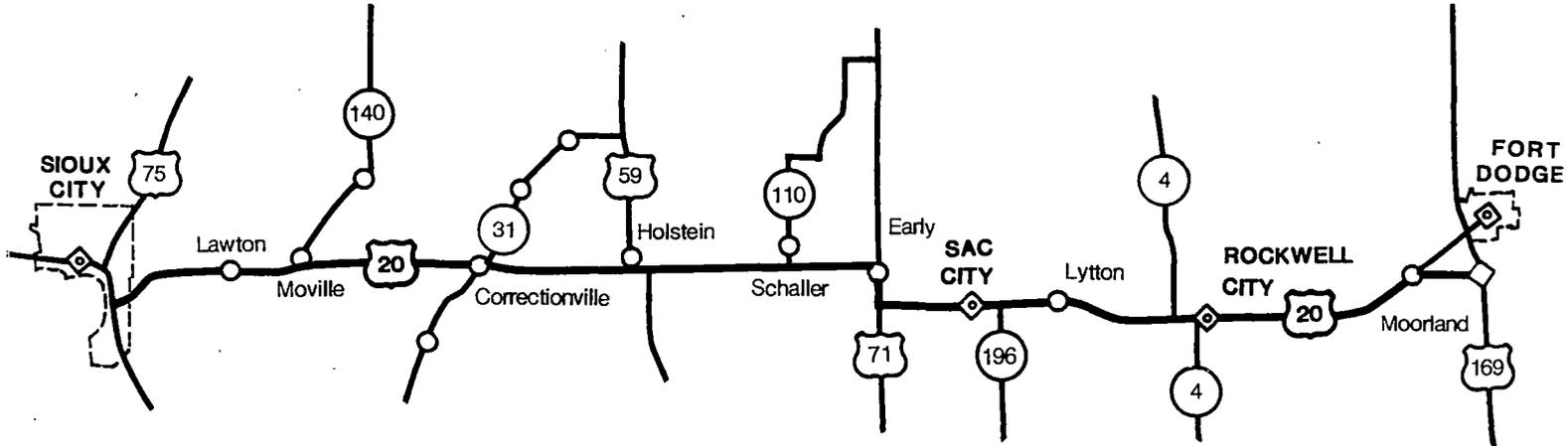

TASK A REPORT



U.S. HIGHWAY 20 CORRIDOR DEVELOPMENT STUDY

Submitted To:

**Iowa Department of Transportation
in cooperation with
Federal Highway Administration
Region XII Council of Governments
Mid-Iowa Development Association
Sioux Land Interstate Metropolitan
Planning Council**

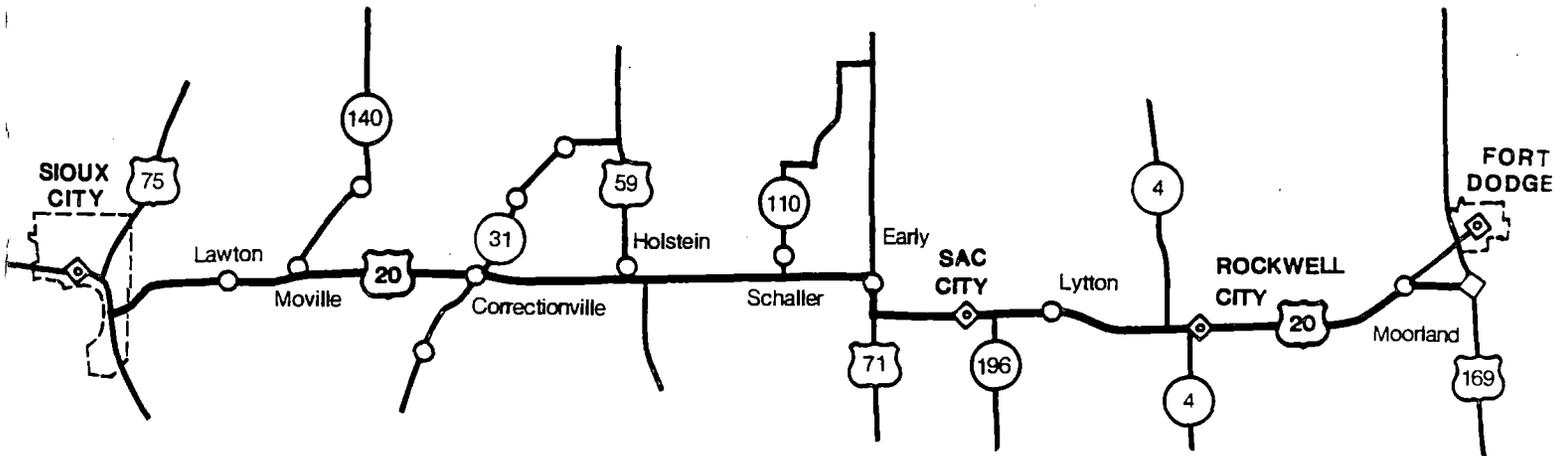
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Ames, Iowa 50010

Submitted by:

**Wilbur Smith Associates
and
Brice, Pedtrides-Donohue**

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TASK A REPORT



TASK A: EXISTING CONDITIONS REPORT

This is the first in a series of interim working papers which are intended to document work conducted to date. Because it is a "working paper," its statistics and analyses should be viewed as preliminary, subject to modification as the work progresses. The entire study is scheduled for completion in September, 1992.

WILBUR
SMITH
ASSOCIATES

ENGINEERS • ARCHITECTS • ECONOMISTS • PLANNERS

NCNB TOWER • P.O. BOX 92 • COLUMBIA, SC 29202 • (803) 738-0580 • CABLE WILSMITH • FAX (803) 251-2064 • TELEX 573439 • WILSMITH CLB

January 16, 1992

Mr. Martin Sankey
Iowa Department of Transportation
800 Lincoln Way
Ames, IA 50010

RE: US 20 Corridor Development Study
Task A Report

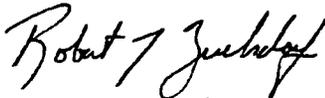
Dear Mr. Sankey:

Wilbur Smith Associates is pleased to submit the Task A Report relative to the US 20 Corridor Development Study. This report provides background information, presents the results of surveys and evaluates the existing facility. The focus of the report is to answer the question: "Does existing Highway 20 provide adequate services, have adequate capacity and serve the transportation and economic needs of business and individuals?".

We would be pleased to meet with the Steering Committee at its convenience to review this report. As is the case with all interim documents, this report is intended for review and comment only. It does not represent study conclusions or recommendations. As the study proceeds, changes and deletions may be made to the information contained herein.

Respectfully submitted,

WILBUR SMITH ASSOCIATES



Robert J. Zuelsdorf
Senior Vice President

RJZ:th

Encl.

EXECUTIVE SUMMARY

This Task A Report summarizes the initial activities of the U.S. 20 Corridor Development Study. Task A constitutes a review of the portion of existing U.S. 20 from the Nebraska state line on the south side of Sioux City to the junction with U.S. 169 south of Ft. Dodge. Preliminary study findings for this 119 mile corridor are summarized below.

REGIONAL CHARACTERISTICS

The six states surrounding the Corridor have experienced a moderate growth in population from 1980 to 1990 (1.4 percent). Of those six states, only Iowa had a decline in population, losing 4.7 percent of its total population. Growth in the multi-state region was primarily concentrated in the larger urban areas.

The nine counties immediately surrounding the study portion of U.S. 20 (Sioux City east to Ft. Dodge) have all experienced declines in population and economic activity over the last two decades. This 9-county primary impact area observed a larger decline in population than was the case in the remainder of Iowa.

Forecasts indicate a modest increase in population and economic activity for Iowa. However, the 9-county primary impact area is not forecast to follow the same trend. The area is projected to experience an 8.9 percent decrease in population from 1990 to 2015, and a 7.0 percent decrease in employment. These statistics imply a need to strengthen this area's economy. One of the purposes of this U.S. 20 Corridor Development Study is to determine whether or not an improved U.S. 20 highway might help the local economy and conceivably the State's economy.

ENVIRONMENTAL OVERVIEW

A literature search and field inspection was conducted to identify environmental resources and constraints within the highway corridor (between Merville and Moorland). Key findings of these efforts include the following:

- Wetlands occur in many locations throughout the entire project corridor, and range in size from less than one acre to several acres. The majority of these wetlands have natural vegetation, but a few are farmed wetlands. Of special concern are two large wetland areas - the Kiowa Marsh under state management near Early, and a privately held 23 acre site located just southwest of South Twin Lake.

- The U.S. 20 area is not well known for quality tracts of native prairie. Limited amounts of native prairie may be found along roadsides, and greenbelts, parks and wetlands are likely to have prairie remnants associated with them.

- Several managed areas occur within the Corridor study area. In addition to the Kiowa Marsh, these include:
 - Lizard Creek Wildlife Area (IDNR);
 - Shillings Sanctuary (Calhoun County)
 - McDonald Greenbelt and Lubeck Woods (Sac County)
 - South Twin Lake (IDNR)
 - South Bend Wildlife Area (IDNR)

- Additionally, there are four known archaeological sites in Sac County as well as four parks and eleven cemeteries scattered throughout the study corridor.

Overall, highway improvements in the corridor region are feasible from the environmental perspective, as long as care is taken in the alignment and design processes.

EXISTING U.S. 20

Existing highway characteristics, including factors such as roadway cross sections, curvature and traffic controls, as well as highway's traffic volumes, have a bearing on the type of traffic service and accident patterns experienced on the highway. Approximately 22 miles (18 percent) of the highway is already four laned. The 97 miles of two lane highway include 7 miles of urban sections through 6 communities.

Most of the highway's existing deficiencies are found on the highway's two lane segments. These include shoulder widths of less than six feet, reduced speed limits in all urban areas, and passing restrictions on 57 percent of the two lane rural segments.

A total of 413 accidents occurred over a three year period for the portion of U.S. 20 under study. This translates into an overall rate of 119.5 accidents per one hundred million vehicle miles of travel (HMVMT), compared to a statewide average of 187 accidents per HMVMT. However, two urban segments and one rural segment exceeded the statewide averages. Additionally, three of the rural segments had accident severity ratings which are two to six times higher than statewide averages.

TRAFFIC CHARACTERISTICS

U.S. 20 is one of the most heavily used highways in Northwestern Iowa. The highest volumes are near Sioux City, and overall daily traffic volumes vary between 1500 and 6500 vehicles. In terms of total vehicle miles of travel (VMT), trucks constitute 16.2 percent of that traffic. Historical traffic trends have paralleled the local economy. In the late 1970's and early 1980's, while the agricultural recession was gripping the area, traffic volumes on U.S. 20 declined. During the last seven years, however, traffic volumes have once again begun to increase. At the present time, all of the segments of U.S. 20 under study operate at level of Service "C" or better. There is no traffic congestion being experienced in the Corridor at this time.

Based on origin/destination surveys conducted along U.S. 20, it was determined that 92 percent of traffic on U.S. 20 had at least one trip end in proximity to the highway. Only 8 percent of all trips on this portion of highway could be classified as "through travel". Origin/destination surveys conducted on I-80 and I-90, south and north of this route, yielded results which suggest that some additional vehicles would travel U.S. 20 if the highway were to be built to a high speed four lane standard in Illinois, Iowa and parts of Nebraska.

FREIGHT TRANSPORTATION

The study's shipper/receiver and motor carrier surveys found that local shipper/receivers are the primary truck users of U.S. 20. The motor carriers appear to divert from U.S. 20 to I-80 for long trips due to the passing difficulties on and towns along U.S. 20 which lead to longer transit times, higher operating costs and variances in delivery times.

Truck surveys on I-80 and I-90 revealed that little or no I-90 truck traffic would be inclined to divert to an improved U.S. 20 since the origin-destination patterns of their trips are not conducive to using U.S. 20. Conversely, there is reason to believe that U.S. 20 could be a viable alternative to some I-80 trucks, especially those travelling between the Northern Iowa-Wisconsin area and the Nebraska, Colorado and West Coast area.

HIGHWAY ROLES

Based on the findings of this study to date, the existing roles of U.S. 20 in Western Iowa have been identified, and these are primarily to provide east-west mobility for people living and working in the Corridor area. The roles and functions of U.S. 20 are partly influenced by the market it serves, and the existing condition of the highway itself. The highway's suitability as a regional route is hampered by a lack of connectivity, and certain inefficiencies in its current design. These inefficiencies include passing restrictions, urban sections, narrow shoulders, and grades.

As this study progresses, the alternative improvements to be considered for U.S. 20 will be tailored to two alternative U.S. 20 roles:

1. Subarea Highway - Under this option, U.S. 20 would continue to be a local access road to this area of Iowa.
2. Multistate Highway - Under this option, U.S. 20 would become a higher class, multi-state highway conducive to longer distance travel.

TABLE OF CONTENTS

<u>CHAPTER</u>		<u>PAGE NO.</u>
	EXECUTIVE SUMMARY	
1	INTRODUCTION	1-1
2	REGIONAL CHARACTERISTICS	2-1
	Regionwide Characteristics	2-1
	State and Subarea Characteristics	2-9
	Demographic Forecasts	2-30
	Study Implications	2-34
3	ENVIRONMENTAL OVERVIEW	3-1
	Topography and Sensitive Areas	3-1
	Cultural Resources	3-11
	Parks and Cemeteries	3-11
	Superfund Sites	3-12
	Agricultural Resources	3-13
	Study Implications	3-13
4	EXISTING HIGHWAY CONDITIONS	4-1
	Highway Characteristics	4-1
	Accident Analysis	4-6
	Study Implications	4-19
5	TRAFFIC CHARACTERISTICS	5-1
	Existing Traffic Counts	5-1
	Roadside Survey Results	5-7
	Interstate Highway Auto Surveys	5-16
	Study Implications	5-28
6	FREIGHT TRANSPORTATION	6-1
	Truck Use of I-20	6-1
	Shipper/Receiver and Motor Carrier Surveys	6-9
	Interstate Highway Trucking Surveys	6-26
	Study Implications	6-34
7	U.S. 20 ROLES AND OPTIONS	7-1
	Existing U.S. 20 Roles	7-1
	Highway Suitability and Deficiencies	7-2
	Role and Improvement Alternatives	7-3

Chapter 1

INTRODUCTION

// The U.S. 20 Corridor Development Study is intended to analyze the U.S. 20 Highway between Sioux City and Fort Dodge, and to provide guidance concerning whether or not the highway should be significantly upgraded. // This Task A report is but the first of a number of study reports that are intended to provide that guidance.

The specific portion of U.S. 20 that is being examined is depicted in Exhibit 1-1. While focusing on this 119 mile section, the study is also considering the route in its broader context, to determine whether or not it is prudent to consider revising the highway's roles and functions.

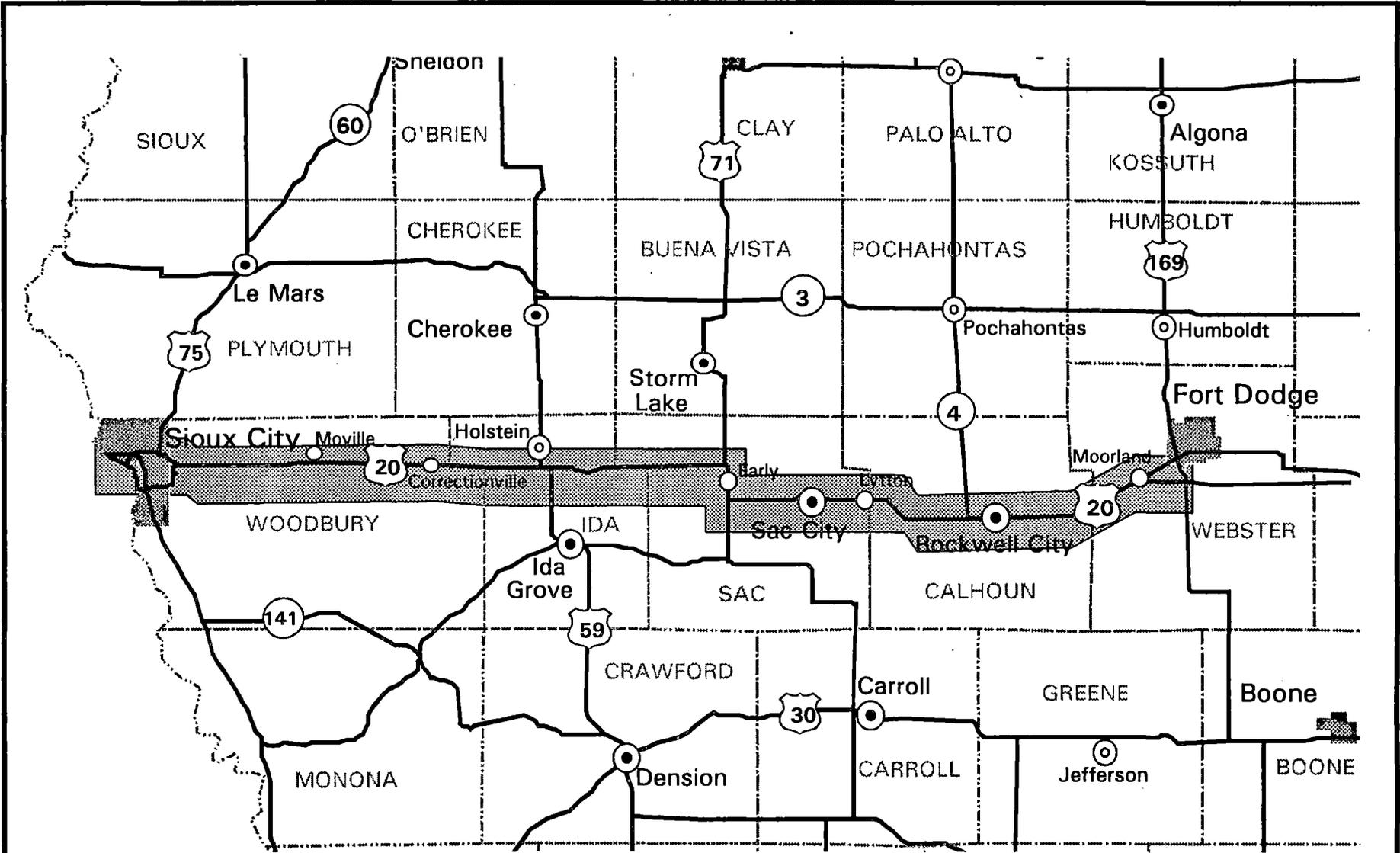
Residents of the corridor area, as well as other Iowans, have long wanted an improved East-West Highway to serve this region. Advocates of such a highway envision substantial benefits being generated, including increased intercity mobility, vehicular safety, increased tourism, improved goods transport, better access to the region and, most especially, economic development. The proponents also feel that such a highway would tie the region together in the East-West direction, particularly now that the portions of U.S. 20 between I-35 and Cedar Falls are under construction as a four lane highway, or planned for improvement to four lanes. Coupled with tentative planning being conducted in Illinois and Nebraska, a case could be made for improving this portion of U.S. 20, conceivably as part of a multi-state reliever route for I-80.

The State of Iowa needs to make certain that limited highway monies are programmed for the most warranted and most beneficial highway corridor projects. This corridor is essentially in competition with other highway corridors and corridor projects for limited funding available from the State and Federal Highway programs. Therefore, Iowa DOT must be certain that any major investments in the corridor are prudent, and that the State as well as regional economies will be better off with the investments than without them.

This initial paper provides the Iowa DOT and U.S. 20 Highway Steering Committee with background information concerning U.S. 20 and its region, including the results of travel and shipper surveys, as well as a preliminary evaluation of the existing highway. This paper answers the question:

"Does existing U.S. 20 between Sioux City and Fort Dodge provide adequate services, have adequate capacity, and serve the corridor transportation needs of businesses and individuals?"

Findings and analyses to date are summarized in this seven chapter report. In Chapter 2 the socioeconomic trends and projections of the region are summarized. These statistics will be used later in the traffic forecasting phase. Chapter 3 identifies the major environmental issues and constraints of the corridor. In Chapter 4, the highway is defined in terms of existing conditions and accident experience. In Chapter 5, traffic counts and historical trends are presented together with roadside survey results. Then Chapter 6 summarizes existing trucking activities and freight issues within the corridor. Chapter 7 concludes with the roles U.S. 20 is playing, its sufficiency for performing those functions, and alternative roles which the highway might be able to play in the future.



U.S. HIGHWAY 20 STUDY CORRIDOR
U.S. Highway 20 Corridor Development Study

Exhibit 1-1

CHAPTER 2

REGIONAL CHARACTERISTICS

One element of this study is to investigate U.S. 20 as a regional highway serving the upper midwest. Exhibit 2-1 illustrates the potential concept of U.S. 20 as a regional highway. The states involved in the region include Illinois, Iowa, Minnesota, Nebraska, South Dakota, and Wisconsin. As a part of this investigation, socioeconomic characteristics of states and portions of states that could be served by such a regional U.S. 20 highway are discussed, as a prelude to the feasibility assessments.

REGIONWIDE CHARACTERISTICS

The importance of regional highways in the six state area can partially be understood by examining existing development patterns. These patterns are best summarized by population and employment.

Population - In 1990, the six-state region had a total population of 25,748,614. The majority of the population in the region is located in the eastern states of Illinois and Wisconsin (63.4 percent) and the larger cities within the entire region. The western portion of the region is primarily rural. Exhibit 2-2 illustrates the geographical variations of population density throughout the region.

From 1980 to 1990, the six-state region observed a population increase of 366,085 (1.44 percent). While the regional increase is much lower than the national increase of 9.81 percent, some areas within the region have experienced larger increases in population. Exhibit 2-3 indicates that only the state of Iowa had an overall decrease in population. Minnesota experienced the largest increase, with Wisconsin next; however, all six states were below the national average. The individual areas gaining in population were primarily the larger cities. Exhibit 2-4 indicates that areas around Chicago, Minneapolis, Des Moines, and other major cities received the majority of the region's population increase.

**Exhibit 2-3
REGIONAL POPULATION**

	<u>1980</u>	<u>1990</u>	<u>Difference</u>	<u>Percent Change 1980 - 1990</u>
Illinois	11,427,429	11,430,602	3,173	0.03%
Iowa	2,913,808	2,776,755	(137,053)	-4.70%
Minnesota	4,075,970	4,375,099	299,129	7.34%
Nebraska	1,569,825	1,578,385	8,560	0.55%
South Dakota	690,768	696,004	5,236	0.76%
Wisconsin	<u>4,705,642</u>	<u>4,891,769</u>	<u>186,127</u>	<u>3.96%</u>
Region Total	25,383,442	25,748,614	365,172	1.44%
Nation	226,542,732	248,759,873	22,217,141	9.81%

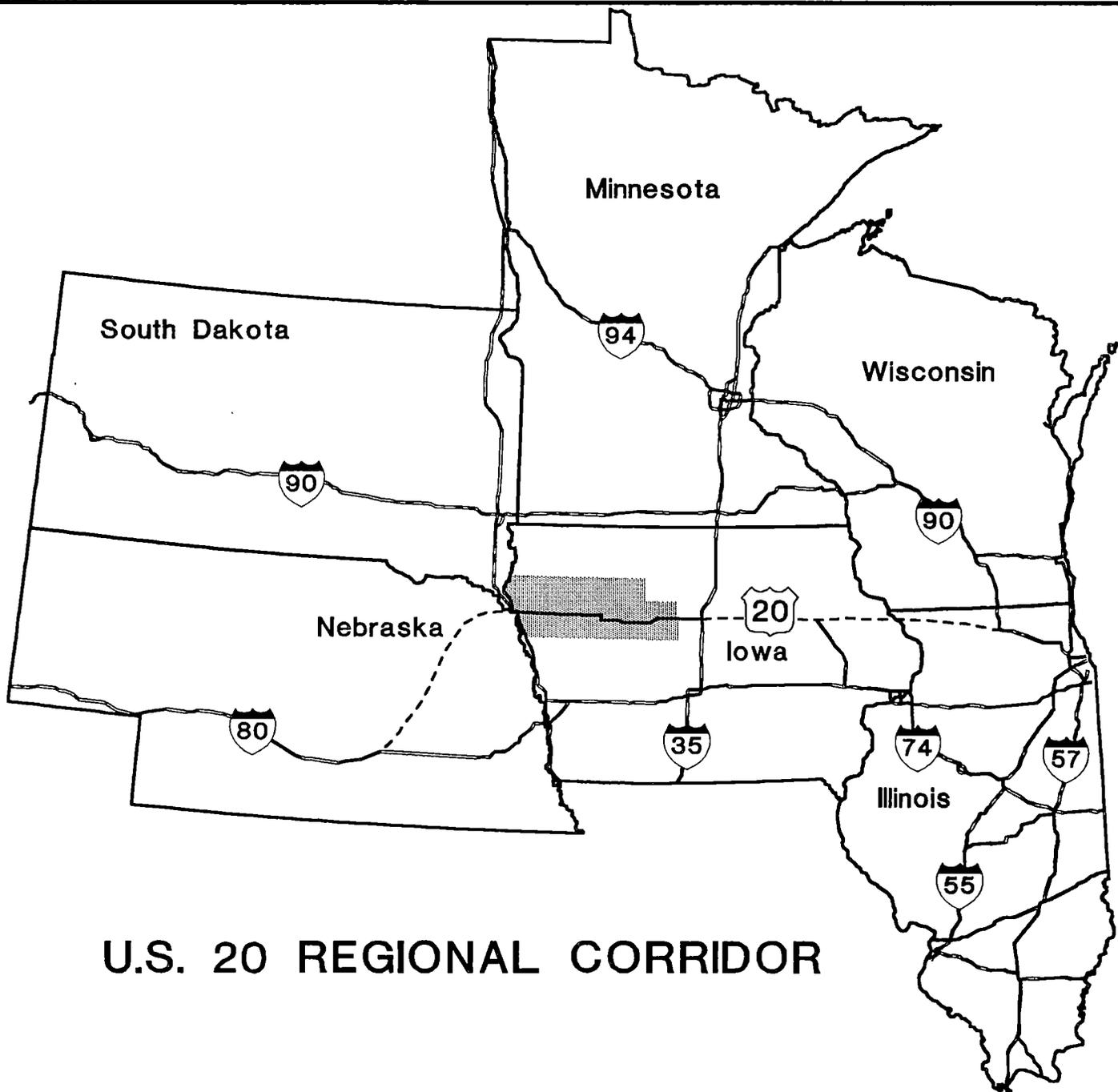
SOURCE: U.S. Census Bureau

Employment - In the same fashion as the nation as a whole, employment in the region has grown at a much faster rate than population over the past two decades. This trend has occurred because of the large number of women who have entered the work force, as well as the growth in the service sector employment. In 1990, total employment in the region was 12,953,430, an increase of over 2 million employees from 1980. All six states in the region had increases in employment. Similar to population, Minnesota and Wisconsin experienced the largest percentage increases, with 33.1 percent and 24.5 percent respectively. Employment figures for the entire six-state region are summarized on Exhibit 2-5.

**Exhibit 2-5
REGIONAL EMPLOYMENT**

	<u>1980</u>	<u>1990</u>	<u>Difference</u>	<u>Percent Change 1980 - 1990</u>
Illinois	5,071,240	5,593,950	522,710	10.31%
Iowa	1,270,810	1,519,020	248,210	19.53%
Minnesota	1,667,270	2,218,590	551,320	33.07%
Nebraska	706,970	868,080	161,110	22.79%
South Dakota	297,600	349,150	51,550	17.32%
Wisconsin	<u>1,931,490</u>	<u>2,404,640</u>	<u>473,150</u>	<u>24.50%</u>
Region Total	10,945,380	12,953,430	2,008,050	18.35%
Nation	112,256,710	137,760,470	25,503,760	22.72%

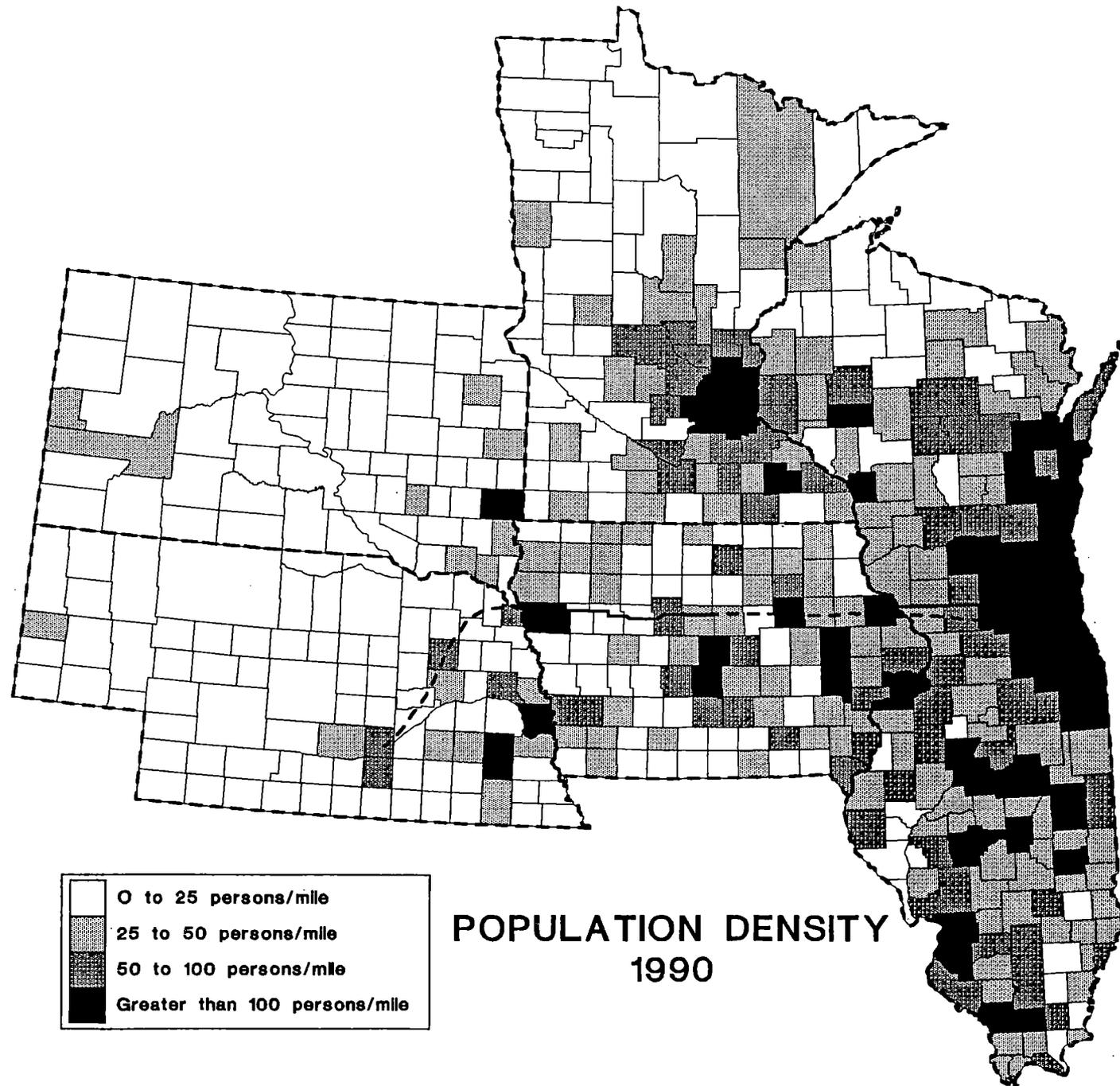
SOURCE: Woods and Poole Economics.



U.S. 20 REGIONAL CORRIDOR

Exhibit 2-1

2-3



**POPULATION DENSITY
1990**

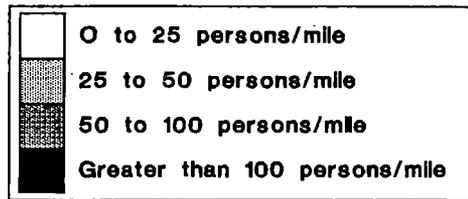
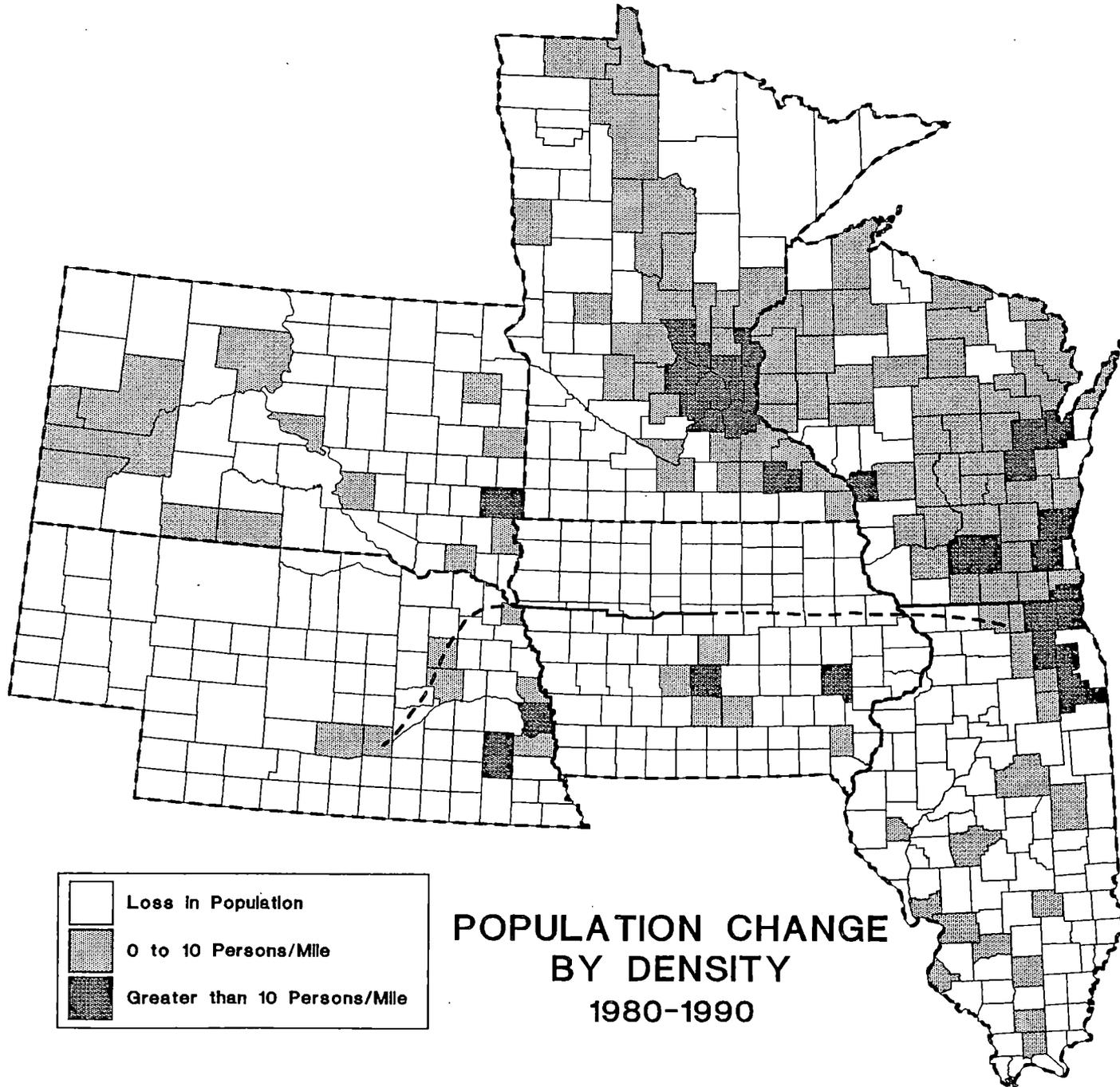


Exhibit 2-2



**POPULATION CHANGE
BY DENSITY
1980-1990**

	Loss in Population
	0 to 10 Persons/Mile
	Greater than 10 Persons/Mile

Exhibit 2-4

STATE AND SUBAREA CHARACTERISTICS

The U.S. 20 corridor study comprises the existing two-lane highway segment generally between Fort Dodge and Sioux City, Iowa (Exhibit 2-6). The population, employment and retail sales characteristics for the State of Iowa and selected trends for the following 9 counties -- Buena Vista, Calhoun, Cherokee, Ida, Plymouth, Pocahontas, Sac, Webster and Woodbury -- are discussed in this section. For purposes of this report, this 9-county area is referred to as the "Primary Impact Region". These nine counties are either directly served by U.S. 20, or have economies on which U.S. 20 is believed to exert a major influence.

