

CHAPTER III

Affected Environment, Environmental Consequences and Measures to Minimize Harm

This chapter describes the affected environment, the environmental consequences and measures to minimize harm associated with the reasonable alternatives and the recommended preferred alternative. This approach is consistent with FHWA's *Guidance for Preparing and Processing Environmental and Section 4(f) Documents* (FHWA Technical Advisory T6640.8A, October 30, 1987).

The *affected environment* is the existing social, economic and environmental settings for the area affected by the reasonable alternatives. The affected environment is described for each resource of concern in the project area. The discussion contains data, information, issues and values that would have a bearing on possible impacts, mitigation measures and the selection of the recommended preferred alternative.

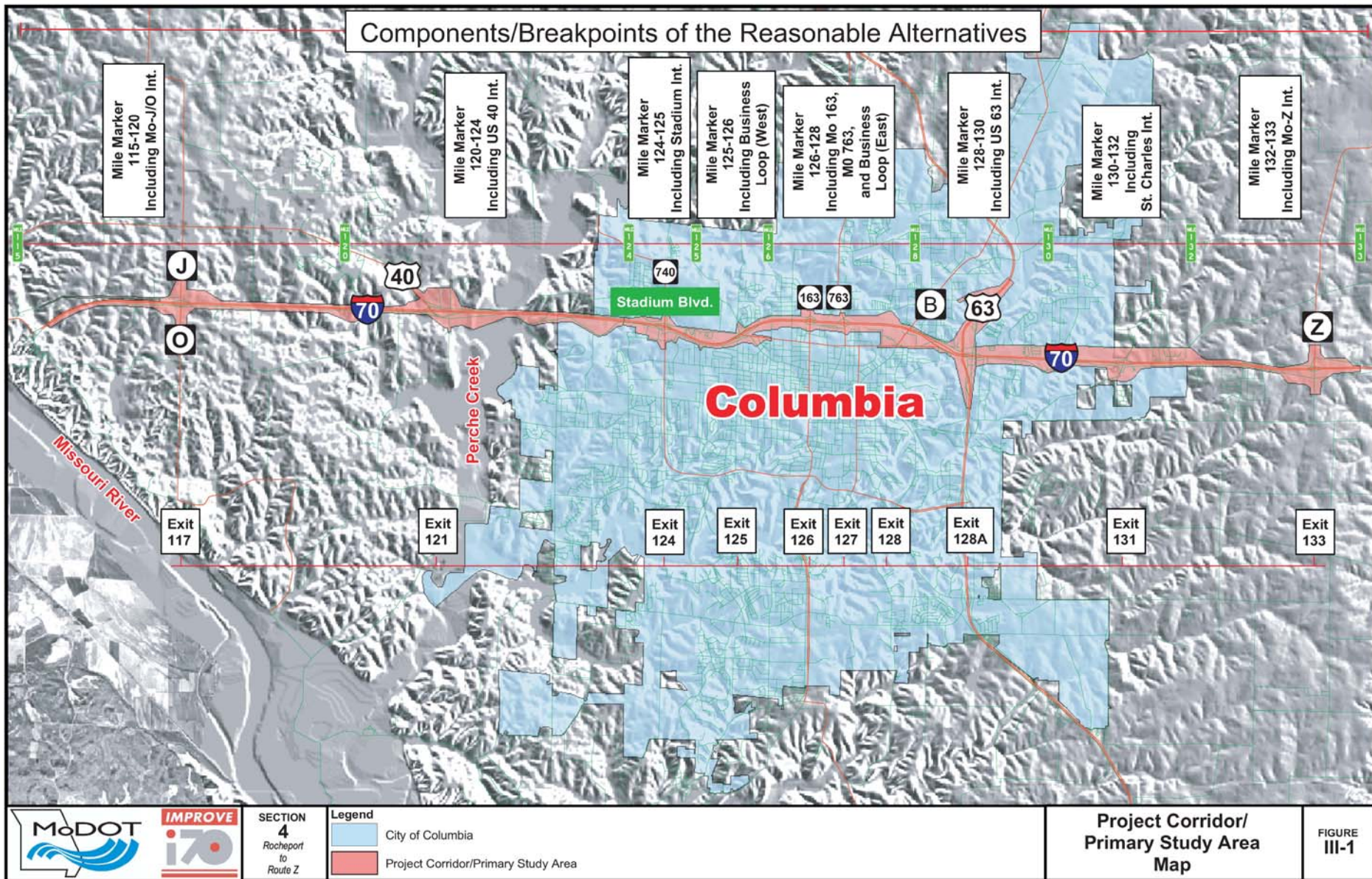
Environmental consequences are the probable beneficial and adverse social, economic and environmental effects of the reasonable alternatives under consideration. The information provides a basis for evaluating the comparative merits of the alternatives.

Measures to minimize harm are mitigative efforts that are proposed to reduce the identified impacts associated with the recommended preferred alternative.

A. Geographic Setting

The SIU 4 portion of I-70 is located in Boone County in central Missouri, passing through the city of Columbia north of the city's center. Columbia, the county seat, is the sixth largest city in Missouri and is located about midway between St. Louis and Kansas City. The western terminus of the 18-mile (28.9-km) project corridor is just west of the Missouri State Highway J/O (MO-J/O) interchange, about seven miles (11.3 km) west of Columbia. The corridor extends through Columbia to a point about three miles (4.8 km) east of Columbia, just east of the MO-Z interchange. Section of Independent Utility 4 is located in an area of transitional hills between the Ozarks of southern Missouri and flatter areas of northern Missouri. The topography along the corridor can generally be characterized as rolling, with medium and narrow ridges and moderate to steep valley side slopes. The corridor extends into the band of hills that border the Missouri River but ends east of the Missouri River floodplain. Elevations in the corridor range from approximately 580 feet (177 meters) National Geodetic Vertical Datum (NGVD) along the Perche Creek floodplain, west of Columbia, to about 890 feet (272 meters) near the eastern project terminus. **Figure III-1** depicts the location of the project, as well as the general topography of the region. It also depicts the general extent of the project corridor or primary study area described within the affected environment sections of this text. The directly impacted areas associated with the reasonable alternatives are shown on the exhibits located at the end of this chapter.

Figure III-1: Project Corridor/Primary Study Area Map



B. Social and Economic Characteristics

1. Affected Environment

The purpose of this section is to provide an overview of social and economic trends, characteristics and development activity within the primary study area/project corridor and in the surrounding region. This section describes key community resources—the public and private facilities, institutions, community services and associations—that promote neighborhood and community cohesion, public safety, quality-of-life and access to business and social opportunities.

a. Demographic and Economic Profile

For this baseline profile of demographic, economic and social trends, the primary study area is defined as those Census blocks and Census block groups within 0.25 mile (.4-km) area of existing I-70 (extending to a 0.5 mile [.8-km] radius area around the existing interchanges). The primary study area is the immediate area that is expected to be most directly affected by the project. This area may also bear a greater share of the secondary impacts of the project, although the secondary impacts can be expected to extend beyond the primary study area.

The primary study area comprises one or more block groups within 13 census tracts in the city of Columbia. The trends and characteristics of the primary study area have been compared to the surrounding regions, including the city of Columbia and Boone County, to support a closer look at the neighborhoods and communities nearest I-70.

This baseline profile of demographic, economic and social characteristics considers population, race and ethnicity, employment, earnings by industry, median household income, per-capita income, poverty, educational attainment and housing.

Population and Racial and Ethnic Characteristics

The U.S. Census reported that a total of 43,152 people resided within the primary study area in 2000, accounting for 31.8 percent of the total 135,454 persons living in Boone County. The city of Columbia had 84,780 persons, accounting for 62.5 percent of the county's population. According to the U.S. Census, Whites are the largest racial group within the primary study area, comprising 80 percent of the area's residents. Nearly 14 percent of the total primary study area population characterized themselves as Black or African-American. Other minority populations comprised only a small portion of the population. Asians comprised 2.6 percent and American Indians 0.7 percent of the total 2000 population.

The primary study area added 13,225 persons between 1990 and 2000 (a 10-year growth rate of 44 percent). In 1990, the population within the primary study area was 29,927, and Whites comprised 87 percent of the total population. Blacks or African-Americans comprised 10.3 percent of the total population. Thus, during the 1990s the minority population of the primary study area grew at a faster rate than its non-minority white population. **Table III-1** summarizes population and economic characteristics of the study area and surrounding regions.

The city of Columbia experienced a 10-year growth rate of 22.6 percent, fueled by the 47 percent growth of the primary study area. In 1990, the city's total population was 69,101

compared to 84,780 in 2000. The percentage of the city population who characterized themselves as Whites decreased marginally from 85.2 percent of the total population in 1990 to 82 percent in 2000. The percentage of Blacks or African-Americans increased from 9.9 percent in 1990 to 10.7 percent in 2000. During the decade, Columbia saw an increase in other minorities, including Asian-Americans. The total minority population grew from 15.6 percent of total population in 1990 to 19.2 percent in 2000.

Similar to trends observed in the primary study area and the city of Columbia, Boone County's population increased from 112,379 in 1990 to 135,454 in 2000, a 10-year growth rate of 20.5 percent. Putting this growth in context, the primary study area accounted for 60 percent of Boone County's total population growth; the city of Columbia's growth accounted for 68 percent of Boone County's total residential growth. Most residents (86 percent) in Boone County characterized themselves as White. Areas outside the city of Columbia have fewer minorities. The percentage of Blacks or African Americans in the Boone County was found to be 8.4 percent, a lower percentage than either the primary study area or the city of Columbia, as reported by the U.S. Census for 2000.

Age Characteristics

The primary study area and Boone County exhibit fairly comparable age cohort patterns. The student population from the University of Missouri affects the city of Columbia's age cohort pattern. The significance of the university is evident in the fact that the single largest age-cohort in the city of Columbia is 19–24 year-olds. Eighty-six percent of all persons within Boone County who are 19-24 years old live within the city of Columbia.

Table III-1 summarizes population characteristics for the primary study area, the city of Columbia and Boone County. One interesting finding is that a larger proportion of the primary study area and Boone County consists of children and youths 12 years and younger than reported elsewhere in the city. Consistent with this fact, there are also more persons in the family-formation years of 25–34 years and 35–49 years residing within the primary study area and Boone County than the rest of the city of Columbia.

The percentage of persons older than 65 within the study area is 8.3 percent. The city of Columbia and Boone County had nearly similar percentages for persons older than 65.

Income and Poverty

Table III-1 also presents economic characteristics for the primary study area, the city of Columbia and Boone County. Residents of the primary study area have a slightly higher median household income than the residents of Columbia. The median household income in 1999 was \$37,349 for the primary study area, \$33,729 for the city of Columbia and \$37,485 for Boone County. By contrast, per-capita income in the primary study area was observed to be lower than reported for the city of Columbia and Boone County. Primary study area residents have a per-capita income of \$18,395 compared to \$19,507 in the city of Columbia and \$19,844 for Boone County residents.

