite residual factors were developed based on the useful lives of the various construction cost elements within each construction item. The resultant residual values for each Heartland Expressway route option and highway standard are listed on Exhibit 7-2. These are based on the capital costs, exclusive of engineering and administration costs.

Exhibit 7-2
RESIDUAL VALUE ESTIMATES
($ Thousand)

	Initial Cost	Residual
Route Option B		
Freeway	$310.6	$108.3
Expressway	257.6	86.1
Two/Four Lane	145.2	48.9
Route Option C		
Freeway	$327.7	$112.6
Expressway	264.7	86.4
Two/Four Lane	147.3	47.9
Route Option D		
Freeway	$326.9	$114.2
Expressway	260.0	85.7
Two/Four Lane	147.7	49.7

Source: Wilbur Smith Associates, Wells Engineers

Highway Maintenance Costs - In addition to the costs of constructing the highway, there will be more road to upkeep and maintain. This includes additional snow removal, mowing, striping, crack sealing, patching, and other work activities. The average annual maintenance cost increase was estimated at $9,500 per mile for a four-lane highway, and at $4,100 per mile for a two-lane highway. Also included in the maintenance cost was a one time cost, midway through the 30 year period, for resurfacing and reconstruction of the existing two-lane highway.

For the four-lane alternatives it was assumed that, where the pavement is in good condition, the existing pavement would be used. However, when the highway was scheduled for resurfacing, it was assumed that the pavement would be upgraded. Therefore, only the incremental cost of upgrading the highway was included.

TRAVEL EFFICIENCY BENEFITS

Any of the three Heartland Expressway route options will save the traveling public time, cost and accident risk. The travel efficiency benefits of the new highway are of three types: value of time savings, vehicle operating cost savings, and accident cost savings. Such highway user benefits were calculated for both passenger vehicles and commercial trucks. The road user benefits estimated for the Heartland Expressway used consumer surplus techniques (see Chapter 6) to ensure that the economic evaluation does not penalize the project due to higher traffic volumes.

Travel efficiency benefits were estimated for the base year (1991), as if the highway were already in place, and for one forecast year (2015). In each of these two years the Heartland Expressway route options and alternative highway standards were evaluated against the Base Case (do nothing alternative). The intermediate year benefits were interpolated between these two years. The following report sections display total travel efficiency benefits in each of the two years.

Vehicle Operating Cost Savings - Any of the Heartland Expressway route options would provide a more direct route between Scottsbluff/Gering and Rapid City. Route options B and C are considerably more direct than route option D. These more direct routes reduce vehicle miles of travel in the corridor, resulting in decreased vehicle operating costs (reduced fuel consumption, etc.). Also, by eliminating stops along the corridor as well as increasing the capacity of the road, a constant flow of traffic is achieved thereby reducing speed change cycles and increasing vehicle operating efficiency, resulting in less travel cost. However, each route option and highway standard will increase travel speeds in the corridor, which results in decreased fuel efficiency. Therefore, the operating cost change involves the increased cost from higher travel speeds compared to the efficiency and cost savings from a more constant flow of traffic.

Passenger vehicle and commercial truck operating cost savings were estimated using the Federal Highway Administration's Technical Report: Vehicle Operating Costs, Fuel Consumption, and Pavement Type and Conditions, updated to 1993 conditions. The vehicle operating cost changes reflect differences in vehicle miles of travel, travel speed changes, curvature and gradient changes, reduced numbers of speed change cycles, and other changes that affect vehicle operations.

Exhibit 7-3 depicts the estimated vehicle operating cost changes (fuel, oil, tires, maintenance, etc.) attributable to each Heartland Expressway route option and highway standard option. For each route option, the expressway alternative has the largest vehicle operating cost reduction, followed by the two/four lane alternative. The freeway highway standard has the least vehicle operating cost impact, and under route option C it increases vehicle operating costs. This is caused by the freeway's higher travel speeds (65 mph posted speed limit). The increase in

freeway travel speeds reduces fuel efficiency enough to counter the cost reduction of the reduced travel distance and decreased stopping and speed change cycles. The expressway achieves nearly the same impact constant flow of traffic impact as does the freeway, without the higher, less fuel efficient travel speed.

Under the expressway and two/four lane highway standard alternatives, Route Option D provides the greatest vehicle operating cost savings. This is due to the greater traffic volumes on Route Option D. This route option connects Scottsbluff/Gering and Rapid City via Alliance, Chadron and Hot Springs, which results in larger traffic volumes. An improved highway in this corridor would help reduce vehicle operating costs for a larger number of motorists. Option D also improves the highway between Scottsbluff/Gering and Alliance, which carries significant volumes of trucks.

Route Option B also significantly reduces vehicle operating costs. This route option would significantly reduce the highway distance between Scottsbluff/Gering and Rapid City. Since this route reduces travel distances in the corridor, less fuel, oil, tires, etc. are consumed, thereby reducing travel costs.

Route Option C has the least impact in terms of reducing vehicle operating costs. This Route Option is somewhat longer than Route Option B (10.7 miles) and is estimated to have less traffic volumes than Route Option D. Therefore, it does not reduce vehicle operating costs as much as the other route options.

Travel Time Savings - The Heartland Expressway route options will increase travel speeds thereby reducing travel time in the corridor. The route options will reduce delays by enabling vehicles to pass slower moving vehicles, will avoid delays due to vehicles turning at major intersections, and will reduce travel time due to the bypassing of communities with traffic signals and lower speed limits. In addition, Routes B and C significantly reduce the distance between Scottsbluff/Gering and Rapid City, thereby decreasing the travel time between these cities even further.

All highway segments have speed limits which, while not always obeyed, tend to reduce speeds compared to the speeds that would occur if such speed limits were absent. This study's analysis used estimated actual speeds, rather than the speed limits, in an attempt to be more realistic.

The estimated annual vehicle hours saved, by route option and highway standard alternative, are listed on Exhibit 7-4. These hours are based on estimated speeds, on a segment-by-segment basis. It is estimated that the by the year 2015 the various route options could save between 340,000 and just over 1.1 million vehicle hours annually. This is time saved by vehicles which would already be traveling in the corridor as well as vehicles diverted and induced into the corridor.

Exhibit 7-3
ESTIMATED ANNUAL VEHICLE OPERATING COST SAVINGS
Years 1991 and 2015
($ Thousand)

	1991	2015
Route Option B		
Freeway	$1,327	$1,309
Expressway	2,517	3,401
Two/Four Lane	2,099	2,877
Route Option C		
Freeway	-$589	-$1,498
Expressway	1,019	1,249
Two/Four Lane	801	993
Route Option D		
Freeway	$732	$1,210
Expressway	2,787	4,675
Two/Four Lane	2,337	3,794

Source: Wilbur Smith Associates

To include time savings in the travel efficiency evaluation, it is necessary that a monetary value be placed on time saved. The value of time varies from person to person and situation to situation. What is certain is that everyone, at one time or another, is willing to pay something to reduce the amount of time spent of travel. For analysis purposes, the FHWA suggests that the method contained in the AASHTO publication "A Manual on User Benefit Analysis of Highway and Bus-Transit Improvements" be used. In 1989 those values were $8.00 per hour for passenger vehicles and $15.00 per hour for commercial trucks. Using the consumer price index, these values in 1992 dollars are equivalent to $9.00 for passenger vehicles and $17.00 for commercial trucks.

Exhibit 7-4
ANNUAL ESTIMATED TRAVEL TIME SAVED
Years 1991 and 2015
(Thousand Hours)

	1991			2015		
	Autos	Trucks	TOTAL	Autos	Trucks	TOTAL
Route Option B						
Freeway	485.9	103.8	589.7	812.6	150.4	963.0
Expressway	296.9	68.9	365.8	490.4	98.1	585.5
Two/Four Lane	255.0	50.0	305.0	421.8	70.8	492.6
Route Option C						
Freeway	416.3	85.3	501.6	707.4	127.7	835.1
Expressway	237.9	52.3	290.2	402.1	76.6	478.7
Two/Four Lane	171.7	34.1	205.8	290.7	48.8	339.5
Route Option D						
Freeway	580.6	84.0	664.6	970.3	154.0	1,124.3
Expressway	305.5	50.4	355.9	509.5	97.4	606.9
Two/Four Lane	247.8	34.8	282.6	410.9	71.4	482.3

Source: Wilbur Smith Associates

Most non-business travelers are less concerned about time, and hence value its savings less, than those on business trips. To account for this difference in "willingness to pay" for time savings, a different monetary value was placed on time for business and non-business travelers. For auto business travelers, the FHWA recommended $9.00 was used for each vehicle hour saved. For non-business travelers a value of $4.50 per vehicle hour saved was used.

Applying these values of time to the estimated hours saved produces the travel time cost savings shown on Exhibit 7-5. These are the values utilized in the travel efficiency analysis.

Exhibit 7-5
ESTIMATED VALUE OF TRAVEL TIME SAVED
Years 1991 and 2015
($ Thousand)

	1991			2015		
	Autos	Trucks	TOTAL	Autos	Trucks	TOTAL
Route Option B						
Freeway	$2,657	$1,765	$4,422	$4,443	$2,556	$6,999
Expressway	1,633	1,172	2,805	2,682	1,667	4,349
Two/Four Lane	1,394	850	2,244	2,306	1,204	3,510
Route Option C						
Freeway	$2,276	$1,450	$3,726	$3,688	$2,171	$6,039
Expressway	1,301	889	2,190	2,199	1,302	3,501
Two/Four Lane	939	580	1,519	1,590	829	2,419
Route Option D						
Freeway	$3,174	$1,428	$4,602	$5,305	$2,619	$7,924
Expressway	1,670	856	2,527	5,786	1,656	4,441
Two/Four Lane	1,355	591	1,946	2,246	1,214	3,461

Source: Wilbur Smith Associates

For all route options, the freeway standard generates the greatest value of time saved, due to its 65 mph posted speed limit. It is estimated that the freeway alternative would produce value of time benefits in excess of $6 million in the year 2015 for each of the route options. The four-lane expressway alternative would produce value of time benefits ranging from $3.5 million to $4.4 million in the year 2015, while the two/four lane alternative would produce time benefits from $2.5 to $3.5 million.

Route Options B and D are estimated to create the largest time savings benefits. Route Option B provides the most direct route between Scottsbluff/Gering and Rapid City, allowing for a considerable time savings between the cities. Route Option D provides an improved highway for the greatest number of motorists, accounting for its significant time benefits.

Accident Cost Savings - The Heartland Expressway route options and highway standard options should reduce the number of accidents in the corridor. A new and improved highway,

regardless of whether it is a four-lane divided freeway or expressway, or even an improved two-lane highway, should have a lower accident rate than do the existing two-lane highways in the corridor. Also by skirting the communities along the route, the Heartland Expressway should reduce the number of vehicles and accidents in the towns, where a large percentage of accidents occur.

To enable the accident calculations, accident information was obtained from the Nebraska Department of Roads, the South Dakota Department of Transportation and the Wyoming Department of Transportation for highways throughout the study region. Accidents were identified and categorized by three types: 1) fatality, 2) injury, and 3) property damage only (PDO). Accident rates, by type of accident, were determined for the existing corridor (without the Heartland Expressway route options), and then estimated for the corridor with each Heartland Expressway route option. The accident reductions, by type, were then estimated.

Of all the Heartland Expressway route options, the highway on which Option D travels has experienced the largest number of accidents in the corridor. This is primarily caused by higher traffic volumes and larger commercial truck volumes, especially between Scottsbluff/Gering and Alliance. South Dakota highway 79 between Hot Springs and Rapid City, which is a common segment to all three route options, has also experienced a significant number of accidents. While this segment has not witnessed a large number of fatal accidents (only 2 fatalities over the last 3 years), it has one of the highest injury and property damage accident rates of any of the segments within the three route alternatives.[1]

Exhibit 7-6 summarizes the number of reduced accidents each Heartland Expressway route option and each highway standard option is estimated to produce. If the Heartland Expressway is constructed to freeway standards, it will have a significant impact on the number of accidents in the area. It is estimated that the freeway alternative, regardless of route, would reduce highway deaths by approximately 4 per year by the year 2015. Injury accidents would be reduced by between 36 and 57, with Route Option D providing the largest reduction in accidents. Property damage only accidents would be reduced by between 33 and 99, again with Route Option D having the largest impact.

Because the expressway does not have total access control, its accident rate is higher than for the freeway alternative. However, if the Heartland Expressway is constructed to expressway standards, it will still have a considerable impact on reducing accidents in the corridor. All three route options would reduce fatalities by similar amounts; however, Route Option D would reduce the largest number of injury and personal damage only accidents.

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[1] South Dakota Department of Transportation, Accident Records Division and Nebraska Department of Roads, Highway Safety Division.

Exhibit 7-6
ESTIMATED NUMBER OF REDUCED ACCIDENTS
Years 1991 and 2015

	1991			2015		
	Fatalities[1]	Injury	P.D.O.	Fatalities	Injury	P.D.O.
Route Option B						
Freeway	3.0	27	33	5.4	42	54
Expressway	1.5	7	5	2.7	10	8
Two/Four Lane	0.9	4	2	1.5	6	5
Route Option C						
Freeway	3.2	23	21	5.8	36	33
Expressway	1.9	17	15	3.4	25	19
Two/Four Lane	1.1	15	12	1.8	21	14
Route Option D						
Freeway	3.1	36	62	5.3	57	99
Expressway	1.8	24	47	3.5	41	80
Two/Four Lane	1.3	20	35	2.4	32	58

[1] Estimated average number of reduced fatalities.

Note: Accidents are based on a 10 year average of actual accidents in the entire corridor and the subsequent rate is compared to the traffic forecasts for each alternative.

Source: Wilbur Smith Associates

Because the two/four lane alternative has portions of its route built to improved two lane highway (passing lanes, wider shoulders) standards, the potential for accidents is greater than for a divided four lane highway. Therefore, this highway standard alternative reduces accidents, but to a lesser extent than is the case with the 4-lane alternatives.

To include the impact of reducing accidents in the travel efficiency evaluation, it is necessary that a monetary cost be established per accident. Accident values were obtained from the FHWA Technical Advisory T7570.1 as used by the South Dakota Department of Transportation. The accident monetary values by accident type are:

Accident Type	Cost
Fatalities (per fatality)	$1,500,000
Injury Accidents	$41,000
Property Damage Only	$2,000

Exhibit 7-17 displays the estimated monetary savings attributable to each Heartland Expressway route option and highway standard option. It is likely that each route and standard option would have a considerable impact on reducing accidents and accident costs between Scottsbluff/Gering and Rapid City.

Exhibit 7-7
ESTIMATED ACCIDENT COST SAVINGS
Years 1991 and 2015
($ Thousand)

	1991	2015
Route Option B		
Freeway	$5,709	$9,944
Expressway	2,502	4,217
Two/Four Lane	1,499	2,416
Route Option C		
Freeway	$5,830	$10,225
Expressway	3,597	6,044
Two/Four Lane	2,300	3,622
Route Option D		
Freeway	$6,253	$10,479
Expressway	3,935	6,974
Two/Four Lane	2,940	5,039

Source: Wilbur Smith Associates

Total Travel Efficiency Benefits - The total travel efficiency economic benefits estimated for the years 1991 and 2015 are summarized in Exhibit 7-8. These assume the highway improvements are already in place. Intermediate year benefits were interpolated in straight-line fashion, and benefits for 2016-2023 were extrapolated in straight-line fashion.

Exhibit 7–8
TOTAL TRAVEL EFFICIENCY BENEFITS

Example Years – ($ Thousand)

	TRAVEL EFFICIENCY BENEFITS							
	1995				2015			
	V.O.C. Savings	Travel Time Savings	Accident Reduction	TOTAL	V.O.C. Savings	Travel Time Savings	Accident Reduction	TOTAL
ROUTE OPTION B								
Freeway	1,327	4,422	5,709	11,458	1,309	6,999	9,944	18,252
Expressway	2,517	2,805	2,502	7,824	3,401	4,349	4,217	11,967
Two/Four Lane	2,097	2,244	1,499	5,839	2,877	3,510	2,416	8,803
ROUTE OPTION C								
Freeway	(589)	3,726	5,830	8,967	(1,498)	6,039	10,225	14,766
Expressway	1,019	2,190	3,597	6,806	1,249	3,501	6,044	10,794
Two/Four Lane	801	1,519	2,300	4,620	993	2,419	3,622	7,034
ROUTE OPTION D								
Freeway	732	4,602	6,253	11,588	1,210	7,924	10,479	19,613
Expressway	2,787	2,527	3,935	9,249	4,675	4,441	6,974	16,090
Two/Four Lane	2,337	1,946	2,940	7,223	3,794	3,461	5,039	12,293

SOURCE: Wilbur Smith Associates

TRAVEL EFFICIENCY FEASIBILITY

To calculate the economic feasibility in travel efficiency terms, all costs and benefits in constant (1992) dollars were determined by year 1993 through 2024, and then discounted back to 1992 using a discount rate of 7 percent. The benefits were then compared with the costs using the conventional feasibility indicators.

The travel efficiency feasibility indicators are summarized on Exhibit 7-9. To interpret this exhibit the following rule is appropriate. A feasible project is one which has:

- A positive Net Present Value,
- An Internal Rate of Return equal to or exceeding the discount rate (7%), and
- A Discounted Benefit/Cost ratio of 1.0 or higher.

The higher the NPV, IRR and B/C, the more feasible the project.

The travel efficiency benefits were calculated for the years 1991 and 2015, and straight-lined in between and beyond. No benefits were included in the benefit/cost analysis prior to 1994. The discounting was done using the OMB recommended discount value of 7 percent.

Travel efficiency is the conventional and traditional method of defining whether or not a highway improvement is economically feasible. According to this test, a highway improvement needs to be quite successful in reducing per vehicle operating costs, travel time, and accident risk; and, it needs to have sufficient traffic volumes on the highway to attain the necessary level of highway user economic benefits.

Exhibit 7-9 suggests the following conclusions, from the travel efficiency perspective (exclusive of economic development benefits):

- None of the Heartland Expressway route options are feasible from the travel efficiency perspective. None of the alternatives have sufficient traffic volumes to produce user benefits greater than the improvement's costs.

- The two/four lane options are more feasible than the freeway and expressway alternatives, from the travel efficiency perspective. This is primarily caused by the lower construction costs required by the two/four lane options. In addition, the four-lane sections are placed only in areas where the most traffic is found, thereby creating increased benefits.

Route Option D, constructed with some four-lane segments and some two-lane segments, is the most feasible of the Heartland Expressway alternatives from the travel efficiency perspective. This option provides a four-lane highway where traffic volumes in the corridor are highest, and provides an improved two lane highway where there are lower traffic volumes, thereby still creating significant travel efficiency benefits where they are needed, while keeping the cost of the project to a minimum.

Exhibit 7-9
TRAVEL EFFICIENCY FEASIBILITY

	Net Present Value[a] ($Million)	Internal Rate of Return	Discounted Benefit/ Cost[a]
Route Option B			
Freeway	-141.3	2.8%	0.59
Expressway	-141.9	1.7%	0.48
Two/Four Lane	-53.6	3.7%	0.65
Route Option C			
Freeway	-199.8	1.2%	0.45
Expressway	-151.9	1.6%	0.44
Two/Four Lane	-69.6	2.6%	0.53
Route Option D			
Freeway	-166.8	2.3%	0.56
Expressway	-161.2	3.5%	0.63
Two/Four Lane	-24.2	5.6%	0.84

(a) Discounted at 7 percent
Source: Wilbur Smith Associates

It should be noted that travel efficiency is only one indicator of economic feasibility; the other test is economic development feasibility (see Chapter 8). In addition, there are engineering, environmental, funding availability and political factors to consider.

Appendix Exhibits E-1 through E-9 present the estimated costs and travel efficiency benefits by year. For analysis purposes, all capital costs are assumed to be spent in one year (1993), and the highway is assumed to open in the beginning of 1994. This, of course is not possible, but these assumptions simplify the analysis without skewing the feasibility results.

Chapter 8
ECONOMIC DEVELOPMENT FEASIBILITY

The travel efficiency analysis found the Heartland Expressway route options between Scottsbluff/Gering and Rapid City to be economically infeasible. However, travel efficiency only includes user benefits of motorists (autos and trucks) on the highway. Highway improvements and new highways can do more than merely improve travel efficiency; they can also create economic value for a region or a state by assisting in the economic development process. By reducing transportation costs in the region, the area could become more economically attractive and competitive, thereby attracting new industries and tourists into the area or encouraging existing industries to expand. This chapter assesses those economic development possibilities, and gauges the highway's economic feasibility in economic development terms.

The economic development impacts are estimated for two regions; the Heartland Expressway primary impact area, consisting of thirteen counties in western Nebraska and South Dakota (see Exhibit 8-1) and the combined States of Nebraska and South Dakota. Impacts are estimated for both regions because the regions reflect potentially different perspectives and reflect different impact magnitudes. What is of benefit to Rapid City or Scottsbluff, might be at the expense of another region or community in Nebraska or South Dakota. When this is the case, it is a transfer within the State and not a net benefit to the State. It is therefore important to recognize both perspectives in the analysis.

ECONOMIC IMPACT MODEL - REMI MODEL

To gauge the impact of the highway improvements on the primary impact area and State economies, the study relied principally on the REMI econometric model (Regional Economic Models, Inc.). The REMI model is a multi-regional dynamic economic and demographic forecasting model that estimates regional and national effects from various governmental or private policy changes or investments. The REMI model simulates a regional economy that predicts demand and supply conditions across 53 sectors, 94 occupations, 25 final demand sectors, and 202 age/sex cohorts.

The highway improvements create a number of events that serve as inputs to the model. These include trucking cost savings, business cost savings, additional roadside expenditures, tourism expenditures, agricultural changes, and others. These direct changes, in monetary terms, serve as inputs into the REMI economic model. For example, the model estimates the regional economic effect from increased profits for businesses and firms in the region created by more efficient truck travel on the highway. The REMI model requires separate regional inputs into the model. Therefore, to calculate the real economic gain to the primary impact area and the two states independently, direct benefits were calculated for both the primary impact area and the two states. The model utilized price levels and output levels for the year 1987; all results were then increased to 1992 price levels utilizing appropriate producer price inflators.

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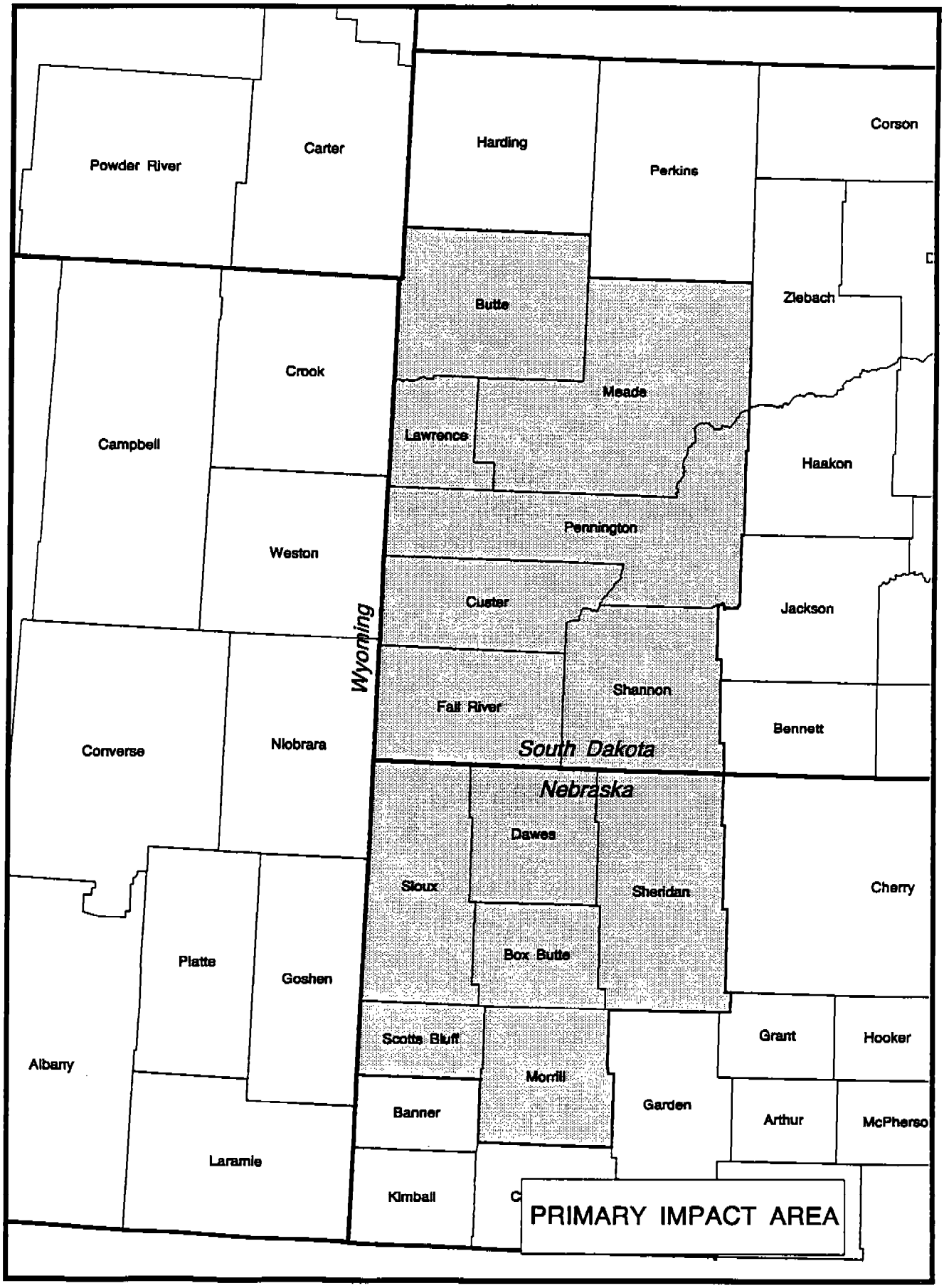

FOUR INDICATORS OF ECONOMIC DEVELOPMENT IMPACT

The Heartland Expressway could yield many different forms of benefit to the corridor area and the two States. In order to recognize these diverse impacts in a consistent fashion, a single set of "indicators of impact" and a single set of definitions were used throughout the economic impact calculations. The economic impacts are expressed in terms of four "indicators of economic development impact:"

Value Added - The value of the corridor's firms output minus the value of the inputs they purchase from other firms. In the corridor study, it is the value added by firms located in the defined corridor impact areas, including employee compensation, proprietary income, indirect business taxes, and other property income. The value added component is the most comprehensive and accurate measure of economic development impact and produces the values used in the economic development feasibility analysis (the "benefit" in the benefit/cost analysis).

Salaried Wages and Proprietary Income - This measure includes increases in payroll costs (wages and salaries) plus income from self-employment.

Employment - Total "new" jobs attributable to the highway improvement including the number of person job years due to road construction and road use, plus the share of those that are employed in sectors that directly or indirectly support the construction process, the road users, and the firms that might expand in or locate to the region.

Population - Additional population that is attracted to (or not lost from) the area as a result of the improved highway constitutes another economic indicator.

These indicators are all produced by the REMI Model; they should not be added together.

FOUR ECONOMIC DEVELOPMENT CAUSES

By improving travel conditions in western Nebraska and South Dakota, the Heartland Expressway, through reduced travel time and costs to the residents and businesses in the area, could create additional economic development benefits to the primary impact area's and the two States' economies. These additional impacts were categorized into four types, and economic development impacts were estimated for each.

Act of Highway Construction/Increased Maintenance - The act of spending money in western Nebraska and South Dakota to build the new highway will be of immediate economic benefit to the corridor area. The construction impacts are temporary in nature, since they exist only during the construction period and terminate when the road construction is complete. However, the increased maintenance spent on snow removal, resurfacing the highway, etc., will occur annually and be of benefit to the primary impact area. Such construction expenditures, however, are valuable statewide only if they cause a "net" increase

in federal funds into the two States.

Competitive Position - An improved highway reduces the cost of transportation. Reductions in transportation time and cost lead to reduced costs of production, which in turn lead to marginally reduced prices and/or increased profits, which can lead to increased production (expansion of existing firm production and/or attraction of new firms), which in turn generates economic impact value. These lower transportation costs also help the region compete against other areas of the country for economic development opportunities. These "competitive position" impacts are created by the increased travel efficiency of the highway improvement and are benefits to both the primary impact area and the two States.

Increased Tourism Activity - A new and efficient highway in western Nebraska and South Dakota will attract more traffic and visitors into the area. This increase in traffic and visitors will generate increased sales for businesses in the primary impact area, such as motels, restaurants, gas stations, tourist visitation places, retail stores, and others who cater to highway users. These increased visitor and tourism expenditures are net benefits to the primary impact area. However, if many of the visitors are diverted from other areas within the State of Nebraska or South Dakota, then the impacts are not entirely net economic gains for the two States.

Non-Business Related Economic Activity - A new and more efficient highway also creates benefits for non-business travelers. These non-business travelers receive travel time savings and operating cost savings as well as reduced numbers of accidents. These non-business benefits are amenity improvements in the quality of life in the area, and therefore are treated as "direct" impacts.

The direct monetary impacts of each of these four categories of impact were estimated external to the REMI model. Then most, but not all, were input into the REMI model. Some components of highway economic development benefits, such as willingness to pay for non-business time savings, are not increases in net economic value. Therefore, these benefits are added to the REMI results. All of the impact categories are net impacts within the primary impact area; most; but not all, are net impacts for the two States. The manner by which each impact type is handled in the analysis is shown on Exhibit 8-2.

ESTIMATED ECONOMIC DEVELOPMENT IMPACT ON THE PRIMARY IMPACT AREA

The people and businesses near the Heartland Expressway stand to gain a great deal economically if a new highway is constructed. Western Nebraska and South Dakota will be better able to compete for industrial and commercial businesses, more money will be spent in the area, and overall the regional economy should benefit.

Exhibit 8-2
ECONOMIC DEVELOPMENT IMPACT TYPES

	NET ECONOMIC IMPACT ON		
	Primary Area	**Two States**	**Method of Analysis**
Construction/Maintenance			
Construction Costs	Some	Some	REMI
Maintenance Costs	Some	Some	REMI
Competitive Position			
Trucking/Logistics	Yes	Some	REMI
Auto Business Travel	Yes	Some	REMI
Tourism/Shopping			
Tourism	Yes	Some	REMI
Roadside Expenditures	Yes	Some	REMI
Non-Business			
Passenger Time	Some	Yes	Direct
Veh. Operating Reduction	Some	Yes	REMI
Accident Reduction	Yes	Yes	Direct

"Yes" indicates that this is a proper net impact on the region (primary impact area or state)
"Some" indicates that a portion of this impact is a net impact
"No" indicates a transfer payment
"REMI" indicates this impact was input into the REMI model
"Direct" indicates this impact was not input into the REMI model but instead was treated as a direct impact, without any "multiplier" effect

SOURCE: Wilbur Smith Associates

Economic Impact of Highway Construction/Increased Maintenance - The total construction cost for the Heartland Expressway varies significantly by route option and highway standard. The spending of construction money in the area is of economic value to the primary impact area, since construction contractors and workers will be hired, construction materials will be purchased, etc. To assess the construction impacts, the estimated costs for each route option and highway standard alternative were input into the REMI model. The model was then used to estimate the economic development impacts that might occur in the primary impact area associated with the construction process itself.

The capital cost was estimated in terms of construction cost and right-of-way cost. The construction cost was treated as an increase in final demand and was input into the REMI model. The right-of-way cost was treated as a transfer payment (nothing is consumed, the land still exists) and was not included. The construction cost was treated as an increase in final demand within the primary impact area (this is proper since the REMI model determines which construction purchases can be spent in the area and which involve expenditures outside western Nebraska and South Dakota). The REMI model determines the amount of materials, labor, etc. that could be supplied locally and estimates the total economic development impacts to the corridor area created by highway construction outlays. For economic development analysis purposes it was assumed that construction would take 5 years to complete, and that construction expenditures would be spent in equal amounts over the five year period. However, increased maintenance costs were estimated at $4,100 per mile for two-lane highways and $9,500 per mile for four-lane highways. The net maintenance cost change was input into the REMI model over the 30 year lifespan of the highway.

The economic impacts due to construction comprise the expenditures spent in the primary impact area, the extent to which those funds employ local people and buy local goods and services, and the flow of those expenditures in terms of respending. The REMI model is updated annually with data for each county by industry sector. The model is able to simulate the impact construction would have on the local economy. The REMI model determines what is needed in highway construction and determines how many local or state contractors can be hired, what materials can be purchased locally, etc. The impacts include labor and expenses associated with planning, design, and construction of the highway, plus the respending of those funds to the extent that such respending occurs within western Nebraska and South Dakota.

The estimated economic development impacts to the primary impact area created by the act of highway construction are summarized on Exhibit 8-3. For all three route options, the freeway standard alternative, because of its greater construction costs, will create the largest "act of construction" economic impact on the Heartland primary impact area. It is estimated that freeway construction expenditures in western Nebraska and South Dakota will result in a value added impact of over $200 million for the five year construction period and will create approximately 1,200 direct,indirect and induced jobs. These jobs and impacts include not only those engaged in construction of the highway, but also include jobs that serve the construction process plus those created by the respending of money. The Heartland Expressway constructed to expressway standards would create an estimated $170 million in valued added impact and approximately 970 new jobs, while the two/four lane alternative would create approximately $95 million in economic benefits and create approximately 550 new jobs.

Exhibit 8–3
HIGHWAY CONSTRUCTION
ECONOMIC DEVELOPMENT IMPACTS
Primary Impact Area

	ECONOMIC DEVELOPMENT IMPACT					
	Impact Per Year For Five Years			Total Construction Period Impact		
	Route B	Route C	Route D	Route B	Route C	Route D
FREEWAY						
Value Added ($000)	$40,474	42,710	42,602	$202,368	213,552	213,008
Wages ($000)	$32,783	34,600	34,509	$163,913	173,001	172,543
Employment (jobs)	--	--	--	1,166	1,230	1,227
Population (people)	--	--	--	1,416	1,495	1,491
EXPRESSWAY						
Value Added ($000)	$33,556	34,487	33,880	$167,778	172,432	169,398
Wages ($000)	$27,169	27,924	32,251	$135,844	139,619	161,254
Employment (jobs)	--	--	--	967	994	976
Population (people)	--	--	--	1,174	1,206	1,185
TWO/FOUR LANE						
Value Added ($000)	$18,909	19,187	19,236	$91,546	95,937	96,179
Wages ($000)	$15,295	15,543	15,560	$76,473	77,624	77,800
Employment (jobs)	--	--	--	545	553	554
Population (people)	--	--	--	661	671	672

Note: This table includes only the impacts caused by the act of constructing the highway. It excludes the impacts attributable to highway use.

SOURCE: Wilbur Smith Associates, REMI Model

Competitive Position Impacts - The Heartland Expressway should also reduce the cost conducting business in western Nebraska and South Dakota, making the area's goods and services relatively more competitive thereby making the area more attractive for economic investment.

The improved competitive position impacts are directly related to increased productivity. To quantify the anticipated competitive position impacts attributable to the Heartland Expressway, the reduced costs of doing business in western Nebraska and South Dakota were estimated and input into the REMI model. These lower costs may be passed on to consumers as lower prices for consumer goods, to workers as higher wages, or to owners of businesses and firms as higher net income. Persons may thus benefit from the highway without even traveling on it.

The Heartland Expressway also increases the probability that western Nebraska and South Dakota will be able to attract new industry to the region. Site selection firms hired by major industrial businesses verified that a community with a four-lane highway is more likely to be selected for industrial location than communities without a four-lane major highway[1]. However, just because western Nebraska and South Dakota have a new four-lane highway running through the area does not guarantee that new industries will move into the area just because of the highway. While location on a four-lane highway may be important, it is not the only factor for industrial location. Labor force conditions, wage rates, the availability of skilled labor, and labor/management relations are all more important factors for site location.

Forecast transportation cost savings were estimated for each Heartland Expressway alternative. These transportation cost savings were input into the REMI model. The REMI model treats these inputs as a reduction in the cost of doing business in the corridor and compares the primary impact area to other areas in the nation. The REMI model examines a variety of local factors in estimating increased economic activity resulting from the Heartland Expressway. Some of these factors include:

- Relative differences in labor wage rates and total factor productivity between the primary impact area and the rest of the nation.
- Relative differences in electrical, gas and oil fuel costs between the primary impact area and the rest of the nation.
- Relative differences in state corporate and average property taxes between the primary impact area and the nation.
- Relative differences in capital costs for equipment inventory and structures for each industrial sector.
- Relative differences in production costs and profitability by industry.
- Relative differences in labor intensity.
- Occupation mix of the primary impact area's labor force and demand for each occupational category

The REMI model evaluates the impact the highway improvement has on each of the above factors and estimates the economic impact the improvement would create.

The economic development impacts to the primary impact area from its increased competitive position are illustrated on Exhibit 8-4. The exhibit displays competitive position

[1] Discussions with PH Fantus Corp.

Exhibit 8-4
INCREASED COMPETITIVE POSITION
ECONOMIC DEVELOPMENT IMPACTS
Primary Impact Area

	ECONOMIC DEVELOPMENT IMPACT								
	1995			2015			Discounted 30 Yr. Benefits(a)		
	Route B	Route C	Route D	Route B	Route C	Route D	Route B	Route C	Route D
FREEWAY									
Value Added ($000)	$1,922	1,232	2,019	$6,674	4,340	8,016	$50,594	32,896	58,075
Wages ($000)	$846	543	895	$3,252	2,115	3,937	$26,342	17,040	30,155
Employment (jobs)	45	29	48	135	88	162	145	93	180
Population (people)	38	24	40	246	160	293	255	166	317
EXPRESSWAY									
Value Added ($000)	$1,681	1,124	1,862	$5,840	3,917	7,291	$44,509	29,735	53,092
Wages ($000)	$746	490	826	$2,846	1,911	3,579	$23,066	15,412	27,535
Employment (jobs)	40	26	44	118	79	147	125	85	162
Population (people)	33	22	37	215	144	266	223	150	288
TWO/FOUR LANE									
Value Added ($000)	$1,318	810	1,475	$4,594	2,829	5,828	$34,912	21,506	91,546
Wages ($000)	$581	355	652	$2,242	1,382	2,863	$18,106	11,158	76,473
Employment (jobs)	31	19	35	93	57	118	99	61	545
Population (people)	26	16	29	169	104	213	176	108	661

Note: This table includes only the impacts caused by the ability of the primary impact area to compete with other regions of the nation for economic activity. It excludes other impact types.

SOURCE: Wilbur Smith Associates, REMI Model

impacts for two years; 1995 and 2015. The first year represents annual impacts as if the highway, in its entirety, were built in 1994; year 2015 represents economic benefits twenty years after completion. Also displayed on the exhibit is the discounted 30 year stream of benefits. This represents total benefits from increased competitive position over the 30 year analysis period.

It is estimated that, from the competitive position standpoint, of the three route alternatives, Route Option D will have the largest economic impact on western Nebraska and South Dakota. Besides connecting Scottsbluff/Gering and Rapid City, Route Option D would serve the communities of Alliance, Chadron, and Hot Springs, thereby increasing the number of residents and businesses the Heartland Expressway directly serves. Over the 30 year analysis period, Route Option D constructed to freeway standards is estimated to create over $58 million in economic development impact (value added) which includes $30.2 million in increased wages and 180 new permanent jobs for the area.

Increased Visitor/Tourism and Roadside Expenditure Impacts - The third component of the economic development impacts for the Heartland Expressway primary impact area is the increased economic activity resulting from increased visitor/tourism expenditures. The highway will create higher traffic volumes in the area. Travelers on the highway may be passing through the area, or traveling on the highway to visit tourism locations throughout western Nebraska and South Dakota. Regardless, visitors will spend money on lodging, restaurants, gas stations, retail establishments, amusement activities, etc. These are all valuable and legitimate economic development benefits for the Heartland Expressway primary impact area.

One portion of the visitor/tourism impacts consists of the estimated net increase in roadside expenditures from additional traffic on the new highway. Recent studies of comparable corridors in the midwest have indicated that roadside expenditures of value to local economies total approximately 16.7 cents per mile. To determine the increase in roadside sales, the increase in vehicle miles traveled (VMT) from diverted or induced traffic into the primary impact area were multiplied by the per vehicle mile expenditure of 16.7 cents.

Another element in the visitor/tourism impact is the increased expenditures from travelers visiting the area for tourism purposes. Currently, western Nebraska and South Dakota gets its largest percentage of tourists from the east (see Appendix D). However, the Heartland Expressway could make the area more accessible and more attractive to potential vacationers principally from areas to the south. To determine the increased number of visitors the Heartland Expressway would bring into western Nebraska and South Dakota, the increased tourist market area was evaluated in terms of time and distance improvements created by each route option. It is estimated that Route Option B, constructed to freeway standards would attract the most tourists to the area. It is estimated that by the year 2015, this option (Option B - freeway) would attract an additional 275,000 tourists per year to western Nebraska and South Dakota. Route Option D (Two/Four Lane) was estimated to have the smallest impact on inducing tourists into the primary impact area. This option (Option D - Two/Four Lane) was estimated to attract an additional 100,000 tourists into the area annually by the year 2015. The remaining options were estimated to attract visitors between this range. The increase in additional visitors was then multiplied by average expenditure information supplied by the South Dakota Department of Tourism to calculate the direct expenditures to be input into the REMI model.

To estimate the full economic development impacts created by the increased visitor/tourism expenditures, the direct expenditures were input through the REMI model as increases in final demand for lodging, eating and drinking establishments, amusement and recreation, and retail establishments. The REMI model then traced the respending of the expenditures through the regional economy to estimate the full economic impact.

The increased visitor/tourism economic development impacts are summarized on Exhibit 8-5. Increased visitor/tourism impacts are estimated to be the largest employment generator from the Heartland Expressway. Route Option B would attract the most tourism dollars into the local economy, with the Interstate type highway creating the largest economic impact of the highway standard alternatives. Route Option B would provide the most direct route for tourists traveling between western Nebraska and the Black Hills Region of South Dakota as well as traveling nearest the major tourist attractions in Nebraska. It is estimated that this Route Option, constructed to freeway standards, will create over $76 million in economic development benefits (value added) due to increased tourism and roadside expenditures, and approximately 321 permanent jobs over the next 30 years.

Non-Business Impacts - In addition to the above described economic development impacts, the new highway will also create time and cost savings attributable to non-business travelers that are of economic value to the area. By decreasing the transportation costs of persons traveling to work, or for personal business or even vacation travelers, the highway enhances the perceived quality of life in the area. Since cost savings to non-business travelers are not of real monetary value (they represents willingness to pay for the highway improvements), the savings for accident reduction, vehicle operating and time savings for non-business travelers were not input into the REMI model; instead, the direct impacts were treated as an amenity value which also can help economic development. The non-business economic development impacts for the Heartland Expressway primary impact area are displayed by route option on Exhibit 8-6.

Of the three route alternatives, Route Option D creates the greatest non-business economic impact. Route D serves a greater number of travelers, which are willing to pay for improved travel times and reduced accident potentials. While Option B is the most direct route between Scottsbluff and Rapid City, its traffic volumes are much less that Route D, and the difference in distance is insufficient to counter the larger number of motorists served by Route D.

Total Economic Development Impacts on the Primary Impact Area - Exhibit 8-7 summarizes the total estimated economic development impacts on the Heartland Expressway primary impact area. It is estimated that, by the year 2015, the Heartland Expressway would create between $25.4 million and $54.6 million in annual economic development benefits (value added) and between 250 and 480 new permanent jobs, depending on the route option and highway standard alternative. Route Option D would create the largest economic development benefits for western Nebraska and South Dakota. This is primarily caused by the increased competitive position benefits creating by serving a larger percentage of the population and business activity in the corridor.

Exhibit 8–5
INCREASED VISITOR/TOURISM
ECONOMIC DEVELOPMENT IMPACTS
Primary Impact Area

	ECONOMIC DEVELOPMENT IMPACT								
	1995			2015			Discounted 30 Yr. Benefits(a)		
	Route B	Route C	Route D	Route B	Route C	Route D	Route B	Route C	Route D
FREEWAY									
Value Added ($000)	$5,223	4,619	4,280	$8,427	4,784	6,952	$76,499	67,830	62,935
Wages ($000)	$3,045	2,772	2,567	$5,681	5,050	4,691	$54,048	49,647	46,049
Employment (jobs)	221	196	181	301	267	348	321	285	265
Population (people)	92	82	76	414	367	341	431	383	356
EXPRESSWAY									
Value Added ($000)	$4,159	3,663	2,720	$6,613	5,900	4,340	$60,422	53,641	29,630
Wages ($000)	$2,487	2,193	1,632	$4,446	3,982	2,921	$44,176	39,239	28,964
Employment (jobs)	176	155	115	236	211	155	250	225	165
Population (people)	74	65	48	325	290	213	337	302	222
TWO/FOUR LANE									
Value Added ($000)	$3,518	3,131	2,164	$5,586	5,042	3,434	$51,105	45,845	31,430
Wages ($000)	$2,107	1,882	1,298	$3,763	3,402	2,317	$37,371	33,560	23,011
Employment (jobs)	149	133	92	199	180	123	211	192	130
Population (people)	62	56	38	275	248	169	284	258	175

Note: This table includes only the impacts caused by the increased ability of the primary impact area to attract additional visitors and touris
It excludes other impact types.

SOURCE: Wilbur Smith Associates, REMI Model

Exhibit 8–6
NON–BUSINESS ECONOMIC DEVELOPMENT IMPACTS
Primary Impact Area

Value Added Impacts – ($ Thousand)

	ECONOMIC DEVELOPMENT IMPACT		
	1995	2015	Discounted 30 Yr. Benefits(a)
ROUTE OPTION B			
Freeway	$7,492	$11,348	$106,445
Expressway	$3,769	$5,184	$50,663
Two/Four Lane	$2,712	$4,201	$39,005
ROUTE OPTION C			
Freeway	$6,938	$10,254	$97,287
Expressway	$4,481	$6,718	$63,314
Two/Four Lane	$2,899	$4,162	$40,026
ROUTE OPTION D			
Freeway	$7,955	$11,591	$110,704
Expressway	$5,337	$8,743	$77,809
Two/Four Lane	$4,077	$6,375	$58,937

Note: This table includes only the impacts attributable to non–business auto travel. It excludes other impact types.

(a) Discounted at 7 percent.

SOURCE: Wilbur Smith Associates, REMI Model

Exhibit 8–7
TOTAL ECONOMIC DEVELOPMENT IMPACTS
Impact on the Primary Impact Area

Example Years – Route Option B

	ECONOMIC DEVELOPMENT IMPACT									
	1995					2015				
	Const./ Maint.	Visitor/ Tourism	Competitive Position	Non–Business	TOTAL	Const./ Maint.	Visitor/ Tourism	Competitive Position	Non–Business	TOTAL
FREEWAY										
Value Added ($000)	$40,474	5,223	1,922	7,492	55,111	$1,245	8,427	6,674	11,348	27,694
Wages ($000)	$32,783	3,045	846	--	36,674	$365	5,681	3,252	--	9,298
Employment (jobs)	1,166	221	45	--	1,432	41	301	135	--	477
Population (people)	1,416	92	38	--	1,546	15	414	246	--	675
EXPRESSWAY										
Value Added ($000)	$33,556	4,159	1,681	3,769	43,164	$1,137	6,613	5,840	5,184	18,774
Wages ($000)	$27,169	2,487	746	--	30,402	$624	4,446	2,846	--	7,916
Employment (jobs)	967	176	40	--	1,183	36	236	118	--	390
Population (people)	1,174	74	33	--	1,281	10	325	215	--	550
TWO/FOUR LANE										
Value Added ($000)	$18,909	3,518	1,318	2,712	26,457	$592	5,586	4,594	4,201	14,973
Wages ($000)	$15,295	2,107	581	--	17,983	$307	3,763	2,242	--	6,312
Employment (jobs)	545	149	31	--	725	19	199	93	--	311
Population (people)	66	62	26	--	154	6	275	169	--	450

NOTE: This table lists the total estimated economic development benefits attributable to the highway improvements in two example years. Year 2015 impacts are less than 1995 because in 1995 the primary impact area is still impacted by the act of spending the highway construction funds.

SOURCE: Wilbur Smith Associates, REMI Model

Exhibit 8–7 (cont.)
TOTAL ECONOMIC DEVELOPMENT IMPACTS
Impact on the Primary Impact Area

Example Years – Route Option C

	ECONOMIC DEVELOPMENT IMPACT									
	1995					2015				
	Const./ Maint.	Visitor/ Tourism	Competitive Position	Non–Business	TOTAL	Const./ Maint.	Visitor/ Tourism	Competitive Position	Non–Business	TOTAL
FREEWAY										
Value Added ($000)	$42,710	4,619	1,232	6,938	55,499	$1,173	7,484	4,340	10,254	23,251
Wages ($000)	$34,600	2,772	543	--	37,914	$184	5,050	2,115	--	7,349
Employment (jobs)	1,230	196	29	--	1,455	40	267	88	--	395
Population (people)	1,495	82	24	--	1,601	15	367	160	--	542
EXPRESSWAY										
Value Added ($000)	$34,487	3,663	1,124	4,481	43,755	$1,064	5,900	3,917	6,718	17,599
Wages ($000)	$27,924	2,193	490	--	30,608	$601	3,982	1,911	--	6,493
Employment (jobs)	994	155	26	--	1,175	34	211	79	--	324
Population (people)	1,206	65	22	--	1,293	9	290	144	--	443
TWO/FOUR LANE										
Value Added ($000)	$19,187	3,131	810	2,899	26,028	$484	5,042	2,829	4,162	12,516
Wages ($000)	$15,543	1,882	355	--	17,780	$259	3,402	1,382	--	5,043
Employment (jobs)	553	133	19	--	705	16	180	57	--	253
Population (people)	671	56	16	--	743	5	248	104	--	357

NOTE: This table lists the total estimated economic development benefits attributable to the highway improvements in two example years. Year 2015 impacts are less than 1995 because in 1995 the primary impact area is still impacted by the act of spending the highway construction funds.