The focus of this section is to compare socioeconomic data for the 9-county primary impact region to that of the surrounding 38-county region and, when appropriate, the entire state of Iowa to determine whether or not the 9-county primary impact area is keeping pace with the surrounding region and the state. This 38-county region is bounded by I-35 (Iowa), I-80 (Iowa), I-29 (Nebraska and South Dakota), and I-90 (Minnesota), and includes the following counties (Exhibit 2-7):

Audubon	Ida
Boone	Kossuth
Buena Vista	Lyon
Calhoun	Monona
Carroll	O'Brien
Cerro Gordo	Osceola
Cherokee	Palo Alto
Clay	Plymouth
Crawford	Pocahontas
Dallas	Polk
Dickinson	Sac
Emmet	Shelby
Franklin	Sioux
Greene	Story
Guthrie	Webster
Hamilton	Winnebago
Hancock	Woodbury
Harrison	Worth
Humboldt	Wright

Population, employment and retail sales are all significant indicators of a county's or region's growth or decline. Both population and employment reflect the flow of economic activity because industries usually emerge in or relocate to growing areas; and people migrate, in part, for job opportunities. Furthermore,

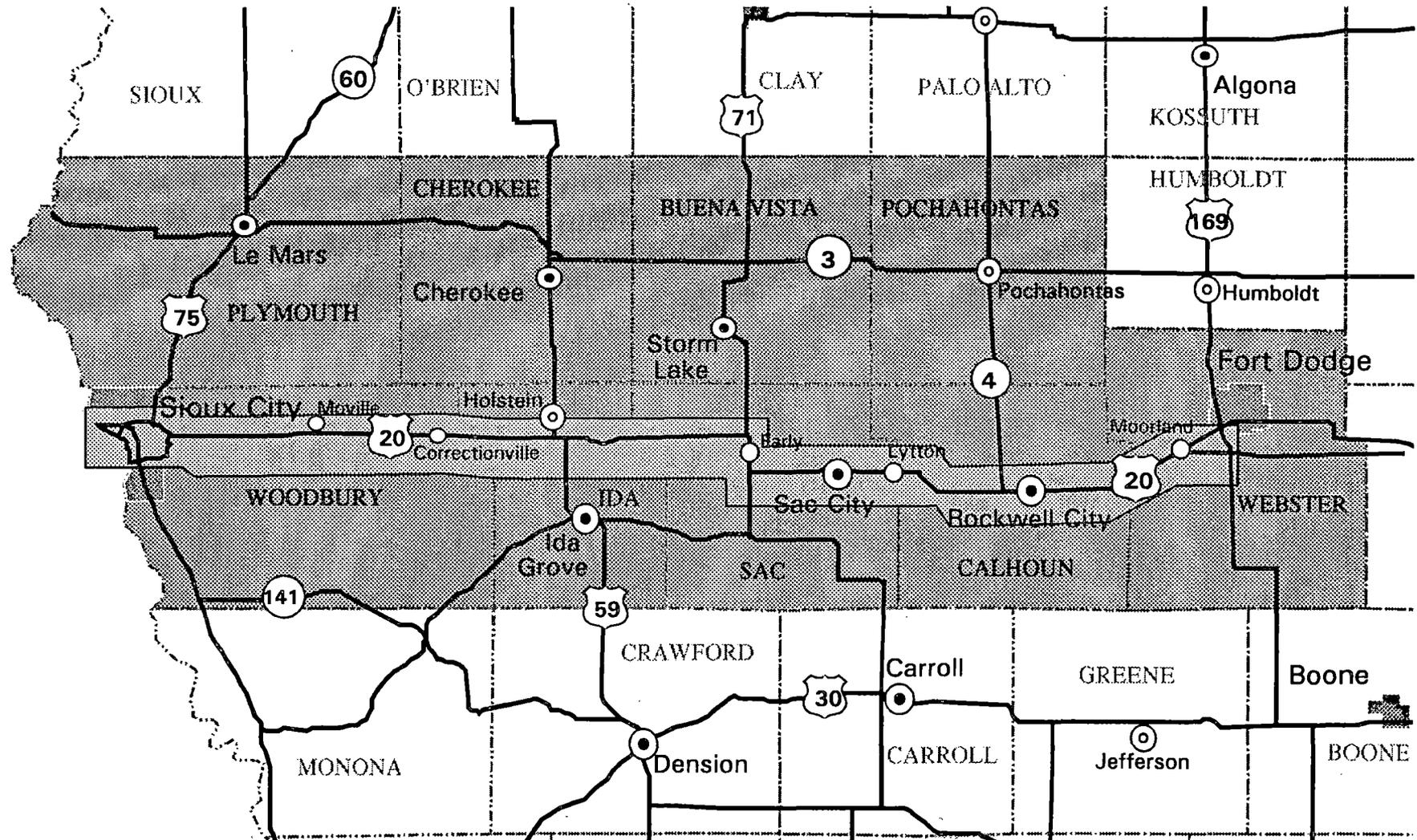
population growth for people of working age (generally 20 to 64) depends on economic conditions. Retail sales data is also helpful in explaining employment and population changes as well as the "health" of the counties within the impact area and region. Counties with robust retail sectors usually are experiencing growth in the number of retail firms and/or a stability or growth in the real sales per firm (real sales mean total sales adjusted for inflation). Counties with declining retail sales are usually experiencing the opposite trends.

Population - This population analysis includes a brief description of total population and past trends of migration, age breakdown and urban/rural population patterns.

Total Population - Iowa's total population was 2,825,041 in 1970, 2,913,808 in 1980 and 2,776,755 as of 1990. The state grew by 3.1 percent between 1970 and 1980. A 4.7 percent loss in population occurred between 1980 and 1990 (Exhibit 2-8). The 38-county region followed the state trend, experiencing a 1.8 percent population increase between 1970 and 1980 and a 3.0 percent decline between 1980 and 1990.

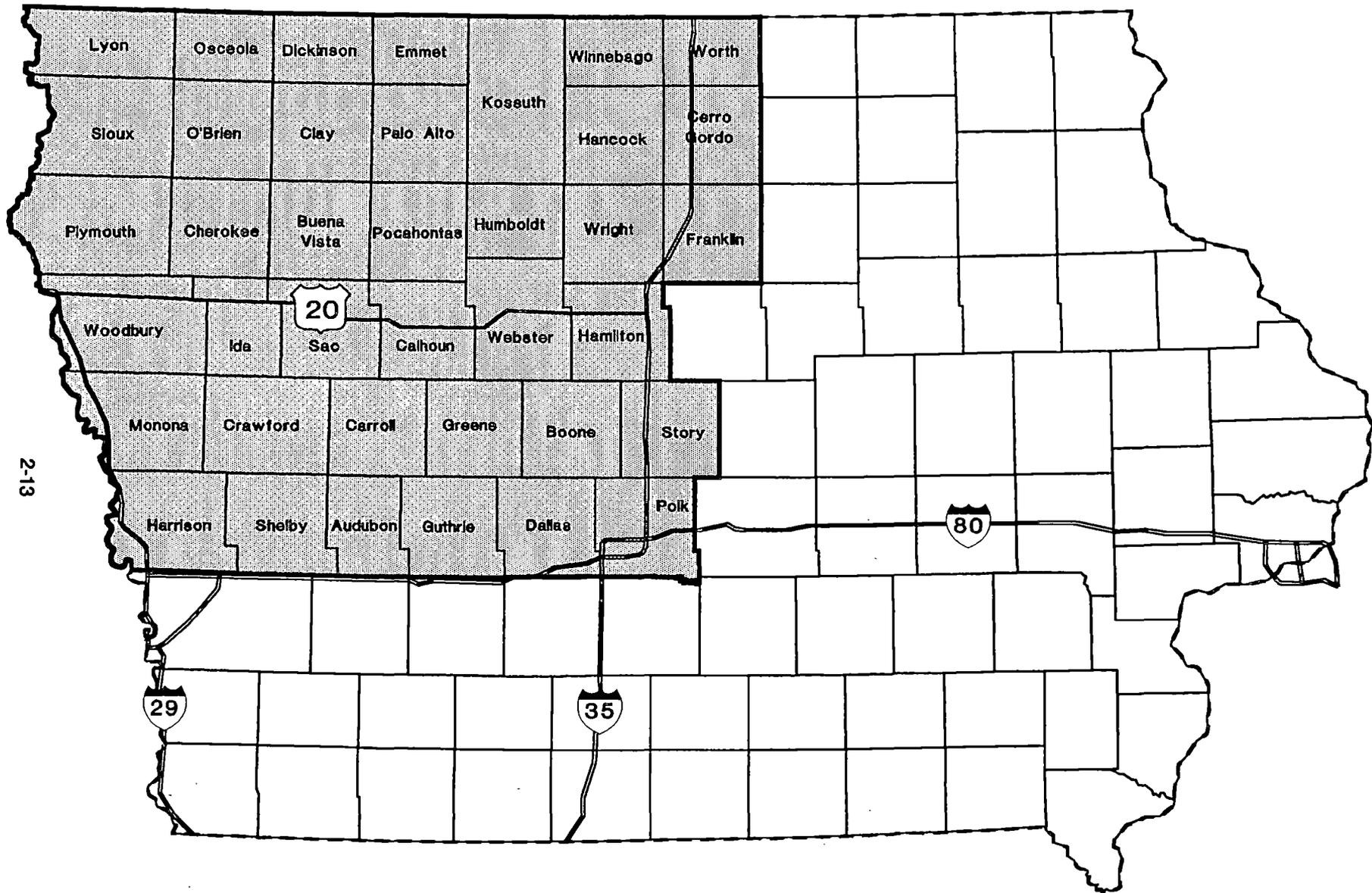
The 9-county primary impact area did not follow the state or 38-county region trend. The area experienced a population loss of 3.4 percent between 1970 and 1980 and a 7.3 percent decline between 1980 and 1990. Approximately 8.8 percent of the total population of Iowa lived in the 9-county impact area in 1980 and decreased slightly to 8.6 percent in 1990. The counties that suffered the most drastic population loss in the 9-county area during the 1980's were Pocahontas (16.2 percent) and Calhoun (15.0 percent). Buena Vista and Woodbury Counties had the smallest population losses of 3.9 and 2.6 percent, respectively.

Between 1980 and 1990, the population loss for the state was greatest in rural Iowa areas like the 9-county primary impact area, where mechanization of agriculture was occurring at a rapid pace and there was also a severe recession in the agricultural industry. This combination carried with it a corresponding loss of jobs. People who lost jobs in agriculture were often unable to find employment in other sectors, and therefore had to migrate out of the area to find work.



NINE COUNTY PRIMARY IMPACT AREA
U.S. Highway 20 Corridor Development Study

Exhibit 2-6



2-13

38-COUNTY REGION

Exhibit 2-8
U.S. 20 AREA POPULATION CHANGES

<u>COUNTY</u>	<u>RESIDENT POPULATION</u>			<u>PERCENT CHANGE</u>	
	<u>1970</u>	<u>1980</u>	<u>1990</u>	<u>1970-80</u>	<u>1980-90</u>
Buena Vista	20,693	20,774	19,965	0.4	-3.9
Calhoun	14,292	13,542	11,508	-5.2	-15.0
Cherokee	17,269	16,238	14,098	-4.9	-13.2
Ida	9,283	8,908	8,365	-4.0	-6.1
Plymouth	24,322	24,743	23,388	1.7	-5.5
Pocohontas	12,793	11,369	9,525	-11.1	-16.2
Sac	15,573	14,118	12,324	-9.3	-12.7
Webster	48,391	45,953	40,342	-5.0	-12.2
Woodbury	103,052	100,884	98,276	-2.1	-2.6
Primary Impact Area Total	265,668	256,529	237,791	-3.4	-7.3
38-County Region Total	1,082,386	1,101,396	1,068,463	1.8	-3.0
State Total	2,825,041	2,913,808	2,776,755	3.1	-4.7

SOURCE: U.S. Bureau of the Census, calculations by State Data Center of Iowa. Population of Iowa Counties: 1980 and 1990 Iowa Development Commission. 1986 Statistical Profile of Iowa, Population and Land Area of Counties; 1970-1980, p. 72-73.

Notes: Primary Impact Area - See Exhibit 2-6
38-County Region - See Exhibit 2-7

Of the 10 towns/cities located on U.S. Highway 20 within the corridor study, all but Merville lost population between 1980 and 1990 (Exhibit 2-9).

Exhibit 2-9
POPULATION OF TOWNS/CITIES LOCATED ALONG U.S. 20

	<u>RESIDENT POPULATION</u>			<u>1970-80</u>	<u>PERCENT CHANGE 1980-90</u>
	<u>1970</u>	<u>1980</u>	<u>1990</u>		
Sioux City	85,925	82,003	80,505	-4.6	-1.8
Lawton	406	447	482	10.1	-7.8
Merville	1,198	1,273	1,306	6.3	2.6
Correctionville	870	935	897	7.5	-4.1
Early	727	670	649	7.8	-3.1
Sac City	3,268	3,000	2,492	-8.2	-16.9
Lytton	378	377	320	-0.3	-15.1
Rockwell City	2,396	2,276	1,981	-5.0	-13.0
Moorland	269	257	209	-4.5	-18.7
Fort Dodge	31,263	29,423	25,894	-5.9	-12.0

SOURCE: Census Services, Iowa State University, Ames, Iowa. Population of Incorporated Places, 1850-1990.

Migration - Population change is attributable to three factors: births, deaths and migration. Net migration is the movement of people in or out of the area after the natural changes (births minus deaths) have been considered (Exhibit 2-10). Between 1970 and 1980, the State of Iowa experienced a net out-migration of 61,985 people. Since then, 275,188 people migrated out of the state. Net migration out of the area was 21,402 between 1970 and 1980 and 29,047 between 1980 and 1990. Of the those leaving the state during the 1980s, 10 percent lived in the 9-county primary impact area.

Age Breakdown - Since 1970, the State of Iowa has continued to experience a decline in the 0-19 year old population (Exhibit 2-11). Between 1970 and 1980, the state experienced a loss of 13.2 percent of the population within that age bracket, and between 1980 and 1990 a 14.3 percent decline in this age group. The primary impact area, as well as the 38-county region, experienced slightly greater declines for this age group between 1970 and 1980 and comparable losses between 1980 and 1990.

**Exhibit 2-10
PRIMARY IMPACT AREA
POPULATION TRENDS 1970-1990**

<u>COUNTY</u>	<u>YEAR</u>	<u>POPULATION</u>	<u>POPULATION CHANGE</u>	<u>ACTUAL BIRTHS</u>	<u>ACTUAL DEATHS</u>	<u>NATURAL CHANGE (BIRTHS-DEATHS)</u>	<u>NET MIGRATION *</u>
Buena Vista	1970/1980	20,693/20,774	81	2,901	2,251	650	(569)
	1980/1990	20,774/19,965	(809)	2,962	2,318	644	(1,453)
Calhoun	1970/1980	14,292/13,542	(750)	1,750	1,835	(85)	(665)
	1980/1990	13,542/11,508	(2,034)	1,488	1,740	(252)	(1,782)
Cherokee	1970/1980	17,269/16,238	(1,031)	2,350	1,770	580	(1,611)
	1980/1990	16,238/14,098	(2,140)	2,034	1,705	329	(2,469)
Ida	1970/1980	9,283/8,908	(375)	1,241	1,143	98	(473)
	1980/1990	8,908/8,365	(543)	1,314	1,060	254	(797)
Plymouth	1970/1980	24,322/24,743	421	3,760	2,331	1,429	(1,008)
	1980/1990	24,743/23,388	(1,355)	3,701	2,314	1,387	(2,742)
Pocahontas	1970/1980	12,793/11,369	(1,424)	1,533	1,483	50	(1,474)
	1980/1990	11,369/9,525	(1,844)	1,375	1,389	(14)	(1,830)
Sac	1970/1980	15,573/14,118	(1,455)	2,005	1,792	213	(1,668)
	1980/1990	14,118/12,324	(1,794)	1,694	1,743	(49)	(1,745)
Webster	1970/1980	48,391/45,953	(2,438)	6,820	4,838	1,982	(4,420)
	1980/1990	45,953/40,342	(5,611)	6,301	4,748	1,553	(7,164)
Woodbury	1970/1980	103,052/100,884	(2,168)	17,544	10,198	7,346	(9,514)
	1980/1990	100,884/98,276	(2,608)	16,106	9,649	6,457	(9,065)
9-County Primary Impact Area Total	1970/1980	265,668/256,529	(9,139)	39,904	27,641	12,263	(21,402)
	1980/1990	256,529/237,791	(18,738)	36,975	26,666	10,309	(29,047)
State Total	1970/1980	2,825,041/2,913,808	88,767	432,055	281,303	150,752	(61,985)
	1980/1990	2,913,808/2,776,755	(137,053)	407,891	269,756	138,135	(275,188)

SOURCE: U.S. Department of Commerce, Bureau of the Census. Calculations by State Data Center of Iowa. Population of Iowa Counties: 1980 and 1990. Iowa Development Commission. 1986 Statistical Profile of Iowa. Population and Land Area of Counties; 1970- 1980, p. 72-73. --- Census Services, Department of Sociology, Iowa State University. 1990 Census Data for the State of Iowa from Summary Tape File 1A. --- Iowa Department of Public Health, Statistical Services, Des Moines, Iowa; 1970-1990.

Iowa Department of Economic Development, 1991 Statistical Profile of Iowa.

* Net Migration = Population change minus natural change.

() = Loss or negative number

Exhibit 2-11
TOTAL POPULATION AGE BREAKDOWN
1970-1990

	<u>0-19 YEARS OF AGE</u>				<u>20-64 YEARS OF AGE</u>				<u>65+ YEARS OF AGE</u>			
	<u>1970</u>	<u>1980</u>	<u>1990</u>	<u>% CHANGE</u>	<u>1970</u>	<u>1980</u>	<u>1990</u>	<u>% CHANGE</u>	<u>1970</u>	<u>1980</u>	<u>1990</u>	<u>% CHANGE</u>
				<u>1980-90</u>				<u>1980-90</u>				<u>1980-90</u>
Buena Vista	7,660	6,330	6,050	-4.4	10,040	11,050	10,300	-6.8	3,060	3,400	3,590	5.6
Calhoun	5,060	3,980	3,110	-21.9	6,750	6,880	5,700	-17.6	2,450	2,670	2,660	-0.4
Cherokee	6,630	5,060	3,810	-24.7	8,310	8,620	7,700	-10.7	2,340	2,550	2,540	-0.4
Ida	3,310	2,680	2,410	-10.1	4,500	4,610	4,240	-8.0	1,460	1,630	1,700	4.3
Plymouth	9,910	8,500	7,420	-12.7	11,450	12,700	12,030	-5.3	2,970	3,580	3,920	9.5
Pocahontas	4,910	3,510	2,560	-27.1	5,880	5,730	4,900	-14.5	2,000	2,100	2,030	-3.3
Sac	5,710	4,210	3,390	-19.5	7,350	7,210	6,170	-14.4	2,520	2,670	2,730	2.2
Webster	19,050	14,660	11,440	-22.0	23,260	24,440	21,470	-12.2	6,040	6,760	7,310	8.1
Woodbury	39,680	32,940	29,320	-11.0	50,790	54,530	53,950	-1.1	12,860	13,470	14,890	10.5
9-County Impact Area Total	101,920	81,870	69,510	-15.1	128,330	135,770	126,460	-6.9	35,700	38,830	41,370	6.5
38-County Region Total	411,770	347,930	304,980	-12.3	536,620	602,570	596,460	-1.0	135,750	150,840	165,640	9.8
State Total	1,081,520	938,030	803,660	-14.3	1,399,550	1,586,170	1,544,390	-2.6	349,700	388,990	423,910	9.0

SOURCE: Historical Data 1970-1988 from U.S. Department of Commerce. Projected Data 1989+, Woods and Poole, 1991.

By observing the relative size of the next oldest population grouping, it becomes obvious that there is a net out migration, because the 20 to 64 year old segment of the population also experienced losses. Between 1980 and 1990, there was a decrease in the number of 20-64 year olds for the state, the primary impact area and the 38-county region. The 38-county region and the state had slight decreases of 1.0 and 2.6 percent, respectively. The 9-county primary impact area, on the other hand, realized a much greater decline of 6.9 percent for this same time period. Four of the 9 counties -- Calhoun, Pocahontas, Sac and Webster -- exceeded the 9-county total decline with individual declines ranging from 17.2 percent (Calhoun County) to 12.2 percent (Webster County).

Overall, the State of Iowa experienced a 9 percent increase in the 65 years and older age group between 1980 and 1990. The primary impact area and the 38-county region experienced similar increases of 9.8 and 6.5 percent, respectively. Of the 9 counties, only Calhoun, Pocahontas and Cherokee realized a slight loss in this age group. The remaining 6 counties followed the increasing trend of the state and the 38-county region, confirming the belief that Iowa's population is aging more rapidly than the U.S. population.

The main reason for the decreases in both the 0-19 and 20-64 year age groups is out-migration due to the economic downturn in the 1980s. The 0-19 year old age group experienced substantially larger decreases because most of the people in this age bracket are children of families whose parents moved. Also, 7 of the counties in this study area have greater than 50 percent of their population living in a rural setting (Exhibit 2-12). A large percentage of this population is represented by farmers. The agricultural recessions of the early 1980s negatively impacted the rural agricultural communities in the area, causing significant increases in out-migration and population decline. It is also believed that a majority of out-migration is young high school and college graduates who cannot find employment (particularly professional) within the area and region, as well as middle-aged farmers who are leaving farming and cannot find other employment within the area. Today, fewer young people are attracted to farming as a career. Thus, most of the existing farmers are older and not having as many children.

Exhibit 2-12
URBAN/RURAL POPULATION
1970-1990

2-20

	<u>1970 POPULATION</u>				<u>1980 POPULATION</u>				<u>1990 POPULATION</u>			
	<u>TOTAL</u>	<u>URBAN</u>	<u>RURAL</u>	<u>PERCENT URBAN</u>	<u>TOTAL</u>	<u>URBAN</u>	<u>RURAL</u>	<u>PERCENT URBAN</u>	<u>TOTAL</u>	<u>URBAN</u>	<u>RURAL</u>	<u>PERCENT URBAN</u>
Buena Vista	20,693	8,591	12,102	41.5	20,774	8,814	11,960	42.4	19,965	8,769	11,196	43.9
Calhoun	14,292	0	14,292	0	13,542	0	13,542	0	11,508	0	11,508	0
Cherokee	17,269	7,272	9,997	42.1	16,238	7,004	9,234	43.1	14,098	6,026	8,072	42.7
Ida	9,283	0	9,190	0	8,908	0	8,908	0	8,365	0	8,365	0
Plymouth	24,322	8,159	16,153	33.5	24,743	8,853	15,890	35.8	23,388	8,454	14,934	36.1
Pocohontas	12,793	0	12,793	0	11,369	0	11,369	0	9,525	0	9,525	0
Sac	15,573	3,268	12,305	21.0	14,118	3,000	11,118	21.2	12,324	0	12,324	0
Webster	48,391	31,263	17,128	64.6	45,953	29,423	16,530	64.0	40,342	25,894	14,448	64.2
Woodbury	103,052	87,157	15,895	84.6	100,884	82,003	18,881	81.3	98,276	83,277	14,999	84.7
9-County Primary Impact Area Total	265,668	145,710	119,855	54.8	256,529	139,097	117,432	54.2	237,791	132,420	105,371	55.7
38-County Region Total	1,082,386	628,921	455,423	58.1	1,101,396	661,698	439,338	60.0	1,068,463	670,322	398,141	62.7
State Total	2,825,041	1,616,405	1,207,971	57.2	2,913,808	1,708,232	1,205,576	58.6	2,776,755	1,655,095	1,121,660	59.6

SOURCE: Iowa Department of Economic Development, 1987-1988 Statistical Profile of Iowa
Census Services, Iowa State University, Ames, Iowa. Population of Iowa's Incorporated Places, 1985-1990

Note: Data may not add to totals shown because of independent rounding.

Urban/Rural - In 1970, 57.2 percent of the state's population lived in an urban setting (cities or towns of 2,500 people or more). In 1980, this increased slightly to 58.6 percent and further increased in 1990 to approximately 59.6 percent. Overall, the 38-county region experienced this same shift from rural to urban population between 1970 and 1990, with the exception of 4 counties. The total population residing in the 9-county primary impact area became slightly more urban between 1980 and 1990. In 1990, 55.7 percent lived in urban areas compared with 54.2 percent in 1980. These percentages are deceiving because they are dominated by the Fort Dodge (Webster County) and Sioux City (Woodbury County) urban area populations. In fact, 7 of the 9 counties have maintained a larger rural than urban population since 1970. Webster and Woodbury are the only 2 counties that have had greater than 50 percent of their population living in urban areas since 1970. Overall, the state, the 38-county region and the 9-county primary impact area currently have over 50 percent of their total population living in an urban setting.

Employment - The employment discussion focuses on manufacturing, agriculture and wholesale trade since these employment sectors generate significant amounts of truck and commercial traffic, which are highly dependent on the state highway system. These sectors are also included because they are considered "basic". This means that the sectors produce output that is not consumed locally but is exported out of the region for national or international consumption. Normally, the "basic" sectors are mining, agriculture, manufacturing, wholesale trade and the federal government. In contrast, "nonbasic" sectors include retail trade, transportation, communication and construction, the output of which is usually consumed locally. The growth of the "nonbasic" sectors depends largely on the growth of the basic sectors that form the basis of the region's economy.

Over the past two decades, Iowa's fortunes have changed many times. As agricultural prices rose and manufacturing employment expanded in the 1970s, the employment and economic security of Iowans increased. With the 1981-82 agricultural recession, economic security declined and the state lost jobs and population. The State of Iowa now appears ready for a slow but steady employment growth over the next 2 decades. An indication of this reversal, although slight, is already apparent (Exhibit 2-13).

Exhibit 2-13
TOTAL EMPLOYMENT IN REGION
1978 - 1990

	<u>EMPLOYED PERSONS</u>			<u>PERCENT</u>
	<u>1978</u>	<u>1985</u>	<u>1990</u>	<u>CHANGE</u>
				<u>1985-90</u>
Buena Vista	6,930	7,770	8,060	3.7
Calhoun	2,970	2,960	3,230	9.1
Cherokee	5,550	5,260	5,160	-1.9
Ida	2,540	2,440	3,120	27.9
Plymouth	6,210	6,270	7,420	18.3
Pocahontas	2,940	2,660	3,030	13.9
Sac	3,780	2,920	3,140	7.5
Webster	19,540	16,870	17,660	4.7
Woodbury*	51,600	48,400	55,700	15.1
9-County Primary				
Impact Area Total	102,060	95,550	106,520	11.5
38-County Region Total	459,744	455,430	532,170	14.9
State Total	1,119,200	1,074,200	1,224,100	14.0

SOURCE: Iowa Department of Employment Services Labor Force, Summary Annual Averages 1978-1987 and 1988-1990.

* Sioux City MSA (Metropolitan Statistical Area) includes Woodbury County, Iowa, and Dakota County, Nebraska.

Total Employment - Between 1985 and 1990, Iowa gained 149,000 jobs, which represents a 14 percent increase in total state employment. The 9-county primary impact area and the 38-county region experienced similar trends, realizing increases of 11.5 and 14.9 percent, respectively, in total employment for the same time period. Cherokee was the only county within the 9-county impact area that lost total employment (1.9 percent) between 1985 and 1990. Ida, Plymouth, Woodbury and Pocahontas realized the greatest total employment growth between 1985 and 1990. This employment growth is mostly the result of local efforts that have helped to stabilize the economy by offering a greater choice of job opportunities.

Manufacturing Employment - Manufacturing includes establishments engaged in the mechanical or chemical transformation of materials or substances into new products. Included in manufacturing are establishments engaged in assembling component parts not associated with structures and in blending materials such as lubricating oils or liquor.

According to the Iowa Department of Employment Services, manufacturing employment in Iowa has steadily increased since 1985 (Exhibit 2-14). Between 1985 and 1990, state manufacturing jobs have increased by approximately 15.2 percent. The 9-county primary impact area and the 38-county region have experienced similar trends. Since 1985, total manufacturing employment has increased approximately 13.7 and 11.3 percent, respectively.

Of the 9 primary counties, Sac is the only county that experienced a decrease in manufacturing employment between 1985 and 1990. Lear-Siegler (agricultural-related manufacturing) located in Sac City closed its plant in 1983. This closure subsequently affected the nonbasic local employers, causing a ripple effect to occur which severely drained the area's employment base.

The increases in manufacturing employment in the primary impact area are attributed to 2 factors: existing firm expansion and diversification. Some of the more significant increases in manufacturing employment have occurred in Plymouth, Pocahontas and Ida Counties. In particular, the town of LeMars in Plymouth County is the home of several firms, such as Wells Dairy, Inc. (dairy products), and

Exhibit 2-14
AREA MANUFACTURING, AGRICULTURE
AND WHOLESALE TRADE EMPLOYMENT
(ANNUAL AVERAGE)

2-24

	<u>Manufacturing Jobs</u>			<u>% Change 1985-90</u>	<u>Agriculture Jobs</u>			<u>% Change 1985-89</u>	<u>Wholesale Trade Jobs</u>			<u>% Change 1985-90</u>
	<u>1978</u>	<u>1985</u>	<u>1990</u>		<u>1978</u>	<u>1985</u>	<u>1989</u>		<u>1978</u>	<u>1985</u>	<u>1990</u>	
Buena Vista	1,150	1,610	1,630	1.2	1,690	1,575	1,460	-7.3	750	600	610	1.7
Calhoun	260	260	300	15.4	1,534	1,394	1,292	-7.3	380	290	280	-3.4
Cherokee	1,010	1,260	1,200	-4.8	1,661	1,535	1,422	-7.4	280	260	240	-7.7
Ida	430	540	910	68.5	1,301	1,079	996	-7.7	210	220	220	0
Plymouth	700	1,030	1,520	47.6	2,859	2,419	2,246	-7.2	510	380	450	18.4
Pocahontas	490	390	650	66.7	1,520	1,332	1,236	-7.2	400	410	450	9.8
Sac	640	240	230	-4.2	1,648	1,577	1,458	-7.5	420	370	390	5.4
Webster	4,580	2,660	2,790	4.9	2,005	1,810	1,685	-6.9	1,250	1,080	1,110	2.8
Woodbury	9,800	9,800	11,000	12.2	2,274	1,942	1,799	-7.4	3,500	3,000	3,300	10.0
9-County Primary Impact Area Total	19,060	17,790	20,230	13.7	16,492	14,663	13,594	-7.3	7,700	6,610	7,050	6.6
38-County Region Total	79,780	71,390	79,480	11.3	48,989	42,339	39,218	-7.4	36,100	35,540	37,820	6.4
State Total	252,500	204,700	235,800	15.2	167,997	149,295	138,215	-7.4	75,900	72,400	75,800	4.7

SOURCE: Iowa Department of Employment Services, Labor Market Information Unit. Labor Force Summary Annual Averages, 1978-1987. Bench Mark Month - March, 1989.

Iowa Department of Employment Services, Labor Market Information Unit. Labor Force Summary Annual Averages, 1988-1990. Bench Mark Month - March, 1990.

After 1982, Iowa Department of Employment Services, combined data into Des Moines SMSA which includes Polk, Warren and Dallas Counties.

Rural Data Project, Department of Economics, Iowa State University, Ames, Iowa. Based on Bureau of Economic Analysis Data.

Harker's, Inc. (meat packing plant), that have steadily expanded their facilities and/or diversified their product lines since 1985.

Several firms in Pocahontas County that produce air and hydraulic cylinders, such as Gold Star Manufacturing, Positech Corporation and Iowa Industrial Hydraulics, have also realized steady growth during the last 5 to 7 years and have hence increased employment. Gomaco Corporation and Midwest Industries, Inc., both located in Ida Grove are almost solely responsible for the increases in manufacturing employment in Ida County since 1985. Both of these firms produce fabricated metal products and machinery and are thriving.

The Sioux City MSA (Metropolitan Statistical Area), which includes Woodbury County, Iowa; Dakota County, Nebraska; and Union County, South Dakota, is the location of many small manufacturing firms that have realized incremental growth/expansion since 1985. Much of the growth and expansion is due, in part, to local loans, additional grants and cash injections toward working capital offered by the Chamber of Commerce, IPS (utility company) and the city. Some of the firms that have benefited from these growth incentives are:

Gateway 2000 (IBM compatible computers), North Sioux City, Nebraska

McCraker Concrete Pipe Machinery (concrete pipe and construction machinery manufacturers), Sioux City, Iowa

Metal Specialists (metal work), Sioux City, Iowa

Missouri Valley Steel (fabricated structural steel), Sioux City, Iowa

John Morrell (meat packing/processing), Sioux City, Iowa

Diosymth, Inc. (medumals and botanicals), Sioux City, Iowa

These firms have added anywhere from 8 to 800 people since 1985.

Some of the new manufacturers in the MSA include:

GVK Cabinets (kitchen cabinet manufacturers)

Wis-Pak (plastic bottle manufacturers)

Speciality Processors and Curley Ribs (both specialize in custom cutting and packaging of meats)

Many of these firms produce "value added" products. This means that the product requires a number of processors to achieve an end product, hence more people are involved, which equates to more jobs. In addition, two years ago (1989) Con Agra opened a new oat milling plant in South Sioux City, South Dakota, and ships most of its processed oat products by truck. Other significant manufacturing firms that have expanded or relocated in the Sioux City MSA are:

Beef Products, Inc., headquartered in South Sioux City (Dakota Dunes, South Dakota) and the processing plant is in North Sioux City, Nebraska
Iman's (pet food), South Sioux City, South Dakota
Prince Manufacturing (hydraulic engineering), North Sioux City, Nebraska.

The Fort Dodge area (Webster County) has an economic range similar to Sioux City, which extends into the surrounding Hamilton and Wright Counties' jurisdictions. The area has many manufacturing firms that have also expanded or diversified since the early 1980s when Hormel closed its plant and the farm economy collapsed. For instance, firms such as Fort Dodge Laboratories (pharmaceutical preparation) and Carnation Company (pet food production) have expanded their facilities and increased employment since 1985.

Since 1985, manufacturing employment growth in Cherokee County is attributable to primarily two companies -- HyVee Foods and Wilson Foods Corporation, both located in Cherokee City. HyVee Foods, Inc., owns a major food warehousing facility and is planning to further expand this operation in the near future. HyVee has been recently identified as Iowa's largest private employer. Wilson Foods is a meat-packing plant that has recently shifted to a meat-processing plant.

Since 1982, when IBP (Iowa Beef Processors) opened a plant in Storm Lake, manufacturing employment has been steadily increasing. The opening and/or expansions of other, smaller manufacturing firms in the area have also contributed to this increase.

Agriculture Employment - Agriculture includes farm establishments engaged in the production of crops and livestock. Overall, the State of Iowa experienced a 17.7 percent loss in agriculture employment between 1978 and 1989 and a 7.4 percent loss between 1985 and 1990. A similar trend is reflected in both the 9-county primary impact area and 38-county region. Within the past few years, many farmers have ceased operations; and few, if any, job opportunities were available to absorb them within the surrounding urban centers. Therefore, those leaving the farms have migrated to other Iowa urban centers or out-of-state. The chicken industry, however, is thriving in Wright County (part of the Fort Dodge economic area). This growth is predicted to continue.

Wholesale Trade Employment - Wholesale trade includes establishments primarily engaged in selling merchandise to retailers or to industrial, commercial, institutional, farm, construction, contractors or professional business users or to other wholesalers or brokers. The State of Iowa experienced a 4.7 percent decline in wholesale trade employment between 1978-1985 and almost completely recovered that loss between 1985-1990. The 9-county primary impact area followed a similar trend, and the 38-county region not only recovered but had an increase in the number of people employed by wholesale trade establishments.

Seven of the 9 counties within the impact area have experienced increases in wholesale employment between 1985 and 1990, indicating the area is beginning to recover from an earlier declining trend in this employment sector. Between 1978 and 1985, 7 of the 9 counties experienced a decline in wholesale employment. Contributing to this decrease in wholesale trade was the closing of farm implement dealerships due to the slow growth in farm equipment sales and production, especially around 1985. Calhoun and Cherokee Counties have continued to experience steady losses in wholesale employment since 1970.

Two of the 9-counties, Woodbury and Plymouth, experienced the greatest increases in wholesale trade employment between 1985 and 1990. Woodbury's wholesale trade employment growth is related to the increased growth in meat packaging and processing as well as the growth in pet food products. The City of Le Mars in Plymouth County has experienced similar spinoffs from comparable manufacturing businesses.

Retail Sales - Retail sales includes establishments engaged in selling merchandise for personal or household consumption and rendering services incidental to the sale of goods. Buying goods for resale to the consumer is a characteristic of retail trade establishments. The retail sales in Exhibit 2-15 are at 1980 price levels (constant dollars).

Retail sales for the years 1980-1990 for the state, the 9-county primary impact area and the 38-county region are tracked based on fiscal years that run from April 1 through March 31. The number of firms, the sales per firm, total sales and a pull factor, which measures the vitality of the county's retail sector, are all discussed in this section. The number of firms (businesses) identified represent the average number of businesses with sales tax permits that were operating in 1980 and 1990. Constant dollar sales are used instead of current dollar sales. Constant dollar sales are current dollar sales that are adjusted for price inflation and represent the real changes in terms of 1980 dollars. The original consumer price index for urban wage earners is used as a deflator. The base year for inflation adjustments is 1980. Therefore, the bottom line (the constant dollar line) is the most useful in determining a county's trends since it represents the real change in terms of 1980 dollars.