**Table III-1: Population and Economic Characteristics of the Primary Study Area, 2000
Comparison of Primary Study Area with City of Columbia and Boone County**

	Primary Study Area		City of Columbia		Boone County	
	Number	%	Number	%	Number	%
<i>Race</i>						
White Alone	34,519	80.0	69,578	82.1	116,335	85.9
Non-Hispanic White	33,772	78.3	68,474	80.8	114,740	84.7
Hispanic White	747	1.7	1,104	1.3	1,595	1.2
Non-White Alone	8,633	20.0	15,202	17.9	19,119	14.1
Black or African-American	5,849	13.6	9,102	10.7	11,351	8.4
American Indian & Alaska Native	288	0.7	422	0.5	663	0.5
Asian Alone	1,103	2.6	3,574	4.2	3,865	2.9
Native Hawaiian & Other Pacific Islander	20	0.0	14	0.0	34	0.0
Other ^a	1,373	3.2	2,090	2.5	3,206	2.4
TOTAL	43,152	100.0	84,780	100.0	135,454	100.0
Minority Population ^b	9,380	21.7	16,306	19.2	20,714	15.3
Hispanic Origin	1,191	2.8	1,802	2.1	2,511	1.9
<i>Age (Years)</i>						
0–5	3,749	8.7	5,794	6.8	9,898	7.3
6–12	4,225	9.8	6,423	7.6	12,478	9.2
13–18	3,184	7.4	6,719	7.9	11,641	8.6
19–24	5,535	12.8	20,194	23.8	23,518	17.4
25–34	8,200	19.0	13,401	15.8	20,691	15.3
35–49	9,788	22.7	16,034	18.9	29,268	21.6
50–64	4,910	11.4	8,812	10.4	16,316	12.0
65 years & older	3,561	8.3	7,403	8.7	11,644	8.6
Total	43,152	100.0	84,780	100.0	135,454	100.0
Number of Households	18,312		33,689		53,094	
Female-Headed	2,342	12.7	3,404	10.1	5,325	10.0
Zero-Car	1,344	7.3	2,908	8.6	3,473	6.5
<i>Poverty</i>						
Persons Answering Question on Poverty	42,454		76,436		126,458	
Persons below Poverty	6,525	15.4	14,670	19.2	18,366	14.5
<i>Income</i>						
Per-Capita Income	\$18,395		\$19,507		\$19,844	
Median Household Income (1999) ^c	\$37,349		\$33,729		\$37,485	
Source: U.S. Department of Commerce, Bureau of Census, U.S. Census of Population and Housing, 2000.						
^a Includes 'some other race alone' and 'two or more races.'						
^b The total minority population includes all who are Black, Hispanic White, American Indian or Alaskan Native, Asian, Native Hawaiian, Other Pacific Islander and Other Categories.						
^c Median household income was calculated by taking the weighted average of the median incomes of all census tracts in a given study area.						

In 1999, 15.4 percent of the population within the primary study area lived below the poverty line (the 1999 poverty threshold for a family of four is \$17,029). The percentage of residents living below the poverty line was 19.2 percent in the city of Columbia and 14.5 percent in Boone County.

Along with the percentage of persons living below poverty, other demographic characteristics that help understand the levels of poverty were also examined. The percentage of female-headed households and zero-car households are demographic indicators that provide insight into poverty. Higher levels of poverty are generally associated with an increase in the number of female-headed households in any area. As presented in **Table III-1**, the percentage of female-headed households in the primary study area (12.7 percent) was higher than those observed in Columbia (10.1 percent) and Boone County (10.0 percent). The percentage of zero-car households in the primary study area was 7.3 percent in 1999, compared to 8.6 percent in Columbia and 6.5 percent in Boone County.

Educational Attainment

In general, the educational attainment levels for primary study area residents exceed that of Columbia and Boone County (see **Table III-2**). According to the 2000 U.S. Census data of persons 25 years of age or older, 63.4 percent of the primary study area residents, 49 percent of city residents and 53.2 percent of county residents were educated to the associate degree level. The city's share falls below the county's, in part because of the high proportion of college-age students among the city's residential population.

**Table III-2: Highest Level of Schooling Completed, 1990–2000
Persons Age 25 or Older**

Areas	Less than 9th Grade	9th to 12th Grade	High School Graduate	Some College, No Degree	Associate's Degree	Bachelor's Degree	Graduate or Professional Degree
Primary Study Area							
1990	6.5%	10.0%	27.4%	17.8%	5.9%	18.6%	13.8%
2000	3.1%	8.2%	25.4%	21.4%	5.3%	21.8%	14.4%
City of Columbia							
1990	5.0%	7.8%	19.8%	22.4%	—	23.6%	21.4%
2000	2.4%	6.1%	17.8%	18.5%	4.3%	26.5%	24.0%
Boone County							
1990	5.9%	9.3%	25.3%	17.7%	25.6%*		16.2%
2000	2.9%	7.5%	23.3%	19.5%	4.7%	23.1%	18.6%
<p>Source: U.S. Department of Commerce, Bureau of Census, U.S. Census of Population and Housing, 2000. * Indicates percent total of associate and bachelor's degree holders in 1990. — Data not available.</p>							

Social and Economic Characteristics within the Primary Study Area

To better understand the socioeconomic patterns of the communities within the primary study area, the individual block groups that lie immediately adjacent to I-70 were analyzed (see **Table III-3**). The existing interchanges on I-70 were used as the geographical limits to categorize block groups into separate subsections along the I-70 corridor. **Figure III-2** depicts the locations of the subsections referenced here. **Figures III-3** and **III-4** present the resulting spatial patterns of minority persons and persons in poverty within the primary study area.

Located between exits 128A and 131 (U.S. 63 to St. Charles interchange), subsection 9 has the largest population among all the project corridor subsections with 8,753 persons. It also has the most housing units and households among the primary study area subsections. Subsection 3 (U.S. 40 to Stadium Boulevard: exits 121–124) and subsection 7 (MO-763 to I-70 Business Loop [east]: exits 127–128) also have high population concentrations with 7,297 and 8,562 persons, respectively.

Subsection 4 (Stadium Boulevard to Business Loop [west]: exits 124–125) has the largest concentration of persons 65 years and older. Within subsection 4 is a block group (Census Tract 14.01, Block Group 3) that exhibits the largest concentration of persons older than 65, with 35.6 percent of all residents. The higher percentage of seniors in this block group can be attributed to the presence of three senior citizen centers.

Subsection 8 (Business Loop [east] to U.S. 63: exits 128–128A) exhibited the largest percentage of minorities with 32.7 percent of all residents classifying themselves as minorities at the time of the U.S. Census (2000). Subsections 6 and 7 have similar minority populations. Subsections 6 and 7 contain parts of several neighborhoods, including the North Central, Benton-Stephens, White Gate and Mexico Gravel neighborhoods.

Minority populations within the project corridor are concentrated primarily within the urban areas between exits 124 and 128A (subsection 4 through 8, Stadium Boulevard through U.S. 63). The block group with the largest concentration of minorities is located within subsection 4 (between exits 124 and 125). Nearly 79 percent of the total population of Census Tract 13, Block Group 1 identify themselves as minorities. Minority populations are also concentrated in two block groups of subsection 5, with 60.2 percent (Census Tract 9, Block Group 2) and 55.7 percent minority residents (Census Tract 7, Block Group 1). Several neighborhoods overlap these two subsections. High minority concentrations are found in the Parkade, Smithton Valley, Highland Park and Ridgeway neighborhoods. The neighborhood association boundaries are depicted in **Exhibit III-1**¹.

Persons living in poverty are also concentrated within the urban subsections (between exits 124–128A). Subsections 4, 6 and 8 have nearly identical aggregate percentages of persons living below poverty (23.2 to 24.4 percent). Within subsection 4, one block group (Census Tract 13, Block Group 1) had 64.3 percent of its residents living in poverty at the time of the U.S. Census in 2000. As noted, this block group also had the highest percentage of minorities among all study area block groups. Similarly, persons living below the poverty level can be found within part of subsection 6 (Census Tract 9, Block Group 1) where 40.5 percent of persons lived below the poverty level at the time of the U.S. Census.

¹ The Chapter III exhibits divide the project corridor into 10 panels (A through J), from west to east. The less visually dense portions of the project corridor utilize a 1' = 1,000' scale. The Columbia portions of the project corridor utilize a 1' = 500' scale. The panel breakpoints are the same for all of the exhibits.

A strong correlation can be found generally between lower per-capita incomes, minority persons and female-headed households residing within an area. Census Tract 18.03, Block Group 2, exhibits per-capita incomes of \$26,176, the highest among all study area block groups and the lowest percentage of minority persons (4.3 percent). By contrast, Census Tract 13, Block Group 1 has the highest percentage of minority persons (78.9 percent) and the lowest per-capita income (\$5,914).

With the exception of subsection 3 (U.S. 40 through Stadium Boulevard: exits 121–124) with only 18 percent of its residents being high school graduates, all other subsections have nearly similar percentages for this particular indicator. Block Group 6 within Census Tract 15.01 has the highest percentage (41.1) of high school graduates among all study area block groups.

According to the U.S. Census Bureau, a linguistically isolated household is one in which members 14 years and older have difficulty with English. The primary study area exhibits very low percentages of linguistically isolated households, suggesting that nearly all residents within the area are conversant in English. Block Group 2 in Census Tract 13 shows the highest percentage (2.5) of linguistically isolated households among the block groups in the study area. Persons of Asian origin comprise nearly 10 percent of the total population of this block group.

Table III-3: Socioeconomic Characteristics of Primary Study Area Distributed by Project Corridor Subsection

Subsection	Census Tract	Block Group	Population	Percent Minority	Percent Poverty	Percent of persons above 65 years	Households	Housing Units	Average HH Size
Subsection 1 (exits 115–117)	Census Tract 18.05	Block Group 3	1,238	6.6%	6.2%	11.2%	459	491	2.61
	Census Tract 18.03	Block Group 3	1,213	10.7%	3.9%	8.8%	482	521	2.60
			2,451	8.6%	5.1%	10.0%	941	1,012	
Subsection 2 (exits 117–121)	Part of Census Tract 18.03	Part of Block Group 3	Block Groups in this subsection are the same as in Subsection 1.						
	Part of Census Tract 18.05	Part of Block Group 3							
Subsection 3 (exits 121–124)	Census Tract 18.03	Block Group 2	940	4.3%	4.1%	4.8%	324	340	2.78
	Census Tract 14	Block Group 4	2,031	10.7%	3.8%	10.5%	799	828	2.56
	Census Tract 13	Block Group 2	1,687	26.1%	21.6%	10.3%	930	1,003	1.76
	Census Tract 18.05	Block Group 1	2,639	13.6%	8.2%	2.1%	942	1,008	2.80
			7,297	14.5%	9.6%	9.9%	2,995	3,179	
Subsection 4 (exits 124–125)	Census Tract 14	Block Group 3	1270	17.6%	12.7%	35.6%	509	556	2.03
	Census Tract 13	Block Group 1	578	78.9%	64.3%	3.6%	250	261	2.64
	Census Tract 13	Block Group 3	602	20.4%	24.6%	6.8%	416	432	1.35
	Census Tract 7	Block Group 2	1,487	20.8%	14.8%	15.1%	741	784	2.01
			3,937	28.2%	23.2%	18.8%	1,916	2,033	
Subsection 5 (exits 125-126)	Census Tract 14	Block Group 2	1,569	8.5%	1.7%	16.8%	663	687	2.44
	Census Tract 9	Block Group 2	801	60.2%	30.7%	6.6%	369	423	2.21
	Census Tract 7	Block Group 3	1,434	28.2%	24.6%	9.1%	659	710	2.12
	Census Tract 7	Block Group 1	785	55.7%	13.5%	14.9%	350	366	2.31
		4,589	31.7%	15.9%	12.3%	2,041	2,186		

Table III-3: Socioeconomic Characteristics of Primary Study Area Distributed by Project Corridor Subsection

Subsection	Census Tract	Block Group	Population	Percent Minority	Percent Poverty	Percent of persons above 65 years	Households	Housing Units	Average HH Size
Subsection 6 (exits 126–127)	Census Tract 9	Block Group 1	1,061	37.0%	40.5%	4.5%	425	568	2.18
	Census Tract 14	Block Group 1	2,157	20.9%	14.9%	4.2%	853	898	2.48
				3,218	26.2%	23.4%	4.3%	1,278	1,466
Subsection 7 (exits 127-128)	Census Tract 15.01	Block Group 6	1,074	33.7%	33.7%	3.6%	454	504	2.42
	Census Tract 15.02	Block Group 3	939	35.0%	35.0%	7.1%	467	500	1.82
	Census Tract 2	Block Group 1	580	29.7%	29.7%	6.2%	359	383	1.70
	Census Tract 15.01	Block Group 3	4,089	18.4%	18.4%	3.4%	1,417	1,577	2.72
	Census Tract 15.01	Block Group 5	1,880	26.2%	7.2%	5.1%	752	806	2.42
				8,562	26.0%	20.3%	4.4%	3,449	3,770
Subsection 8 (exits 128–128 A)	Census Tract 15.02	Block Group 1	1,752	35.6%	27.0%	6.7%	736	786	2.23
	Census Tract 10.01	Block Group 2	860	26.9%	19.1%	11.6%	474	510	1.93
				2,612	32.7%	24.4%	8.3%	1,210	1,296
Subsection 9 (exits 128A–131)	Census Tract 15.02	Block Group 2	3,071	18.4%	10.7%	13.4%	1424	1,509	2.23
	Census Tract 10.02	Block Group 1	1,989	9.3%	15.0%	5.0%	851	895	2.36
	Census Tract 16.01	Block Group 2	3,693	18.6%	10.3%	5.6%	1488	1,602	2.46
				8,753	16.4%	11.4%	8.2%	3,763	4,006
Subsection 10 (exits 131–133)	Census Tract 16.02	Block Group 1	1,733	10.4%	3.3%	4.6%	719	752	2.51
				1,733	10.4%	3.3%	4.6%	719	752
Total Within Primary Study Area			43,152	21.7%	15.4%	8.3%	18,312	19,700	

Source: U.S. Department of Commerce, Bureau of Census, U.S. Census of Population and Housing, 2000.