SOURCE: Wilbur Smith Associates, REMI Model

Exhibit 8–7 (cont.)
TOTAL ECONOMIC DEVELOPMENT IMPACTS
Impact on the Primary Impact Area

Example Years – Route Option D

	ECONOMIC DEVELOPMENT IMPACT									
	1995					2015				
	Const./ Maint.	Visitor/ Tourism	Competitive Position	Non-Business	TOTAL	Const./ Maint.	Visitor/ Tourism	Competitive Position	Non-Business	TOTAL
FREEWAY										
Value Added ($000)	$42,602	4,280	2,019	7,955	56,856	$1,221	6,952	8,016	11,591	27,780
Wages ($000)	$34,509	2,567	895	--	37,970	$301	4,691	3,937	--	8,929
Employment (jobs)	1,227	181	48	--	1,456	45	248	162	--	455
Population (people)	1,491	76	40	--	1,607	16	341	293	--	650
EXPRESSWAY										
Value Added ($000)	$33,880	2,720	1,862	5,337	43,799	$1,100	4,340	7,291	8,473	21,204
Wages ($000)	$32,251	1,632	826	--	34,709	$597	2,921	3,579	--	7,097
Employment (jobs)	976	115	44	--	1,135	35	155	147	--	337
Population (people)	1,185	48	37	--	1,270	11	213	266	--	490
TWO/FOUR LANE										
Value Added ($000)	$19,236	2,164	1,475	4,077	26,952	$568	3,434	5,828	6,375	16,204
Wages ($000)	$15,560	1,298	652	--	17,510	$290	2,317	2,863	--	5,469
Employment (jobs)	554	92	35	--	681	18	123	118	--	259
Population (people)	672	38	29	--	739	6	169	213	--	388

NOTE: This table lists the total estimated economic development benefits attributable to the highway improvements in two example years. Year 2015 impacts are less than 1995 because in 1995 the primary impact area is still impacted by the act of spending the highway construction funds.

SOURCE: Wilbur Smith Associates, REMI Model

ECONOMIC DEVELOPMENT IMPACT ON NEBRASKA AND SOUTH DAKOTA

As shown on Exhibit 8-7, the Heartland Expressway primary impact area will significantly benefit if any of the improvement options is built. However, before feasibility can be ascertained, it is relevant to know the extent to which the new highway would help the economies of Nebraska and South Dakota. The key point is that the states' economy will benefit, but not by as much as the local economy of the primary impact area. This is because some of the primary impact area benefits are transfers from elsewhere within the two States.

Economic Impact of Highway Construction/Maintenance - The Heartland Expressway primary impact area will benefit from the localized construction expenditures, primarily because they pay very little of the cost of the project and receive most of the benefits. In most state highway projects, construction expenditures are not of net benefit statewide because those state and federal funds could have been spent elsewhere in the state. This is the case with all federal formula money. However, the Heartland Expressway has been identified as a High Priority Corridor under the ISTEA act and qualifies for federal demonstration funds. These are funds that the States of Nebraska and South Dakota would not receive from regular federal formula grants. However, FHWA will probably only fund the Heartland Expressway if it is shown to be a feasible and viable project. While federal demonstration funds will benefit the two States economy, using these impacts as economic development impacts would bias the true feasibility of the Heartland Expressway. Therefore, construction impacts are not included as economic development benefits for the two States.

Competitive Position Impacts - While the Heartland Expressway will improve the competitive position of the primary impact area, the same can also be true for the entire economies of Nebraska and South Dakota. Reducing the cost of doing business in western Nebraska and South Dakota can improve the economic situation of firms and other areas of the two States which would use the new highway. Firms and businesses in Omaha or Sioux Falls which supply stores in Alliance could receive benefits from the Heartland Expressway. Also, the entire states of Nebraska and South Dakota benefit from the improved competitive position of western Nebraska and South Dakota, to the extent that it is more competitive with places in other states. Therefore, the competitive position impacts for the two States are comprised of primary impact area's impacts, plus the benefits from the rest of the two States. However, jobs and activity diverted from other locations in Nebraska or South Dakota to the primary impact area are not a net benefit to the entire two States and are excluded.

The effect of enhancing Nebraska's and South Dakota's statewide competitive position through the Heartland Expressway is displayed on Exhibit 8-8. The exhibit reveals that in 2015 the 4-lane freeway would create an estimated $5.4 to $10.0 million in value added economic development benefit for the two states.

Increased Tourism/Shopping Impacts - The impact on the entire states of Nebraska and South Dakota from increased visitor/tourism expenditures in the primary impact area are somewhat less than the impact on the local level. This is because of transfers from within the two States to the primary impact area. For example, if a tourist is diverted to Angostura Reservoir from Lake McConaughy, it is a benefit to the primary impact area but it is not a net benefit for the two States. However, the majority of increased visitor expenditures attributable

Exhibit 8–8
INCREASED COMPETITIVE POSITION
ECONOMIC DEVELOPMENT IMPACTS
States of Nebraska and South Dakota

	ECONOMIC DEVELOPMENT IMPACT								
	1995			2015			Discounted 30 Yr. Benefits(a)		
	Route B	Route C	Route D	Route B	Route C	Route D	Route B	Route C	Route D
FREEWAY									
Value Added ($000)	$2,491	1,620	2,636	$8,306	5,392	9,999	$63,459	41,239	72,784
Wages ($000)	$1,107	717	1,173	$1,036	2,631	4,893	$32,956	21,330	32,764
Employment (jobs)	58	37	61	165	108	199	177	115	221
Population (people)	47	31	49	296	193	353	308	201	383
EXPRESSWAY									
Value Added ($000)	$2,176	1,463	2,430	$7,182	4,885	9,080	$55,314	37,265	66,547
Wages ($000)	$969	659	1,082	$3,494	2,375	4,453	$28,692	19,321	34,547
Employment (jobs)	51	34	57	143	97	181	153	104	200
Population (people)	41	28	45	256	174	321	265	181	348
TWO/FOUR LANE									
Value Added ($000)	$1,717	1,040	1,935	$5,719	3,543	7,278	$43,753	26,942	53,082
Wages ($000)	$764	474	853	$2,784	1,713	3,562	$22,262	13,968	27,525
Employment (jobs)	40	25	45	114	71	145	122	76	160
Population (people)	32	20	36	203	125	257	212	132	279

Note: This table includes only the impacts caused by the ability of the two States to compete with other regions of the nation for economic activity. It excludes other impact types.

SOURCE: Wilbur Smith Associates, REMI Model

to the Heartland Expressway are created by travelers and tourists from other states. Therefore, these visitor expenditures are of net benefit to both the primary impact area and the entire states of Nebraska and South Dakota.

The Statewide impacts from increased visitor/tourism expenditures from the Heartland Expressway are summarized on Exhibit 8-9. It is estimated that the entire states of Nebraska and South Dakota would benefit from increased tourism expenditures from all Heartland Expressway route options.

Non-Business Impacts - Most of the travelers that will use the Heartland Expressway will travel for non-business purposes. These non-business travelers, traveling to or from other areas in Nebraska and South Dakota, benefit from the new highway. Similar to the competitive position impacts, the non-business economic development benefits equal the primary impact area's benefits plus the benefits to other residents in the State, less any transfer effects. The non-business economic development impacts for each route option and highway standard alternative are summarized on Exhibit 8-10.

Total Economic Development Impacts to the States of Nebraska and South Dakota - The total statewide economic development impacts estimated for the entire States of Nebraska and South Dakota are displayed on Exhibit 8-11. The two State total benefits are less than the total primary impact area benefits since some of the primary impact area benefits are attributable to transfers from within the two states. In 1995 the largest transfer is the construction expenditure, which is not of net benefit to the two States. However, in the year 2015, the economic development benefits are similar. This is due to the larger multiplier (more respending) that occurs within the two States. There are significant transfers from within the two states; however, the impacts that are of net benefit to the entire states of Nebraska and South Dakota remain in the economy longer because of the two States' larger multipliers.

Similar to the primary impact area's total economic development benefits, of the three route alternatives, Option D provides the largest amount of benefits for the entire states of Nebraska and South Dakota. This is primarily caused by the larger economic benefits created by the increased competitive position this route produces.

Exhibit 8-9
INCREASED VISITOR/TOURISM ECONOMIC DEVELOPMENT IMPACTS
States of Nebraska and South Dakota

	ECONOMIC DEVELOPMENT IMPACT								
	1995			2015			Discounted 30 Yr. Benefits(a)		
	Route B	Route C	Route D	Route B	Route C	Route D	Route B	Route C	Route D
FREEWAY									
Value Added ($000)	$4,902	4,347	4,039	$7,872	6,998	6,602	$71,402	63,368	58,788
Wages ($000)	$2,901	2,581	2,392	$5,200	4,620	4,292	$51,231	45,474	42,187
Employment (jobs)	199	176	163	269	239	224	287	253	237
Population (people)	85	75	70	370	328	306	385	339	319
EXPRESSWAY									
Value Added ($000)	$3,916	3,453	2,559	$6,166	5,529	4,049	$56,436	50,118	36,964
Wages ($000)	$2,315	2,038	1,751	$4,063	3,643	2,674	$40,481	35,933	26,540
Employment (jobs)	158	139	104	211	189	139	224	201	148
Population (people)	68	60	44	290	259	190	301	270	198
TWO/FOUR LANE									
Value Added ($000)	$3,309	2,949	2,055	$5,231	4,707	3,227	$47,744	42,800	29,371
Wages ($000)	$1,969	1,747	1,210	$3,443	3,112	2,120	$34,258	30,742	21,073
Employment (jobs)	134	120	82	179	161	110	190	172	117
Population (people)	58	51	36	246	221	150	255	231	157

Note: This table includes only the impacts caused by the increased ability of the two States to attract additional visitors and tourists It excludes other impact types.

SOURCE: Wilbur Smith Associates, REMI Model

Exhibit 8–10
NON–BUSINESS ECONOMIC DEVELOPMENT IMPACTS
States of Nebraska and South Dakota

Value Added Impacts – ($ Thousand)

	ECONOMIC DEVELOPMENT IMPACT		
	1995	2015	Discounted 30 Yr. Benefits(a)
ROUTE OPTION B			
Freeway	$8,324	$12,609	$118,272
Expressway	$4,188	$5,760	$56,545
Two/Four Lane	$3,013	$4,668	$43,338
ROUTE OPTION C			
Freeway	$7,709	$11,394	$108,098
Expressway	$4,979	$7,465	$70,350
Two/Four Lane	$3,221	$4,625	$44,474
ROUTE OPTION D			
Freeway	$8,839	$12,879	$123,004
Expressway	$5,931	$9,415	$86,454
Two/Four Lane	$4,530	$7,083	$65,485

Note: This table includes only the impacts attributable to non–business auto travel. It excludes other impact types.

(a) Discounted at 7 percent.

SOURCE: Wilbur Smith Associates, REMI Model

Exhibit 8–11
TOTAL ECONOMIC DEVELOPMENT IMPACTS
Impact on the Entire States of Nebraska and South Dakota

Example Years – Route Option B

	ECONOMIC DEVELOPMENT IMPACT							
	1995				2015			
	Visitor/ Tourism	Competitive Position	Non–Business	TOTAL	Visitor/ Tourism	Competitive Position	Non–Business	TOTAL
FREEWAY								
Value Added ($000)	$4,902	$2,491	8,324	15,717	$7,872	$8,306	12,609	28,787
Wages ($000)	$2,901	$1,107	--	4,008	$5,200	$1,036	--	6,236
Employment (jobs)	199	58	--	257	269	165	--	434
Population (people)	85	47	--	132	370	296	--	666
EXPRESSWAY								
Value Added ($000)	$3,916	$2,176	4,188	10,280	$6,166	$7,182	5,760	19,108
Wages ($000)	$2,315	$969	--	3,284	$4,063	$3,494	--	7,557
Employment (jobs)	158	51	--	209	211	143	--	354
Population (people)	68	41	--	109	290	256	--	546
TWO/FOUR LANE								
Value Added ($000)	$3,309	$1,717	3,013	8,039	$5,231	$5,719	4,668	15,618
Wages ($000)	$1,969	$764	--	2,733	$3,443	$2,784	--	6,227
Employment (jobs)	134	40	--	174	179	114	--	293
Population (people)	58	32	--	90	246	203	--	449

NOTE: This table lists the total estimated economic development benefits attributable to the highway improvements in two example years.

SOURCE: Wilbur Smith Associates, REMI Model

Exhibit 8–11 (cont.)
TOTAL ECONOMIC DEVELOPMENT IMPACTS
Impact on the Entire States of Nebraska and South Dakota

Example Years – Route Option C

	ECONOMIC DEVELOPMENT IMPACT							
	1995				2015			
	Visitor/ Tourism	Competitive Position	Non–Business	TOTAL	Visitor/ Tourism	Competitive Position	Non–Business	TOTAL
FREEWAY								
Value Added ($000)	$4,347	$1,620	7,709	13,676	$6,998	$5,392	11,394	23,785
Wages ($000)	$2,581	$717	––	3,298	$4,620	$2,631	––	7,251
Employment (jobs)	176	37	––	213	239	108	––	347
Population (people)	75	31	––	106	328	193	––	521
EXPRESSWAY								
Value Added ($000)	$3,453	$1,463	4,979	9,895	$5,529	$4,885	7,465	17,878
Wages ($000)	$2,038	$659	––	2,697	$3,643	$2,375	––	6,017
Employment (jobs)	139	34	––	173	189	97	––	286
Population (people)	60	28	––	88	259	174	––	433
TWO/FOUR LANE								
Value Added ($000)	$2,949	$1,040	3,221	7,210	$4,707	$3,543	4,625	12,874
Wages ($000)	$1,747	$474	––	2,221	$3,112	$1,713	––	4,825
Employment (jobs)	120	25	––	145	161	71	––	232
Population (people)	51	20	––	71	221	125	––	346

NOTE: This table lists the total estimated economic development benefits attributable to the highway improvements in two example years.

SOURCE: Wilbur Smith Associates, REMI Model

Exhibit 8–11 (cont.)
TOTAL ECONOMIC DEVELOPMENT IMPACTS
Impact on the Entire States of Nebraska and South Dakota

Example Years – Route Option D

	ECONOMIC DEVELOPMENT IMPACT							
	1995				2015			
	Visitor/ Tourism	Competitive Position	Non–Business	TOTAL	Visitor/ Tourism	Competitive Position	Non–Business	TOTAL
FREEWAY								
Value Added ($000)	$4,039	$2,636	8,839	15,514	$6,602	$9,999	12,879	29,480
Wages ($000)	$2,392	$1,173	--	3,565	$4,292	$4,893	--	9,185
Employment (jobs)	163	61	--	224	224	199	--	423
Population (people)	70	49	--	119	306	353	--	659
EXPRESSWAY								
Value Added ($000)	$2,559	$2,430	5,931	10,920	$4,049	$9,080	9,415	22,544
Wages ($000)	$1,751	$1,082	--	2,833	$2,674	$4,453	--	7,127
Employment (jobs)	104	57	--	161	139	181	--	320
Population (people)	44	45	--	89	190	321	--	511
TWO/FOUR LANE								
Value Added ($000)	$2,055	$1,935	4,330	8,320	$3,227	$7,278	7,083	17,588
Wages ($000)	$1,210	$853	--	2,063	$2,120	$3,562	--	5,682
Employment (jobs)	82	45	--	127	110	145	--	255
Population (people)	36	36	--	72	150	257	--	407

NOTE: This table lists the total estimated economic development benefits attributable to the highway improvements in two example years.

SOURCE: Wilbur Smith Associates, REMI Model

ADVERSE IMPACTS ON EASTERN WYOMING

The Heartland Expressway has the potential to divert traffic, and therefore economic activity associated with such traffic, from parallel highways in eastern Wyoming. A portion of the visitor/tourism benefits to the Heartland Expressway primary impact area will come from traffic that would otherwise use U.S. 85 in Wyoming. To assess the economic impact on eastern Wyoming, diverted traffic volumes were estimated from eastern Wyoming to the Heartland Expressway primary impact area (see Chapter 5). Based on these diverted traffic volumes, the economic loss to Eastern Wyoming was estimated. Exhibit 8-12 summarizes the impacts on eastern Wyoming by route option.

Exhibit 18-12
ECONOMIC IMPACT ON EASTERN WYOMING
Value Added Impact
($ Thousand)

		FROM EASTERN WYOMING	
	Total States Benefits	Impacts on Eastern Wyoming	Percent
Route Option B			
Freeway	$26.51	$1.31	4.9%
Expressway	18.49	1.15	6.2%
Two/Four Lane	14.53	0.93	6.4%
Route Option C			
Freeway	$21.50	$1.29	6.0%
Expressway	16.26	1.16	7.1%
Two/Four Lane	11.79	0.91	7.7%
Route Option D			
Freeway	$27.20	$1.01	3.7%
Expressway	20.70	0.53	2.6%
Two/Four Lane	16.80	0.34	2.0%

Source: Wilbur Smith Associates

Of the total economic benefit of the Heartland Expressway to western Nebraska and western South Dakota, approximately 2 to 8 percent is estimated to be from eastern Wyoming. Route Option D, with some 4-lane segments and some 2-lane segments, is estimated to have the least negative impact on eastern Wyoming. This alternative diverts the least amount of traffic from U.S. 85. Route Option B, because of its location nearest to Wyoming, would have the greatest negative impact on eastern Wyoming, with the freeway alternative creating the largest adverse impact.

ECONOMIC DEVELOPMENT FEASIBILITY

To determine whether the Heartland Expressway is feasible from the economic development perspective, each highway option's costs were compared with its economic development benefits using benefit/cost analysis. The cost side of the equation comprises the same capital and maintenance costs as used in the travel efficiency evaluation. The economic development impacts already include the proper share of the travel efficiency benefits; therefore the travel efficiency benefits (of Chapter 7) and the economic development impacts (of Chapter 8) should not be added together.

Economic Feasibility Calculations - The benefit/cost calculations are depicted on Exhibits E-10 through E-27 in the Appendix. For analysis purposes all construction funds are assumed to be spent in one year (1994), followed by 30 years of benefits. The costs and benefits shown by year (1994-2025) are not the discounted values. The discounted values, discounted at 7 percent per year, are shown in the lower right side of the matrix.

Exhibit 8-13 indicates the feasibility results from the Heartland Expressway primary impact area's perspective; Exhibit 8-14 illustrates the feasibility results from the two States' perspective. From the primary impact area's perspective, all Heartland Expressway alternatives are feasible; from the statewide perspective, only Route Option D with some two lane sections and some four-lane sections is feasible.

Economic Feasibility Indicators - Exhibits 8-13 and 8-14 are interpreted as follows:

- A project with a positive net present value is an economically feasible investment. An investment with a negative net present value is not an economically feasible project.
- A project with a rate of return in excess of 7 percent is economically feasible. If the project's rate of return is too low, then the money would better be spent elsewhere.
- A project with a benefit/cost ratio of 1.0 or more is an economically feasible project.

Exhibit 8-13
ECONOMIC DEVELOPMENT FEASIBILITY RESULTS
Heartland Primary Impact Area Perspective

	Net Present Value[a]	Internal Rate of Return	Discounted Benefit/ Cost[a]
	($ Million)		
Route Option B			
Freeway	$103.1	11.4%	1.30
Expressway	57.8	10.0%	1.21
Two/Four Lane	72.7	13.1%	1.48
Route Option C			
Freeway	$53.0	9.3%	1.15
Expressway	48.3	9.5%	1.18
Two/Four Lane	59.3	12.1%	1.40
Route Option D			
Freeway	$75.6	10.2%	1.20
Expressway	73.2	10.6%	1.27
Two/Four Lane	80.3	13.5%	1.52

(a) Discounted at 7 percent

Source: Wilbur Smith Associates

Feasibility from the Primary Impact Area Perspective - This study shows that the thirteen-county primary impact area in western Nebraska and South Dakota is wise to pursue the Heartland Expressway. The economic calculations suggest the following:

1. From the primary impact area's perspective, any of the alternatives would be an economically feasible undertaking.

2. Route Option B constructed to freeway standards would provide the largest net economic value for the residents of western Nebraska and South Dakota. The net present value for this Heartland Expressway option states that the region will benefit by a net increase of $103.1 million.

3. However, Route Option D, constructed with some four lane sections and some two-lane sections, would provide the best investment return for the primary impact area. For every $1 invested in the route alternative, $1.52 would be received in local economic benefits; however, the net economic value obtained would be less than Route B (freeway).

4. If western Nebraska and South Dakota can persuade the two States and/or Federal government to pay for the Heartland Expressway, the primary impact area and its residents will be much better off economically.

5. While difficult to measure as an economic benefit, rural health care is a transportation issue for the panhandle of Nebraska and western South Dakota. The two largest medical centers in the region are located at the study's terminus points: Scottsbluff and Rapid City. Route Option D (Two/Four Lanes) would provide four-lane connections between these two medical centers and the next largest communities in the region (Alliance and Hot Springs). The Heartland Expressway highway improvements would be able to improve health care service in western Nebraska and South Dakota by providing better access to tertiary health care facilities in Scottsbluff and Rapid City.

Feasibility from the two States Perspective - From the statewide perspective, however, the Heartland Expressway is less feasible, as shown on Exhibit 8-14.

1. From the perspective of the two states, only Route Option D, with four-lane sections between Scottsbluff/Gering and Alliance, and Rapid City and Hot Springs, is an economically feasible undertaking. The NPV is positive ($11.0 million), the rate of return in real terms is greater than the OMB recommended 7.0 percent (7.6 percent), and the benefit/cost ratio (1.07) is greater than 1.

2. The other Heartland Expressway alternatives are all infeasible from the two States perspective. Only Route Option B (two/four lanes) is nearly feasible however, with a 0.99 benefit/cost ratio.

ECONOMIC FEASIBILITY RESULTS

These calculations, based on the economic development potential of the Heartland Expressway, suggest the following:

1. In terms of economic value to western Nebraska and South Dakota, any of the Heartland Expressway options would add significantly to the region.

2. In terms of economic value to the entire states of Nebraska and South Dakota, only Route Option D, with four-lane expressway segments between Scottsbluff/Gering and Alliance, and between Rapid City and Hot Springs, is feasible.

3. In terms of economic value to eastern Wyoming, Route Option D (two/four lanes) has the least negative impact on the region.

Exhibit 8-14
ECONOMIC DEVELOPMENT FEASIBILITY
States of Nebraska and South Dakota Perspective

	Net Present Value[a] $ (Million)	Internal Rate of Return	Discounted Benefit/ Cost[a]
Route Option B			
Freeway	-$57.4	5.5%	0.83
Expressway	-79.6	4.4%	0.71
Two/Four Lane	-1.4	6.9%	0.99
Route Option C			
Freeway	-$121.8	3.7%	0.66
Expressway	-93.8	3.9%	0.66
Two/Four Lane	-20.6	5.8%	0.86
Route Option D			
Freeway	-$91.1	4.6%	0.76
Expressway	-57.8	5.2%	0.79
Two/Four Lane	11.0	7.6%	1.07

(a) Discounted at 7 percent
Source: Wilbur Smith Associates

Chapter 9
ENVIRONMENTAL OVERVIEW

It should be noted at the outset that this chapter summarizes environmental investigations only to the level of an "overview." Its purpose is to identify areas of environmental concern that might influence or prohibit roadway development. While the overview process has not included in-depth environmental analyses, it has involved research, data collection, agency contacts and extensive field observations.

Regardless of the alignment and highway option selected for development of the Heartland Expressway, there will very likely be impacts in almost every category of the natural, human, and cultural environments. The intensity of such impacts will depend, to a great extent, on the following:

1. **Highway Type** - A freeway will require more right-of-way than either an expressway or an upgraded two-lane facility. As a result, related impacts are likely to be greater.

2. **New Location** - Improvements made on existing highway alignments are likely to have less impact on the environment than highways on new locations. Such links require considerably more right-of-way than improvements to existing roadways, and would therefore result in greater levels of impacts to the natural environment. These links also can be more disruptive to established patterns of human activity.

3. **Bridges** - Rivers and their associated floodplains and riparian environments constitute an area of potential impact when new bridges are introduced.

Regardless of these potential variations in environmental impact, the environmental overview process determined that it is not likely that any environmental impacts will be so critical that they cannot be avoided, or minimized, or mitigated. The primary reason for the relatively low level of anticipated impacts, considering the length of the proposed facility, is the fact that most alignments are being proposed along existing highway routes. Land use patterns, transportation patterns, and ecological functions have adapted to the presence of a transportation facility along these routes. As a result, expansion, upgrade, or modest realignment of these facilities is likely to be less harmful to the natural and manmade environments than a new facility on new location.

ENVIRONMENTAL ISSUES VARY BY HIGHWAY TYPE

The three highway types being considered (freeway, expressway, and a combination 2/4 lane highway) have considerably different environmental impact potential.

Freeway - Freeway development along any of the proposed alignments would be the most ambitious. A freeway by definition is a multi-lane facility that only allows access at certain controlled interchange points. Indiscriminate access across a freeway is prohibited, which could

be restrictive to social interaction, access to jobs and services, and the efficient management of farms and ranches that may occur on both sides of the highway facility. In addition to requiring additional land for expansion of an existing facility to freeway standards, even more land may be required for frontage roads at strategic locations in order to accommodate local circulation. Freeway interchanges often require expansive acreage, compounded by the fact that interchanges are most desirable in developed areas where two major routes already intersect.

Expressways - Expressways are similar in some respects to freeways but do not have grade separated interchanges at every intersecting route, and are less restrictive to local circulation.

Improved Two-Lane - This designation refers to an upgraded two-lane roadway, with intermittent passing lanes, some turning lanes, plus shoulder widening. Under most circumstances, these changes would be the least environmentally disruptive, simply because less new right-of-way would be required. As a result, local environmental characteristics could remain virtually intact, where an existing roadway is utilized.

POTENTIAL ENVIRONMENTAL IMPACTS OF THE HEARTLAND EXPRESSWAY

Regardless of which highway type is considered for the Heartland Expressway, there are likely to be some impacts in each of the categories that are provided protection under Federal and State law. These impact areas are discussed in the paragraphs which follow. Subsequent sections of this chapter deal with the specific segments and their respective potentials for environmental impact.

Land Use Impacts - The introduction of modifications to or expansions of the existing highway system can change the way land use patterns have developed over history and can influence the way they develop in the future. Because a freeway denies access except at interchange points, more intensive future land uses are likely to develop around such points. Other sites along a freeway facility will have somewhat diminished potential for development, because access is limited. At the opposite end of the spectrum, however, the upgrade of an existing two-lane facility is likely to have only minor impacts on land uses.

Prime Farmlands - Certain soil types have been designated by the Soil Conservation Service of the U.S. Department of Agriculture as being important for agricultural purposes. The Soil Conservation Service undertakes a ranking evaluation for proposed new highway projects to determine the relevant impacts in removing such high quality soils from agricultural production, essentially in perpetuity. Most of the farm soils within the river valleys of Western Nebraska and South Dakota are of a highly desirable type for agriculture. The impacts to prime farmlands can be reduced by the selection of a narrower cross-section facility and the utilization of existing roadways wherever possible. This of course has to be considered in the context of overall project purpose and transportation service.

Socioeconomic Impacts - While there may be some restrictions on local accessibility with the freeway option, most socioeconomic effects of new highways are positive. In terms of economics, improved accessibility to points of employment, shopping, community services, entertainment, and social interaction are benefits that accrue from transportation improvements.

However, there are people in the corridor who strongly believe that a new highway will cause additional people in the region, and that any such increase in number of people and increased traffic are bad. In this sense, what one person views as a benefit, someone else may view as a disbenefit of the project.

Communities and Neighborhoods - Because almost all of the proposed Heartland Expressway alignments are along existing highway routes, with little or new alignment, little disruption to established communities and neighborhoods can be anticipated. These are long-standing transportation corridors around which the respective communities have developed and which utilize these routes as part of their local transportation systems. Routing the higher-speed through-traffic around communities, e.g., Alliance, Rapid City, etc. will also serve to maintain the integrity of communities and neighborhoods. A number of the towns along the routes - Alliance, Chadron, Crawford, Hot Springs - are somewhat removed from existing through routes at the present time. It is unlikely that any severe impacts will result in this regard if the proposed alignments are pursued.

Parks and Recreation Areas - There is a profusion of federal lands, state parks and other recreation sites in Western Nebraska and South Dakota. Some of these would be crossed while others are located in proximity to the study segments under consideration. Sites where conflict with roadway improvements would be unavoidable include the Nebraska National Forest, Buffalo Gap and Oglala National Grasslands, and others. The opportunity exists to shift proposed highway improvements within these areas in order to preserve the integrity of such areas and to minimize impacts to them. Section 4(f) of the National Transportation Act mandates that parks and recreation areas established with public funds for public use may not be disturbed for highway construction unless there is no prudent or feasible alternative. There appear to be several segments throughout the project area that would be subject to these criteria.

Community Services - In general, the delivery of community services, including fire, police, ambulance, and utilities will be enhanced as a result of the Heartland Expressway. If freeways are constructed along certain segments, there may have to be some rerouting of service delivery, but this is a relative common practice in highway development and has not traditionally been shown to be a problem. Service routes are always considered in the location of freeway interchanges and grade separations.

The Heartland Expressway would also improve access to health care facilities in western Nebraska and western South Dakota. The region's two largest health care facilities are located in Scottsbluff and Rapid City. An improved highway connecting the region to these two cities should improve rural residents ability to get from rural areas to the primary and secondary health care facilites.

Utilities - Water, sewer, electric power, natural gas, and other utilities commonly parallel major highway routes. The three finalist route options would not present any unusual problems with regard to utilities. The relocation of utilities is traditionally a part of highway construction projects. No major transmission lines, electrical or gas, have been identified that would prohibit development of the project in accordance with any of the alternatives under consideration. Major agricultural irrigation systems could be impacted, particularly along the more easterly segments.

Relocations - It is not likely that the Heartland Expressway will necessitate extensive relocations of households and businesses along any of the routes. Relocations will primarily occur in developed areas, as most segments on new alignment are across very sparsely populated terrain. Along existing roadways, the greater the additional right-of-way needs, the greater the incidence of relocations is likely to be. The judicious placement of expanded highway sections on sides of existing facilities where there is the least development can help to minimize displacements. Considering the overall length of the project, and the relatively sparse development throughout much of the area, relocations are not believed to be critical impact problems.

Pedestrians and Bicyclists - Federal guidelines require the consideration of cyclists, pedestrians, and other non-automotive transport modes. While special facilities of these types may not be appropriate in rural areas, there may be opportunities in the urban communities and through recreation areas to incorporate biking/pedestrian trails within the right-of-way of the proposed facility. This would have to be a part of the cooperative effort with the respective communities involved. Specific funds have been allocated for such "transportation enhancements" as part of the ISTEA legislation.

Air Quality - Regional air quality is not a problem throughout the area, and improved free-flow of traffic at a good operating speed can help to forestall future problems and relieve current trends. It has been clearly shown that stop-and-go traffic and frequent gear shifts by trucks contribute significantly to highway-generated air pollution. When traffic is allowed to flow with few interruptions, the air pollution burden is less. A freeway would be most beneficial, but any improvement that would allow traffic to flow with only occasional interruptions is advantageous in terms of air quality. Traffic flows well in the study area at the present time. Anticipated increases in traffic can be accommodated with ease by the Heartland Expressway.

Noise - Traffic noise, like air quality, is intensified when trucks have to shift gears more often and when large volumes of automobile traffic are brought in proximity to sensitive land uses such as residential areas, schools, and hospitals. The use of new locations and realignments in the Heartland Expressway project will remove the higher volumes of through traffic from developed areas and allow local traffic to flow better. It is difficult to mitigate excessive noise impacts from highways except in the case of freeways. This is because noise-attenuating barriers must be continuous in order to be effective. In the case of a two-lane arterial or a divided expressway, there would be at-grade intersections and periodic driveways that would cause regular interruptions in the noise barrier, thus allowing noise to "spill" through into sensitive areas. In the case of freeways, noise-attenuation barriers can be effective provided that they can be placed in proximity to the travel lanes. The farther away such barriers are placed, the taller they must be, in order to be effective. The introduction of a new highway into parklands and other natural areas will increase noise levels and may have some negative effects on wildlife functions.

Water Quality - The proposed Heartland Expressway will cross a number of rivers, creeks and drainage areas. The quality of the water in these bodies is generally quite good and is used for multiple purposes, including drinking water, irrigation and recreation. The disturbance of adjacent soils for highway construction can cause siltation to these water bodies, unless appropriate construction measures are observed. Run-off will be increased as a result of

increased paved surface for new highways. Proper construction and maintenance of detention/retention sites can help prevent the chemicals and residues contained in this run-off from reaching these water bodies. Riverbank stabilization will be important during bridge construction to prevent the long-term erosion of riverbanks and continued siltation of streams. No problems are foreseen with the Heartland Expressway in this regard so long as standard accepted design and construction practices are followed.

Permits - A number of Federal and State permits will have to be applied for prior to letting various sections of the project for construction. Results of the Environmental Overview indicate that, with judicious and sensitive planning of the facility, it should be possible to obtain these permits. One of the key permits will have to be obtained from the Army Corps of Engineers for placing construction fill in wetlands. These permits are not automatically forthcoming and the applicant is required to show evidence of attempts to avoid such impacts wherever possible. Mitigation plans are required as part of the permit application.

Wetlands - Wetlands are considered valuable for their ability to replenish ground water, as a key element in the biological food chain, and as habitat for a wide variety of plant and animal species. Western Nebraska and South Dakota contain wetlands of several different types, including streams and rivers, lakes, drainage channels, and isolated sinks. It is not likely that, with a facility the length of the proposed Heartland Expressway, all wetlands can be avoided. However, because much of the proposed new facility will be across rolling upland terrain, it should be possible to keep this impact to a minimum. Almost all segments under consideration have the potential for wetland involvement, but this should not be considered as a critical deterrent to project development. There would be various opportunities to mitigate impacts by restoring or creating additional wetlands near the corridors.

Wildlife/Threatened and Endangered Species - It has been determined that the following threatened and endangered species may occur in the Heartland Expressway area:

Listed Species	Expected Occurrence
Bald eagle (Haliaeetus leucocephalus)	Migration, winter resident, nesting
Peregrine falcon (Falco peregrinus)	Migration
Whooping crane (Grus americana)	Migration
Black-footed ferret (Mustela nigripes)	Prairie dog towns
Blowout Penstemon (Penstemon haydenii)	Sandhills blowouts

Bald eagles utilize mature riparian timber near streams and lakes. The North Platte River in Scottsbluff and Morrill counties is a major eagle wintering area. Bald eagles may be scattered throughout the project area during migration. In 1993, three young bald eagles were fledged from a nest located at Lake Alice in Scottsbluff County.

Peregrine falcons generally are associated with wetlands and open areas such as cropland and grassland. Most observations in Nebraska are in late April to early May, September, and October. Pennington County, South Dakota is listed in this species' breeding range.

Whooping cranes use shallow, sparsely vegetated streams and wetlands with good horizontal visibility, as roosting and feeding sites during migrations. The project area is located on the western edge of the whooping crane migration corridor. Whooping crane sightings have been confirmed in Dawes, Sioux, Scottsbluff, and Morrill counties, Nebraska and in all three South Dakota Counties through which the Heartland Expressway passes.

All prairie dog towns are considered to be potential habitat for the black-footed ferret. If a proposed project may affect prairie dogs, the U.S. Fish and Wildlife Service should be notified to determine if ferret surveys are required.

Blowout Penstemon, a plant species, is found only in blowouts within the Nebraska Sandhills. Within the project area, populations are known to occur in Box Butte and Morrill counties.

Floodplains - Consideration of floodplains is important in highway improvement projects for two reasons: first, to ensure that floodwaters can pass under the highway facilities unobstructed, and second, to ensure that the roadway can continue to operate in times of flooding. Depending on the elevation of 50-year and 100-year floods, the required separation can be achieved using either culverts or bridges. Consideration of floodplains is essentially a matter of appropriate engineering and is not likely to be a problem for development of the Heartland Expressway.

Historic Sites - One of the few drawbacks with the utilization of existing highways for the Heartland Expressway is the potential for impacting historic structures, particularly in the more populated areas. Human development has traditionally taken place along routes that would provide good access to trade, employment, and social interaction. Not all of Nebraska and South Dakota have been surveyed for historic resources, and such surveys would have to be undertaken for each individual segment when it is programmed for construction.

A potential difficulty for roadway construction in terms of historic resources would be in urban areas where the existing two-lane road is planned for widening to an additional two lanes with a median. Generally, widening can take place on one side or the other, depending on the potential for impacts, but in instances when there are historic structures on both sides of the roadway, it may be necessary to consider bypassing a whole district or, in extreme cases proceeding with some impacts to historic sites, along with appropriate mitigation and compensation. The Heartland Expressway would traverse few urban areas, and there appears to be sufficient flexibility, at this current stage of route planning, to avoid impacting many if not all historic sites along the planned routes. No specific conflicts were identified during the Environmental Overview.

Archaeological Resources - Similar to consideration of historic sites, archaeological resources have not been previously documented to a great extent along the proposed route alignments. During the route development process for any segment that is proposed for construction, a Phase I Archaeological Investigation will have to be conducted. This level of investigation includes literature search and sample testing in the field. When the alignment is more precisely defined, it may be necessary to undertake a Phase II investigation which is more precise and more laborious. The presence of the Agate Fossil Beds west of the project area is indicative of the level of archaeological resources likely to be found in the area.

Because there has historically been a strong Native American presence in Nebraska and South Dakota, and the proximity of the project to historic Oglala Sioux lands, there are likely to be sites, known and unknown, related to these native peoples that will have to be considered in the alignment process. Most archaeological sites identified can be excavated and documented without necessitating the realignment of a proposed roadway. In rare instances, a site may be of such outstanding value that its preservation, in situ, is mandated. Such an occurrence is rare, but given the length of the proposed facility and the diversity of human habitation therein, the potential does exist. There are no known sites that would preclude development of any of the corridor segments at the present time.

Contaminated Sites - Expansion of existing highways frequently necessitates the identification of any above-ground or underground storage sites that may have contaminated soil and ground water. A primary source of such sites is abandoned service stations, but there could also be some sites associated with electrical transmission substations, farm machinery, fueling sites, etc. Landfills, of both a formal and informal basis, may also present concerns. If state records are incomplete, the route development process will have to include some literature search and field investigations to determine if such sites exist. This category of concern is not usually critical in terms of highway development because of the ability to shift alignment or to excavate the contaminants. Such sites are usually non-existent or difficult to locate on new location routes, due to inadequate historic records.

ENVIRONMENTAL IMPACT POTENTIAL, BY HIGHWAY SEGMENT

The following sections present a discussion of potential environmental impacts with regard to seven study corridor segments. It is beneficial to discuss the overall Heartland Expressway in terms of corridor segments, because these discrete portions of the project could be constructed individually as stand-alone projects. The seven study segments utilized for this discussion are as follows:

1. Scottsbluff/Gering to Alliance (Route Option D, part.)
2. Alliance to Chadron (Route Option D, part.)
3. Chadron to Hot Springs (Route Option D, part.)
4. Scottsbluff/Gering to Crawford (Route Option C)
5. Scottsbluff/Gering to Crawford (Route Option B)
6. Crawford to Hot Springs (Route Option B, C)
7. Hot Springs to Rapid City (Route Option B, C, D)

While these various segments have much in common, each has unique characteristics, whether from the standpoint of environmental conditions or from its urban/rural setting. Potential impacts are identified only from the perspective of a generalized environmental overview. Specific environmental impacts will have to be quantified during any subsequent project development and preliminary engineering phases.

Scottsbluff/Gering to Alliance (Route D, part.) - This route segment extends eastward from the existing U.S.26 Bypass around the northern perimeter of the City of Scottsbluff. The route

closely parallels the Burlington Northern Railroad between Scottsbluff and the town of Minatare, where the railroad diverts to a southeastward direction and U.S. 26 proceeds due east.

In the vicinity of Minatare and eastward, there are several creeks, canals and drainage channels. Some of these have been impounded or modified by earlier highway construction and, as a result, are now functioning as wetlands. These wetlands, while in proximity to U.S. 26, do not appear to be very complex and generally contain a single dominant plant species, such as cattail.

This route segment is sparsely populated. The primary human activities are farm and ranch-related, including a number of cattle feed-lots.

Ninemile Creek is a recognized trout stream to the northeast of Minatare. Care must be exercised in roadway construction to avoid pollution or siltation of this stream.

The east-west portion of this segment generally parallels the North Platte River. As a result the terrain is relatively flat to gently rolling, increasing in elevation toward the east as the route continues to diverge from the river.

The segment follows U.S. 385 northward to Alliance from its junction with U.S. 26 in Morrill County. For almost its entire length to Alliance, this segment closely parallels another Burlington Northern Railroad line, located on the east of U.S. 385.

There is very little vegetation along this corridor segment other than grassland, cultivated fields and trees/shrubs around ranch/farm buildings and along drainageways. The topography is gently rolling.

Bronco Lake, east of Alliance is listed as a fishing/recreation lake, but does not appear on all maps. It would not be affected by the proposed roadway improvements. The segment crosses Smoke Creek just south of Alliance.

Alliance to Chadron (Route D, part.) - This segment follows Nebraska Highway 2 northwest of Alliance to Berea where it follows an unpaved section road northward to the intersection of Nebraska Highway 87 and U.S. 385. This unpaved section, and a realignment section west of Chadron, are the only portions of Route Option "D" that do not follow an existing primary arterial route. Development along this segment is sparse and is predominantly farming and ranching. This segment continues to parallel the Burlington Northern Railroad, located immediately to the northeast, up to the village of Berea where the segment diverges from Nebraska Highway 2 and proceeds due north on new alignment up to Nebraska Highway 87.

North of Highway 87, U.S. 385 crosses the valley of the Niobrara River. About 5 miles west of U.S. 385 the Niobrara is impounded as the Box Butte Reservoir. Around this lake is the Box Butte National Wildlife Refuge. A state recreation area is also on the lake. This area would not be impacted by the roadway segment as presently conceived.

The Niobrara River has regional importance for livestock watering and agricultural irrigation and, east of the impact corridor, carries the designation as a "Wild and Scenic River." Such rivers are given special protection under federal law.

The Niobrara Valley is an area of extensive agricultural operations with common occurrences of elaborate agricultural irrigation systems. About 10 miles south of Chadron the route enters the Nebraska National Forest, a scenic area of pine forest and grass meadows. Here the terrain is rolling hills. The scenic and recreational value of the National Forest is emphasized by numerous designated areas, most prominent of which is Chadron State Park. Chadron Creek is well known for brown trout, as are other streams and ponds in the National Forest.

There are two holding ponds on Chadron Creek that supply drinking water to the City of Chadron. A well field along U.S. 385 about 24 miles south of Chadron also supplies drinking water to Chadron.

The segment diverts to the northwest on new alignment west of Chadron. There is sufficient open terrain for a new highway, but care must be exercised to avoid Chadron Creek and a local golf course along U.S. 385 south of Chadron.

Chadron to Hot Springs (Route D, part.) - North of Chadron this segment follows U.S. 385 all the way to just north of the Cheyenne River near Hot Springs. Northwest of Chadron the segment crosses the White River and its associated valley of gently rolling farmlands.

As the segment enters South Dakota, it crosses through the Buffalo Gap National Grasslands, an area of gently rolling, short-grass prairie. The Cheyenne River Valley, which this segment crosses near Hot Springs, is essentially the southern terminus of the Black Hills. The two river crossings may be the most sensitive environmental areas along this segment, along with Horseshead Creek which flows from the Angostura Reservoir south of Hot Springs.

Scottsbluff/Gering to Crawford (Route C) - This segment is on a new location alignment north from Scottsbluff to the intersection Nebraska Highway 2 and Nebraska Highway 71 west of Hemingford. From that intersection the segment follows Nebraska Highway 2/71 to Crawford.

The primary impacts of the new-location portion would likely be associated with potential disruption of suburban development in Scottsbluff and to the North Platte National Wildlife Refuge. This wildlife area centers around a series of lakes northeast of the City of Scottsbluff, primarily Lake Alice and Lake Minatare. As noted earlier, Lake Alice is home to nesting bald eagles.

The new-location portion crosses several creeks and drainage areas, including Winter Creek in Sioux County and Snake Creek in Box Butte County. The gently rolling terrain north of Scottsbluff transitions north of Snake Creek to higher elevations of very gently rolling, almost flat farmland. The northern third of this segment is along an unpaved county section road.

The northern portion of this segment follows Nebraska Highway 2/71 all the way to Crawford. The terrain is very gently rolling as the route approaches the Niobrara River which it crosses just south of Marsland.

North of Marsland in Dawes County, the terrain continues to be relatively gently rolling until Nebraska Highway 2/71 enters the Nebraska National Forest about 10 miles south of Crawford. Although the National Forest is only 4 miles wide at the highway crossing, the terrain is quite hilly and the vegetation (trees) is notably different from lower elevations. The national designation of the forest is indicative of its ecological sensitivity and importance as a natural resource. New highway construction has the potential to be environmentally disruptive in hilly terrain because of the increased levels of cut-and-fill and side-slope stabilization required in these areas. The terrain continues to be rolling hills as the segment approaches Crawford.

Scottsbluff/Gering to Crawford (Route B) - This segment follows existing Nebraska Highway 71 north from Scottsbluff, approximately 27 miles to the point where Highway 71 turns and travels eastward. From this point to the northern boundary of the Nebraska National Forest (about 6 miles south of Crawford) this segment is on new location.

The segment begins in the North Platte River Valley north of Scottsbluff and travels through almost flat farmlands interspersed with scenic buttes. About 20 miles north of Scottsbluff, the route climbs above bluffs to reach a plateau of grasslands and the wide valley of the Niobrara River. The Agate Fossil Beds National Monument is along the Niobrara River, 9-to-10 miles west of this segment, and would not be impacted.

As the segment proceeds northeastward on new location, it parallels to the west a series of 3 power transmission lines until the segment rejoins Nebraska Highway 2/71 on the north boundary of the National Forest. This segment would cross the Nebraska National Forest totally on new location south of Crawford. Extensive environmental studies, along with coordination with the U.S. Department of the Interior, would have to be undertaken to determine whether it would be environmentally responsible to place a new roadway through this protected area. It may result that a reduced cross-section would be advisable, or limiting construction to create a one-way pairing with the existing Highway 2/71.

The boundary of Fort Robinson State Park is less that one mile from existing Nebraska Highway 2/71, but the park is not likely to be affected, as planned improvements in the Crawford area are along the existing roadway.

Crawford to Hot Springs (Routes B and C) - Proceeding north along Nebraska Highway 2/71 from Crawford, this segment crosses several creeks through rolling terrain before entering the Oglala National Grassland about 6 miles north of Crawford. About 5 miles into the grassland, Highway 2/71 turns northwestward and the route segment continues northward on new location toward Hot Springs. It may be advisable to divert the segment eastward from the National Grassland shortly after it proceeds on new location.

The new location portion of this segment is approximately 25 miles in length. Potential impacts to the Oglala National Grassland and to the Buffalo Gap Grassland mandate judicious routing and facility design.

Environmental agencies have suggested, through initial consultation, that this new location section be realigned as far eastward as possible to avoid the habitat range of the swift fox which may already be endangered. This mammal species does not range farther than one or two miles

from its natal dens, but is attracted by highway environments in searching for food. It is not noted for its alertness to the dangers of highway traffic.

Hot Springs to Rapid City (Routes B, C, and D) - The Black Hills parallel South Dakota Highway 79 immediately to the west all the way from Hot Springs to Rapid City. Adjacent terrain is rolling to gently rolling grassland with some cultivated fields and wooded areas along creeks and drainage channels.

All the creeks and channels crossed along this segment drain into the Cheyenne River which Highway 79 crosses south of Hot Springs. Some of these channels have flowing water while in others the flow is seasonal or intermittent. A number of them have been impounded by earthen dams to facilitate livestock watering.

The study corridor crosses the Buffalo Gap National Grassland continuously through its South Dakota portion. The grassland is important in the scenic context, but is also historically important, along with its value for cattle grazing.

As the existing South Dakota Highway 79 alignment proceeds northward toward Rapid City, the corridor is along the scenic foothills for the Black Hills. A number of parks and recreation areas are located west of the corridor, but are not likely to be impacted by roadway improvements. Among these are Wind Cave National Park and Custer State Park.

Chapter 10
STUDY FINDINGS AND CONCLUSIONS

This Heartland Expressway Study sought to determine whether or not a major highway investment between Scottsbluff/Gering and Rapid City is feasible. It examined various route alignments and highway standard options. Nine finalist improvement options were analyzed in terms of cost, traffic, engineering feasibility, environmental implications, and travel efficiency and economic development potential.

FIVE TESTS OF FEASIBILITY

To gauge the feasibility of these alternative investments, five "tests of feasibility" were analyzed:

- Need based on traffic
- Engineering and cost feasibility
- Environmental implications
- Travel efficiency feasibility
- Economic development feasibility

Need Based on Traffic - Both automobile and commercial truck traffic were extensively studied. Roadside surveys were conducted, a computerized traffic model was developed, and surveys were conducted of trucking firms, shipping firms, and other businesses in the region that rely on highway transportation. Traffic estimates were made for all Heartland Expressway alternatives.

Most states start planning to widen rural 2-lane highways to 4-lane when existing daily volumes reach 5,000 to 6,000 vehicles per day. Based on the current highway system in western Nebraska and South Dakota, none of the highways in the region (other than the interstate highways) presently meet that threshold and, only South Dakota Highway 79 between Rapid City and Hermosa is forecast to reach this threshold by the year 2015. However, during peak times of the year (summer tourist season and fall harvest), the segment between Scottsbluff/Gering and Alliance and the segment between Hot Springs and Hermosa currently reach this traffic threshold.

Engineering and Cost Feasibility - Capital cost estimates were developed for each of the Heartland Expressway finalist alternatives. Exhibit 10-1 summarizes these cost estimates.

Given sufficient funds, the analyses suggest that any of the options can be constructed from an engineering perspective.

Exhibit 10-1
CAPITAL COST SUMMARY
($ Million)

	TOTAL
Route Option B	
Freeway	$310.6
Expressway	257.6
Two/Four Lane	145.2
Route Option C	
Freeway	$327.7
Expressway	264.7
Two/Four Lane	147.3
Route Option D	
Freeway	$326.9
Expressway	260.0
Two/Four Lane	147.7

Source: Wilbur Smith Associates, Wells Engineers

Environmental Feasibility - While this study did not comprise an Environmental Impact Statement or even an Environmental Assessment, sufficient environmental review work was done to imply that, in the view of this study team, it is unlikely that any of the environmental impacts will be critical to the point where they cannot be avoided, minimized or mitigated. Care must be taken, however, in the design process to avoid or alleviate environmentally sensitive areas.

Travel Efficiency Feasibility - Any of the Heartland Expressway alternatives will lead to safer and more efficient travel. However, none of the alternatives produce sufficient highway user benefits to outweigh the cost of the project based on travel efficiency. Exhibit 10-2 displays the results of the travel efficiency analysis.

Economic Development Feasibility - The key issue addressed in this study, and the key feasibility test, is whether or not a new or upgraded highway between Scottsbluff/Gering and Rapid City will generate sufficient net economic development impacts to warrant the investment. The remainder of Chapter 10 deals with this economic development test of feasibility.