Total Retail Sales - The State of Iowa experienced a decline in total retail sales (constant dollars) and an increase in the number of retail firms between 1980 and 1990. Overall, the 38-county region followed the same trend as the state. The primary impact area did not follow this trend, however. Between 1980 and 1990, the area experienced a decrease in both total retail sales and number of firms/businesses.

The pull factor is considered to be the most realistic measure of the vitality of a county's retail sector (Iowa Retail Sales 1980-90, June, 1991). The pull factor indicates the ability of a county's retail markets to "pull" or lure shoppers to the area. The greater the pull factor, the larger the retail market area. This is a very accurate measure of a county's retail strength since it takes into account

Exhibit 2-15
AREA RETAIL SALES
(1980-1990)
1980 Constant Price Levels

	<u>Number of Firms</u>		<u>Sales per Firms (Millions-Constant \$)*</u>		<u>Total Sales (Millions-Constant \$)*</u>		<u>Pull Factor**</u>	
	<u>1980</u>	<u>1990</u>	<u>1980</u>	<u>1990</u>	<u>1980</u>	<u>1990</u>	<u>1980</u>	<u>1990</u>
Buena Vista	816	762	\$156,025	\$111,076	\$127,355	\$84,612	1.17	0.90
Calhoun	524	484	114,082	61,111	59,779	46,649	0.80	0.55
Cherokee	603	579	132,489	83,279	79,824	48,218	0.88	0.73
Ida	340	334	124,772	86,453	42,423	28,875	0.87	0.73
Plymouth	760	786	126,893	90,988	96,470	71,539	0.75	0.65
Pocahontas	506	443	102,464	51,652	51,667	22,869	0.77	0.51
Sac	586	521	112,351	60,892	65,781	31,740	0.80	0.55
Webster	1,424	1,410	209,456	169,892	298,213	239,463	1.17	1.26
Woodbury	2,528	2,654	235,092	202,372	594,253	537,045	1.10	1.16
9-County Primary Impact Area Total	6,085	7,973	1,313,624	917,715	1,415,765	1,111,010		
38-County Region Total	34,302	35,364	5,298,353	3,672,362	6,388,010	5,711,015		
State Total	92,347	92,807	---	---	15,380,853,327	13,083,740,732		

SOURCE: Iowa Agriculture and Home Economics Experiment Station, Iowa State University Cooperative Extension Service through the Rural Data Project and the Iowa Department of Revenue and Finance. Iowa Retail Sales 1980-1990.

* Constant dollar sales (a.k.a. real dollar sales) at 1980 price levels.

** Pull Factor = County's current dollar per capita sales divided by state average per capita sales for each merchandise category. Current dollars are the actual sales with no adjustments made for price inflation.

NOTES: Retail Merchandise Groups = Utilities, Building Materials, General Merchandise, Food, Motor Vehicle, Apparel, Home Furnishings, Eat and Drink, Speciality, Services, Wholesale and Miscellaneous.

the change in inflation, population and the state economy. Seven of the 9 counties experienced a reduction in their pull factor. Webster and Woodbury were the only 2 counties to increase their retail markets.

DEMOGRAPHIC FORECASTS

The forecast analysis relies solely on the Woods and Poole 1991 projected data. The specific economic forecasting models used by Woods and Poole to generate employment forecasts for each county follow a standard economic base approach. The Woods and Poole methodology is based on a comprehensive county data base which integrates the economic activities of each county to capture regional flows. According to Woods and Poole, this methodology is used because changes in one county affect growth or decline in other counties. Woods and Poole believes that this method avoids using simple extrapolations of recent historical trends that frequently create overly optimistic or pessimistic forecasts.

One of the shortcomings of using the Woods and Poole data is that the projected numbers (1989-2015) rely only on data that was available before 1989. Hence, any growth or decline that has occurred after 1988 has not been considered in the Woods and Poole forecast methodology. This may be of particular concern to those counties that have experienced considerable decline during the past decade, but have recently started to expand their economies.

Forecast Population - According to the Woods and Poole projections, the long-term outlook for the State of Iowa indicates a halt to the modest population declines of recent years (1980-1990). The State of Iowa is forecast to begin modest population growth and approach a total of almost 3 million people by 2015. Between 1990 and 2015, the state is expected to experience a population increase of 7.3 percent, or 203,400 persons (Exhibit 2-16). The 38-county region is also predicted to realize a 9.1 percent increase in population, which represents an increase of approximately 96,740 persons.

Exhibit 2-16
POPULATION PROJECTIONS
1990-2015

<u>COUNTY</u>	<u>RESIDENT POPULATION</u>				<u>PERCENT CHANGE</u> <u>1990-2015</u>
	<u>1990</u>	<u>2000</u>	<u>2010</u>	<u>2015</u>	
Buena Vista	19,940	20,450	20,690	20,790	4.3
Calhoun	11,470	10,800	10,160	9,890	-13.8
Cherokee	14,050	12,600	11,560	11,190	-20.4
Ida	8,350	8,310	8,220	8,160	-2.3
Plymouth	23,380	23,550	23,600	23,600	0.9
Pocohontas	9,480	9,090	8,900	8,810	-7.1
Sac	12,300	11,860	11,340	11,070	-10.0
Webster	40,220	38,110	36,330	35,690	-11.3
Woodbury	98,160	93,920	88,960	87,130	-11.2
9-County Primary Impact Area Total	237,350	228,690	219,760	216,330	-8.9
38-County Region Total	1,067,120	1,104,090	1,142,520	1,163,850	9.1
State Total	2,771,960	2,837,850	2,924,750	2,975,360	7.3

SOURCE: Projected Data 1990-2015 from Woods and Poole, Copyright 1991, Woods and Poole Economics, Inc.

This will be re-run with new data.

The 9-county primary impact area is forecast to witness a population decline, according to Woods and Poole. The area will gradually lose approximately 8.9 percent of its population (Exhibit 2-16), or 21,020 people, between 1990 and the year 2015. Seven counties in the area are forecast to have losses ranging from 2.3 percent (Iowa County) to 20.4 percent (Cherokee County). Buena Vista and Plymouth are the only counties forecast to realize slight population gains during this same time period.

Forecast Employment: Overall, the state, the 38-county region and the 9-county primary impact area have experienced comparable increases in total employment since 1985. This trend is also evident in the manufacturing and wholesale trade employment sectors. The severe agriculture recession in the early 1980s caused farm-related jobs to decline and continue to decrease throughout the 1980s.

During the last five to six years, many communities within the 9-county area primary have worked hard to encourage local plant and business expansion and diversification. This effort has contributed to the 9-county impact area's positive changes in employment. Due to these local efforts, the primary impact area, in a comparable fashion to the 38-county region and state, have all begun to recover from the past economic declines and recession of the late 1970s and early 1980s.

Total employment for the State of Iowa is forecast to increase by 8.2 percent between 1990 and 2015 (Exhibit 2-17). This equates to approximately 132,190 additional jobs in the state by 2015. The 38-county region is predicted to follow a similar trend, gaining approximately 55,720 jobs, an 8.4 percent increase, between 1990 and 2015. On the other hand, employment for the 9-county primary impact area is expected to decline between 1990 and 2015. Overall, the area is expected to lose approximately 7 percent, or 9,560 jobs. Only three counties, Buena Vista, Iowa and Plymouth, are expected to realize increases in total employment during this same time period.

Exhibit 2-17
FORECAST EMPLOYMENT
1990-2015

	<u>EMPLOYED PERSONS</u>				<u>PERCENT CHANGE</u>
	<u>1990</u>	<u>2000</u>	<u>2010</u>	<u>2015</u>	<u>1990-2015</u>
Buena Vista	12,610	13,450	14,050	14,240	12.9
Calhoun	5,600	5,200	4,850	4,680	-16.4
Cherokee	7,650	6,880	6,390	6,210	-18.8
Ida	5,250	5,820	6,580	6,910	31.6
Plymouth	11,840	12,470	13,140	13,350	12.8
Pocohontas	5,370	5,190	4,990	4,880	-9.1
Sac	5,890	5,640	5,350	5,190	-11.9
Webster	22,510	20,770	19,430	18,820	-16.4
Woodbury	57,290	53,530	51,080	50,170	-12.4
9-County Primary Impact Area Total	134,010	128,950	125,860	124,450	-7.1
38-County Region Total	663,240	694,970	710,600	718,960	8.4
State Total	1,609,280	1,676,180	1,726,370	1,741,470	8.2

SOURCE: Woods and Poole Projected Data 1989-2015 from Woods and Poole, 1990 Census is Included for Total Population and Employment. 1991 State Profile of Iowa, Woods and Poole Economics, Inc., Copyright, 1991.

*This projection
will be re-run
with new data.*

STUDY IMPLICATIONS

The population and employment trends and forecasts for the region served by U.S. 20 create a number of policy and analysis issues to be dealt with in this study. These include the following:

- Clearly the local region served by existing U.S. 20 is continuing to experience declines in resident population and employment. This would indicate that traffic growth will be modest, if there is any traffic growth at all.
- If that is true, then significant improvements to U.S. 20 would be needed either to solve any existing capacity or safety problems, or to help revitalize the area's economy, or to change the role which U.S. 20 plays. It is unlikely that major improvements will be needed in order to respond to traffic pressures.
- An important policy decision confronting the state, and one with which this study will help, is whether public investment in rural highways can successfully help rejuvenate local rural economics. In this sense, this is not a conventional highway corridor feasibility study.

CHAPTER 3 ENVIRONMENTAL OVERVIEW

One measure of feasibility is the ability to make the highway improvements without causing undue environmental harm. To gain insights into the environmental ease or difficulty of making those highway improvements, a literature search and field inspection was conducted to identify environmental resources within the project corridor between Moorland and Merville, Iowa, and one potential alternative corridor between Moorland and Early. For environmental review purposes, the project corridor consists of three major element:

- Existing alignment between Moorland and Merville. A 1,000-foot wide corridor centered on the highway was studied.
- Bypass areas include the communities of Correctionville, Early, Sac City, Lytton, Rockwell City and Moorland. Corridors located approximately 1 mile to the north and south of each town were studied.
- New corridor from Moorland to Early. An approximately 1-mile wide corridor north of the existing alignment of U.S. Highway 20 was studied.

Resources inventoried included wetlands, remnant prairies, rivers, streams, protected plant and animal species, parks and recreation areas, state preserves, cultural resources, Superfund sites, agricultural land and cemeteries.

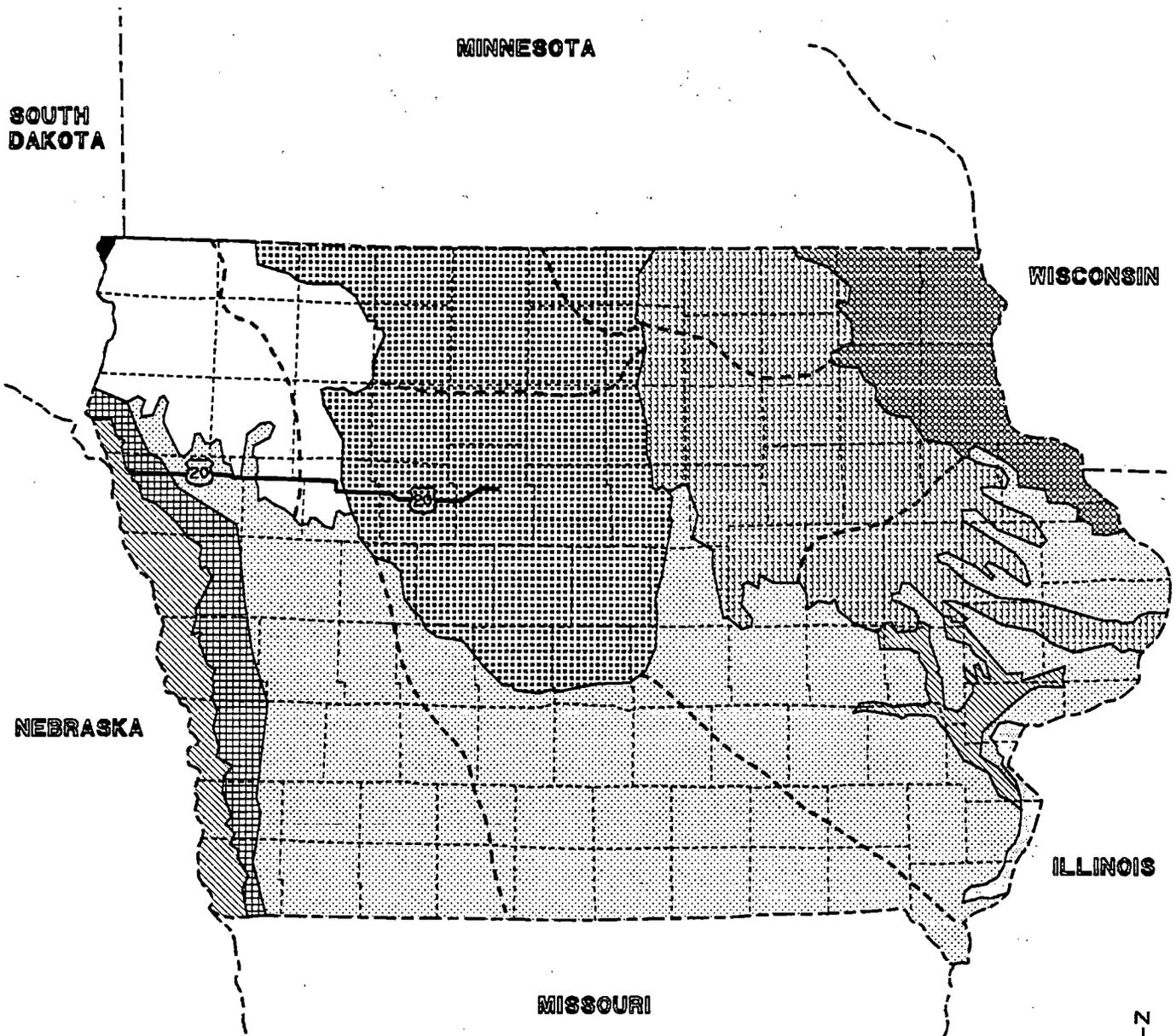
TOPOGRAPHY AND SENSITIVE AREAS

Several landform regions based on glacial history and topography exist in Iowa. The U.S. Highway 20 project corridor passes through four of these regions, shown on Exhibit 3-1. These are Wisconsin Surface Region, Northwest Iowa Plains Region, Southern Iowa Drift Plain and Loess Hills Region.

Wisconsin Surface Region was formed by the most recent glacier, the Wisconsin. The area is commonly known as the Prairie Pothole Section. This region covers approximately 30,000 square miles and extends as far south as the city of Des Moines. In its retreat, the glacier left many marks in the form of moraines and marshes. Glacial ice had enormous effects on the land, scouring out materials and depositing them nearby to form a gravelly knob or ridge, or dropping a block of ice in a depression to gradually form a landscape rich in nutrients and biologically diverse. For 9,000 years, this part of Iowa laid under a blanket of complex and diverse prairie vegetation. At the juncture of this region and the Northwest Iowa Plains are several small glacial fens. Fens are a rare type of wetland with the water source coming from groundwater instead of surface water common to other wetlands. They have very alkaline water and specific species of plants associated with them. At one time, there were as many as 1.5 million acres of wetlands in Iowa. Many areas have been tilled and drained for agricultural purposes, and there are now less than 55,000 acres of wetlands in the state. The project corridor passes through this region from Moorland in Webster County to about the middle of Sac County.

Northwest Iowa Plains Region is largely treeless, lies at the highest elevation and has the least rainfall in the state. This region was once covered by tall grass prairie, but now has largely been converted to agricultural purposes. Still, scattered prairie remnants remain. This region is divided into the Tazewell Swell and Swale Section and the Western Iowa Plains Section. Tazewell Swell and Swale Section is the youngest of the two sections and has a gently undulating surface. This section has been converted to agricultural purposes. The Western Iowa Plains Section is rugged, capped with thick loess and still contains prairie remnants and woodlands. Loess is a geological term for an unstratified, loamy deposit which is believed to have been carried by the wind from other areas. This is an important area for several different species. From east of Early to the eastern side of Ida County, the highway passes through this region.

Southern Iowa Drift Plain was covered by the Kansan Glacier 500,000 years ago. Historically, this region was heavily wooded, and today contains a substantial part



- | | |
|--|---|
|  SIOUX QUARTZITE REGION |  SOUTHERN IOWA DRIFT PLAIN |
|  ALLUVIAL REGIONS |  IOWAN SURFACE REGION |
|  LOESS HILLS REGION |  PALEOZOIC PLATEAU REGION |
|  NORTHWEST IOWA PLAINS REGION |  SANDY PROVINCES |
|  WISCONSIN SURFACE REGION |  SUBREGION LINE |



NATURAL REGIONS OF IOWA

of Iowa's remaining forest cover. This large region covers much of the southern half of the state and can be divided into four sections. The project corridor passes through only one, the Western Rolling Hills Section. On the west side of this section there is a deep loess which gradually thins, and the rugged hills flatten to rolling hills as one travels east. There is a noticeable absence of wetlands (which have long since disappeared due to erosion in this mature land). This area provides good habitat for wintering birds, and has significant amounts of lowland prairie. This region includes the project area from the east side of Ida County to the middle of Woodbury County.

Loess Hills Region was formed by wind blowing finely ground material from melting glaciers to the eastern edge of the Missouri River Alluvium. Loess is fairly common; however, what makes the hills in Western Iowa unique is they are much deeper than what is normally found elsewhere in the world. Due to the rugged nature of these hills, conversion to cropland and other uses has been prevented. Some of the hills have remained virtually unchanged and appear as the first pioneers saw them. Much native prairie remains in these hills. Many rare species may be found here, such as Ottoe's skipper and the grasshopper mouse. On the dry bluffs, there are Great Plains plant species that do not occur anywhere else in Iowa. The project area passes through this region from the middle of Woodbury County to Sioux City on the western edge of Iowa in Woodbury County.

Wetlands, Rivers and Streams: Several regulations protect wetlands at the state and federal levels. Natural resource information for the existing alignment is summarized in Exhibit 3-2. Under federal law, jurisdictional wetlands, or wetlands requiring a Section 404 permit for the placement of dredged or fill material within their boundaries, are those which have hydric soils, wetland hydrology and hydrophytic vegetation. However, Section 404 permits, issued by the Army Corps of Engineers (CE) with EPA oversight, are not issued without demonstration that all practicable alternatives have been taken to minimize and avoid impacts to wetlands.

Exhibit 3-2
LOCATIONS OF NATURAL RESOURCES AND CEMETERIES BY MILEPOST
EXISTING U.S. HIGHWAY 20¹

	<u>Milepost</u>	<u>Managed Areas²</u>	<u>Native Prairie and Protected Species</u>	<u>Wetlands (Acres)</u>			<u>No. Stream and River Crossings</u>	<u>Cemeteries</u>
				<u><1</u>	<u>1-5</u>	<u>>5</u>		
Woodbury Cty.	21-24			2			1	
	24-27			2	1			
	37-30	1		7			1	
	30-33	1	0	4	2		2	
	33-36			2				
	36-39			6	3			
Ida Cty.	39-42			6				
	42-45			3				1
	45-48			5	2			
	48-51			16			1	
	51-54	1		6				
	54-57			5				
Sac Cty.	57-60			4		1		
	60-63			1				
	63-66			9	1		1	
	66-69	3		16	1			2
	69-72			5		4		
	72-75			8	2		1	
	75-78	1		6	1		1	
	78-81			16			1	
81-84			8	2	1			
Calhoun Cty.	84-87			3		2	1	
	87-90			3			1	
	90-93			5	1		1	
	93-96	1		4				
	96-99	1	X	6			2	1
	99-102						1	
	102-105			1	2		2	
	105-108			1			2	
Webster Cty.	108-111		XO	3			1	
	111-115		XO	5	2		2	

¹ Existing alignment includes a 1,000-foot wide corridor centered on highway. Does not include bypass areas or potential new corridor between Early and Moorland around communities.

² Includes state managed areas and parks.

³X Prairie Remnants

O Protected Species - Have not been found in these areas but have potential for occurring, according to IDNR. All other areas could potentially contain protected species but have not been thoroughly field checked.

In addition, compensatory mitigation to replace lost wetland acres is often required. Iowa law protects only wetland Types 4, 5 and 6, which are described in Exhibit 3-3. These wetlands have a more prolonged presence of surface water during the growing season than other wetland types.

Wetlands occur almost continually throughout the entire project corridor and range from less than 1 acre to several acres in size. The majority of these wetlands have natural vegetation, and a few are farmed wetlands. They are seasonally flooded or lacking prolonged or permanent standing water. These would be protected by federal law but not Iowa law.

Existing Alignment - Many wetlands occur along the existing alignment between Merville and Moorland. Most are naturally occurring, but some are farmed wetlands and a few are artificially created wetlands. By far, the majority of wetlands are 1 acre or smaller, many of which are located within the flood plains of rivers and streams of the project area. The amount of wetlands in proportion to the number of rivers and streams varies among counties. The portion of Woodbury County field reviewed has a fairly even proportion of wetlands to rivers and streams. Ida and Sac Counties both have a large proportion of wetlands to rivers. Calhoun and the portion of Webster County studied have many more streams and fewer wetlands. Exhibit 3-4 illustrates these distributions. There are approximately 21 different rivers and streams that intersect U.S. 20. Some of these are crossed more than once. The major rivers are listed below by county:

- Woodbury County - Little Sioux River
- Ida County - Maple River
- Sac County - Boyer River
Raccoon River
- Calhoun County - none, but several streams
- Webster County - none, but several streams

A few artificially excavated wetlands that occur along the existing alignment could be classified as protected wetlands under Iowa law. Information on wetlands protected by Iowa law is not yet available.

Exhibit 3-3
DEFINITIONS: TYPE 3, 4 AND 5 WETLANDS
PROTECTED BY IOWA LAW

<u>Type</u>	<u>Characteristics</u>
3 - Inland Shallow Marsh	Soil is usually waterlogged during the growing season, often covered with as much as 6 inches or more of water. Vegetation includes grasses, bulrushes, cattails, arrowheads, smartweeds and other emergent aquatic vegetation.
4 - Inland Deep Fresh Marsh	Soil covered with 6 inches to 3 feet or more of water during growing season. Vegetation includes cattails, reeds, bulrushes and wild rice. Open water areas may contain pondweeds, naiads, coontail, water milfoils and other submergent aquatic vegetation.
5 - Inland Open Fresh Water	Water is usually less than 10 feet deep and is fringed by a border of emergent vegetation. Vegetation includes pondweeds, naiads, coontail, water milfoils and other submergent aquatic vegetation.

SOURCE: Circular 39, Wetlands of the United States, 1971 Edition, U.S. Department of Interior.

The wetlands over 1 acre that lie along U.S. Highway 20 are shown in Exhibit 3-4.

New Corridor - In the region between Moorland and Early there are several wetlands. The majority are 0 to 1 acre in size. On the attached figures, only the wetlands greater than 5 acres in size are included in the 1-mile wide corridor.

Two significant wetlands exist in or near this corridor. Kiowa Marsh, approximately 383 acres near Early, is owned and managed by the state and partly owned by the federal government. Exhibit 3-4 depicts areas where potential future acquisitions of this marsh may be made. These land acquisitions would more than double the amount currently owned by the state and federal governments. The second significant wetland is just southwest of South Twin Lake, north of Rockwell City. It is privately owned and approximately 23 acres in size.

The frequency and size of the wetlands in this new corridor are similar to those in the existing corridor. As mentioned earlier, Sac County has a greater number of wetlands than do either Calhoun or Webster Counties. The latter two counties are heavily drained for agriculture and have more channelized creeks, streams and dredge ditches.

River crossings are the same for this potential new corridor as on the existing alignment. However, the intermittent creeks, streams and dredge ditches are not the same and, therefore, the number of crossings could vary.

Bypasses - U.S. 20 passes through six communities between Moorland and Merville. All six were investigated on the north and south of the community for possible bypasses. Wetlands and the number of stream and river crossings were the major aspects inspected. Listed below are the six communities with comments on bypass impacts:

- Correctionville: The north side has slightly fewer, less concentrated wetlands than the south and one river crossing, the Little Sioux River. The south side has more wetlands.

- **Early:** Bypasses would be either on the northeast side or the southwest side due to existing highway alignment. The concentration and size of wetlands is approximately equal on both sides.
- **Sac City:** The north side has many wetlands concentrated together and the Raccoon River crossing. On the south side, there are fewer wetlands overall, but one approximately 85-acre wetland and the Raccoon River crossing. So, neither side has more wetland acreage than the other.
- **Lytton:** On the north, there are few wetlands, all of which are small in size. The south side has more wetlands that are larger in size.
- **Rockwell City:** The north side has fewer stream crossings and there are few wetlands. On the south side of town, there may be one extra stream crossing, and more wetlands.
- **Moorland:** The north and south sides of town have about equal numbers and concentrations of wetlands.

Protected Species and Prairie Remnants: The U.S. 20 area is not well known for having quality remnant tracts of native prairie. Areas where diverse prairie was found during field inspection are included in Exhibit 3-4. The potential new corridor had limited amounts of native prairie in the roadsides, except in areas associated with a wetland or other natural feature, such as Kiowa Marsh. Bypasses around communities were not inspected in great detail for native prairie. However, greenbelts, parks and wetlands are likely to have prairie remnants associated with them.

Managed Areas: Several managed areas occur along the existing highway (Exhibit 3-4). Managed areas include parks, recreational areas and state wildlife areas. These areas are illustrated on the attached figures. From Moorland to Early in or near the potential new corridor, there are several managed areas which are listed below:

- **Lizard Creek Wildlife Area (IDNR)** is in Webster County north of Moorland and is approximately 103 acres and supports many animals and plants. Some of these plants are rare. Immediately north of this area are some privately owned fens. (Fens can be found where groundwater surfaces. They are characterized by little or no standing water and high alkalinity. A number of plants grow only in this rare wetland type).

- Shillings Sanctuary (Calhoun County Conservation Board), in Calhoun County, lies 1/2 mile north of existing Highway 20 and south of Knierim. It is a 17-acre tract of prairie.
- McDonald Greenbelt and Lubeck Woods (Sac County Conservation Board) are greenbelts on the Raccoon River north of Sac City in Sac County.
- South Twin Lake (IDNR) north of Rockwell City in Calhoun County has several associated wetlands, mostly on the south side of the lake. Some of these are privately owned.
- Kiowa Marsh, east of Early in Sac County, is state managed and owned by the state and federal governments. Potential future acquisitions of land adjacent and nearby may be made.
- Sioux Bend Wildlife Area (64 Acres), owned by the state and managed by IDNR, is located adjacent to U.S. 20 on the west side of Correctionville in Woodbury County.

CULTURAL RESOURCES

The National Historic Preservation Act of 1966 protects cultural resources such as historical and archaeological sites. Indian battle sites, or skirmishes, and campsites lie within the potential new corridor in Sac County. The county applied for funds for an archaeological survey of this site from the Iowa Historical Department which they did not receive. There are four sites scattered through the eastern half of the county. These are shown on Exhibit 3-4. Undoubtedly, other archaeological and historic resources occur in the project corridor. During this phase of the project, it is beyond the scope to conduct field surveys to identify these sites. The Office of State Archaeologist maintains records of known sites in their files, but a file search was beyond the scope of the present study. However, this issue may need to be addressed during future project phases.

PARKS AND CEMETERIES

Several city, county and roadside parks and cemeteries occur along the existing U.S. U.S. 20 alignment. Exhibit 3-4 identifies locations of these areas. Most of the

cemeteries located adjacent to the highway and in the potential new corridor and bypasses cover about an acre or less. Two cemeteries lie near the potential new corridor. The first, northwest of Moorland, is Our Lady of Good Council Cemetery. The second, south of Knierim, is Greenfield Township Cemetery. Two other cemeteries lie very near the potential new corridor. They are Twin Lakes Cemetery in Calhoun County and Cedar Cemetery in Sac County.

There are a number of cemeteries that occur in the bypass corridors around each community. They are listed below:

<u>Community</u>	<u>Cemetery Name</u>	<u>Bypass Direction</u>
Moorland	Our Lady of Good Council	N
Rockwell City	Rosehill	N
Lytton	None	
Sac City	Quarry grove	S
	Oakland	N
Early	Early Union	E
Correctionville	Correctionville	S
	Unnamed	N

Public parks adjacent to existing U.S. U.S. 20 are listed below:

<u>Park</u>	<u>County</u>
Roadside Park	Woodbury
Roadside Park	Ida
Early City Park	Sac
Reiff Park	Sac
Roadside Park	Sac
Sac City Park	Sac
Rockwell City Park	Calhoun
Rest Area	Calhoun

SUPERFUND SITES

Superfund sites are areas such as landfills and toxic waste dumps that the U.S. Environmental Protection Agency has designated for clean-up. There are several in Iowa; however, in checking with the U.S. EPA Superfund Site Location Listing for Iowa, none were found in the project corridor.

AGRICULTURAL RESOURCES

Iowa state and federal laws protect agricultural land. The Iowa law says relocating a highway through cultivated land should be avoided to the maximum extent possible. However, if that is not possible, then diagonal routes on those lands should be avoided.

The rural lands in the project corridor are primarily used for row-crop agriculture. Impacts to agricultural lands from operations and agricultural drainage systems must be addressed in the location/EIS phase of the project. Midwestern farmers have been especially concerned about diagonal crossings of farm fields as these severances hinder farm operations and create unuseable parcels. The existing highway has several diagonal crossings already. There is potential for diagonal crossings at each of the six communities where bypasses are anticipated. Diagonal crossings that could occur as a result of the potential new corridor are difficult to estimate at this time since this corridor is quite broad. Below is a list estimating the number of potential diagonal crossings for each county, including bypass communities.

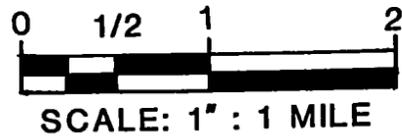
Number of County Potential New Diagonal Crossings

<u>County</u>	<u>Number</u>
Woodbury	1
Ida	0
Sac	3
Calhoun	2
Webster	1

Coordination with the local SCS office in each county and compliance with the federal and state farmland laws will be required.

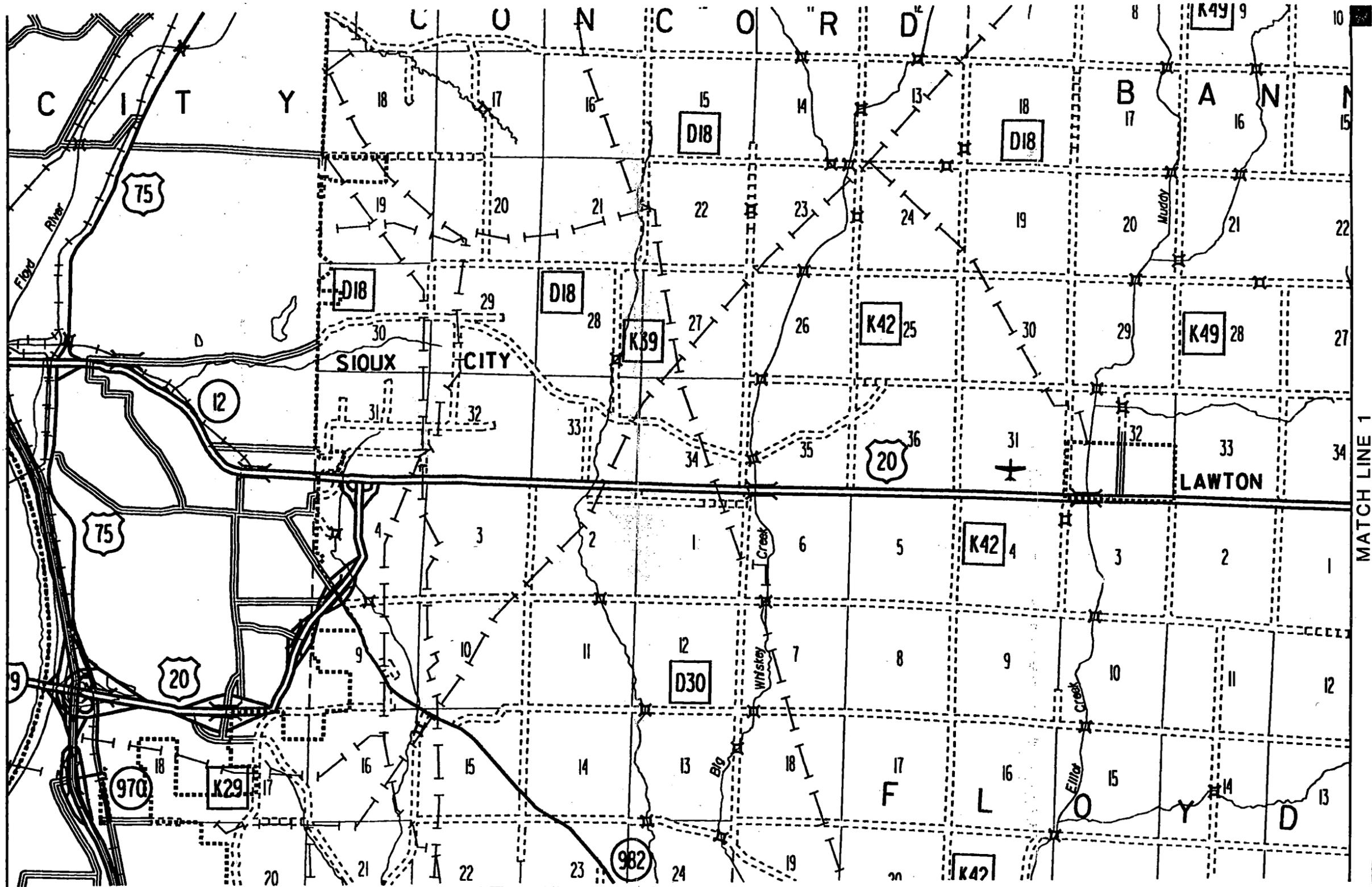
STUDY IMPLICATIONS

The Corridor's environment overview suggests that there are places that will influence where highway construction can occur and that future alignment studies and design will have to recognize. The overview also suggest, however, that any of the U.S. 20 improvement alternatives are feasible from the environmental perspective.



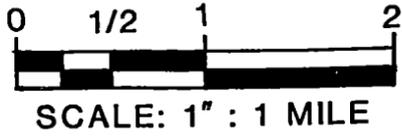
LEGEND:

- TRAFFIC SIGNALS
- STOP SIGNS
- WETLAND BOUNDRIES
- PRAIRIE REMNANTS
- WOODED AREAS
- CEMETERY
- INDIAN SITES



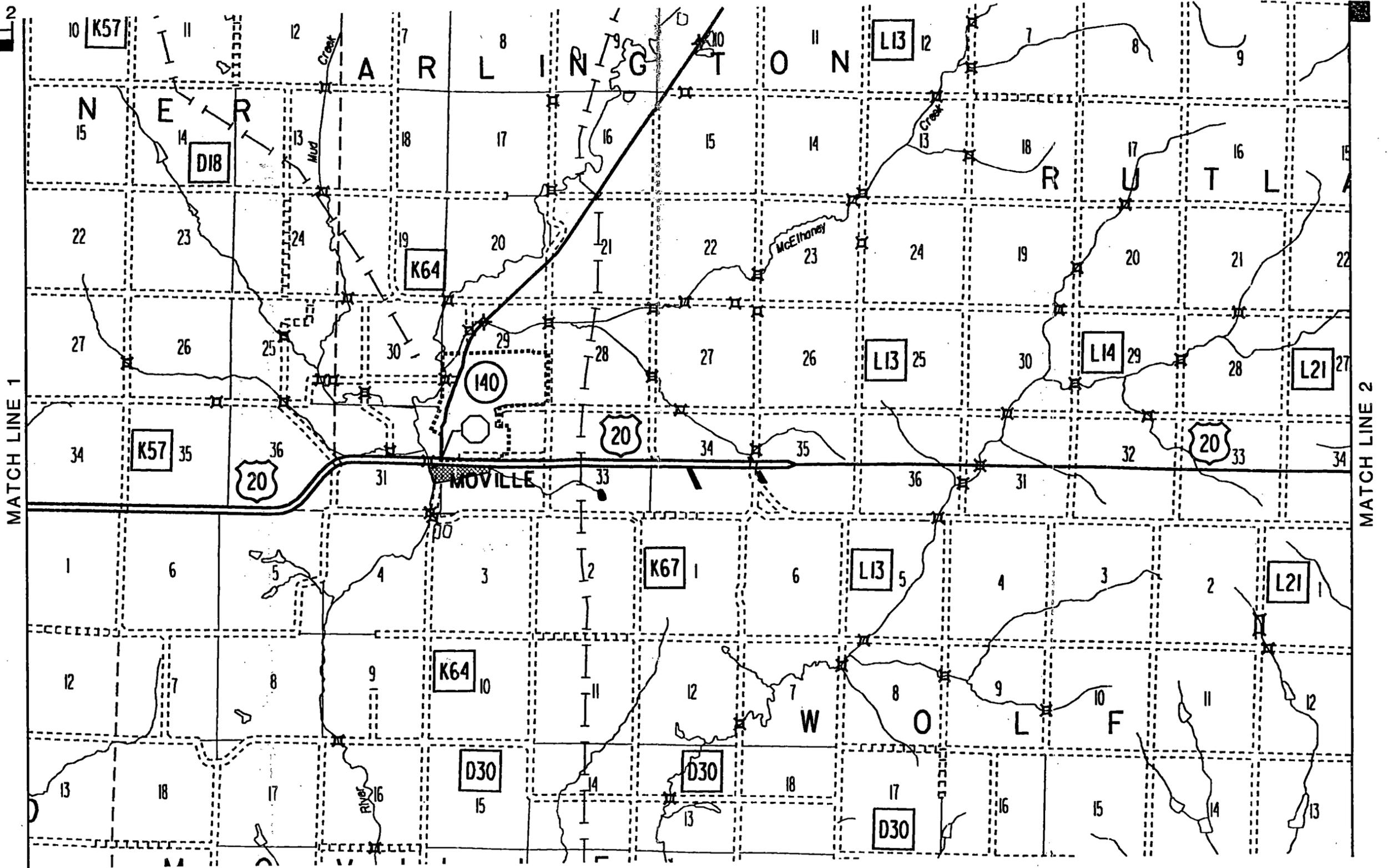
ENVIRONMENTAL AND CULTURAL FEATURES

U.S. Highway 20 Corridor Development Study.