Notes: Figures for Percent Minority and Percent Poverty represented in bold and in italics indicate the census block groups which exceed the county averages for percent minority of 15.3 percent and percentage of persons in poverty of 14.5 percent.

Figure III-2: SIU 4 Subsection Map

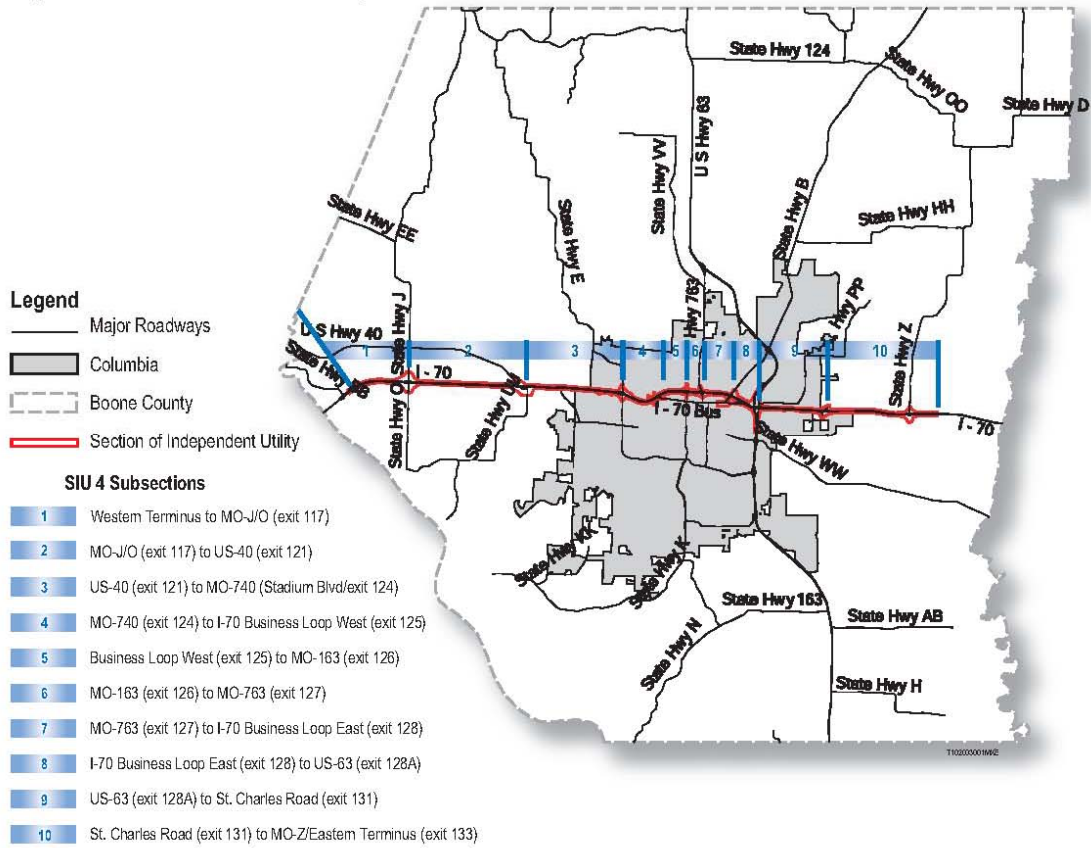
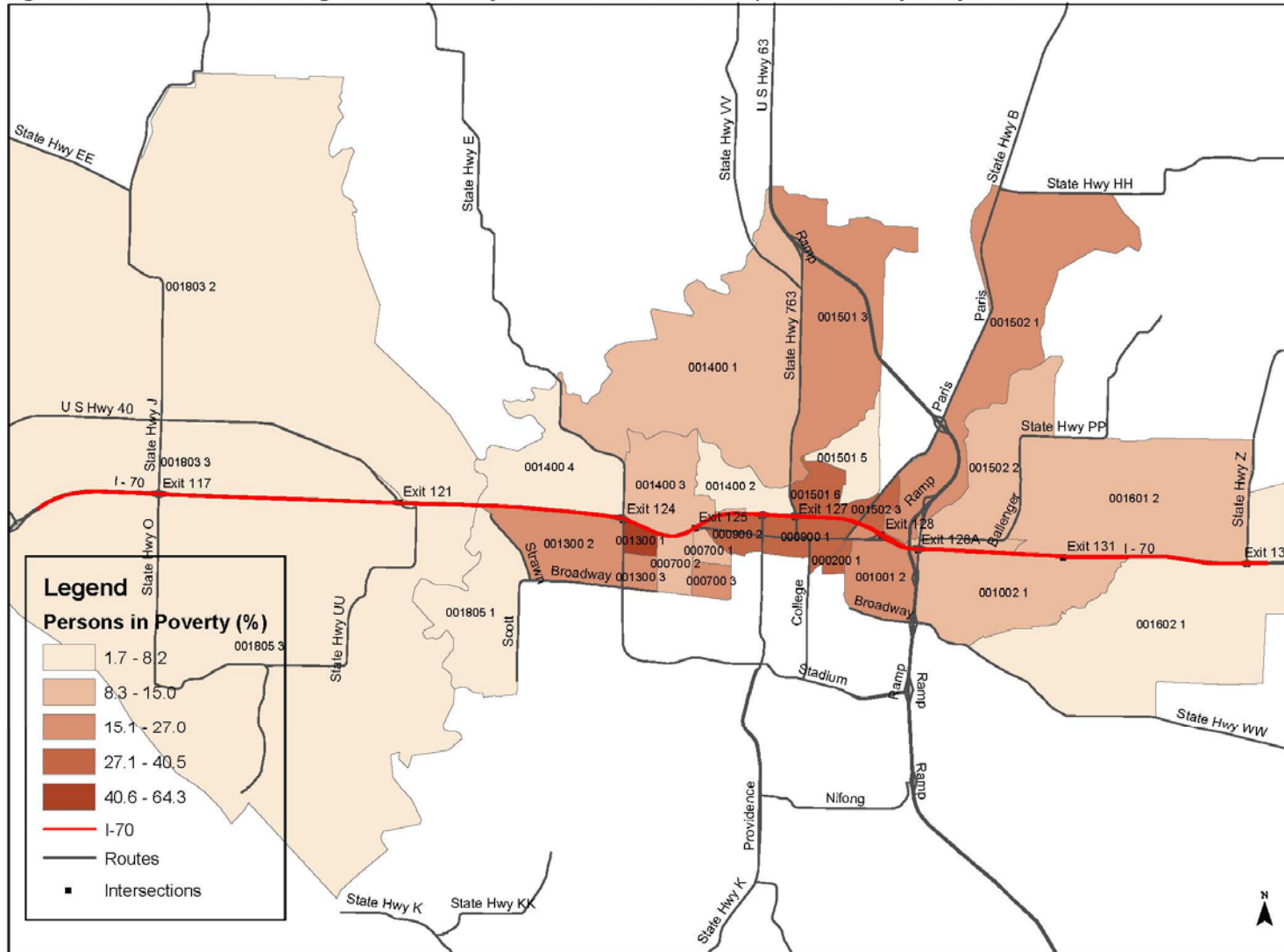


Figure III-4: Spatial Distribution of Poverty



Economic Base: Employment and Earnings

The percentage of the employed labor force in the primary study area is higher than those observed in the city of Columbia or Boone County. **Table III-4** presents a comparison of the labor force in the primary study area to the surrounding regions.

Table III-4: Labor Force Characteristics of Study Area and Surrounding Region, 2000

Areas	Total Labor Force	Employed Labor Force	% of Labor Force Employed
Primary Study Area	24,992	23,887	95.6
City of Columbia	49,033	45,630	93.1
Boone County, MO	77,188	72,978	94.5

Source: U.S. Department of Commerce, Bureau of Census, U.S. Census of Population and Housing, 2000.

Employment data disaggregated by industry sector show the influence of state government, particularly the University of Missouri, on the Boone County economic base. The relatively larger role for state government buffers the region's economy and reduces the region's dependency on the private sector in comparison to the state and national economy. Nearly 65 percent of all jobs in Boone County were in the private sector compared to nearly 86 percent in the state of Missouri and the United States, as a whole. After state and local government, services and retail trade were the largest employers in the county employing a total of 28 percent of the workforce. The county's economic base is less dependent on manufacturing sector employment as a source of jobs than the state or nation. **Table III-5** compares employment by sector.

Table III-5: Employment by Sector in Boone County, Missouri and the U.S. (2000)

Industry Sector	Percentage of Total Employment		
	Boone County	Missouri	U.S.
Forestry, Fishing and Related Activities	0.2	0.4	0.7
Mining	0.2	0.3	0.6
Construction	6.3	7.8	7.5
Manufacturing	7.0	13.1	12.9
Transportation and Warehousing	0.0	4.6	4.1
Wholesale Trade	3.5	4.9	4.8
Retail Trade	14.0	14.5	14.2
Finance, Insurance and Real Estate ^a	8.5	10.1	10.4
Services ^b	14.1	17.9	19.1
Health Care and Social Assistance	10.9	12.6	11.8
State and Local Government	35.3	14.0	13.9
Total	100	100	100

Source: U.S. Department of Commerce, Bureau of Economic Analysis, 2000.

^a. Total employment includes employment in finance, insurance and real estate (rental and leasing).
^b. Total employment in the services sectors includes employment in professional and technical services, management of companies and enterprises, administrative and waste services and educational services.

Housing Stock, Occupancy and Tenure Status

Housing units in Boone County are primarily two- and three-bedroom, owner-occupied, single-family residences. About 55 percent of the total housing units in the county are single-family homes, 36 percent are multi-family units (duplex houses, town homes and apartment houses) and about nine percent are mobile homes (Source: U.S. Bureau of Census, 2000). Most of the housing units in Boone County are owner-occupied. The vast majority of houses were constructed within the last 50 years. In the urban area, the older homes are generally located in the city center, south of Business Loop 70 between Stadium Boulevard and U.S. 63.