Exhibit 10-2
TRAVEL EFFICIENCY FEASIBILITY RESULTS

	Net Present Value[a] ($ Million)	Internal Rate of Return	Discounted Benefit/Cost Ratio[a]
Route Option B			
Freeway	-$141.3	2.8%	0.59
Expressway	-141.9	1.7%	0.48
Two/Four Lane	-53.6	3.7%	0.65
Route Option C			
Freeway	-$199.8	1.2%	0.45
Expressway	-151.9	1.6%	0.44
Two/Four Lane	-69.6	2.6%	0.53
Route Option D			
Freeway	-$168.8	2.3%	0.56
Expressway	-161.2	3.5%	0.63
Two/Four Lane	-24.2	5.6%	0.84

(a) Discounted at 7 percent
Source: Wilbur Smith Associates

ECONOMIC OBJECTIVE

One objective of this study is to determine what level of highway investment, if any, is warranted between Scottsbluff/Gering and Rapid City. There are economic consequences of either underinvesting or overinvesting in the highway corridor. If the two States underinvest in the corridor, economic development will be inhibited because real and perceived travel costs will be greater, competitive position will be hindered, etc. There is therefore an economic cost associated with underinvestment in the Scottsbluff/Gering to Rapid City corridor. If the two States overinvest in the corridor, overall efficiency will suffer because those funds could have been put to better more efficient use elsewhere. There is therefore an economic cost associated with overinvestment in the Heartland Corridor.

Recognizing these facts, this study seeks to define those highway investments, and those levels of investment, that are efficient (neither underinvested nor overinvested). This implies efficient and feasible use of tax dollars. The proper level of investment is calculated in terms of travel efficiency and economic development benefits, compared with the highway's costs.

ECONOMIC BASIS FOR A FEASIBLE HIGHWAY PROJECT

The Heartland Expressway would be used to transport goods and people from one place to another. Investment in the Heartland Expressway contributes to economic development in that it will lower transportation costs which makes the corridor region increasingly attractive to other forms of investment. Such changes may be realized in numerous ways, including improved traffic safety, decreases in fuel and other vehicle operating costs, increased tourism, attraction of new industry, revised logistics, and changes in noise and air pollution. But in the final analysis, all of the direct benefits from the Heartland Expressway, and therefore the justification for investing in it, flow from using it for transportation.

Benefits from the Heartland Expressway may not only accrue to persons and businesses whose vehicles use the highway. Lower transportation costs may be passed on to consumers as lower prices for consumer goods, to workers as higher wages, or to owners of businesses as higher net income. Persons may thus benefit from the Heartland Expressway without traveling on it.

It is important to keep in mind that for any of these benefits to occur, the highway investment must either enable significant reductions in transportation costs or cause revised perceptions of the area. If the amount of these savings is small for each trip, if the number of vehicles using the highway is not sufficiently large, or if perceptions do not change dramatically, the investment will not produce benefits that exceed its cost. Highway investment must be based on reasonable estimates of traffic volumes they will service, the cost savings travelers will experience, and a realistic assessment of revised business practices.

Investing in a highway improvement that produces benefits which are less than the associated costs of the improvements inhibit economic development. The costs will be paid by users and other taxpayers in the form of higher taxes, or would be paid in a lost opportunity (an alternative highway would not get improved). These higher taxes work against economic growth within the taxing jurisdiction because they reduce post-tax return to businesses and households by lowering disposable income, and investment in the "wrong" highway project similarly inhibits overall economic growth. Therefore it is imperative that the highway investment be economically feasible; if it is not, it is economically counterproductive.

FEASIBILITY PERSPECTIVES

Whether or not the Heartland Expressway alternatives are viewed as "economically feasible" depends on one's perspective.

Primary Impact Area Perspective - The residents and businesses in western Nebraska and South Dakota are interested in efficiency, but they are also interested in the economic development and economic diversification of their region. The study examined the Heartland Expressway's economic feasibility from the perspective of the communities located in proximity to the highway corridor.

Nebraska and South Dakota Statewide Perspectives - The two States perspective, as represented by the Nebraska Department of Roads and the South Dakota Department of Transportation, is that efficiency is important, and so is statewide economic development. The two States are concerned with their ability to be competitive with other states. The study also examined the Heartland Expressway's economic feasibility from this perspective.

The economic development feasibility tests from these two different perspectives are summarized on Exhibit 10-3. Included in the economic feasibility calculations are all quantifiable public sector financial costs attributable to the highway project (cost of planning, designing, building and maintaining the road improvements) and all quantifiable economic benefits including road user benefits (vehicle operating cost savings, value of time savings, accident cost savings) and also including economic development benefits (competitive advantage benefits, increased visitor/tourism benefits, etc). Excluded from the cost/benefit calculations are the road improvement implications that cannot reasonably be tabulated in monetary terms.

Exhibit 10-3
ECONOMIC DEVELOPMENT FEASIBILITY RESULTS
Heartland Expressway Study

	Two States Perspective[a]			Corridor Perspective[b]		
	B/C	IRR	NPV ($Million)	B/C	IRR	NPV ($ Million)
Route Option B						
Freeway	0.83	5.5%	-57.4	1.30	11.4%	$103.1
Expressway	0.71	4.4%	-79.6	1.21	10.0%	57.8
Two/Four Lane	0.99	6.9%	-1.4	1.48	13.1%	72.7
Route Option C						
Freeway	0.66	3.7%	-$121.8	1.15	9.3%	$53.0
Expressway	0.66	3.9%	-93.8	1.18	9.5%	48.3
Two/Four Lane	0.86	5.8%	-20.6	1.40	12.1%	59.3
Route Option D						
Freeway	0.76	4.6%	-$91.1	1.20	10.2%	$75.6
Expressway	0.79	5.2%	-57.8	1.27	10.6%	73.2
Two/Four Lane	1.07	7.6%	11.0	1.52	13.5%	80.3

(a) Economic development impacts in the two States, includes some travel efficiency benefits.
(b) Economic development impacts in the primary impact area, includes some travel efficiency benefits

Source: Wilbur Smith Associates, REMI model.

Corridor Economic Development Feasibility - From the perspective of western Nebraska and western South Dakota, (the 13-county primary impact area), all Heartland Expressway alternatives are economically feasible. The benefit/cost ratios are all greater than 1.0 (1.15 to 1.52), the internal rates of return are in the range of 9.3 to 13.5 percent, and the net present values are all positive, indicating that the region would benefit by between $53 and $103 million if the Heartland Expressway was constructed. Clearly, from the perspective of those in the corridor, the Heartland Expressway is an economically beneficial and feasible undertaking.

States of Nebraska and South Dakota Economic Development Feasibility - From the two States' perspective, only one Heartland Expressway alternative is economically feasible. Route Option D, which connects Scottsbluff/Gering and Rapid City via Alliance, Chadron and Hot Springs, constructed partially four-lane expressway (between Scottsbluff/Gering and Alliance, and between Rapid City and Hot Springs) and partially an improved two-lane (between Alliance and Hot Springs), is economically feasible from the states' perspective. This alternative has a benefit/cost ratio of 1.07, an internal rate of return of 7.6 percent, and a positive net present value of $11.0 million. According to this calculation, the economies of the two-state region will be better off by $11.0 million if the highway is built than if the highway is not built.

Route Option B (Two/Four Lanes) is nearly feasible with a benefit/cost ratio of 0.99. However, compared to Route Option D, Route B is not nearly as attractive. While Route B is a more direct alignment; between Scottsbluff/Gering and Rapid City, it would carry less traffic and serve fewer people than Route D. Also, since Route D connects the larger cities in the Region, it has a greater ability to foster economic development.

Priority Segments - In South Dakota the highest priority segment is Rapid City to Hermosa. The second highest priority in South Dakota is Hermosa to Hot Springs. In Nebraska the highest priority segment is the connection of existing four-lanes in Scottsbluff to Alliance. Alliance to Hot Springs would be the next priority.

Economic Feasibility as a National High Priority Corridor - The feasibility study indicates that Route Option D (Two/Four Lane) is economically feasible from the perspective of the two States. This indicates that the economies of the two States will be better off if the project is constructed. However, the benefit/cost ratio of 1.07 indicates that this project may not be a high priority. If the two States were to fund the entire project, the project would have to compete with other feasible state projects for limited funds and, based on the 1.07 benefit/cost ratio, the Heartland Expressway might be a lower priority project among feasible projects. However, the Heartland Expressway Corridor is listed as a National High Priority Corridor under the ISTEA act and qualifies for federal demonstration funds. Exhibit 10-4 includes the economic impact from federal demonstration funds on the two States' economy. When these economic impacts are included in the feasibility analysis, with demonstration funds, the project becomes even more feasible from the two States' perspective. These indicators imply that, if the two States can obtain federal demonstration funds to assist in constructing the Heartland Expressway, the project is more feasible and should therefore receive a higher state priority. Using demonstration funds this alternative has a statewide benefit/cost ratio of 1.60, an internal rate of return of 13.7 percent, and a net present value of 92.6 million.

Exhibit 10-4
ECONOMIC IMPACT AND FEASIBILITY INCLUDING FEDERAL DEMONSTRATION FUNDS
States of Nebraska and South Dakota

Route Option D (Two/Four Lane)

Economic Impact of Federal Construction Money

Impact Terms	5-Year Construction Period
Value Added ($000)	$75,432
Wages ($000)	$58,458
Employment	510
Population	607

Economic Feasibility

Feasibility Indicators	
Benefit/Cost	1.60
Net Present Value (000)	$92.6 Million
Internal Rate of Return	13.7%

Source: Wilbur Smith Associates

STUDY RESULTS: ANALYSES AND COMPARISONS ONLY

This study identified alternative route options and highway alternatives between Scottsbluff/Gering and Rapid City. It developed traffic, economic and other statistics for each option.

Based on these statistics and comparisons, the Nebraska Department of Roads and the South Dakota Department of Transportation will make their determination as to what improvements, if any, should be built between Scottsbluff/Gering and Rapid City. This study does not make that decision, nor does it conclude or recommend a particular course of action. Rather, it only presents information which might be useful to the two States in making their decisions.

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APPENDICES

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Appendix A
REGIONAL CHARACTERISTICS AND FORECASTS

The Heartland Expressway Corridor Area extends from Rapid City, South Dakota on the north to Scottsbluff/Gering, Nebraska on the south and to the Wyoming border on the west to generally Nebraska Highway 27 and eastern Shannon and Pennington Counties in South Dakota on the east. This corridor area is approximately 200 miles long and 100 miles wide, containing thirteen counties, seven in South Dakota and six in Nebraska. These thirteen counties include:

South Dakota	Nebraska
Custer	Box Butte
Fall River	Dawes
Lawrence	Morrill
Meade	Scotts Bluff
Pennington	Sheridan
Shannon	Sioux

Population, employment and retail sales are all significant indicators of a county's or region's economic well being. This chapter describes the historical and existing demographic and economic conditions for this thirteen county region.

The Heartland Expressway Corridor extends into two states; South Dakota and Nebraska. The counties in each state are quite diverse, therefore the existing conditions and trends focused on the individual state regions as well as the entire corridor area.

POPULATION

In 1990 the thirteen county corridor area had a total population of 227,122. More than two-thirds of the total corridor population is located in South Dakota and 54 percent of the population is located at either of the the two end points (Pennington County - Rapid City, S.D. and and Scottsbluff County Scottsbluff/Gering, NE). Exhibit A-1 geographically displays 1990 population for the cities and towns located throughout the thirteen county corridor. The thirteen county region is overwhelmingly rural. Besides Rapid City and Scottsbluff/Gering, there are only four communities with a population greater than 5,000 person; Spearfish, S.D. (6,966); Sturgis, S.D. (5,330); Alliance, NE (9,765); and Chadron, NE (5,588).

South Dakota Trends - South Dakota's population as of April 1, 1990 was 696,004, an increase of 0.8 percent since 1980 and 4.6 percent since 1970 (Exhibit A-3). The seven counties within the Heartland Expressway Corridor had a 1990 population of 154,224, 22.3 percent of the total population in South Dakota. The seven corridor counties have increased at a much faster rate than the State. Since 1980 the seven counties have increased by 8.1 percent, and 27.7 percent since 1970. The greatest population increase in the six counties occurred in the northern end of the corridor, primarily in Pennington County (Rapid City), which has gained nearly 22,000 persons since 1970. The remaining six counties, except for Fall River and Butte, have also had significant increases in population.

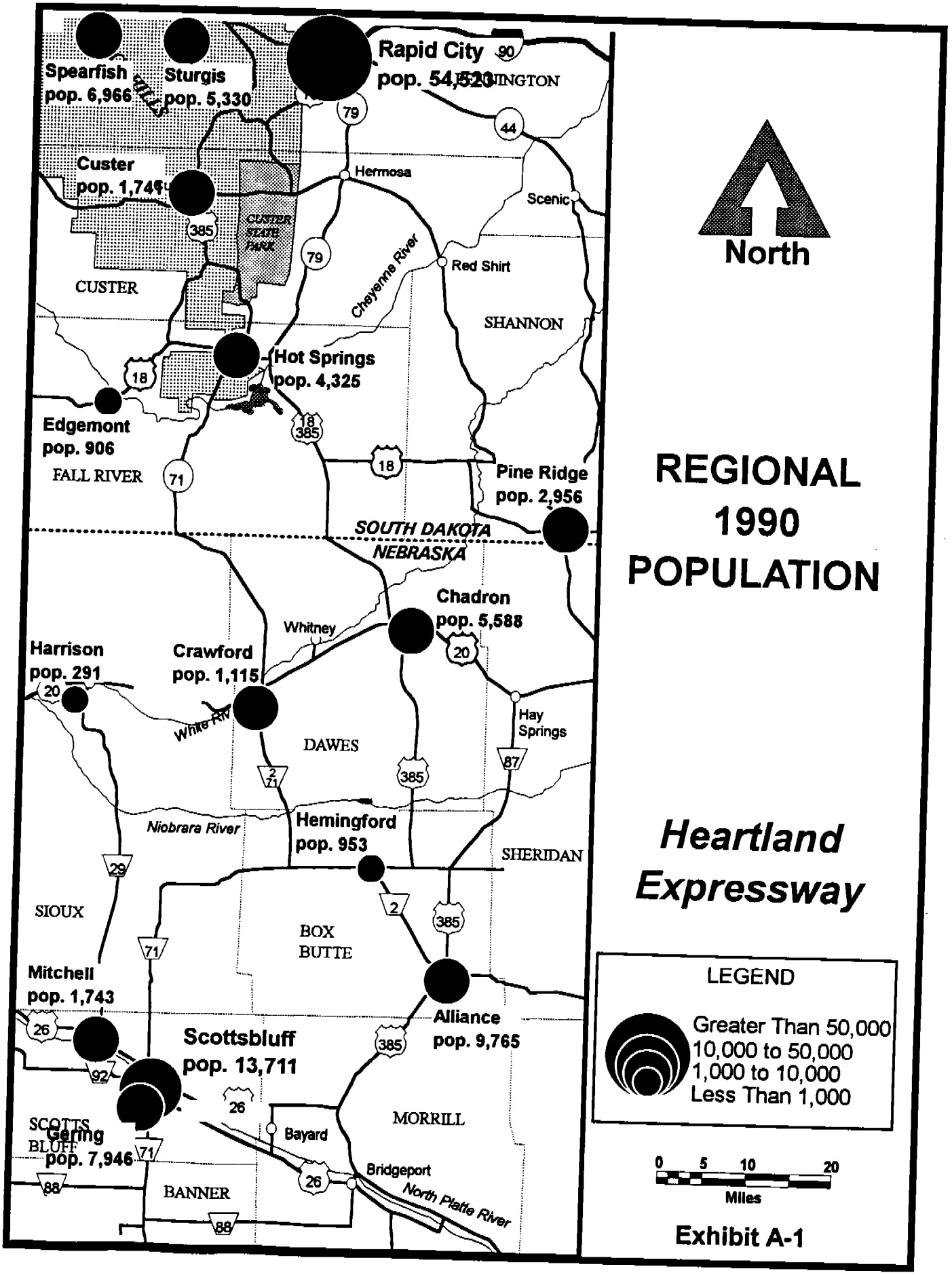

Spearfish
pop. 6,966
Sturgis
pop. 5,330
Rapid City
pop. 54,523
Custer
pop. 1,746
CUSTER STATE PARK
Hermosa
Scenic
Red Shirt
Cheyenne River
CUSTER
SHANNON
Hot Springs
pop. 4,325
Edgemont
pop. 906
FALL RIVER
Pine Ridge
pop. 2,956
SOUTH DAKOTA
NEBRASKA
Chadron
pop. 5,588
Whitney
Harrison
pop. 291
Crawford
pop. 1,115
White Riv
DAWES
Hay Springs
Niobrara River
Hemingford
pop. 953
SHERIDAN
SIOUX
BOX BUTTE
Mitchell
pop. 1,743
Scottsbluff
pop. 13,711
Alliance
pop. 9,765
SCOTTS BLUFF
Gering
pop. 7,946
Bayard
MORRILL
Bridgeport
North Platte River
BANNER
North
REGIONAL
1990
POPULATION
Heartland
Expressway
LEGEND
Greater Than 50,000
10,000 to 50,000
1,000 to 10,000
Less Than 1,000
0 5 10 20
Miles

Exhibit A-1

Exhibit A–2
Population and Economic Activity Centers

	Community	Population		Community	Population
SD	Rapid City city	54,523	NE	Terrytown village	656
NE	Scottsbluff city	13,711	SD	Hill City city	650
NE	Alliance city	9,765	SD	New Underwood city	553
NE	Gering city	7,946	NE	Big Springs village	495
SD	Spearfish city	6,966	NE	Lyman village	452
NE	Sidney city	5,959	SD	Oglala CDP	422
NE	Chadron city	5,588	NE	Potter village	388
SD	Sturgis city	5,330	NE	Lodgepole village	368
SD	Hot Springs city	4,325	NE	Lewellen village	307
SD	Lead city	3,632	NE	Harrison village	291
SD	Box Elder city	2,680	NE	Dalton village	282
SD	Pine Ridge CDP	2,596	SD	Manderson–White Horse	243
NE	Kimball city	2,574	SD	Hermosa town	242
SD	Blackhawk CDP	1,995	SD	Keystone town	232
SD	Deadwood city	1,830	NE	Dix village	229
NE	Gordon city	1,803	SD	Central City city	185
NE	Mitchell city	1,743	SD	Buffalo Gap town	173
SD	Custer city	1,741	NE	Broadwater village	160
NE	Bridgeport city	1,581	NE	Henry village	145
NE	Bayard city	1,196	SD	Oelrichs town	138
NE	Rushville city	1,127	SD	Batesland town	124
NE	Crawford city	1,115	NE	Bushnell village	119
NE	Oshkosh city	986	NE	Melbeta village	116
NE	Chappell city	979	NE	McGrew village	99
NE	Morrill village	974	SD	Pringle town	96
NE	Hemingford village	953	SD	Wasta town	82
SD	Kyle CDP	914	SD	Quinn town	72
SD	Edgemont city	906	SD	Fairburn town	62
SD	Whitewood city	891	NE	Whitney village	38
SD	Wall town	834	NE	Clinton village	33
NE	Minatare city	807	SD	Wounded Knee CDP	18
NE	Hay Springs village	693	NE	Marsland village	10

Source: PL94 File, 1990 U.S. Census Bureau

Exhibit A-3
TOTAL POPULATION
1970-1990

Nebraska Counties	1970	1980	1990	% Change 1970-1990	% Change 1980-1990
Box Butte	10,094	13,696	13,130	30.1%	-4.1%
Dawes	9,693	9,609	9,021	-6.9%	-6.1%
Morrill	5,813	6,085	5,423	-6.7%	-10.9%
Scottsbluff	36,432	38,344	36,025	-1.1%	-6.0%
Sheridan	7,285	7,544	6,750	-7.3%	-10.5%
Sioux	2,034	1,845	1,549	-23.8%	-16.0%
Nebraska Study Area	71,351	77,123	71,898	0.8%	-6.8%
State of Nebraska	1,483,493	1,569,825	1,578,385	6.4%	0.5%
Percent of State	4.8%	4.9%	4.6%		
South Dakota Counties					
Butte	7,770	8,370	7,914	1.9%	-5.4%
Custer	4,698	6,000	6,179	31.5%	3.0%
Fall River	7,505	8,439	7,353	-2.0%	-12.9%
Lawrence	17,453	18,339	20,655	18.3%	12.6%
Meade	16,618	20,717	21,878	31.7%	5.6%
Pennington	59,349	70,361	81,343	37.1%	15.6%
Shannon	8,198	11,323	9,902	20.8%	-12.5%
S.D. Study Area	121,591	143,549	155,224	27.7%	8.1%
State of S.D.	665,507	690,768	696,004	4.6%	0.8%
Percent of State	18.3%	20.8%	22.3%		

SOURCE: U.S. Census Bureau, Wilbur Smith Associates

Nebraska Trends - Nebraska's population as of 1990 was 1,578,385, an increase of 0.5 percent from 1980 and 6.4 percent since 1970 (Exhibit A-3). The six counties within the Heartland Expressway Corridor had a 1990 population of 71,898, a decrease from 1980 of 6.8 percent, but a small increase from 1970 of 0.8 percent. All six counties experienced declines in population during the 1980's, and only Box Butte County has a larger population than it had in 1970. The six counties in the corridor have also been losing its share of population compared to the State. In 1970, the six counties accounted for 4.8 percent of the Nebraska's population; by 1990 this share had decreased to 4.6 percent.

EMPLOYMENT

Employment trends are usually a good indicator of the overall soundness of a local economy. This section focuses on manufacturing, agriculture, and wholesale trade, since these employment sectors usually generate significant amounts of truck and commercial traffic. These employment sectors are also considered "basic" or export industries. These industries produce output that is not consumed locally, but is exported out of the region for national and international consumption. In contrast, "non-basic" sectors, which generally include retail trade, transportation, and construction, produce products or provide services that are consumed locally. The growth of "non-basic" industries largely depend on the growth of "basic" industries that form the basis of the region's economy.

In 1990, the thirteen county corridor area's total employment was 121,370 an increase of 45.3 percent since 1970 and an increase of 9.3 percent from 1980 (Exhibit A-4). The largest portion of this employment growth has occurred in the South Dakota section of the corridor. The seven counties in South Dakota have increased 58.6 percent in total employment since 1970. The largest growth in this area has been in Pennington County (Rapid City). Pennington County has almost doubled its employment base over the last 20 years, increasing nearly 75 percent during that period. This six-county area has been increasing at a much faster rate than the State of South Dakota. Since 1970, the seven counties have increased its total employment by 59 percent compared to the rest of the State's 26 percent.

The six counties in the Nebraska corridor area have also increased its employment base over the last 20 years. However, the employment growth occurred during the 1970's and has since been stable in places and has steadily decreased in other places. Scotts Bluff (Scottsbluff/Gering) and Box Butte (Alliance) Counties have had the largest increase in total employment, accounting for 91.2 percent of the six counties total growth of the last 20 years. The six counties in the Nebraska section of the corridor have also been increasing at a slower rate than the rest of the State. From 1970, the rest of Nebraska has increased in total employment base by 35.3 percent compared to the six counties 23.3 percent.

Exhibit A-4
TOTAL EMPLOYMENT
1970-1990

Nebraska Counties	1970	1980	1990	% Change 1970-1990	% Change 1980-1990
Box Butte	4,410	7,830	7,390	67.6%	-5.6%
Dawes	4,240	4,560	4,410	4.0%	-3.3%
Morrill	2,350	2,720	2,430	3.4%	-10.7%
Scottsbluff	16,470	20,550	20,200	22.6%	-1.7%
Sheridan	3,250	4,120	3,700	13.8%	-10.2%
Sioux	890	950	840	-5.6%	-11.6%
Nebraska Study Area	31,610	40,730	38,970	23.3%	-4.3%
State of Nebraska	706,970	868,080	952,470	34.7%	9.7%
Percent of State	4.5%	4.7%	4.1%		
South Dakota Counties					
Butte	3,430	3,690	3,480	1.5%	-5.7%
Custer	2,050	2,580	3,190	55.6%	23.6%
Fall River	3,200	4,090	3,750	17.2%	-8.3%
Lawrence	6,690	8,750	10,730	60.4%	22.6%
Meade	4,620	5,550	6,250	35.3%	12.6%
Pennington	30,160	42,950	52,750	74.9%	22.8%
Shannon	1,790	2,660	2,250	25.7%	-15.4%
S.D. Study Area	51,940	70,270	82,400	58.6%	17.3%
State of S.D.	297,600	349,150	393,080	32.1%	12.6%
Percent of State	17.5%	20.1%	21.0%		

SOURCE: U.S. Census Bureau, Wilbur Smith Associates

Manufacturing Employment - The manufacturing industry is primarily recognized as the major export or "basis" sector of a regional economy. Usually a region with a strong and growing manufacturing sector indicates a strong and expanding local economy. An area with a large manufacturing base usually has a large variety of service and retail industries to provide for the manufacturing industries and their employees. The definition of manufacturing includes establishments engaged in the mechanical or chemical transformation of materials or substances into new products. Included are establishments engaged in assembling component parts not associated with structures and in blending materials.

In 1990, the thirteen county corridor area had a total manufacturing employment of approximately 8,200, an increase of 59.3 percent since 1970 (Exhibit A-5). However, nearly all of this increase in manufacturing employment has occurred in the South Dakota section of the Corridor. The seven counties in South Dakota has more than doubled its manufacturing base over the last 20 years (an increase of 123 percent). The Nebraska counties, however, have only witnessed a small increase in manufacturing employment over the last 20 years, with the majority of this increase occurring during the 1970's, and has since seen a significant decrease (21.1 percent) during the 1980's.

South Dakota Manufacturing - According to the Governor's Office of Economic Development, there are 190 manufacturing establishments in the South Dakota portion of the study area. The majority of these industries (57 percent - 109 out of 190) are located in Rapid City. The largest manufacturing establishments in the region are primarily mining or mining related. The largest manufacturer employer in the region is the Homestake Mining Company, located in Lead, which has over a 1,000 employees. Other large manufacturers (employing more than 200 employees) in the South Dakota region include:

Manufacturer	Primary Industry	Location
SCI Manufacturing	Printed Circuit Boards	Rapid City
Black Hills Jewelry Mfg.	Jewelry, Precious Metals	Rapid City
Black Hills Packing Co.	Meat Products	Rapid City
Black Hills Special Services Coop.	Wood Products	Sturgis
Coleman - Frizzell, Inc.	Jewelry, Precious Metals	Rapid City
Hills Materials Company	Construction Sand & Gravel	Rapid City
Merillat Industries	Particleboard	Rapid City
Pope and Talbot, Inc.	Lumber Products	Spearfish
Rushmore Gold Co.	Jewelry, Precious Metals	Rapid City
South Dakota Cement Plant	Cement	Rapid City

Export industries (selling to people and places outside of the area) are generally the economic foundation of a region and its source of growth. The basis behind the importance of the export industries lies on the assumption that as manufacturers increase their exports outside the region, it will automatically lead to an increase in the "non-basic" or service sector. In the seven counties in South Dakota, 23 percent (43 out of 190) of the manufacturing industries are categorized as basic or export industries.

Exhibit A-5
TOTAL MANUFACTURING EMPLOYMENT
1970-1990

Nebraska Counties	1970	1980	1990	% Change 1970-1990	% Change 1980-1990
Box Butte	110	520	570	418.2%	9.6%
Dawes	70	60	60	-14.3%	0.0%
Morrill	180	170	170	-5.6%	0.0%
Scottsbluff	2,310	2,680	1,920	-16.9%	-28.4%
Sheridan	90	180	130	44.4%	-27.8%
Sioux	0	0	0	---	---
Nebraska Study Area	2,760	3,610	2,850	40,010	-21.1%
State of Nebraska	35,440	42,660	40,010	7.1%	-6.2%
Percent of State	7.8%	8.5%	7.1%		
South Dakota Counties					
Butte	100	70	70	-30.0%	0.0
Custer	200	240	300	50.0%	25.0%
Fall River	70	90	40	-42.9%	-55.6%
Lawrence	180	490	810	350.0%	65.3%
Meade	10	260	360	3,500.0%	38.5%
Pennington	1,760	3,120	3,800	115.9%	21.8%
Shannon	110	160	40	-63.6%	-75.0%
S.D. Study Area	2,430	4,430	5,420	123.0%	22.3%
State of S.D.	16,800	27,350	33,940	102.0%	24.1%
Percent of State	13.9%	15.9%	15.8%		

SOURCE: Woods and Poole Economics, Wilbur Smith Associates

Nebraska Manufacturing - According to the Nebraska Department of Economic Development, the six counties in the Nebraska study area have a total of 114 manufacturing establishments. These industries are spread throughout the study area, but the majority of these establishments are located in the southern end of the corridor in Scottsbluff and Gering (51 percent - 58 out of 114). The largest two manufacturing employers in the region are the Lockwood Corporation industrial and commercial machinery) in Gering and Western Sugar Co. in Scottsbluff. Western Sugar also has large plants located in Mitchell and Bayard. These two industries each employ over 200 persons. Below is a list of other major manufacturers (employ over 100 persons) in the Nebraska study area:

Manufacturer	Primary Industry	Location
Dayco Alliance	Industrial Hose	Alliance
Industrial/Midwec	Capacitor Assembly	Scottsbluff
Packerland Packing Co.	Beef Processing	Gering
Western Valley Processing Co.	Beef, Beef Byproducts	Scottsbluff
Woolrich Inc.	Insulated Jackets, Coats	Alliance

There are only 16 manufacturing establishments (14 percent) in the Nebraska section that are categorized as export industries. This lack of new export industries is a possible cause for the sluggish economy this region has witnessed over the last decade.

Wholesale Trade Employment - The wholesale trade industry includes establishments primarily engaged in selling merchandise to retailers or to industrial, commercial, farm, construction, contractors or professional business users or to other wholesalers or brokers. In 1990, the thirteen county corridor area had a total wholesale employment base approximately 4,750 employees, an increase of 111 percent (Exhibit A-6). This increase is primarily from an expansion of the entire wholesale trade industry nationwide. However, both the South Dakota counties and the Nebraska counties have had large increases in the wholesale trade industry compared to their respective states during this 20 year period. Similar to manufacturing employment, the six counties in the Nebraska corridor area have had a decline in the wholesale trade industry during the 1980's. The South Dakota counties, however, have continued to increase, but a lesser rate of growth.

TOTAL RETAIL SALES

Retail sales includes total sales from establishments engaged in selling merchandise for personal or household consumption and rendering services incidental to the sale of the goods. Buying goods for resale to the consumer is a characteristic of retail trade establishments. The retail sales in Exhibit A-7 are at 1990 price levels.

Trends in retail sales are a good indicator of the vitality of a county's retail sector. By comparing the trend in retail sales compared to population growth, one can analyze an area's ability to attract or lure shoppers to the area.

Exhibit A-6
TOTAL WHOLESALE TRADE EMPLOYMENT
1970-1990

Nebraska Counties	1970	1980	1990	% Change 1970-1990	% Change 1980-1990
Box Butte	80	300	260	225.0%	-13.3%
Dawes	90	210	160	77.8%	-23.8%
Morrill	10	170	130	1,200.0%	-23.5%
Scottsbluff	710	1,460	1,150	62.0%	-21.2%
Sheridan	40	210	200	400.0%	-4.8%
Sioux	10	10	20	100.0%	100.0%
Nebraska Study Area	940	2,360	1,920	104.3%	-18.6%
State of Nebraska	29,530	51,410	55,290	87.2%	7.5%
Percent of State	3.2%	4.6%	3.5%		
South Dakota Counties					
Butte	80	20	20	-75.0%	0.0%
Custer	30	30	30	0.0%	0.0%
Fall River	30	50	40	33.3%	-20.0%
Lawrence	80	170	250	212.5%	47.1%
Meade	70	250	240	242.9%	-4.0%
Pennington	1,020	1,670	2,270	122.5%	35.9%
Shannon	10	0	0	-100.0%	---
S.D. Study Area	1,320	2,190	2,850	115.9%	30.1%
State of S.D.	11,060	19,350	20,120	81.9%	4.0%
Percent of State	11.2%	11.2%	14.1%		

SOURCE: Woods and Poole Economics, Wilbur Smith Associates

Exhibit A-7
TOTAL RETAIL SALES
1970-1990 ($ Million)

Nebraska Counties	1970	1980	1990	% Change 1970-1990	% Change 1980-1990
Box Butte	66.7	77.3	12.0	-7.0	-19.8
Dawes	57.4	63.3	58.2	1.4	-8.1
Morrill	30.4	22.4	13.0	-57.2	-42.0
Scottsbluff	266.8	299.6	272.7	2.2	-9.0
Sheridan	51.8	53.8	28.9	-44.2	-46.3
Sioux	2.2	3.4	3.1	40.9	-8.8
Nebraska Study Area	475.3	519.8	437.9	-7.9	-15.8
State of Nebraska	8,921.3	10,153.9	10,099.6	13.2	-0.5%
Percent of State	5.3%	5.1%	4.3%		
South Dakota Counties					
Butte	38.7	41.9	31.0	-19.9	-26.0
Custer	18.6	26.1	24.5	31.7	-6.1
Fall River	36.7	46.2	37.2	1.4	-19.5
Lawrence	88.9	105.9	118.1	32.8	11.5
Meade	66.8	69.9	63.8	-4.5	-8.7
Pennington	480.7	670.5	755.2	57.1	12.6
Shannon	7.3	9.9	8.0	9.6	19.2
S.D. Study Area	737.7	970.4	1,037.8	40.7	6.9
State of S.D.	3,664.6	4,329.1	4,353.0	18.8	0.6
Percent of State	20.1%	22.4%	22.5%		

SOURCE: U.S. Census Bureau, Wilbur Smith Associates

In 1990, the thirteen county corridor area had total retail sales of approximately $1.47 billion. This is an increase of approximately 21.7 percent from 1970, in constant dollars, and is relatively unchanged from 1980. Nearly all of this growth in retail sales has occurred in the South Dakota section of the Heartland Expressway corridor. The seven counties in South Dakota have had a 40.7 percent increase in retail sales since 1970, which is much higher than the state's increase of just over 19 percent. This magnitude of the increase in retail sales is primarily caused by the Black Hills tourist industry in this area.

Over the past 20 years, the six counties in Nebraska have witnessed a slight increase in retail activity during the 1970's, but have had this increase disappear through the 1980's. The State of Nebraska, however, has had a slightly larger increase in retail activity during the 1970's and has remained fairly constant during the 1980's

DEMOGRAPHIC FORECASTS

As input into the traffic forecasting and economic models, population and employment forecasts have been created for the Heartland Expressway Study Area.

Population and employment are indicators of a region's economic growth or decline. Employment and population are particularly important for three reasons: 1) they reflect the flow of economic activity as industries emerge or relocate in growing areas, 2) they indicate migration patterns in relation to job opportunities, and 3) they create local and regional traffic levels between communities.

Source of Forecasts - The forecast analyses rely on a variety of sources. Forecasts for the six-county Nebraska Study Area rely on projections prepared by NPA Data Services, Inc. The specific economic forecasting models used by NPA Data Services to generate population and employment forecasts for each county follow a standard economic base approach. The NPA projection method reflects national and international as well as regional and local economic growth trends, and utilizes current demographic patterns of births, deaths and international and regional migrants. The South Dakota demographic forecasts rely on information provided by the South Dakota Department of Transportation and historical trends. Published forecasts for the Black Hills Region of South Dakota are somewhat dated, with the result that they do not include demographic activity after gaming was established in Deadwood. Therefore, recent local forecasts were used for the South Dakota region.

Population Forecasts - According to the NPA Data population growth trends, the long term outlook for the Heartland Corridor Area indicates an overall moderate increase. The thirteen counties resident population is forecast to increase by 22.3 percent from 1990 to the year 2015. Exhibit A-8 displays the entire population forecasts for the Heartland Expressway Corridor Area.

Exhibit A-8
POPULATION PROJECTIONS
1970-1990
($ Million)

Nebraska Counties	1970	1990	2015	Annual Change 1970-1990	Annual Change 1990-2015
Box Butte	10,094	13,130	15,040	1.32%	0.54%
Dawes	9,693	9,021	8,840	-0.36%	-0.08%
Morrill	5,813	5,423	5,410	-0.35%	-0.01%
Scottsbluff	36,432	36,025	36,025	-0.06%	0.10%
Sheridan	7,285	6,750	6,750	-0.38%	-0.01%
Sioux	2,034	1,549	1,549	-1.35%	-0.64%
Nebraska Study Area	71,351	71,898	71,898	0.04%	0.13%
South Dakota Counties					
Butte	7,770	7,914	8,320	0.09%	0.20%
Custer	4,698	6,179	6,650	1.38%	0.29%
Fall River	7,505	7,353	7,340	-0.10%	-0.01%
Lawrence	17,453	20,655	27,810	0.85%	1.20%
Meade	16,618	21,878	25,070	1.38%	0.55%
Pennington	59,349	81,343	116,890	1.59%	1.46%
Shannon	8,198	9,902	11,520	0.95%	0.61%
S.D. Study Area	121,591	155,224	203,600	1.23%	1.09%
TOTAL	192,942	227,122	277,880	0.82	0.81%

SOURCE U.S. Census Bureau, NPA Data Services, Inc.
South Dakota Department of Transportation
Wilbur Smith Associates

Overall, the Nebraska Study Area is forecast to experience a slight increase in population during the 25 year period (3.3 percent). However, all of this growth is expected in two counties -- Box Butte and Scottsbluff. Box Butte is forecast to experience the largest increase (14.5 percent), with Scotts Bluff County expected to increase at 2.5 percent. Dawes, Morrill, and Sheridan Counties are all forecast to experience slight declines in population (2.0, 0.2, and 0.3 percent declines respectively). The largest percent decrease is forecast for Sioux County (14.8 percent), although the actual person decrease expected is only 229 persons.

Western South Dakota is forecast to experience a greater increase in population over the next 25 years. Overall, the seven-county area is forecast to increase by 31.2 percent (48,375 persons) by the year 2015. The largest percentage increase is forecast for Pennington County at 43.7 percent, for a growth rate of 1.46 percent per year. The next largest increase is forecast for Lawrence County at 34.6 percent. All counties in the South Dakota study are forecast to increase between 1990 and 2015.

Employment Forecasts - The thirteen-county Heartland Expressway Study Area is also forecast to experience a moderate increase in employment. The Study Area is forecast to increase from a base of 121,370 jobs in 1990 to a total of 174,420 jobs in the year 2015 (a 43.7 percent increase). Exhibit A-9 displays the employment forecasts for the two state Heartland Expressway Study Area.

The six-counties in the Nebraska Study Area are forecast to experience a 12.9 percent increase in employment (5,030 jobs). The largest employment increase is forecast for Box Butte County, where total jobs are expected to increase by 31.3 percent. The only county expected to experience a decrease in employment is Sioux County, where 130 jobs are expected to be lost.

The South Dakota portion of the Heartland Study Area is forecast to experience a significant increase in the number of jobs to the year 2015. Overall, employment in the seven counties is expected to increase by 58.3 percent (48,020 jobs). The largest increase in employment is forecast for Pennington County (an increase of 33,790 jobs). The largest percentage increase is expected in Custer, Lawrence and Pennington counties (64.0 percent). All counties in the seven county South Dakota Study Area are forecast to experience employment increases in the next 25 years.

Relevance to the Heartland Corridor - These population and employment forecasts assume that the Heartland Corridor highway is not built. If the highway is built, that could cause additional population and employment growth.

The significance of these estimates is that, since traffic volumes generally reflect population size, some growth in traffic in the corridor can be expected. However, most of that growth will occur on the northern segments, because that is where the population growth is expected.

Exhibit A-9
EMPLOYMENT FORECASTS

Nebraska Counties	1970	1990	2015	Annual Change 1970-1990	Annual Change 1990-2015
Box Butte	4,410	7,390	9,700	2.61%	1.09%
Dawes	4,240	4,410	4,520	0.20%	0.10%
Morrill	2,350	2,430	2,490	0.17%	0.10%
Scottsbluff	16,470	20,200	22,520	1.03%	0.44%
Sheridan	3,250	3,700	4,060	0.65%	0.37%
Sioux	890	840	710	-0.29%	-0.67%
Nebraska Study Area	31,610	38,970	44,000	1.05%	0.49%
South Dakota Counties					
Butte	3,430	3,480	3,750	0.07%	0.30%
Custer	2,050	3,190	5,423	2.24%	2.14%
Fall River	3,200	3,750	4,042	0.80%	0.30%
Lawrence	6,690	10,730	17,868	2.39%	2.06%
Meade	4,620	6,250	8,411	1.52%	1.19%
Pennington	30,160	52,750	88,180	2.83%	2.08%
Shannon	1,790	2,250	2,746	1.15%	0.80%
S.D. Study Area	51,640	82,400	130,420	2.36%	1.85%
TOTAL	83,550	121,370	174,420	1.88%	1.46%

SOURCE: U.S. Census Bureau, NPA Data Services, Inc.
South Dakota Department of Transportation
Wilbur Smith Associates

Appendix B
AUTOMOBILE ORIGIN AND DESTINATION SURVEY RESULTS

To provide insights into traffic demand in and around the Heartland Expressway Study Area, origin and destination travel surveys were conducted throughout the corridor. To understand traffic seasonal variations, two separate sets of roadside surveys were conducted. The first set was conducted in August (peak season), to reflect the higher travel volumes during the summer months. The surveys were repeated in late October (off peak season) to ascertain the difference between the peak and off-peak travel seasons and to measure the magnitude of the tourist and recreational traffic during the summer months.

Roadside surveys were conducted at 10 locations between Rapid City and Scottsbluff/Gering; in addition, rest area and license plate surveys of automobiles were conducted at 4 locations on Interstate 80 and Interstate 90. The interstate surveys were conducted to determine the number of long distance trips, currently using the interstate system, that could conceivably divert to the Heartland Expressway.

Truck surveys were conducted at weigh stations on Interstate 80 and Interstate 90. These truck surveys were conducted to determine the number of long distance truck trips that could conceivably divert to the Heartland Expressway. The trucking results are presented in Appendix C.

The traffic model created for the Heartland Expressway Feasibility Study is a peak season model, used to estimate and forecast traffic during the periods of greatest traffic volumes. The peak season traffic surveys were used to determine traffic flows in the traffic model, while the off-peak season traffic surveys were used to forecast travel over an annualized period. The peak season survey results will be discussed first, followed by a comparison of the Fall and Summer survey results.

PEAK SEASON (SUMMER) SURVEY RESULTS

The 10 survey locations were selected to intercept all or the majority of traffic that is traveling within or at entry points into the corridor. Exhibits B-1 and B-2 display the locations of the 10 survey sites.

Data Expansion - Since the roadside surveys were only conducted for 12 hours each day, the survey information was factored to represent total daily volumes. To represent the daily number of trips, the survey trip records were entered into a computerized data base and expanded to the peak season traffic volume based on vehicle type and survey hour for each survey location. This expansion process produced a total of 13,734 auto trips, matching the total peak season traffic volume of 13,740 for the ten survey locations.

Exhibit B-1
PEAK SEASON ROADSIDE SURVEY LOCATIONS

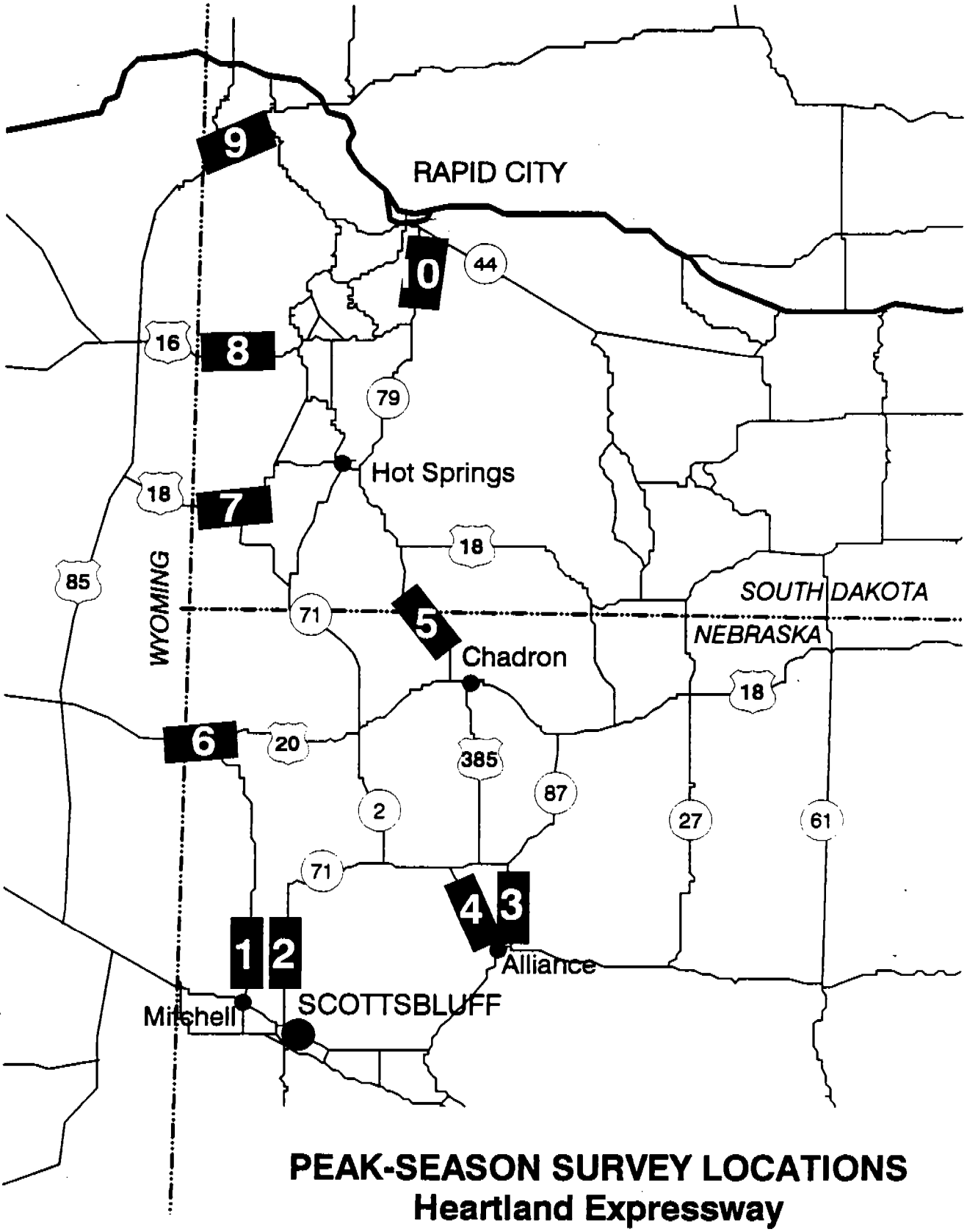
STATION #	STATION LOCATION	DIRECTION SURVEYED
1	SR 29 North of Mitchell, NE	Northbound
2	SR 71 Near Sioux/Scottsbluff Co. Line	Northbound
3	US 385 North of Alliance, NE	Northbound
4	SR 2 North of Alliance, NE	Northbound
5	US 385 Near NE/SD Border	Northbound
6	US 20 West of Harrison, NE	Eastbound
7	US 18 East of SD/WY Border	Eastbound
8	US 16 East of SD/WY Border	Eastbound
9	US 85 East of SD/WY Border	Eastbound
10	SR 79 South of Rapid City	Southbound

Surveys were conducted from 7 a.m. to 7 p.m., between Tuesday, August 4, 1992 and Wednesday, August 12, 1992. Autos and trucks were stopped and information was obtained regarding:

- Trip Origin
- Trip Destination
- Trip Purpose
- Type of Vehicle
- Number of Occupants
- License Plate of Vehicle

The survey form is presented as Exhibit B-3.

Survey Response Rate - During the Summer survey period 3,860 autos were surveyed. Due to modest traffic volumes, a high sampling rate was achieved during the 12 hour period surveyed. Exhibit B-4 displays the total number of automobiles surveyed by station location along with the peak hour traffic volume for the station location.



PEAK-SEASON SURVEY LOCATIONS
Heartland Expressway

Exhibit B–2

Serial Number:
Date:

HEARTLAND EXPRESSWAY O&D STUDY

Hour starting: _____
Interviewer: _____

STATION LOCATION: Station Number: ___ Direction: EB WB

VEH. TYPE	NUMBER OF PERSONS	ORIGIN Where did this trip begin ?	DESTINATION Where will this trip end ?	TRIP PUR-POSE	State of License Plate
		State: City: County:	State: City: County:		
		State: City: County:	State: City: County:		
		State: City: County:	State: City: County:		
		State: City: County:	State: City: County:		

VEHICLE TYPE

C = Passenger Car, Pick-ups & Vans
B = Buses & RV's
L = Light Truck
H = Heavy Truck
O = Others

TRIP PURPOSE

W = To/From Work
B = On Business
V = Vacation
O = Others

Exhibit B – 3

Exhibit B-4
SURVEY RESPONSE RATE

STATION #	Autos Surveyed	Peak Season Auto ADT	RESPONSE RATE
1	145	280	51.7%
2	272	670	40.6
3	422	1,400	30.1
4	659	1,830	36.0
5	513	960	53.4
6	104	590	17.6
7	263	1,400	18.8
8	347	1,550	22.4
9	201	560	35.9
10	934	4,500	20.8
	3,860	13,740	28.1%

NOTE: Surveys were conducted in one direction only.

Vehicle Type - The roadside survey classified vehicles by type; passenger vehicles (including recreational vehicles and motorcycles), heavy trucks (multi- axle, tractor trailer combinations) and light trucks (single axle trucks). The survey results reveal that over 85 percent of all trips in the corridor are made by passenger vehicles (Exhibit B-5). Trucks make up just over 10 percent of all trips, with the majority of these vehicles being the heavy, multi-axle trucks. It should be noted that these figures are an average of all 10 survey locations, and that at Stations 5 (US 385 near South Dakota/Nebraska Border) and 6 (US 20 West of Harrison), truck percentages were a little higher, totaling over 20 percent of all vehicles (complete truck survey results are discussed later).

Trip Purpose - The survey data was classified by trip purpose as illustrated in Exhibit B-6. The survey results reveal that the majority of auto trips in the corridor during the peak travel season are vacation or recreational trips. These vacation trips account for 46.4 percent of the total trips. Business trips make up 21.1 percent of the total trips in the corridor, while motorists going to work account for 17.2 percent, and other trips make up 15.3 percent of all auto trips.

Vehicle Occupancy - The roadside survey also tabulated the number of occupants in each vehicle. From the survey, the average number of persons per passenger vehicle in the corridor during the peak season is 2.18. However, vehicle occupancy by trip purpose varied significantly. Vehicles with occupants traveling for recreational or vacation purposes had an average of 2.71 persons per vehicle, motorists traveling for business has a vehicle occupancy of 1.65, and vehicles traveling to/from work had the least persons per vehicle, with an average of 1.47.