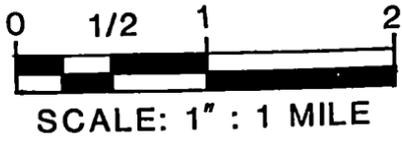
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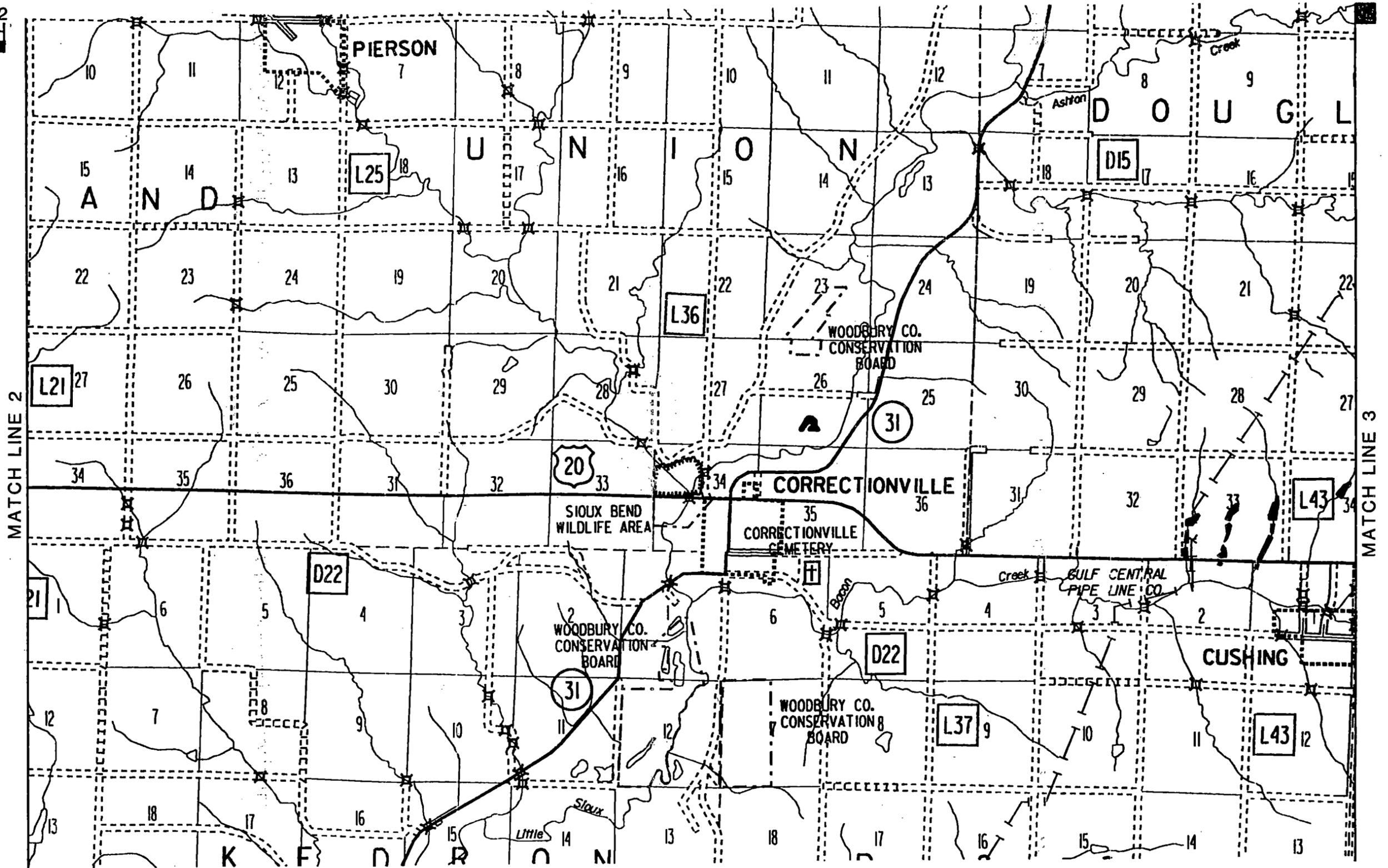
ENVIRONMENTAL AND CULTURAL FEATURES

U.S. Highway 20 Corridor
Development Study



LEGEND:

- TRAFFIC SIGNALS 
- STOP SIGNS 
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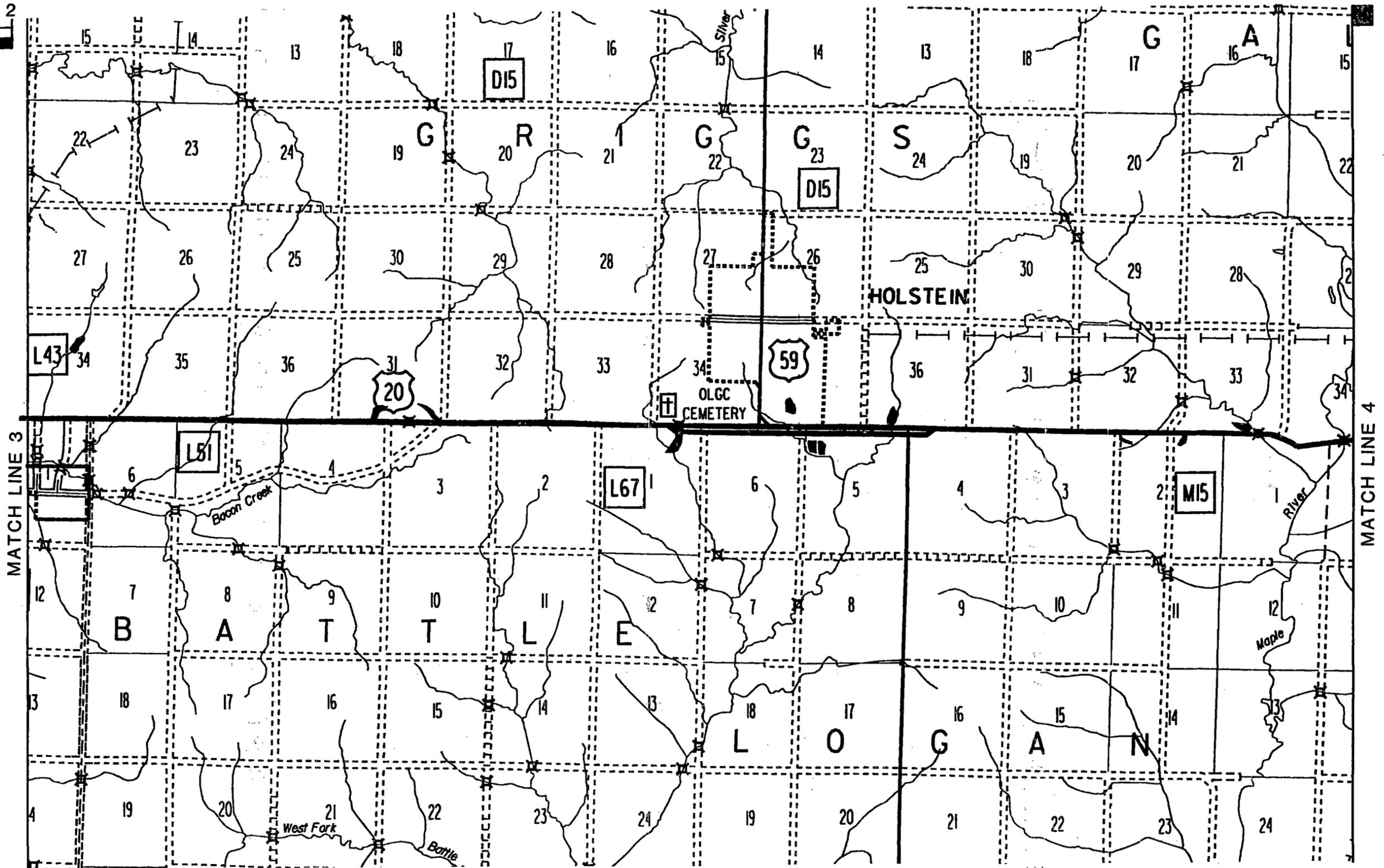
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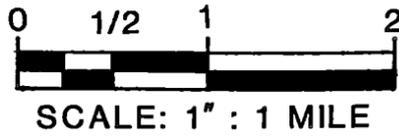
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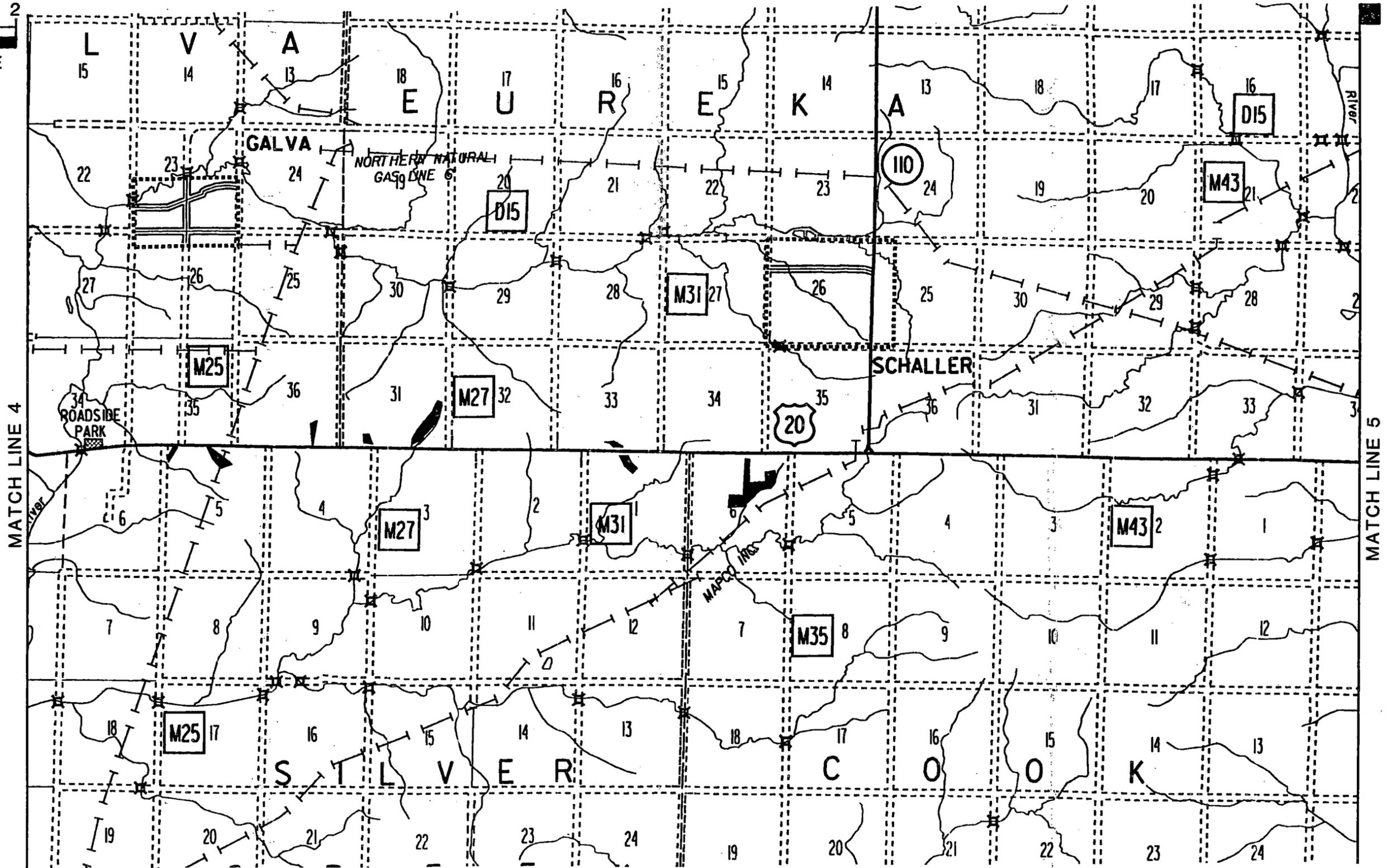
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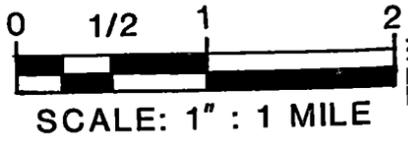
LEGEND:

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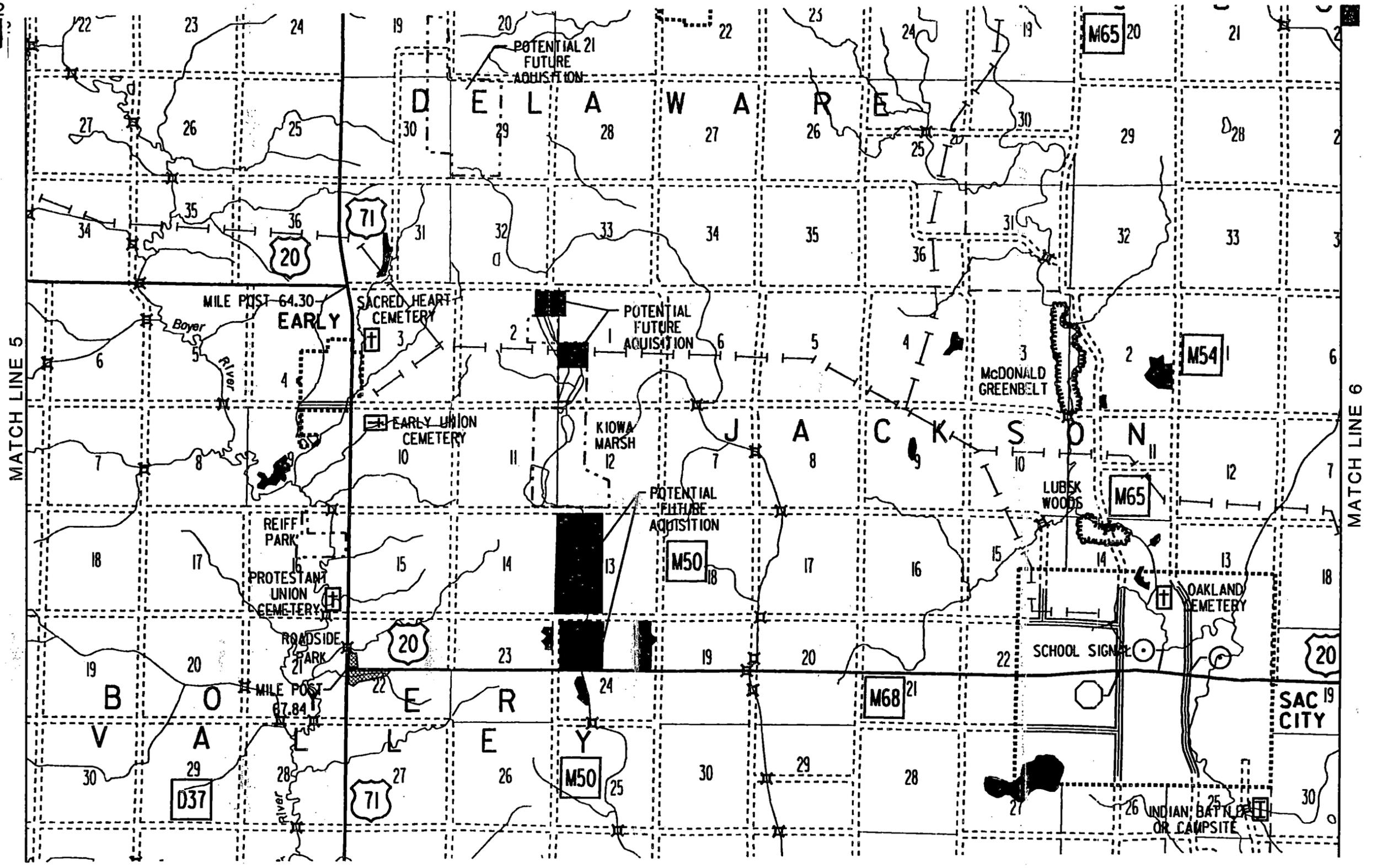
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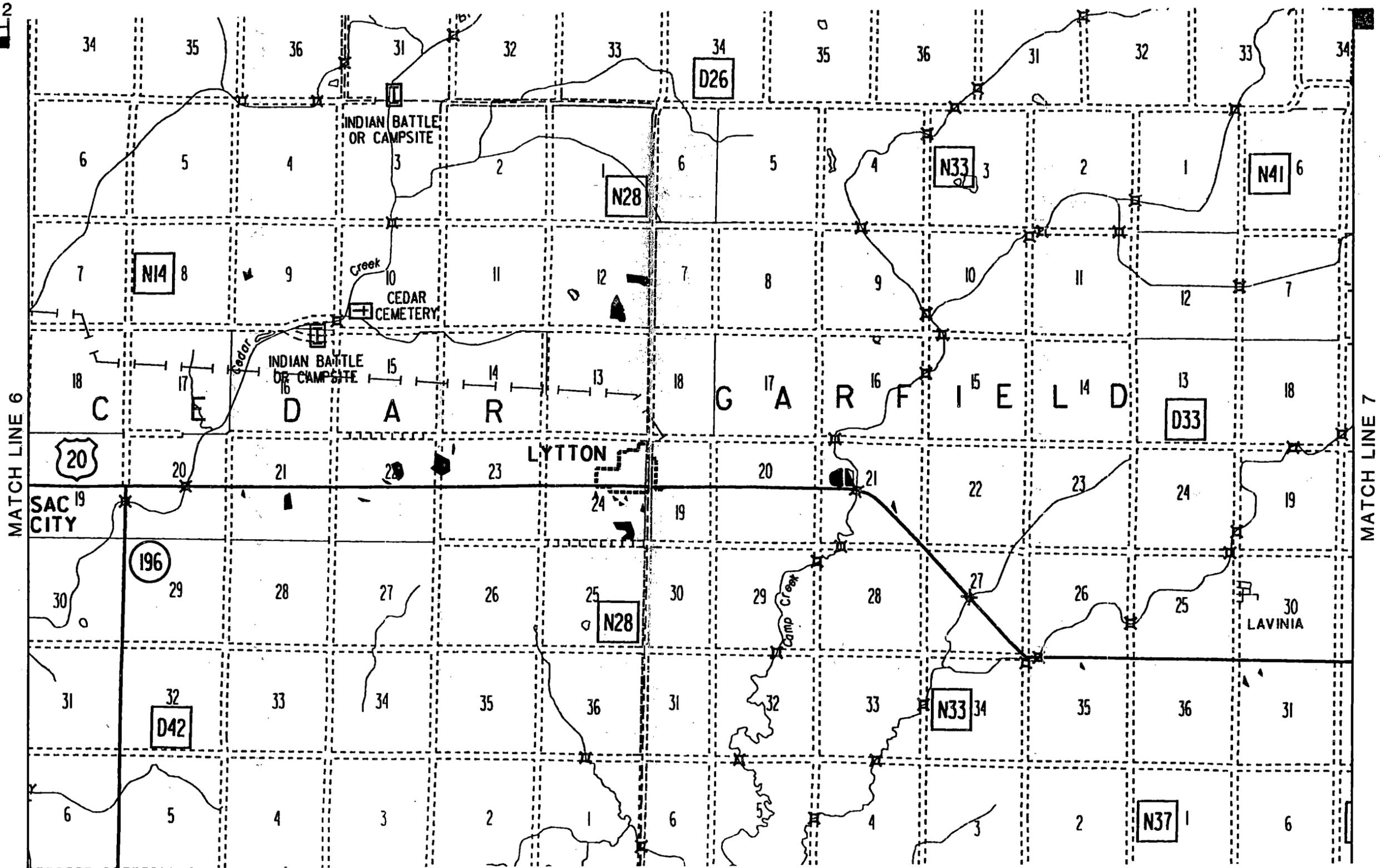
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ENVIRONMENTAL AND CULTURAL FEATURES

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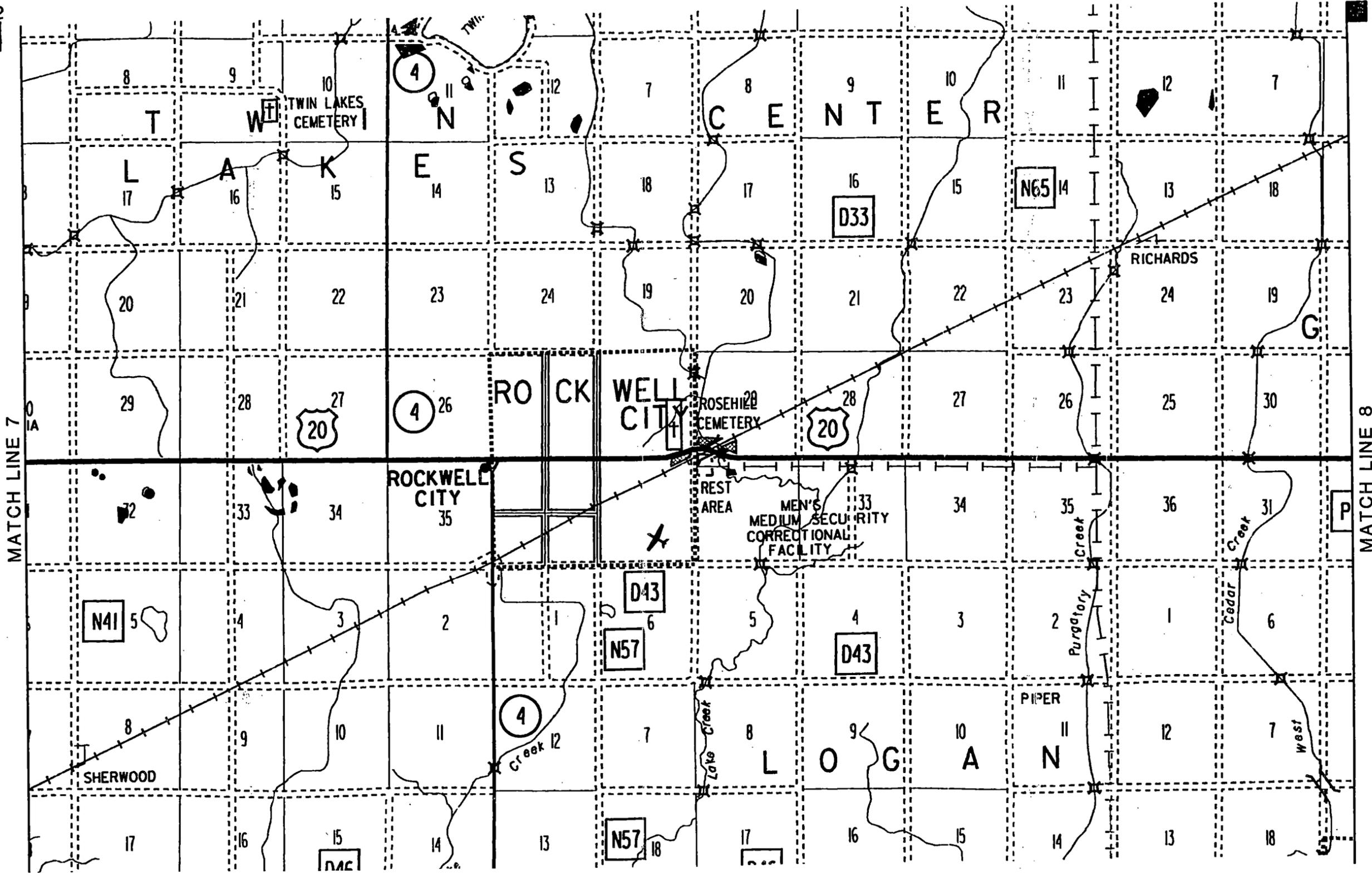


LEGEND:

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U.S. Highway 20 Corridor
Development Study

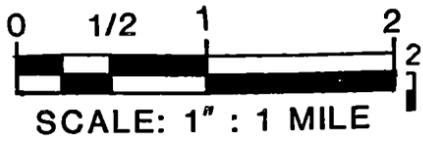


LEGEND:

- TRAFFIC SIGNALS
- STOP SIGNS
- WETLAND BOUNDARIES
- PRAIRIE REMNANTS
- WOODED AREAS
- CEMETERY
- INDIAN SITES

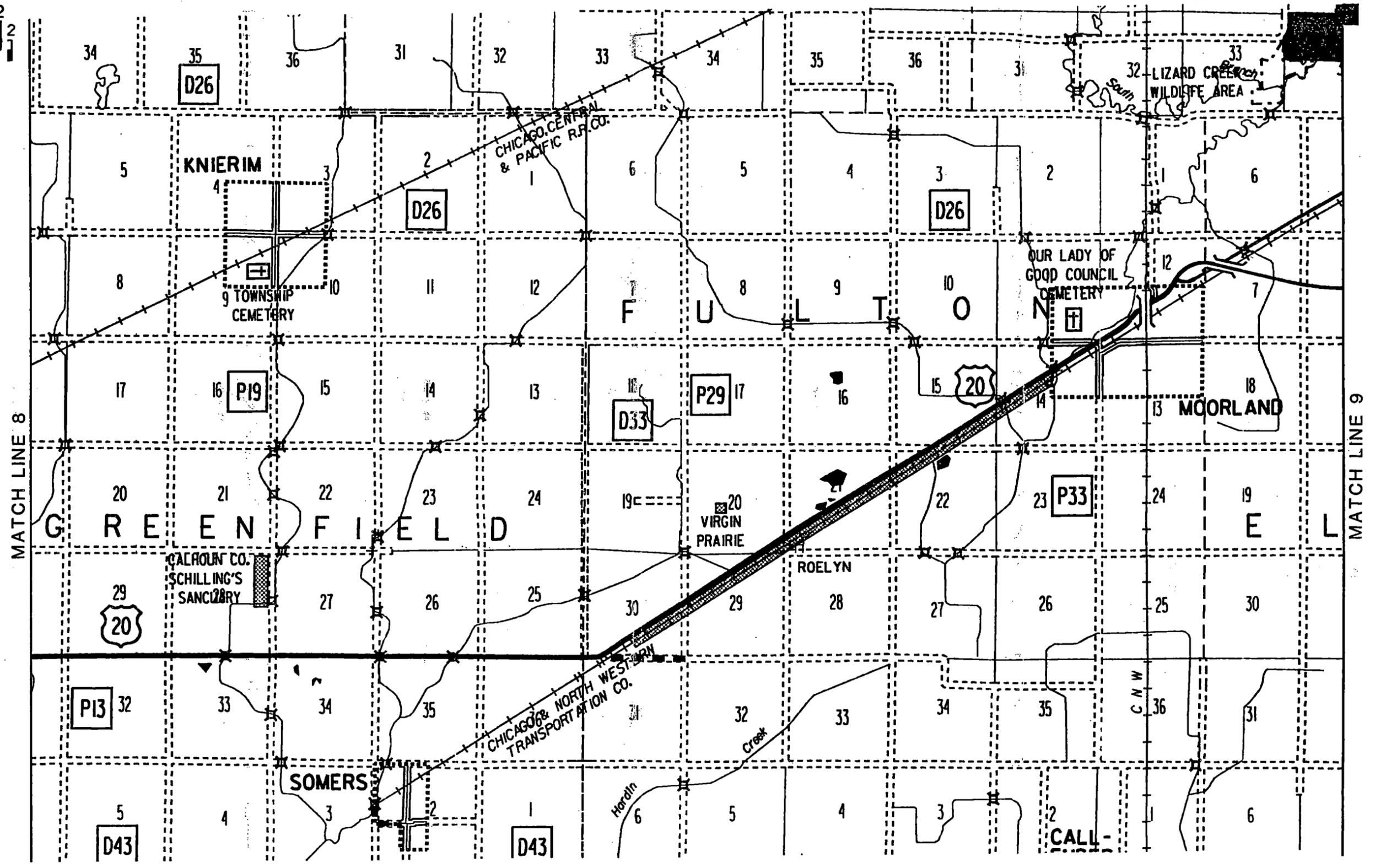
ENVIRONMENTAL AND CULTURAL FEATURES

U.S. Highway 20 Corridor
Development Study



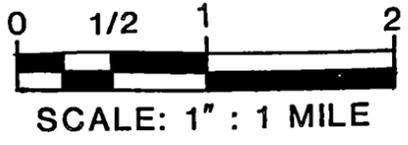
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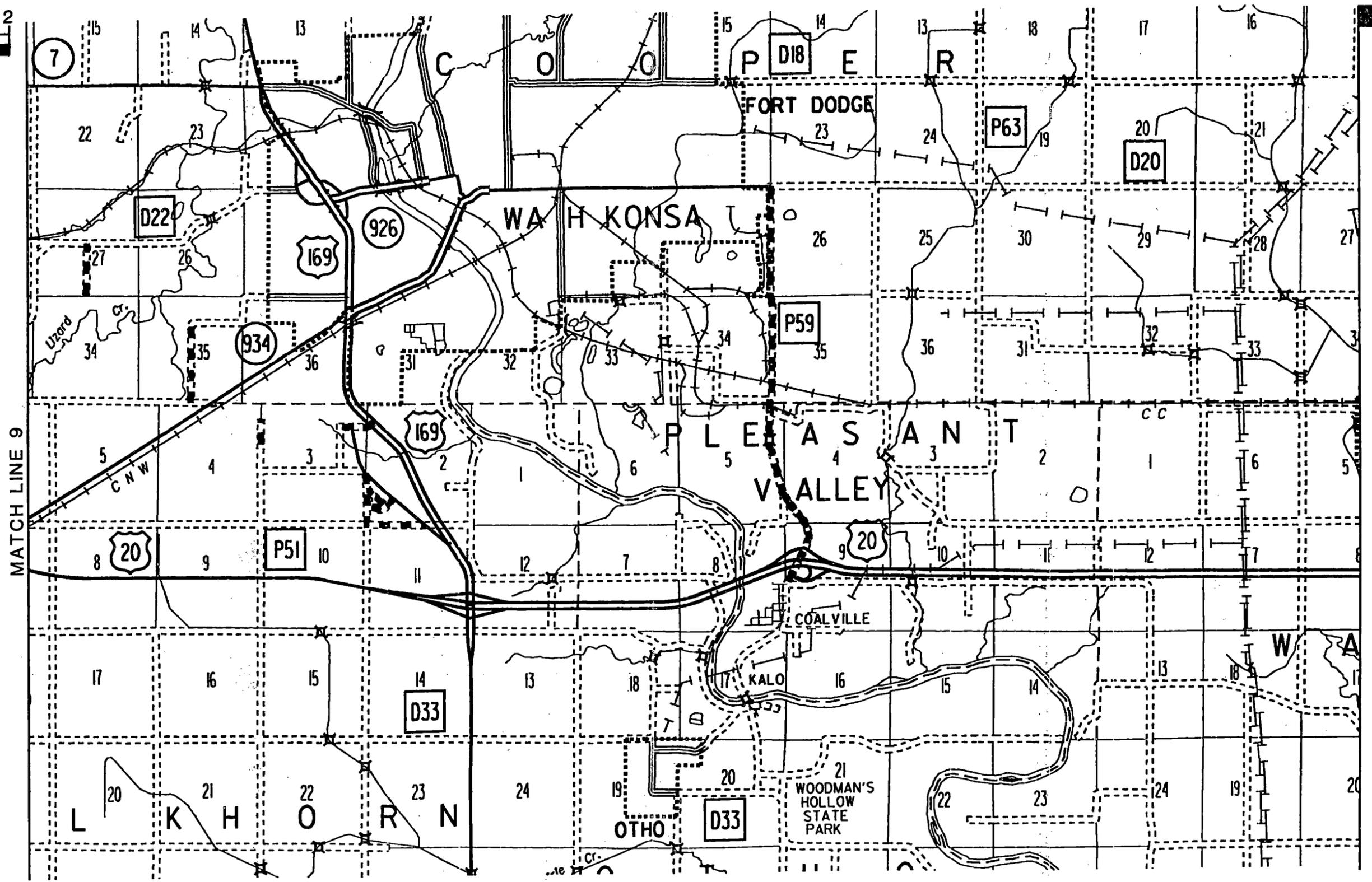
ENVIRONMENTAL AND CULTURAL FEATURES

U.S. Highway 20 Corridor
Development Study



LEGEND:

- TRAFFIC SIGNALS 
- STOP SIGNS 
- WETLAND BOUNDRIES 
- PRAIRIE REMNANTS 
- WOODED AREAS 
- CEMETERY 
- INDIAN SITES 



ENVIRONMENTAL AND CULTURAL FEATURES

U.S. Highway 20 Corridor Development Study

Chapter 4 EXISTING HIGHWAY CONDITIONS

Existing highway characteristics, including factors such as roadway cross section, curvature and traffic controls, as well as the utilization of the highway by traffic volumes, have a bearing on the type of traffic service and the accident patterns experienced on the highway. Therefore, after identifying some of the characteristics, the most recent three years of accident experiences are analyzed with a view to identifying existing infrastructure deficiencies. The cost to society as a result of accidents which might be prevented by construction improvements can then be identified. In later phases of this study, such avoidable accident costs will be utilized to calculate the benefits which certain highway improvements might create.

HIGHWAY CHARACTERISTICS

An inventory of physical conditions was compiled to assist in describing and determining the condition of the U.S. 20 Study Corridor. Data was obtained from field observations as well as information provided from the Iowa Department of Transportation and the local agencies in the Corridor.

Roadway Segments: For the purpose of this study, U.S. 20 was divided into 17 segments, totaling 119 miles in length. These segments vary in length, but are relatively consistent in their design and operational features (Exhibit 4-1). Segments 1, 2 and 6 are 4-lane sections, while the rest of the study area is served by a 2-lane highway. The communities which U.S. 20 passes through have also been defined by individual sections. Approximately 22 miles of this highway are already a four lane cross section. The remaining 97 miles are two lanes wide, and about 93 percent should be classified as rural.

Shoulders: For the majority of the corridor, U.S. 20 has shoulders which meet modern design standards. There are, however, locations where the shoulder widths

are less than 10 feet. This occurs several times within nearly all of the segments. Of greater importance is the fact that there are also locations in the middle of the corridor where the shoulder width is less than six feet. These narrow shoulders can restrict clearances between disabled vehicles and through traffic. They can also reduce the chances of recovery for an errant vehicle. The locations of narrow shoulders are illustrated on Exhibits 4-2 and 4-3.