While spread throughout the primary study area, residential development is concentrated in four key areas immediately adjacent to I-70:

- Between exits 125 and 126 (north side of I-70): The Parkade neighborhood is located in this area and participates in the Columbia Neighborhood Association program. It consists primarily of single-family homes on quarter-acre lots. The first row of homes immediately abuts I-70. Between Creasy Springs Road and Providence Road, there are about 40 homes adjacent to I-70.
- Between exits 128 and 128A (north side of I-70): This neighborhood is known as White Gate and participates in Columbia's Neighborhood Association program. It consists of both single- and multi-family homes. Clark Lane separates White Gate from I-70. Between Paris Road and U.S. 63, there are about 25 structures in the first row of residences nearest I-70.
- Between exits 128A and 131 (north side of I-70): Pine Grove is a mobile home community located between I-70 and Clark Lane at roughly I-70 mile marker 130. There are about 75 mobile homes on a 21-acre parcel. Roughly 10 immediately abut I-70.
- Between exits 131 and 133 (north side of I-70): This neighborhood is just outside the existing city boundary. It consists of both single- and multi-family homes. The first row of structures immediately abuts I-70. Two rows of multi-family structures abut I-70, single-family homes begin after this. There are about 25 structures (four units per structure) in the first row of residences nearest I-70.

There are numerous other residential properties throughout the rest of the project corridor.

Exhibit III-2 displays the residential development patterns within the study area.

In 2000, the primary study area accounted for just less than 55 percent of the total housing stock of the city and 35 percent of the county. However, the primary study area contributed a greater share of vacant housing stock in the city (62 percent) and the county (39 percent). The primary study area's contribution to the Columbia and Boone County supply of both occupied and vacant units rose significantly between 1990 and 2000. The primary study area accounted for nearly 78 percent of the city's housing growth over the decade (see **Table III-6**).

Table III-6: Housing Profile within Study Areas, 1990–2000

	Primary Study Area		City of Columbia		Boone County		Primary Study Area	
	Number	%	Number	%	Number	%	% of City	% of County
Annual % Growth (1990–2000) *	6,494	4.9	8,365	3.0	11,983	2.7	77.6	54.2
<i>Total Housing Units (2000)</i>	<i>19,700</i>		<i>35,916</i>		<i>56,678</i>		<i>54.9</i>	<i>34.8</i>
Occupied	18,312	93.8	33,689	93.8	53,094	93.7	54.4	34.5
Vacant	1,388	7.0	2,227	6.2	3,584	6.3	62.3	38.7
<i>Total Housing Units (1990)</i>	<i>13,206</i>		<i>27,551</i>		<i>44,695</i>		<i>47.9</i>	<i>29.5</i>
Occupied	12,383	93.8	25,841	93.8	41,937	93.8	47.9	29.5
Vacant	823	6.2	1,710	6.2	2,758	6.2	48.1	29.8

Source: U.S. Department of Commerce, Bureau of Census, U.S. Census of Population and Housing, 2000.
* Annual percentage growth in total housing units.

Despite the growth in housing units, the vacancy rates in 2000 did not vary greatly from those of a decade earlier. The primary study area closely resembled Columbia and Boone County in terms of the mix of occupied units, accounting for 93 percent of the housing stock in 1990 and 2000. Overall, there are few major differences in the occupancy characteristics between the study area, Columbia or Boone County.

As shown in **Table III-7**, total occupied housing units in the primary study area grew at a faster annual percentage growth rate compared to surrounding regions between 1990 and 2000. The primary study area's importance as a place of residence with respect to the city and county is evident in the changes in owner- and renter-occupied dwellings. By 2000, the primary study area accounted for nearly half the city's rental supply and 60 percent of owner-occupied dwellings.

Table III-7: Tenure of Occupied Housing Units, 1990–2000

	Primary Study Area		City of Columbia		Boone County		Primary Study Area	
	Number	%	Number	%	Number	%	% of City	% of County
Annual % Growth (1990–2000) *	5,929	4.8	7,848	3.0	11,157	2.7	75.5	53.1
<i>Total Occupied Housing Units (2000)</i>	<i>18,312</i>		<i>33,689</i>		<i>53,094</i>		<i>54.4</i>	<i>34.5</i>
Owner	9,644	52.7	15,927	47.3	30,541	57.5	60.6	31.6
Renter	8,668	47.3	17,762	52.7	22,553	42.5	48.8	38.4
<i>Total Occupied Housing Units (1990)</i>	<i>12,383</i>		<i>25,841</i>		<i>41,937</i>		<i>47.9</i>	<i>29.5</i>
Owner	6,362	51.4	11,311	43.8	23,078	55.0	56.2	27.6
Renter	6,021	48.6	14,530	56.2	18,859	45.0	41.4	31.9

Source: U.S. Department of Commerce, Bureau of Census, U.S. Census of Population and Housing, 2000.
* Annual percentage growth in total housing units.

In terms of housing tenure, the primary study area, Columbia and Boone County all added a proportionately greater mix of owner-occupied units between 1990 and 2000. By the year 2000, Columbia continued to have slightly more rental than owner-occupied dwelling units in contrast to the primary study area or Boone County.

Contract rents were examined in terms of the median, average and distribution of rent levels. **Table III-8** shows that the most common rent level (i.e., mode) was between \$350 and \$399 a month. Keeping in mind that the primary study area accounted for 49 percent of the rental dwellings in Columbia and 38 percent of the Boone County rental supply, **Table III-8** can be informative in assessing the availability and price spectrum of the rental market geographically. For example, the primary study area is a major location of rental properties at rents above \$1,250 in comparison to Columbia or Boone County. Similarly, the primary study area tends to be the area with a higher than proportionate share of the lowest rent level units.

Table III-8: Contract Rents in the Primary Study Area and Surrounding Region

Rents	Primary Study Area	%	City of Columbia	%	Boone County	%	% Share of Primary Study Area	
							Columbia	Boone County
< \$100	183	2.1	352	2.0	454	2.0	52.0	40.3
\$100–\$149	184	2.1	330	1.9	391	1.8	55.8	47.1
\$150–\$199	149	1.7	294	1.7	417	1.9	50.7	35.7
\$200–\$249	189	2.2	703	3.9	992	4.5	26.9	19.1
\$250–\$299	612	7.0	1,105	6.2	1,540	6.9	55.4	39.7
\$300–\$349	1,133	13.1	2,013	11.3	2,660	12.0	56.3	42.6
\$350–\$399	1,581	18.2	2,535	14.2	3,136	14.1	62.4	50.4
\$400–\$449	1,177	13.6	2,488	14.0	2,885	13.0	47.3	40.8
\$450–\$499	702	8.1	1,660	9.3	2,119	9.5	42.3	33.1
\$500–\$549	492	5.7	1,402	7.9	1,771	8.0	35.1	27.8
\$550–\$599	705	8.1	1,199	6.7	1,459	6.6	58.8	48.3
\$600–\$649	549	6.3	914	5.1	1,121	5.0	60.1	49.0
\$650–\$699	311	3.6	933	5.2	1,057	4.8	33.3	29.4
\$700–\$749	151	1.7	233	1.3	319	1.4	64.8	47.3
\$750–\$799	74	0.9	283	1.6	299	1.3	26.1	24.7
\$800–\$899	69	0.8	274	1.5	301	1.4	25.2	22.9
\$900–\$999	33	0.4	311	1.7	311	1.4	10.6	10.6
\$1,000–\$1,249	32	0.4	233	1.3	237	1.1	13.7	13.5
\$1,250–\$1,499	29	0.3	55	0.3	64	0.3	52.7	45.3
\$1,500–\$1,999	30	0.3	36	0.2	36	0.2	83.3	83.3

Table III-8: Contract Rents in the Primary Study Area and Surrounding Region

Rents	Primary Study Area	%	City of Columbia	%	Boone County	%	% Share of Primary Study Area	
							Columbia	Boone County
\$2,000 or more	17	0.2	17	0.1	17	0.1	100.0	100.0
No cash rent	279	3.2	438	2.5	661	3.0	63.7	42.2
Total	8,681	100	17,808	100	22,247	100	48.7	39.0
Avg. Contract Rent	\$526	—	\$542	—	\$527	—	—	—
Med. Contract Rent	—	—	\$427	—	\$421	—	—	—

Source: U.S. Department of Commerce, Bureau of Census, U.S. Census of Population and Housing, 2000.

The distribution of housing values for owner-occupied units was analyzed to assess the housing market of the primary study area, the city of Columbia and Boone County. Across all three regions, most the units were priced from \$80,000 to \$124,999 (see **Table III-9**). The \$100,000–\$124,999 category was observed to have the highest number of units in all three regions. The median housing value of housing units in the city of Columbia (\$110,700) was higher than estimated for the primary study area (\$85,000) or Boone County (\$100,800).

Table III-9 can also be informative in assessing the availability and price spectrum of the housing market for purchase geographically when it is recalled that the primary study area accounted for around 60 percent of the owner-occupied dwellings in the city and 31 percent of the county owner-occupied stock. Housing with values below \$100,000 is highly concentrated in the primary study area rather than elsewhere in the Columbia or Boone County. As housing values rise above \$100,000, the primary study area represents with few exceptions a decreasing share of the total supply.

Table III-9: Housing Values in the Primary Study Area and Surrounding Region

Housing Values	Primary Study Area	City of Columbia	Boone County	% Share of Primary Study Area	
				Columbia	Boone County
Less than \$10,000	338	369	841	91.6	40.2
\$10,000–\$14,999	163	142	418	114.8	39.0
\$15,000–\$19,999	180	197	436	91.4	41.3
\$20,000–\$24,999	144	156	505	92.3	28.5
\$25,000–\$29,999	172	195	457	88.2	37.6
\$30,000–\$34,999	206	208	449	99.0	45.9
\$35,000–\$39,999	99	113	370	87.6	26.8
\$40,000–\$49,999	328	414	992	79.2	33.1
\$50,000–\$59,999	634	596	1,382	106.4	45.9
\$60,000–\$69,999	726	723	1,758	100.4	41.3

Table III-9: Housing Values in the Primary Study Area and Surrounding Region

Housing Values	Primary Study Area	City of Columbia	Boone County	% Share of Primary Study Area	
				Columbia	Boone County
\$70,000–\$79,999	941	934	2,088	100.7	45.1
\$80,000–\$89,999	1,054	1,187	2,499	88.8	42.2
\$90,000–\$99,999	1,202	1,656	2,935	72.6	41.0
\$100,000–\$124,999	1,417	2,514	4,319	56.4	32.8
\$125,000–\$149,999	843	2,086	3,366	40.4	25.0
\$150,000–\$174,999	373	1,369	2,220	27.2	16.8
\$175,000–\$199,999	205	1,005	1,442	20.4	14.2
\$200,000–\$249,999	262	925	1,713	28.3	15.3
\$250,000–\$299,999	118	497	1,010	23.7	11.7
\$300,000–\$399,999	63	339	678	18.6	9.3
\$400,000–\$499,999	22	172	264	12.8	8.3
\$500,000–\$749,999	36	69	224	52.2	16.1
\$750,000–\$999,999	10	36	58	27.8	17.2
\$1,000,000 or more	62	24	105	258.3	59.0
Total:	9,598	15,926	30,529	60.3	31.4
Med. Housing Value (\$)	\$85,000	\$110,700	\$100,800	—	—

Source: U.S. Census of Population and Housing, 2000.

Notes:

* Median Housing Value for owner occupied housing units in the Primary Study Area has been estimated based on the mid-point of the housing values provided.

** As the Primary Study Area extends beyond the boundaries of the city of Columbia, percent shares of housing values of the study area compared to the city of Columbia are noticed to be greater than 100 percent in some cases.

The city of Columbia also has a number of mobile home parks within its limits. The parks are common and widely dispersed throughout the city. Subsection 9 (exits 128A–131: U.S. 63 to St. Charles) has the highest number of units in mobile home parks within the primary study area. At the time of field investigation, Pine Grove had 115 mobile homes located just north of I-70, whereas Creek Wood Estates had 110 homes on Clark Lane. Lake of the Woods, near exit 131 on St. Charles Road, had another 19 homes. The largest park (Vandiver Park) is situated north of I-70 in subsection 7 and had 149 units. **Table III-10** presents the mobile home parks identified by subsection within the primary study area.