Exhibit B–5
SUMMER SURVEY TRIPS BY VEHICLE TYPE

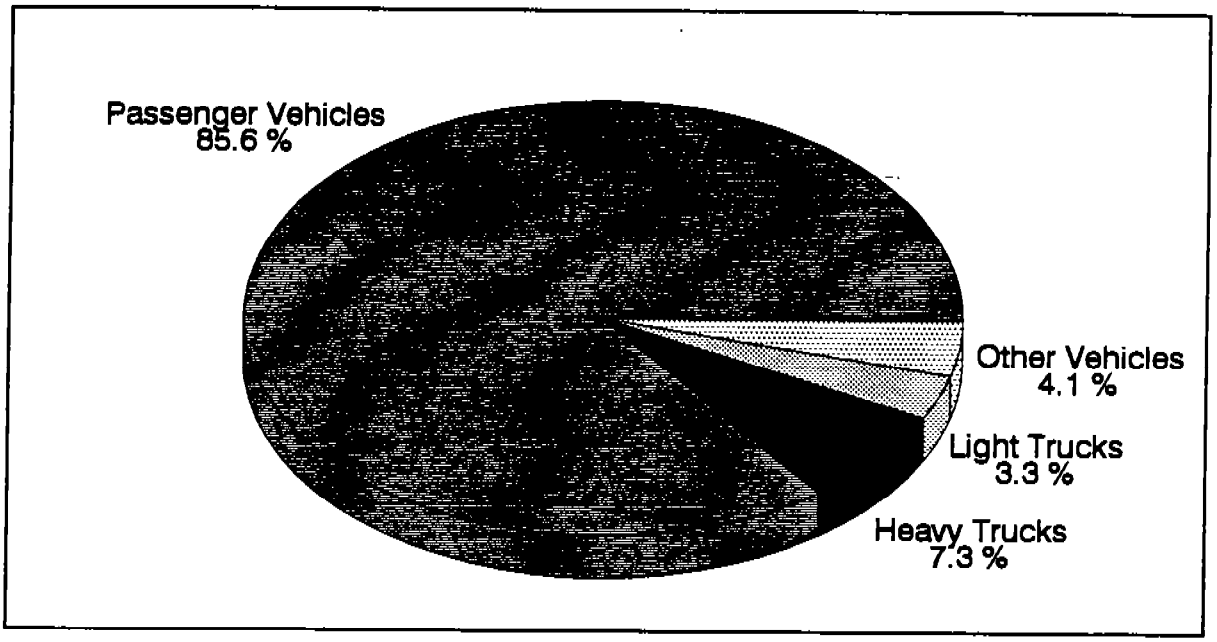
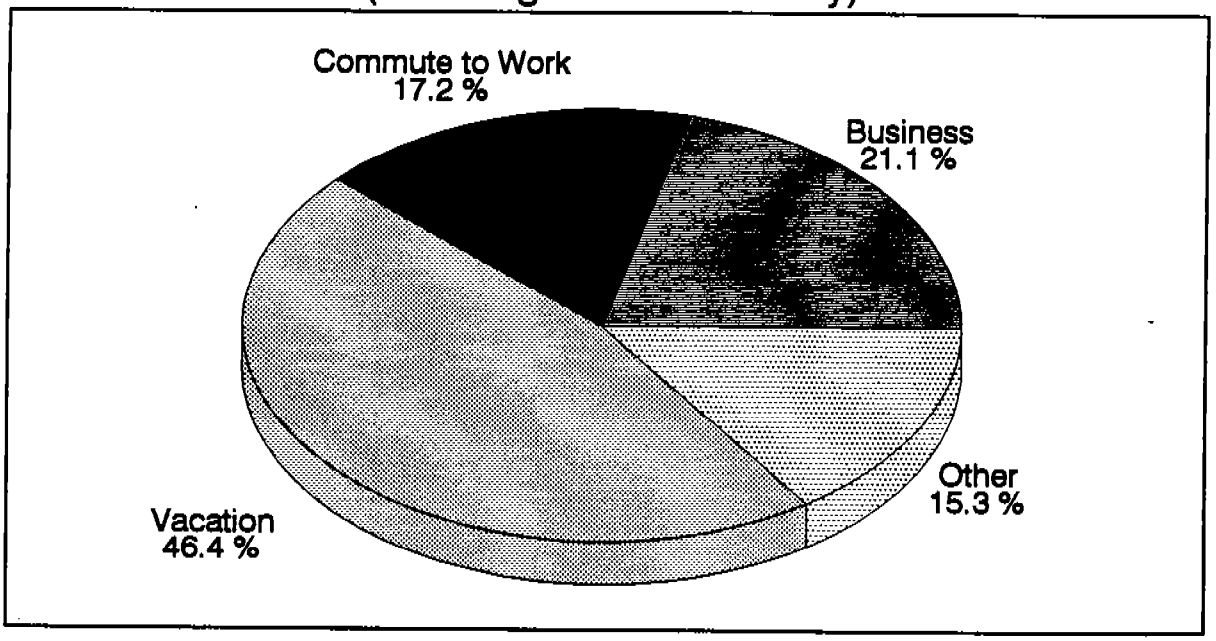


Exhibit B–6
SUMMER SURVEY TRIPS BY PURPOSE
(Passenger Vehicles Only)



Source: Peak Season Roadside Survey, August 1992
Wilbur Smith Associates

Traffic Sectors - Traffic sectors were established for the study corridor. These 18 traffic sectors were defined in order to present the roadside survey results. The Heartland Expressway Study Area is divided into three sectors, Nebraska Study Area, South Dakota Study Area, and Wyoming Study Area. The entire 18 sectors are graphically displayed on Exhibit B-7. The results of the origin and destination surveys will be displayed by traffic sector.

Auto Origin and Destination Patterns - The most important survey results are the origin and destination patterns of motorists traveling in the corridor. This information provides data concerning the travel desires of motorists in the corridor and provides an indication of the potential of existing trips that would use the Heartland Expressway between Scottsbluff/Gering and Rapid City.

For presentation purposes, the ten survey stations were combined into four geographical categories. To obtain the traffic movements traveling from the southern end of the corridor, survey stations 1 through 4, either just north of Scottsbluff/ Gering area or just north of Alliance (see Exhibit B-2 for approximate locations) were tabulated together. Survey stations 6 through 9, located just west of Wyoming border, were also combined to display the traffic movements from the west. Survey station 5 (US 385 at the Nebraska/South Dakota Border) depicts the traffic flows through the middle of the corridor and survey station 6 (SR 79 just south of Rapid City) illustrates traffic movements through the northern end of the corridor.

The origins and destinations of all vehicles were tabulated and the motorists' travel desires through the four survey categories are graphically displayed in Exhibits B-8 through B-11. These travel patterns give an indication of the amount of long and short distance trips that could conceivably divert to the Heartland Expressway.

The majority of trips passing through the southern end of the corridor are local trips. A total of 73 percent of all trips passing through the four southern survey stations have both trip ends within the Nebraska portion of the study area. Also, 83.5 percent of all origins begin within the Nebraska study area, as well as 80.1 percent of all the destinations. The total trips with both origins and destinations within the entire Heartland Expressway Corridor is 82.8 percent. A total of 16.1 percent of the total trips passing through the southern survey stations are traveling to/from outside areas into the Heartland Corridor, and 1.1 percent of the trips are passing through the corridor.

The origin and destination patterns at the northern end of the corridor are similar to those at the southern end of the corridor, in which the majority of trips are local. Nearly 87 percent of all trips passing through the northern survey locations have both ends of the trip inside the Heartland Corridor. A total of 72.8 percent of the total trips are from inside the South Dakota portion of the study area. Also, 95.7 percent of all the originations and 75.5 percent of all the destinations are from the South Dakota portion of the study area. The percentage of trips observed at the northern survey locations traveling to the Nebraska portion of the study area is 12.7 percent. A total of 12.5 percent of the total trips entering from the northern end of the corridor are traveling to outside areas (primarily Colorado) from within the Heartland Corridor area, and 0.7 percent trips are passing through the corridor.

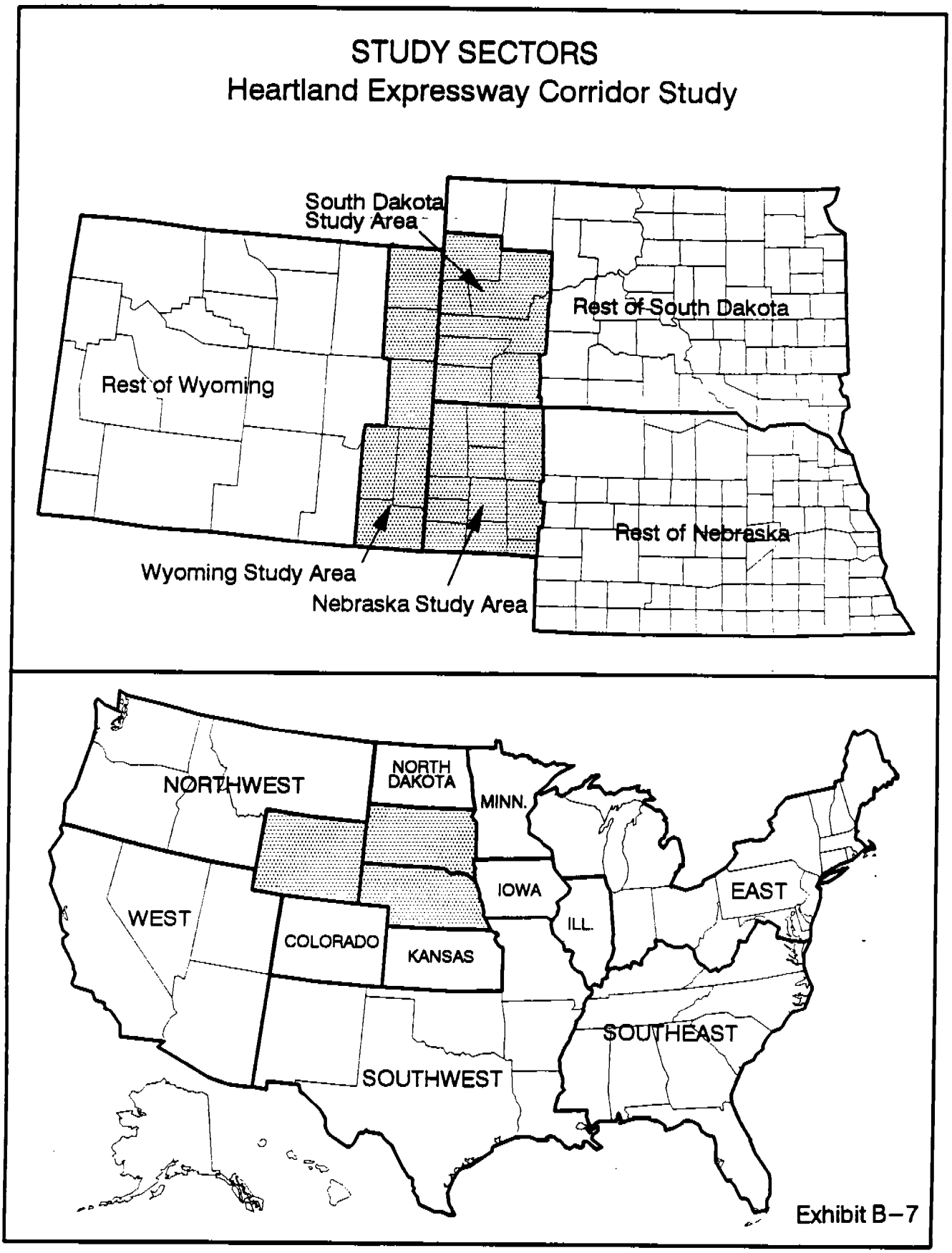
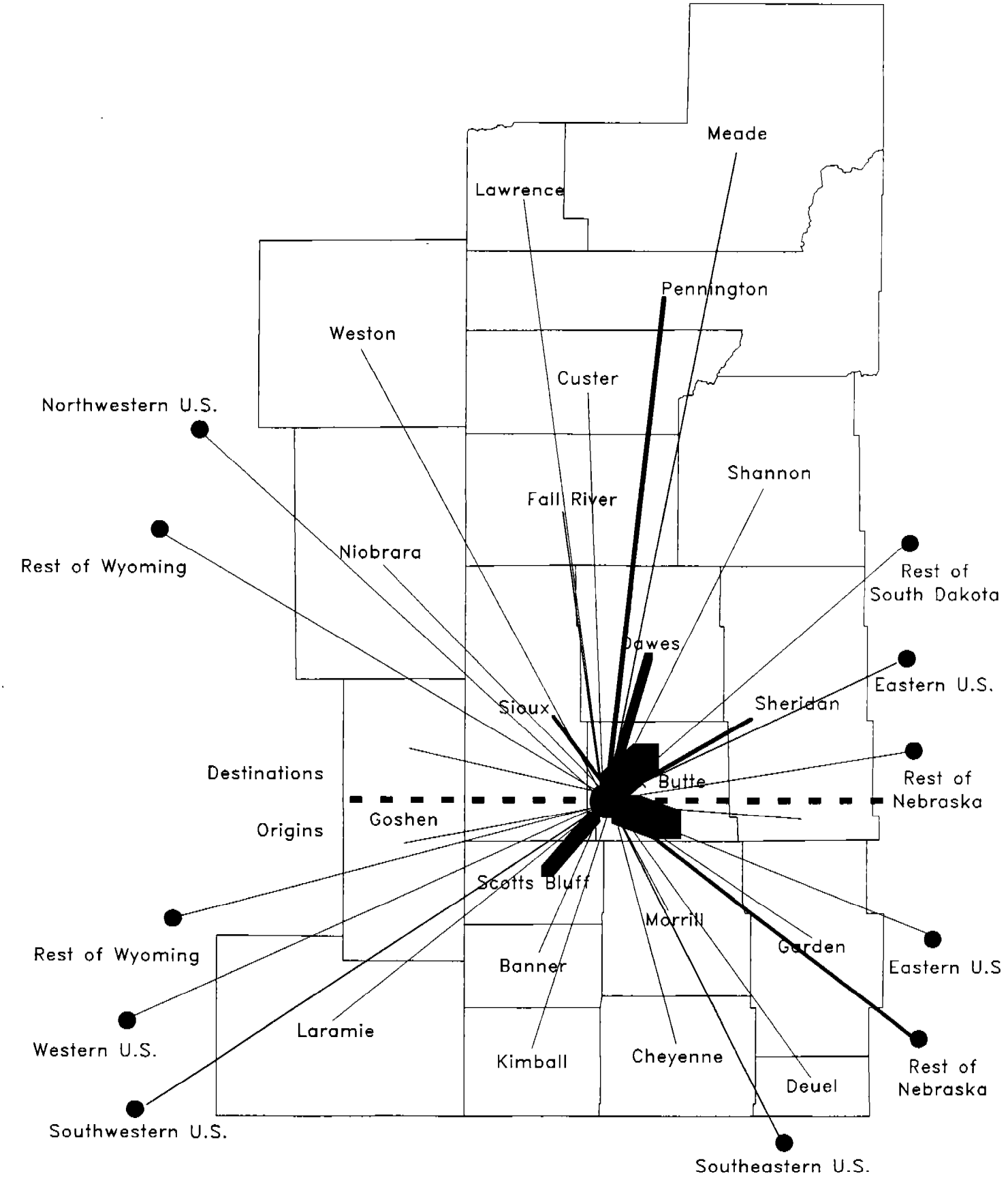
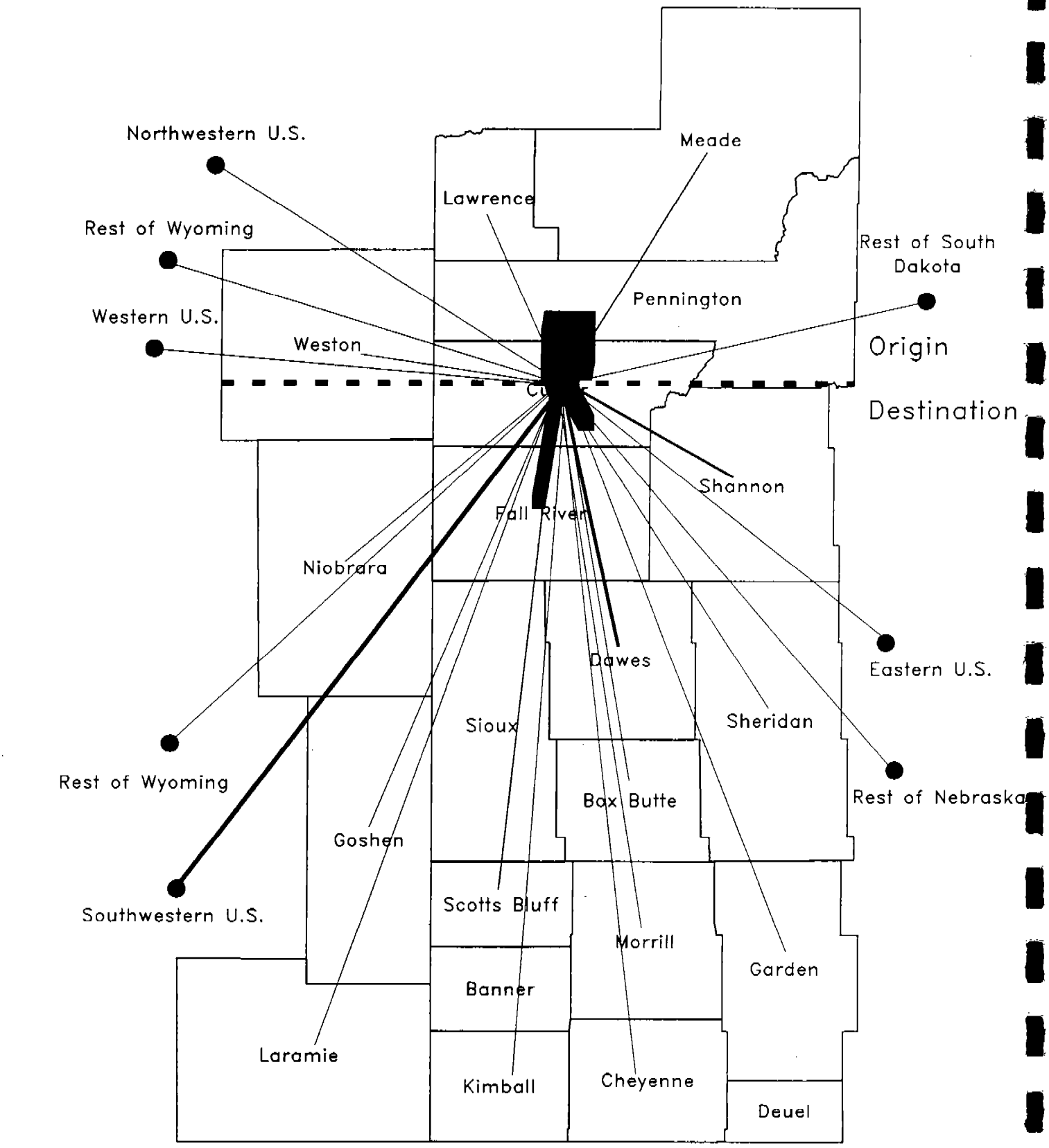

STUDY SECTORS
Heartland Expressway Corridor Study
South Dakota Study Area
Rest of South Dakota
Rest of Wyoming
Rest of Nebraska
Wyoming Study Area
Nebraska Study Area
NORTHWEST
NORTH DAKOTA
MINN.
IOWA
ILL.
EAST
WEST
COLORADO
KANSAS
SOUTHEAST
SOUTHWEST

Exhibit B–7



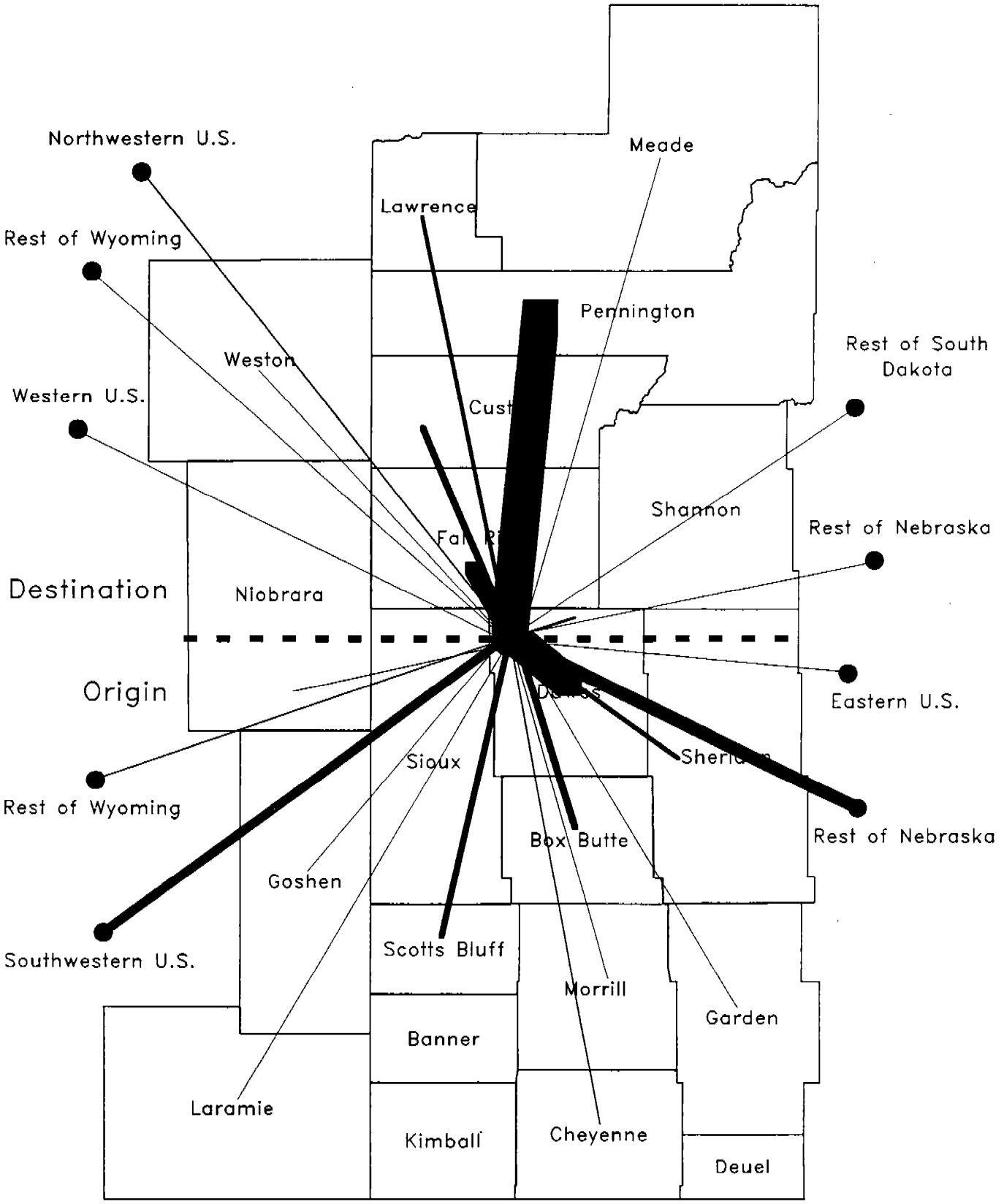
ORIGINS AND DESTINATIONS OF AUTO TRIPS THROUGH THE SOUTHERN SURVEY STATIONS

Exhibit B–8



ORIGINS AND DESTINATIONS OF AUTO TRIPS THROUGH THE NORTHERN SURVEY STATION

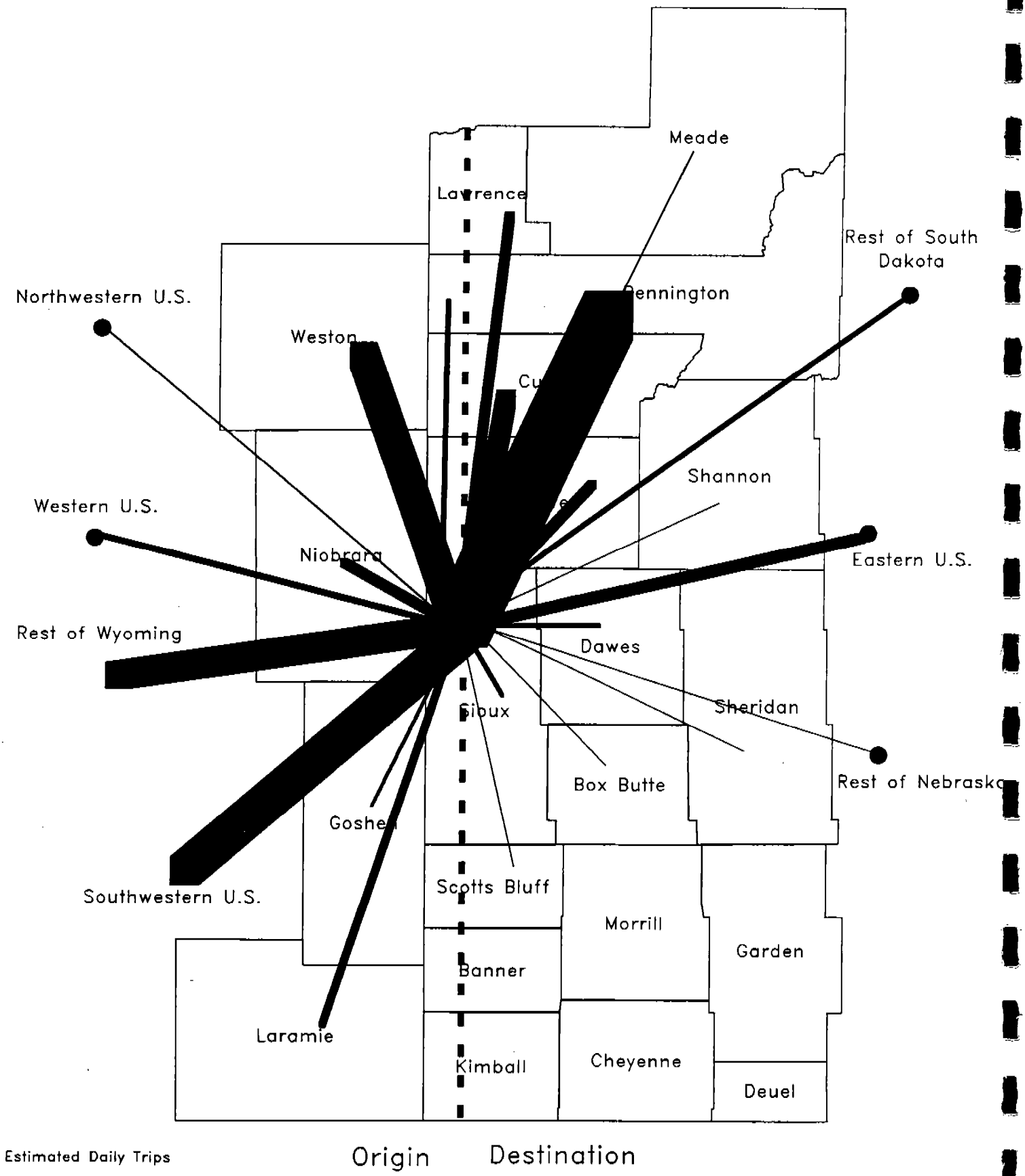
Exhibit B–9



Estimated Daily Trips

250
125
0

ORIGINS AND DESTINATIONS OF AUTO TRIPS THROUGH THE CENTRAL SURVEY STATION



ORIGINS AND DESTINATIONS OF AUTO TRIPS THROUGH THE WESTERN SURVEY STATIONS

The majority of trips traveling through the central portion of the corridor (US 385 near the Nebraska/South Dakota border) were also local, with 65.6 percent of the total trips having both their origin and destination within the Heartland Corridor. A total of 93 percent of the total trips are traveling to the South Dakota portion of the study area and 68.1 percent are traveling from the Nebraska Study Area. The majority of the remaining trips are traveling from outside the corridor area to the South Dakota study area, with the majority of these trips coming from eastern Nebraska or the State of Colorado. Through trips (not having either trip end in the Heartland Corridor area) account for 6.2 percent of the total trips.

The origins and destinations observed at the four survey stations at the western side of the corridor have a more diverse origin/destination pattern than do the other survey locations. Only 41.3 percent of the total trips through the west side of the corridor are traveling within the Heartland Corridor (including the most eastern row of counties in Wyoming). While the South Dakota portion of the study area (Rapid City and the Black Hills) is the primary destination of most trips (73.3 percent), a large percentage of the origination of these trips are from outside the study area, primarily from Colorado and the rest of Wyoming. Of the total trips passing through the survey stations, 22.2 percent are from Western Wyoming and 21.5 percent are from the State of Colorado. The total trips passing through the corridor is 11.0 percent, which is much higher than observed at the other survey locations.

The large percentage of local trips in the corridor, along with the high number of vacation and recreational trips, imply that a large majority of tourists are traveling through the corridor visiting several different tourist sites. The origin and destination surveys also illustrate a strong presence of out of state trips into the Heartland Corridor from states which could divert onto the Heartland Expressway. The roadside surveys also imply that U.S. 85 in Wyoming is currently a major gateway into the Black Hills for tourists from Colorado and Western Wyoming.

License Plate Distribution - The roadside survey kept tabs on the license plate of each vehicle that passed through each survey station. This information will be used to help determine distribution of local versus non-local traffic in the corridor. Exhibit B-12 shows the distribution of license plates observed at the survey locations by state and region for the four combined survey locations.

AUTOMOBILE INTERSTATE HIGHWAY SURVEYS

In addition to the roadside surveys, rest area and license plate surveys of automobiles were conducted at 4 locations on Interstate 80 and Interstate 90. The Interstate 80 surveys were conducted at the eastbound rest area in Kimball County, and the westbound rest area near Chappell in Deuel County. The Interstate 90 rest area surveys were conducted at the eastbound welcome center in Lawrence County, and at the westbound rest area near Wall in Pennington County. License plate counts were also conducted of passing vehicles on the interstates to factor the rest area surveys to the total trips on the interstates. These interstate surveys were conducted to help determine the number of long distance trips, currently using the interstate system, that could conceivably divert to the Heartland Expressway.

Exhibit B–12
AUTOMOBILE LICENSE PLATE DISTRIBUTION
Peak–Season Survey

STATE OR REGION	SOUTH	NORTH	WEST	CENTRAL
Nebraska	79.2%	7.4%	5.1%	44.2%
South Dakota	4.4%	65.7%	15.9%	15.6%
Wyoming	1.9%	1.9%	25.0%	3.5%
Colorado	3.0%	4.0%	12.7%	3.5%
Illinois	0.4%	1.0%	2.5%	0.9%
Iowa	0.3%	2.5%	2.6%	2.4%
Kansas	2.1%	1.1%	0.3%	7.2%
Minnesota	0.1%	2.9%	3.7%	0.4%
North Dakota	0.1%	1.1%	1.5%	0.2%
East U.S.	2.1%	3.0%	8.3%	4.6%
Northwest U.S.	1.3%	1.4%	3.9%	3.7%
Southeast U.S.	0.9%	1.3%	1.3%	2.4%
Southwest U.S.	2.8%	2.5%	4.8%	7.8%
West U.S.	1.1%	3.6%	9.6%	2.9%
Canada	0.1%	0.8%	2.8%	0.6%

Source: Peak Season Roadside Survey, Aug. 1992
Wilbur Smith Associates

Trip Purpose - The interstate surveys were classified by trip purpose. The survey results reveal that the majority of auto trips on Interstates 80 and 90 near the Heartland Corridor Area during the peak travel season are traveling for recreational or vacation purposes. These vacation trips account for 56.7 percent of the total trips on the interstates. Business trips make up 17.4 percent, while motorists commuting to work account for 7.2 percent and other trips make up 18.7 percent of all auto trips.

Vehicle Occupancy - The interstate survey also tabulated the number of occupants in each vehicle, and found that the average number of persons per passenger vehicle on the two interstates is 2.40. However, vehicle occupancy by trip purpose varied slightly. Vehicles with occupants traveling for recreational or vacation purposes has an average of 2.75 persons per vehicle, motorists traveling for business has a vehicle occupancy of 1.71, and commuters traveling to/from work has the least persons per vehicle, with an average of 1.68.

Origins and Destinations - The primary purpose of the interstate surveys was to ascertain the number of long distance trips currently using the interstate highway system that could conceivably divert to the Heartland Expressway. For example, a vehicle currently traveling from Minneapolis, Minnesota to Salt Lake City, Utah on Interstate 90 either has to travel along a long stretch of two-lane highway or use Interstate 25 in Wyoming which travels southeast to get to its final destination. This portion of the trip west of Rapid City adds a large amount of additional time to the trip. If a four-lane Heartland Expressway were constructed, this trip could utilize the expressway thereby saving travel time. The origin and destination patterns derived from the interstate surveys assisted in developing these long distance diversions.

Exhibits B-13 and B-14 graphically display the origins and destinations for the eastbound rest area on Interstate 80 near Chappell in Deuel County, Nebraska and the westbound rest area on Interstate 90 near Wall, South Dakota.

License Plate Distribution - The interstate survey also tabulated the license plate of each passing vehicle on the interstate near the rest areas. This information was used to help determine the distribution of local versus non-local traffic traveling on the interstates. Exhibit B-15 shows the distribution of license plates observed on the two interstates by state and region.

OFF-PEAK (FALL) ROADSIDE SURVEYS

Roadside surveys were also conducted during the off-peak travel season in October. These "off-peak" surveys were conducted at five of the ten summer survey locations. The objective of the off-peak surveys was to determine the difference in motorist's origin/destination patterns throughout the year, and to identify seasonal variations in trip characteristics in the Heartland Expressway Study Area.

The off-peak roadside surveys were conducted at five locations. The five locations with the highest summer traffic levels were selected. Exhibits B-16 and B-17 display the locations of the 5 survey sites.

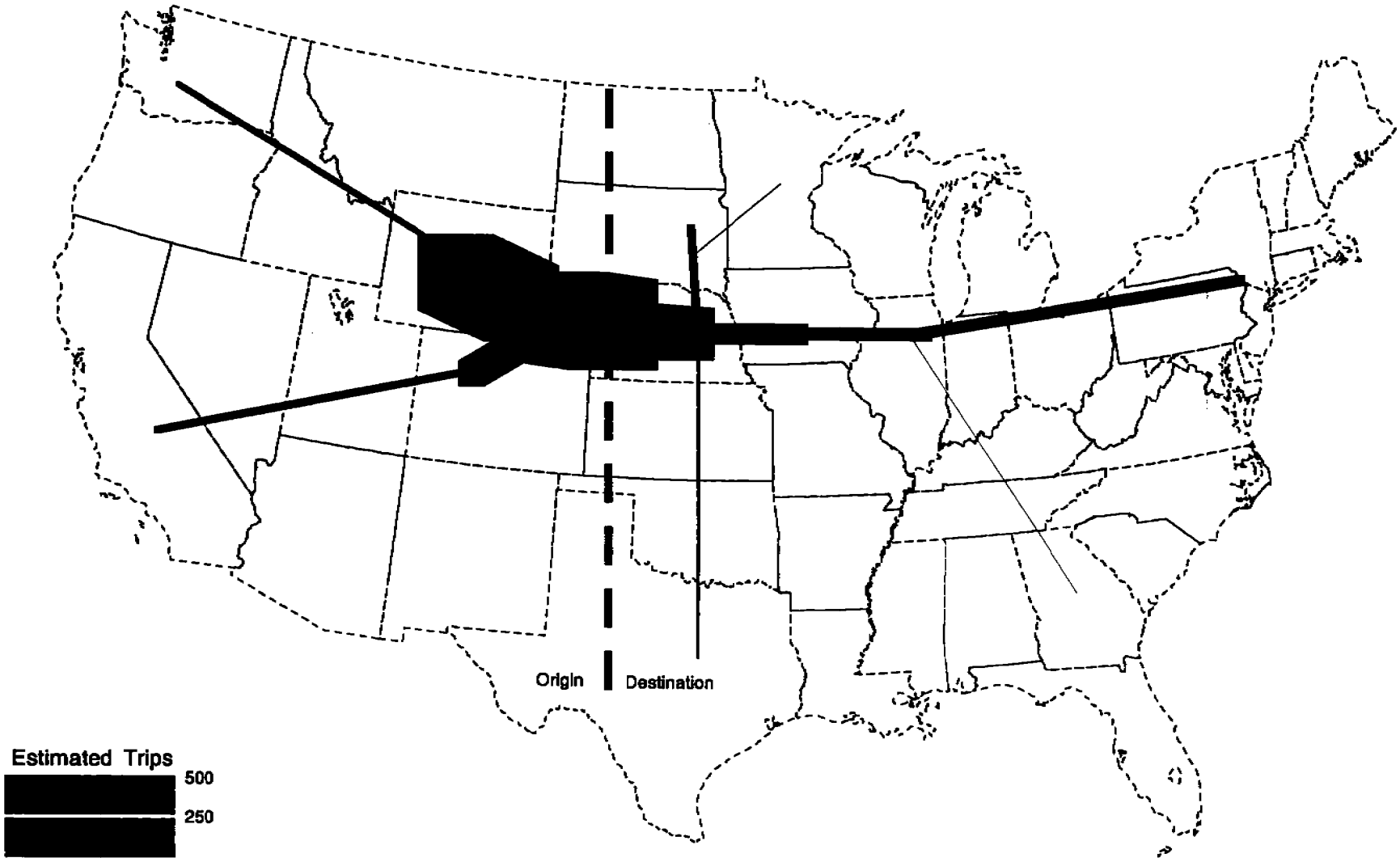
Surveys were conducted from 7 a.m. to 7 p.m., between the period of Thursday, October 23, 1992 and Monday, October 26, 1992. The same survey forms utilized in the peak-season surveys were used in the Fall, as were identical data factoring methodologies and procedures.

Vehicle Type - The percentage of vehicle types during the Fall months are similar to that of the Summer months. In the Fall season, the percentage of passenger vehicles in the Heartland Corridor is 83.9 percent, compared with 85.6 percent in the Summer months. The percentage of trucks in the corridor is a little higher in the Fall months than during the Summer season. The percentage of heavy trucks in the Fall is 9.7 percent (Summer percent is 7.3 percent), light trucks is 6.1 percent (summer percent is 3.3 percent). This higher truck percentage could be caused the smaller number of other vehicles (motor homes, motorcycles, buses) during the Fall season. In addition, there are large volumes of sugar beet trucks in the Fall, south and southwest from Alliance, which were not surveyed.

Exhibit B–13

INTERSTATE 80 AUTOMOBILE TRAFFIC DESIRES MAP

Destination and Origin of Eastbound Auto Traffic

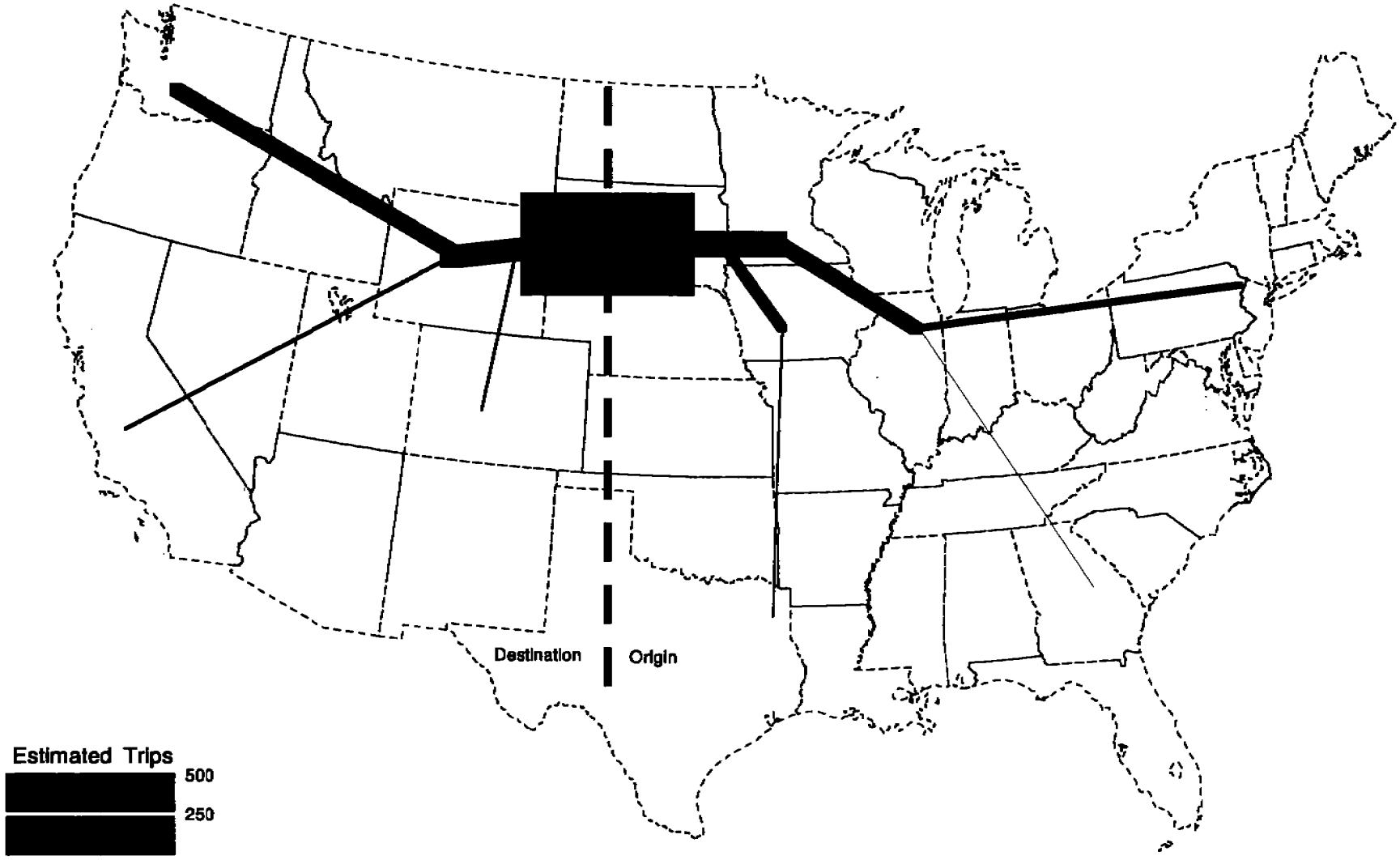


Source: Heartland Roadside Survey, 1992

Exhibit B–14

INTERSTATE 90 AUTOMOBILE TRAFFIC DESIRES MAP

Destination and Origin of Westbound Auto Traffic



Source: Heartland Roadside Survey, 1992

Exhibit 3–15
AUTOMOBILE LICENSE PLATE DISTRIBUTION
Interstate Passenger Vehicle Survey

STATE OR REGION	INTERSTATE 80 EASTBOUND	INTERSTATE 90 WESTBOUND
Nebraska	44.1%	5.0%
South Dakota	4.9%	42.2%
Wyoming	14.9%	2.1%
Colorado	11.5%	1.8%
Iowa	2.3%	5.9%
Minnesota	0.5%	8.4%
North Dakota	0.3%	1.5%
East U.S.	9.9%	15.7%
Northwest U.S.	1.8%	5.7%
Southeast U.S.	1.3%	2.2%
Southwest U.S.	2.9%	3.9%
West U.S.	4.4%	5.6%
Others	1.2%	0.0%

Source: Interstate Survey, Aug. 1992
Wilbur Smith Associates

Exhibit B-16
OFF-PEAK SEASON SURVEY LOCATIONS

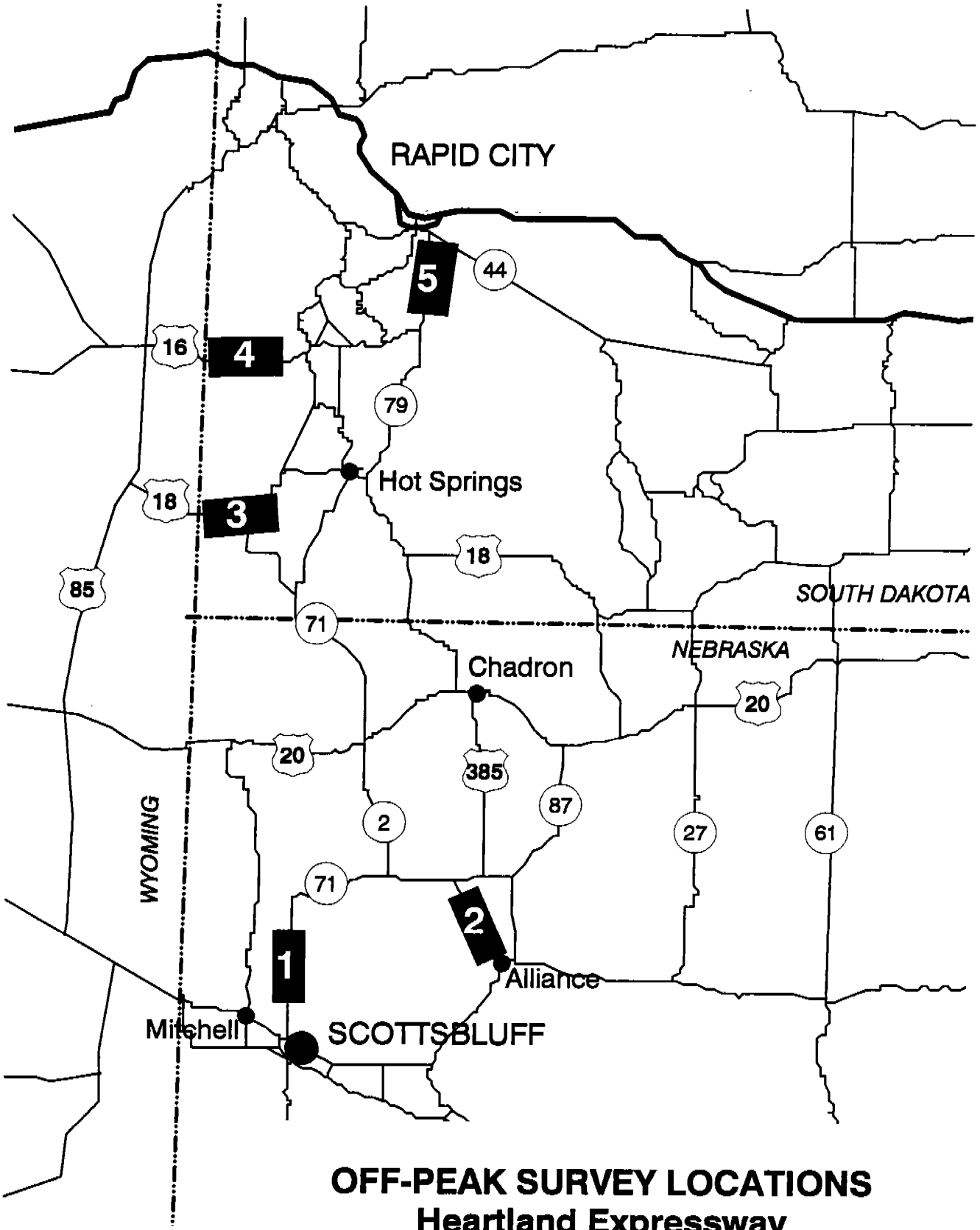
STATION #	STATION LOCATION	DIRECTION SURVEYED
1	SR 71 Near Sioux/Scottsbluff Co. Line	Northbound
2	SR 2 North of Alliance, NE	Northbound
3	US 18 East of SD/WY Border	Eastbound
4	US 16 East of SD/WY Border	Eastbound
5	SR 79 South of Rapid City	Southbound

Trip Purpose - The trip purposes of motorists during the Fall season are much different than are those for travelers during the Summer months (Exhibit B-18). During the Summer months the majority of motorists in the Heartland Corridor are traveling for recreational or vacation purposes. However, during the Fall season, recreational or vacation trips account for only 5.9 percent of the total trips, significantly less than the 46.4 percent during the Summer survey. The primary purpose of trips during the Fall survey are other trips (57.7 percent), which mainly includes trips for personal business (trips to the doctor, shopping, visit friends, etc.). Business trips account for 21.9 percent, nearly identical to the business percentage during the Summer months, indicating that there is not a seasonal variation for these types of trips.

Vehicle Occupancy - The number of occupants per vehicle during the off-peak season is a little less than during the Summer months. The average vehicle occupancy for all vehicles during the Fall is 1.72, compared with 2.18 for the Summer months. This is primarily caused by the significantly less amount of vacation trips in the corridor during the off-peak season.

The average vehicle occupancy for Fall vacation trips is 2.29, compared with 2.71 for the Summer months. Motorists traveling for business purposes during the Fall months have an average vehicle occupancy of 1.50, compared with 1.65 for the Summer, and commuters traveling to/from work have a Fall vehicle occupancy of 1.23 compared with 1.47 in the Summer months.