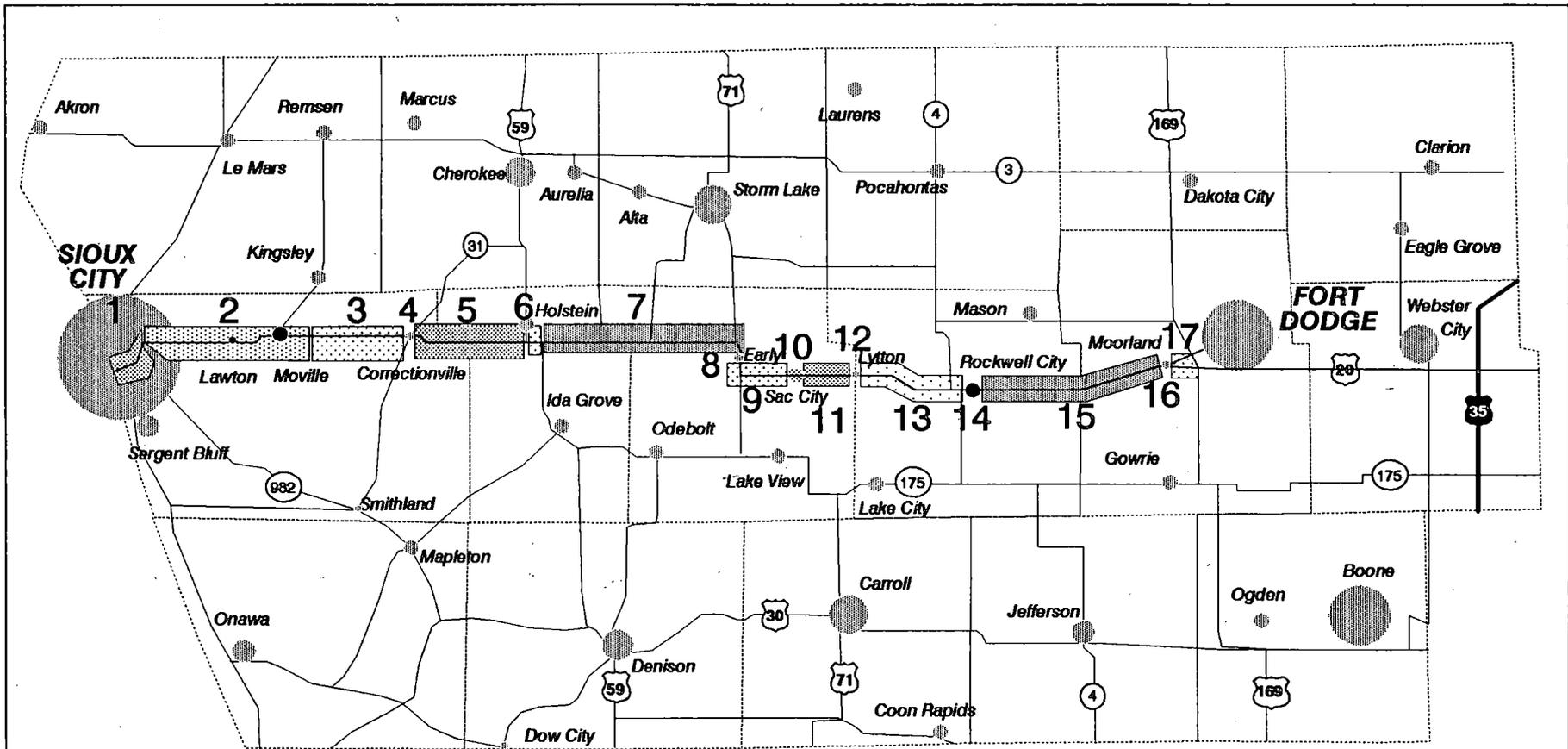
Grades: Long, steep grades can adversely impact vehicular speed, especially heavy trucks. There are a number of roadway segments in the U.S. 20 Corridor which traverse difficult terrain, and therefore contain grades that can reduce vehicular speed significantly. The western end of the corridor contains many highway sections where the percentage grade exceeds 5 percent. The steepest grade in the study area (8 percent) is located in Sac City.

Curves: Sharp curves can also cause a reduction in vehicular speed. U.S. 20 contains few locations where curves impede traffic conditions. Segment 7 contains a section of highway with a curvature of 28 degrees, which can reduce traffic operations to approximately 25 mph. No other sections of U.S. 20 have significant curves.

Speed Limits: The physical features of U.S. 20 are such that, for most of its length, speed limits are posted at 55 mph. There are, however, some locations (mainly in the communities which U.S. 20 travels through) where the speed limit drops below 55 mph. For example, in both Sac City and Rockwell City, U.S. 20 passes through a school zone where the speed limit drops to 25 mph. The locations where the speed limit is less than 55 mph are illustrated on Exhibits 4-2 and 4-3.

Passing Restrictions: Horizontal and vertical curves can limit the sight distance of the driver in the vehicle. Where the sight distance is not adequate to ensure safe passing, a no-passing zone is marked on the highway. This occurs quite frequently on two lane rural segments in the study area. The various 2-lane rural segments are marked for no-passing in 22 percent to 64 percent of their respective lengths (Exhibits 4-2 and 4-3). The seven rural two lane segments (3, 4, 7, 9, 11, 13 and 15) provide passing opportunities less than half of the 88.4 miles they represent in the Corridor.

U.S. HIGHWAY 20 SEGMENT PLAN



SEGMENT DESCRIPTIONS

- | | |
|--|--|
| 1 - State Line to IA 12 Interchange | 10 - City Limits of Sac City |
| 2 - IA 12 to end of Divided Section East of Merville | 11 - East Limits of Sac City to West Limits of Lytton |
| 3 - End of Divided Section to West Limits of Correctionville | 12 - City Limits of Lytton |
| 4 - City Limits of Correctionville | 13 - East Limits of Lytton to West Limits of Rockwell City |
| 5 - East Limits of Correctionville to West Jct of U.S. 59 | 14 - City Limits of Rockwell City |
| 6 - West Jct. of U.S. 59 to East Jct. of U.S. 59 | 15 - East Limits of Rockwell City to West Limits Moorland |
| 7 - East Jct. of U.S. 59 to North Limits of Early | 16 - City Limits of Moorland |
| 8 - City Limits of Early | 17 - East Limits of Moorland to U.S. 169 |
| 9 - South Limits of Early to West Limits of Sac City | |

Exhibit 4-2
U.S. 20 HIGHWAY INVENTORY
Sioux City to Fort Dodge

45

<u>Segment</u>	<u>Length</u> (miles)	<u>Traffic</u> <u>ADT</u>	<u>Posted</u> <u>Speed</u> (mph)	<u>% Passing</u> <u>Restriction</u> (percent)	<u>Shoulder</u> <u>Width</u> (feet)	<u>Residential</u> <u>Entrances</u> ¹ (per mile)	<u>Business</u> <u>Entrances</u> ¹ (per mile)	<u>Total</u> <u>Driveways</u> ¹ (per mile)
1	4.41	9,880	55	0	10	0(0)	0(0)	0
2	16.09	6,480	55	0	10	3.2(52)	0.5(6)	3.7
3	11.52	3,040	55	56	10	0.7(8)	0.2(3)	0.9
4	0.12	2,890	45	0	10	8.3(1)	8.3(1)	16.3
5	12.25	2,380	55	64	10	2.9(36)	0.1(1)	3.0
6	1.41	2,690	55	0	10	2.1(3)	0.0(0)	2.1
7	19.38	1,540	55	69	6-10	2.8(55)	0.0(0)	2.8
8	0.41	2,800	35	0	3	26.8(11)	24.4(10)	51.2
9	9.01	2,210	55	57	3-10	6.2(56)	1.0(9)	7.2
10	2.52	5,420	25-35	27	0-6	8.7(22)	15.1(38)	23.8
11	5.45	2,140	55	34	5-6	4.4(24)	2.0(11)	6.4
12	0.56	1,890	35	0	3-8	12.5(7)	17.9(10)	30.4
13	11.18	1,580	55	45	6	1.4(7)	0.1(1)	1.5
14	2.00	3,630	25-45	0	0-10	13.0(26)	18.0(36)	31.0
15	16.23	2,200	55	53	10	1.9(31)	0.3(5)	2.2
16	1.49	3,170	NA	NA	NA	NA	NA	NA
17	5.39	1,970	NA	NA	NA	NA	NA	NA
	119.07			Avg. 44		3.1(349)	1.2(131)	4.3

¹ The number of driveways intersecting each segment is included within parentheses. The average number of driveways per mile is also included for comparison purposes.

NA: Data Not Available.

Traffic Control Devices: Traffic control devices consisting of signals and stop signs at key intersections can also affect traffic operations. On this segment of U.S. 20 there are two traffic signals, both located in Sac City. There are also stops signs in both Merville and Sac City.

Driveways: In addition to public highways which intersect U.S. Highway 20, there are many local residences and businesses which have driveways connecting these land uses with the highway. Traffic entering the highway from these driveways can impair vehicular operations, particularly on the two-lane portions of the Corridor. Minimum desirable spacing between public highway intersections on rural highways is approximately 1320 feet (four per mile). While there is no comparable desirable spacing for private driveways, since most are used by relatively smaller traffic volumes, denser spacing is generally permissible along highways without access control. Exhibits 4-2 and 4-3 summarize the number as well as average occurrences per mile of residential, business and total driveways by segment. It should be noted that Segments 8, 10, 12 and 14 have significantly higher frequencies of driveways than the rest of the Corridor.

ACCIDENT ANALYSIS

Traffic accidents are a major problem facing society because of the losses in lives, injuries to people and damage to property. In an effort to reduce accidents, it is important to identify and minimize unsafe conditions which can lead to accidents. Of primary importance is the realization that traffic accidents are caused by any one or more of the following three factors: the driver, the vehicle, and the road.

In considering the driver, there is a multitude of factors which contribute to accident-causing situations. The background and emotional state of the driver are inputs to accident involvement. In addition, the driver's physical condition can be a crucial factor. The variability of the "good driver" has been demonstrated through research. Such factors as fatigue and "span of attention" are apparently more important than sex or age.

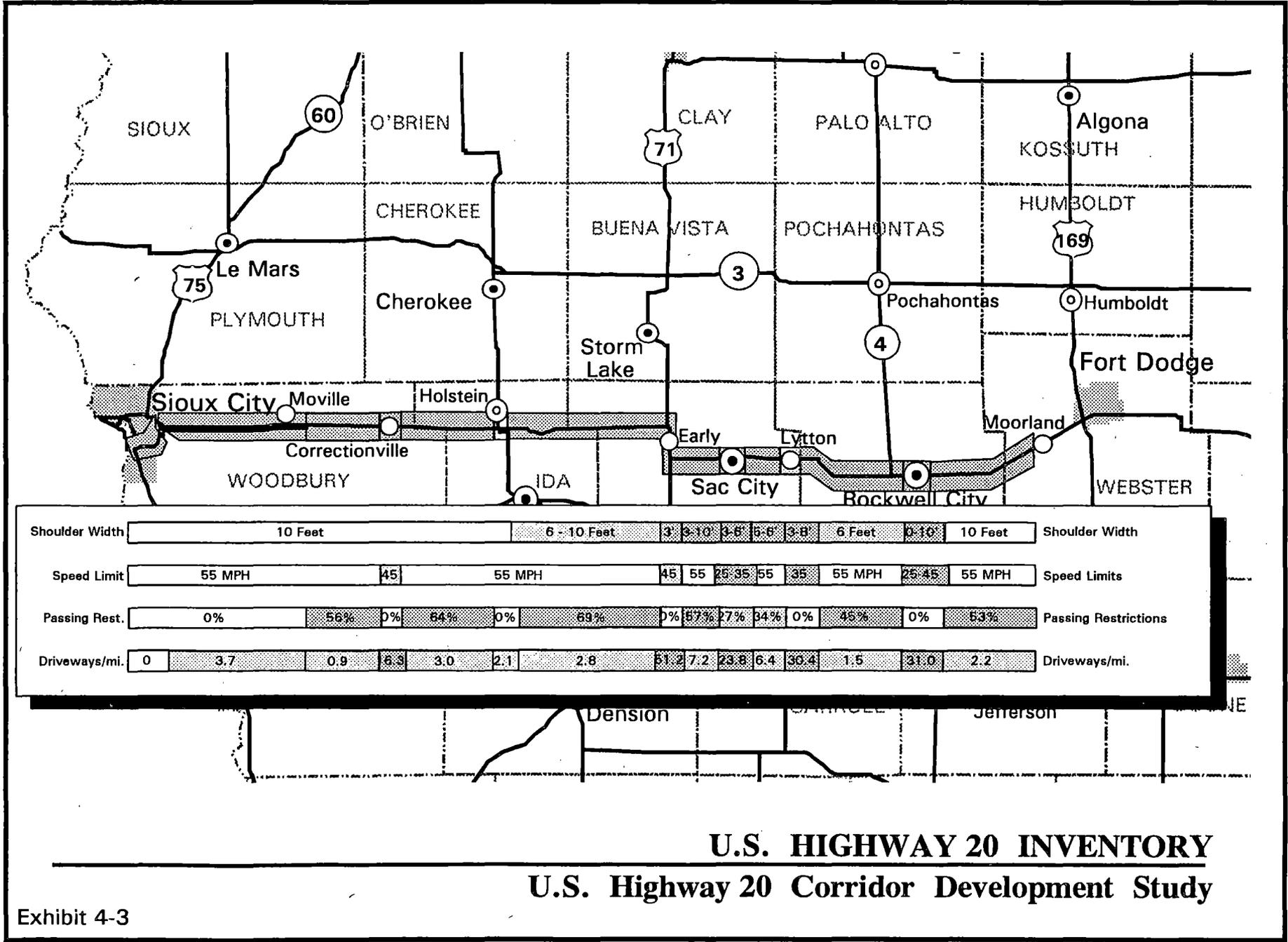


Exhibit 4-3

The vehicle is also an important cause of accidents. Variables such as overall dimensions, performance characteristics like acceleration and braking capabilities, and vehicle mix are all elements which in one way or another affect operational conditions as well as the frequency and severity of traffic accidents.

The highway itself is the one feature the traffic engineer is most directly concerned with, and over which he has the greatest potential impact in the reduction of accidents. Deficiencies in roads, such as slippery surfaces, poor alignment and profile, inadequate sight distance, etc. contribute to accident incidence. Statistics have shown that approximately 36 percent of all reported accidents occur at intersections. Intersection geometrics and traffic control procedures can significantly affect the accident potential at intersections.

In an effort to identify current accident problem areas, data related to traffic flows and accidents were collected. Recent accident data was analyzed to determine frequency as well as probable causes and trends. Data regarding accidents along U.S. 20 were obtained from the Iowa Department of Transportation. It should be noted that the Easternmost portion of U.S. 20 (segments 16 and 17 - between Moorland and U.S. 169) was only opened to traffic late in 1990. As a result, no accident history is available, and this segment is not included in this analysis.

Historical Accident-Experience: During the three years of 1988, 1989 and 1990, a total of 413 accidents were reported on U.S. 20 between the Nebraska/Iowa state line and the west city limits of Moorland. Nine of these accidents resulted in a total of 12 people being killed. Another 108 accidents caused 160 injuries. The remaining 296 accidents involved only property damage to vehicles.

Accident Rates: Accident experience is expressed in the number of accidents per 100 million vehicle miles of travel (HMVMT). These data were available for Iowa. The accident rates on each of the road segments for U.S. 20 are summarized in Exhibit 4-4. These are based on the most recent three years (1988-1990) of accident data for this portion of U.S. 20.

As can be seen on Exhibit 4-4, total accident rates are quite variable throughout the corridor. They varied from a low of 57.6 accidents per HMVMT on the rural segment between Early and Sac City (Segment 9) to a high of 572 accidents per HMVMT in the town of Correctionville (Segment 4). By way of comparison, the Iowa DOT calculated accident rates on 383 highway segments of the state's Commercial and Industrial Network (CIN). U.S. 20 is a part of this CIN highway system. The average accident rate for the entire CIN system was 187 accidents per HMVMT as compared to 119 for this portion of U.S. 20. Those portions of the system which were predominantly rural in nature had an accident rate of 152 per HMVMT, while the average of those segments in municipalities was 408 accidents per HMVMT. Only three segments of the study corridor exceeded the statewide averages. Two urban segments, one through Correctionville, and another through Sac City exceeded the statewide municipal accident rate. The rural segment from Sac City to Lytton exceeded the statewide rural average.

The total accident rates are comprised of all types of accidents, including those involving fatalities, injuries and property damage. Rates for each type of accident for each study segment are also summarized in Exhibit 4-4. As with the total rates, the values for individual segments are highly variable. The five segments which were sites of fatal accidents during the study period are all rural, with the exception of the westernmost segment which is a high speed, controlled access facility located on the south side of Sioux City. These types of accidents account for anywhere from 1 to 11 percent of the total accident rate. Injury accidents represented anywhere from 10 to 50 percent of the total accident rate (excluding the segment of U.S. 20 through Lytton where no injury accidents occurred).

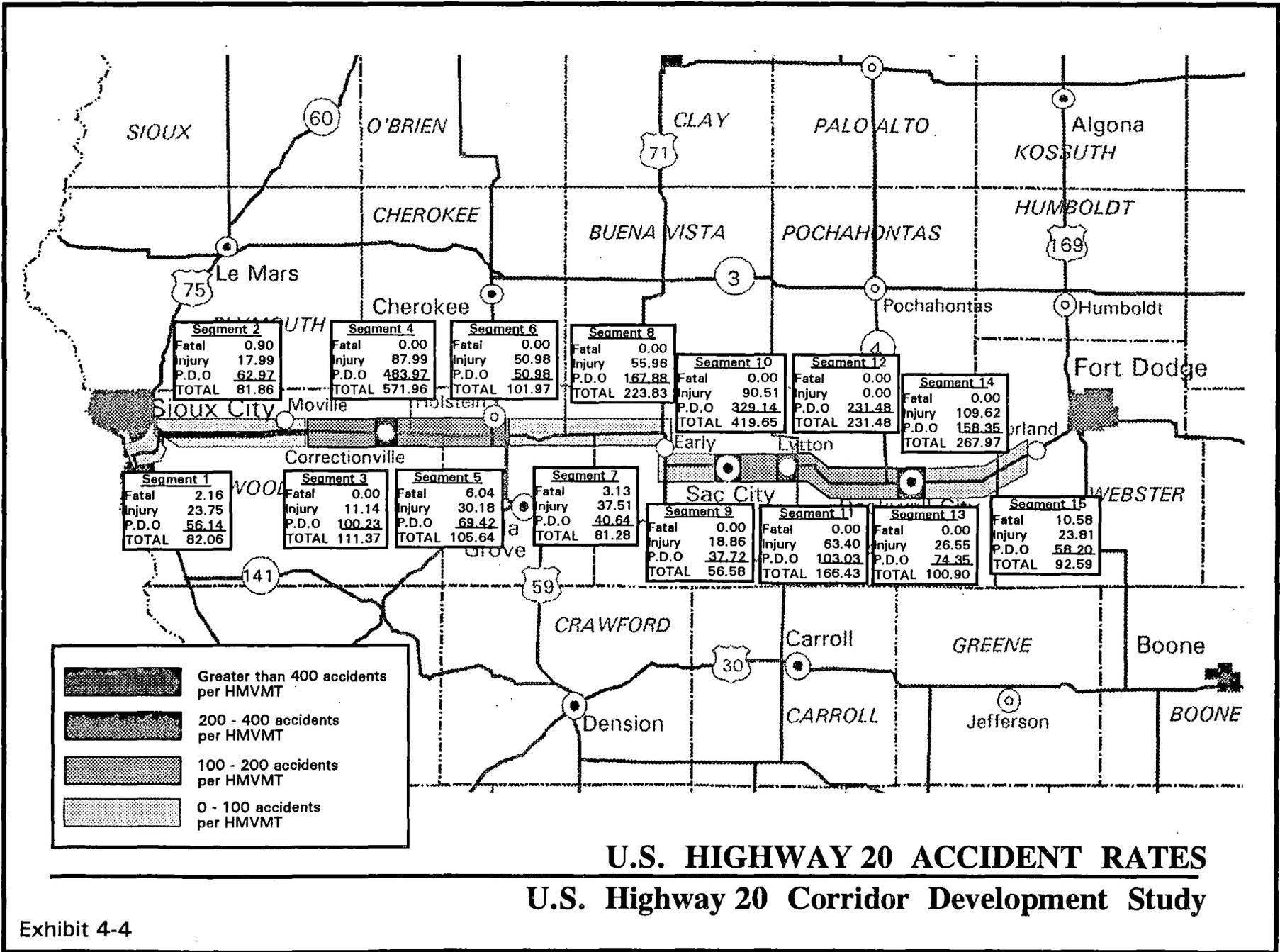


Exhibit 4-4

Accident Severity: Accident severity rates consider the fact that fatal accidents are more severe than personal injury accidents and, in turn, personal injury accidents are more severe than those involving only property damage. Severity is measured in terms of the cost of accidents per 10,000 vehicle miles of travel. Accident severity rates were calculated for U.S. 20 and are presented in Exhibit 4-5.

As a point of comparison, the average severity rating for rural sections of the state's commercial and industrial network (CIN) of which U.S. 20 is a part, was 313. The average severity rating for municipal segments of the CIN was 455. Three of the 16 study segments exceed those statewide averages. All three are rural two lane highway segments, including:

- Segment 5 (1089.3) between Correctionville and U.S. 59 (north)
- Segment 7 (596.2) between U.S. 59 (south) and Early
- Segment 15 (1849.6) between Rockwell City and Moorland

All three of these segments are substantially in excess of the statewide average.

Types of Accidents: After identifying the rates and severities of accidents on a segment by segment basis, a more detailed investigation of the various types of accidents was undertaken. To get a general sense of what the major contributing factors were on each segment, individual accident summaries were reviewed. The effect of various conditions and factors on accident experience was measured. Each of these conditions and factors is reviewed below.

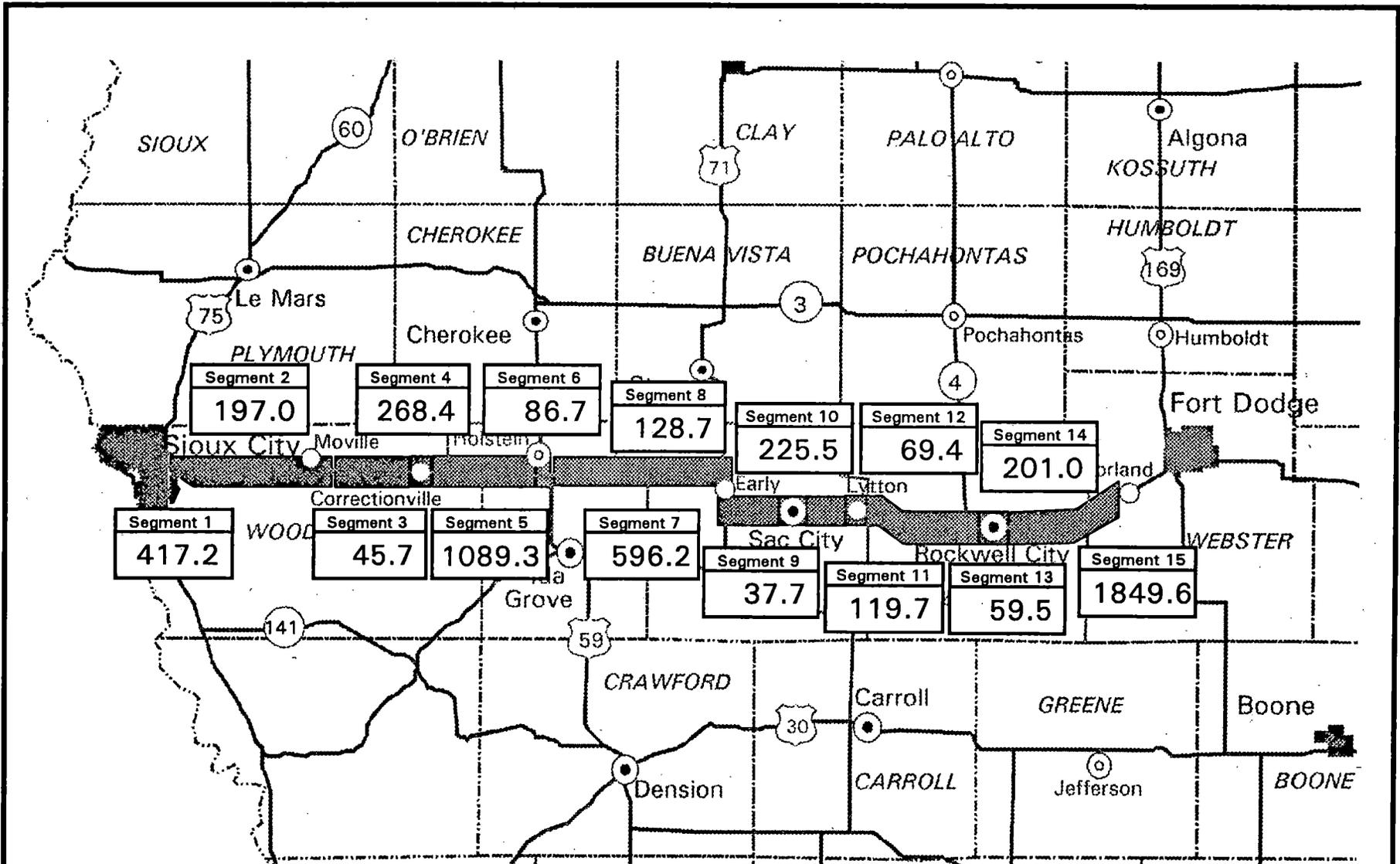
Two Lane vs. Four Lane: The twelve segments of two-lane facility experienced an average of approximately 152 accidents per HMVMT. Five of these segments passed through municipalities, while seven served rural areas. The rate average for urban two lane segments approximated 364 accidents per HMVMT, while the rate for rural two lane segments was 118 accidents per HMVMT.

The three four-lane segments included two partially access controlled rural areas and one fully access controlled urban facility. The urban facility had a rate of 82.06 accidents per HMVMT, while the rural segments had an average rate of 82.55 accidents per HMVMT. The two rural four lane segments ranged between 81.86 and 101.97 accidents per HMVMT. The segment with the higher rate was an extremely short (1.4 miles) section whose accident rates were heavily influenced by intersections with U.S. 59 (north) and U.S. 59 (south).

Based on these statistics, it appears that widening a two lane rural section to four lanes could result in a thirty percent reduction in accidents, while widening an urban section to four lanes could result in about a 75 percent reduction in accidents. Such a finding is not inconsistent with findings from other parts of the nation, although particularly in rural areas, the magnitude of the improvement is usually closer to 50 percent.

Accidents Involving Animals: Overall, 24 percent of the accidents along this portion of U.S. 20 involved animals (Exhibit 4-6). The highest experience of this type of accident occurred on the two-lane segment between Merville and Correctionville, where 65.0 percent of all accidents involved animals (26 accidents). The only accidents of this type which occurred on urban segments occurred along the U.S. 20 Bypass south of Sioux City (3 accidents) and in Sac City (1 accident).

Single Versus Multiple Car Accidents: Half of the accidents which occurred on this section of U.S. 20 involved only a single vehicle (Exhibit 4-7). This distribution of accidents varied somewhat within different categories of roadway. As would be expected, there were almost six times as many multiple vehicle accidents as opposed to single vehicle accidents in the small urban areas. What was somewhat surprising was that almost two-thirds of all accidents on the rural four lane highways involved only a single vehicle. Given higher design standards (such as wide shoulders and gentle curves), one would not expect such a high distribution of single car accidents.



U.S. HIGHWAY 20 ACCIDENT SEVERITY RATES

U.S. Highway 20 Corridor Development Study

Exhibit 4-6
ACCIDENTS INVOLVING ANIMALS IN ROADWAY

<u>SEGMENT</u>	<u>DESCRIPTION</u>	<u>ACCIDENTS INVOLVING ANIMALS</u>	<u>OTHER CAUSES</u>	<u>PERCENT INVOLVING ANIMALS</u>
1	4-Lane Bypass	3	35	7.9%
2	4-Lane Rural	34	57	37.4
3	2-Lane Rural	26	14	65.0
4	2-Lane Correctionville	0	13	0.0
5	2-Lane Rural	9	26	25.7
6	4-Lane Rural	0	4	0.0
7	2-Lane Rural	4	22	15.4
8	2-Lane Early	0	4	0.0
9	2-Lane Rural	3	9	25.0
10	2-Lane Sac City	1	50	2.0
11	2-Lane Rural	6	15	28.6
12	2-Lane Lytton	0	2	0.0
13	2-Lane Rural	6	13	31.6
14	2-Lane Rockwell City	0	22	0.0
15	2-Lane Rural	8	27	22.9
16	2-Lane Moorland	NA	--	--
17	2-Lane Rural	NA	--	--
TOTAL ACCIDENTS		100	313	24.2%

Urban 2-lane	1	91 1.1%
Rural 2-lane	62	126 33.0
Urban 4-lane	3	35 7.9
Rural 4-lane	34	61 35.8

NA: Not Available

SOURCE: Iowa Department of Transportation
 Wilbur Smith Associates

Exhibit 4-7
SINGLE VS. MULTI-VEHICLE ACCIDENTS

<u>SEGMENTDESCRIPTION</u>		<u>SINGLE VEHICLE</u>	<u>MULTI- VEHICLE</u>	<u>PERCENT VEHICLE ACCIDENTS</u>
1	4-Lane Bypass	18	20	52.6%
2	4-Lane Rural	64	27	29.7
3	2-Lane Rural	32	8	20.0
4	2-Lane Correctionville	1	12	92.3
5	2-Lane Rural	NA	--	--
6	4-Lane Rural	2	2	50.0
7	2-Lane Rural	NA	--	--
8	2-Lane Early	0	4	100.0
9	2-Lane Rural	8	4	33.3
10	2-Lane Sac City	10	41	80.4
11	2-Lane Rural	11	10	47.6
12	2-Lane Lytton	0	2	100.0
13	2-Lane Rural	12	7	36.8
14	2-Lane Rockwell City	3	19	86.4
15 *	2-Lane Rural	7	10	58.8
16	2-Lane Moorland	NA	--	--
17	2-Lane Rural	NA	--	--
TOTAL		168	166	49.7%
Urban 2-lane		14	78	84.8
Rural 2-lane		70	39	35.8
Urban 4-lane		18	20	52.6
Rural 4-lane		66	29	30.5

NA: Not Available

* Detailed accident information was provided for only 17 of the 35 accidents in this segment.

SOURCE: Iowa Department of Transportation
Wilbur Smith Associates

Generally there was a large percentage of single vehicle accidents on the two lane rural segments. However, Segment 15 (Rockwell City to Moorland) had slightly more multi-vehicle accidents than single vehicle accidents, resulting in a larger severity rate.

Intersection vs. Non-Intersection: Approximately 52 percent of all accidents occurred at intersections (Exhibit 4-8). This is comparable to national averages. There was some variation between urban and rural segments. Urban two lane sections had 89 percent of accidents occurring at intersections, and the urban four lane facility in Sioux City had 74 percent of accidents occurring at interchanges. For rural two lane locations, only 28 percent of accidents occurred at intersections. This percent increased to 34 percent for four lane rural sections.

Light Condition: Generally, rural segments experienced substantially more accidents (3 to 4 times more) under lowlight than daylight conditions. In municipalities, more accidents occurred in daylight than lowlight conditions. There were no significant variations from these generalizations, except for the two lane rural section from Merville to Correctionville where there were 14 times more accidents under lowlight conditions. This same segment had an unusually high accident experience involving animals (65.0% of all accidents).

STUDY IMPLICATIONS

Analyses conducted to date suggest that existing U.S. 20, while having some deficiencies on the two-lane segments, is a reasonably good rural highway relative to the roles it is currently providing. However, it cannot play a major regional role (for long distance traffic) without significant improvement. While it has accidents, the accident rates are typical of highways of its nature and function.

While certain segments could be improved from an operation and accident perspective, the primary reasons to consider major upgrading are more oriented to economic development and a revision in the highway's intended role, rather than because the highway is in some way deficient.

Exhibit 4-8
ACCIDENTS OCCURRING AT INTERSECTIONS

<u>SEGMENT</u>	<u>DESCRIPTION</u>	<u>ACCIDENTS AT INTERSECTIONS</u>	<u>NON-INTERSECTION ACCIDENTS</u>	<u>PERCENT ACCIDENTS AT INTERSECTIONS</u>
1	4-Lane Bypass	28	10	73.7%
2	4-Lane Rural	29	62	31.9
3	2-Lane Rural	5	35	12.5
4	2-Lane Correctionville	10	3	76.9
5	2-Lane Rural	NA	NA	--
6	4-Lane Rural	3	1	75.0
7	2-Lane Rural	NA	NA	--
8	2-Lane Early	4	0	100.0
9	2-Lane Rural	5	7	41.7
10	2-Lane Sac City	46	5	90.2
11	2-Lane Rural	9	12	42.9
12	2-Lane Lytton	2	0	100.0
13	2-Lane Rural	8	11	42.1
14	2-Lane Rockwell City	20	2	90.9
15 *	2-Lane Rural	4	13	23.5
16	2-Lane Moorland	NA	--	--
17	2-Lane Rural	NA	--	--
TOTAL		173	161	51.8%
Urban 2-lane		82	10	89.1%
Rural 2-lane		31	78	28.4
Urban 4-lane		28	10	73.7
Rural 4-lane		32	63	33.7

NA: Not Available

* Detailed accident information was provided for only 17 of the 35 accidents in this segment.

SOURCE: Iowa Department of Transportation
Wilbur Smith Associates

Chapter 5

TRAFFIC CHARACTERISTICS

U.S. 20 between Sioux City and Fort Dodge has traditionally been a local/sub-regional highway serving the communities of Northwest Iowa as well as portions of Nebraska and South Dakota. Traffic characteristics on this section of U.S. 20 are therefore primarily related to local traffic (with at least one trip end in or near the study corridor).

EXISTING TRAFFIC COUNTS

Exhibit 5-1 displays 1990 average daily traffic volumes for the 17 segments along the corridor. Traffic volumes for each segment were developed by calculating a weighted average of all traffic counts on each segment, based on distance for each section of U.S. 20 as listed in Iowa DOT's "Volume of Traffic on the Primary Road System, 1990". The traffic volumes vary significantly over the length of the corridor. The highest traffic volumes exist at the two ends of the study corridor, near Sioux City and Fort Dodge, with lower traffic volumes along the more rural, middle section of the corridor. Traffic volumes range from 1,540 vehicles per day to 9,880 vehicles per day. Typical rural volumes on U.S. 20 are 2,000 to 3,000.

A comparison of U.S. 20 with other east-west roadways in northwest Iowa indicates that U.S. 20 is a relatively popular corridor, especially for commercial traffic (Exhibit 5-2). Traffic volumes for east-west highways in the region, at each rural county boundary, suggest that U.S. 20 carries an average of 470 trucks per day. U.S. Highway 18, located approximately 30 miles north of U.S. 20, carries an average of 350 trucks per day (14.1 percent of its total traffic). Only U.S. 30 carries slightly more trucks (515 per day, 17.2 percent of total traffic) than U.S. 20 in northwest Iowa.

Historical Traffic Trends: Over the last fifteen years, traffic volumes along U.S. 20 have varied, both up and down. All segments within the corridor have experienced fluctuations in traffic volumes, primarily as a result of the downturn of the agricultural economy in the early 1980's. However, traffic volumes along the corridor have been increasing during the last few years. Since 1984, traffic volumes along the corridor have increased by an average of 1.7 percent per year. Historic traffic growth for U.S. 20 is summarized on Exhibit 5-3.

**Exhibit 5-3
DAILY VEHICLE MILES OF TRAVEL
on U.S. 20
1976 - 1990**

	<u>DAILY VMT</u>		<u>1990</u>	<u>ANNUAL PERCENT CHANGE</u>		
	<u>1976</u>	<u>1984</u>		<u>1976-90</u>	<u>1976-84</u>	<u>1984-90</u>
Automobiles	248,064	235,325	254,137	.17%	-.66%	1.29%
Light Trucks	19,760	13,734	14,794	-2.05%	-4.45%	1.25%
Heavy Trucks	<u>28,879</u>	<u>26,453</u>	<u>34,412</u>	1.26%	-1.09%	4.48%
Total VMT	296,703	275,512	303,343	.16%	-.92%	1.62%

Source: Wilbur Smith Associates

Truck volumes along the U.S. 20 study corridor have historically observed a similar pattern. Truck traffic declined in the early 1980's and has been experiencing an increase in volumes since 1984. Overall, heavy truck volumes have been increasing at a much faster rate than automobiles in the study corridor.

Level of Service: One means of evaluating rural traffic conditions is to determine volume to capacity ratios. Capacity is a quantitative measure of the ultimate number of motor vehicles which can travel over a particular roadway during the course of a specific time period. Transportation engineers use varying degrees of capacity (called levels of service) in order to provide qualitative measurements of capacity. Level of Service (LOS) is expressed in six levels which are comparable to the academic grading system.

- Level of Service A. Free flow conditions with low volumes, high speeds and few restrictions in speed or maneuverability.