Table III-10: Mobile Homes within Primary Study Area of I-70 Study Corridor

Subsection	Mobile Home	Units
Subsection 1 (exits 115–117)	Individual homes	2
Subsection 2 (exits 117–121)	Individual homes	7
Subsection 3 (exits 121–124)	Individual homes	2
Subsection 4 (exits 124–125)	Park	18
Subsection 6 (exits 126–127)	Rainbow Village*	23
Subsection 7 (exits 127–128)	Vandiver Park	149
Subsection 9 (exits 128A–131)	Pine Grove	115
	Creek Wood Estates	110
	Lake of the Woods	19

Source: *The Louis Berger Group, Inc., 2003.*

*Rainbow Village mobile homes were evident from field visits in autumn 2003, but plans exist for removal of the mobile homes from the site.

In order to identify the locations of the various public housing developments within the city of Columbia, a list of developments present in the city was obtained from the Columbia Housing Authority. The City of Columbia's Consolidated Plan – A Strategy of Community Needs (1999-2004) was also reviewed for information on public housing developments in the area. Based on a review of these sources, the Columbia Housing Authority manages approximately 700 housing units situated throughout the city. In addition, the Housing Authority administers a total of 740 rental assistance units. However, only one housing development was identified within the boundaries of the Primary Study area. The development known as the Bear Creek Development accommodates 100 units and is located at 1301 Elleta Boulevard. There would be no direct project-related impacts; Elleta Boulevard is a short east-west roadway between MO-763 and Bear Creek Park, located approximately 0.4 mile (0.6 km) north of I-70.

Journey to Work

Boone County's journey-to-work patterns are influenced by several factors, mainly its central location within the state and its national reputation as a health care provider. The concentration of economic activity within the city of Columbia and the presence of the University of Missouri at Columbia are major contributors to commuter traffic into Boone County. The regional access provided by I-70 and U.S. 63 are also key factors affecting the travel patterns of the residents of the region. Nearly 85 percent of Boone County's workforce resides within the county. Callaway County is the second highest contributor, with 3.6 percent of its residents commuting to work in Boone County. The balance is made up from the other surrounding counties (Cole, Cooper, Howard and Audrain).

When examining the means of transportation to work, driving alone is the overwhelming choice of transportation mode for the journey to work for persons living in the primary study area. As presented in **Table III-11**, 93.2 percent drive to work while only one percent of workers use public transport to get to work. Carpooling accounts for 14.3 percent of the journeys to work for primary study area workers, whereas those who drove alone comprised 80.5 percent of the total.

Table III-11: Means of Transportation to Work, Comparison of Primary Study Area, City and County

	Primary Study Area		City of Columbia		Boone County	
	Number	%	Number	%	Number	%
Car, truck or van	22,114	93.2	39,007	86.8	64,698	89.9
Drove alone	18,730	80.5	33,767	75.2	55,737	77.4
Carpooled	3,384	14.3	5,240	11.7	8,961	12.5
Public transportation	236	1.0	484	1.1	518	0.7
Motorcycle	39	0.2	87	0.2	88	0.1
Bicycle	167	0.7	668	1.5	687	1.0
Walked	404	1.7	3,153	7.0	3,385	4.7
Other means	128	0.5	200	0.4	301	0.4
Worked at home	638	2.7	1,320	2.9	2,290	3.2
TOTAL	23,726	100	44,919	100	71,967	100

Source: U.S. Census of Population and Housing, 2000

Within Columbia, 75.2 percent of workers traveled to their jobs in their car alone. Public transportation comprised 1.1 percent of the total. Carpooling was somewhat less prevalent within Columbia than within the primary study area, accounting for 11.7 percent of the total. Primarily because of the university, seven percent of workers in the city of Columbia walked to their jobs, compared with 1.7 percent in the primary study area.

For Boone County, nearly three-quarters of the workforce drove alone to work. Public transportation as a means of getting to work is used by less than one percent (0.7 percent) of the workforce. It is interesting to note, however, that the percentage of those workers traveling by car to work is slightly less than found when looking at the primary study area. The journey to work travel patterns reaffirm that the regional economy and urban environment have been heavily shaped and influenced by automobile dependency. The primary study area immediately surrounding I-70 is as heavily dependent as the remainder of Boone County is on the interstate (and its connecting arteries) for the journey to work.

In addition to analyzing census data regarding commutation patterns, a survey was administered to businesses within the potential impact area of the Improve I-70 Project². Respondents were asked to estimate the location and mode by which their employees conveyed themselves to their workplace. Employers estimated that about 18 percent were drawn from the surrounding area of within one to three miles (1.6 km to 4.8 km) and the rest of city of Columbia accounted for about 46 percent of employees. About 13 percent were drawn from outside of Boone County. Thus, businesses within the primary study area report very similar patterns as those reported in the Census, with nearly 87 percent of employees living with Boone County. The survey data, however, also established that surrounding neighborhoods near I-70 account for roughly one-fifth of the employee base for employees of the primary study area.

² The I-70 business survey is summarized in **Section III.B.1.b** and the complete I-70 business survey report is contained in **Appendix III-A**.

With few exceptions, employers indicated that nearly all employees arrived at work by automobile. Roughly two to five percent of employees arrived by bus, bicycle, walking or other means.

b. Community Resources—Facilities, Institutions and Services

There are several types of community resources—facilities, institutions and services—that are important for maintaining the life and health of communities. Community facilities support services and activities typically provided by government and non-profit institutions. The physical condition, operating standards, accessibility and availability of these facilities and services are influential in shaping community life and are a reflection of the community's values. The quality and availability of these resources influence local development and tangibly affect an area's perceived quality of life.

The following text presents a profile of the community facilities, institutions and services found in the project area.

Neighborhood Associations

The City of Columbia through its Neighborhood Association Program encourages residents to form local associations “to ensure neighborhood stability through information sharing and public participation in the municipal decision-making process.”³ The City's Department of Planning and Development assists residents in establishing a local neighborhood association. Currently there are more than 50 associations in the city of Columbia.

A local neighborhood association acts as a forum for residents to interact with City officials and provide feedback on local development projects. A recognized local association also benefits from receiving official notifications from City agencies of proposed plans and subdivision applications that may affect area residents. In some of the older neighborhoods, federal funding is provided for housing and public improvements.

To improve public involvement outreach processes and community impact assessment for the I-70 Project, the neighborhood associations were inventoried and mapped. The contact names of representatives from known associations were added to the project team's mailing lists. From this list, some representatives were recruited to participate in the project's Advisory Group as well as contacted for the purposes of holding Improve I-70 information-sharing events in their communities.

Twelve neighborhood associations were identified within the immediate vicinity of I-70. These are listed in **Table III-12** and are shown on **Exhibit III-1**.

³ Neighborhood Association Program. http://www.gocolumbia.com/Planning/Housing_Programs/Neighborhood_Associations/

Table III-12: Neighborhood Associations within Primary Study Area of I-70 Study Corridor

Subsection	Neighborhood Associations
Subsection 3 (exits 121-124)	Valley View Gardens, Park De Ville, Smithton Ridge
Subsection 4 (exits 124-125)	Highland Park, Smithton Valley
Subsection 5 (exits 125-126)	Parkade, Ridgeway, Smithton Valley
Subsection 6 (exits 126-127)	North Central
Subsection 7 (exits 127-128)	North Central, Benton-Stephens, White Gate
Subsection 8 (exits 128-128 A)	White Gate, Mexico Gravel
Subsection 9 (exits 128A-131)	Zaring, Woodbridge
<i>Source: CATSO 2003.</i>	

Fire Protection Services

The Boone County Fire Protection District and the City of Columbia Fire Department jointly provide fire protection for Columbia and surrounding areas. The Boone County Fire Protection District has 10 stations and operates with a volunteer staff of about 300 members.

The City of Columbia has eight fire stations throughout the city. According to the City’s budget, the fire department responded to a total of 6,621 incidents in 2002 and has 128 full-time employees. The estimated response time per incident is 4.75 minutes. The City Fire Department’s responsibilities include protecting lives and property from fire, explosion, hazardous materials and other natural or manmade disasters. The department also provides emergency medical, public fire education, fire investigation and code enforcement services.

Four fire stations are in the immediate vicinity of I-70. These are shown on **Exhibit III-1**:

- The Headquarters of the Boone County Fire Protection District is located at 2201 I-70 Drive Northwest, in the northwestern quadrant of the Stadium Boulevard interchange (exit 124). This is a headquarters only, not an operating fire station.
- Station No. 2 of the Columbia Fire Department is located at 1212 West Worley, just south of I-70 off of Stadium Avenue.
- Station No. 5 of the Columbia Fire Department is located at 1400 Ballenger Lane, between exits 128A and 131.
- Boone County Fire Station No. 1 is located at 5910 East St. Charles Road near exit 131.

Officials from the City Fire Department and the Boone County Fire Protection District indicated interest in improvements to on- and off-ramps, particularly in the central area between Stadium Boulevard and U.S. 63, to improve response times. North-south connectivity was also observed to be very beneficial to emergency operations.

Emergency Services

All emergency calls are routed to the 911 center managed by the Department of Emergency Communications and Management and under the supervision of the City Manager. The Joint Communications Center responds to calls by dispatching ambulance, police, fire and other emergency services to the scene of emergency.

The Boone Hospital Ambulance Service and the University Hospital Ambulance Service are emergency response centers in the city of Columbia. They are the first to respond to medical emergencies in the area. Neither center is located within the primary study area. Based on location, these emergency response centers dispatch units that must cross I-70 to respond to service calls.

Police Protection Services

The Columbia Police Department provides police protection services to city residents. The Boone County sheriff's office is also within city limits, but its primary service area extends outside them. The University of Missouri Police Department is another police organization located within the city and is responsible for law enforcement on the campuses of the University of Missouri at Columbia.

According to the City's 2004 Budget, the Columbia Police Department has 175 employees and responded to 58,402 calls for service in 2002 and nearly as many in 2001 (57,030 calls).

The headquarters of the Columbia Police Department is located at 600 East Walnut Street. The University of Missouri at Columbia manages the second station located at 901 Virginia Avenue. The county sheriff's department is stationed at 2121 County Drive. Neither location is within the primary study area.

Schools

Public Schools in the city of Columbia are operated under the jurisdiction of the Columbia School District. The district is the tenth largest in the state of Missouri and includes 19 elementary schools, three middle schools, three junior high schools, three high schools and the Columbia Area Career Center.

Four public schools lie within the primary study area. Two others are near the boundaries of the study area and, for the purposes of this assessment, are included in the primary study area.

Table III-13 summarizes the location of schools near I-70.

The city of Columbia also has nine private and parochial schools located within city limits. Only one of these schools, the Columbia Catholic School located at 817 Bernadette Drive, is in the primary study area.

Exhibit III-1 depicts the location of the schools within the study corridor.