Auto Origin and Destination Patterns - One of the primary uses of the off-peak (Fall) roadside survey was to determine the number of non-Summer travelers that might be attracted to the Heartland Expressway. To derive the non-Summer travel patterns, the five Fall roadside

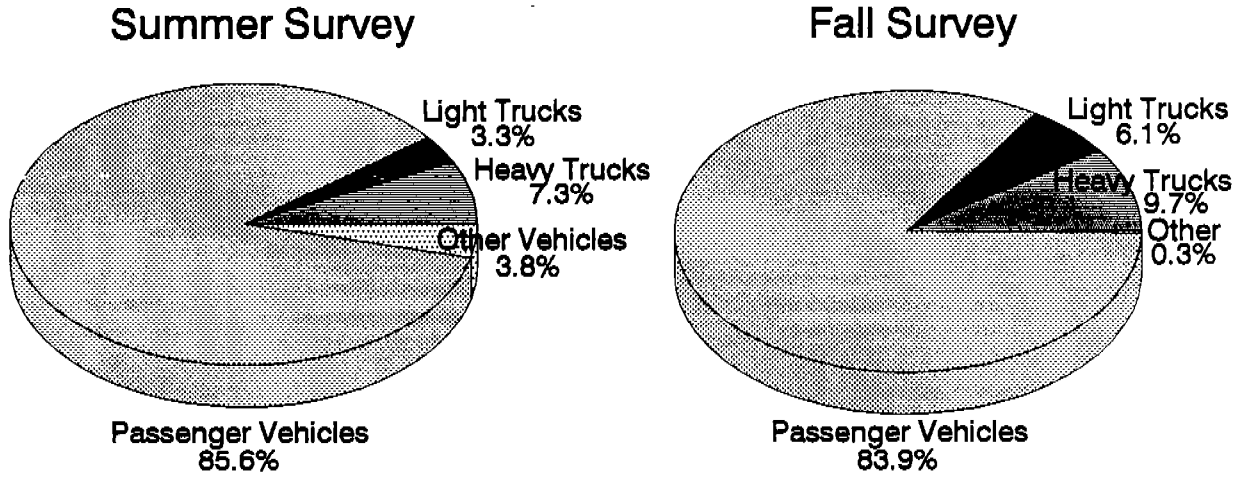


OFF-PEAK SURVEY LOCATIONS
Heartland Expressway

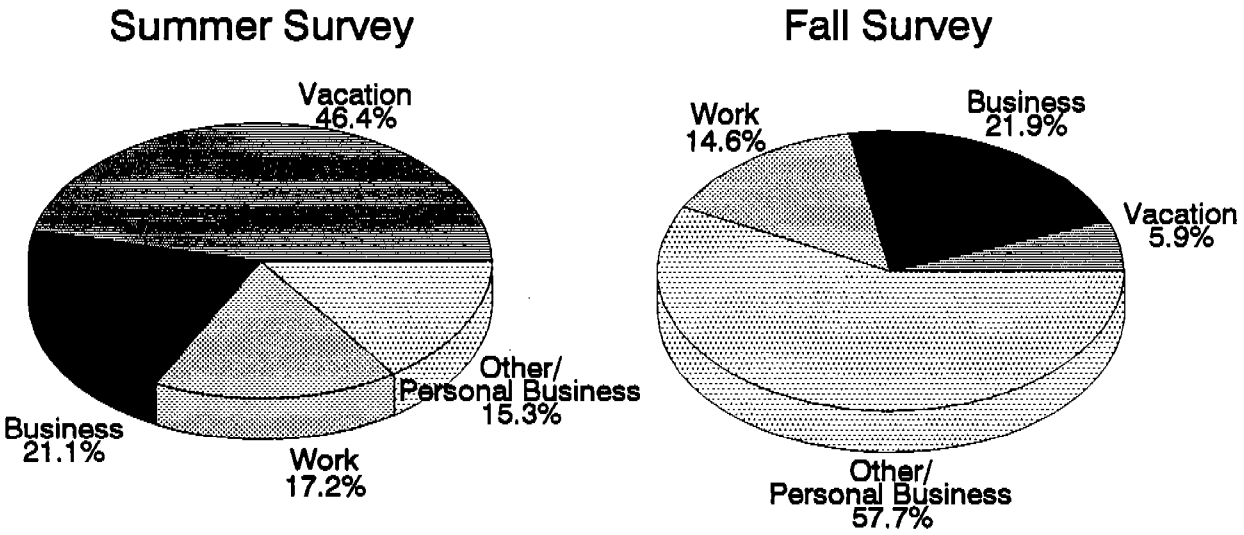
Exhibit B–17

Exhibit B–18

VEHICLE TYPE



TRIP PURPOSE



SOURCE: Wilbur Smith Associates

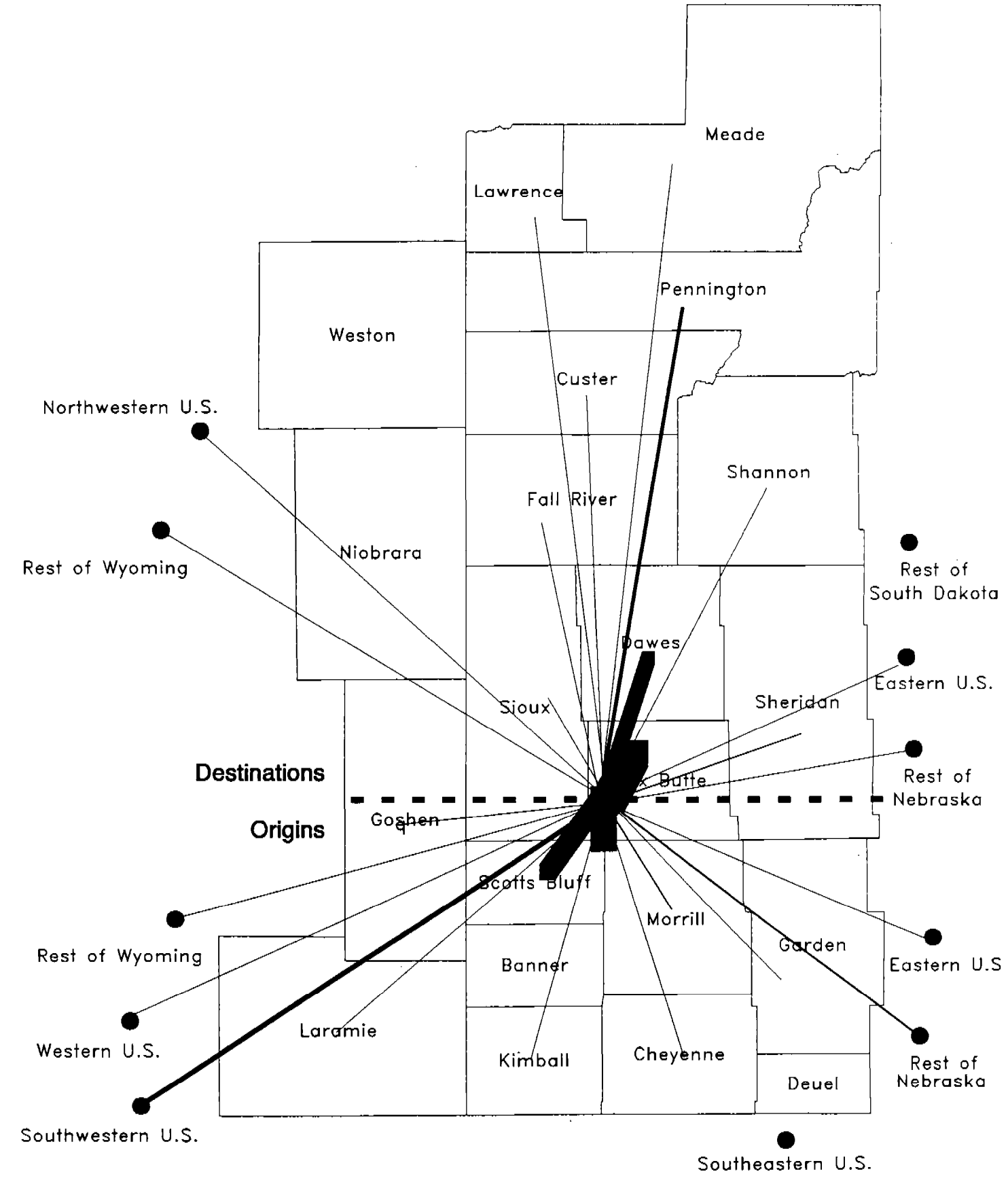
surveys were combined into the same categories used in the Summer survey. An off-peak survey was not conducted on US 385 near the Nebraska/South Dakota border; therefore a Summer/non-Summer comparison in the middle of the corridor cannot be made. Exhibits B-19 through B-21 display the Fall origin and destination results for the three combination survey locations. Note that totals for the Fall survey stations are much less than the tables for the Summer survey. The lower trip volumes represent the lower amounts of daily traffic during the Fall months and that only five surveys were conducted during off-peak season compared with the 10 sites surveyed during the Summer months.

The origin and destination pattern observed at the southern end of the corridor (SR 71 north of Scottsbluff and SR 2 north of Alliance) indicates a change in travel patterns of motorists during the Fall and Summer months. The survey reflects a larger percentage of local trips during the Fall season. Of all the automobiles passing through the two southern survey locations, 92.8 percent are traveling to and from destinations inside the Heartland Corridor, compared with 82.8 percent for the Summer survey. Also, 90.0 percent of all origins begin within the Nebraska study area (compared with 80.1 percent for Summer), as well as 92.2 percent of all the destinations (compared to 83.5 percent for Summer). The largest percentage decrease in trips is the number of vehicles traveling from other areas of the U.S. to the Heartland Corridor Area. During the Summer months, 16.2 percent of all trips observed at the southern survey stations are traveling from external locations (Colorado, Rest of Nebraska, etc.) to areas within the Heartland Corridor, compared with only 6.7 percent in the Fall.

While the traffic volume for the northern survey location (SR 79 south of Rapid City) is considerably less during the Fall months than the Summer months, travel patterns do not appear to vary significantly. For example, the percent of trips which both originate and terminate within the Heartland Corridor during the Fall and Summer months are exactly the same (86.9 percent). Also the percentage of all trips which begin in the Rapid City area is 76.7 percent during the Fall months, compared with 75.5 percent for the Summer months. This could be caused by the large number of tourists staying in Rapid City or the number of short distance trips from tourist site to tourist site, thereby increasing the number of local trips during the summer months.

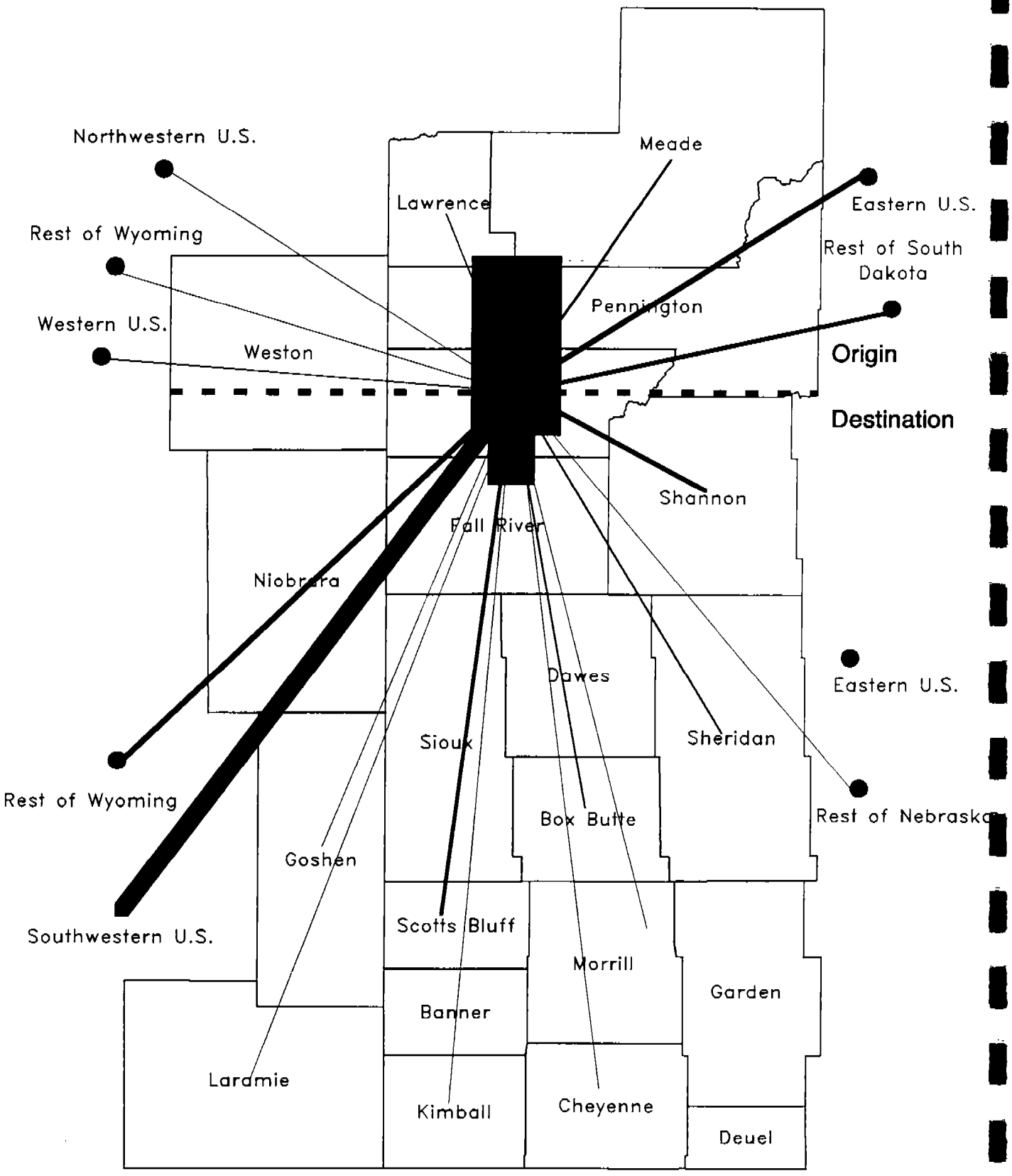
The similarities in seasonal travel patterns for this northern gateway can possibly be caused by a number of factors. One explanation is the increase in winter tourism activities in the Black Hills Area. Another possible reason is that the largest percentage of vacation trips into the Black Hills area are from locations south of Rapid City .

The travel patterns of motorists entering the corridor from the west also appear to have a seasonal variation. During the Summer months, the largest percentage of vehicles on these highways comprised recreational travelers from Wyoming, Colorado and points west, traveling to the Black Hills Area and Western Nebraska. However during the Fall season, the largest percentage of trips are made by local travelers inside the Heartland Corridor (52.1 percent). While the total volumes may be less, these highways still carry a significant amount of motorists into the Heartland Corridor from Western Wyoming and Colorado (36.7 percent).



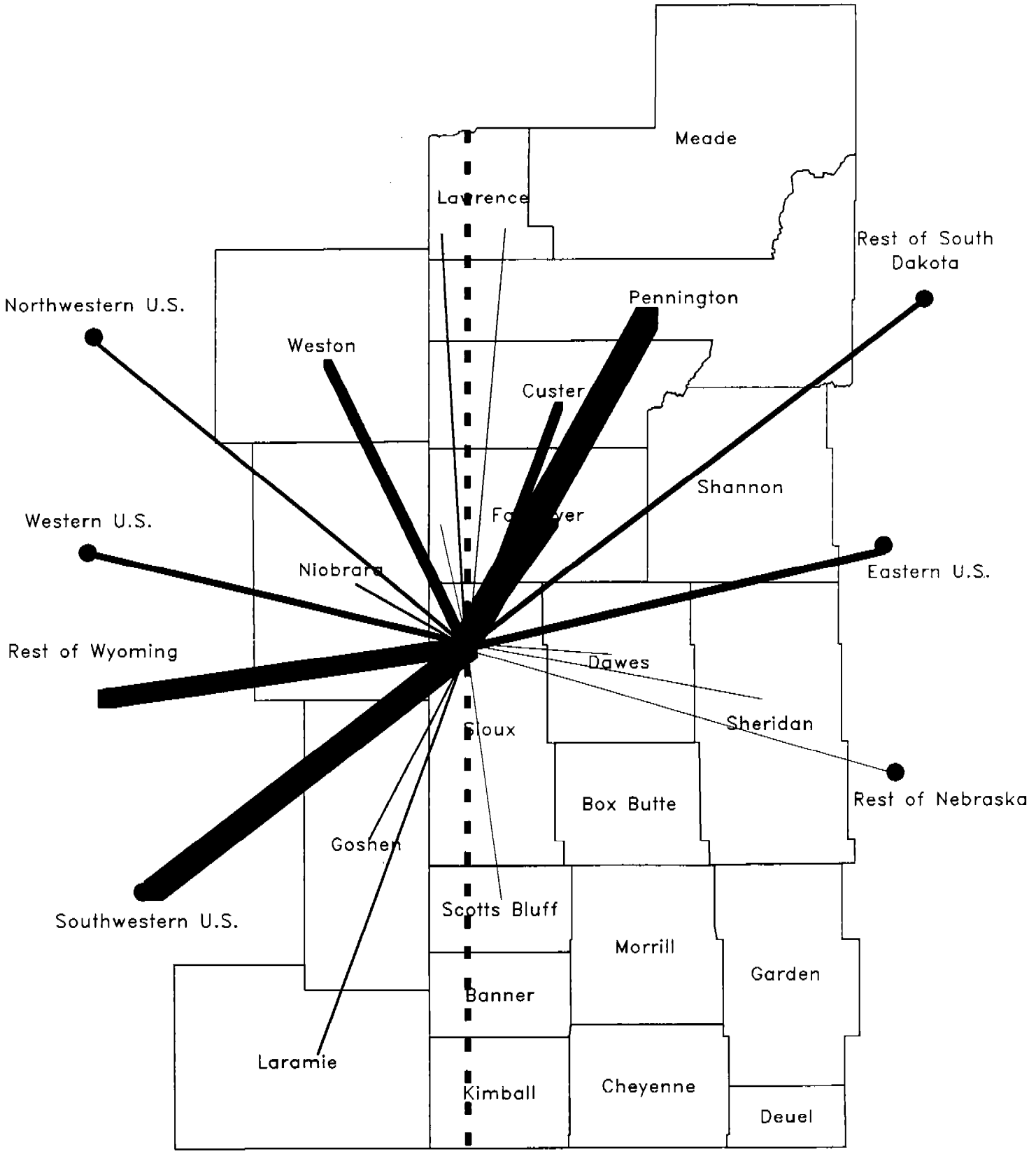
ORIGINS AND DESTINATIONS OF AUTO TRIPS THROUGH SOUTHERN SURVEY STATIONS - FALL SURVEY

Exhibit B-19



ORIGINS AND DESTINATIONS OF AUTO TRIPS THROUGH NORTHERN SURVEY STATION - FALL SURVEY

Exhibit B-20



ORIGINS AND DESTINATIONS OF AUTO TRIPS THROUGH WESTERN SURVEY STATIONS - FALL SURVEY

The difference in travel patterns between the Summer and Fall months indicates considerable seasonal variation in types of trips in the Heartland Corridor. The surveys also denote a large number of recreational and vacation trips attracted to Western Nebraska and the Black Hills Region of South Dakota during the Summer months, of which many are traveling the entire length of the corridor between Scottsbluff/Gering and Rapid City.

License Plate Distribution - Exhibit B-22 depicts the distribution of license plates observed passing through the Fall survey stations. The Exhibit compares the Fall results with the Summer results. The difference in the license plate distribution between Summer and Fall seasons verifies the fact that there is a large variation between trips in the corridor by season.

ROADSIDE SURVEY IMPLICATIONS

The primary purpose of the roadside surveys is to develop a traffic database that depicts traffic desires throughout the corridor that can be used to assist in formulating traffic forecasts for the Heartland Expressway alternatives.

The roadside surveys and license plate observations suggest the following regarding the envisaged Heartland Expressway:

- Currently most traffic in the corridor is local traffic.
- During the Summer months, 46 percent of the trips in the Heartland corridor are recreational or vacation trips. However, the Fall survey revealed that recreational trips are only 6 percent, indicating a large seasonal variation in trip characteristics.
- Most of the Summer tourist traffic that could divert to the Heartland Expressway currently uses US 85 in Wyoming to access the Black Hills.

Exhibit B–22

AUTOMOBILE LICENSE PLATE DISTRIBUTION
Off–Peak Season Survey

STATE OR REGION	SOUTH		NORTH		WEST	
	Off–Peak	Peak	Off–Peak	Peak	Off–Peak	Peak
Nebraska	90.0%	79.2%	7.1%	7.4%	1.7%	5.1%
South Dakota	3.3	4.4	84.0	65.7	30.0	15.9
Wyoming	2.0	1.9	3.2	1.9	45.7	25.0
Colorado	2.2	3.0	2.1	4.0	6.2	12.7
Illinois	0.0	0.4	0.0	1.0	0.3	2.5
Iowa	0.2	0.3	0.2	2.5	0.0	2.6
Kansas	0.2	2.1	0.0	1.1	0.0	0.3
Minnesota	0.2	0.1	0.8	2.9	2.9	3.7
North Dakota	0.0	0.1	0.5	1.1	0.9	1.5
East U.S.	0.2	2.1	0.2	3.0	2.7	8.3
Northwest U.S.	0.7	1.3	1.1	1.4	3.0	3.9
Southeast U.S.	0.2	0.9	0.0	1.3	1.2	1.3
Southwest U.S.	0.3	2.8	0.3	2.5	1.2	4.8
West U.S.	0.5	1.1	0.5	3.6	3.0	9.6
Canada	0.0	0.1	0.0	0.8	1.2	2.8

Source: Heartland Roadside Surveys, 1992
Wilbur Smith Associates

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Appendix C
FREIGHT TRANSPORTATION SURVEYS

Regional trucking characteristics were analyzed to ascertain how well existing highways in the Heartland Corridor are serving local economic needs, and to identify patterns of highway freight transportation in the area. A number of trucking issues were addressed, including: 1) existing truck travel patterns in the corridor, 2) the extent to which trucks, that are not now traveling in the Heartland Corridor, might use a new highway between Scottsbluff/Gering and Rapid City; and 3) how the Heartland Expressway might help existing trucking firms and shippers/receivers in the area. To help address these issues, trucks were included in the roadside origin and destination surveys and the I-80 and I-90 surveys, and surveys were also taken of shippers/ receivers and motor carriers.

ROADSIDE ORIGIN AND DESTINATION TRUCK SURVEY

The truck roadside origin and destination surveys were conducted in conjunction with the automobile roadside surveys, at the same 10 locations listed on Exhibit C-1.

Exhibit C-1
ROADSIDE TRUCK SURVEY LOCATIONS

STATION #	STATION LOCATION	DIRECTION SURVEYED
1	SR 29 North of Mitchell, NE	Northbound
2	SR 71 Near Sioux/Scottsbluff Co. Line	Northbound
3	US 385 North of Alliance, NE	Northbound
4	SR 2 North of Alliance, NE	Northbound
5	US 385 Near NE/SD Border	Northbound
6	US 20 West of Harrison, NE	Eastbound
7	US 18 East of SD/WY Border	Eastbound
8	US 16 East of SD/WY Border	Eastbound
9	US 85 East of SD/WY Border	Eastbound
10	SR 79 South of Rapid City	Southbound

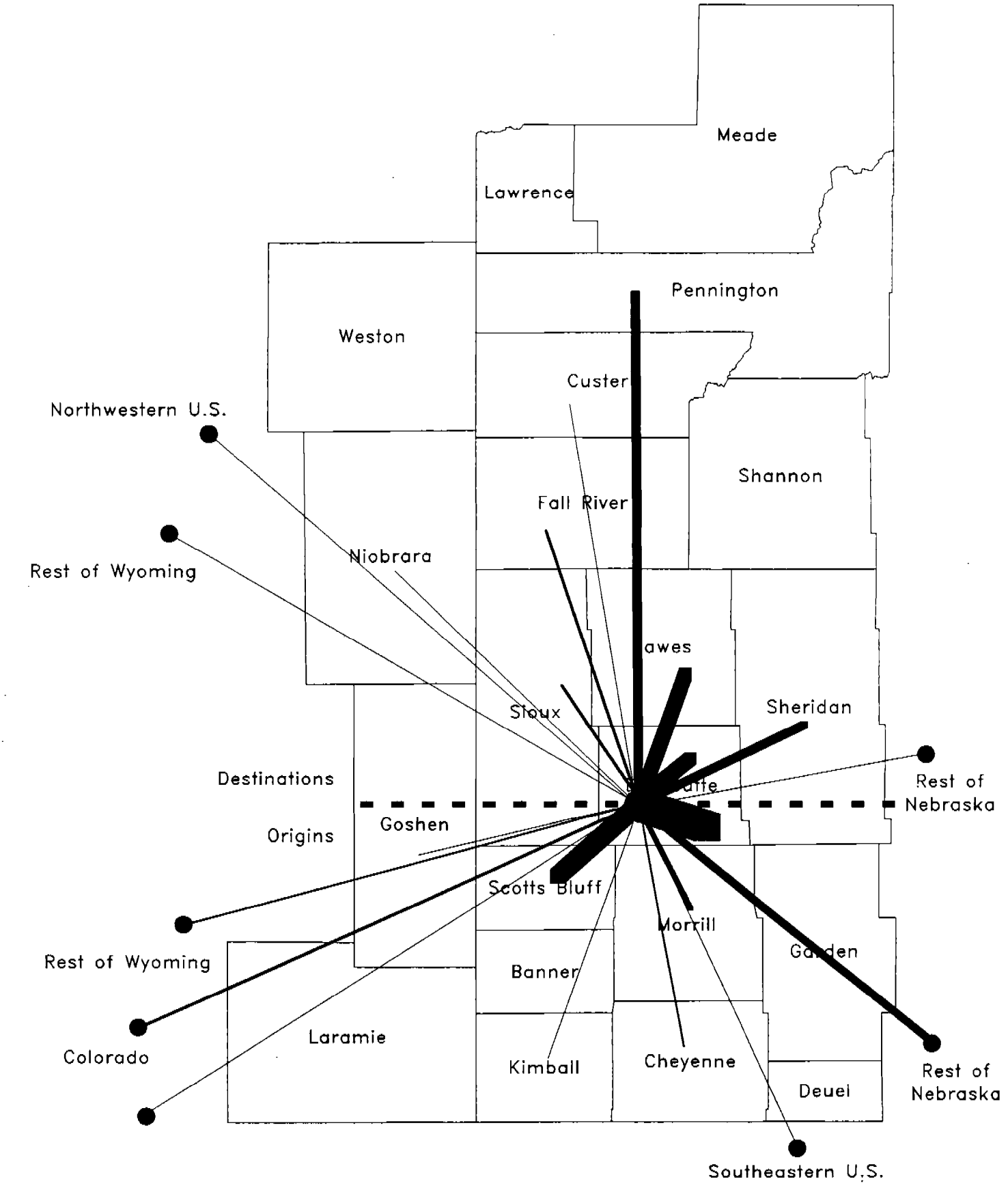
Trucks passing through the survey locations were stopped, and the drivers were asked questions concerning their origin, destination, carrier type, etc. The same survey form used in the automobile roadside survey was utilized for the truck survey.

Distribution of Truck Types - The roadside surveys classified trucks as light trucks or heavy trucks. Single unit vehicles are classified as "light trucks" and combination unit, multi-axle vehicles are classified as "heavy trucks". The majority of trucks in the Heartland Corridor (64.1

percent) are the combination unit, multi-axle, heavy trucks. Light trucks make up the remaining (35.9 percent).

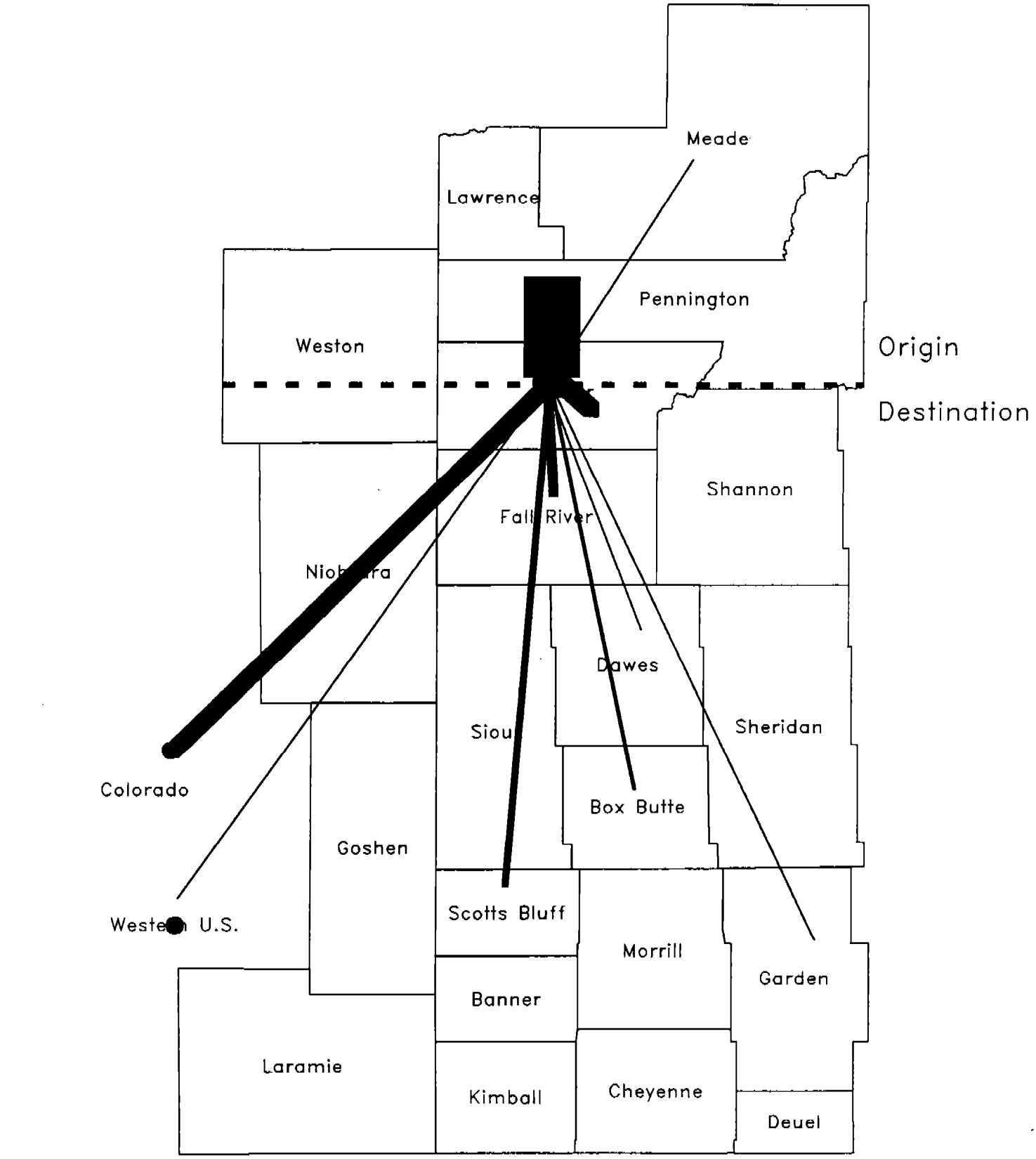
Existing Truck Travel Patterns - For presentation purposes the ten survey stations were combined into four geographical categories (same categories as the automobile roadside survey). To obtain the traffic movements traveling from the southern end of the corridor, survey stations 1 through 4, just north of Scottsbluff/Gering area or just north of Alliance, were tabulated together. Survey stations 6 through 9, located just east of the Wyoming border, were also combined to display the traffic movements from the west. Survey station 5 (US 385 at the Nebraska/South Dakota Border) depicts the traffic flows through the middle of the corridor and survey station 10 (SR 79 just south of Rapid City) illustrates traffic movements through the northern end of the corridor. Exhibits C-2 through C-5 graphically display the existing truck traffic desires (of the trucks already using the corridor).

As was the case with automobiles, truck traffic flow through the corridor is primarily local in nature. A large percentage of the truck traffic is internal to the Heartland Corridor Study (having both an origin and a destination between and including Scottsbluff/Gering and Rapid City). There is very little through truck traffic in the corridor. The trucks traveling to or from destinations outside the Heartland Corridor, for the most part, have one trip end inside the Heartland Corridor. The only significant through truck traffic is traveling through the western survey locations (near the Wyoming border), and this traffic is primarily traveling from western Wyoming to areas in South Dakota, just east of Rapid City.



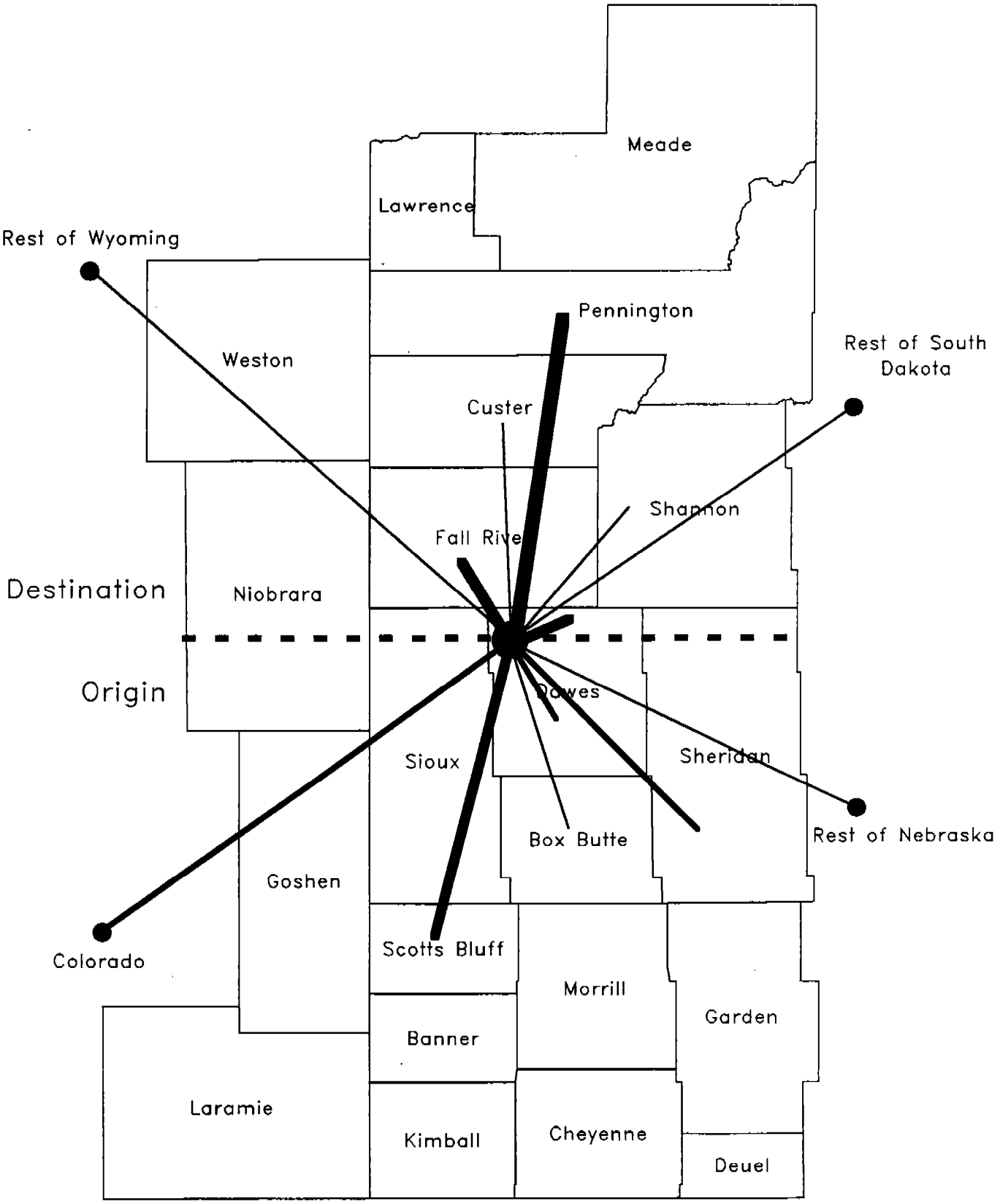
ORIGINS AND DESTINATIONS OF TRUCK TRIPS THROUGH THE SOUTHERN SURVEY STATIONS

Exhibit C–2



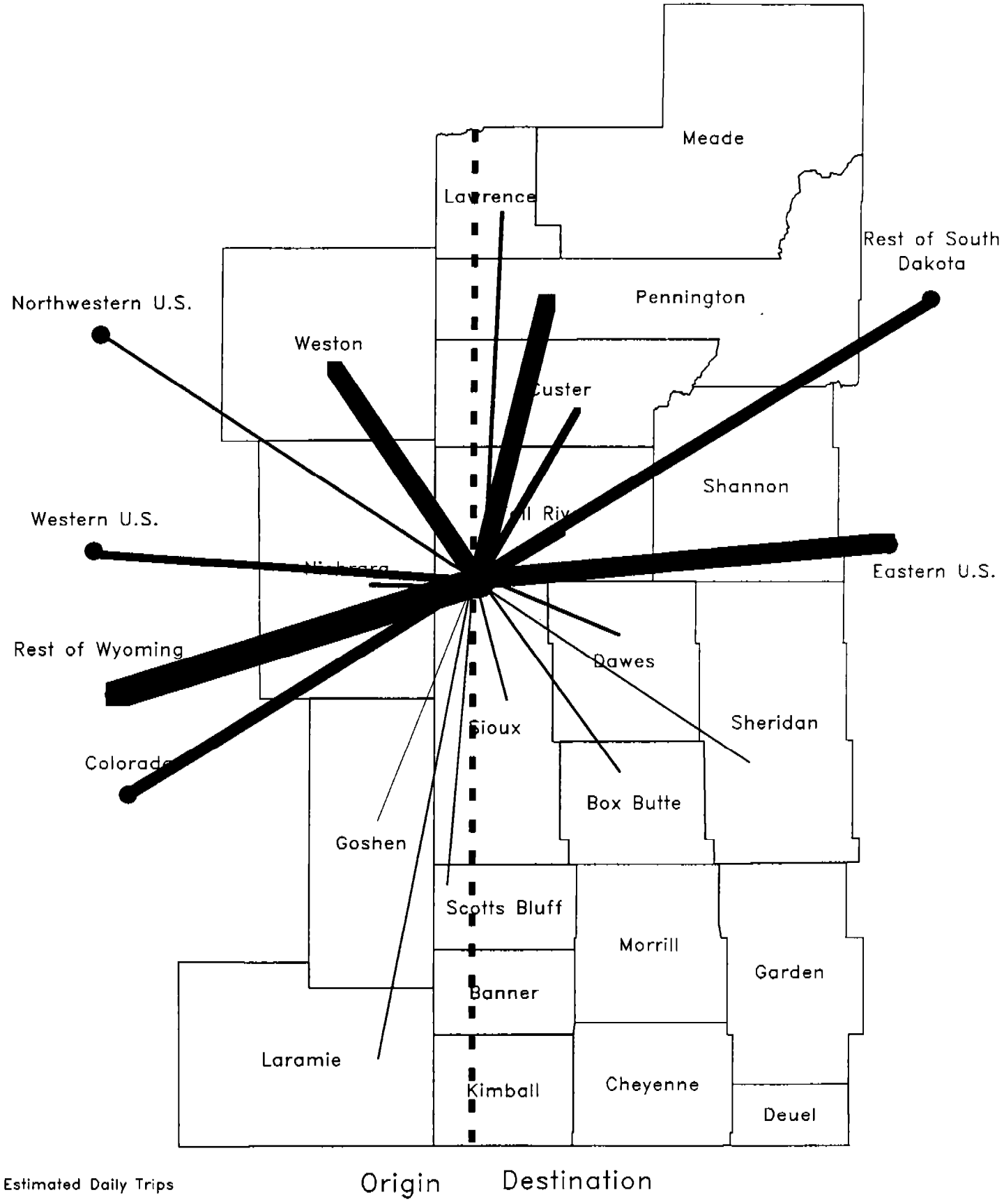
ORIGINS AND DESTINATIONS OF TRUCK TRIPS THROUGH THE NORTHERN SURVEY STATION

Exhibit C–3



ORIGINS AND DESTINATIONS OF TRUCK TRIPS THROUGH THE CENTRAL SURVEY STATION

Exhibit C-4



ORIGINS AND DESTINATIONS OF TRUCK TRIPS THROUGH THE WESTERN SURVEY STATIONS

Exhibit C–5

INTERSTATE TRUCK SURVEY

To obtain information concerning long distance truck travel, surveys were conducted at truck weigh stations on both Interstate 80 and 90 during the month of October. The Interstate 80 survey was conducted at the westbound weigh station near North Platte, Nebraska, and the Interstate 90 survey was conducted at the eastbound Port of Entry weigh station near the South Dakota/Wyoming border.

The Interstate highways surveys interviewed all trucks between the hours of 7 AM and 7 PM. Information was obtained regarding:

- Trip Origin
- Trip Destination
- Type of Carrier
- Commodity Hauled

The interstate trucking survey form is presented as Exhibit C-6.

Type of Carriers - The interstate truck surveys classified carriers by four categories: 1) for-hire, regulated truckload carriers, 2) for-hire, regulated less-than-truckload (LTL) carriers, 3) private carriers (shippers and receivers which have their own trucking fleet), and 4) independent truckers. Exhibit C-7 displays the distribution of carrier types using I-80 and I-90. The majority of carriers on the two interstates are for-hire trucking (83.4 percent), with most of these trucks carrying full loads (86.8 percent). The percentage of private freight carriers on the two Interstate highways is 7.9 percent and independent truckers make up 8.7 percent.

Hazardous Materials - The interstate trucking survey also requested information concerning the hauling of hazardous materials. On Interstate 80, 5.1 percent of the trucks indicate they are hauling hazardous materials and on Interstate 90, only 3.0 percent indicate they are carrying hazardous materials.

Interstate Truck Origins and Destinations - The primary purpose of the interstate trucking surveys was to gain information that would be useful in determining the potential number of long distance truck trips that could conceivably divert to the Heartland Expressway. Currently the Nebraska Department of Roads has programmed Nebraska Highway 71 to be widened to four-lanes from Interstate 80 (at Kimball) to Scottsbluff/Gering. The addition of the Heartland Expressway would make a direct connection between Interstates 80 and 90 and could conceivably divert through, long distance truck trips.

Exhibits C-8 and C-9 graphically display the truck traffic flows for the two interstate highways. The origin and destination results from the interstate surveys reveal that there is some potential to divert long distance truck trips onto the Heartland Expressway. It appears the largest number of divertable trips could come from Interstate 80, where the truck volumes are much greater and where truck traffic desires indicate more of a need for a north-south highway. Among these divertable trips on I-80 would be a substantial number which have origins in eastern Nebraska, or in states to the east and southeast of Nebraska and with destinations in the northwestern states.

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Time - ______________________
Date - ______________________

INTERSTATE 80/90 TRUCKING SURVEY

Heartland Expressway Study

1. Where did you begin this trip (where you picked up this load) (nearest city and state) ______________________

2. Where will your trip end (where you will leave the load) (nearest city and state) ______________________

3. What is the nature of your haul?

a. For-Hire, Regulated Commodities	A-1	______	Truckload
	A-2	______	Less than Truckload
b. Private Freight (Wal-Mart, etc.)	B	______	
c. Independent Trucker (Owner/Operator) hauling exempt commodity	C	______	

4. Carrying hazardous material? D ______

1. Where did you begin this trip (where you picked up this load) (nearest city and state) ______________________

2. Where will your trip end (where you will leave the load) (nearest city and state) ______________________

3. What is the nature of your haul?

a. For-Hire, Regulated Commodities	A-1	______	Truckload
	A-2	______	Less than Truckload
b. Private Freight (Wal-Mart, etc.)	B	______	
c. Independent Trucker (Owner/Operator) hauling exempt commodity	C	______	

4. Carrying hazardous material? D ______

1. Where did you begin this trip (where you picked up this load) (nearest city and state) ______________________

2. Where will your trip end (where you will leave the load) (nearest city and state) ______________________

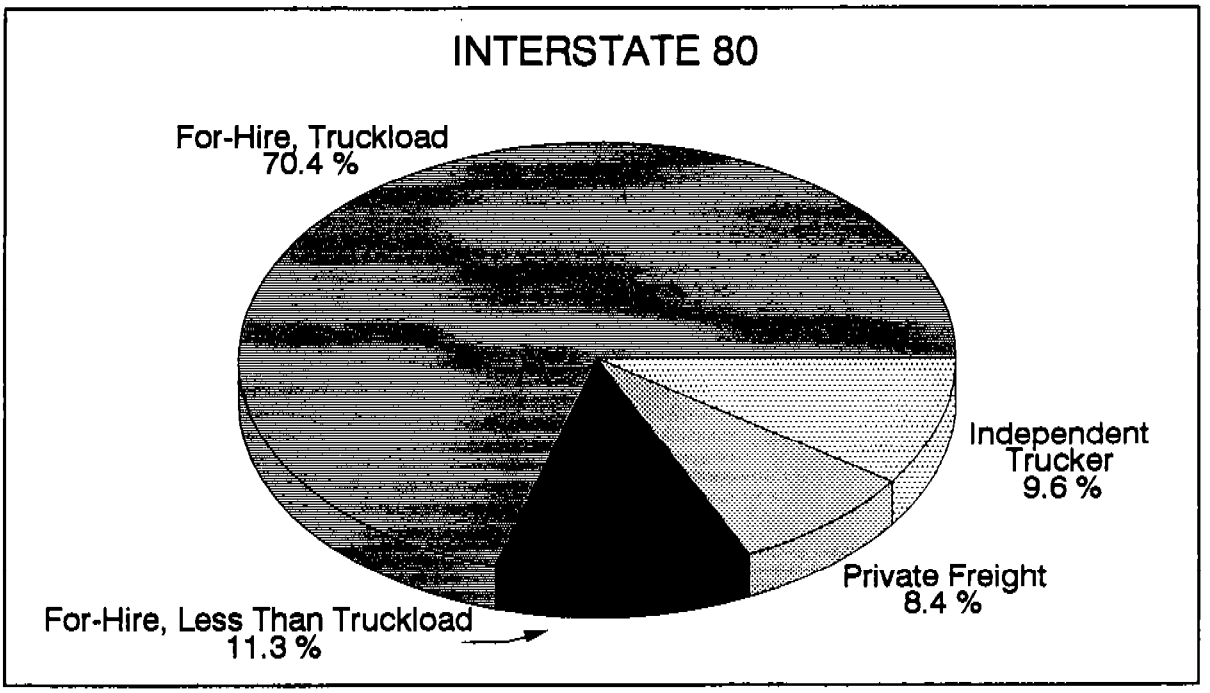
3. What is the nature of your haul?

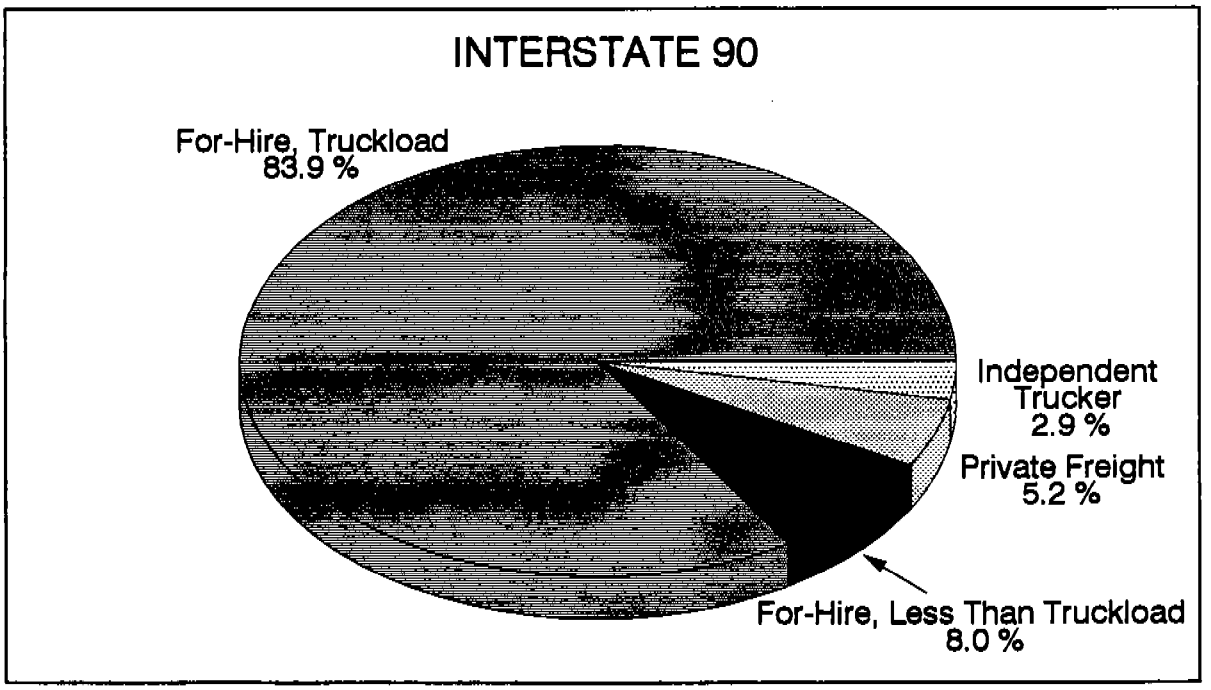
a. For-Hire, Regulated Commodities	A-1	______	Truckload
	A-2	______	Less than Truckload
b. Private Freight (Wal-Mart, etc.)	B	______	
c. Independent Trucker (Owner/Operator) hauling exempt commodity	C	______	

4. Carrying hazardous material? D ______

Exhibit C–6

Exhibit C–6
TRUCK TYPES ON EACH INTERSTATE HIGHWAY



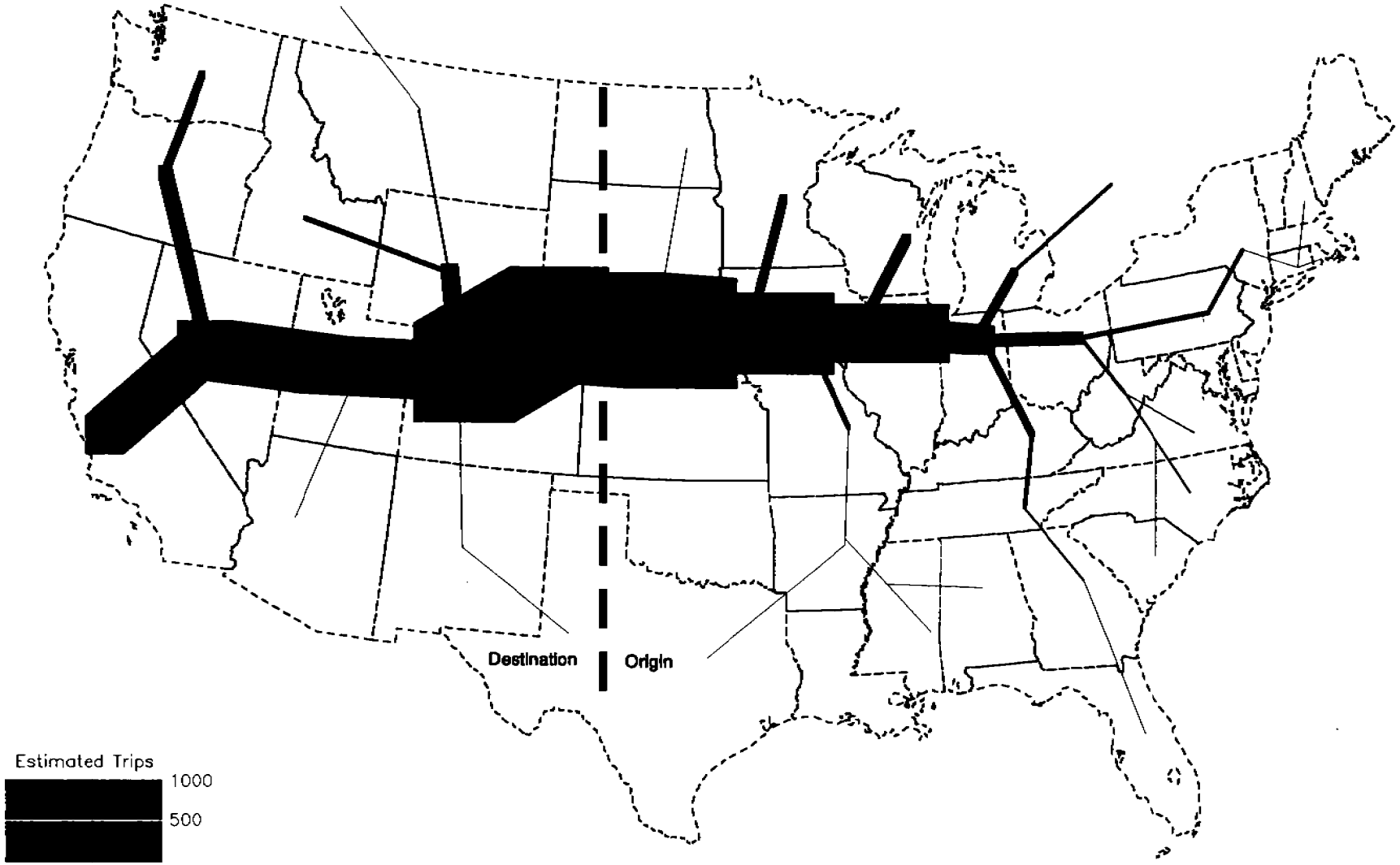


Source: Interstate Truck Survey, October 1992
Wilbur Smith Associates

Exhibit C–8

INTERSTATE 80 TRUCK TRAFFIC DESIRES MAP

Destination and Origin of Westbound Truck Traffic

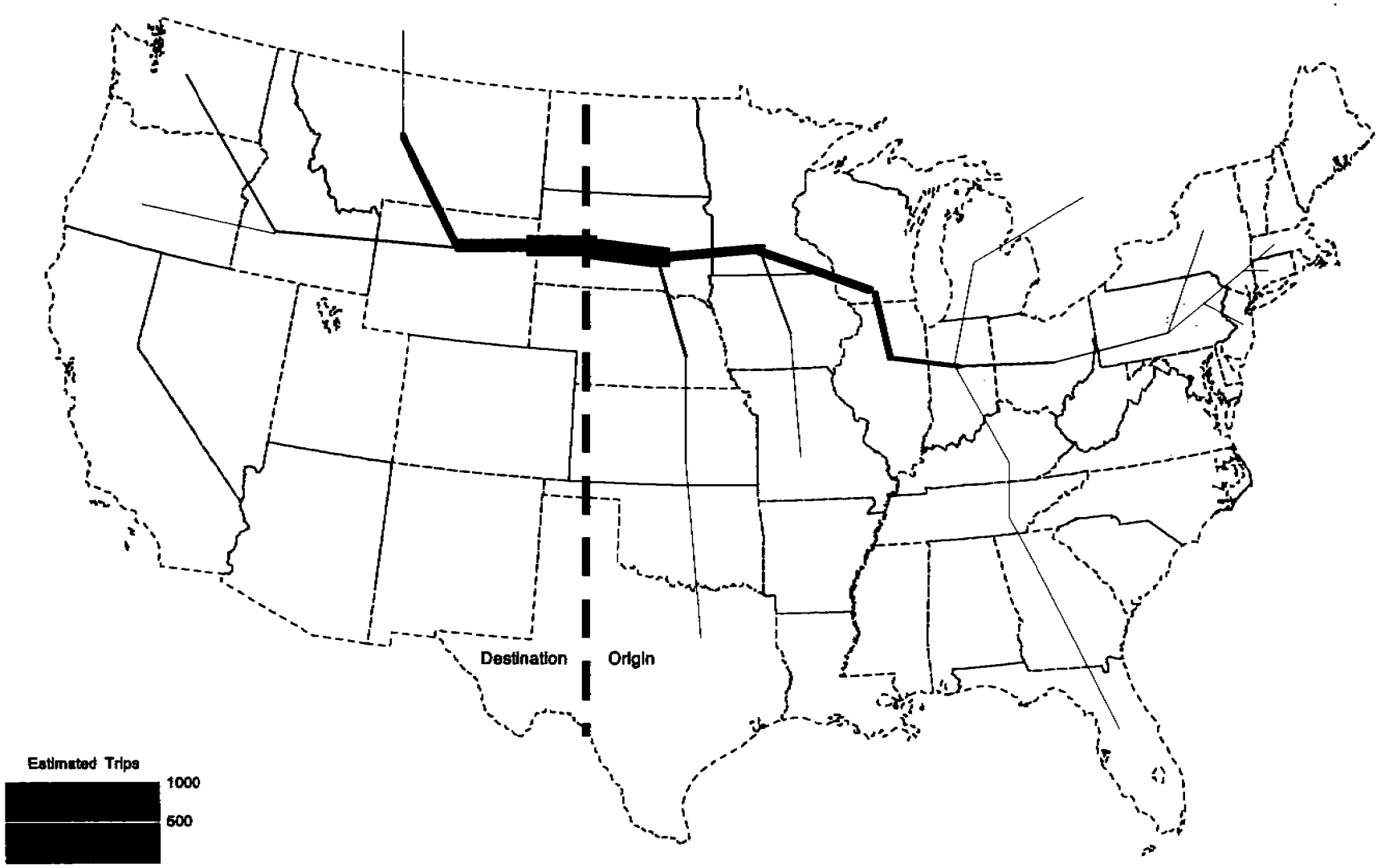


Source: Heartland Roadside Survey, 1992

Exhibit C–9

INTERSTATE 90 TRUCK TRAFFIC DESIRES MAP

Destination and Origin of Eastbound Truck Traffic



Source: Heartland Roadside Survey, 1992

SHIPPER/RECEIVER AND MOTOR CARRIER SURVEYS

In order to determine how trucking companies and shipper/receiver firms might use a new expressway, surveys were taken of businesses in the region. These surveys sought to determine current truck use of highways in the study corridor, and to analyze how firms might potentially use a new expressway. These surveys included personal contact, telephone contact, and mail-out questionnaires.