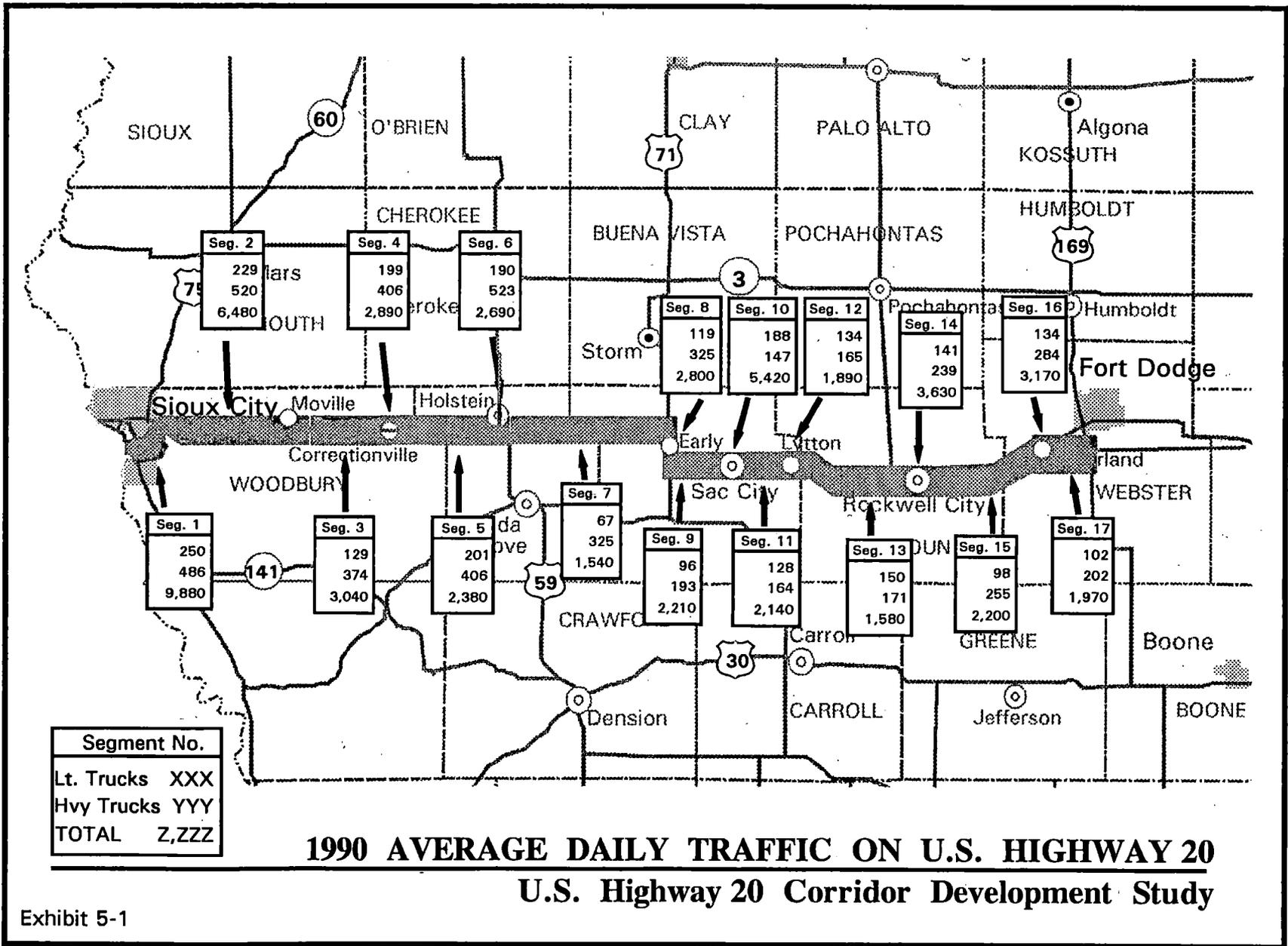
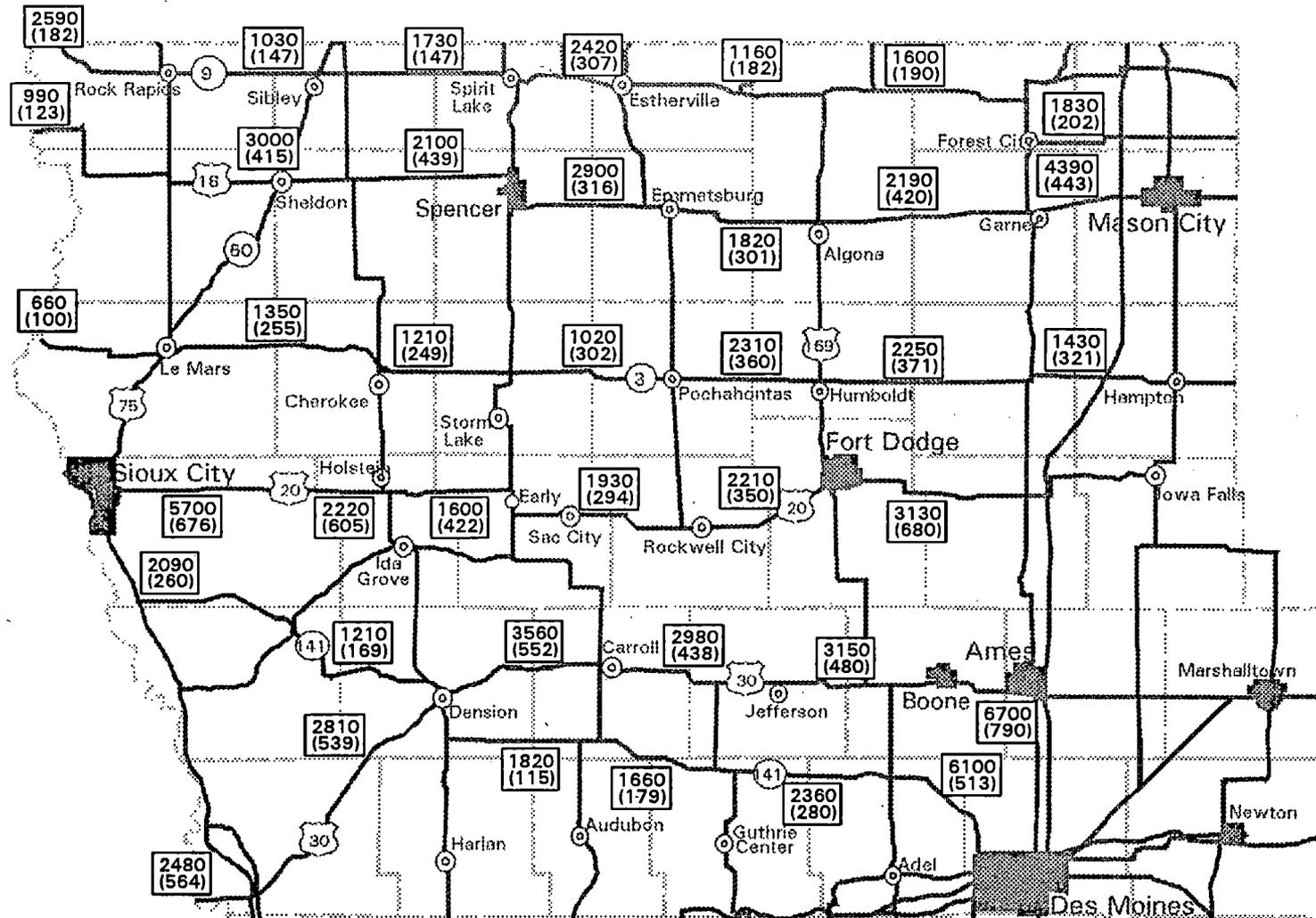


Exhibit 5-1



0000 Total Average Daily Traffic (ADT)
 000 Truck ADT

TRAFFIC VOLUMES ON EAST/WEST CORRIDORS

U.S. Highway 20 Corridor Development Study

Exhibit 5-2

- Level of Service B. Stable flow with operating speed and maneuverability only modestly restricted by traffic conditions.
- Level of Service C. Stable flow with operating speed and maneuverability restricted by traffic conditions.
- Level of Service D. Approaching unstable flow. Tolerable operating speeds but little freedom to select speed or to maneuver.
- Level of Service E. Unstable flow with low operating speeds and momentary stoppages.
- Level of Service F. Forced flow operations at low speeds and significant stoppages.

Exhibit 5-4 displays the level of service experienced on the Highway 20 segments based on 1990 average daily traffic volumes. The LOS conditions for the most part illustrate that traffic on U.S. 20 is able to operate at a stable flow. There is only one segment in the corridor where the LOS is below "B" and this occurs as U.S. 20 passes through Sac City. The lower level of service in Sac City is primarily caused by higher traffic volumes in the town, as well as lower average operator speeds resulting from two traffic signals.

ROADSIDE SURVEY RESULTS

To gain further insights regarding traffic characteristics within the U.S. 20 corridor region, special purpose origin/destination surveys were conducted at ten roadside survey stations. These ten locations are indicated on Exhibit 5-5 and are described in Exhibit 5-6.

Exhibit 5-6 ROADSIDE SURVEY LOCATIONS

<u>STATION #</u>	<u>STATION LOCATION</u>	<u>SURVEYED TRAFFIC DIRECTION</u>
1	SR 3 near Jct with CR 29	West
2	SR 7 at Calhoun/Webster Co. line	West
3	US 20 near Jct with CR 65	West
4	SR 175 East of Auburn	West
5	US 30 near Jct with CR P46	West
6	SR 141 West of Mapleton	East
7	SR 31 West of US 59	East
8	US 20 near East Jct of CR K42	East
9	US 75 between Hinton and Merrill	North
10	SR 3 at Buena Vista/Cherokee Co. line	East

Surveys were conducted from 7 a.m. to 7 p.m., during the period August 9 through August 13. As a part of the survey, autos and trucks were stopped and information was obtained regarding:

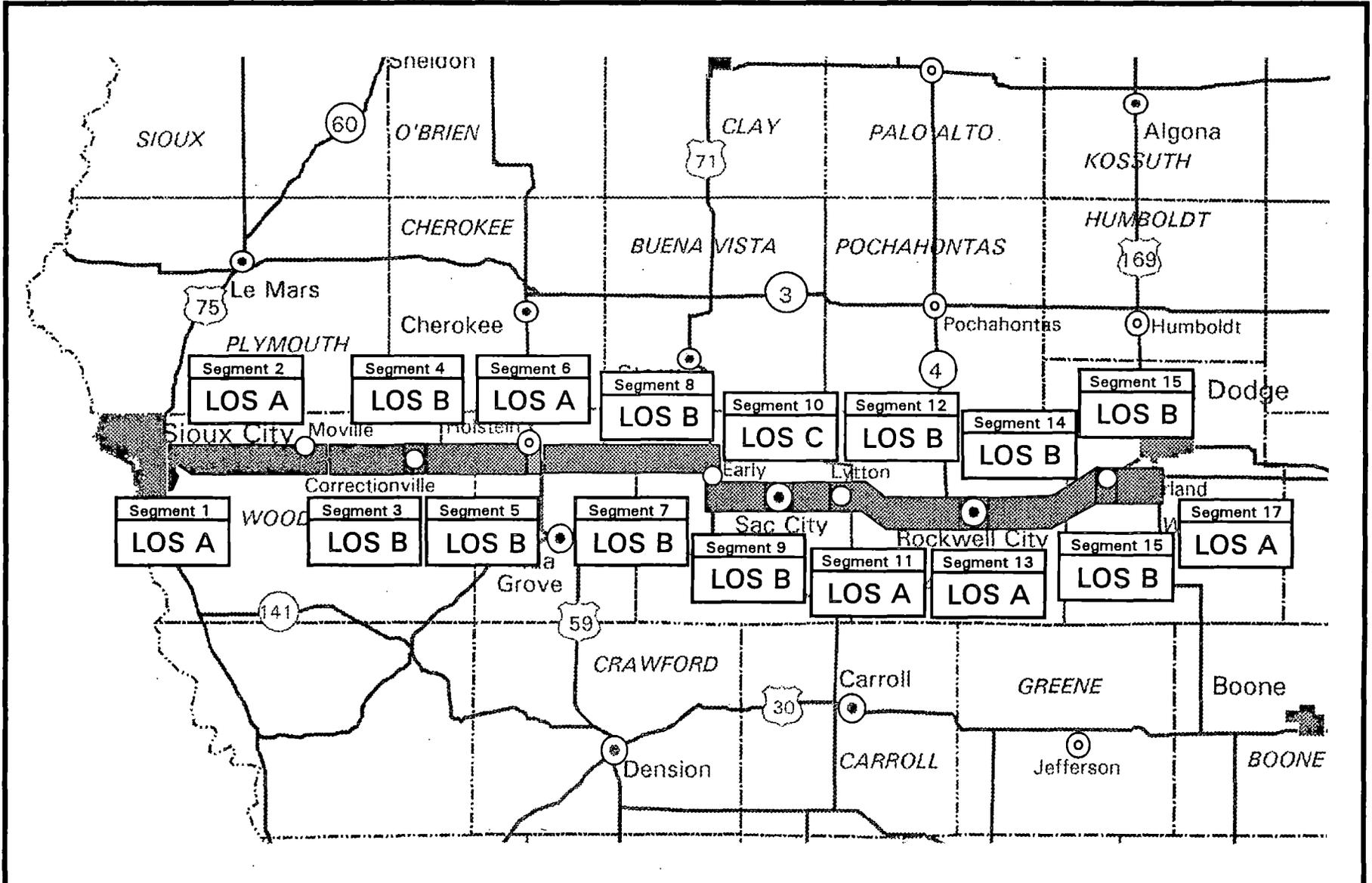
- Trip origin;
- Trip destination;
- Trip purpose;
- Type of vehicle; and,
- Number of Occupants.

The survey form is presented as Exhibit 5-7.

Sample Rates: The sampling rates achieved during the roadside surveys are summarized in Exhibit 5-8. The total number of usable surveys totaled 8,566, which represents 71 percent of the total one direction traffic during the 12-hour survey period. The high sampling rates achieved, ranging between 57 and 82 percent of actual traffic during the survey period, are generally attributable to the modest traffic volumes at the survey locations.

**Exhibit 5-8
ROADSIDE SURVEY SAMPLE RATES**

<u>SURVEY STATION</u>	<u>1986 AADT</u>	<u>SURVEY PERIOD VOLUME</u>	<u>USABLE SURVEYS</u>	<u>RESPONSE RATE</u>
1	2,470	988	744	75.3%
2	1,840	736	585	79.5%
3	2,380	952	746	78.4%
4	1,720	688	564	82.0%
5	3,230	1,292	1,010	78.2%
6	1,720	688	524	76.2%
7	1,240	496	367	74.0%
8	6,730	2,692	1,957	72.7%
9	7,520	3,008	1,711	56.9%
10	<u>1,428</u>	<u>568</u>	<u>358</u>	<u>63.0%</u>
	30,270	12,108	8,566	70.7%



LEVEL OF SERVICE CONDITIONS FOR U.S. HIGHWAY 20
U.S. Highway 20 Corridor Development Study

Exhibit 5-4

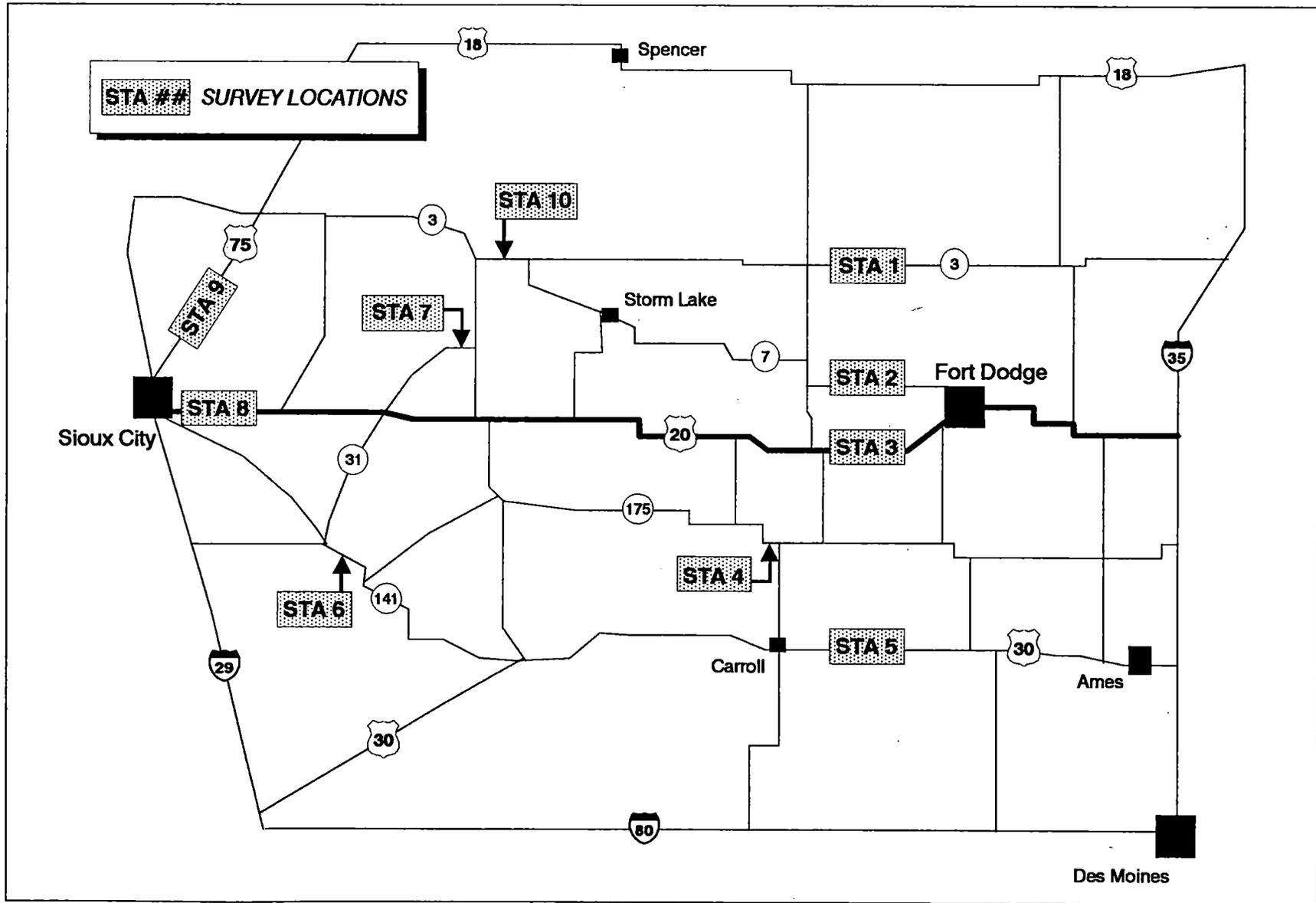


Exhibit 5-5

US 20 STUDY CORRIDOR ROADSIDE SURVEY LOCATIONS

US 20 O&D STUDY

Serial Number: _____

Date: _____

Hour ending: _____
Interviewer: _____

STATION LOCATION: Station Number: _____

Direction: EB WB

VEH. TYPE	NUMBER OF PERSONS	ORIGIN <i>Where did this trip begin ?</i>	DESTINATION <i>Where will this trip end ?</i>	TRIP PURPOSE	Commodity Hauled
State: City: County:	Location:	State: City: County:	Location:		
State: City: County:	Location:	State: City: County:	Location:		
State: City: County:	Location:	State: City: County:	Location:		
State: City: County:	Location:	State: City: County:	Location:		

VEHICLE TYPE	COMMODITY HAULED	TRIP PURPOSE
C = Passenger Car Pick-ups & Vans B = Buses & RV's	L = Light Truck H = Heavy Truck O = Others	1 = Agricultural/ Farm Products 2 = Oil/ Gas 3 = Metallic Products 4 = Mixed Products
		W = Work B = Business P = Personal Business
		V = Vacation E = Education O = Others

5-13

Data Expansion: To represent the actual number of trips made, the survey trip records were entered into a computerized data base and expanded to the average annual daily traffic (AADT) count for each survey location. Survey records for all stations were combined to produce a data base of trips. This expansion process produced a total of 30,407 trips compared to 30,270 AADT for all stations.

Traffic Sectors: Traffic sectors were established for the study corridor to determine origins and destination points of each trip intercepted at the survey stations. Each of the 17 counties located closest to the corridor represents a sector. The rest of Iowa is divided into five sectors. An additional eleven sectors are defined outside of Iowa. Exhibit 5-9 identifies all of the sectors.

Auto Trip Origins and Destinations: The origin/destination pairs for all 10 roadside survey station locations have been tabulated for use in developing the traffic model. For purposes of this Task A report only, the results for the two survey stations on U.S. 20 are presented (Exhibits 5-10 through 5-13). These exhibits present data expanded to the auto ADT at each station location.

Exhibits 5-10 and 5-11 refer to the survey on the east end of the corridor, west of Fort Dodge. Those statistics suggest that 71.6% of the autos and 67.2% of total traffic have both trip ends within the 17 county region. They also suggest that 95.5% of the autos and 94.9% of total traffic have one or both trip ends in the 17 county region (only 5.1% of both trip ends outside of the corridor region). Clearly, U.S. 20 near Fort Dodge serves as an access road to the 17 county area near the highway.

Exhibits 5-12 and 5-13 depict the origin/destination pairs on the west end (east of Sioux City), where the traffic volumes are higher). At that location 80.5% of the auto trips and 78.8% of all vehicles have trip origins and destinations within the 17 county region. An additional 16.5% of the autos have one trip end in the region and one trip end elsewhere. Only 3% of the auto trips have both trip ends external to the region.

Exhibit 5-14 summarizes the extent to which the results from all 10 roadside survey locations relate to the 17 county region.

Trip Purpose: The survey data was classified by trip purpose as illustrated in Exhibit 5-15. Business trips make up 39 percent of all trips, while personal business trips make up 35 percent, work trips accounted for another 16 percent, while vacation travel (the survey was conducted in August), accounted for a little more than 8 percent. Because schools are generally not in session during this time of the year, education trips only accounted for 1.5 percent of all travel.

Vehicle Type: Another classification of the surveys was by vehicle type. Eighty-six percent of trips on study area roads were made by passenger cars. Trucks make up 13 percent of vehicles and buses nearly 1 percent of total travel in the study area, as illustrated in Exhibit 5-16. It should be noted that truck percentages are higher than this for some portions of U.S. 20. More than two thirds of all truck travel in the corridor is attributable to heavy trucks (generally defined as multi-axle, cab and trailer combinations).

Vehicle Occupancy: The final classification of survey information is by vehicle occupancy. Exhibit 5-17 presents a pie chart broken down into 7 categories. As shown, more than 62 percent of all vehicle trips were driver only trips. All told, the average vehicle occupancy rate observed was 1.63 persons per vehicle. This rate is within the general range which has been observed in rural areas throughout the United States.

INTERSTATE HIGHWAY AUTO SURVEYS

To develop a data base which will be used to estimate the number of automobiles that might divert over to U.S. 20 if U.S. 20 were improved, a series of surveys were taken. The roadside surveys on U.S. 20 and in the environs of U.S. 20 were discussed earlier. To complement those surveys, three survey types were also conducted on I-80 and I-90.

U.S. HIGHWAY 20 STUDY SECTORS

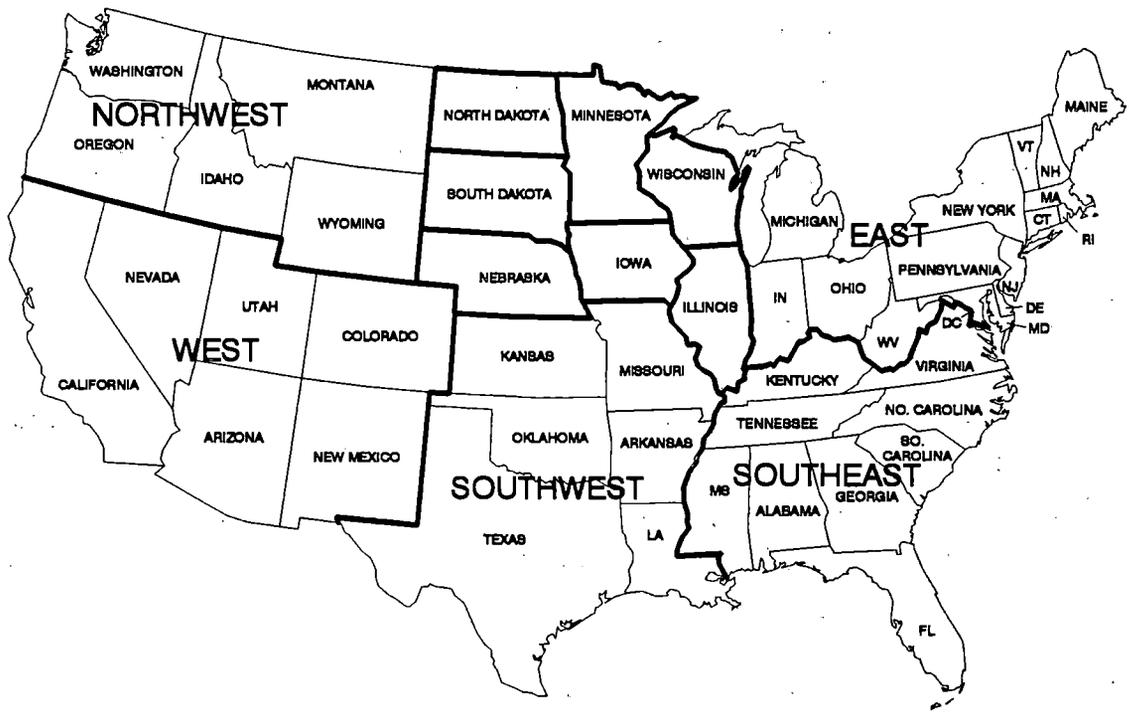
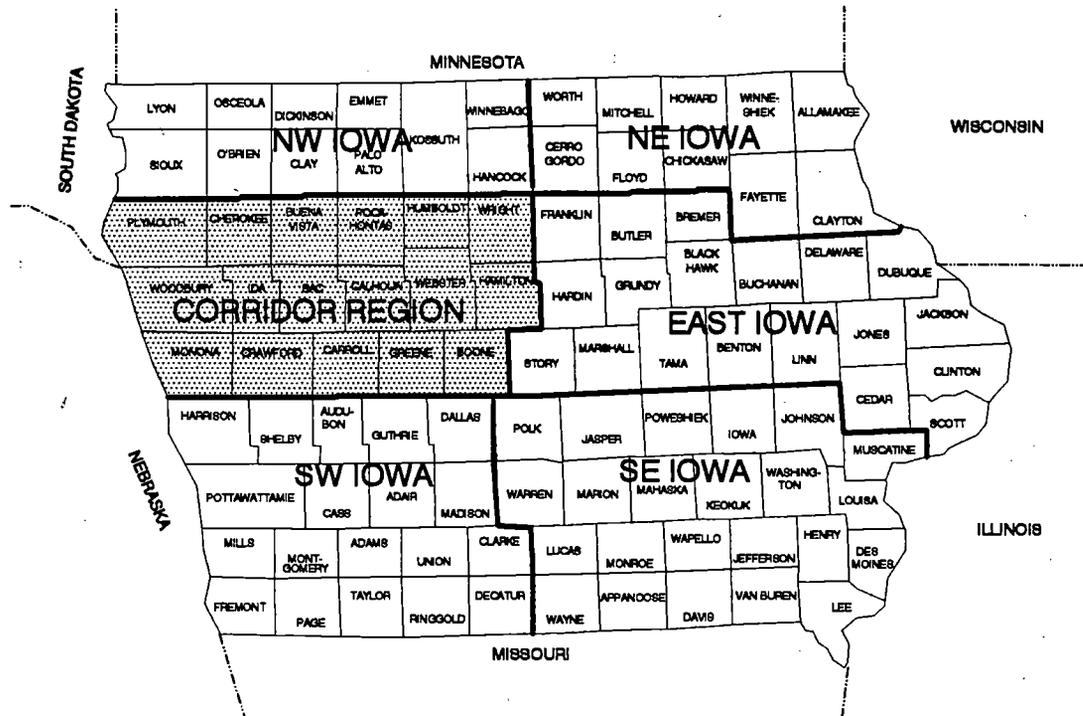


Exhibit 5-10

AUTO ORIGIN AND DESTINATION PAIRS
U.S. 20 Survey Location - West of Fort Dodge
1991

NUMBER OF DAILY AUTOS										
Regional (a)	Regional (a)	Nebraska	East Iowa	NE Iowa	SE Iowa	NW Iowa	SW Iowa	Minnesota	S. Dakota	TOTAL (b)
Regional (a)	1,398		159	32	44	14	33			1,680
Illinois	26	6								32
Minnesota	24	10			3					37
Nebraska	57		11							68
North Dakota						4				4
South Dakota	37		25		3					65
Wisconsin	26	3							2	31
East U.S.	3									3
Northwest U.S.								2		2
Southeast U.S.										
Southwest U.S.	7									7
West U.S.	4									4
NW Iowa			14		2					16
NE Iowa							3			3
TOTAL	1,582	19	209	32	52	18	36	2	2	1,952

41.0%

NUMBER OF TOTAL VEHICLES										
Regional (a)	Regional (a)	Nebraska	S. Dakota	East Iowa	NE Iowa	SE Iowa	NW Iowa	SW Iowa	Minnesota	TOTAL (b)
Regional (a)	1,610			202	59	65	32	40		2,008
Illinois	29	6	5							40
Minnesota	33	16				3				52
Nebraska	116			14	5					135
North Dakota							4			4
South Dakota	40			31		8				79
Wisconsin	29	8	2							39
East U.S.	3									3
Northwest U.S.									2	2
Southeast U.S.										
Southwest U.S.	12									12
West U.S.	4									4
NW Iowa				14		2				16
NE Iowa								3		3
TOTAL	1,876	30	7	261	64	78	36	43	2	2,397

74.3%

(a) The seventeen-county corridor region
 (b) Survey results have been factored to total ADT at station location
 SOURCE: Roadside Survey on U.S. 20, 1991
 Wilbur Smith Associates

Exhibit 5-11
AUTO ORIGIN AND DESTINATION PAIRS
CORRIDOR REGION ONLY
U.S. 20 Survey Location - West of Fort Dodge
1991

	NUMBER OF DAILY AUTOS					TOTAL ^(a)
	Calhoun	Hamilton	Sac	Webster	Wright	
Boone						23
Buena Vista		5		18		931
Calhoun	165	14		752		65
Carroll	3	3		57	2	
Cherokee						20
Crawford				20		8
Greene	8					
Hamilton						26
Humboldt	17		5	4		10
Ida			3	7		3
Monona		3				8
Plymouth		3		3	2	16
Pocahontas	3	2		11		180
Sac	3	10		167		
Webster						
Woodbury		20		71		91
Wright	13		3			16
TOTAL	212	60	11	1,110	4	1,397

	NUMBER OF TOTAL VEHICLES								TOTAL ^(a)
	Boone	Calhoun	Greene	Hamilton	Humboldt	Sac	Webster	Wright	
Boone									
Buena Vista			3	8			28		39
Calhoun	4	180		14			786		984
Carroll		8		3	4		57	2	74
Cherokee							6		6
Crawford		6					20		26
Greene		8							8
Hamilton									
Humboldt		17				5	4		26
Ida				7		3	9		19
Monona				3					3
Plymouth				3			3	2	8
Pocahontas		3		2			17		22
Sac		3		18			224	3	248
Webster									
Woodbury				28			101		129
Wright		13				3			16
TOTAL	4	238	3	86	4	11	1,255	7	1,608

(a) Survey results have been factored to total ADT at station location
 SOURCE: Roadside Surveys on U.S. 20, 1991, Wilbur Smith Associates

Exhibit 5-12
AUTO ORIGIN AND DESTINATION PAIRS
U.S. 20 Survey Location - East of Sioux City
1991

NUMBER OF DAILY AUTOS											
	Regional (a)	Nebraska	East Iowa	NE Iowa	SE Iowa	NW Iowa	SW Iowa	Illinois	S. Dakota	East U.S.	TOTAL (b)
Regional (a)	4,866		147	21	36	79	21				5,170
Illinois	18	3									21
Minnesota	31	6									37
Nebraska	399		12	9		32					452
North Dakota	3										3
South Dakota	196		22	3	10		6	18			255
Wisconsin	12	12							3		27
East U.S.	6	6							9		21
Northwest U.S.			3							3	6
Southeast U.S.											
Southwest U.S.	21										21
West U.S.	8							9		3	20
NW Iowa			6		9						15
TOTAL	5,560	27	190	33	55	111	27	27	12	6	6,048

NUMBER OF TOTAL VEHICLES												
	Regional (a)	Nebraska	S. Dakota	East Iowa	NE Iowa	SE Iowa	NW Iowa	SW Iowa	Illinois	Minnesota	East U.S.	TOTAL (b)
Regional (a)	5,211			180	24	41	83	21				5,560
Illinois	34	11	4									49
Minnesota	31	13										44
Nebraska	448			17	18	2	47			3		535
North Dakota	3											3
South Dakota	229			26	3	10	4	6	18			296
Wisconsin	15	12	3									30
East U.S.	6	6	13									25
Northwest U.S.	9			3							3	15
Southeast U.S.												
Southwest U.S.	21											21
West U.S.	12								9		3	24
NW Iowa				6		9						15
TOTAL	6,019	42	20	232	45	62	134	27	27	3	6	6,617

(a) The seventeen-county corridor region

(b) Survey results have been factored to total ADT at station location

SOURCE: Roadside Survey on U.S. 20, 1991

Wilbur Smith Associates

Exhibit 5-13
AUTO ORIGIN AND DESTINATION PAIRS
CORRIDOR REGION ONLY
U.S. 20 Survey Location - East of Sioux City
1991

	NUMBER OF DAILY AUTOS				
	Cherokee	Humboldt	Plymouth	Woodbury	TOTAL ^(a)
Boone				3	3
Buena Vista			15	230	245
Calhoun				20	20
Carroll				34	34
Cherokee				224	224
Crawford				38	38
Greene				6	6
Hamilton				3	3
Humboldt				3	3
Ida			6	610	616
Monona				83	83
Plymouth				326	326
Pocahontas				12	12
Sac				94	94
Webster				118	118
Woodbury	3	3	15	3,017	3,038
Wright				3	3
TOTAL	3	3	36	4,824	4,866

	NUMBER OF DAILY AUTOS				
	Cherokee	Humboldt	Plymouth	Woodbury	TOTAL ^(a)
Boone				3	3
Buena Vista			19	248	267
Calhoun				24	24
Carroll				38	38
Cherokee				286	286
Crawford				47	47
Greene				11	11
Hamilton				3	3
Humboldt				7	7
Ida			6	653	659
Monona				86	86
Plymouth				378	378
Pocahontas				21	21
Sac				111	111
Webster				148	148
Woodbury	3	3	19	3,084	3,109
Wright				12	12
TOTAL	3	3	44	5,160	5,210