Table III-13: Location of Schools within Primary Study Area

Subsection	Name of School	2002-2003 Enrollment	Address	In Primary Study Area	Attendance Area Crosses over I-70
Subsection 2 (exit 117-121)	Midway Heights Elementary	250	West Highway 40 – 65202	No	Yes
Subsection 3 (exit 121- 124)	Smithton Middle School	963	3600 Worley St – 65203	No	Yes
	Mary Paxton Keeley Elementary	573	201 Park DeVille Dr – 65203	No	Yes
Subsection 4 (exit 124- 125)	Center for Gifted Education	—	918 Bernadette Dr – 65203	Yes	NA
	West Junior High School	906	401 Clinkscales Rd – 65203	No	Yes
	West Boulevard Elementary	272	319 West Boulevard – 65203	No	Yes
Subsection 5 (exit 125- 126)	Parkade Elementary School	389	111 Parkade Blvd – 65202	Yes	Yes
	John Ridgeway Elementary	242	107 E. Sexton Road – 65203	No	Yes
	Gentry Middle School	824	4200 Bethel Street – 65203	No	Yes
	Hickman High School	2,164	1104 N. Providence Rd	Yes	Yes
	Jefferson Junior High School	819	713 Rogers Street – 65201	No	Yes
	Frederick Douglass High School	190	310 N. Providence Rd – 65203	No	Yes
Subsection 7 (exit 127-128)	Eugene Field Elementary	277	1010 Range Line Rd – 65201	Yes	Yes
	Lee Elementary School	281	1208 Locust – 65201	No	Yes
	Benton Elementary School	245	1410 Hinkson Ave – 65201	No	Yes
Subsection 8 (exit 128- 128A)	Oakland Junior High School	710	3405 Oakland Place – 65202	No	Yes
	Shepard Boulevard Elementary	450	2616 Shepard Blvd – 65201	No	Yes

Source: Columbia Public School District, 2002–2003 State Report

Child Care Centers

Access to child care centers in the city is dependent on the local transportation system. Proposed improvements to the highway may impact the functioning of these centers. Eight child care centers are located in the primary study area. The Subsections of the project corridor with such centers are listed below:

- The Wonder World Child Development Center located at 606 Claudell Lane is the only child care center located between exits 124 and 125 of the project corridor.
- Two child care centers are located between exits 125 and 126, Turn the Page Child Development Center located at 1201 Jewell Avenue and Educare located at 601 Business Loop 70 West.
- The Child Learning and Development Center is located north of I-70 at 1 Vandiver Drive, between exits 126 and 127.
- The Woodhaven Learning Center, at 1405 Hathman Place, is located between exits 127 and 128A.
- The Kinder Care Learning Center is north of I-70 near the Paris Road overpass.
- The Headstart Child Development is south of I-70 at 700 Fay Street.
- The Twin Woods Cottage Pre-School and Day Care, 901 Sun Valley Drive, is located between exits 131 and 133.

Exhibit III-1 depicts the locations of child care centers within the primary study area.

Hospitals/Health Care Facilities

Health care facilities are widely dispersed and found near interchanges along I-70 in Columbia. Two large hospitals are located within the primary study area. Immediately adjacent to these hospitals are several smaller clinics and diagnostic facilities.

Western I-70 Business Loop to MO-163—The Ellis Fischel Cancer Center is located between exits 125 and 126 at 115 Business Loop 70 West. The Rusk Rehabilitation Center is located on the same parcel and adjoins the Cancer Center.

U.S. 63 to St. Charles Road—The Columbia Regional Hospital is located within this portion of the project corridor, southeast of exit 128A. Adjoining the regional hospital complex are several smaller health care facilities, including Charter Behavioral Health System, Healthsouth Rehabilitation Center, Boone Clinic, Columbia Orthopedic Group, Health Pavilion, Missouri Lion's Eye Research Foundation and the Regional Care Center.

Exhibit III-1 presents the location of hospitals/health centers within the primary study area.

Senior Citizen Facilities: Nursing Homes and Adult Retirement Communities

Senior citizen facilities were inventoried including nursing homes and adult retirement communities in Columbia and Boone County based on a review of the Services for Seniors directory published by The Senior Network of Columbia (2002) and other local and state publications. There is a range of facilities and services for seniors, including skilled nursing care,

assisted-living, adult retirement communities, home health care and advisory and support services to access transportation.

Because senior citizen facilities are near I-70, the inventory of facilities was supplemented with telephone interviews for information on the number of units, rents, occupancy rates and other attributes of the facilities. As reported in **Table III-14**, the facilities vary significantly in terms of rental costs, size of unit and features of units and supportive medical care services. During the interviews, many facilities reported occupancy rates that were deemed high to very high, suggesting that available supply of comparable replacement facilities and dwellings could become an issue of concern if senior dwellings were acquired for the project.

Within the primary study area there are seven senior citizen facilities. The locations of senior citizen facilities are indicated in **Exhibit III-1** and described below.

MO-740 to Western I-70 Business Loop (exits 124 and 125)—West Village Manor, the Terrace Retirement Community and Candlelight Lodge are located just north of I-70. Terrace Retirement Community is an exclusive apartment community with services for independent living retirees with no in-house medical facilities, whereas West Village Manor and Candlelight Lodge provide 24-hour nursing assistance and onsite residential facilities.

MO-763 to Eastern I-70 Business Loop (exits 127 and 128)—Four facilities operate within this area. One is located in the Parkade Center on Business 70W and is operated by the Boone County Senior Services Administration. The Services for Independent Living is located southwest of exit 128. The Central Missouri Regional Center and the National Health Care Investor are located north of I-70.

Homeless Shelters

Of the four homeless shelters in Columbia, only one is near the primary study area. The Positive Motivation shelter at 1200 Rangeline Street is located between exits 126 and 127 (**Exhibit III-1**).

Table III-14: Senior Citizen Facilities

Facility	Type	Number of Beds/Rooms	Rents	Occupancy	Facilities Offered
Ashland Healthcare	Skilled nursing care facility	60 beds 57 semiprivate 3 private	\$111/day \$117/day	Very high; 2 to 3 beds vacant	Include onsite comprehensive healthcare services, meals, laundry, housekeeping services and transportation to medical appointments.
Columbia Healthcare Center	Skilled nursing care facility	92 beds, semiprivate	\$118/day	Very high	Include onsite comprehensive healthcare services, meals, laundry, housekeeping services and transportation to medical appointments.
Heritage Hall Nursing Center	Skilled nursing care facility	60 beds 52 semiprivate 4 single private 4 double private	\$114/day \$126/day \$132/day	Very high, 2 beds vacant	Include onsite comprehensive healthcare services, meals, laundry, housekeeping services and transportation to medical appointments.
South Hampton Place	Skilled nursing care facility	100 beds 28 private rooms 72 semi-private rooms	\$120/day \$112/day	Very high, 3 private rooms vacant	Include onsite nursing services. No meals and personal laundry services. General housekeeping services provided.
The Bluffs	N/A				
The Stuart House	Skilled nursing care facility	27 beds 24 semiprivate 3 private	\$84/day \$130/day	High, 1 private and 1 semiprivate room vacant	Include onsite comprehensive healthcare services, meals, laundry, housekeeping services and transportation to medical appointments.
West Village Manor	Skilled nursing care facility	120 beds semiprivate private Alzheimer's treatment	\$105/day \$152/day \$107/day	N/A	Include onsite comprehensive healthcare services, meals, laundry, housekeeping services and transportation to medical appointments.
Candlelight Lodge	Independent living				Include onsite nursing services, meals, laundry, housekeeping services and transportation to medical appointments.

Table III-14: Senior Citizen Facilities

Facility	Type	Number of Beds/Rooms	Rents	Occupancy	Facilities Offered
Terrace Senior Living	Independent living	128 apartments 24 studios 4 queen studios 61 units: 1 BR/1 bath 4 units: 2 BR/1 bath 35 units: 2 BR/2 bath	\$1,158/month \$1,235/month \$1,613/month \$1,920/month \$2,080/month	Very high, one 1BR/ 1 bath unit available	Include meals, laundry, housekeeping services. No onsite medical facility. Transportation provided to medical appointments and local markets.
Buena Vista	Independent living	32 beds	Rent based on income	Very high, 2 beds vacant	Include onsite nursing and housekeeping services. Meals not provided, kitchen present in units.
NBA Lenoir Retirement Community	Independent living	45 apartments	1 BR/1 Bath: \$1,995/month 1BR/2 Bath: \$2,295/month (\$350/2nd person)	Very high, one 1BR/ 2 bath available	Include onsite nursing services, meals, laundry, housekeeping services and transportation to medical appointments.
	Assisted living	30 units	1BR/1 bath: \$1,700/month	Very high, none available	Include onsite nursing services, meals, laundry, housekeeping services and transportation to medical appointments.
	Independent homes	Over 100 units	Price varies based on prevalent market rates and size of home. Residents are returned 75 percent of the initial payment amount when they vacate their unit.	Very high, 2 to 3 units available	
Paquin Towers	Subsidized public housing	N/A	Rent calculated as 30 percent of gross income.		

Table III-14: Senior Citizen Facilities

Facility	Type	Number of Beds/Rooms	Rents	Occupancy	Facilities Offered
Oak Towers	Subsidized public housing	Total: 147 units Studios: 83 units 1 BR units: 64 units	Rent calculated as 30 percent of gross income.	Very high, 3 to 4, 1 BR units available	Include onsite nursing services, meals, laundry, housekeeping services and transportation to medical appointments.
Hanover Estates	Assisted living units	148 units 1 BR units: 12 units 2 BR units: 136 units 72 units reserved for persons older than 55	\$415/month	N/A	No onsite nursing services and meals. General housekeeping services provided.
River Hills	Assisted living units	1 BR/1 Bath: 12 units	Rent based on gross income	One 1 BR/1 bath available	No onsite nursing and meals. General housekeeping services provided.
Tiger Columns	Independent living	60 units 5 units as models 5 guest units	Rents range from \$1,200/month to \$3,000/month	20 units vacant	Include onsite nursing services, meals, laundry, housekeeping services and transportation to medical appointments. A wellness clinic is organized onsite 3 days a week.

Source: Telephone interviews conducted by The Louis Berger Group, 2004.

Churches

Churches are located primarily in densely developed areas and near major arterials and intersections within the primary study area. Based on review of local directories and windshield surveys, there are 18 churches in the primary study area. **Table III-15** presents the location and names of the churches and **Exhibit III-1** illustrates their locations.

Table III-15: Churches within Primary Study Area of I-70 Study Corridor, SIU 4, 2000

Subsection	Churches
Subsection 3 (exits 121–124)	Columbia United Church of Christ Columbia Korean Baptist Church
Subsection 4 (exits 124–125)	Our Lady of Lourdes Catholic Church Centerpoint Church
Subsection 5 (exits 125–126)	Parkade Baptist Church First Church of God Friendship Missionary Baptist Church Church of the Covenant Monument of Grace Church of God in Christ
Subsection 6 (exits 126–127)	First Assembly of God
Subsection 7 (exits 127–128)	All People’s Missionary Baptist Church Crossroads Christian Center
Subsection 9 (exits 128A–131)	Victory Christian Fellowship Church Praise Assembly of God Church Charity Baptist Church Victory Christian Church Unity of Christ AME Zion Family Worship Center
Subsection 10 (exits 131–133)	Prairie Grove Baptist Church
<i>Source: Columbia, MO Telephone Directory and The Yellow Pages, City of Columbia 2003–2004; The Louis Berger Group 2003.</i>	

The churches listed were identified early in the public involvement process and added to the project mailing list. The churches were contacted to determine whether they were interested in hosting project meetings and/or publicizing project-related information.

Existing Business Community, Business Survey and Utilities

This text will examine the pattern of commercial and industrial development within the project corridor. Within the Columbia portions of SIU 4, commercial and industrial developments are the primary land uses adjacent to the I-70 corridor. Commercial and industrial operations extend almost continuously from the Stadium Boulevard interchange to east of U.S. 63. Outside of Columbia, commercial operations are clustered at the existing interchanges and intermittently throughout the rest of the corridor. The most common commercial and industrial enterprises along the corridor are retail operations, hotels and motels, auto sales, restaurants and taverns, auto repair and other miscellaneous repair shops. Several different pieces of data within the EIS depict the business community.

Exhibit III-2 depicts the existing land use pattern within the study area. This provides a broad overview of the spatial nature of the business community. Each parcel of land was evaluated and categorized into one of 12 different land use categories. The commercial use category covers most typical businesses – retail, office, sales, very light production and restaurants, etc. The industrial use category covers most manufacturing and production elements of the business community. Specialty elements of the business community are captured in the agricultural, cemeteries, fraternal, utilities and railroad categories. The interrelated nature of land uses is highlighted in this exhibit.