The surveys were sent to 87 shipper/receiver firms and 65 motor carrier firms. These firms were selected based on their probability of using existing highways in the region and their possibility of using a new facility Heartland Expressway in the study corridor. Of these, 28 shipper/receiver and 17 motor carrier firms responded, comprising approximately 30 percent.

The shipper/receiver and motor carrier survey forms are depicted on Exhibits C-10 and C-11.

Type of Truck Travel - A large percentage of the survey respondents were from the Rapid City area. Of the 45 respondents, 17 were from the Rapid City area while only 4 were from the Scottsbluff area. However, the split between South Dakota and Nebraska was fairly even. South Dakota reported 24 firms, Nebraska 13, and 8 respondents chose to remain anonymous.

Truck Use of Corridor - Exhibit C-12 identifies the number of daily truck trips to and from the terminals that use highways in the study corridor. These, like the remainder of this section, only reflect the statistics from the firms that responded to the survey and do not necessarily represent all the firms in the study corridor.

- Of the 28 shipper/receivers, 92 percent of their trucks use some portion of the highways in the study corridor. Of those that use some portion, only 15 percent use highways comprising the entire distance both with Scottsbluff and Rapid City.

- Of the 17 motor carrier firms, 74 percent of the firms' trucks use a portion of the highways in the corridor. This is significantly less than the results of the shipper/receiver survey.

- Overall, the results indicate that over 80 percent use a portion of the study corridor, with close to 20 percent utilizing the entire study corridor.

Exhibit C-13 shows the number of firms that utilize each highway in the corridor. Highways 71, 79, and 385 are the most frequently used segments.

Exhibit C – 10

HEARTLAND SHIPPER/RECEIVER SURVEY

Corridor Study From Rapid City to Scottsbluff - 1992

YOUR FIRM'S EXISTING TRUCK OPERATIONS

1. Your firm has been identified as one which ships or receives cargo/commodities by truck. If some of those trucks drive between or within the Rapid City and Scottsbluff corridor (i.e. highways 2, 16, 18, 29, 71, 79, 385) check here _____ and complete this survey. If your trucks (your own or for-hire motor carriers) do not use any portion of the corridor, explain why you do not, answer question 15, and return this survey without answering questions #2-14.

_____

_____

2. How many of your firm's plants or sites use trucks that use a portion of this corridor, where are those plants or sites located, and about how many truck trips per year carry freight to or from these sites.

	Plant or Site Location (town or nearest town)	No. of Annual Trips
Site #1:	_____	_____
Site #2:	_____	_____
Site #3:	_____	_____
Site #4:	_____	_____
Site #5:	_____	_____
Site #6:	_____	_____

3. Of all the annual truck trips listed above, what percent use:

_____ % use a portion of the corridor (between Rapid City and Scottsbluff)
_____ % use the entire corridor distance (between Rapid City and Scottsbluff)
_____ % do not use the corridor at all
100 % total trucks to/from the sites

4. Your firm might have its own fleet of trucks, or you might use for-hire truckers (common or contract carriers), or both. Of total annual truck trips to/from the above sites, what percent are:

_____ % your own private fleet of trucks
_____ % for hire trucks
100 % total

5. Based upon truck shipments that drive the corridor, what are the principal cargo/commodity types which these trucks carry?

Inbound		*Outbound*	
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
Other cargo types _____	_____	Other cargo types _____	_____
Total Cargo	100%	Total Cargo	100%

6. What is the primary geographical DESTINATION of the majority of your firm's trucked commodity shipments moving from the corridor area (circle only one):

a. Local (in or around your community)
b. Corridor area (between Rapid City and Scottsbluff)
c. Regional (SD, NE, WY)
d. Other _____

7. What is the primary geographical ORIGIN of the majority of your firm's inputs transported by truck to the corridor area (circle only one):

a. Local (in or around your community)
b. Corridor area (between Rapid City and Scottsbluff)
c. Regional (SD, NE, WY)
d. Other _____

8. Which principal highways are used (please check):

____2 ____16 ____18 ____29 ____71 ____79 ____385 ____Other

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9. Please indicate any trucking problems and the degree to which they affect the following: (0 - no impact, 10 - worst impact)

Problem	*(0-10)*	*Any Comments?*
Speed (time in transit)		
Reliability (variation in time of delivery)		
Loss and Damage to Goods		
Cost of operating your trucks		
Other (specify)		

10. Overall, how would you rate the existing corridor between Rapid City and Scottsbluff as a trucking route:

a. excellent
b. good
c. average
d. poor or unsatisfactory

POSSIBLE IMPROVEMENTS TO THE CORRIDOR

11. The states could build a new expressway between the two cities by the most direct route, or improve existing highways and build new necessary segments, or route the expressway near large communities within the region. Recognizing that these are your tax dollars at work and money spent in one place cannot be used in another place, what (from your business use standpoint) do you think the state should do? Please explain why: _____

12. Would such an improvement help your firm? In what ways?

13. If a direct 4-lane expressway between the two cities were built, what would your firm do that it is not currently doing? _____

OTHER

14. Do you have any other comment that would help the South Dakota Department of Transportation and the Nebraska Department of Roads determine the best course of action for the corridor? _____

15. If we need to call your firm to clarify anything on this questionnaire, who would we call?

Name: _____
Telephone: _____
Firm: _____
Address: _____

Thank you for completing this survey. Your answers will remain confidential (not disclosed as attributable to your firm. All responses will be aggregated with results from other firms). If you have questions please call:

Mr. Robert Zuelsdorf - Wilbur Smith Associates (803) 251-2029
Mr. James Jenssen - South Dakota Department of Transportation (605) 773-3174
Mr. Art Yonkey - Nebraska Department of Roads (402) 479-4795

Please return this questionnaire in the enclosed prepaid envelope to:

Mr. Eric McClellan
Wilbur Smith Associates
P.O. Box 92
Columbia, SC 29202

Exhibit C–11
HEARTLAND MOTOR CARRIER SURVEY
Corridor Study From Rapid City to Scottsbluff - 1992

YOUR FIRM'S EXISTING TRUCK OPERATIONS

1. Your firm has been identified as one which trucks cargo/commodities. If some of those trucks drive between or within the Rapid City and Scottsbluff corridor (i.e. highways 2, 16, 18, 29, 71, 79, 385) check here _____ and complete this survey. If your trucks (your own or for-hire motor carriers) do not use any portion of the corridor, explain why you do not, answer question 13, and return this survey without answering questions #2-12. _____

2. Which of the following describe your firm's operations and cargoes in the corridor? (Please check)

General Freight Carriage	_____	Truckload (R)
	_____	Less-Than-Truckload (LTL)
	_____	Both TL and LTL
Specialized Freight Carraige	_____	Heavy machinery
	_____	Liquid petroleum
	_____	Refrigerated products
	_____	Agricultural products
	_____	Motor Vehicles
	_____	Building materials
	_____	Household goods
	_____	Hazardous materials
	_____	Other

3. If your trucking firm has terminals in the corridor, where are they located, and about how many truck trips per year carry freight to or from these sites.

	Truck Terminal or Site Location (town or nearest tow	*No. of Annual Trips*
Site #1:	_____	_____
Site #2:	_____	_____
Site #3:	_____	_____
Site #4:	_____	_____
Site #5:	_____	_____

4. Of all the annual trucks entering/leaving the above sites, what percent use:

_____ % use a portion of the corridor (between Rapid City and Scottsbluff)
_____ % use the entire corridor distance (between Rapid City and Scottsbluff)
_____ % do not use the corridor at all
100 % total trucks to/from the sites

5. What is the primary geographical coverage of the majority of your firm's trucking operations.

a. Local (in or around your community)
b. Corridor area (between Rapid City and Scottsbluff)
c. Regional (SD, NE, WY)
d. Other _____

6. Which principal highways are used (please check):

____2 ____16 ____18 ____29 ____71 ____79 ____385 ____Other

7. Please indicate any trucking problems and the degree to which they affect the following: (0 - no impact, 10 - worst impact)

Problem	*(0-10)*	*Any Comments?*
Speed (time in transit)	_____	_____
Reliability (variation in time of delivery)	_____	_____
Loss and Damage to Goods	_____	_____
Cost of operating your trucks	_____	_____
Other (specify)	_____	_____

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8. Overall, how would you rate the existing corridor between Rapid City and Scottsbluff as a trucking route:

   a. excellent
   b. good
   c. average
   d. poor or unsatisfactory

POSSIBLE IMPROVEMENTS TO THE CORRIDOR

9. The states could build a new expressway between the two cities by the most direct route, or improve existing highways and build new necessary segments, or route the expressway near large communities within the region. Recognizing that these are your tax dollars at work and money spent in one place cannot be used in another place, what (from your business use standpoint) do you think the state should do? Please explain why: _____

10. Would such an improvement help your firm? In what ways?

11. If a direct 4-lane expressway between the two cities were built, what would your firm do that it is not currently doing? _____

OTHER

12. Do you have any other comment that would help the South Dakota Department of Transportation and the Nebraska Department of Roads determine the best course of action for the corridor? _____

13. If we need to call your firm to clarify anything on this questionnaire, who would we call?

    Name: _____
    Telephone: _____
    Firm: _____
    Address: _____

Thank you for completing this survey. Your answers will remain confidential (not disclosed as attributable to your firm. All responses will be aggregated with results from other firms). If you have questions please call:

Mr. Robert Zuelsdorf - Wilbur Smith Associates (803) 251-2029
Mr. James Jenssen - South Dakota Department of Transportation (605) 773-3174
Mr. Art Yonkey - Nebraska Department of Roads (402) 479-4795

Please return this questionnaire in the enclosed prepaid envelope to:

Mr. Eric McClellan
Wilbur Smith Associates
P.O. Box 92
Columbia, SC 29202

Exhibit C-12
TRUCK TRIPS TO/FROM TERMINALS

TOTAL Reported Annual Terminal Trips	SHIPPERS/ RECEIVERS Trucks	Percent	MOTOR CARRIERS Trucks	Percent	Trucks	Percent
Entire Route	3,400	23%	1,700	19%	5,100	21%
Portion of Route	9,700	66%	4,700	52%	14,400	61%
Do Not Use Route	1,500	11%	2,700	29%	4,200	18%
Total Annual Terminal Trips	14,600	100%	9,100	100%	23,700	100%

SOURCE: Shipper/Receiver & Motor Carrier Firm Surveys
Wilbur Smith Associates

Exhibit C-13
PRINCIPAL CORRIDOR HIGHWAYS USED BY TRUCKING FIRMS
Survey Response Data

HIGHWAY	NUMBER OF RESPONSES SHIPPER/RECEIVER	MOTOR CARRIER	TOTAL
SR 2	10	7	17
SR 16	6	3	9
SR 18	6	7	13
SR 29	4	4	8
SR 71	12	9	21
SR 79	15	13	28
US 385	12	12	24

SOURCE: Shipper/Receiver & Motor Carrier Firm Surveys
Wilbur Smith Associates

Truck Origins/Destinations - It is also interesting to examine the origins and destinations of where the trucking trips occur. Exhibit C-14 reveals that the majority of the firms have trucks with origins and/or destinations outside the study corridor. Only 6 of the shipper/receiver firms have primary origins and destinations within the study area. The majority of the firms, 12, operate with origins and destinations outside the study area.

Exhibit C-14
PRIMARY GEOGRAPHIC ORIGINS & DESTINATIONS
Survey Response Data

GEOGRAPHICAL REGION	SHIPPER/RECEIVER OUTBOUND	SHIPPER/RECEIVER INBOUND	MOTOR CARRIERS
Local Area	4	4	1
Corridor Area	3	3	0
Regional (SD, NE, WY)	3	5	5
Other (National)	11	6	11

SOURCE: Shipper/Receiver & Motor Carrier Firm Surveys
Wilbur Smith Associates

Commodities Transported - The principal commodities transported in this corridor, as reported by the survey respondents, are building material products, manufactured goods, and heavy machinery and parts. Approximate shares are listed in Exhibit C-15. These statistics are greatly influenced by what firms responded to the survey, and therefore are not statistically reliable.

Perceived Deficiencies - Opinions regarding the effectiveness of the study corridor as a trucking route, the impact of the lack of passing opportunities, and overall trip effectiveness were analyzed. Exhibits C-16 and C-17 analyze these deficiencies.

The general concensus of both the trucking firms and the shippers/receivers is that the corridor is an average or poor trucking corridor. In fact, 95 percent feel that the corridor is average to below average while only 2 respondents labeled it as a good trucking route.

Exhibit C-15
PRINCIPAL COMMODITIES TRANSPORTED
Survey Response Data

COMMODITY	NUMBER OF RESPONSES SHIPPER/RECEIVER	MOTOR CARRIER
Heavy Machinery	3	3
Agricultural Products	1	3
Building Materials	9	3
Hazardous Materials	--	1
Manufactured Goods	6	--
Livestock	1	--
Refrigerated Goods	--	3
Other	--	6

SOURCE: Shipper/Receiver & Motor Carrier Firm Surveys
Wilbur Smith Associates

Exhibit C-16
HEARTLAND CORRIDOR RATINGS AS A TRUCKING ROUTE
Survey Response Data

RATING	NUMBER OF RESPONSES SHIPPER/RECEIVER	MOTOR CARRIER	TOTAL
Excellent	0	0	0
Good	1	1	2
Average	12	8	20
Poor or Unsatisfactory	8	7	15

SOURCE: Shipper/Receiver & Motor Carrier Firm Surveys
Wilbur Smith Associates

The results differ, however, when the firms were asked to rate specific problems, such as speed or reliability, on a scale from 0 (no problem) to 10 (severe problem). Speed concerns topped the list of problems but show only a 5.5 average degree of severity. The other concerns such as reliability, loss and damage of goods, and cost of operating trucks, are all well below five. In fact, the overall rating given for the condition of the road has an index of 4.2. In other words, the majority of the firms view the highways in the corridor as being a poor trucking route but do not view the problem as a significant impediment to their productivity. In fact, one firm felt that money could be better spent on other projects, such as decreasing the national debt.

Exhibit C-17
LACK OF PASSING OPPORTUNITY IMPACTS ON TRUCKING
Survey Response Data

PROBLEM	AVERAGE DEGREE OF SEVERITY SHIPPER/RECEIVER	MOTOR CARRIER	BOTH
Speed (time in transit)	6.2	4.6	5.5
Reliability (variation in time of delivery)	4.4	4.3	4.3
Loss and Damage to Goods	1.6	2.6	2.0
Cost of Operating Trucks	2.8	5.8	4.1
Other (Weather, Safety, Tourist Congestion)	1.0	7.8	5.6
TOTAL SEVERITY OF IMPACTS	3.7	4.9	4.2

NOTE: "0" is No Problem; "10" is Most Severe Problem.

SOURCE: Shipper/Receiver & Motor Carrier Firm Surveys
Wilbur Smith Associates

FREIGHT TRANSPORTATION SURVEY CONCLUSIONS

The freight surveys suggest the following regarding the envisaged Heartland Expressway:

- There are very few trucks traveling through the entire Heartland Corridor. Most of the truck traffic is local traffic, having both an origin and a destination between and including Scottsbluff/Gering and Rapid City.

- The majority of shippers/receivers and motor carrier firms located within the Heartland Corridor utilize a portion of the existing highway system; however, only a small number use the entire corridor between Scottsbluff and Rapid City.

- The general concensus of both truck firms and shippers/receivers is that the existing Heartland Corridor is an average or poor trucking corridor.

- The majority of firms view the highways in the Corridor as being a poor trucking route but do not view the problem as a significant impediment to their productivity.

Appendix D
HEARTLAND EXPRESSWAY TOURISM INDUSTRY

The Heartland Expressway highway improvements might not only increase the efficiency of trucking and industrial development in the area but might also enhance the tourist industry in the Black Hills Region of South Dakota and the Panhandle of Nebraska. The tourism industry could benefit through improved mobility for visitors, including less travel time and improved safety, resulting in a more reliable and enjoyable trip for visitors. The Heartland Expressway could also make the tourist and recreation sites in the region more accessible and more attractive to potential vacationers, thereby potentially increasing the number of visitors to the region.

According to the South Dakota Department of tourism, 98 percent of all persons visiting the Black Hills Region travel by highway (92 percent by automobile, 6 percent by bus). In 1991 over 2.6 million visitors visited Mount Rushmore National Monument. This implies that over 2 1/2 million people traveled to Western South Dakota via the area's highway system. This figure does not include the hundreds of thousands of visitors who traveled to the Panhandle of Nebraska to visit Fort Robinson State Park or many of the other tourist attractions in the area. The roadside surveys conducted specifically for this study in August of 1992 also found that 46 percent of all motorists traveling in the Heartland Corridor are traveling for recreational or vacation purposes, far more than any other trip purpose.

Exhibit D-1 displays the results from a traveler origination and destination survey conducted by the South Dakota Department of Tourism. The survey indicates that there may be potential for the Heartland Expressway to bring visitors into the Black Hills of South Dakota. According to the South Dakota Department of Tourism's survey, nearly 14 percent of all visitors currently visiting South Dakota would have the option of using the Heartland Expressway to travel to/from Western South Dakota. Another 64 percent of the visitors could travel along I-80 and then use the Heartland Expressway to travel to western South Dakota. Again these figures do not represent the large potential of motorists frequenting tourist sites in the Panhandle of Nebraska.

MAJOR TOURIST DESTINATIONS IN THE AREA

The Heartland Expressway Study Area covers a large portion of Western Nebraska and South Dakota which includes numerous tourist sites and attractions. The Black Hills of South Dakota and the Panhandle of Nebraska attract approximately 3 million visitors each year from all over the U.S. and the World. Mount Rushmore National Monument attracted nearly 2.6 million visitors alone and Fort Robinson State Park, located near Crawford, Nebraska attracted nearly 300,000 visitors in 1991, making it one of the largest visitor attractions in the State of Nebraska.

South Dakota Tourist Attractions - Tourism in South Dakota is a very large industry and has been dramatically increasing over the last several years. The Black Hills Region is a major part of that industry. Exhibit D-2 illustrates the increasing amount of visitor expenditures the State of South Dakota has witnessed over the last several years, along with the expenditures and percentage accumulated by the Black Hills Region.

Exhibit D-1
Origin of Travelers to South Dakota

State	Percent of Visitors
Minnesota	14.8 %
Iowa	8.9
Illinois	7.2
Wisconsin	5.2
Colorado	4.7
Nebraska	4.5
Missouri	4.5
Others	50.2
	100.0

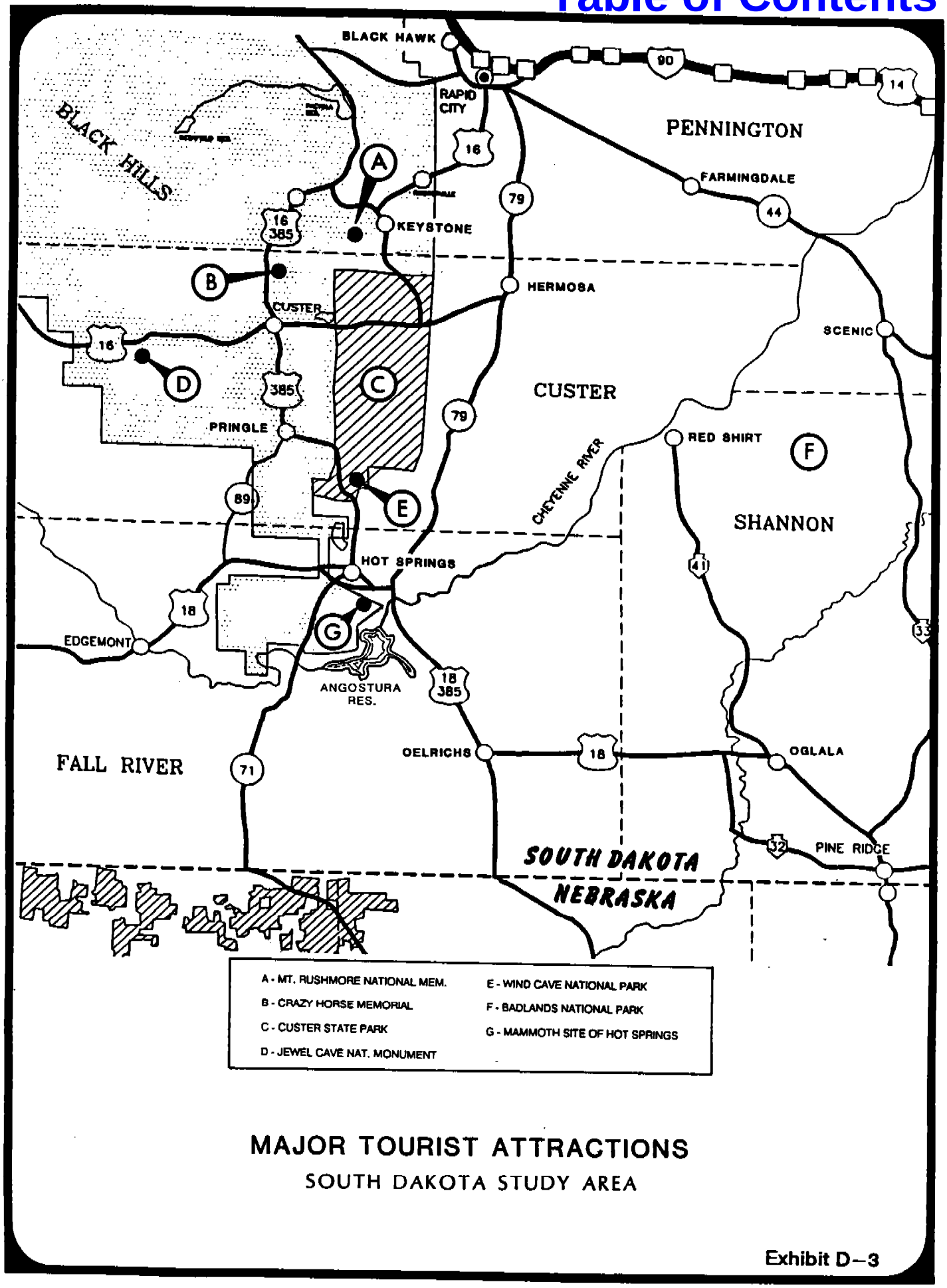
Source: South Dakota Department of Tourism

Exhibit D-2
Annual Visitor Expenditures

	Millions of Current Dollars				
	1987	1988	1989	1990	1991
State of South Dakota	$245.3	$270.9	$302.2	$343.9	$380.6
Black Hills Region	$123.5	$130.1	$150.7	$189.2	$213.6
Percentage (Black Hills)	50.3%	48.0%	49.9%	55.0%	56.1%

Source: South Dakota Department of Tourism

While Mount Rushmore is the most noted and popular tourist destination in the Black Hills, it is not the only attraction. Exhibit D-3 displays the locations of many of the major tourist attractions in Western South Dakota. Exhibit D-4 indicates the annual number of visitors for the largest tourist destinations in Western South Dakota. The increasing number of visitors to the Black Hills each year would imply that improved highways may be important and, conceivably, the Heartland Expressway could play a role in attracting even more visitors to the area.



MAJOR TOURIST ATTRACTIONS
SOUTH DAKOTA STUDY AREA

Exhibit D–3

Exhibit D–4
HEARTLAND EXPRESSWAY AREA TOURIST SITES

SOUTH DAKOTA SITES	ANNUAL VISITORS 1988	1989	1990	1991
Mount Rushmore	2,013,749	2,075,190	2,144,724	2,689,154
Badlands National Park	NA	NA	1,338,475	1,530,369
Custer State Park	1,010,880	1,163,974	1,241,023	1,403,919
Wind Cave National Park	1,187,631	1,127,025	1,169,649	1,181,233
Jewel Cave National Monument	127,031	131,252	137,632	152,725
Mammoth Site	NA	NA	75,952	87,962

NEBRAKA SITES	1988	1989	1990	1991
Toadstool Park	NA	NA	NA	NA
Museum of the Fur Trade	48,259	43,011	48,669	48,083
Fort Robinson State Park	291,212	285,473	296,235	297,221
Chadron State Park	171,660	156,983	180,965	166,800
Scotts Bluff Nat'l Monument	147,408	164,050	171,788	186,183
Chimney Rock Nat'l Monument	20,198	18,673	16,930	18,340
Agate Fossil Beds Nat'l Monument	NA	20,459	23,483	22,891
Nebraska Nat'l Forest (Pine Ridge)	NA	7,500	16,000	14,500

SOURCE: Nebraska Department of Economic Development
South Dakota Department of Tourism

Another large tourist attraction in the Black Hills is the recent addition of legalized gaming. In November of 1989, legalized gaming started in Deadwood. Since that time, over $640 million has been wagered in Deadwood and, according to the South Dakota Department of Tourism, total bet by month has been increasing over the previous year since gaming began in Deadwood. Exhibit D-5 displays the total bet by month for gaming in Deadwood.

Nebraska Tourist Attractions - While the Panhandle of Nebraska may not be as famous as a major tourist destination as the Black Hills of South Dakota, the area does have a number of tourist attractions which are visited by hundreds of thousands of tourists each year. The largest of the attractions is Fort Robinson State Park. Other major attractions in the area include: Chadron State Park, Museum of the Fur Trade, Scottsbluff National Monument, Chimney Rock National Monument, and Toadstool Park. Exhibit D-6 depicts the location for each of these tourist sites and Exhibit D-4 displays the attractions annual number of visitors from 1988 to 1991.

DEVELOPMENT PROJECTS

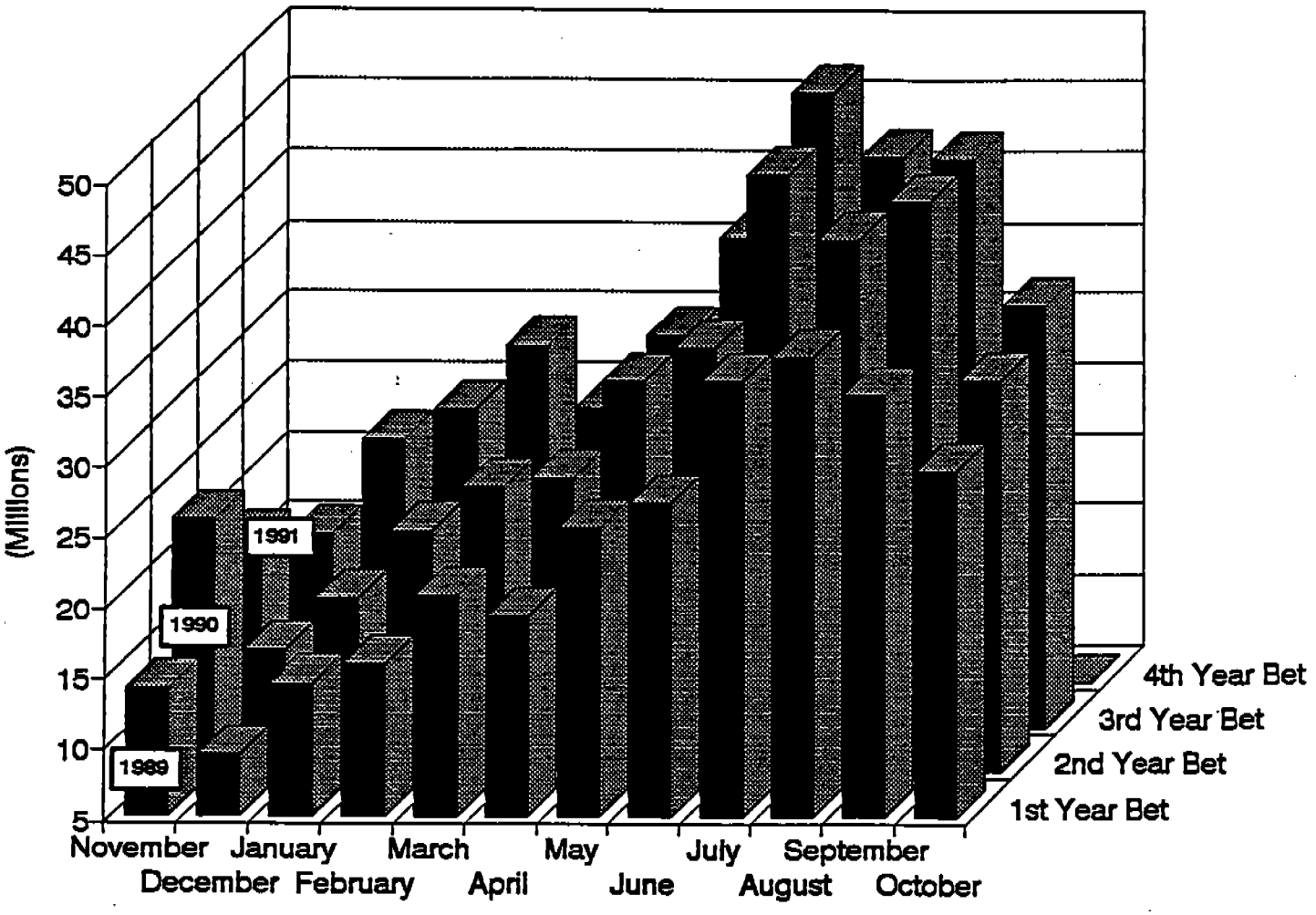
Many enhancements or improvements to tourist sites are planned or underway in both South Dakota and Nebraska. In the Black Hills Region of South Dakota numerous projects are planned including the establishment of the Chief Big Foot National Memorial Park and the Wounded Knee National Memorial in Shannon County, which would honor the victims of the 1890 Wounded Knee Massacre. The National Park Service estimates that within its first five years of operation, the national memorial would draw 80,000 to 190,000 visitors annually. Open for completion in 1993 is the Mount Rushmore visitor information center, as well as on-going work on the preservation of the sculpture. Improvements at Custer State Park include the construction of additional log cabins at Blue Bell Lodge as well as the planning of a conference center at the State Game Lodge. Other significant improvements in the Black Hills Region include major improvements at Angostura Recreational Area and further developments in Deadwood, including a large casino and convention center.

Major development projects in western Nebraska include the completion of a new visitor center and improved access roads at the Agate Fossil beds as well as a museum at the Chimney Rock National Historic site.

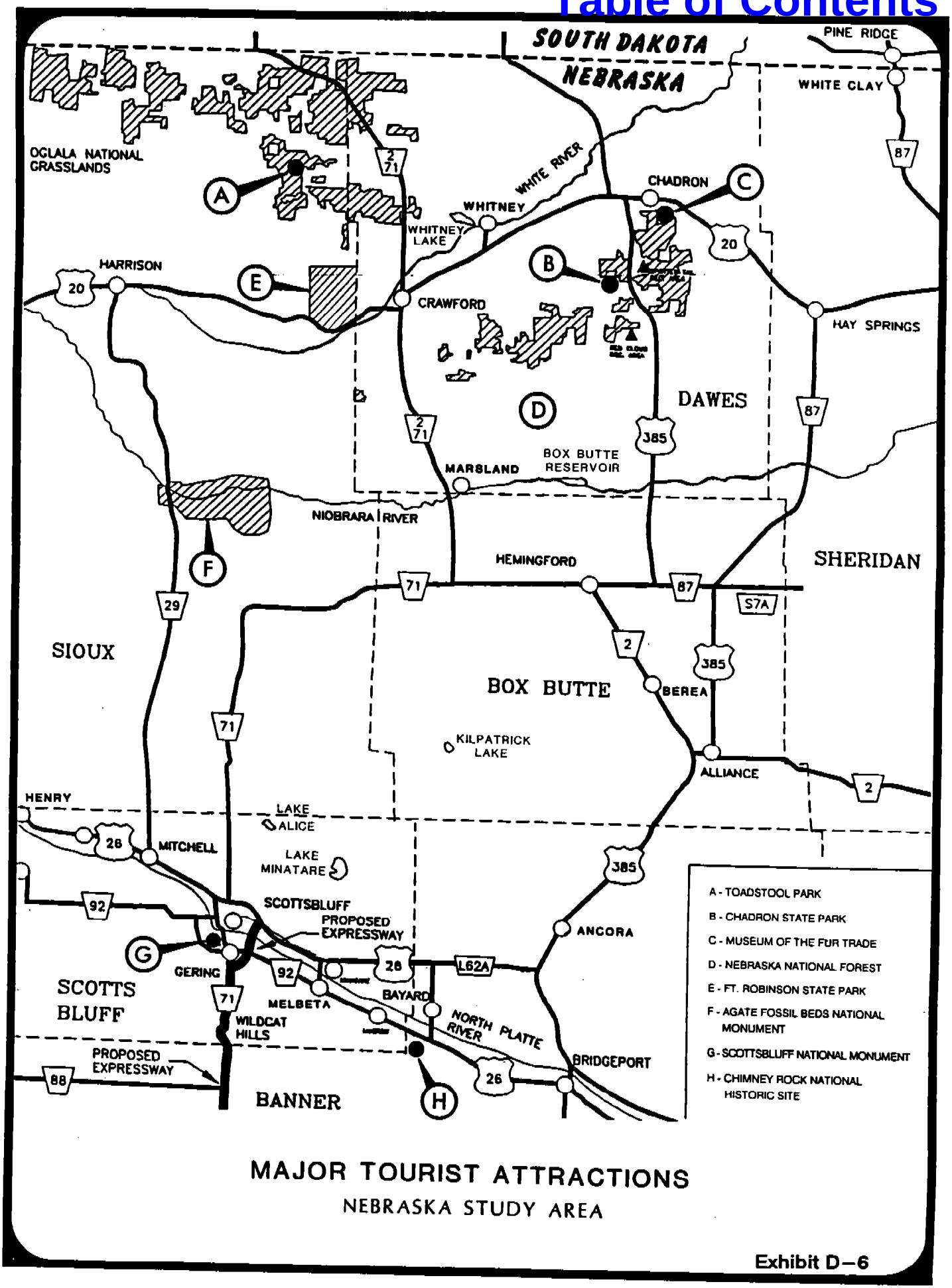
VISITOR ROUTES OF ENTRY INTO THE AREA

The roadside surveys conducted as part of this study indicate significant tourist and recreational traffic in the Heartland Expressway Corridor. A large percentage of these tourist trips were made by persons traveling from locations outside the two states. Of importance to the Heartland Expressway are the major tourist entry points into the Heartland Corridor, and the identification of which routes are being utilized by tourist traffic once inside the corridor.

Exhibit D–5
TOTAL BET BY MONTH



SOURCE: South Dakota Department of Tourism



MAJOR TOURIST ATTRACTIONS
NEBRASKA STUDY AREA

Exhibit D–6

Exhibit D-7 identifies the ten peak season survey locations conducted throughout the corridor. These ten survey locations cover the major entry points into the Heartland Expressway Corridor. Stations 1 through 4 cover the southern entry points, Stations 6 through 9 cover the west entry points and intercept vehicles which use Interstate 25 and U.S. 85 in Wyoming to travel into the Corridor, and Station 10 covers vehicles traveling from the north into the corridor.

Exhibit D-7
PEAK SEASON SURVEY LOCATIONS

STATION #	STATION LOCATION	DIRECTION SURVEYED
1	SR 28 North of Mitchell, NE	Northbound
2	SR 71 Near Sioux/Scottsbluff Co. Line	Northbound
3	US 385 North of Alliance, NE	Northbound
4	SR 2 North of Alliance, NE	Northbound
5	US 385 Near NE/SD Border	Northbound
6	US 20 West of Harrison, NE	Eastbound
7	US 18 East of SD/WY Border	Eastbound
8	US 16 East of SD/WY Border	Eastbound
9	US 85 East of SD/WY Border	Eastbound
10	SR 79 South of Rapid City	Southbound

Exhibit D-8 displays the daily number of vacation and recreational trips passing through the ten survey locations, and the trip purpose percentage of traffic at the individual locations, during the Summer months. As shown, all entry points into the corridor have a large percentage of tourist traffic. However, Station 7 (U.S. 18 East of SD/WY Border) and Station 10 (SR 79 South of Rapid City) are the most commonly used entry points for tourist traffic into the corridor.

When the survey stations are grouped by their geographical locations (i.e. Stations 1-4 South, Stations 6-9 West, and Station 10 North) the major gateways for tourist traffic into the Heartland Corridor become much clearer. Exhibit D-9 displays the number and percentage of tourist trips entering the corridor by direction.

A large percentage of the tourist trips entering the Heartland Corridor are from the west. This indicates that there currently are a number of recreational and vacation trips using Interstate 25 and U.S. 85 in Wyoming to travel into the Black Hills of South Dakota and the Panhandle of Nebraska.

Exhibit D-8
DAILY TOURIST TRIPS BY SURVEY STATION
Peak Season Survey

STATION #	STATION LOCATION	NUMBER OF TOURIST TRIPS	PERCENT TOURIST TRIPS
1	SR 28	70	24.8%
2	SR 71	158	23.5
3	US 385	482	34.4
4	SR 2	641	35.1
5	US 385	622	64.3
6	US 20	315	52.9
7	US 18	1,043	74.5
8	US 16	832	53.0
9	US 85	302	53.6
10	SR 79	1,915	42.5

Exhibit D-9
DAILY TOURIST TRIPS BY DIRECTION
Peak Season Survey

STATION LOCATION	NUMBER OF TOURIST TRIPS	PERCENT OF TOTAL TOURIST TRIPS
South	1,351	23.5%
West	2,493	43.3
North	1,915	33.2

Exhibit D-10 indicates the home location (license plate of vehicle) of tourist travelers entering the Heartland Corridor. The exhibit is arranged by survey location direction to distinguish the directional differences of long distance tourist trips entering the Heartland Corridor.

The majority of recreational trips entering the corridor from the south are local vacation trips, with over 50 percent of the vehicles having Nebraska license plates. However, there is still a significant number of trips from longer distances, with nearly 14 percent of the vehicles being from states non-adjacent to Nebraska and South Dakota.

Exhibit D-10
LICENSE PLATE OF TOURIST VEHICLES

Southern Survey Locations

LICENSE PLATE	NUMBER OF TOURIST TRIPS	PERCENT OF TOURIST TRIPS
Colorado	79	5.8%
Iowa	12	0.9
Kansas	85	6.3
Missouri	16	1.2
North Dakota	3	0.2
Nebraska	781	57.8
South Dakota	69	5.1
Wisconsin	10	0.7
Wyoming	28	2.1
East U.S.	87	6.4
Northwest U.S.	42	3.1
Southeast U.S.	27	2.0
Southwest U.S.	71	5.3
West U.S.	38	2.8
Canada	3	0.2

Western Survey Locations

LICENSE PLATE	NUMBER OF TOURIST TRIPS	PERCENT OF TOURIST TRIPS
Colorado	395	15.8 %
Iowa	95	3.8
Kansas	11	0.4
Minnesota	118	4.7
Missouri	61	2.4
North Dakota	56	2.2
Nebraska	111	4.4
South Dakota	166	6.7
Wisconsin	85	3.4
Wyoming	392	15.7
East U.S.	287	11.5
Northwest U.S.	119	4.8
Southeast U.S.	48	1.9
Southwest U.S.	113	4.5
West U.S.	337	13.5
Canada	99	4.0

The largest percentage of trips entering the corridor from the west are from the nearby states of Wyoming and Colorado. These two states account for 31.5 percent of the total vacation trips entering the corridor from the west. There are also many trips from western states, including the Pacific Northwest and southwestern states that are using these four highways as entry points into the corridor. Many of these trips are traveling on Interstate 25 or US 85 in Wyoming before entering the Heartland corridor. These trips could conceivably divert on to the Heartland Expressway.

SUMMARY AND CONCLUSIONS

The tourist industry in Western Nebraska and South Dakota is a very large and growing industry which relies on the area's highway system. The tourist sites in the Heartland Corridor attract visitors from all over North America. The Heartland Expressway might therefore play a role in reshaping visitor travel patterns and traffic conditions throughout the area.