(a) Survey results have been factored to total ADT at station location

SOURCE: Roadside Surveys on U.S. 20, 1991, Wilbur Smith Associates

HIGHWAY 20 ROADSIDE SURVEY TRIPS BY ORIGIN-DESTINATION CATEGORY

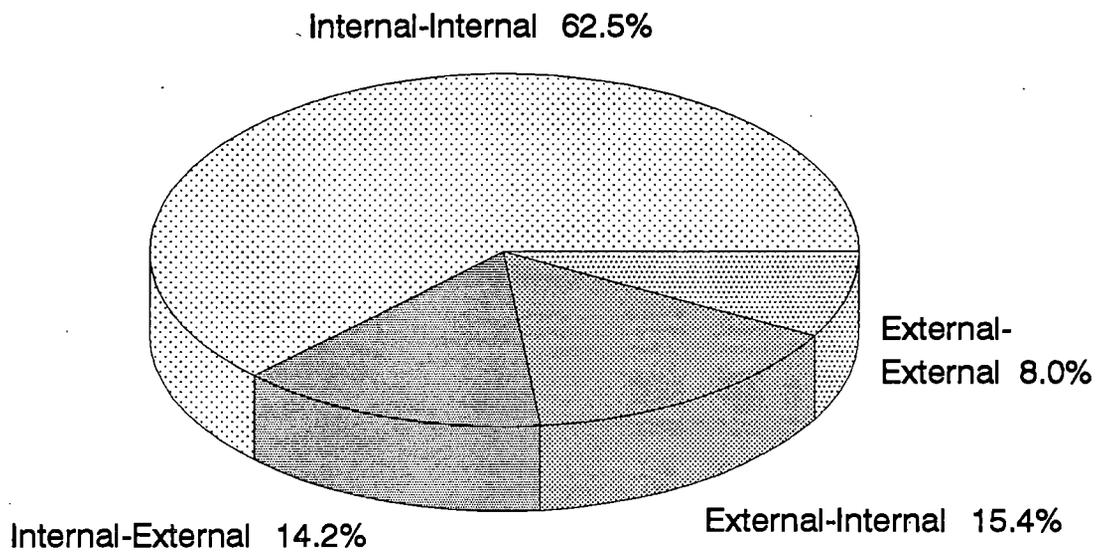


Exhibit 5-14

HIGHWAY 20 ROADSIDE SURVEY TRIPS BY PURPOSE

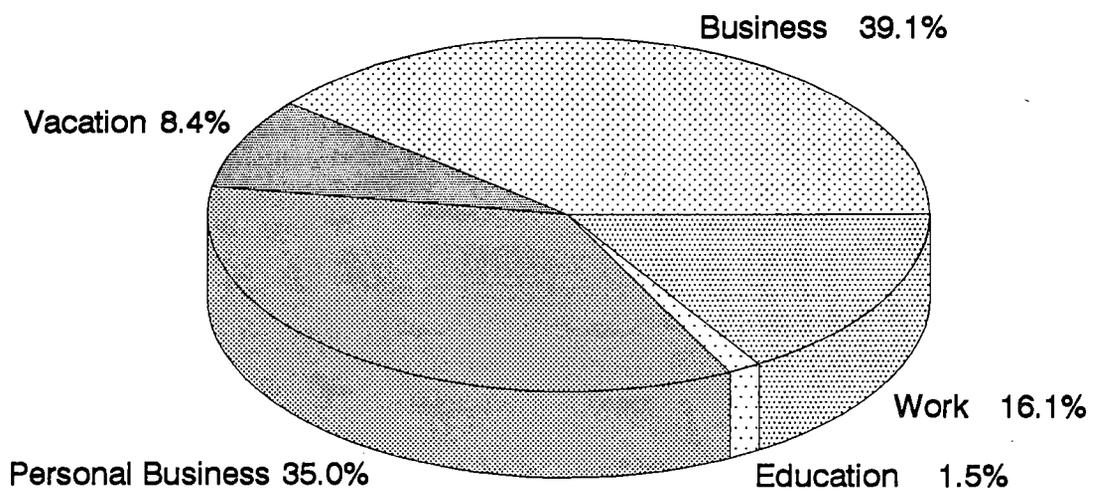


Exhibit 5-15

HIGHWAY 20 ROADSIDE SURVEY TRIPS BY VEHICLE TYPE

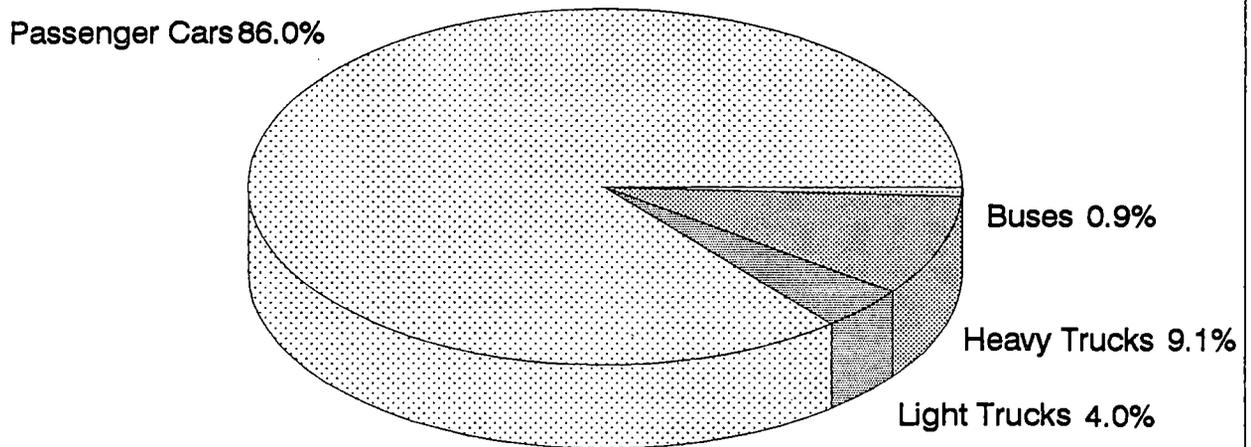
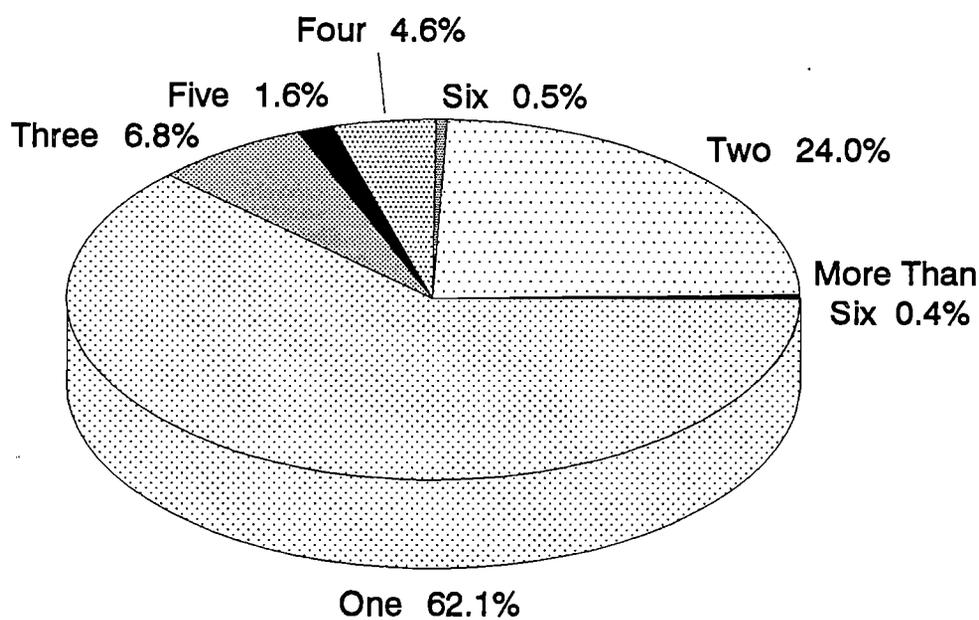


Exhibit 5-16

HIGHWAY 20 ROADSIDE SURVEY TRIPS BY OCCUPANCY CATEGORY



*Average
1.63 persons/ auto*

Persons Per Vehicle

Exhibit 5-17

- **Interstate License Plate Observations** - Personnel were placed roadside on I-80 and I-90 which recorded the license plates of autos using those two highways. This observation process identified who uses I-80 and I-90, by state of auto registration.
- **Interstate Rest Stop Motorist Survey** - Personnel were placed at rest stops along I-80 and I-90 and those personnel asked questions of motorists that stopped, of their own choice, at the rest stops. The survey form is shown in Exhibit 5-18.
- **Interstate Trucker Survey** - Surveys were taken of truck drivers at the weigh stations on I-80 and I-90. The truck survey results are explained later in Chapter 6.

I-80 License Plate Results: Exhibit 5-19 presents a summary of the auto license plate findings on I-80. This represents a one-day daylight hours observation on Friday, November 22. These statistics suggest that, during that period, 50% of autos passing that point were Iowa cars, and 20.1% were Nebraska cars. This suggests that 70% of auto traffic on I-80 at that point could be construed as "local" traffic. Approximately 87% of auto traffic is by cars from the multi-state region (Iowa, Minnesota, Illinois, Nebraska, North and South Dakota and Wisconsin), suggesting that only 13% is by cars from distant locations. These results are for daylight hours only, and there is likely a greater proportion of long-distance travel at night. Also, these license plate observations do not indicate origin/destination; they only indicate state of vehicle registration.

I-90 License Plate Results: The license plate observations on I-90, located in Minnesota, suggests that almost half (47.7%) of autos are from Minnesota. The statistics also suggest that I-90 traffic is overwhelmingly regional, with 97.8% by cars registered in Minnesota, South and North Dakota, Iowa, Illinois, Wisconsin and Nebraska. Only 2.2% are from elsewhere in the U.S..

Rest Stop Survey Results: Recognizing that the license plate surveys only indicate state of registration rather than origin/destination, a survey of people stopping at rest stops on I-80 and I-90 was also taken. This survey is biased by the characteristics of those who stop at rest stops compared with those who do not stop at the rest areas. Remarkably, the percentages by state of residence almost replicate what was found in the license plate surveys.

Exhibit 5-20 summarizes the origin/destination results from these rest area surveys. Iowa travel dominates (65.7% of all trips) on I-80, compared with 50% of the license plates being from Iowa. The 15.7% difference is presumably people from other states coming to Iowa. Of the total trips on I-80, 28.6% had one trip end outside of the seven state region.

On I-90, every surveyed party had one or both trip ends in Minnesota, South Dakota or Wisconsin. Minnesota dominated, with 76.6%. Only 4.4% had a trip end outside of the seven state region.

STUDY IMPLICATIONS

The purpose of Chapter 4 is to develop a traffic data base that depicts certain things about U.S. 20 traffic and potential traffic that can later be used to develop traffic forecasts for each alternative U.S. 20 improvement type. The traffic count data, the roadside surveys, the vehicle classification counts and the license plate observations accomplish this.

INTERSTATE O&D STUDY

Date: _____

Direction: EB WB

Hour ending: _____

Interviewer: _____

ORIGIN <i>Where did this trip begin ?</i>	DESTINATION <i>Where will this trip end ?</i>	TRIP PUR- POSE	STATE VEHICLE LICENSE PLATE
State: City: County: <div style="display: flex; justify-content: space-between;"> <input type="text"/><input type="text"/><input type="text"/> <input type="text"/><input type="text"/><input type="text"/> </div>	State: City: County: <div style="display: flex; justify-content: space-between;"> <input type="text"/><input type="text"/><input type="text"/> <input type="text"/><input type="text"/><input type="text"/> </div>	<input type="checkbox"/>	<input type="text"/> <input type="text"/> <input type="text"/>
State: City: County: <div style="display: flex; justify-content: space-between;"> <input type="text"/><input type="text"/><input type="text"/> <input type="text"/><input type="text"/><input type="text"/> </div>	State: City: County: <div style="display: flex; justify-content: space-between;"> <input type="text"/><input type="text"/><input type="text"/> <input type="text"/><input type="text"/><input type="text"/> </div>	<input type="checkbox"/>	<input type="text"/> <input type="text"/> <input type="text"/>
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TRIP PURPOSE <hr/> W = Work V = Vacation B = Business E = Education P = Personal Business O = Others			

5-29

Exhibit 5-20
Interstate Automobile Trip Origin/Destination Pairs
1991

I-80 Trip O & D Percentages

	<u>Iowa</u>	<u>Nebraska</u>	<u>S.Dakota</u>	<u>N.W. U.S.</u>	<u>S.W. U.S.</u>	<u>Wisc.</u>	<u>Total</u>
Iowa	18.1%						18.1%
Illinois	2.0%	9.9%	1.0%		0.3%	2.3%	15.5%
Minnesota	0.5%	3.8%				2.5%	6.8%
Nebraska	30.01%				0.3%		30.3%
N. Dakota							
S. Dakota	3.8%						3.8%
Wisconsin		2.3%				2.5%	4.8%
East U.S.	0.3%	4.8%	1.3%	0.3%		2.5%	9.2%
N.W. U.S.	0.5%						0.5%
S.E. U.S.		0.5%					0.5%
S.W. U.S.	1.8%						1.8%
West U.S.	<u>8.7%</u>						<u>8.7%</u>
Total	<u>65.7%</u>	<u>21.3%</u>	<u>2.3%</u>	<u>0.3%</u>	<u>0.6%</u>	<u>9.8%</u>	<u>100.0%</u>

I-90 Trip O & D Percentages

	<u>Minnesota</u>	<u>S. Dakota</u>	<u>Wisc.</u>	<u>Other</u>	<u>Total</u>
Iowa	13.9%	6.6%	0.7%		21.2%
Illinois	1.5%	6.6%			8.1%
Minnesota	14.6%				14.6%
Nebraska	3.6%				3.6%
N. Dakota					
S. Dakota	38.6%				38.6%
Wisconsin	0.7%	8.8%			9.5%
East U.S.					
N.W. U.S.	1.5%		0.7%		2.2%
S.E. U.S.					
S.W. U.S.					
West U.S.	<u>2.2%</u>				<u>2.2%</u>
Total	<u>76.6%</u>	<u>22.0%</u>	<u>1.4%</u>	<u>0.0%</u>	<u>100.0%</u>

Note: Tables represent two-way origin and destination pairs.

Source: Interstate Rest Area Surveys, 1991, Wilbur Smith Associates

Chapter 6

FREIGHT TRANSPORTATION

Regional trucking characteristics were analyzed to ascertain how well U.S.20 is serving local economic needs, and to serve as the basis for trucking forecasts that will be made later in this study. A number of trucking issues were addressed, including: (1) To what extent do trucks now use U.S. 20; (2) Might those trucks that are not now using U.S. 20 use it if it were improved; and (3) What do the truckers think of U.S. 20 as a truck route. To help address these issues, truck counts in the region were reviewed, surveys of shipper/receiver and motor carrier firms were conducted, and truck driver interviews were taken in the corridor as well as on I-80 and I-90.

TRUCK USE OF U.S. 20

To seek insights into trucking use of U.S. 20, traffic counts and vehicle classification data were analyzed, and roadside surveys were conducted.

Existing Truck Traffic: Average daily truck count data for the 17 analysis segments of U.S. 20 are depicted in Exhibit 6-1. The number of trucks using the highway is greatest near the towns and cities (736 trucks daily near Sioux City) and lower in the middle of the study section. As a percent of total traffic ADT, trucks constitute between 7.4% near Sioux City and 26.5% in Holstein. These are somewhat typical statistics for a highway of this type, and suggest that U.S. 20 trucking traffic is limited to trucks serving local businesses. Approximately 31.8% of the truck traffic comprises "light trucks" and 68.7% are heavy trucks (tractor/trailer trucks).

Exhibit 6-2 summarizes truck trends on U.S. 20 in terms of truck daily vehicle miles of travel (VMT) on this segment of highway. VMT is calculated by multiplying the average counts on the segment by the segment's length.

Exhibit 6-2
TRUCK TRENDS ON U.S. 20
1976 - 1990

	<u>DAILY VMT</u>			<u>ANNUAL COMPOUND PERCENT CHANGE</u>		
	<u>1976</u>	<u>1984</u>	<u>1990</u>	<u>76-90</u>	<u>76-84</u>	<u>84-90</u>
Light Trucks	19,760	13,734	14,794	-2.05	-4.45	1.25
Heavy Trucks	<u>28,879</u>	<u>26,453</u>	<u>34,412</u>	1.26	-1.09	4.48
Total Trucks	48,639	40,187	49,206			
Automobiles	<u>248,064</u>	<u>235,325</u>	<u>254,137</u>	.17	-.66	1.29
Total Traffic	296,703	275,512	303,343	.16	-.92	1.62

SOURCE: Wilbur Smith Associates

Traffic by both light trucks and heavy trucks declined between 1976 and 1984, but has increased since 1984. Heavy truck traffic has in recent years been increasing faster than any other vehicle type.

Existing Truck Travel Patterns: In this study roadside surveys were conducted of both automobile and truck drivers at ten locations in and near U.S. 20. The results are tabulated for each survey station and will be used in the travel model. To display the truck origin and destination pairs, the nation and region were divided into the analysis sectors shown in Exhibit 6-3. The truck origin/destination pairs for the two U.S. 20 survey stations are shown in Exhibits 6-4 through 6-7.

Exhibit 6-4 summarizes all truck trips on U.S. 20 just west of Fort Dodge, and depicts the origin/destination patterns for those with one or two trip ends external to the corridor region. Of those with external trip ends, 33% were in Nebraska and 58% were elsewhere in Iowa. Any origin/destination pair with zero indicates that no truck with this origin/destination pattern was interviewed.

Exhibit 6-5 summarizes the origin/destination patterns for the west of Fort Dodge location for trucks that have local (within a 17 county region) origins and destinations. Once again, any county pair with zero shown merely means that no trucks with that specific origin/destination pattern was surveyed that day.

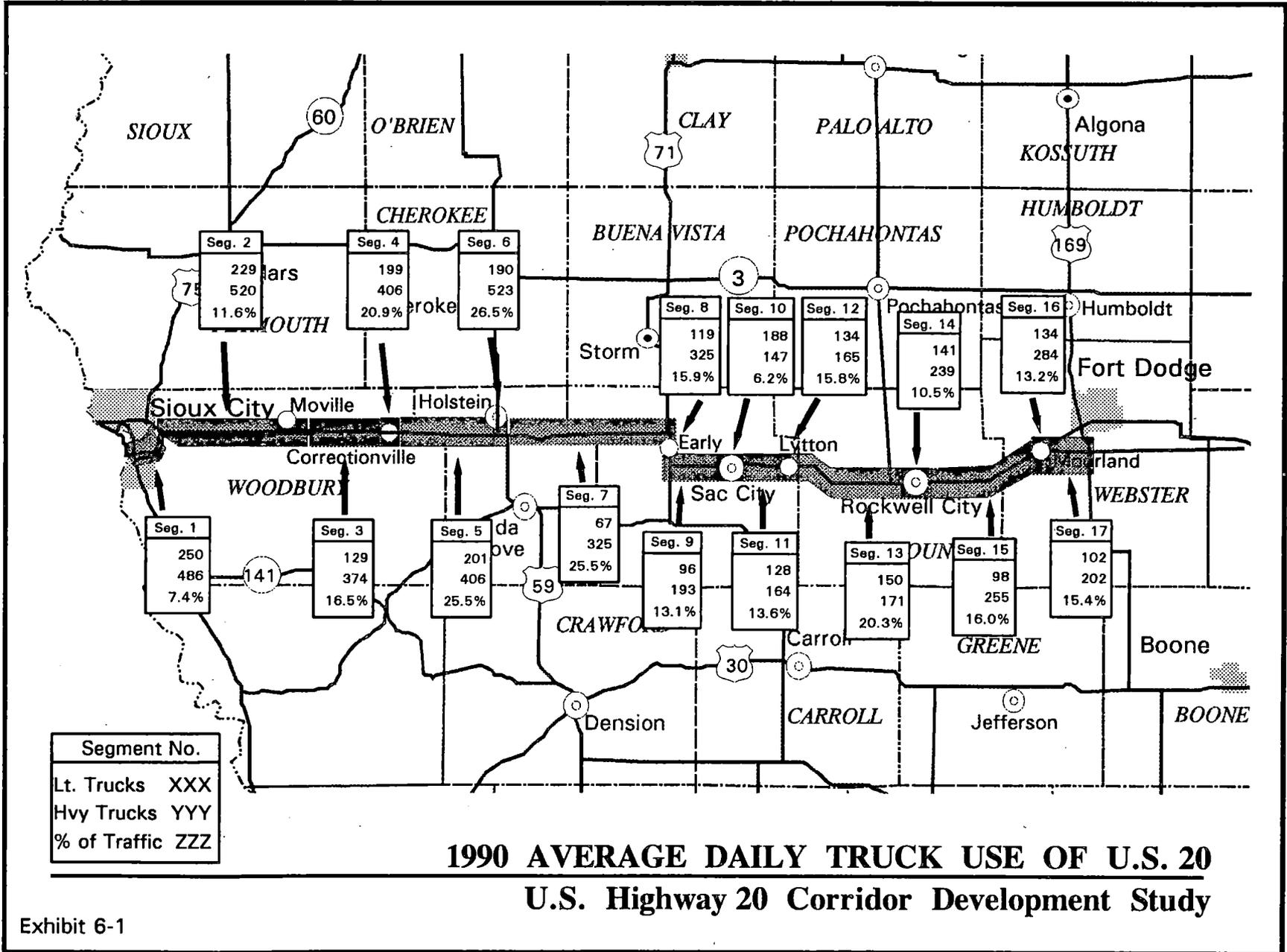


Exhibit 6-1

U.S. HIGHWAY 20 STUDY SECTORS

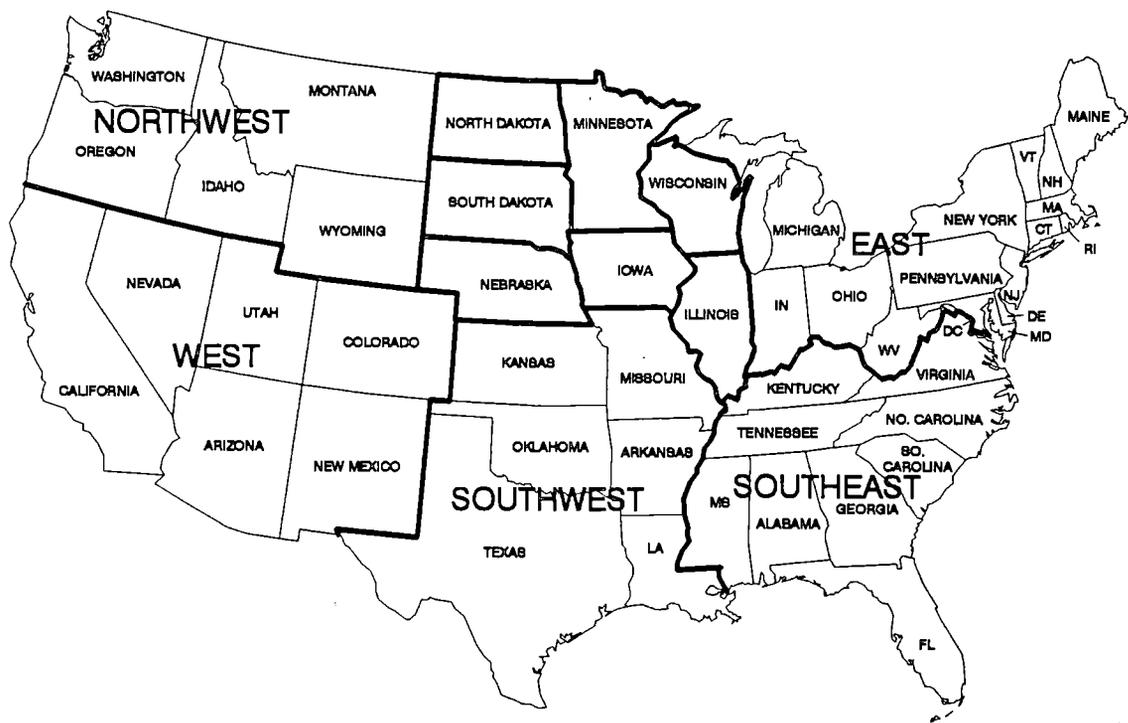
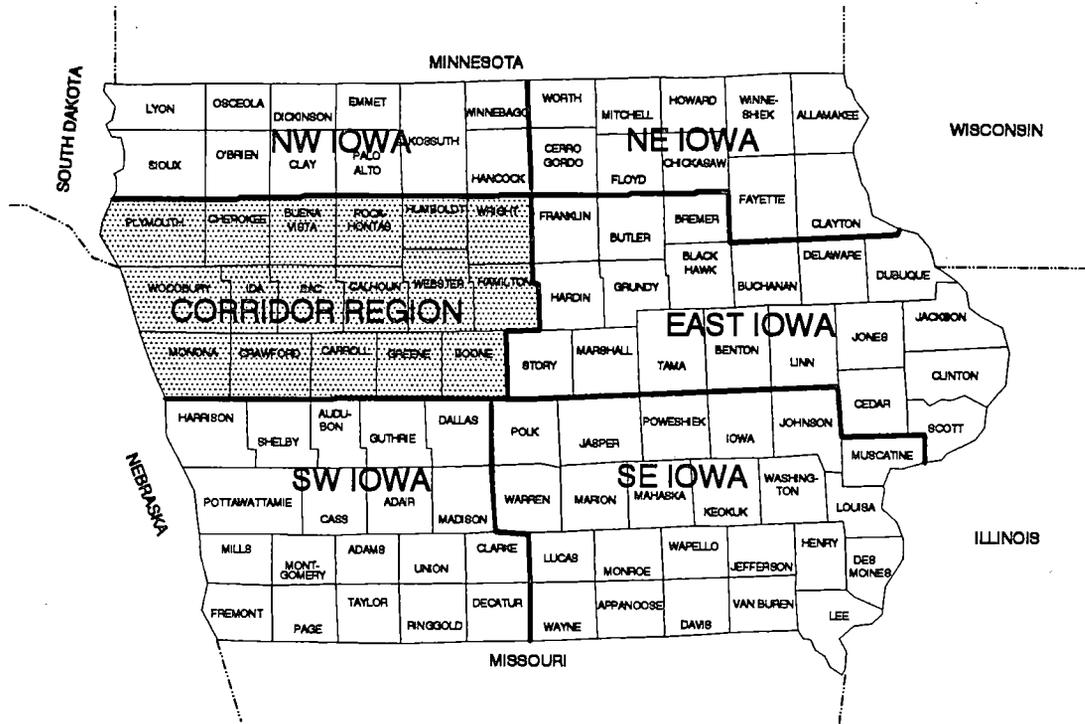


Exhibit 6-4
TRUCK ORIGIN AND DESTINATION PAIRS
U.S. 20 Survey Location - West of Fort Dodge
1991

NUMBER OF DAILY LIGHT TRUCKS							
	Regional ^(a)	East Iowa	NE Iowa	SE Iowa	NW Iowa	SW Iowa	TOTAL ^(b)
Regional	82	10	3	2	13		110
Illinois							
Minnesota	4						4
Nebraska	8						8
North Dakota							
South Dakota		6					6
Wisconsin	3						3
East U.S.							
Northwest U.S.							
Southeast U.S.							
Southwest U.S.							
West U.S.							
TOTAL	97	16	3	2	13		131

NUMBER OF DAILY HEAVY TRUCKS										
	Regional	Minnesota	S. Dakota	Wisconsin	East Iowa	NE Iowa	SE Iowa	NW Iowa	SW Iowa	TOTAL ^(b)
Regional	129				33	24	19	5	7	217
Illinois	3		5							8
Minnesota	5									5
Nebraska	51	6		5	3	5				70
North Dakota										
South Dakota	3						5			8
Wisconsin										
East U.S.										
Northwest U.S.										
Southeast U.S.										
Southwest U.S.	5									5
West U.S.										
TOTAL	196	6	5	5	36	29	24	5	7	313

(a) The seventeen-county corridor region
(b) Total truck ADT at the station location
SOURCE: Roadside Truck Surveys, 1991
Wilbur Smith Associates

Exhibit 6-5
TRUCK ORIGIN AND DESTINATION PAIRS
CORRIDOR REGION ONLY
U.S. 20 Survey Location - West of Fort Dodge
1991

	NUMBER OF DAILY LIGHT TRUCKS				
	Calhoun	Crawford	Hamilton	Webster	TOTAL ^(a)
Boone					
Buena Vista					
Calhoun	10	6		19	35
Carroll	5				5
Cherokee				2	2
Crawford					
Greene					
Hamilton					
Humboldt					
Ida			7	2	9
Monona					
Plymouth					
Pocahontas					
Sac				21	21
Webster					
Woodbury			8	2	10
Wright					
TOTAL	15	6	15	46	82

	NUMBER OF DAILY HEAVY TRUCKS							
	Boone	Calhoun	Greene	Hamilton	Humboldt	Webster	Wright	TOTAL ^(a)
Boone								
Buena Vista			3	3		10		16
Calhoun	4	5				15		24
Carroll					4			4
Cherokee						4		4
Crawford								
Greene								
Hamilton								
Humboldt								
Ida								
Monona								
Plymouth						6		6
Pocahontas								
Sac				8		36	3	47
Webster								
Woodbury						28		28
Wright								
TOTAL	4	5	3	11	4	99	3	129

(a) Total truck ADT at survey location

SOURCE: Roadside Truck Surveys, 1991, Wilbur Smith Associates

Overall, the surveys at the U.S. 20 roadside survey locations west of Fort Dodge found that:

- 211 trucks (82 light, 129 heavy) had trips internal to the corridor region (within a 17 county area). This means that 47.6% of truck traffic on U.S. 20 is entirely local traffic.
- Another 198 trucks (44.6%) had one trip end in the 17 county area and one trip end outside that area.
- Only 35 trucks (7.9%) had both trip ends outside of the 17 county region. This verifies that existing U.S. 20 is not conducive to through travel. It is a local truck route, not a through truck route.
- Excluding the immediate multi-state area (Iowa, Illinois, Minnesota, Nebraska, North and South Dakota, Wisconsin), only 5 trucks (1%) had one trip end further away, and all 5 were all from the Southwest U.S.

Exhibits 6-6 and 6-7 for the west end survey station (east of Sioux City) have essentially the same findings. At that location 60.6% of the truck traffic is internal to the 17 county region, 159 trucks (27.9%) have one external trip end, and 11.5% have both trip ends external to the region.

SHIPPER/RECEIVER AND MOTOR CARRIER SURVEYS

To gain insights into how the trucking companies and shippers/receivers might adapt to an improved U.S. 20, surveys were taken of trucking companies and shipper/receiver companies that use or could use U.S. 20. These surveys included personal contact, telephone contact, and mail out surveys.

The shipping and trucking surveys involved 41 shipper/receivers and 38 motor carrier firms. Of these, 16 shipper/receivers and 16 motor carrier firms responded (approximately 40 percent). Exhibit 6-8 lists firms that were contacted and those that responded. The shipper/receiver and motor carrier surveys are shown as Exhibits 6-9 and 6-10.

Exhibit 6-6
TRUCK ORIGIN AND DESTINATION PAIRS
U.S. 20 Survey Location - East of Sioux City
1991

NUMBER OF DAILY LIGHT TRUCKS								
	Regional ^(a)	Minnesota	East Iowa	NE Iowa	SE Iowa	NW Iowa	SW Iowa	TOTAL ^(b)
Regional ^(a)	128		8	3				139
Illinois								
Minnesota								
Nebraska	5	3			2			10
North Dakota								
South Dakota	13							13
Wisconsin								
East U.S.								
Northwest U.S.								
Southeast U.S.								
Southwest U.S.								
West U.S.								
TOTAL	146	3	8	3	2			162

NUMBER OF DAILY HEAVY TRUCKS									
	Regional ^(a)	Nebraska	S. Dakota	East Iowa	NE Iowa	SE Iowa	NW Iowa	SW Iowa	TOTAL ^(b)
Regional ^(a)	217			25		5	4		251
Illinois	16	8	4						28
Minnesota		7							7
Nebraska	44			5	9		15		73
North Dakota									
South Dakota	20			4			4		28
Wisconsin	3								3
East U.S.			4						4
Northwest U.S.	9								9
Southeast U.S.									
Southwest U.S.									
West U.S.	4								4
TOTAL	313	15	8	34	9	5	23		407

(a) The seventeen-county corridor region

(b) Total truck ADT at survey location

SOURCE: Roadside Truck Surveys, 1991
 Wilbur Smith Associates

Exhibit 6-7
TRUCK ORIGIN AND DESTINATION PAIRS
CORRIDOR REGION ONLY
U.S. 20 Survey Location - East of Sioux City
1991

	LIGHT TRUCKS		
	<u>Plymouth</u>	<u>Woodbury</u>	<u>TOTAL</u> (a)
Boone		14	14
Buena Vista			
Calhoun			
Carroll			
Cherokee		11	11
Crawford			
Greene			
Hamilton			
Humboldt			
Ida		32	32
Monona		3	3
Plymouth		25	25
Pocahontas			
Sac		8	8
Webster	4		4
Woodbury		30	30
Wright			
TOTAL	4	123	127

	HEAVY TRUCKS		
	<u>Plymouth</u>	<u>Woodbury</u>	<u>TOTAL</u> (a)
Boone			
Buena Vista	4	4	8
Calhoun		4	4
Carroll		4	4
Cherokee		51	51
Crawford		9	9
Greene		5	5
Hamilton			
Humboldt		4	4
Ida		11	11
Monona			
Plymouth		27	27
Pocahontas		9	9
Sac		9	9
Webster		30	30
Woodbury		37	37
Wright		9	9
TOTAL	4	213	217

(a) Total truck ADT at survey location
 SOURCE: Roadside Truck Surveys, 1991
 Wilbur Smith Associates

Exhibit 6-8 Firms Surveyed

Motor Carrier Firms		Shipper/Receiver Firms	
Firms	Location	Firms	Location
ABF Freight Syst.Inc	Ankeny	* Ag Processing Inc (AGP)	Sheldon
* ABF Freight Syst.Inc	Sioux City	* Agland Cooperative	Schaller
Churchill Trucklines	Omaha	Albrecht Oil & Feed	Wall Lake
Consolid. Freight	Fort Dodge	AMPI	Sanborn
Consolid. Freightwys	Omaha	* Artex	South Sioux City
* Consolid.Freightwys.	Sioux City	Beef America	Le Mars
Crouse Cartage Co.	Carroll	Bil-Mar Turkey	Storm Lake
* Decker Trucklines	Fort Dodge	* Boyer Valley Fertilizer	Boyer Valley
Dennis Burson	Sioux City	BT	Le Mars
* Direct Transit	North Sioux City, SD	Carnation	Fort Dodge
Eagle	Sioux City	Celotex	Fort Dodge
Ellerbrock Trucking	Sac City	Coon's Feed Service	Sac City
Fremont Smith	Sioux City	Corn Belt Manufacturing	Early
Glover Trucking	South Sloux City	Dry Dock Tackle	Early
Goldsmith	Sergeant Bluff	* Early Co-op Grain	Early
G&T Trucking	Schaller	* Farmers Coop Elevator	Odebolt
* Heyl Truck Line	Akron	Farmland Foods	Carroll & Denison
* Hirshbach	South Sioux City	Farner Brocken	Carroll
K & B Transportal	South Sioux City	Franklin Laboratories	Fort Dodge
* Keim Co.	Fort Dodge	Georgia Pacific	Fort Dodge
* King Transfer	Onawa	Harker	Le Mars
Kobs	Sergeant Bluff	IBP	Storm Lake & Denison
* Manx Trucking	Sioux City	IBP-PBX	Dakota City, NE
* Mau Trucking	Ida Grove	* Iowa Industrial Hydraulics	Pochontas
Mike Kuhn Trucking	Schaller	Jacobsen Seed	Lake View
Myrtue Soren Trucking	Schaller	JR Construction	Sioux City
* Noll Trucking	Early	* Lake View Concrete	Lake View
Pyle Truck Line	Schaller	* Midwest Contentental	Sioux City
Raymond Freese Trucking	Lake View	National Gypsum	Fort Dodge
Roadway Express Inc.	Ames	* Nemaha Milling	Nemaha
Roadway Express Inc.	Sioux City	* Noble Popcorn	Sac City
Smithways Motor Express	Fort Dodge	Pepsi Cola	Carroll
* T-Bone Express	Sioux City	* Range Feed	Sac City & Ulmer
Van Wyk	Sheldon	Rosenthal	Sioux City
* Wall Lake Transfer	Wall Lake	Schroeder Feed Mills	Odebolt
Yellow Freight Syst.	Sioux City	* Schuster	Le Mars
* Yellow Freight Syst.	Fort Dodge	Stock Popcorn	Lake View
		* Sunwise Systems	Sac City
		* U.S. Gypsum	Fort Dodge
		Wall Lake Fertilizer	Wall Lake
		* Williams Milling	Sac City

* Signifies firms responding to survey. Note two motor carrier firms chose to remain anonymous.

HIGHWAY 20 SHIPPER/RECEIVER SURVEY

Two-Lane Route Portion From Sioux City to Fort Dodge

1991

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 use any portion of Highway 20 between Sioux City and Fort Dodge, check here _____ and complete this survey. If your trucks (your own or for hire motor carriers) do not use this portion of Highway 20, explain why you do not, answer question 21, and return this survey without answering questions #2 - 20.

2. How many of your firm's plants or sites use trucks that use this portion of Highway 20, 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)	Number of Annual Truck 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 Highway 20 (a portion between Sioux City and Fort Dodge)
- _____ % use the entire Highway 20 distance (between Sioux City and Fort Dodge)
- _____ % do not use Highway 20 at all
- 100% total trucks to/from the sites

4. Of your firm's total cost of doing business at the above sites, what percent of the total cost is trucking cost?

- _____ % is trucking cost

5. 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

6. Approximately what percentage of your expenditures on for-hire motor carrier service at locations indicated in question #2 is spent on:

- _____ less-than-truckload (LTL) carrier service
(LTL service normally is defined to include shipments less than 10,000 pounds but not small package service)
- _____ truckload (TL) carrier service
- _____ small package service (e.g., UPS)

7. Based upon truck shipments that use this portion of Highway 20, 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%

8. What is the primary geographical DESTINATION of the majority of your firm's commodity shipments by truck moving from the Highway 20 area (circle only one)

- | | |
|---------------------------------------|--|
| a. International | d. Intrastate (within Iowa) |
| b. National (outside adjacent states) | e. Local (in or around your community) |
| c. Regional (among adjacent states) | |

9. What is the primary geographical ORIGIN of the majority of your firm's inputs transported by truck to the Highway 20 area (circle only one)

- | | |
|---------------------------------------|--|
| a. International | d. Intrastate (within Iowa) |
| b. National (outside adjacent states) | e. Local (in or around your community) |
| c. Regional (among adjacent states) | |

TRUCKING PROBLEMS WITH EXISTING HIGHWAY 20

10. For your freight movements that use this portion of Highway 20, what are the major trucking difficulties, where are the problems, and how severe are they? _____

11. If you identified trucking problems in using this portion of Highway 20, indicate the degree to which they affect the following: (0 - no impact, 10 - worst impact)

Problem	Level of Severity (0 - 10)
Speed (time in transit)	_____
Reliability (variation in time of delivery)	_____
Loss and Damage to Goods	_____
Cost of operating your trucks	_____
Other (specify) _____	_____

12. Is the existing condition of this segment of Highway 20 in any way retarding your firm's growth, market or competitive position or is it detrimental to your firm in any other way? Explain:

13. From your firm's trucking perspective, which are the two greatest Highway 20 problems as you see them? (indicate "1" for the greatest trucking problem, indicate "2" for the second greatest trucking problem. Do not check more than two).