Appendix III-A contains the final report discussing the business survey conducted for the I-70 (SIU 4) project. Because of the importance of the business community within the study area and the potential for substantive displacements, the project team instituted a business survey. This survey was intended to engage businesses, within the immediate vicinity of the anticipated I-70 improvements, in order to gather basic information on the nature of the businesses most likely to be directly impacted by the project. As part of the survey, business owners were asked questions regarding the nature of their business operation, the number and type of employees on-site, details on their present location as well as future site selection criteria. In addition, their sensitivity to the disruptions typically associated with a large-scale highway improvement project was investigated. Specific attention would be paid to the relocation strategies that they may follow under different impact scenarios. The results of the business survey will be referenced throughout this EIS.

The business survey used a questionnaire in order to interview business owners. The survey process included the following steps: first, the businesses to be contacted were identified. This included all businesses within the footprint of the emerging alternatives. **Exhibit III-2** shows the business survey footprint. Because of the very large footprint, many respondents are ultimately unaffected by the reasonable alternatives and recommended preferred alternative. Their participation was valuable in the development and evaluation of alternatives⁴. After the business survey footprint was established, the questionnaire was finalized, with assistance from the project's Advisory Group. In all, 326 businesses were identified. Next, all of the businesses were contacted by phone. In all 1,395 telephone calls were made by the project team. Upon approval, the questionnaire was forwarded to the appropriate business representative. In all, 235 business owners received surveys. The survey could then be completed with, or without, assistance from the project team. In order to provide an opportunity for the recipients to meet with the project team in a group setting, a Drop-In session was held. Including the Drop-In session, a total of 148 face-to-face contacts were made. In all, 116 business surveys were completed. **Exhibit III-2** also identifies, by name, all of the businesses that completed the business survey.

Exhibit III-3 depicts all of the individual buildings within the immediate project area. The use of the building is also depicted, as is whether or not it would be acquired in order to build the recommended preferred alternative. Each acquired building is identified by name.

Appendix III-B also lists the structure acquisitions by name and the number of business operations effected. The business operation terminology would be used because some businesses have multiple structures, while other businesses operate within a common building.

A final piece of data that references the business community is **Appendix III-C**. This appendix lists all of the land required by the recommended preferred alternative. One of the data

⁴ In some of the analysis to be presented in the EIS, the responses are sorted in order to present the results of only those respondents who are impacted directly by the reasonable alternatives.

elements also presented is the class of the parcel – commercial properties are denoted by a C. Developed by the Boone County Tax Assessor, class category is used to administer Boone County's property tax system.

Another element of the business community is its utilities. A literature review was conducted to identify utilities (power and water transmission facilities) that may be affected by the Improve I-70 project. There are five regionally important utility lines that cross the project corridor: (1) a Williams Petroleum pipeline crosses the project corridor about 1,000 feet (304.8 m) west of the MO-Z interchange, (2) a natural gas pipeline, owned and operated by Ameren Union Electric Company, crosses the corridor just east of the St. Charles Road interchange, (3) a Central Electric Power Cooperative line (overhead, high-tension electrical lines) crosses I-70 east of U.S. 63 and turns west to cross U.S. 63 about 2,000 feet (609.6 m) north of the interchange, (4) a Missouri Power and Light electrical line runs along the Perche Creek floodplain and crosses I-70 just west of the Perche Creek bridge and (5) a Missouri Power and Light line crosses at the western end of the SIU 4 project corridor.

Local electrical distribution service is supplied by the City of Columbia Water and Light Department (generally within the city limits) and Boone Electric Cooperative (unincorporated county areas). The Columbia municipal power plant is located at the corner of Business Loop I-70 and Bowling Street, immediately south of I-70 between exits 127 and 128. The power plant is shown on **Exhibit III-1** (Panel F). The Ameren Union Electric Company supplies natural gas service throughout Boone County.

Water is supplied to customers throughout the county from groundwater wells. Generally, groundwater supplies are adequate and of good quality. The Columbia Water and Light Department supplies water to the city and surrounding area. The primary water source wells for the city system are located near the Missouri River in the McBaine Bottoms area, about eight miles (12.9 km) southwest of the city center. Beyond the service area of the Columbia Water and Light, Public Water Supply Districts 1 (west of Columbia) and 9 (east of Columbia) supply customers along the I-70 corridor. Sources for these districts are wells located within them, a few in the project vicinity. Two wells for Public Water Supply District 9 are located west of MO-Z and south of I-70 within 0.25 mile (.4 km) of the project corridor.

Columbia provides a centralized sanitary sewer system for most of the city connected to the city treatment plant located along Gillespie Bridge Road southwest of the city. The treatment plant was last updated in 2001. The Boone County Regional Sewer District serves much of the urbanized area around the city. Some wastewater is treated at the city's treatment plant, but most is treated at several treatment lagoons around the county. A number of private wastewater treatment systems serve individual subdivisions and mobile home parks, including several along the project corridor. Many low-density residences are served by individual septic systems.

During this NEPA phase of the project, the level of design of the alternatives does not provide details about the specific locations and costs of the utilities. Should the project proceed to preliminary engineering, MoDOT requires that major underground and overhead utilities be identified and utility concerns be noted. The preliminary engineering plans would begin to identify specific opportunities for adjustment of the roadway and/or the need for utility relocations.

Parks, Recreational Areas and Other Public Use Lands

The Columbia Parks and Recreation Department oversees more than 2,000 acres of park land with 52 park and recreation facilities. Parks in the immediate vicinity of I-70 SIU 4 include the following:

Columbia Cosmopolitan Recreation Area: The largest recreation area in the project study area is the Columbia Cosmopolitan Recreation Area (also known as Cosmo Park or CCRA), located immediately northeast of the I-70 interchange with Stadium Boulevard. Along with traditional park features, CCRA is home to the six-field Antimi Sports complex, six-field Rainbow Softball Center, 2.4-mile (3.9 km) Rhett's Run Mountain Bike Trail, the 1.25-mile (2.01 -km) asphalt Cosmo Fitness Trail, Skate Park, L. A. Nickell Golf Course (18 holes) and soccer and football fields (see **Figure III-5** for location of facilities within the park). The City's Parks, Recreation & Open Space Master Plan recommends \$3.3 million of improvements, including improvements to the sports complex, softball center, tennis courts, soccer fields, skate park and playground. Improvements would include replacing and upgrading shelters, improving the golf course and park management center and other miscellaneous repairs. Cosmo Park has been the recipient of Section 6(f) Land and Water Conservation Funds and the portion closest to I-70 is visible in **Exhibit III-1D**.

Lake of the Woods Recreation Area: This 145-acre community park is located at 6700 St. Charles Road, north of I-70. It includes a clubhouse, fishing lake, 18-hole golf course, picnic sites, swimming pool and restrooms. Improvements recommended for the park in the City's Master Plan include constructing new shelters and restrooms, renovating the fairways, roadway, parking lot and trees and other miscellaneous improvements. The Lake of the Woods Recreation Area has been the recipient of Section 6(f) Land and Water Conservation Funds and is visible in **Exhibit III-1I**.

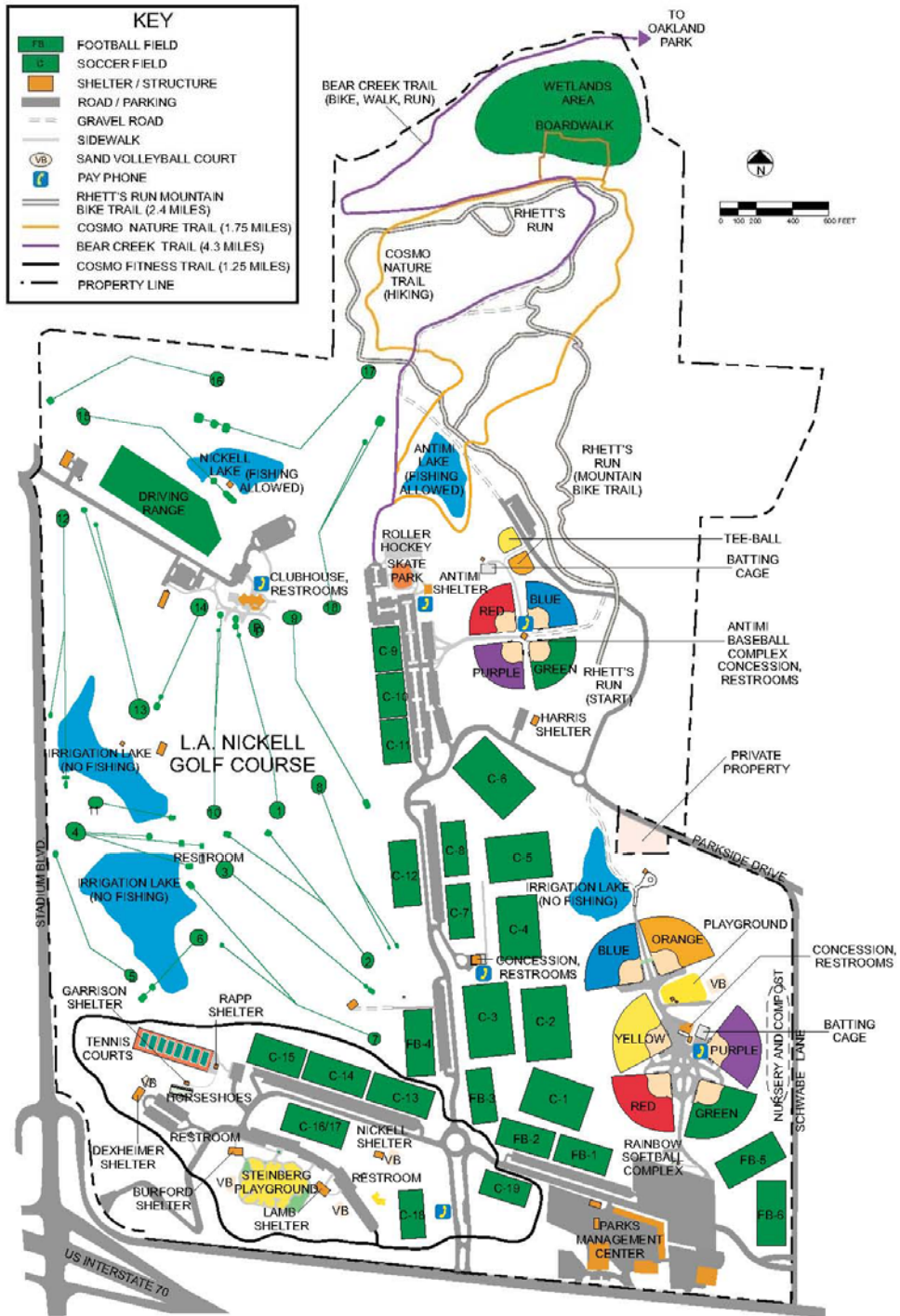
Coordination with the administrator of the Columbia Park and Recreation Department was undertaken. Both Cosmo Park and the Lake of the Woods Recreation Area have used Section 6(f) funds for numerous park improvements. None of these improvements occur in the vicinity of the I-70 project.

c. Transportation Planning Environment

The responsibility for ensuring the adequacy of the transportation system within Boone County and Columbia is shared among the City and County governments and with CATSO. The principal planning documents are summarized in this text. The documents examined include the region's existing Thoroughfare Plan, long-range Transportation Plan, mass transit facilities and plans, air and rail service and bicycle/pedestrian resources. Through reference to these plans, it would be possible to determine how the reasonable alternatives would affect the existing and planned transportation environment.