Table of Contents

Appendix E

ECONOMIC FEASIBILITY CALCULATIONS

Exhibit E–1
TRAVEL EFFICIENCY FEASIBILITY
Route Option B (Freeway)

($000)

	Capital	Maint.	V.O.C.	Time	Accidents	Residual	Total Cost	Total Benefits	Net Benefits
1991			1,327.1	4,421.9	5,709.2				
1992									
1993	310,597.9						310,597.9	0.0	(310,597.9)
1994		1,353.4	1,324.9	4,744.0	6,238.5		1,353.4	12,307.4	10,954.0
1995		1,353.4	1,324.1	4,851.4	6,415.0		1,353.4	12,590.5	11,237.1
1996		1,353.4	1,323.4	4,958.8	6,591.4		1,353.4	12,873.6	11,520.2
1997		1,353.4	1,322.6	5,066.2	6,767.9		1,353.4	13,156.7	11,803.3
1998		1,353.4	1,321.9	5,173.6	6,944.3		1,353.4	13,439.8	12,086.4
1999		1,353.4	1,321.1	5,281.0	7,120.7		1,353.4	13,722.8	12,369.4
2000		1,353.4	1,320.4	5,388.3	7,297.2		1,353.4	14,005.9	12,652.5
2001		1,353.4	1,319.6	5,495.7	7,473.6		1,353.4	14,289.0	12,935.6
2002		1,353.4	1,318.9	5,603.1	7,650.1		1,353.4	14,572.1	13,218.7
2003		1,353.4	1,318.2	5,710.5	7,826.5		1,353.4	14,855.2	13,501.8
2004		1,353.4	1,317.4	5,817.9	8,002.9		1,353.4	15,138.2	13,784.8
2005		1,353.4	1,316.7	5,925.3	8,179.4		1,353.4	15,421.3	14,067.9
2006		1,353.4	1,315.9	6,032.6	8,355.8		1,353.4	15,704.4	14,351.0
2007		1,353.4	1,315.2	6,140.0	8,532.3		1,353.4	15,987.5	14,634.1
2008		40,526.6	1,314.4	6,247.4	8,708.7		40,526.6	16,270.5	(24,256.1)
2009		1,353.4	1,313.7	6,354.8	8,885.2		1,353.4	16,553.6	15,200.2
2010		1,353.4	1,312.9	6,462.2	9,061.6		1,353.4	16,836.7	15,483.3
2011		1,353.4	1,312.2	6,569.6	9,238.0		1,353.4	17,119.8	15,766.4
2012		1,353.4	1,311.4	6,676.9	9,414.5		1,353.4	17,402.9	16,049.5
2013		1,353.4	1,310.7	6,784.3	9,590.9		1,353.4	17,685.9	16,332.5
2014		1,353.4	1,309.9	6,891.7	9,767.4		1,353.4	17,969.0	16,615.6
2015		1,353.4	1,309.2	6,999.1	9,943.8		1,353.4	18,252.1	16,898.7
2016		1,353.4	1,308.5	7,106.5	10,120.2		1,353.4	18,535.2	17,181.8
2017		1,353.4	1,307.7	7,213.9	10,296.7		1,353.4	18,818.3	17,464.9
2018		1,353.4	1,307.0	7,321.2	10,473.1		1,353.4	19,101.3	17,747.9
2019		1,353.4	1,306.2	7,428.6	10,649.6		1,353.4	19,384.4	18,031.0
2020		1,353.4	1,305.5	7,536.0	10,826.0		1,353.4	19,667.5	18,314.1
2021		1,353.4	1,304.7	7,643.4	11,002.4		1,353.4	19,950.6	18,597.2
2022		1,353.4	1,304.0	7,750.8	11,178.9		1,353.4	20,233.7	18,880.3
2023		1,353.4	1,303.2	7,858.2	11,355.3		1,353.4	20,516.7	19,163.3
2024						108,297.9	0.0	108,297.9	108,297.9
@ Discount Rate of		7.0%			Discounted Totals		341,590.5	200,264.2	(141,326.3)

Feasibility Results

Net Present Value	(141,326.3)
Internal Rate of Return	2.8%
Benefit/Cost Ratio	0.59

SOURCE: Wilbur Smith Associates

Exhibit E–2
TRAVEL EFFICIENCY FEASIBILITY
Route Option B (Expressway)

($000)

	Capital	Maint.	V.O.C.	Time	Accidents	Residual	Total Cost	Total Benefits	Net Benefits
1991			2,517.4	2,805.0	2,502.0				
1992									
1993	257,551.0						257,551.0	0.0	(257,551.0)
1994		1,105.8	2,627.9	2,997.9	2,591.4		1,105.8	8,217.3	7,111.5
1995		1,105.8	2,664.7	3,062.3	2,621.2		1,105.8	8,348.2	7,242.4
1996		1,105.8	2,701.6	3,126.6	2,651.0		1,105.8	8,479.2	7,373.4
1997		1,105.8	2,738.4	3,190.9	2,680.8		1,105.8	8,610.1	7,504.3
1998		1,105.8	2,775.2	3,255.2	2,710.6		1,105.8	8,741.1	7,635.3
1999		1,105.8	2,812.1	3,319.5	2,740.4		1,105.8	8,872.0	7,766.2
2000		1,105.8	2,848.9	3,383.8	2,770.2		1,105.8	9,003.0	7,897.2
2001		1,105.8	2,885.7	3,448.2	2,800.0		1,105.8	9,133.9	8,028.1
2002		1,105.8	2,922.6	3,512.5	2,829.8		1,105.8	9,264.9	8,159.1
2003		1,105.8	2,959.4	3,576.8	2,859.6		1,105.8	9,395.8	8,290.1
2004		1,105.8	2,996.2	3,641.1	2,889.5		1,105.8	9,526.8	8,421.0
2005		1,105.8	3,033.1	3,705.4	2,919.3		1,105.8	9,657.8	8,552.0
2006		1,105.8	3,069.9	3,769.7	2,949.1		1,105.8	9,788.7	8,682.9
2007		1,105.8	3,106.7	3,834.1	2,978.9		1,105.8	9,919.7	8,813.9
2008		(1,744.2)	3,143.6	3,898.4	3,008.7		(1,744.2)	10,050.6	11,794.8
2009		1,105.8	3,180.4	3,962.7	3,038.5		1,105.8	10,181.6	9,075.8
2010		1,105.8	3,217.2	4,027.0	3,068.3		1,105.8	10,312.5	9,206.7
2011		1,105.8	3,254.1	4,091.3	3,098.1		1,105.8	10,443.5	9,337.7
2012		1,105.8	3,290.9	4,155.6	3,127.9		1,105.8	10,574.4	9,468.6
2013		1,105.8	3,327.7	4,220.0	3,157.7		1,105.8	10,705.4	9,599.6
2014		1,105.8	3,364.6	4,284.3	3,187.5		1,105.8	10,836.3	9,730.5
2015		1,105.8	3,401.4	4,348.6	3,217.3		1,105.8	10,967.3	9,861.5
2016		1,105.8	3,438.2	4,412.9	3,247.1		1,105.8	11,098.3	9,992.5
2017		1,105.8	3,475.1	4,477.2	3,276.9		1,105.8	11,229.2	10,123.4
2018		1,105.8	3,511.9	4,541.6	3,306.7		1,105.8	11,360.2	10,254.4
2019		1,105.8	3,548.7	4,605.9	3,336.5		1,105.8	11,491.1	10,385.3
2020		1,105.8	3,585.6	4,670.2	3,366.3		1,105.8	11,622.1	10,516.3
2021		1,105.8	3,622.4	4,734.5	3,396.1		1,105.8	11,753.0	10,647.2
2022		1,105.8	3,659.2	4,798.8	3,425.9		1,105.8	11,884.0	10,778.2
2023		1,105.8	3,696.1	4,863.1	3,455.7		1,105.8	12,014.9	10,909.1
2024						86,087.6	0.0	86,087.6	86,087.6
@ Discount Rate of			7.00%			Discounted Totals	$270,239.9	$128,379.3	($141,860.6)

Feasibility Results

Net Present Value	($141,860.6)
Internal Rate of Return	1.7%
Benefit/Cost Ratio	0.48

SOURCE: Wilbur Smith Associates

Exhibit E–3
TRAVEL EFFICIENCY FEASIBILITY
Route Option B (Two/Four Lanes)

($000)

	Capital	Maint.	V.O.C.	Time	Accidents	Residual	Total Cost	Total Benefits	Net Benefits
1991			2,096.8	2,243.6	1,498.6				
1992									
1993	145,170.2						145,170.2	0.0	(145,170.2)
1994		547.7	2,194.3	2,401.9	1,613.3		547.7	6,209.5	5,661.8
1995		547.7	2,226.8	2,454.7	1,651.5		547.7	6,333.0	5,785.3
1996		547.7	2,259.3	2,507.4	1,689.7		547.7	6,456.4	5,908.7
1997		547.7	2,291.8	2,560.2	1,728.0		547.7	6,579.9	6,032.2
1998		547.7	2,324.3	2,612.9	1,766.2		547.7	6,703.4	6,155.7
1999		547.7	2,356.8	2,665.7	1,804.4		547.7	6,826.9	6,279.2
2000		547.7	2,389.3	2,718.5	1,842.7		547.7	6,950.4	6,402.7
2001		547.7	2,421.8	2,771.2	1,880.9		547.7	7,073.9	6,526.2
2002		547.7	2,454.3	2,824.0	1,919.1		547.7	7,197.4	6,649.7
2003		547.7	2,486.8	2,876.8	1,957.4		547.7	7,320.9	6,773.2
2004		547.7	2,519.2	2,929.5	1,995.6		547.7	7,444.3	6,896.6
2005		547.7	2,551.7	2,982.3	2,033.8		547.7	7,567.8	7,020.1
2006		547.7	2,584.2	3,035.0	2,072.0		547.7	7,691.3	7,143.6
2007		547.7	2,616.7	3,087.8	2,110.3		547.7	7,814.8	7,267.1
2008		(392.8)	2,649.2	3,140.6	2,148.5		(392.8)	7,938.3	8,331.1
2009		547.7	2,681.7	3,193.3	2,186.7		547.7	8,061.8	7,514.1
2010		547.7	2,714.2	3,246.1	2,225.0		547.7	8,185.3	7,637.6
2011		547.7	2,746.7	3,298.9	2,263.2		547.7	8,308.8	7,761.1
2012		547.7	2,779.2	3,351.6	2,301.4		547.7	8,432.2	7,884.5
2013		547.7	2,811.7	3,404.4	2,339.6		547.7	8,555.7	8,008.0
2014		547.7	2,844.2	3,457.1	2,377.9		547.7	8,679.2	8,131.5
2015		547.7	2,876.7	3,509.9	2,416.1		547.7	8,802.7	8,255.0
2016		547.7	2,909.2	3,562.7	2,454.3		547.7	8,926.2	8,378.5
2017		547.7	2,941.7	3,615.4	2,492.6		547.7	9,049.7	8,502.0
2018		547.7	2,974.2	3,668.2	2,530.8		547.7	9,173.2	8,625.5
2019		547.7	3,006.7	3,721.0	2,569.0		547.7	9,296.7	8,748.9
2020		547.7	3,039.2	3,773.7	2,607.2		547.7	9,420.1	8,872.4
2021		547.7	3,071.7	3,826.5	2,645.5		547.7	9,543.6	8,995.9
2022		547.7	3,104.2	3,879.2	2,683.7		547.7	9,667.1	9,119.4
2023		547.7	3,136.7	3,932.0	2,721.9		547.7	9,790.6	9,242.9
2024						48,879.2	0.0	48,879.2	48,879.2
@ Discount Rate of			7.00%		Discounted Totals		151,625.8	97,993.0	(53,632.7)

Feasibility Results

Net Present Value	($53,632.7)
Internal Rate of Return	3.7%
Benefit/Cost Ratio	0.65

SOURCE: Wilbur Smith Associates

Exhibit E–4
TRAVEL EFFICIENCY FEASIBILITY
Route Option C (Freeway)

($000)

	Capital	Maint.	V.O.C.	Time	Accidents	Residual	Total Cost	Total Benefits	Net Benefits
1991			(558.8)	3,725.9	5,830.5				
1992									
1993	327,743.5						327,743.5	0.0	(327,743.5)
1994		1,276.6	(676.2)	4,015.0	6,379.8		1,276.6	9,718.6	8,442.0
1995		1,276.6	(715.4)	4,111.4	6,562.9		1,276.6	9,958.9	8,682.3
1996		1,276.6	(754.5)	4,207.8	6,745.9		1,276.6	10,199.2	8,922.6
1997		1,276.6	(793.6)	4,304.2	6,929.0		1,276.6	10,439.6	9,162.9
1998		1,276.6	(832.8)	4,400.5	7,112.1		1,276.6	10,679.9	9,403.3
1999		1,276.6	(871.9)	4,496.9	7,295.2		1,276.6	10,920.2	9,643.6
2000		1,276.6	(911.0)	4,593.3	7,478.3		1,276.6	11,160.5	9,883.9
2001		1,276.6	(950.2)	4,689.7	7,661.4		1,276.6	11,400.9	10,124.3
2002		1,276.6	(989.3)	4,786.0	7,844.5		1,276.6	11,641.2	10,364.6
2003		1,276.6	(1,028.5)	4,882.4	8,027.6		1,276.6	11,881.5	10,604.9
2004		1,276.6	(1,067.6)	4,978.8	8,210.6		1,276.6	12,121.8	10,845.2
2005		1,276.6	(1,106.7)	5,075.2	8,393.7		1,276.6	12,362.2	11,085.6
2006		1,276.6	(1,145.9)	5,171.5	8,576.8		1,276.6	12,602.5	11,325.9
2007		1,276.6	(1,185.0)	5,267.9	8,759.9		1,276.6	12,842.8	11,566.2
2008		55,549.4	(1,224.1)	5,364.3	8,943.0		55,549.4	13,083.1	(42,466.3)
2009		1,276.6	(1,263.3)	5,460.7	9,126.1		1,276.6	13,323.5	12,046.9
2010		1,276.6	(1,302.4)	5,557.0	9,309.2		1,276.6	13,563.8	12,287.2
2011		1,276.6	(1,341.6)	5,653.4	9,492.3		1,276.6	13,804.1	12,527.5
2012		1,276.6	(1,380.7)	5,749.8	9,675.3		1,276.6	14,044.4	12,767.8
2013		1,276.6	(1,419.8)	5,846.2	9,858.4		1,276.6	14,284.7	13,008.1
2014		1,276.6	(1,459.0)	5,942.5	10,041.5		1,276.6	14,525.1	13,248.5
2015		1,276.6	(1,498.1)	6,038.9	10,224.6		1,276.6	14,765.4	13,488.8
2016		1,276.6	(1,537.2)	6,135.3	10,407.7		1,276.6	15,005.7	13,729.1
2017		1,276.6	(1,576.4)	6,231.7	10,590.8		1,276.6	15,246.1	13,969.4
2018		1,276.6	(1,615.5)	6,328.0	10,773.9		1,276.6	15,486.4	14,209.8
2019		1,276.6	(1,654.7)	6,424.4	10,957.0		1,276.6	15,726.7	14,450.1
2020		1,276.6	(1,693.8)	6,520.8	11,140.0		1,276.6	15,967.0	14,690.4
2021		1,276.6	(1,732.9)	6,617.2	11,323.1		1,276.6	16,207.4	14,930.8
2022		1,276.6	(1,772.1)	6,713.5	11,506.2		1,276.6	16,447.7	15,171.1
2023		1,276.6	(1,811.2)	6,809.9	11,689.3		1,276.6	16,688.0	15,411.4
2024						112,555.8	0.0	112,555.8	112,555.8
@ Discount Rate of			7.00%			Discounted Totals	363,255.8	163,489.6	(199,766.3)

Feasibility Results

Net Present Value	(199,766.3)
Internal Rate of Return	1.2%
Benefit/Cost Ratio	0.45

SOURCE: Wilbur Smith Associates

Exhibit E–5
TRAVEL EFFICIENCY FEASIBILITY
Route Option C (Expressway)

($000)

	Capital	Maint.	V.O.C.	Time	Accidents	Residual	Total Cost	Total Benefits	Net Benefits
1991			1,019.3	2,190.0	3,597.3				
1992									
1993	264,681.4						264,681.4	0.0	(264,681.4)
1994		950.7	1,048.0	2,353.8	3,903.2		950.7	7,305.0	6,354.3
1995		950.7	1,057.6	2,408.5	4,005.1		950.7	7,471.2	6,520.5
1996		950.7	1,067.2	2,463.1	4,107.1		950.7	7,637.3	6,686.6
1997		950.7	1,076.7	2,517.7	4,209.0		950.7	7,803.4	6,852.7
1998		950.7	1,086.3	2,572.3	4,311.0		950.7	7,969.6	7,018.9
1999		950.7	1,095.9	2,626.9	4,412.9		950.7	8,135.7	7,185.0
2000		950.7	1,105.4	2,681.5	4,514.9		950.7	8,301.8	7,351.1
2001		950.7	1,115.0	2,736.1	4,616.8		950.7	8,468.0	7,517.3
2002		950.7	1,124.6	2,790.7	4,718.8		950.7	8,634.1	7,683.4
2003		950.7	1,134.1	2,845.4	4,820.8		950.7	8,800.3	7,849.6
2004		950.7	1,143.7	2,900.0	4,922.7		950.7	8,966.4	8,015.7
2005		950.7	1,153.3	2,954.6	5,024.7		950.7	9,132.5	8,181.8
2006		950.7	1,162.9	3,009.2	5,126.6		950.7	9,298.7	8,348.0
2007		950.7	1,172.4	3,063.8	5,228.6		950.7	9,464.8	8,514.1
2008		(8,039.2)	1,182.0	3,118.4	5,330.5		(8,039.2)	9,630.9	17,670.1
2009		950.7	1,191.6	3,173.0	5,432.5		950.7	9,797.1	8,846.4
2010		950.7	1,201.1	3,227.6	5,534.4		950.7	9,963.2	9,012.5
2011		950.7	1,210.7	3,282.3	5,636.4		950.7	10,129.4	9,178.7
2012		950.7	1,220.3	3,336.9	5,738.3		950.7	10,295.5	9,344.8
2013		950.7	1,229.9	3,391.5	5,840.3		950.7	10,461.6	9,510.9
2014		950.7	1,239.4	3,446.1	5,942.2		950.7	10,627.8	9,677.1
2015		950.7	1,249.0	3,500.7	6,044.2		950.7	10,793.9	9,843.2
2016		950.7	1,258.6	3,555.3	6,146.2		950.7	10,960.0	10,009.3
2017		950.7	1,268.1	3,609.9	6,248.1		950.7	11,126.2	10,175.5
2018		950.7	1,277.7	3,664.5	6,350.1		950.7	11,292.3	10,341.6
2019		950.7	1,287.3	3,719.2	6,452.0		950.7	11,458.5	10,507.8
2020		950.7	1,296.9	3,773.8	6,554.0		950.7	11,624.6	10,673.9
2021		950.7	1,306.4	3,828.4	6,655.9		950.7	11,790.7	10,840.0
2022		950.7	1,316.0	3,883.0	6,757.9		950.7	11,956.9	11,006.2
2023		950.7	1,325.6	3,937.6	6,859.8		950.7	12,123.0	11,172.3
2024						86,419.5	0.0	86,419.5	86,419.5
@ Discount Rate of			7.00%		Discounted Totals		273,220.3	121,356.1	(151,864.2)

Feasibility Results

Net Present Value	(151,864.2)
Internal Rate of Return	1.6%
Benefit/Cost Ratio	0.44

SOURCE: Wilbur Smith Associates

Exhibit E–6
TRAVEL EFFICIENCY FEASIBILITY
Route Option C (Two/Four Lane)

($000)

	Capital	Maint.	V.O.C.	Time	Accidents	Residual	Total Cost	Total Benefits	Net Benefits
1991			801.2	1,518.9	2,299.7				
1992									
1993	147,345.4						147,345.4	0.0	(147,345.4)
1994		334.8	825.2	1,631.4	2,465.0		334.8	4,921.6	4,586.8
1995		334.8	833.2	1,668.9	2,520.1		334.8	5,022.2	4,687.4
1996		334.8	841.2	1,706.4	2,575.2		334.8	5,122.8	4,788.0
1997		334.8	849.3	1,743.9	2,630.2		334.8	5,223.4	4,888.6
1998		334.8	857.3	1,781.4	2,685.3		334.8	5,324.0	4,989.2
1999		334.8	865.3	1,818.9	2,740.4		334.8	5,424.6	5,089.8
2000		334.8	873.3	1,856.4	2,795.5		334.8	5,525.2	5,190.4
2001		334.8	881.3	1,893.9	2,850.6		334.8	5,625.8	5,291.0
2002		334.8	889.3	1,931.4	2,905.7		334.8	5,726.4	5,391.6
2003		334.8	897.3	1,968.8	2,960.8		334.8	5,826.9	5,492.1
2004		334.8	905.3	2,006.3	3,015.9		334.8	5,927.5	5,592.7
2005		334.8	913.3	2,043.8	3,071.0		334.8	6,028.1	5,693.3
2006		334.8	921.3	2,081.3	3,126.1		334.8	6,128.7	5,793.9
2007		334.8	929.3	2,118.8	3,181.2		334.8	6,229.3	5,894.5
2008		(7,418.2)	937.3	2,156.3	3,236.3		(7,418.2)	6,329.9	13,748.1
2009		334.8	945.4	2,193.8	3,291.3		334.8	6,430.5	6,095.7
2010		334.8	953.4	2,231.3	3,346.4		334.8	6,531.1	6,196.3
2011		334.8	961.4	2,268.8	3,401.5		334.8	6,631.7	6,296.9
2012		334.8	969.4	2,306.3	3,456.6		334.8	6,732.3	6,397.5
2013		334.8	977.4	2,343.8	3,511.7		334.8	6,832.9	6,498.1
2014		334.8	985.4	2,381.3	3,566.8		334.8	6,933.5	6,598.7
2015		334.8	993.4	2,418.8	3,621.9		334.8	7,034.1	6,699.3
2016		334.8	1,001.4	2,456.3	3,677.0		334.8	7,134.7	6,799.9
2017		334.8	1,009.4	2,493.8	3,732.1		334.8	7,235.3	6,900.5
2018		334.8	1,017.4	2,531.3	3,787.2		334.8	7,335.9	7,001.1
2019		334.8	1,025.4	2,568.8	3,842.3		334.8	7,436.5	7,101.7
2020		334.8	1,033.4	2,606.3	3,897.4		334.8	7,537.1	7,202.3
2021		334.8	1,041.5	2,643.8	3,952.4		334.8	7,637.7	7,302.9
2022		334.8	1,049.5	2,681.3	4,007.5		334.8	7,738.3	7,403.5
2023		334.8	1,057.5	2,718.8	4,062.6		334.8	7,838.9	7,504.1
2024						47,859.0	0.0	47,859.0	47,859.0
@ Discount Rate of			7.00%			Discounted Totals	148,689.9	79,117.2	(69,572.7)

Feasibility Results

Net Present Value	(69,572.7)
Internal Rate of Return	2.6%
Benefit/Cost Ratio	0.53

SOURCE: Wilbur Smith Associates

Exhibit E--7
TRAVEL EFFICIENCY FEASIBILITY
Route Option D (Freeway)

($000)

	Capital	Maint.	V.O.C.	Time	Accidents	Residual	Total Cost	Total Benefits	Net Benefits
1991			732.3	4,602.3	6,252.7				
1992									
1993	326,903.7						326,903.7	0.0	(326,903.7)
1994		1,532.8	792.0	5,017.5	6,780.9		1,532.8	12,590.4	11,057.6
1995		1,532.8	811.9	5,155.9	6,957.0		1,532.8	12,924.8	11,392.0
1996		1,532.8	831.8	5,294.3	7,133.1		1,532.8	13,259.2	11,726.4
1997		1,532.8	851.6	5,432.7	7,309.2		1,532.8	13,593.6	12,060.8
1998		1,532.8	871.5	5,571.1	7,485.3		1,532.8	13,928.0	12,395.2
1999		1,532.8	891.4	5,709.5	7,661.4		1,532.8	14,262.3	12,729.5
2000		1,532.8	911.3	5,847.9	7,837.4		1,532.8	14,596.7	13,063.9
2001		1,532.8	931.2	5,986.3	8,013.5		1,532.8	14,931.1	13,398.3
2002		1,532.8	951.1	6,124.7	8,189.6		1,532.8	15,265.5	13,732.7
2003		1,532.8	971.0	6,263.2	8,365.7		1,532.8	15,599.9	14,067.1
2004		1,532.8	990.9	6,401.6	8,541.8		1,532.8	15,934.2	14,401.4
2005		1,532.8	1,010.8	6,540.0	8,717.9		1,532.8	16,268.6	14,735.8
2006		1,532.8	1,030.7	6,678.4	8,893.9		1,532.8	16,603.0	15,070.2
2007		1,532.8	1,050.6	6,816.8	9,070.0		1,532.8	16,937.4	15,404.6
2008		88,710.4	1,070.5	6,955.2	9,246.1		88,710.4	17,271.7	(71,438.7)
2009		1,532.8	1,090.3	7,093.6	9,422.2		1,532.8	17,606.1	16,073.3
2010		1,532.8	1,110.2	7,232.0	9,598.3		1,532.8	17,940.5	16,407.7
2011		1,532.8	1,130.1	7,370.4	9,774.4		1,532.8	18,274.9	16,742.1
2012		1,532.8	1,150.0	7,508.8	9,950.5		1,532.8	18,609.3	17,076.5
2013		1,532.8	1,169.9	7,647.2	10,126.5		1,532.8	18,943.6	17,410.8
2014		1,532.8	1,189.8	7,785.6	10,302.6		1,532.8	19,278.0	17,745.2
2015		1,532.8	1,209.7	7,924.0	10,478.7		1,532.8	19,612.4	18,079.6
2016		1,532.8	1,229.6	8,062.4	10,654.8		1,532.8	19,946.8	18,414.0
2017		1,532.8	1,249.5	8,200.8	10,830.9		1,532.8	20,281.2	18,748.4
2018		1,532.8	1,269.4	8,339.2	11,007.0		1,532.8	20,615.5	19,082.7
2019		1,532.8	1,289.3	8,477.6	11,183.0		1,532.8	20,949.9	19,417.1
2020		1,532.8	1,309.2	8,616.0	11,359.1		1,532.8	21,284.3	19,751.5
2021		1,532.8	1,329.1	8,754.4	11,535.2		1,532.8	21,618.7	20,085.9
2022		1,532.8	1,348.9	8,892.8	11,711.3		1,532.8	21,953.1	20,420.3
2023		1,532.8	1,368.8	9,031.2	11,887.4		1,532.8	22,287.4	20,754.6
2024						114,183.8	0.0	114,183.8	114,183.8
@ Discount Rate of			7.00%		Discounted Totals		377,521.5	210,704.4	(166,817.0)

Feasibility Results

Net Present Value	(166,817.0)
Internal Rate of Return	2.3%
Benefit/Cost Ratio	0.56

SOURCE: Wilbur Smith Associates

Exhibit E-8
TRAVEL EFFICIENCY FEASIBILITY
Route Option D (Expressway)

($000)

	Capital	Maint.	V.O.C.	Time	Accidents	Residual	Total Cost	Total Benefits	Net Benefits
1991			2,786.9	2,526.7	3,934.5				
1992									
1993	260,047.1						260,047.1	0.0	(260,047.1)
1994		1,034.0	3,022.9	2,766.0	4,314.5		1,034.0	10,103.4	9,069.4
1995		1,034.0	3,101.5	2,845.8	4,441.1		1,034.0	10,388.5	9,354.5
1996		1,034.0	3,180.2	2,925.6	4,567.8		1,034.0	10,673.6	9,639.6
1997		1,034.0	3,258.9	3,005.4	4,694.4		1,034.0	10,958.7	9,924.7
1998		1,034.0	3,337.5	3,085.1	4,821.1		1,034.0	11,243.7	10,209.7
1999		1,034.0	3,416.2	3,164.9	4,947.8		1,034.0	11,528.8	10,494.8
2000		1,034.0	3,494.8	3,244.7	5,074.4		1,034.0	11,813.9	10,779.9
2001		1,034.0	3,573.5	3,324.5	5,201.1		1,034.0	12,099.0	11,065.0
2002		1,034.0	3,652.1	3,404.2	5,327.7		1,034.0	12,384.1	11,350.1
2003		1,034.0	3,730.8	3,484.0	5,454.4		1,034.0	12,669.2	11,635.2
2004		1,034.0	3,809.5	3,563.8	5,581.1		1,034.0	12,954.3	11,920.3
2005		1,034.0	3,888.1	3,643.6	5,707.7		1,034.0	13,239.4	12,205.4
2006		1,034.0	3,966.8	3,723.3	5,834.4		1,034.0	13,524.5	12,490.5
2007		1,034.0	4,045.4	3,803.1	5,961.0		1,034.0	13,809.6	12,775.6
2008		(2,652.0)	4,124.1	3,882.9	6,087.7		(2,652.0)	14,094.7	16,746.7
2009		1,034.0	4,202.8	3,962.7	6,214.3		1,034.0	14,379.7	13,345.7
2010		1,034.0	4,281.4	4,042.4	6,341.0		1,034.0	14,664.8	13,630.8
2011		1,034.0	4,360.1	4,122.2	6,467.7		1,034.0	14,949.9	13,915.9
2012		1,034.0	4,438.7	4,202.0	6,594.3		1,034.0	15,235.0	14,201.0
2013		1,034.0	4,517.4	4,281.8	6,721.0		1,034.0	15,520.1	14,486.1
2014		1,034.0	4,596.0	4,361.5	6,847.6		1,034.0	15,805.2	14,771.2
2015		1,034.0	4,674.7	4,441.3	6,974.3		1,034.0	16,090.3	15,056.3
2016		1,034.0	4,753.4	4,521.1	7,101.0		1,034.0	16,375.4	15,341.4
2017		1,034.0	4,832.0	4,600.9	7,227.6		1,034.0	16,660.5	15,626.5
2018		1,034.0	4,910.7	4,680.6	7,354.3		1,034.0	16,945.6	15,911.6
2019		1,034.0	4,989.3	4,760.4	7,480.9		1,034.0	17,230.7	16,196.7
2020		1,034.0	5,068.0	4,840.2	7,607.6		1,034.0	17,515.8	16,481.8
2021		1,034.0	5,146.6	4,920.0	7,734.2		1,034.0	17,800.8	16,766.8
2022		1,034.0	5,225.3	4,999.7	7,860.9		1,034.0	18,085.9	17,051.9
2023		1,034.0	5,304.0	5,079.5	7,987.6		1,034.0	18,371.0	17,337.0
2024						85,712.4	0.0	85,712.4	85,712.4
@ Discount Rate of			7.00%			Discounted Totals	271,542.1	170,384.4	(101,157.6)

Feasibility Results

Net Present Value	(101,157.6)
Internal Rate of Return	3.5%
Benefit/Cost Ratio	0.63

SOURCE: Wilbur Smith Associates

Exhibit E–9
TRAVEL EFFICIENCY FEASIBILITY
Route Option D (Two/Four Lane)

($000)

	Capital	Maint.	V.O.C.	Time	Accidents	Residual	Total Cost	Total Benefits	Net Benefits
1991			2,336.6	1,946.1	2,940.2				
1992									
1993	147,682.8						147,682.8	0.0	(147,682.8)
1994		504.6	2,518.7	2,135.4	3,202.6		504.6	7,856.7	7,352.1
1995		504.6	2,579.4	2,198.5	3,290.0		504.6	8,067.9	7,563.3
1996		504.6	2,640.1	2,261.6	3,377.5		504.6	8,279.2	7,774.6
1997		504.6	2,700.8	2,324.7	3,464.9		504.6	8,490.5	7,985.9
1998		504.6	2,761.5	2,387.8	3,552.4		504.6	8,701.7	8,197.1
1999		504.6	2,822.2	2,450.9	3,639.8		504.6	8,913.0	8,408.4
2000		504.6	2,882.9	2,514.0	3,727.3		504.6	9,124.3	8,619.7
2001		504.6	2,943.6	2,577.1	3,814.7		504.6	9,335.5	8,830.9
2002		504.6	3,004.3	2,640.2	3,902.2		504.6	9,546.8	9,042.2
2003		504.6	3,065.0	2,703.3	3,989.6		504.6	9,758.0	9,253.4
2004		504.6	3,125.8	2,766.5	4,077.1		504.6	9,969.3	9,464.7
2005		504.6	3,186.5	2,829.6	4,164.6		504.6	10,180.6	9,676.0
2006		504.6	3,247.2	2,892.7	4,252.0		504.6	10,391.8	9,887.2
2007		504.6	3,307.9	2,955.8	4,339.5		504.6	10,603.1	10,098.5
2008		(1,100.9)	3,368.6	3,018.9	4,426.9		(1,100.9)	10,814.4	11,915.3
2009		504.6	3,429.3	3,082.0	4,514.4		504.6	11,025.6	10,521.0
2010		504.6	3,490.0	3,145.1	4,601.8		504.6	11,236.9	10,732.3
2011		504.6	3,550.7	3,208.2	4,689.3		504.6	11,448.1	10,943.5
2012		504.6	3,611.4	3,271.3	4,776.7		504.6	11,659.4	11,154.8
2013		504.6	3,672.1	3,334.4	4,864.2		504.6	11,870.7	11,366.1
2014		504.6	3,732.8	3,397.5	4,951.6		504.6	12,081.9	11,577.3
2015		504.6	3,793.5	3,460.6	5,039.1		504.6	12,293.2	11,788.6
2016		504.6	3,854.2	3,523.7	5,126.6		504.6	12,504.5	11,999.9
2017		504.6	3,914.9	3,586.8	5,214.0		504.6	12,715.7	12,211.1
2018		504.6	3,975.6	3,649.9	5,301.5		504.6	12,927.0	12,422.4
2019		504.6	4,036.3	3,713.0	5,388.9		504.6	13,138.3	12,633.7
2020		504.6	4,097.0	3,776.1	5,476.4		504.6	13,349.5	12,844.9
2021		504.6	4,157.7	3,839.2	5,563.8		504.6	13,560.8	13,056.2
2022		504.6	4,218.4	3,902.3	5,651.3		504.6	13,772.0	13,267.4
2023		504.6	4,279.1	3,965.4	5,738.7		504.6	13,983.3	13,478.7
2024						49,757.5	0.0	49,757.5	49,757.5
@ Discount Rate of			7.00%		Discounted Totals		153,362.5	129,159.6	(24,202.8)

Feasibility Results

Net Present Value	(24,202.8)
Internal Rate of Return	5.6%
Benefit/Cost Ratio	0.84

SOURCE: Wilbur Smith Associates

Exhibit E–10
ECONOMIC DEVELOPMENT FEASIBILITY
Heartland Expressway Primary Impact Area
Route Option B (Freeway)

($000)

	Capital	Maint.	Const./ Maint.	Competitive Position	Tourism	Non–Business	Residual	Total Cost	Total Benefits	Net Benefits
1993	310,597.9		40,865.3					310,597.9	40,865.3	(269,732.6)
1994		1,353.4	40,901.6	1,329.9	5,102.1	7,298.7		1,353.4	54,632.3	53,278.9
1995		1,353.4	40,575.2	1,922.4	5,223.0	7,491.5		1,353.4	55,212.1	53,858.7
1996		1,353.4	40,200.4	2,335.9	5,368.1	7,684.3		1,353.4	55,588.7	54,235.3
1997		1,353.4	39,825.6	2,749.3	5,513.2	7,877.2		1,353.4	55,965.3	54,611.9
1998		1,353.4	(846.3)	3,162.8	5,658.3	8,070.0		1,353.4	16,044.8	14,691.4
1999		1,353.4	(846.3)	3,576.3	5,803.4	8,262.8		1,353.4	16,796.2	15,442.8
2000		1,353.4	(846.3)	3,989.8	5,948.4	8,455.6		1,353.4	17,547.6	16,194.2
2001		1,353.4	(532.0)	4,219.5	6,112.9	8,648.5		1,353.4	18,448.9	17,095.5
2002		1,353.4	(217.6)	4,449.2	6,277.3	8,841.3		1,353.4	19,350.2	17,996.8
2003		1,353.4	96.7	4,679.0	6,441.7	9,034.1		1,353.4	20,251.5	18,898.1
2004		1,353.4	411.1	4,908.7	6,606.2	9,226.9		1,353.4	21,152.8	19,799.4
2005		1,353.4	725.4	5,138.4	6,770.6	9,419.8		1,353.4	22,054.2	20,700.8
2006		1,353.4	805.2	5,319.7	6,947.1	9,612.6		1,353.4	22,684.6	21,331.2
2007		1,353.4	885.0	5,501.1	7,123.6	9,805.4		1,353.4	23,315.1	21,961.7
2008		40,526.6	964.8	5,682.5	7,300.1	9,998.2		40,526.6	23,945.6	(16,581.0)
2009		1,353.4	1,044.6	5,863.8	7,476.7	10,191.1		1,353.4	24,576.1	23,222.7
2010		1,353.4	1,124.4	6,045.2	7,653.2	10,383.9		1,353.4	25,206.6	23,853.2
2011		1,353.4	1,148.6	6,170.9	7,807.9	10,576.7		1,353.4	25,704.1	24,350.7
2012		1,353.4	1,172.8	6,296.6	7,962.7	10,769.5		1,353.4	26,201.6	24,848.2
2013		1,353.4	1,196.9	6,422.4	8,117.5	10,962.4		1,353.4	26,699.1	25,345.7
2014		1,353.4	1,221.1	6,548.1	8,272.2	11,155.2		1,353.4	27,196.6	25,843.2
2015		1,353.4	1,245.3	6,673.9	8,427.0	11,348.0		1,353.4	27,694.1	26,340.7
2016		1,353.4	1,308.2	6,782.7	8,574.5	11,540.8		1,353.4	28,206.1	26,852.7
2017		1,353.4	1,371.0	6,891.5	8,722.0	11,733.7		1,353.4	28,718.2	27,364.8
2018		1,353.4	1,433.9	7,000.3	8,869.5	11,926.5		1,353.4	29,230.2	27,876.8
2019		1,353.4	1,496.8	7,109.1	9,017.0	12,119.3		1,353.4	29,742.2	28,388.8
2020		1,353.4	1,559.7	7,217.9	9,164.5	12,312.1		1,353.4	30,254.2	28,900.8
2021		1,353.4	1,622.5	7,326.7	9,312.0	12,505.0		1,353.4	30,766.2	29,412.8
2022		1,353.4	1,685.4	7,435.6	9,459.5	12,697.8		1,353.4	31,278.2	29,924.8
2023		1,353.4	1,748.3	7,544.4	9,607.0	12,890.6		1,353.4	31,790.2	30,436.8
2024							108,297.9	0.0	108,297.9	108,297.9
	@ Discount Rate of		7.00%				Discounted Totals	$341,590.5	$444,670.6	$103,080.1

Feasibility Results

Net Present Value	$103,080.1
Internal Rate of Return	11.4%
Benefit/Cost Ratio	1.30

SOURCE: Wilbur Smith Associates

Exhibit E–11
ECONOMIC DEVELOPMENT FEASIBILITY
Heartland Expressway Primary Impact Area
Route Option B (Expressway)

($000)

	Capital	Maint.	Const./ Maint.	Competitive Position	Tourism	Non–Business	Residual	Total Cost	Total Benefits	Net Benefits
1993	257,551.0		33,889.2					257,551.0	33,889.2	(223,661.8)
1994		1,105.8	33,913.4	1,160.7	4,074.4	3,698.8		1,105.8	42,847.3	41,741.5
1995		1,105.8	33,635.3	1,680.6	4,159.1	3,769.5		1,105.8	43,244.5	42,138.7
1996		1,105.8	33,321.0	2,043.3	4,270.3	3,840.2		1,105.8	43,474.8	42,369.0
1997		1,105.8	33,018.7	2,406.0	4,381.5	3,910.9		1,105.8	43,717.2	42,611.4
1998		1,105.8	(713.3)	2,768.7	4,492.8	3,981.7		1,105.8	10,529.8	9,424.0
1999		1,105.8	(713.3)	3,131.4	4,604.0	4,052.4		1,105.8	11,074.4	9,968.6
2000		1,105.8	(713.3)	3,494.1	4,715.2	4,123.1		1,105.8	11,619.1	10,513.3
2001		1,105.8	(452.2)	3,716.6	4,841.0	4,193.8		1,105.8	12,299.2	11,193.4
2002		1,105.8	(191.0)	3,939.0	4,966.7	4,264.5		1,105.8	12,979.3	11,873.5
2003		1,105.8	70.1	4,161.5	5,092.5	4,335.3		1,105.8	13,659.3	12,553.5
2004		1,105.8	331.3	4,384.0	5,218.2	4,406.0		1,105.8	14,339.4	13,233.6
2005		1,105.8	592.4	4,606.4	5,343.9	4,476.7		1,105.8	15,019.5	13,913.7
2006		1,105.8	703.7	4,744.2	5,479.3	4,547.4		1,105.8	15,474.7	14,368.9
2007		1,105.8	814.9	4,882.1	5,614.8	4,618.1		1,105.8	15,929.9	14,824.1
2008		(1,744.2)	926.1	5,019.9	5,750.2	4,688.9		(1,744.2)	16,385.1	18,129.3
2009		1,105.8	1,037.4	5,157.7	5,885.6	4,759.6		1,105.8	16,840.2	15,734.4
2010		1,105.8	1,148.6	5,295.6	6,021.0	4,830.3		1,105.8	17,295.4	16,189.6
2011		1,105.8	1,146.2	5,404.4	6,139.5	4,901.0		1,105.8	17,591.0	16,485.2
2012		1,105.8	1,143.7	5,513.2	6,258.0	4,971.7		1,105.8	17,886.6	16,780.8
2013		1,105.8	1,141.3	5,622.0	6,376.4	5,042.5		1,105.8	18,182.2	17,076.4
2014		1,105.8	1,138.9	5,730.8	6,494.9	5,113.2		1,105.8	18,477.8	17,372.0
2015		1,105.8	1,136.5	5,839.6	6,613.4	5,183.9		1,105.8	18,773.4	17,667.6
2016		1,105.8	1,153.4	5,933.9	6,722.2	5,254.6		1,105.8	19,064.2	17,958.4
2017		1,105.8	1,170.3	6,028.2	6,831.0	5,325.3		1,105.8	19,355.0	18,249.2
2018		1,105.8	1,187.3	6,122.5	6,939.9	5,396.1		1,105.8	19,645.7	18,539.9
2019		1,105.8	1,204.2	6,216.9	7,048.7	5,466.8		1,105.8	19,936.5	18,830.7
2020		1,105.8	1,221.1	6,311.2	7,157.5	5,537.5		1,105.8	20,227.3	19,121.5
2021		1,105.8	1,238.1	6,407.9	7,268.7	5,608.2		1,105.8	20,522.9	19,417.1
2022		1,105.8	1,255.0	6,504.6	7,379.9	5,678.9		1,105.8	20,818.5	19,712.7
2023		1,105.8	1,271.9	6,601.3	7,491.2	5,749.7		1,105.8	21,114.1	20,008.3
2024							86,087.6	0.0	86,087.6	86,087.6
@ Discount Rate of			7.00%			Discounted Totals		$270,239.9	$328,078.5	$57,838.6

Feasibility Results

Net Present Value	$57,838.6
Internal Rate of Return	10.0%
Benefit/Cost Ratio	1.21

SOURCE: Wilbur Smith Associates

Exhibit E-12
ECONOMIC DEVELOPMENT FEASIBILITY
Heartland Expressway Primary Impact Area
Route Option B (Two/Four Lane)

($000)

	Capital	Maint.	Const./ Maint.	Competitive Position	Tourism	Non-Business	Residual	Total Cost	Total Benefits	Net Benefits
1993	145,170.2		19,102.7					145,170.2	19,102.7	(126,067.5)
1994		547.7	19,114.8	906.8	3,445.7	2,637.3		547.7	26,104.7	25,557.0
1995		547.7	18,957.6	1,317.8	3,518.3	2,711.8		547.7	26,505.6	25,957.9
1996		547.7	18,776.3	1,600.8	3,612.6	2,786.3		547.7	26,775.9	26,228.2
1997		547.7	18,594.9	1,883.7	3,706.9	2,860.7		547.7	27,046.2	26,498.5
1998		547.7	(459.4)	2,166.6	3,801.2	2,935.2		547.7	8,443.6	7,895.9
1999		547.7	(459.4)	2,449.5	3,895.5	3,009.7		547.7	8,895.2	8,347.5
2000		547.7	(459.4)	2,732.4	3,989.8	3,084.1		547.7	9,346.9	8,799.2
2001		547.7	(309.5)	2,906.5	4,096.2	3,158.6		547.7	9,851.8	9,304.1
2002		547.7	(159.6)	3,080.6	4,202.6	3,233.1		547.7	10,356.7	9,809.0
2003		547.7	(9.7)	3,254.7	4,309.0	3,307.5		547.7	10,861.6	10,313.9
2004		547.7	140.2	3,428.8	4,415.4	3,382.0		547.7	11,366.4	10,818.7
2005		547.7	290.2	3,602.9	4,521.8	3,456.5		547.7	11,871.3	11,323.6
2006		547.7	350.6	3,714.2	4,635.4	3,530.9		547.7	12,231.1	11,683.4
2007		547.7	411.1	3,825.4	4,749.1	3,605.4		547.7	12,590.9	12,043.2
2008		(392.8)	471.5	3,936.6	4,862.7	3,679.8		(392.8)	12,950.7	13,343.5
2009		547.7	532.0	4,047.8	4,976.4	3,754.3		547.7	13,310.5	12,762.8
2010		547.7	592.4	4,159.1	5,090.0	3,828.8		547.7	13,670.3	13,122.6
2011		547.7	592.4	4,246.1	5,189.2	3,903.2		547.7	13,931.0	13,383.3
2012		547.7	592.4	4,333.2	5,288.3	3,977.7		547.7	14,191.6	13,643.9
2013		547.7	592.4	4,420.2	5,387.5	4,052.2		547.7	14,452.3	13,904.6
2014		547.7	592.4	4,507.3	5,486.6	4,126.6		547.7	14,712.9	14,165.2
2015		547.7	592.4	4,594.3	5,585.7	4,201.1		547.7	14,973.6	14,425.9
2016		547.7	602.1	4,671.7	5,680.0	4,275.6		547.7	15,229.4	14,681.7
2017		547.7	611.8	4,749.1	5,774.3	4,350.0		547.7	15,485.2	14,937.5
2018		547.7	621.4	4,826.5	5,868.6	4,424.5		547.7	15,741.1	15,193.4
2019		547.7	631.1	4,903.8	5,963.0	4,499.0		547.7	15,996.9	15,449.2
2020		547.7	640.8	4,981.2	6,057.3	4,573.4		547.7	16,252.7	15,705.0
2021		547.7	650.5	5,056.2	6,151.6	4,647.9		547.7	16,506.1	15,958.4
2022		547.7	660.1	5,131.1	6,245.9	4,722.4		547.7	16,759.5	16,211.8
2023		547.7	669.8	5,206.1	6,340.2	4,796.8		547.7	17,012.9	16,465.2
2024							48,879.2	0.0	48,879.2	48,879.2
@ Discount Rate of		7.00%				Discounted Totals		$151,625.8	$224,281.8	$72,656.0

Feasibility Results

Net Present Value	$72,656.0
Internal Rate of Return	13.1%
Benefit/Cost Ratio	1.48

SOURCE: Wilbur Smith Associates

Exhibit E–13
ECONOMIC DEVELOPMENT FEASIBILITY
Heartland Expressway Primary Impact Area
Route Option C (Freeway)

($000)

	Capital	Maint.	Const./ Maint.	Competitive Position	Tourism	Non–Business	Residual	Total Cost	Total Benefits	Net Benefits
1993	327,743.5		43,126.2					327,743.5	43,126.2	(284,617.3)
1994		1,276.6	43,162.5	858.4	4,509.7	6,772.6		1,276.6	55,303.2	54,026.6
1995		1,276.6	42,811.9	1,233.2	4,618.5	6,938.4		1,276.6	55,602.0	54,325.4
1996		1,276.6	42,412.9	1,501.6	4,749.1	7,104.2		1,276.6	55,767.8	54,491.2
1997		1,276.6	42,038.1	1,770.0	4,879.7	7,270.0		1,276.6	55,957.8	54,681.2
1998		1,276.6	(991.4)	2,038.4	5,010.2	7,435.8		1,276.6	13,493.0	12,216.4
1999		1,276.6	(991.4)	2,306.8	5,140.8	7,601.6		1,276.6	14,057.8	12,781.2
2000		1,276.6	(991.4)	2,575.2	5,271.4	7,767.4		1,276.6	14,622.6	13,346.0
2001		1,276.6	(657.7)	2,739.7	5,418.9	7,933.2		1,276.6	15,434.0	14,157.4
2002		1,276.6	(324.0)	2,904.1	5,566.4	8,099.0		1,276.6	16,245.4	14,968.8
2003		1,276.6	9.7	3,068.5	5,713.9	8,264.8		1,276.6	17,056.9	15,780.3
2004		1,276.6	343.4	3,233.0	5,861.4	8,430.6		1,276.6	17,868.3	16,591.7
2005		1,276.6	677.1	3,397.4	6,008.9	8,596.4		1,276.6	18,679.7	17,403.1
2006		1,276.6	744.8	3,501.4	6,166.1	8,762.1		1,276.6	19,174.3	17,897.7
2007		1,276.6	812.5	3,605.3	6,323.2	8,927.9		1,276.6	19,669.0	18,392.4
2008		55,549.4	880.2	3,709.3	6,480.4	9,093.7		55,549.4	20,163.6	(35,385.8)
2009		1,276.6	947.9	3,813.3	6,637.6	9,259.5		1,276.6	20,658.3	19,381.7
2010		1,276.6	1,015.6	3,917.3	6,794.8	9,425.3		1,276.6	21,153.0	19,876.4
2011		1,276.6	1,047.0	4,001.9	6,932.6	9,591.1		1,276.6	21,572.6	20,296.0
2012		1,276.6	1,078.5	4,086.5	7,070.4	9,756.9		1,276.6	21,992.3	20,715.7
2013		1,276.6	1,109.9	4,171.2	7,208.3	9,922.7		1,276.6	22,412.0	21,135.4
2014		1,276.6	1,141.3	4,255.8	7,346.1	10,088.5		1,276.6	22,831.7	21,555.1
2015		1,276.6	1,172.8	4,340.4	7,483.9	10,254.3		1,276.6	23,251.4	21,974.8
2016		1,276.6	1,252.6	4,410.6	7,614.5	10,420.1		1,276.6	23,697.7	22,421.1
2017		1,276.6	1,332.4	4,480.7	7,745.1	10,585.9		1,276.6	24,144.0	22,867.4
2018		1,276.6	1,412.2	4,550.8	7,875.6	10,751.7		1,276.6	24,590.3	23,313.7
2019		1,276.6	1,491.9	4,620.9	8,006.2	10,917.5		1,276.6	25,036.6	23,760.0
2020		1,276.6	1,571.7	4,691.1	8,136.8	11,083.3		1,276.6	25,482.9	24,206.3
2021		1,276.6	1,651.5	4,763.6	8,269.8	11,249.1		1,276.6	25,934.0	24,657.4
2022		1,276.6	1,731.3	4,836.1	8,402.8	11,414.9		1,276.6	26,385.1	25,108.5
2023		1,276.6	1,811.1	4,908.7	8,535.8	11,580.7		1,276.6	26,836.2	25,559.6
2024							112,555.8	0.0	112,555.8	112,555.8
	@ Discount Rate of	7.00%				Discounted Totals		$363,255.8	$416,216.4	$52,960.6

Feasibility Results

Net Present Value	$52,960.6
Internal Rate of Return	9.3%
Benefit/Cost Ratio	1.15

SOURCE: Wilbur Smith Associates

Exhibit E–14
ECONOMIC DEVELOPMENT FEASIBILITY
Heartland Expressway Primary Impact Area
Route Option C (Expressway)

($000)

	Capital	Maint.	Const./ Maint.	Competitive Position	Tourism	Non–Business	Residual	Total Cost	Total Benefits	Net Benefits
1993	264,681.4		34,820.2					264,681.4	34,820.2	(229,861.2)
1994		950.7	34,856.4	773.8	3,578.7	4,368.8		950.7	43,577.8	42,627.1
1995		950.7	34,566.3	1,124.4	3,663.4	4,480.7		950.7	43,834.7	42,884.0
1996		950.7	34,251.9	1,363.8	3,764.9	4,592.6		950.7	43,973.2	43,022.5
1997		950.7	33,937.6	1,603.2	3,866.5	4,704.4		950.7	44,111.7	43,161.0
1998		950.7	(858.4)	1,842.6	3,968.0	4,816.3		950.7	9,768.5	8,817.8
1999		950.7	(858.4)	2,082.0	4,069.6	4,928.2		950.7	10,221.3	9,270.6
2000		950.7	(858.4)	2,321.3	4,171.2	5,040.1		950.7	10,674.1	9,723.4
2001		950.7	(587.6)	2,471.3	4,287.2	5,151.9		950.7	11,322.8	10,372.1
2002		950.7	(316.8)	2,621.2	4,403.3	5,263.8		950.7	11,971.5	11,020.8
2003		950.7	(45.9)	2,771.1	4,519.4	5,375.7		950.7	12,620.2	11,669.5
2004		950.7	224.9	2,921.0	4,635.4	5,487.5		950.7	13,268.9	12,318.2
2005		950.7	495.7	3,070.9	4,751.5	5,599.4		950.7	13,917.6	12,966.9
2006		950.7	614.2	3,165.3	4,874.8	5,711.3		950.7	14,365.5	13,414.8
2007		950.7	732.7	3,259.6	4,998.1	5,823.1		950.7	14,813.5	13,862.8
2008		(8,039.2)	851.2	3,353.9	5,121.5	5,935.0		(8,039.2)	15,261.5	23,300.7
2009		950.7	969.6	3,448.2	5,244.8	6,046.9		950.7	15,709.5	14,758.8
2010		950.7	1,088.1	3,542.5	5,368.1	6,158.8		950.7	16,157.5	15,206.8
2011		950.7	1,083.3	3,617.4	5,474.5	6,270.6		950.7	16,445.8	15,495.1
2012		950.7	1,078.5	3,692.4	5,580.9	6,382.5		950.7	16,734.2	15,783.5
2013		950.7	1,073.6	3,767.3	5,687.3	6,494.4		950.7	17,022.6	16,071.9
2014		950.7	1,068.8	3,842.3	5,793.7	6,606.2		950.7	17,311.0	16,360.3
2015		950.7	1,063.9	3,917.3	5,900.1	6,718.1		950.7	17,599.4	16,648.7
2016		950.7	1,076.0	3,982.6	6,004.1	6,830.0		950.7	17,892.6	16,941.9
2017		950.7	1,088.1	4,047.8	6,108.0	6,941.8		950.7	18,185.9	17,235.2
2018		950.7	1,100.2	4,113.1	6,212.0	7,053.7		950.7	18,479.1	17,528.4
2019		950.7	1,112.3	4,178.4	6,316.0	7,165.6		950.7	18,772.3	17,821.6
2020		950.7	1,124.4	4,243.7	6,420.0	7,277.5		950.7	19,065.5	18,114.8
2021		950.7	1,136.5	4,309.0	6,523.9	7,389.3		950.7	19,358.8	18,408.1
2022		950.7	1,148.6	4,374.3	6,627.9	7,501.2		950.7	19,652.0	18,701.3
2023		950.7	1,160.7	4,439.6	6,731.9	7,613.1		950.7	19,945.2	18,994.5
2024							86,419.5	0.0	86,419.5	86,419.5
	@ Discount Rate of	7.00%					Discounted Totals	$273,220.3	$321,493.9	$48,273.6

Feasibility Results

Net Present Value	$48,273.6
Internal Rate of Return	9.5%
Benefit/Cost Ratio	1.18

SOURCE: Wilbur Smith Associates

Exhibit E–15
ECONOMIC DEVELOPMENT FEASIBILITY
Heartland Expressway Primary Impact Area
Route Option C (Two/Four Lane)

($000)