- Sioux City to Early, or
- Early to Rockwell City, or
- Rockwell City to Fort Dodge, or
- Small communities along the route, or
- Other problems (identify) _____

14. Overall, how would you rate existing Highway 20 between Sioux City and Fort Dodge as a trucking route:

- a. excellent
- b. good
- c. average
- d. poor
- e. unsatisfactory

POSSIBLE IMPROVEMENTS TO HIGHWAY 20

15. The state could build bypasses around the small communities, build additional passing lanes, reconstruct portions of the highway on improved alignment, eliminate the at-grade intersection stops, build 4-lane portions of the highway or make the entire segment 4 lanes. 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? Explain why: _____

16. Would such an improvement help your firm? In what ways?

17. If you are now using railroad service to meet part of your transportation needs to and from your facilities at locations listed in question 2 above, would this improvement in Highway 20 affect the amount of use of rail service vis-a-vis trucking? Yes _____ No _____ If "yes," to what extent; if "no," why not?

18. If this portion of Highway 20 were 4-lane, what would your firm do that it is not currently doing?

FUTURE

19. In terms of your firm's trucking volumes that use this portion of Highway 20 under its existing condition, do you expect your firm's truck volumes over the next 10 years to:
- a. Decline
 - b. Stay about as they are
 - c. Increase a little
 - d. Increase a great deal

20. Do you have any other comments that would help the Iowa Department of Transportation to decide the best course of action on Highway 20 between Sioux City and Fort Dodge? _____

21. 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: Marty Sankey – Iowa DOT (515) 239-1034, or
Robert Zuelsdorf – Wilbur Smith Associates (515) 280-5310
Robert Holsinger – Wilbur Smith Associates (515) 280-5310

Return this questionnaire in the enclosed prepaid envelope to: Highway 20 Shipper Survey
Wilbur Smith Associates
104 S.W. 4th Street
Des Moines, Iowa 50309

Thank you.

HIGHWAY 20 MOTOR CARRIER SURVEY

Two-Lane Route Portion From Sioux City to Fort Dodge

1991

YOUR FIRM'S EXISTING TRUCK OPERATIONS

1. Your firm has been identified as one which uses Highway 20. If some of your trucks use any portion of Highway 20 between Sioux City and Fort Dodge, check here _____ and complete this survey. If your trucks do not use Highway 20, explain why you do not use Highway 20, answer question 17, and return this survey without answering questions #2 - 16.
-
-

2. Which of the following describe your firm's operations and cargoes on Highway 20? (Mark x before the appropriate responses)

- | | | |
|------------------------------|-------|---------------------------|
| General Freight Carriage | _____ | Truckload (R) |
| | _____ | Less-Than-Truckload (LTL) |
| | _____ | Both TL and LTL |
| | | |
| Specialized Freight Carriage | _____ | Heavy machinery |
| | _____ | Liquid petroleum |
| | _____ | Refrigerated products |
| | _____ | Agricultural products |
| | _____ | Motor vehicles |
| | _____ | Building materials |
| | _____ | Household goods |
| | _____ | Hazardous materials |
| | _____ | Other (specify) |
| | _____ | _____ |

3. Which one of the following best describes your firm's primary geographical coverage?

- | | |
|-------------|---------------|
| a. National | c. Intrastate |
| b. Regional | d. Local |

4. If your trucking firm has truck terminals in the Highway 20 corridor, where are they located, about how many truck trips per year carry freight to or from these sites, and if you are an LTL carrier, are the terminals break bulk or end-of-the-line (pickup and delivery terminals).

Truck Terminal or Site Location (Town or County)	No. of Annual Truck Trips	If LTL Carrier:	
		Break Bulk	End-of-the-Line
Site #1: _____	_____	_____	_____
Site #2: _____	_____	_____	_____
Site #3: _____	_____	_____	_____
Site #4: _____	_____	_____	_____
Site #5: _____	_____	_____	_____

5. Of all trucks entering/leaving the above sites annually, as listed above, what percent use:

- | | |
|-------|---|
| _____ | a portion of Highway 20 (a portion between Sioux City and Fort Dodge) |
| _____ | the entire distance (between Sioux City and Fort Dodge) |
| _____ | do not use Highway 20 (use other routes) |
| 100% | total trucks to/from the truck terminals |

6. In addition to the truck use of the above listed trucking terminals, how many other annual truck trips do your trucks have on Highway 20 that do not use the terminals? _____ annual truck trips not using the terminals.

TRUCKING PROBLEMS WITH EXISTING HIGHWAY 20

7. For your operations that use this portion of Highway 20, what are the major trucking problems where are the problems, and how severe are they? _____

8. If you identified trucking problems in using this portion of Highway 20, indicate the degree to which they affect the following: (0 - no impact, 10 - worst impact)

Problem	Level of Severity (0 - 10)
Speed (time in transit)	_____
Reliability (variation in time of delivery)	_____
Loss and Damage to Goods	_____
Cost of operating your trucks	_____
Other (specify) _____	_____

9. Is the existing condition of this segment of Highway 20 in any way retarding the nature of your operations, your firm's growth, market or competitive position or is it detrimental to your firm in any other way? Explain:

10. From your firm's trucking perspective, which are the two greatest Highway 20 problems as you see them? (indicate "1" for the greatest trucking problem, indicate "2" for the second greatest trucking problem. Do not check more than two).

- _____ Sioux City to Early, or
- _____ Early to Rockwell City, or
- _____ Rockwell City to Fort Dodge, or
- _____ Small communities along the route, or
- _____ Other problems (identify) _____

11. Overall, how would you rate existing Highway 20 between Sioux City and Fort Dodge as a trucking route:

- a. excellent
- b. good
- c. average
- d. poor
- e. unsatisfactory

POSSIBLE IMPROVEMENTS TO HIGHWAY 20

12. The state could build bypasses around the small communities, build additional passing lanes, reconstruct portions of the highway on improved alignment, eliminate the at-grade intersection stops, build 4-lane portions of the highway or make the entire segment 4 lanes. Recognizing that these are your tax dollars at work and money spent in one place cannot be used in another place, what (from your trucking standpoint) do you think the state should do? Explain why: _____

13. Would such an improvement help your firm? In what way? _____

14. If this portion of Highway 20 were 4-lane, what would your firm do that it is not currently doing?

FUTURE

15. In terms of your firm's trucking volumes that use this portion of Highway 20 under its existing condition, do you expect the truck volumes over the next 10 years to:

- a. Decline
- b. Stay about as they are
- c. Increase a little
- d. Increase a great deal

16. Do you have any other comments that would help the Iowa Department of Transportation to decide the best course of action on Highway 20 between Sioux City and Fort Dodge? _____

17. 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: Marty Sankey – Iowa DOT (515) 239-1034, or
Robert Zuelsdorf – Wilbur Smith Associates (515) 280-5310
Robert Holsinger – Wilbur Smith Associates (515) 280-5310

Return this questionnaire in the enclosed prepaid envelope to: Highway 20 Trucking Survey
Wilbur Smith Associates
104 S.W. 4th Street
Des Moines, Iowa 50309

Thank you.

Type of Truck Travel: Exhibit 6-11 presents the terminal locations of those shippers/receivers and motor carriers that responded to the survey. Of the 27 motor carrier terminals, 17 are on U.S. 20 (12 in Sioux City or Fort Dodge). Of the 18 shipper/receiver locations, 9 are on U.S. 20 and 9 are at off-corridor locations.

Exhibit 6-12 identifies the number of daily truck trips to and from the terminals that use U.S. 20. These only reflect the statistics from the firms that responded to the survey. They are not necessarily representative of all firms in the region.

- Of the 16 shipper/receivers, 71% of their trucks use U.S. 20 for truck carriage (51% use a portion of the Sioux City-Ft. Dodge segment, 20% use the entire Ft. Dodge-Sioux City segment). The 29% of truck trips that do not use U.S. 20 either are located at the highway corridor's end points or are off the highway.
- Of the 16 trucking firms, 39% of their truck trips are on U.S. 20 and 61% of their truck trips do not use U.S. 20. This is natural, since the trucking firms have trucks going in all directions, with only one direction served by this segment of U.S. 20.
- Overall, these statistics suggest that half or more (55%) of total truck trips in the area use U.S. 20. This is not unexpected.

**Exhibit 6-12
TRUCK TRIPS TO/FROM TERMINALS
Survey Response Data**

	<u>SHIPPERS</u>		<u>TRUCKERS</u>		<u>TOTAL</u>	
	<u>Trucks</u>	<u>Percent</u>	<u>Trucks</u>	<u>Percent</u>	<u>Trucks</u>	<u>Percent</u>
Reported Terminal Trips						
Entire Route	3,700	20%	5,800	8%	9,500	10%
Portion of Route	9,400	51%	22,300	31%	31,700	35%
Do Not Use U.S. 20	5,500	29%	44,400	61%	49,900	55%
Total Annual Terminal Trips	18,600	100%	72,500	100%	91,100	100%

Source: Shipper, Receiver, Trucking Firms Survey.
Wilbur Smith Associates

Commodities Transported: The principal commodities transported in the study impact area, as reported by the survey respondents, are agricultural products, refrigerated foods, building materials, agricultural chemicals and fertilizer. Approximate shares are listed in Exhibit 6-13.

**Exhibit 6-13
PRINCIPAL COMMODITIES TRANSPORTED
Survey Response Data**

<u>Commodity</u>	<u>NUMBER OF RESPONSES</u>	
	<u>Shipper/Receiver</u>	<u>Motor Carrier</u>
Heavy Machinery	--	3
Refrigerated Foods	2	8
Agricultural Products	8	3
Building Materials	4	1
Hazardous Materials	--	2
Manufactured Goods	2	1
Livestock	1	1
Ag. Chem./Fertilizer	5	--

Source: Shipper, Receiver, Trucking Firm Surveys
Wilbur Smith Associates

Perceived U.S. 20 Deficiencies: The major trucking problem experienced along U.S. 20 is the lack of opportunity to pass slower moving traffic. Of the 32 responding firms, 20 indicated problems on U.S. 20 such as slow traffic, farm vehicles, rolling hills (especially Early to Merville), small towns and narrow roads. The trucking industry's perceived impact severity on a scale of 0-10 (10 being most severe) that the lack of passing opportunities has is shown in Exhibit 6-14.

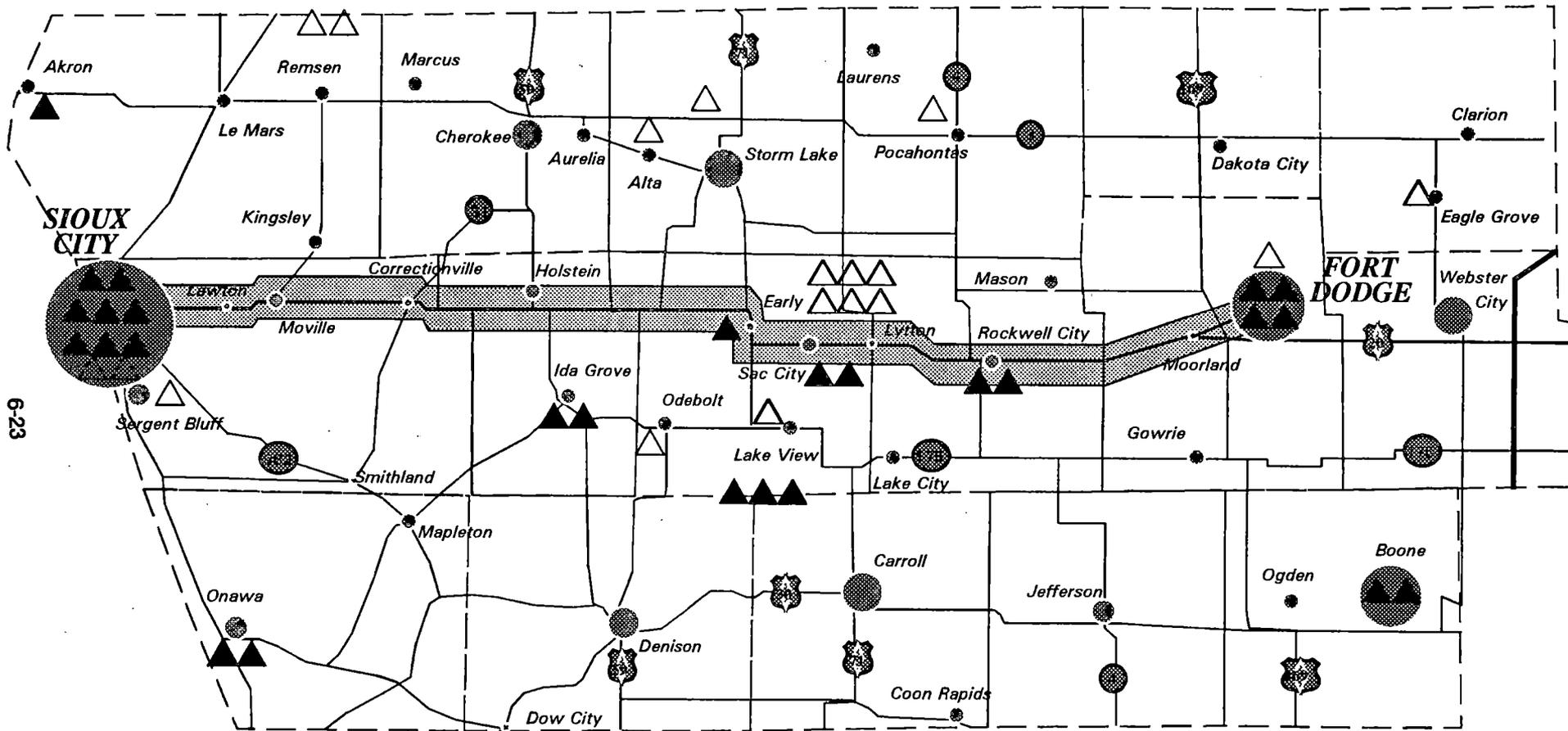
**Exhibit 6-14
LACK OF PASSING OPPORTUNITY IMPACTS
ON TRUCKING
Survey Response Data**

<u>TRUCKING PROBLEM</u>	<u>AVERAGE DEGREE OF SEVERITY</u>
Speed (time in transit)	7.5
Reliability (variation in time of delivery)	5.3
Loss and Damage to Goods	0.8
Cost of Operating Trucks	5.4
Other (Winter Driver aggravation, safety, and lack of truck stops)	1.8

Note: "0" is no problem; "10" is most severe problem

Source: Shipper, Receiver, Trucking Firms Survey
Wilbur Smith Associates

SURVEY RESPONDENTS' TERMINAL LOCATIONS



6-23

△	Shipper/Receiver Terminal Locations
▲	Motor Carrier Terminal Locations

The lack of passing opportunities has a major perceived impact on truck speed (time in transit). The second major impact, cost of operating trucks, is a result of the need to accelerate and decelerate which raises fuel costs as well as straining braking systems. The other significant issue, reliability, arises when late shipments hold up other work tasks and cause unnecessary overtime expense.

According to the survey, the two most severe problem locations along the corridor are from Sioux City to Early and in the small communities all along the route. Overall, U.S. 20 was rated by the survey respondents as a little below average as a trucking route. The overall ratings assigned to U.S. 20 as a truck route are listed in Exhibit 6-15. The trucking firms view U.S. 20 as average, or below average.

Exhibit 6-15
U.S. 20 RATING AS A TRUCK ROUTE
Survey Response Data

<u>U.S. 20 AS A</u> <u>TRUCK ROUTE</u>	<u>NUMBER OF RESPONSES</u>		
	<u>Shipper/</u> <u>Receivers</u>	<u>Motor</u> <u>Carriers</u>	<u>Total</u>
Excellent	2	0	2
Good	2	1	3
Average	5	9	14
Poor	5	4	9
Unsatisfactory	1	2	3

Source: Shipper, Receiver, Trucking Firms Survey
 Wilbur Smith Associates

Impact of Corridor: Of the 32 respondent firms, over half do not feel that U.S. 20 in its present condition is retarding their growth or competitive position. Of those firms that do believe U.S. 20 is retarding growth or competitive position, the most frequently cited reason was the lack of 4 lanes from Sioux City to Chicago which often leads to the need to use Interstate 80 rather than U.S. 20.

Desired U.S. 20 Improvements: A significant majority (67 percent) of the freight industry's responses think U.S. 20 should be four lanes with bypasses. An additional 20 percent think that passing lanes and town bypasses should be built. One respondent, however, thought the money would be better spent on area railroads.

Effect of U.S. 20 Improvements: The perceived impact on the freight industry of building a four lane highway from Ft. Dodge to Sioux City are reduced travel times, relieved truck operating costs and shipping costs, and possibly the attraction of new businesses (both trucking and manufacturing).

INTERSTATE HIGHWAY TRUCKING SURVEYS

Trucking surveys were also conducted on I-80 and I-90. These surveys were intended to ascertain what truck traffic might be inclined to use U.S. 20 if it were improved. Trucks were directed into the weigh stations on I-80 and I-90 and the truck drivers were asked questions concerning origin and destination and haul nature. These surveys were conducted in weigh stations near Avoca, Iowa (I-80) and Worthington, Minnesota (I-90) in conjunction with truck safety inspections. Of particular interest were any trucks with origin/destination patterns that could conceivably use U.S. 20. In addition, the trucks were also checked as to whether they carried hazardous material. The surveys were conducted from 1:00 PM to 10:00 with an hour break between 5:00 and 6:00 PM at the two weigh stations. The I-80 surveys were conducted on westbound traffic on November 21, and on I-90 Eastbound traffic on November 11. The I-80 survey form is depicted in Exhibit 6-16. Exhibit 6-17 presents the I-80 and I-90 truck origin/destination results. These are raw, unfactored survey results.

Interstate 80 Truck Survey Results: The I-80 survey results indicate that nearly half(46.7%) of the truck traffic on I-80 at this location has one trip end in Nebraska. The other trip ends are spread over a wide area. Nearly 38 percent of the I-80 truck trips begin in Iowa and over 20 percent begin in Illinois. The truck traffic desires Map, Exhibit 6-18, show the origin and destination of all 718 surveyed trucks.

Time - _____
 Date - _____

INTERSTATE 80 TRUCKING SURVEY

(Relative to U.S. 20 Corridor 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 6-17
INTERSTATE TRUCK ORIGIN AND DESTINATION RESULTS
1991

I-80 Truck Survey - Westbound

ORIGIN	DESTINATION							TOTAL	PERCENT
	Iowa	Nebraska	N. Dakota	S. Dakota	NW U.S.	SW U.S.	West		
Iowa	35	168	1	15	8	6	39	272	(37.9%)
Illinois	6	80		1	13		49	149	(20.8%)
Minnesota	3	14				2	14	33	(4.6%)
Wisconsin	1	16			1	1	30	49	(6.8%)
East U.S.	8	48	1	4	29	1	106	197	(27.4%)
Southeast U.S.	2	8			3		3	16	(2.2%)
Southwest U.S.		1					1	2	(0.3%)
TOTAL	55	335	2	20	54	10	242	718	
PERCENT	(7.7%)	(46.7%)	(0.3%)	(2.8%)	(7.5%)	(1.4%)	(33.6%)		

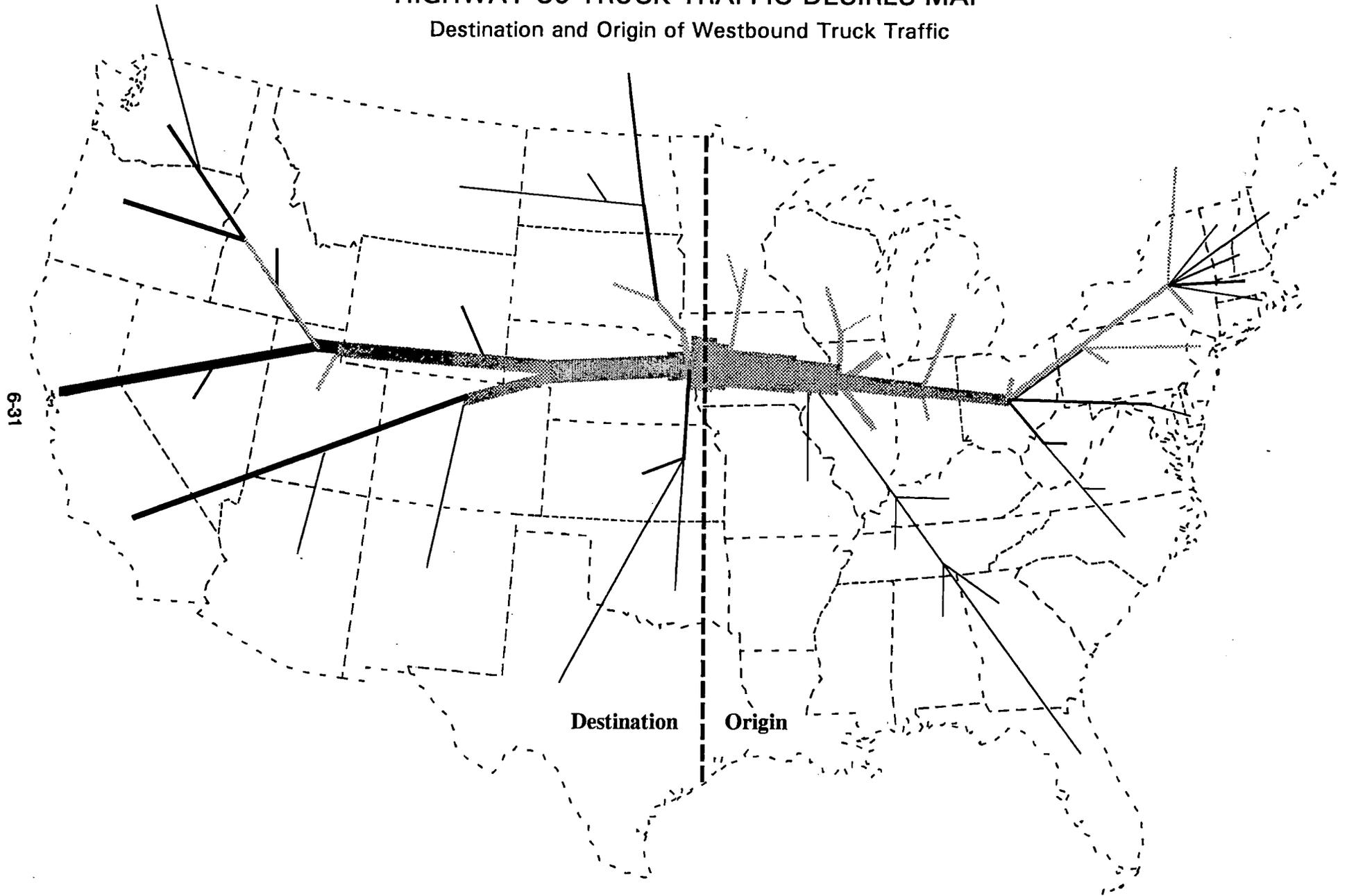
I-90 Truck Survey - Eastbound

ORIGIN	DESTINATION						TOTAL	PERCENT
	Iowa	Illinois	Minnesota	Wisconsin	East U.S.	SE U.S.		
Iowa		1	10	6	3		20	(10.8%)
Minnesota	7	3	11		3	1	25	(13.4%)
North Dakota			1	1	2		4	(2.1%)
Nebraska	1		5	4			10	(5.4%)
South Dakota	17	19	25	14	21	3	99	(53.2%)
Northwest	1	2	2	8	4		17	(9.2%)
Southwest U.S.	2		1	1			4	(2.1%)
West		1	4	1	1		7	(3.8%)
TOTAL	28	26	59	35	34	4	186	
PERCENT	(15.1%)	(14.0%)	(31.7%)	(18.8%)	(18.4%)	(2.1%)		

NOTE: These tables indicate the number of truck drivers surveyed on the two Interstates, by truck trip origin and destination. The statistics are not factored in any way. Any region not listed had zero trucks surveyed.

SOURCE: Wilbur Smith Associates

Exhibit 6-18
HIGHWAY 80 TRUCK TRAFFIC DESIRES MAP
Destination and Origin of Westbound Truck Traffic



Major Origins

37.9 percent of truck traffic (274 trips) begin in Iowa.

20.8 percent of truck traffic (130 trips) begin in Illinois.

10.4 percent of truck traffic (75 trips) begin in Northern Iowa & Wisconsin.

Major Destinations

26.7 percent of truck traffic (193 trips) end in Omaha.

12.2 percent of truck traffic (88 trips) end in Lincoln.

54.5 percent of truck traffic (394 trips) end in Nebraska and Sioux City.

17.4 percent of truck traffic (126 trips) end in Colorado and Southern California.

21.3 percent of truck traffic (154 trips) end on the West Coast.

Of the total truck trips, 75 trips or 10.4 percent of all of the truck traffic on I-80 originates in the Northern Iowa - Wisconsin area. These are examples of truck trips that could possibly use U.S. 20 if it were improved.

Interstate 90 Truck Survey Results: The I-90 survey results indicate that over half (53.2%) of the traffic originates in South Dakota, and the traffic destinations are spread over the Minnesota, Iowa, Wisconsin and Illinois area. The Truck Traffic Desires Map, Exhibit 6-19 summarizes the origin and destination of all 191 surveyed trucks. The major origin and destination areas for this traffic are:

Major Origins

53.2 percent of truck traffic (99 trips) begin in South Dakota.

25.7 percent of truck traffic (49 trips) begin in Northwestern Iowa and Southwestern Minnesota.

77.4 percent of truck traffic (144 trips) begin in South Dakota, Minnesota and Iowa.

26.2 percent of truck traffic (50 trips) begin south of I-90.

Major Destinations

31.7 percent of truck traffic (59 trips) ends in Minnesota.

15.1 percent of truck traffic (28 trips) end in Iowa.

18.8 percent of truck traffic (35 trips) end in Wisconsin.

14.0 percent of truck traffic (26 trips) end in Illinois.

The survey indicates that the vast majority of originating eastbound truck traffic (144 trips) on I-90 is from South Dakota, Minnesota and Iowa. Considering the direct route that I-90 provides eastbound, no significant shift of South Dakota or Minnesota traffic could be anticipated if U.S. 20 were to be improved. Of the 120 Iowa truck trips, only 1 was destined for Illinois.

STUDY IMPLICATIONS

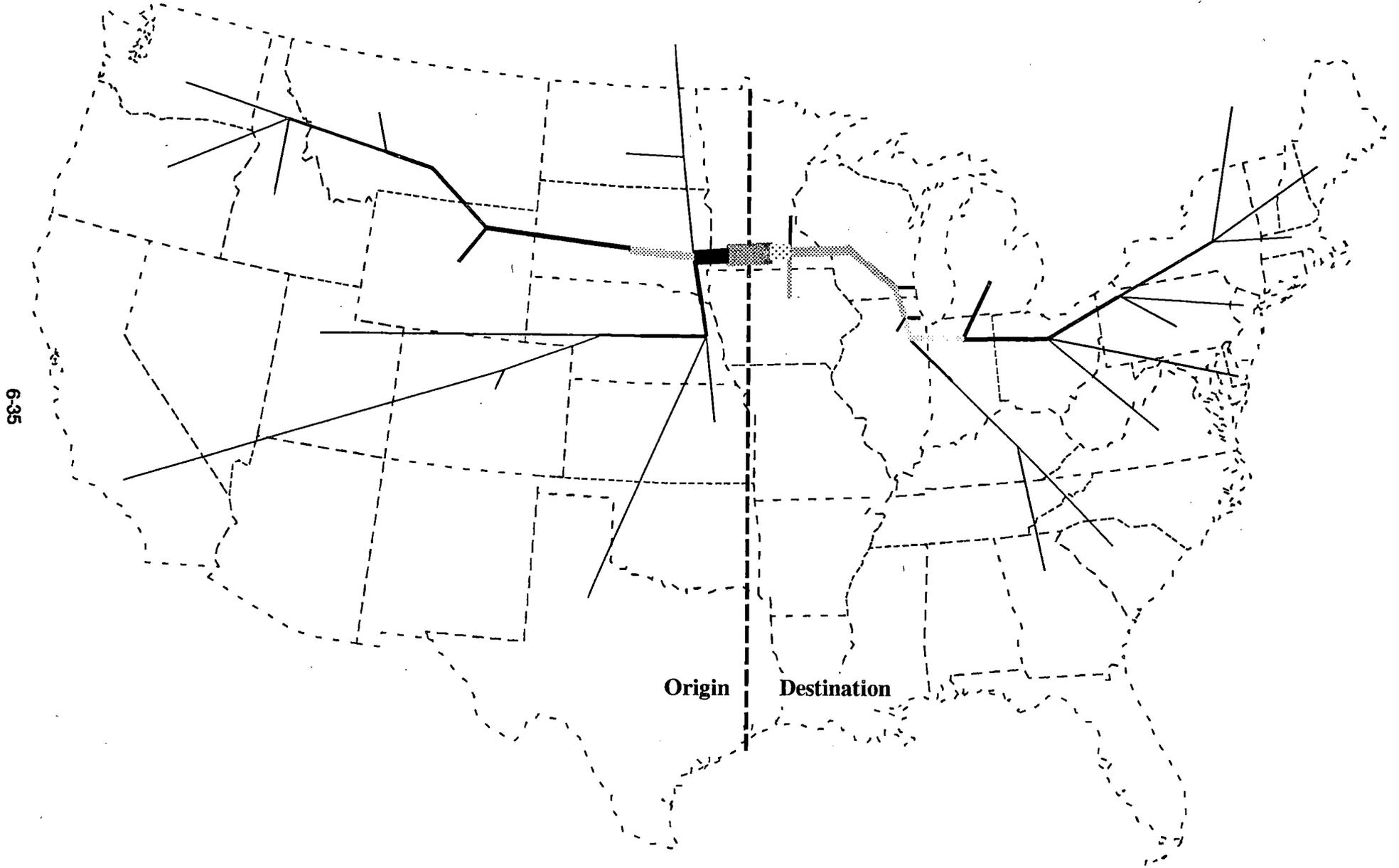
The freight work conducted to date suggest a number of things relevant to the study and its conduct. These include:

- Trucks constitute 6.2% to 26.5% of traffic on U.S. 20, depending on the location. These are overwhelmingly "local service" trucks; U.S. 20 is not a through route for trucks due to its 2-lane configuration.
- Light truck traffic is declining, while large truck traffic is increasing (it is increasing faster than auto traffic).
- The truckers are most concerned with passing difficulties on U.S. between Sioux City and Early and resulting speed, cost, and reliability implications and the problems of passing through small turns along the route.
- Based on the Interstate surveys, few (if any) trucks would divert from I-90 if U.S. 20 were a four-lane facility, but more potential lies with trucks on I-80. Ten percent or more are potentially divertable from I-80.
- Truckers in the U.S. 20 primary impact area tend to utilize the Interstate highways for long distance east-west travel, rather than using U.S. 20.

Exhibit 6-19

HIGHWAY 90 TRUCK TRAFFIC DESIRES MAP

Origin and Destination of Eastbound Truck Traffic



6-35

Chapter 7

U.S. 20 ROLES AND OPTIONS

In this Task A report, existing conditions involving U.S. 20 were investigated. These existing conditions lead to certain conclusions regarding the roles which the existing highway is playing, and conclusions concerning the suitability of U.S. 20 in terms of performing these roles. In turn, insights are gained in terms of alternative roles for the highway which could lead to the alternative improvement options to be considered,

EXISTING U.S. 20 ROLES

Based upon a review of existing conditions and travel characteristics, it is possible to identify roles and functions that U.S. 20 serves. The following are some of these important functions. These should not be considered as an exhaustive list; instead they provide a sense of the breadth of functions the highway serves.

- Providing east-west mobility for people living and working in the Corridor, as well as access to regional highways (only 8 percent of all travel on U.S. 20 can be classified as "through" traffic);
- Providing access to regional post-secondary schools in Sioux City, Storm Lake and Ft. Dodge; as well as serving school bus operations, particularly during adverse weather conditions;
- Providing access to health service functions in Sioux City and Ft. Dodge, as well as to a lesser degree in Storm Lake and Carroll;
- Providing access to recreational opportunities at Storm Lake and along the Missouri River;
- Providing service to public agencies such as fire, mail delivery and emergency medical services;
- Connecting small businesses such as convenience stores, restaurants, service stations and other commercial establishments with both markets and suppliers;

- Linking industries in the Corridor to their markets, suppliers and employees;
- Serving agricultural, industrial and commercial trucking activities within, and to a limited degree, outside the Corridor;

These example roles indicate that U.S. 20 is used overwhelmingly for local access purposes. In its present form, U.S. 20 is not conducive to "through" traffic. Other highways, particularly I-80 and I-90, serve this through traffic function.

HIGHWAY SUITABILITY AND DEFICIENCIES

The roles and functions of U.S. 20 are partly influenced by the market it serves, and the existing condition of the highway itself. Later stages of this study will examine the impact of highway improvements on growth and economic vitality; however, based on the analyses of the existing infrastructure, several conclusions can be drawn about the suitability and deficiencies of U.S. 20 relative to the highway's existing roles.

Connectivity: U.S. 20 currently serves primarily local traffic. Only about 8 percent of all travel in the Corridor is through traffic, partly because U.S. 20 does not have good connections west of I-29 and east of I-35. While the State of Iowa is working on upgrading links between I-35 and Cedar Falls, U.S. 20 in both Illinois and Nebraska are not competitive with other routes such as I-80. Therefore, to be a true "through" route, more would be needed than merely upgrading the U.S. segment between Sioux City and Ft. Dodge.

Efficiency: This portion of U.S. 20 has several characteristics which make it not desirable for long distance travel, and less desirable for local traffic. These characteristics include:

- **Passing Restrictions:** 48 miles of the 119 mile Corridor are posted and signed as no passing zones.
- **Urban Sections:** U.S. 20 passes through a number of communities which necessitates a reduction in speed, which in turn increases travel time and increases vehicle operating costs. These communities and the speed limits are

Correctionville	- 45 mph
Early	- 35 mph
Sac City	- 25-35 mph
Lytton	- 35 mph
Rockwell City	- 25-45 mph

Traffic signals and stop signs in some of these towns further impede efficient movement of traffic.

- Design Standards: Almost 22 miles of the highway are built to a high standard four lane design. However, on the two lane portions of the highway, there are sections with narrow shoulders, steep grades, and in one instance a sharp curve. These are of concern from both operational and safety standpoints.
- Traffic Safety: U.S. 20 may be characterized as a reasonably safe facility. Nevertheless, the urban sections have substantially higher accident rates than would be the case if the towns were bypassed, and three rural two lane segments have accident severity rates significantly higher than statewide averages.
- Level of Service: U.S. 20 provides an acceptable level of service under existing traffic conditions. Traffic congestion does not seem to be a problem anywhere along the highway.

ROLE AND IMPROVEMENT ALTERNATIVES

In determining which improvement alternatives to consider later in this study, it is a requisite that the improvement options be related to the roles envisaged for the highway. Two alternative roles will be considered.

- Subarea Highway - This is the role currently played by U.S. 20. The highway serves a region of Iowa, principally as an intermediate access road to the area between I-80 and I-90. The Consultant will devise improvement alternatives that are tailored to this role.
- Multi-State Regional Highway - This role would cause U.S. 20 to become a more major highway that autos and trucks will use for longer distance trips. Under this scenario, the highway would become more of a competitor with I-80 and I-90. The Consultant will also devise improvement alternatives that are tailored to this role. These alternatives will likely be examined with and without highway improvements on each end in Nebraska, Iowa and Illinois.

Therefore, the next phases of this study will evaluate the U.S. 20 segment initially unto itself, with improvements only between Sioux City and Ft. Dodge. Then the broader context will be evaluated, to see whether or not it is feasible to make U.S. 20 a higher standard, multi-state highway. Relative to the latter, it will be important to recognize what might be needed in the adjacent states. At this time only the following is known.

Illinois: Eleven miles east of Dubuque, U.S. 20 becomes a two lane highway for 56 miles (essentially between Galena and Freeport). It then continues as a four lane highway bypassing Rockford to the south before tying into I-90, which provides direct access to Chicago. At the present time, the Illinois DOT Five Year Plan is oriented to urban congestion relief. Limited funds will be available for rural highway projects, but there are a number of competing corridors (such as U.S. 67, which was appropriated \$2.5M for environmental impact studies in the 1992 ISTEA). Still, there is a special interest group in Illinois which is lobbying for improvements to U.S. 20.

Nebraska: U.S. 20 is a two lane, rural highway serving the sparsely populated northern region of Nebraska from eastern to western borders of the state. There are no long range plans to widen most of the highway, but recent origin/destination studies conducted in the northeastern portion of the state have led the Nebraska Department of Roads to consider the feasibility of creating highway improvements in a general corridor linking South Sioux City, Norfolk, Columbus and Grand Island. Grand Island is connected to I-80 by a four lane section of U.S. 34.

The impact of these potential highway improvements on travel demands for the portion of U.S. 20 included in this study will be considered during later stages of the U.S. 20 Corridor Development Study.