	Capital	Maint.	Const./ Maint.	Competitive Position	Tourism	Non–Business	Residual	Total Cost	Total Benefits	Net Benefits
1993	147,345.4		19,380.8					147,345.4	19,380.8	(127,964.6)
1994		334.8	19,392.9	556.2	3,058.9	2,810.5		334.8	25,818.4	25,483.6
1995		334.8	19,235.7	810.1	3,131.4	2,898.7		334.8	26,075.9	25,741.1
1996		334.8	19,054.4	984.2	3,218.4	2,986.9		334.8	26,243.8	25,909.0
1997		334.8	18,873.0	1,158.3	3,305.5	3,075.0		334.8	26,411.8	26,077.0
1998		334.8	(616.6)	1,332.4	3,392.5	3,163.2		334.8	7,271.5	6,936.7
1999		334.8	(616.6)	1,506.5	3,479.6	3,251.4		334.8	7,620.8	7,286.0
2000		334.8	(616.6)	1,680.6	3,566.6	3,339.6		334.8	7,970.1	7,635.3
2001		334.8	(461.9)	1,789.4	3,665.8	3,427.7		334.8	8,421.0	8,086.2
2002		334.8	(307.1)	1,898.2	3,764.9	3,515.9		334.8	8,871.9	8,537.1
2003		334.8	(152.3)	2,007.0	3,864.1	3,604.1		334.8	9,322.8	8,988.0
2004		334.8	2.4	2,115.8	3,963.2	3,692.2		334.8	9,773.7	9,438.9
2005		334.8	157.2	2,224.6	4,062.4	3,780.4		334.8	10,224.5	9,889.7
2006		334.8	224.9	2,292.3	4,166.3	3,868.6		334.8	10,552.1	10,217.3
2007		334.8	292.6	2,360.0	4,270.3	3,956.7		334.8	10,879.7	10,544.9
2008		(7,418.2)	360.3	2,427.7	4,374.3	4,044.9		(7,418.2)	11,207.2	18,625.4
2009		334.8	428.0	2,495.4	4,478.3	4,133.1		334.8	11,534.8	11,200.0
2010		334.8	495.7	2,563.2	4,582.2	4,221.3		334.8	11,862.3	11,527.5
2011		334.8	493.3	2,616.3	4,674.1	4,309.4		334.8	12,093.2	11,758.4
2012		334.8	490.9	2,669.5	4,766.0	4,397.6		334.8	12,324.0	11,989.2
2013		334.8	488.4	2,722.7	4,857.9	4,485.8		334.8	12,554.9	12,220.1
2014		334.8	486.0	2,775.9	4,949.8	4,573.9		334.8	12,785.7	12,450.9
2015		334.8	483.6	2,829.1	5,041.7	4,662.1		334.8	13,016.5	12,681.7
2016		334.8	486.0	2,877.5	5,131.1	4,750.3		334.8	13,244.9	12,910.1
2017		334.8	488.4	2,925.9	5,220.6	4,838.4		334.8	13,473.4	13,138.6
2018		334.8	490.9	2,974.2	5,310.1	4,926.6		334.8	13,701.8	13,367.0
2019		334.8	493.3	3,022.6	5,399.5	5,014.8		334.8	13,930.2	13,595.4
2020		334.8	495.7	3,070.9	5,489.0	5,103.0		334.8	14,158.6	13,823.8
2021		334.8	498.1	3,116.9	5,576.1	5,191.1		334.8	14,382.2	14,047.4
2022		334.8	500.5	3,162.8	5,663.1	5,279.3		334.8	14,605.8	14,271.0
2023		334.8	503.0	3,208.8	5,750.2	5,367.5		334.8	14,829.4	14,494.6
2024							47,859.0	0.0	47,859.0	47,859.0
	@ Discount Rate of	7.00%				Discounted Totals		$148,689.9	$208,004.0	$59,314.1

Feasibility Results

Net Present Value	$59,314.1
Internal Rate of Return	12.1%
Benefit/Cost Ratio	1.40

SOURCE: Wilbur Smith Associates

Exhibit E–16
ECONOMIC DEVELOPMENT FEASIBILITY
Heartland Expressway Primary Impact Area
Route Option D (Freeway)

($000)

	Capital	Maint.	Const./ Maint.	Competitive Position	Tourism	Non–Business	Residual	Total Cost	Total Benefits	Net Benefits
1993	326,903.7		43,017.4					326,903.7	43,017.4	(283,886.3)
1994		1,532.8	43,053.7	1,390.4	4,183.9	7,779.7		1,532.8	56,401.1	54,868.3
1995		1,532.8	42,703.1	2,019.1	4,280.0	7,955.5		1,532.8	56,957.6	55,424.8
1996		1,532.8	42,304.1	2,485.8	4,400.9	8,137.3		1,532.8	57,328.0	55,795.2
1997		1,532.8	41,929.3	2,952.5	4,521.8	8,319.0		1,532.8	57,722.6	56,189.8
1998		1,532.8	(822.1)	3,419.1	4,642.7	8,500.8		1,532.8	15,740.5	14,207.7
1999		1,532.8	(822.1)	3,885.8	4,763.6	8,682.6		1,532.8	16,509.8	14,977.0
2000		1,532.8	(822.1)	4,352.5	4,884.5	8,864.3		1,532.8	17,279.2	15,746.4
2001		1,532.8	(490.9)	4,669.3	5,022.3	9,046.1		1,532.8	18,246.8	16,714.0
2002		1,532.8	(159.6)	4,986.1	5,160.2	9,227.9		1,532.8	19,214.5	17,681.7
2003		1,532.8	171.7	5,302.8	5,298.0	9,409.6		1,532.8	20,182.1	18,649.3
2004		1,532.8	503.0	5,619.6	5,435.8	9,591.4		1,532.8	21,149.7	19,616.9
2005		1,532.8	834.2	5,936.4	5,573.6	9,773.2		1,532.8	22,117.4	20,584.6
2006		1,532.8	863.3	6,158.8	5,721.1	9,954.9		1,532.8	22,698.1	21,165.3
2007		1,532.8	892.3	6,381.3	5,868.6	10,136.7		1,532.8	23,278.9	21,746.1
2008		88,710.4	921.3	6,603.7	6,016.2	10,318.4		88,710.4	23,859.6	(64,850.8)
2009		1,532.8	950.3	6,826.2	6,163.7	10,500.2		1,532.8	24,440.4	22,907.6
2010		1,532.8	979.3	7,048.7	6,311.2	10,682.0		1,532.8	25,021.1	23,488.3
2011		1,532.8	1,027.7	7,242.1	6,439.3	10,863.7		1,532.8	25,572.8	24,040.0
2012		1,532.8	1,076.0	7,435.6	6,567.5	11,045.5		1,532.8	26,124.6	24,591.8
2013		1,532.8	1,124.4	7,629.0	6,695.6	11,227.3		1,532.8	26,676.3	25,143.5
2014		1,532.8	1,172.8	7,822.4	6,823.8	11,409.0		1,532.8	27,228.0	25,695.2
2015		1,532.8	1,221.1	8,015.9	6,951.9	11,590.8		1,532.8	27,779.8	26,247.0
2016		1,532.8	1,334.8	8,192.4	7,075.3	11,772.6		1,532.8	28,375.0	26,842.2
2017		1,532.8	1,448.4	8,368.9	7,198.6	11,954.3		1,532.8	28,970.3	27,437.5
2018		1,532.8	1,562.1	8,545.5	7,321.9	12,136.1		1,532.8	29,565.5	28,032.7
2019		1,532.8	1,675.7	8,722.0	7,445.2	12,317.9		1,532.8	30,160.8	28,628.0
2020		1,532.8	1,789.4	8,898.5	7,568.6	12,499.6		1,532.8	30,756.0	29,223.2
2021		1,532.8	1,903.0	9,075.0	7,691.9	12,681.4		1,532.8	31,351.3	29,818.5
2022		1,532.8	2,016.7	9,251.5	7,815.2	12,863.2		1,532.8	31,946.5	30,413.7
2023		1,532.8	2,130.3	9,428.0	7,938.5	13,044.9		1,532.8	32,541.8	31,009.0
2024							114,183.8	0.0	114,183.8	114,183.8
@ Discount Rate of		7.00%				Discounted Totals		$377,521.5	$453,105.7	$75,584.2

Feasibility Results

Net Present Value	$75,584.2
Internal Rate of Return	10.2%
Benefit/Cost Ratio	1.20

SOURCE: Wilbur Smith Associates

Exhibit E–17
ECONOMIC DEVELOPMENT FEASIBILITY
Heartland Expressway Primary Impact Area
Route Option D (Expressway)

($000)

	Capital	Maint.	Const./ Maint.	Competitive Position	Tourism	Non–Business	Residual	Total Cost	Total Benefits	Net Benefits
1993	260,047.1		34,215.7					260,047.1	34,215.7	(225,831.4)
1994		1,034.0	34,239.8	1,281.6	2,659.9	5,180.7		1,034.0	43,362.0	42,328.0
1995		1,034.0	33,961.8	1,861.9	2,720.3	5,337.5		1,034.0	43,881.5	42,847.5
1996		1,034.0	33,647.4	2,289.9	2,795.3	5,494.3		1,034.0	44,226.9	43,192.9
1997		1,034.0	33,333.1	2,717.9	2,870.2	5,651.1		1,034.0	44,572.3	43,538.3
1998		1,034.0	(773.8)	3,145.9	2,945.2	5,807.9		1,034.0	11,125.2	10,091.2
1999		1,034.0	(773.8)	3,573.9	3,020.2	5,964.7		1,034.0	11,785.0	10,751.0
2000		1,034.0	(773.8)	4,001.9	3,095.1	6,121.5		1,034.0	12,444.7	11,410.7
2001		1,034.0	(507.8)	4,287.2	3,177.3	6,278.3		1,034.0	13,235.1	12,201.1
2002		1,034.0	(241.8)	4,572.6	3,259.6	6,435.1		1,034.0	14,025.4	12,991.4
2003		1,034.0	24.2	4,857.9	3,341.8	6,591.9		1,034.0	14,815.7	13,781.7
2004		1,034.0	290.2	5,143.2	3,424.0	6,748.7		1,034.0	15,606.0	14,572.0
2005		1,034.0	556.2	5,428.6	3,506.2	6,905.5		1,034.0	16,396.4	15,362.4
2006		1,034.0	665.0	5,629.3	3,595.7	7,062.2		1,034.0	16,952.1	15,918.1
2007		1,034.0	773.8	5,830.0	3,685.1	7,219.0		1,034.0	17,507.9	16,473.9
2008		(2,652.0)	882.6	6,030.7	3,774.6	7,375.8		(2,652.0)	18,063.7	20,715.7
2009		1,034.0	991.4	6,231.4	3,864.1	7,532.6		1,034.0	18,619.5	17,585.5
2010		1,034.0	1,100.2	6,432.1	3,953.5	7,689.4		1,034.0	19,175.2	18,141.2
2011		1,034.0	1,100.2	6,603.7	4,030.9	7,846.2		1,034.0	19,581.1	18,547.1
2012		1,034.0	1,100.2	6,775.4	4,108.3	8,003.0		1,034.0	19,987.0	18,953.0
2013		1,034.0	1,100.2	6,947.1	4,185.7	8,159.8		1,034.0	20,392.8	19,358.8
2014		1,034.0	1,100.2	7,118.8	4,263.1	8,316.6		1,034.0	20,798.7	19,764.7
2015		1,034.0	1,100.2	7,290.5	4,340.4	8,473.4		1,034.0	21,204.5	20,170.5
2016		1,034.0	1,114.7	7,447.6	4,413.0	8,630.2		1,034.0	21,605.5	20,571.5
2017		1,034.0	1,129.2	7,604.8	4,485.5	8,787.0		1,034.0	22,006.6	20,972.6
2018		1,034.0	1,143.7	7,762.0	4,558.1	8,943.8		1,034.0	22,407.6	21,373.6
2019		1,034.0	1,158.3	7,919.2	4,630.6	9,100.6		1,034.0	22,808.6	21,774.6
2020		1,034.0	1,172.8	8,076.3	4,703.1	9,257.4		1,034.0	23,209.6	22,175.6
2021		1,034.0	1,187.3	8,231.1	4,776.1	9,414.2		1,034.0	23,610.6	22,576.6
2022		1,034.0	1,201.8	8,385.9	4,853.1	9,571.0		1,034.0	24,011.7	22,977.7
2023		1,034.0	1,216.3	8,540.6	4,928.0	9,727.8		1,034.0	24,412.7	23,378.7
2024							85,712.4	0.0	85,712.4	85,712.4
@ Discount Rate of		7.00%						Discounted Totals	$271,542.1	$344,759.6	$73,217.6

Feasibility Results

Net Present Value	$73,217.6
Internal Rate of Return	10.6%
Benefit/Cost Ratio	1.27

SOURCE: Wilbur Smith Associates

Exhibit E–18
ECONOMIC DEVELOPMENT FEASIBILITY
Heartland Expressway Primary Impact Area
Route Option D (Two/Four Lane)

($000)

	Capital	Maint.	Const./ Maint.	Competitive Position	Tourism	Non–Business	Residual	Total Cost	Total Benefits	Net Benefits
1993	147,682.8		19,429.2					147,682.8	19,429.2	(128,253.6)
1994		504.6	19,441.3	1,015.6	2,115.8	3,962.0		504.6	26,534.7	26,030.1
1995		504.6	19,284.1	1,475.0	2,164.2	4,076.9		504.6	27,000.2	26,495.6
1996		504.6	19,102.7	1,813.6	2,222.2	4,191.8		504.6	27,330.3	26,825.7
1997		504.6	18,921.4	2,152.1	2,280.2	4,306.7		504.6	27,660.4	27,155.8
1998		504.6	(507.8)	2,490.6	2,338.3	4,421.5		504.6	8,742.6	8,238.0
1999		504.6	(507.8)	2,829.1	2,396.3	4,536.4		504.6	9,254.1	8,749.5
2000		504.6	(507.8)	3,167.7	2,454.3	4,651.3		504.6	9,765.5	9,260.9
2001		504.6	(353.0)	3,399.8	2,519.6	4,766.2		504.6	10,332.6	9,828.0
2002		504.6	(198.3)	3,631.9	2,584.9	4,881.1		504.6	10,899.6	10,395.0
2003		504.6	(43.5)	3,864.1	2,650.2	4,995.9		504.6	11,466.7	10,962.1
2004		504.6	111.2	4,096.2	2,715.5	5,110.8		504.6	12,033.7	11,529.1
2005		504.6	266.0	4,328.3	2,780.8	5,225.7		504.6	12,600.8	12,096.2
2006		504.6	326.4	4,487.9	2,850.9	5,340.6		504.6	13,005.9	12,501.3
2007		504.6	386.9	4,647.5	2,921.0	5,455.5		504.6	13,410.9	12,906.3
2008		(1,100.9)	447.3	4,807.1	2,991.1	5,570.3		(1,100.9)	13,816.0	14,916.9
2009		504.6	507.8	4,966.7	3,061.3	5,685.2		504.6	14,221.0	13,716.4
2010		504.6	568.2	5,126.3	3,131.4	5,800.1		504.6	14,626.0	14,121.4
2011		504.6	568.2	5,266.6	3,191.8	5,915.0		504.6	14,941.6	14,437.0
2012		504.6	568.2	5,406.8	3,252.3	6,029.9		504.6	15,257.2	14,752.6
2013		504.6	568.2	5,547.0	3,312.8	6,144.7		504.6	15,572.8	15,068.2
2014		504.6	568.2	5,687.3	3,373.2	6,259.6		504.6	15,888.4	15,383.8
2015		504.6	568.2	5,827.5	3,433.7	6,374.5		504.6	16,203.9	15,699.3
2016		504.6	577.9	5,955.7	3,491.7	6,489.4		504.6	16,514.7	16,010.1
2017		504.6	587.6	6,083.9	3,549.7	6,604.3		504.6	16,825.4	16,320.8
2018		504.6	597.3	6,212.0	3,607.8	6,719.1		504.6	17,136.2	16,631.6
2019		504.6	606.9	6,340.2	3,665.8	6,834.0		504.6	17,446.9	16,942.3
2020		504.6	616.6	6,468.3	3,723.8	6,948.9		504.6	17,757.7	17,253.1
2021		504.6	626.3	6,596.5	3,784.3	7,063.8		504.6	18,070.8	17,566.2
2022		504.6	636.0	6,724.6	3,844.7	7,178.7		504.6	18,384.0	17,879.4
2023		504.6	645.6	6,852.8	3,905.2	7,293.5		504.6	18,697.1	18,192.5
2024							49,757.5	0.0	49,757.5	49,757.5
	@ Discount Rate of		7.00%				Discounted Totals	$153,362.5	$233,685.7	$80,323.2

Feasibility Results

Net Present Value	$80,323.2
Internal Rate of Return	13.5%
Benefit/Cost Ratio	1.52

SOURCE: Wilbur Smith Associates

Exhibit E–19
ECONOMIC DEVELOPMENT FEASIBILITY
States of Nebraska and South Dakota
Route Option B (Freeway)

($000)

	Capital	Maint.	Competitive Position	Tourism	Non–Business	Residual	Total Cost	Total Benefits	Net Benefits
1993	310,597.9						310,597.9	0.0	(310,597.9)
1994		1,353.4	1,753.1	4,799.3	8,109.7		1,353.4	14,662.0	13,308.6
1995		1,353.4	2,490.6	4,902.0	8,323.9		1,353.4	15,716.5	14,363.1
1996		1,353.4	2,983.9	5,027.4	8,538.2		1,353.4	16,549.4	15,196.0
1997		1,353.4	3,477.2	5,152.8	8,752.4		1,353.4	17,382.4	16,029.0
1998		1,353.4	3,970.5	5,278.2	8,966.7		1,353.4	18,215.3	16,861.9
1999		1,353.4	4,463.8	5,403.5	9,180.9		1,353.4	19,048.2	17,694.8
2000		1,353.4	4,957.0	5,528.9	9,395.2		1,353.4	19,881.1	18,527.7
2001		1,353.4	5,266.6	5,683.1	9,609.4		1,353.4	20,559.0	19,205.6
2002		1,353.4	5,576.1	5,837.2	9,823.7		1,353.4	21,236.9	19,883.5
2003		1,353.4	5,885.6	5,991.4	10,037.9		1,353.4	21,914.8	20,561.4
2004		1,353.4	6,195.1	6,145.5	10,252.2		1,353.4	22,592.8	21,239.4
2005		1,353.4	6,504.6	6,299.7	10,466.4		1,353.4	23,270.7	21,917.3
2006		1,353.4	6,705.3	6,466.2	10,680.7		1,353.4	23,852.1	22,498.7
2007		1,353.4	6,906.0	6,632.6	10,894.9		1,353.4	24,433.5	23,080.1
2008		40,526.6	7,106.7	6,799.1	11,109.2		40,526.6	25,015.0	(15,511.6)
2009		1,353.4	7,307.4	6,965.6	11,323.4		1,353.4	25,596.4	24,243.0
2010		1,353.4	7,508.1	7,132.1	11,537.7		1,353.4	26,177.8	24,824.4
2011		1,353.4	7,667.7	7,280.1	11,751.9		1,353.4	26,699.7	25,346.3
2012		1,353.4	7,827.3	7,428.1	11,966.2		1,353.4	27,221.5	25,868.1
2013		1,353.4	7,986.9	7,576.0	12,180.4		1,353.4	27,743.3	26,389.9
2014		1,353.4	8,146.5	7,724.0	12,394.7		1,353.4	28,265.2	26,911.8
2015		1,353.4	8,306.1	7,872.0	12,608.9		1,353.4	28,787.0	27,433.6
2016		1,353.4	8,441.5	8,013.8	12,823.2		1,353.4	29,278.5	27,925.1
2017		1,353.4	8,576.9	8,155.7	13,037.4		1,353.4	29,769.9	28,416.5
2018		1,353.4	8,712.3	8,297.5	13,251.7		1,353.4	30,261.4	28,908.0
2019		1,353.4	8,847.7	8,439.3	13,465.9		1,353.4	30,752.9	29,399.5
2020		1,353.4	8,983.1	8,581.1	13,680.2		1,353.4	31,244.4	29,891.0
2021		1,353.4	9,125.8	8,720.9	13,894.4		1,353.4	31,741.1	30,387.7
2022		1,353.4	9,268.5	8,860.6	14,108.7		1,353.4	32,237.7	30,884.3
2023		1,353.4	9,411.1	9,000.4	14,322.9		1,353.4	32,734.4	31,381.0
2024						108,297.9	0.0	108,297.9	108,297.9
	@ Discount Rate of		7.00%		Discounted Totals		$341,590.5	$284,148.5	($57,441.9)

Feasibility Results

Net Present Value	($57,441.9)
Internal Rate of Return	5.5%
Benefit/Cost Ratio	0.83

SOURCE: Wilbur Smith Associates

Exhibit E–20
ECONOMIC DEVELOPMENT FEASIBILITY
States of Nebraska and South Dakota
Route Option B (Expressway)

($000)

	Capital	Maint.	Competitive Position	Tourism	Non–Business	Residual	Total Cost	Total Benefits	Net Benefits
1993	257,551.0						257,551.0	0.0	(257,551.0)
1994		1,105.8	1,547.6	3,843.5	4,109.7		1,105.8	9,500.8	8,395.0
1995		1,105.8	2,176.3	3,915.5	4,188.3		1,105.8	10,280.0	9,174.2
1996		1,105.8	2,611.5	4,010.0	4,266.9		1,105.8	10,888.4	9,782.6
1997		1,105.8	3,046.8	4,104.5	4,345.5		1,105.8	11,496.8	10,391.0
1998		1,105.8	3,482.0	4,199.1	4,424.0		1,105.8	12,105.2	10,999.4
1999		1,105.8	3,917.3	4,293.6	4,502.6		1,105.8	12,713.5	11,607.7
2000		1,105.8	4,352.5	4,388.2	4,581.2		1,105.8	13,321.9	12,216.1
2001		1,105.8	4,616.1	4,507.4	4,659.8		1,105.8	13,783.3	12,677.5
2002		1,105.8	4,879.7	4,626.6	4,738.4		1,105.8	14,244.6	13,138.8
2003		1,105.8	5,143.2	4,745.8	4,816.9		1,105.8	14,706.0	13,600.2
2004		1,105.8	5,406.8	4,865.0	4,895.5		1,105.8	15,167.3	14,061.5
2005		1,105.8	5,670.4	4,984.2	4,974.1		1,105.8	15,628.7	14,522.9
2006		1,105.8	5,842.1	5,107.6	5,052.7		1,105.8	16,002.3	14,896.5
2007		1,105.8	6,013.7	5,230.9	5,131.3		1,105.8	16,375.9	15,270.1
2008		(1,744.2)	6,185.4	5,354.2	5,209.8		(1,744.2)	16,749.5	18,493.7
2009		1,105.8	6,357.1	5,477.5	5,288.4		1,105.8	17,123.0	16,017.2
2010		1,105.8	6,528.8	5,600.8	5,367.0		1,105.8	17,496.6	16,390.8
2011		1,105.8	6,659.4	5,713.9	5,445.6		1,105.8	17,818.8	16,713.0
2012		1,105.8	6,789.9	5,826.9	5,524.2		1,105.8	18,141.0	17,035.2
2013		1,105.8	6,920.5	5,940.0	5,602.7		1,105.8	18,463.2	17,357.4
2014		1,105.8	7,051.1	6,053.0	5,681.3		1,105.8	18,785.4	17,679.6
2015		1,105.8	7,181.7	6,166.1	5,759.9		1,105.8	19,107.6	18,001.8
2016		1,105.8	7,305.0	6,270.9	5,838.5		1,105.8	19,414.4	18,308.6
2017		1,105.8	7,428.3	6,375.7	5,917.1		1,105.8	19,721.1	18,615.3
2018		1,105.8	7,551.6	6,480.5	5,995.6		1,105.8	20,027.8	18,922.0
2019		1,105.8	7,674.9	6,585.4	6,074.2		1,105.8	20,334.5	19,228.7
2020		1,105.8	7,798.3	6,690.2	6,152.8		1,105.8	20,641.3	19,535.5
2021		1,105.8	7,909.5	6,797.1	6,231.4		1,105.8	20,937.9	19,832.1
2022		1,105.8	8,020.7	6,903.9	6,310.0		1,105.8	21,234.6	20,128.8
2023		1,105.8	8,132.0	7,010.8	6,388.5		1,105.8	21,531.3	20,425.5
2024						86,087.6	0.0	86,087.6	86,087.6
	@ Discount Rate of		7.00%		Discounted Totals		$270,239.9	$190,645.6	($79,594.3)

Feasibility Results

Net Present Value	($79,594.3)
Internal Rate of Return	4.4%
Benefit/Cost Ratio	0.71

SOURCE: Wilbur Smith Associates

Exhibit E–21
ECONOMIC DEVELOPMENT FEASIBILITY
States of Nebraska and South Dakota
Route Option B (Two/Four Lane)

($000)

	Capital	Maint.	Competitive Position	Tourism	Non–Business	Residual	Total Cost	Total Benefits	Net Benefits
1993	145,170.2						145,170.2	0.0	(145,170.2)
1994		547.7	1,209.0	3,247.5	2,930.4		547.7	7,386.9	6,839.2
1995		547.7	1,716.8	3,309.1	3,013.1		547.7	8,039.1	7,491.4
1996		547.7	2,057.8	3,389.3	3,095.8		547.7	8,542.9	7,995.2
1997		547.7	2,398.7	3,469.4	3,178.6		547.7	9,046.7	8,499.0
1998		547.7	2,739.7	3,549.6	3,261.3		547.7	9,550.6	9,002.9
1999		547.7	3,080.6	3,629.8	3,344.1		547.7	10,054.4	9,506.7
2000		547.7	3,421.6	3,709.9	3,426.8		547.7	10,558.3	10,010.6
2001		547.7	3,631.9	3,808.6	3,509.5		547.7	10,950.1	10,402.4
2002		547.7	3,842.3	3,907.2	3,592.3		547.7	11,341.8	10,794.1
2003		547.7	4,052.7	4,005.9	3,675.0		547.7	11,733.6	11,185.9
2004		547.7	4,263.1	4,104.5	3,757.8		547.7	12,125.4	11,577.7
2005		547.7	4,473.4	4,203.2	3,840.5		547.7	12,517.1	11,969.4
2006		547.7	4,613.7	4,312.1	3,923.2		547.7	12,849.1	12,301.4
2007		547.7	4,753.9	4,421.1	4,006.0		547.7	13,181.0	12,633.3
2008		(392.8)	4,894.2	4,530.0	4,088.7		(392.8)	13,512.9	13,905.7
2009		547.7	5,034.4	4,638.9	4,171.5		547.7	13,844.8	13,297.1
2010		547.7	5,174.7	4,747.9	4,254.2		547.7	14,176.7	13,629.0
2011		547.7	5,283.5	4,844.5	4,336.9		547.7	14,464.9	13,917.2
2012		547.7	5,392.3	4,941.1	4,419.7		547.7	14,753.0	14,205.3
2013		547.7	5,501.1	5,037.7	4,502.4		547.7	15,041.2	14,493.5
2014		547.7	5,609.9	5,134.3	4,585.2		547.7	15,329.4	14,781.7
2015		547.7	5,718.7	5,230.9	4,667.9		547.7	15,617.5	15,069.8
2016		547.7	5,820.3	5,321.3	4,750.6		547.7	15,892.2	15,344.5
2017		547.7	5,921.8	5,411.8	4,833.4		547.7	16,167.0	15,619.3
2018		547.7	6,023.4	5,502.2	4,916.1		547.7	16,441.7	15,894.0
2019		547.7	6,125.0	5,592.6	4,998.9		547.7	16,716.5	16,168.8
2020		547.7	6,226.5	5,683.1	5,081.6		547.7	16,991.2	16,443.5
2021		547.7	6,318.4	5,767.3	5,164.3		547.7	17,250.1	16,702.4
2022		547.7	6,410.3	5,851.6	5,247.1		547.7	17,509.0	16,961.3
2023		547.7	6,502.2	5,935.9	5,329.8		547.7	17,767.9	17,220.2
2024						48,879.2	0.0	48,879.2	48,879.2
2025									
	@ Discount Rate of		7.00%		Discounted Totals		$151,625.8	$150,275.3	($1,350.5)

Feasibility Results

Net Present Value	($1,350.5)
Internal Rate of Return	6.9%
Benefit/Cost Ratio	0.99

SOURCE: Wilbur Smith Associates

Exhibit E–22
ECONOMIC DEVELOPMENT FEASIBILITY
States of Nebraska and South Dakota
Route Option C (Freeway)

($000)

	Capital	Maint.	Competitive Position	Tourism	Non–Business	Residual	Total Cost	Total Benefits	Net Benefits
1993	327,743.5						327,743.5	0.0	(327,743.5)
1994		1,276.6	1,136.5	4,254.6	7,525.1		1,276.6	12,916.2	11,639.6
1995		1,276.6	1,620.1	4,347.1	7,709.3		1,276.6	13,676.5	12,399.9
1996		1,276.6	1,939.3	4,458.1	7,893.5		1,276.6	14,290.9	13,014.3
1997		1,276.6	2,258.5	4,569.1	8,077.7		1,276.6	14,905.3	13,628.7
1998		1,276.6	2,577.7	4,680.0	8,262.0		1,276.6	15,519.7	14,243.1
1999		1,276.6	2,896.8	4,791.0	8,446.2		1,276.6	16,134.1	14,857.5
2000		1,276.6	3,216.0	4,902.0	8,630.4		1,276.6	16,748.5	15,471.9
2001		1,276.6	3,416.7	5,039.7	8,814.6		1,276.6	17,271.1	15,994.5
2002		1,276.6	3,617.4	5,177.4	8,998.8		1,276.6	17,793.7	16,517.1
2003		1,276.6	3,818.1	5,315.2	9,183.1		1,276.6	18,316.3	17,039.7
2004		1,276.6	4,018.8	5,452.9	9,367.3		1,276.6	18,839.0	17,562.4
2005		1,276.6	4,219.5	5,590.6	9,551.5		1,276.6	19,361.6	18,085.0
2006		1,276.6	4,352.5	5,740.6	9,735.7		1,276.6	19,828.9	18,552.3
2007		1,276.6	4,485.5	5,890.7	9,919.9		1,276.6	20,296.1	19,019.5
2008		55,549.4	4,618.5	6,040.7	10,104.2		55,549.4	20,763.4	(34,786.0)
2009		1,276.6	4,751.5	6,190.7	10,288.4		1,276.6	21,230.6	19,954.0
2010		1,276.6	4,884.5	6,340.8	10,472.6		1,276.6	21,697.9	20,421.3
2011		1,276.6	4,986.1	6,470.3	10,656.8		1,276.6	22,113.1	20,836.5
2012		1,276.6	5,087.6	6,599.8	10,841.0		1,276.6	22,528.4	21,251.8
2013		1,276.6	5,189.2	6,729.2	11,025.3		1,276.6	22,943.7	21,667.1
2014		1,276.6	5,290.7	6,858.7	11,209.5		1,276.6	23,358.9	22,082.3
2015		1,276.6	5,392.3	6,988.2	11,393.7		1,276.6	23,774.2	22,497.6
2016		1,276.6	5,489.0	7,115.6	11,577.9		1,276.6	24,182.6	22,906.0
2017		1,276.6	5,585.7	7,243.1	11,762.1		1,276.6	24,591.0	23,314.4
2018		1,276.6	5,682.5	7,370.5	11,946.4		1,276.6	24,999.3	23,722.7
2019		1,276.6	5,779.2	7,497.9	12,130.6		1,276.6	25,407.7	24,131.1
2020		1,276.6	5,875.9	7,625.4	12,314.8		1,276.6	25,816.1	24,539.5
2021		1,276.6	5,960.5	7,748.7	12,499.0		1,276.6	26,208.3	24,931.7
2022		1,276.6	6,045.2	7,872.0	12,683.2		1,276.6	26,600.4	25,323.8
2023		1,276.6	6,129.8	7,995.3	12,867.5		1,276.6	26,992.6	25,716.0
2024						112,555.8	0.0	112,555.8	112,555.8
@ Discount Rate of			7.00%				Discounted Totals	$363,255.8	$241,413.1	($121,842.7)

Feasibility Results

Net Present Value	($121,842.7)
Internal Rate of Return	3.7%
Benefit/Cost Ratio	0.66

SOURCE: Wilbur Smith Associates

Exhibit E–23
ECONOMIC DEVELOPMENT FEASIBILITY
States of Nebraska and South Dakota
Route Option C (Expressway)

($000)

	Capital	Maint.	Competitive Position	Tourism	Non–Business	Residual	Total Cost	Total Benefits	Net Benefits
1993	264,681.4						264,681.4	0.0	(264,681.4)
1994		950.7	1,039.8	3,381.1	4,854.3		950.7	9,275.1	8,324.4
1995		950.7	1,462.9	3,453.0	4,978.6		950.7	9,894.5	8,943.8
1996		950.7	1,750.7	3,539.3	5,102.9		950.7	10,392.9	9,442.2
1997		950.7	2,038.4	3,625.7	5,227.2		950.7	10,891.3	9,940.6
1998		950.7	2,326.2	3,712.0	5,351.5		950.7	11,389.7	10,439.0
1999		950.7	2,613.9	3,798.3	5,475.8		950.7	11,888.0	10,937.3
2000		950.7	2,901.7	3,884.6	5,600.1		950.7	12,386.4	11,435.7
2001		950.7	3,083.0	3,991.5	5,724.4		950.7	12,798.9	11,848.2
2002		950.7	3,264.4	4,098.4	5,848.7		950.7	13,211.5	12,260.8
2003		950.7	3,445.7	4,205.3	5,973.0		950.7	13,624.0	12,673.3
2004		950.7	3,627.1	4,312.1	6,097.3		950.7	14,036.5	13,085.8
2005		950.7	3,808.5	4,419.0	6,221.6		950.7	14,449.1	13,498.4
2006		950.7	3,929.4	4,532.1	6,345.9		950.7	14,807.3	13,856.6
2007		950.7	4,050.3	4,645.1	6,470.2		950.7	15,165.6	14,214.9
2008		(8,039.2)	4,171.2	4,758.2	6,594.5		(8,039.2)	15,523.8	23,563.0
2009		950.7	4,292.1	4,871.2	6,718.8		950.7	15,882.1	14,931.4
2010		950.7	4,413.0	4,984.2	6,843.1		950.7	16,240.3	15,289.6
2011		950.7	4,507.3	5,093.2	6,967.4		950.7	16,567.9	15,617.2
2012		950.7	4,601.6	5,202.1	7,091.7		950.7	16,895.4	15,944.7
2013		950.7	4,695.9	5,311.0	7,216.0		950.7	17,222.9	16,272.2
2014		950.7	4,790.2	5,420.0	7,340.3		950.7	17,550.5	16,599.8
2015		950.7	4,884.5	5,528.9	7,464.6		950.7	17,878.0	16,927.3
2016		950.7	4,969.1	5,625.5	7,588.9		950.7	18,183.5	17,232.8
2017		950.7	5,053.8	5,722.1	7,713.2		950.7	18,489.1	17,538.4
2018		950.7	5,138.4	5,818.7	7,837.5		950.7	18,794.6	17,843.9
2019		950.7	5,223.0	5,915.3	7,961.8		950.7	19,100.1	18,149.4
2020		950.7	5,307.7	6,011.9	8,086.1		950.7	19,405.7	18,455.0
2021		950.7	5,389.9	6,104.4	8,210.4		950.7	19,704.7	18,754.0
2022		950.7	5,472.1	6,196.9	8,334.7		950.7	20,003.7	19,053.0
2023		950.7	5,554.3	6,289.4	8,459.0		950.7	20,302.7	19,352.0
2024						86,419.5	0.0	86,419.5	86,419.5
	@ Discount Rate of		7.00%		Discounted Totals		$273,220.3	$179,384.2	($93,836.1)

Feasibility Results

Net Present Value	($93,836.1)
Internal Rate of Return	3.9%
Benefit/Cost Ratio	0.66

SOURCE: Wilbur Smith Associates

Exhibit E–24
ECONOMIC DEVELOPMENT FEASIBILITY
States of Nebraska and South Dakota
Route Option C (Two/Four Lane)

($000)

	Capital	Maint.	Competitive Position	Tourism	Non–Business	Residual	Total Cost	Total Benefits	Net Benefits
1993	147,345.4						147,345.4	0.0	(147,345.4)
1994		334.8	749.6	2,908.3	3,150.6		334.8	6,808.5	6,473.7
1995		334.8	1,039.8	2,949.4	3,220.8		334.8	7,210.0	6,875.2
1996		334.8	1,250.1	3,021.4	3,291.0		334.8	7,562.5	7,227.7
1997		334.8	1,460.5	3,093.3	3,361.2		334.8	7,915.0	7,580.2
1998		334.8	1,670.9	3,165.3	3,431.4		334.8	8,267.5	7,932.7
1999		334.8	1,881.3	3,237.2	3,501.6		334.8	8,620.0	8,285.2
2000		334.8	2,091.6	3,309.1	3,571.8		334.8	8,972.5	8,637.7
2001		334.8	2,227.0	3,401.6	3,641.9		334.8	9,270.6	8,935.8
2002		334.8	2,362.5	3,494.1	3,712.1		334.8	9,568.7	9,233.9
2003		334.8	2,497.9	3,586.6	3,782.3		334.8	9,866.8	9,532.0
2004		334.8	2,633.3	3,679.1	3,852.5		334.8	10,164.9	9,830.1
2005		334.8	2,768.7	3,771.6	3,922.7		334.8	10,463.0	10,128.2
2006		334.8	2,855.7	3,872.3	3,992.9		334.8	10,720.9	10,386.1
2007		334.8	2,942.8	3,973.0	4,063.1		334.8	10,978.9	10,644.1
2008		(7,418.2)	3,029.8	4,073.7	4,133.3		(7,418.2)	11,236.8	18,655.0
2009		334.8	3,116.9	4,174.4	4,203.5		334.8	11,494.8	11,160.0
2010		334.8	3,203.9	4,275.1	4,273.7		334.8	11,752.7	11,417.9
2011		334.8	3,271.6	4,361.5	4,343.8		334.8	11,977.0	11,642.2
2012		334.8	3,339.4	4,447.8	4,414.0		334.8	12,201.2	11,866.4
2013		334.8	3,407.1	4,534.1	4,484.2		334.8	12,425.4	12,090.6
2014		334.8	3,474.8	4,620.4	4,554.4		334.8	12,649.6	12,314.8
2015		334.8	3,542.5	4,706.8	4,624.6		334.8	12,873.8	12,539.0
2016		334.8	3,600.5	4,791.0	4,694.8		334.8	13,086.3	12,751.5
2017		334.8	3,658.5	4,875.3	4,765.0		334.8	13,298.8	12,964.0
2018		334.8	3,716.6	4,959.6	4,835.2		334.8	13,511.3	13,176.5
2019		334.8	3,774.6	5,043.8	4,905.4		334.8	13,723.8	13,389.0
2020		334.8	3,832.6	5,128.1	4,975.6		334.8	13,936.3	13,601.5
2021		334.8	3,893.1	5,210.3	5,045.7		334.8	14,149.2	13,814.4
2022		334.8	3,953.5	5,292.5	5,115.9		334.8	14,362.0	14,027.2
2023		334.8	4,014.0	5,374.8	5,186.1		334.8	14,574.9	14,240.1
2024						47,859.0	0.0	47,859.0	47,859.0
	@ Discount Rate of	7.00%			Discounted Totals		$148,689.9	$128,087.1	($20,602.8)

Feasibility Results

Net Present Value	($20,602.8)
Internal Rate of Return	5.8%
Benefit/Cost Ratio	0.86

SOURCE: Wilbur Smith Associates

Exhibit E–25
ECONOMIC DEVELOPMENT FEASIBILITY
States of Nebraska and South Dakota
Route Option D (Freeway)

($000)

	Capital	Maint.	Competitive Position	Tourism	Non–Business	Residual	Total Cost	Total Benefits	Net Benefits
1993	326,903.7						326,903.7	0.0	(326,903.7)
1994		1,532.8	1,837.7	3,946.3	8,637.4		1,532.8	14,421.5	12,888.7
1995		1,532.8	2,635.7	4,038.8	8,839.4		1,532.8	15,513.9	13,981.1
1996		1,532.8	3,196.7	4,139.5	9,041.4		1,532.8	16,377.5	14,844.7
1997		1,532.8	3,757.7	4,240.2	9,243.3		1,532.8	17,241.2	15,708.4
1998		1,532.8	4,318.7	4,340.9	9,445.3		1,532.8	18,104.9	16,572.1
1999		1,532.8	4,879.7	4,441.6	9,647.3		1,532.8	18,968.5	17,435.7
2000		1,532.8	5,440.7	4,542.3	9,849.2		1,532.8	19,832.2	18,299.4
2001		1,532.8	5,830.0	4,671.8	10,051.2		1,532.8	20,553.0	19,020.2
2002		1,532.8	6,219.3	4,801.3	10,253.2		1,532.8	21,273.7	19,740.9
2003		1,532.8	6,608.6	4,930.8	10,455.1		1,532.8	21,994.5	20,461.7
2004		1,532.8	6,997.9	5,060.3	10,657.1		1,532.8	22,715.3	21,182.5
2005		1,532.8	7,387.2	5,189.8	10,859.1		1,532.8	23,436.0	21,903.2
2006		1,532.8	7,662.9	5,327.5	11,061.0		1,532.8	24,051.4	22,518.6
2007		1,532.8	7,938.5	5,465.2	11,263.0		1,532.8	24,666.7	23,133.9
2008		88,710.4	8,214.2	5,602.9	11,464.9		88,710.4	25,282.0	(63,428.4)
2009		1,532.8	8,489.8	5,740.6	11,666.9		1,532.8	25,897.4	24,364.6
2010		1,532.8	8,765.5	5,878.3	11,868.9		1,532.8	26,512.7	24,979.9
2011		1,532.8	9,012.1	5,999.6	12,070.8		1,532.8	27,082.6	25,549.8
2012		1,532.8	9,258.8	6,120.9	12,272.8		1,532.8	27,652.4	26,119.6
2013		1,532.8	9,505.4	6,242.1	12,474.8		1,532.8	28,222.3	26,689.5
2014		1,532.8	9,752.1	6,363.4	12,676.7		1,532.8	28,792.2	27,259.4
2015		1,532.8	9,998.7	6,484.7	12,878.7		1,532.8	29,362.1	27,829.3
2016		1,532.8	10,226.0	6,601.8	13,080.7		1,532.8	29,908.5	28,375.7
2017		1,532.8	10,453.3	6,719.0	13,282.6		1,532.8	30,454.9	28,922.1
2018		1,532.8	10,680.6	6,836.1	13,484.6		1,532.8	31,001.3	29,468.5
2019		1,532.8	10,907.9	6,953.3	13,686.6		1,532.8	31,547.7	30,014.9
2020		1,532.8	11,135.2	7,070.4	13,888.5		1,532.8	32,094.2	30,561.4
2021		1,532.8	11,357.7	7,189.6	14,090.5		1,532.8	32,637.8	31,105.0
2022		1,532.8	11,580.1	7,308.9	14,292.5		1,532.8	33,181.4	31,648.6
2023		1,532.8	11,802.6	7,428.1	14,494.4		1,532.8	33,725.1	32,192.3
2024						114,183.8	0.0	114,183.8	114,183.8
@ Discount Rate of			7.00%		Discounted Totals		$377,521.5	$286,414.4	($91,107.0)

Feasibility Results

Net Present Value	($91,107.0)
Internal Rate of Return	4.6%
Benefit/Cost Ratio	0.76

SOURCE: Wilbur Smith Associates

Exhibit E–26
ECONOMIC DEVELOPMENT FEASIBILITY
States of Nebraska and South Dakota
Route Option D (Expressway)

($000)

	Capital	Maint.	Competitive Position	Tourism	Non–Business	Residual	Total Cost	Total Benefits	Net Benefits
1993	260,047.1						260,047.1	0.0	(260,047.1)
1994		1,034.0	1,704.7	2,517.8	5,756.3		1,034.0	9,978.8	8,944.8
1995		1,034.0	2,430.2	2,558.9	5,930.5		1,034.0	10,919.6	9,885.6
1996		1,034.0	2,945.2	2,620.6	6,104.7		1,034.0	11,670.5	10,636.5
1997		1,034.0	3,460.3	2,682.2	6,278.9		1,034.0	12,421.4	11,387.4
1998		1,034.0	3,975.3	2,743.9	6,453.2		1,034.0	13,172.4	12,138.4
1999		1,034.0	4,490.4	2,805.6	6,627.4		1,034.0	13,923.3	12,889.3
2000		1,034.0	5,005.4	2,867.2	6,801.6		1,034.0	14,674.2	13,640.2
2001		1,034.0	5,353.6	2,947.4	6,975.8		1,034.0	15,276.8	14,242.8
2002		1,034.0	5,701.8	3,027.5	7,150.0		1,034.0	15,879.4	14,845.4
2003		1,034.0	6,050.0	3,107.7	7,324.3		1,034.0	16,482.0	15,448.0
2004		1,034.0	6,398.2	3,187.9	7,498.5		1,034.0	17,084.5	16,050.5
2005		1,034.0	6,746.4	3,268.0	7,672.7		1,034.0	17,687.1	16,653.1
2006		1,034.0	7,000.3	3,346.1	7,846.9		1,034.0	18,193.3	17,159.3
2007		1,034.0	7,254.2	3,424.2	8,021.1		1,034.0	18,699.6	17,665.6
2008		(2,652.0)	7,508.1	3,502.3	8,195.4		(2,652.0)	19,205.8	21,857.8
2009		1,034.0	7,762.0	3,580.4	8,369.6		1,034.0	19,712.0	18,678.0
2010		1,034.0	8,015.9	3,658.5	8,543.8		1,034.0	20,218.2	19,184.2
2011		1,034.0	8,228.7	3,736.6	8,718.0		1,034.0	20,683.3	19,649.3
2012		1,034.0	8,441.5	3,814.7	8,892.2		1,034.0	21,148.5	20,114.5
2013		1,034.0	8,654.3	3,892.8	9,066.5		1,034.0	21,613.6	20,579.6
2014		1,034.0	8,867.1	3,971.0	9,240.7		1,034.0	22,078.7	21,044.7
2015		1,034.0	9,079.8	4,049.1	9,414.9		1,034.0	22,543.8	21,509.8
2016		1,034.0	9,283.0	4,123.0	9,589.1		1,034.0	22,995.1	21,961.1
2017		1,034.0	9,486.1	4,197.0	9,763.3		1,034.0	23,446.5	22,412.5
2018		1,034.0	9,689.2	4,271.0	9,937.6		1,034.0	23,897.8	22,863.8
2019		1,034.0	9,892.3	4,345.0	10,111.8		1,034.0	24,349.1	23,315.1
2020		1,034.0	10,095.4	4,419.0	10,286.0		1,034.0	24,800.5	23,766.5
2021		1,034.0	10,296.1	4,482.7	10,460.2		1,034.0	25,239.1	24,205.1
2022		1,034.0	10,496.8	4,546.5	10,634.4		1,034.0	25,677.7	24,643.7
2023		1,034.0	10,697.5	4,610.2	10,808.7		1,034.0	26,116.4	25,082.4
2024						85,712.4	0.0	85,712.4	85,712.4
	@ Discount Rate of		7.00%		Discounted Totals		$271,542.1	$213,784.7	($57,757.4)

Feasibility Results

Net Present Value	($57,757.4)
Internal Rate of Return	5.2%
Benefit/Cost Ratio	0.79

SOURCE: Wilbur Smith Associates

Exhibit E–27
ECONOMIC DEVELOPMENT FEASIBILITY
States of Nebraska and South Dakota
Route Option D (Two/Four Lane)

($000)

	Capital	Maint.	Competitive Position	Tourism	Non–Business	Residual	Total Cost	Total Benefits	Net Benefits
1993	147,682.8						147,682.8	0.0	(147,682.8)
1994		504.6	1,354.1	2,004.0	4,402.3		504.6	7,760.3	7,255.7
1995		504.6	1,934.5	2,055.4	4,529.9		504.6	8,519.7	8,015.1
1996		504.6	2,340.7	2,096.5	4,657.5		504.6	9,094.7	8,590.1
1997		504.6	2,746.9	2,137.6	4,785.2		504.6	9,669.7	9,165.1
1998		504.6	3,153.2	2,178.7	4,912.8		504.6	10,244.7	9,740.1
1999		504.6	3,559.4	2,219.8	5,040.5		504.6	10,819.7	10,315.1
2000		504.6	3,965.6	2,260.9	5,168.1		504.6	11,394.6	10,890.0
2001		504.6	4,248.5	2,326.7	5,295.8		504.6	11,871.0	11,366.4
2002		504.6	4,531.5	2,392.4	5,423.4		504.6	12,347.3	11,842.7
2003		504.6	4,814.4	2,458.2	5,551.1		504.6	12,823.6	12,319.0
2004		504.6	5,097.3	2,524.0	5,678.7		504.6	13,300.0	12,795.4
2005		504.6	5,380.2	2,589.8	5,806.4		504.6	13,776.3	13,271.7
2006		504.6	5,583.3	2,655.5	5,934.0		504.6	14,172.8	13,668.2
2007		504.6	5,786.4	2,721.3	6,061.6		504.6	14,569.4	14,064.8
2008		(1,100.9)	5,989.6	2,787.1	6,189.3		(1,100.9)	14,965.9	16,066.8
2009		504.6	6,192.7	2,852.8	6,316.9		504.6	15,362.4	14,857.8
2010		504.6	6,395.8	2,918.6	6,444.6		504.6	15,759.0	15,254.4
2011		504.6	6,572.3	2,980.3	6,572.2		504.6	16,124.8	15,620.2
2012		504.6	6,748.8	3,041.9	6,699.9		504.6	16,490.6	15,986.0
2013		504.6	6,925.3	3,103.6	6,827.5		504.6	16,856.4	16,351.8
2014		504.6	7,101.9	3,165.3	6,955.2		504.6	17,222.3	16,717.7
2015		504.6	7,278.4	3,226.9	7,082.8		504.6	17,588.1	17,083.5
2016		504.6	7,445.2	3,280.4	7,210.4		504.6	17,936.0	17,431.4
2017		504.6	7,612.1	3,333.8	7,338.1		504.6	18,284.0	17,779.4
2018		504.6	7,778.9	3,387.2	7,465.7		504.6	18,631.9	18,127.3
2019		504.6	7,945.8	3,440.7	7,593.4		504.6	18,979.8	18,475.2
2020		504.6	8,112.6	3,494.1	7,721.0		504.6	19,327.7	18,823.1
2021		504.6	8,274.6	3,545.5	7,848.7		504.6	19,668.8	19,164.2
2022		504.6	8,436.6	3,596.9	7,976.3		504.6	20,009.8	19,505.2
2023		504.6	8,598.6	3,648.3	8,104.0		504.6	20,350.9	19,846.3
2024						49,757.5	0.0	49,757.5	49,757.5
	@ Discount Rate of		7.00%		Discounted Totals		$153,362.5	$164,401.8	$11,039.3

Feasibility Results

Net Present Value	$11,039.3
Internal Rate of Return	7.6%
Benefit/Cost Ratio	1.07

SOURCE: Wilbur Smith Associates