Figure III-5: Cosmo Park Facility Map

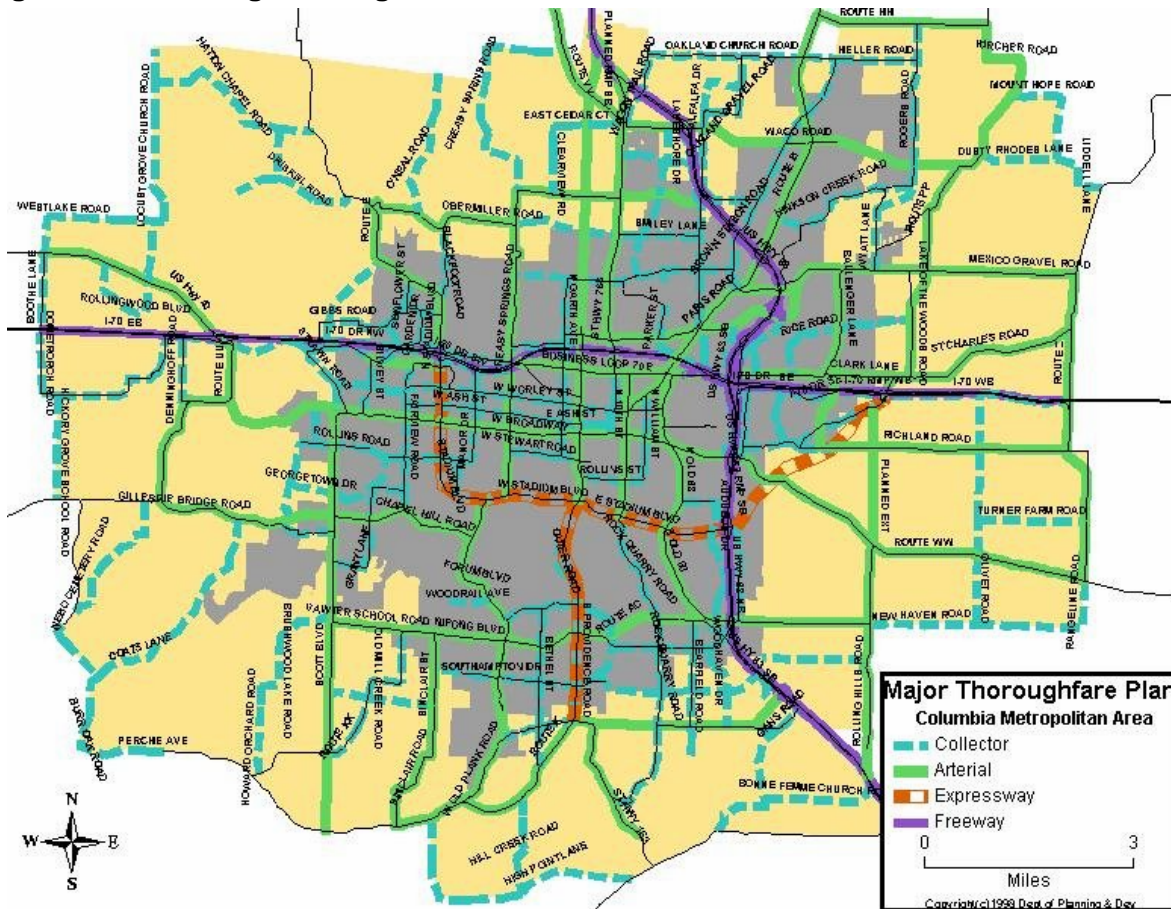
COLUMBIA COSMOPOLITAN RECREATION AREA
1615 BUSINESS LOOP 70 WEST



Thoroughfare Plan

The Major Thoroughfare Plan adopted by the Columbia City Council and the Boone County Commission serves as the joint plan for roadways in Columbia and surrounding areas within Boone County. It also serves as the basis for the traffic modeling efforts that led to the development of the region’s long-range transportation plan (Major Roadway Plan). **Figure III-6** depicts the existing Thoroughfare Plan. Transportation planning documents typically organize an area’s roadways by function, size and type. The Thoroughfare Plan identifies freeways, expressways, arterials and collectors.⁵ The highest volume roadways—I-70 (east/west) and U.S. 63 (north/south)—are the only freeways within Boone County. The network of expressways in Boone County includes a loop around the southern part of Columbia by MO-740 (Stadium Boulevard) and MO-163 (Providence Road) starting at MO-740 and extending southward.

Figure III-6: Existing Thoroughfare Plan



A noticeable addition to the existing roadway network is the creation/expansion of the MO-740 expressway. It currently ends at U.S. 63. The proposed extension would continue it to the northeast, terminating at the St. Charles Road interchange (exit 131). The arterial and collector network extends throughout the area. Other important proposed additions to the roadway network include the following:

⁵ More detailed definitions of these terms are provided in the discussion of the CATSO 2025 Transportation Plan.

- The creation of an arterial that would connect Stadium Boulevard to Silvey Street to the west along Bernadette Street (adjacent to the Columbia Mall).
- The creation of a continuous collector street south of I-70 and west of Stadium Boulevard by extending I-70 Drive SW across Perche Creek to connect to Sugar Creek Drive.
- A new collector between Sorrels Overpass Drive, off I-70 Drive SW west of Stadium Boulevard, to Stadium Boulevard north of I-70.
- The creation of a continuous collector roadway system around the U.S. 63 interchange.
- The extension of Ballenger Road as a north-south arterial between MO-PP (Mexico Gravel Road) north of I-70 and St. Charles Road south of I-70.
- In a recent development (August 18, 2003), the City of Columbia voted to amend the Major Roadway Plan to include an extension of Broadway, Scott Boulevard, Route ZZ, Route UU or Route E to a new I-70 interchange west of Stadium Boulevard. As discussed in Chapter II, a new interchange (west of Stadium Boulevard) was evaluated as a part of the project. One of the important components of the project's purpose and need is to improve the existing interchanges so that they operate appropriately. Because the Stadium interchange has unique operational constraints, a new interchange would have been pursued if the existing interchange could not be improved in accordance with the project's standards. That was not the case, and a new interchange was determined not to be reasonable within the context of the Improve I-70 project. However, it was noted that a new interchange west of the Stadium interchange may be reasonable under a project that sought to improve regional connectivity and regional development. The project team has identified an area within which a new interchange might be placed so that it would not adversely affect operation of I-70 or adjacent interchanges.

CATSO 2025 Transportation Plan (2002)

The adopted CATSO 2025 Transportation Plan (Major Roadway Plan), when fully implemented, is intended to adequately address the roadway capacity needs for the area. This long-range plan for the Columbia metro area classifies roadways and identifies the needed improvements to the system. The improvements are based, in part, on traffic modeling. These models were also used during the traffic modeling parts of the SIU 4 project. As defined in the Columbia 2025 Transportation Plan, roadways are classified in order of function, traffic volumes and their relationship to the rest of the system. **Figure III-7** is the CATSO Major Roadway Plan.

Freeway—Four, six or eight travel lanes with a minimum 400 feet (121.9-m) of right of way. These are limited access roadways with full grade-separated interchanges. Access on and off the roadway is accomplished by ramps connecting to frontage roads or interchanges. The only freeway designations are for I-70 and U.S. 63.

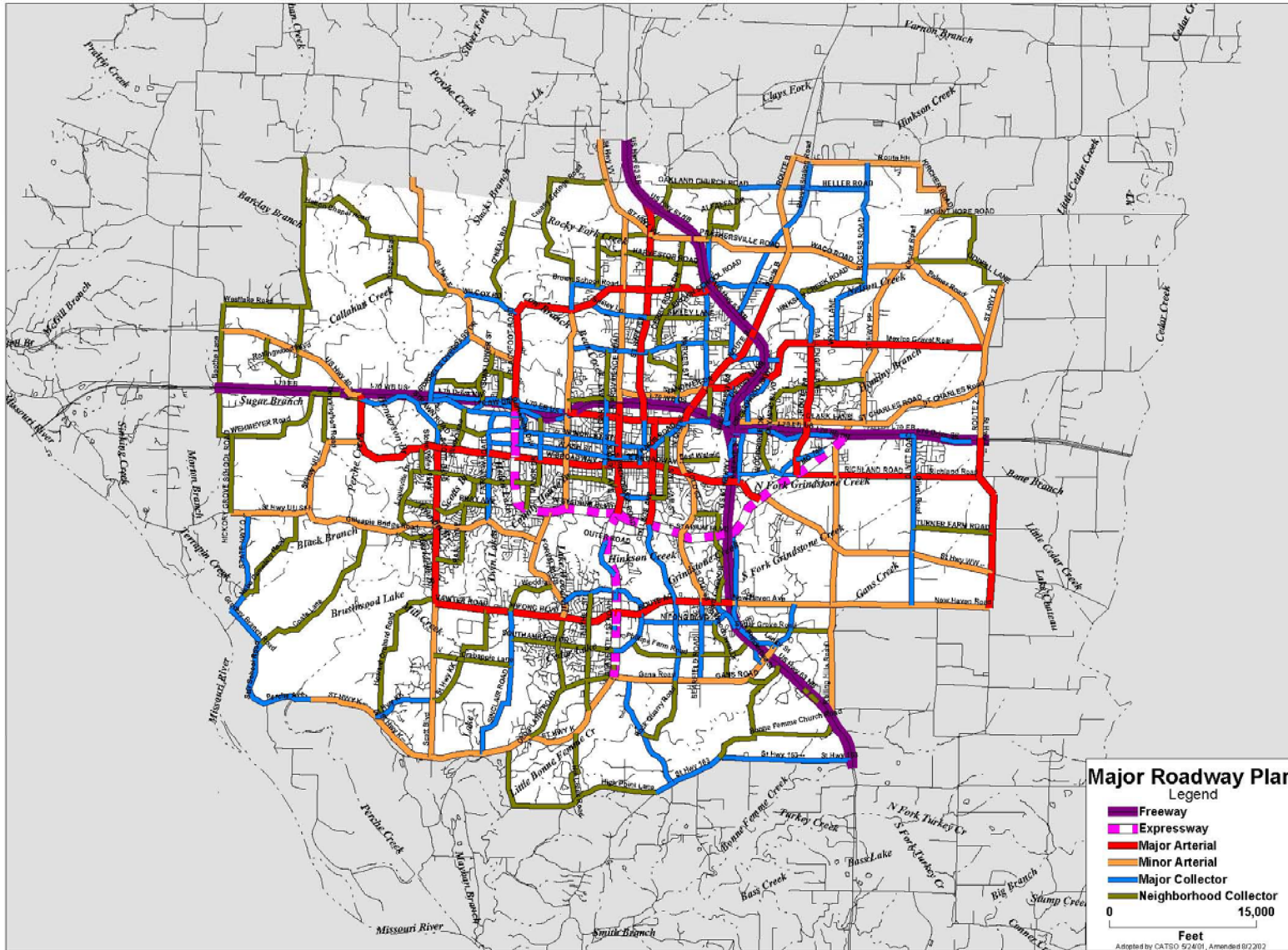
Expressway—Four or six travel lanes with a minimum 250 feet (76.2-m) of right of way. A high-volume, high-capacity arterial roadway with widely spaced signalized intersections at minor intersections. Major intersections are grade separated. There is limited (right in/right out only) or no direct access to the main lanes from property fronting the roadway. The part of Stadium

Boulevard (MO-740), beginning just south of I-70 and running counterclockwise to its terminus at U.S. 63, is designated an expressway.

Major Arterial—Four or six lanes with 90 (27.4 m) to 150 feet (45.7 m) of right of way. A high-volume roadway with at-grade street intersections and regulated driveway access. Signals are placed at significant intersections with priority given to the arterial through movement. A raised center median with a minimum spacing requirement for median breaks or a flush median may be provided depending on the access requirements of the properties fronting the arterial. Major arterials near I-70 include MO-UU (south of U.S. 40 interchange), Stadium Boulevard (north of I-70), Business Loop 70 (between interchanges), Providence Road (south of I-70), MO-763 (Range Line Road), Paris Road, Ballenger Lane and MO-Z south of I-70.

Minor Arterial—Two or four lanes with 90 (27.4 m) to 120 feet (36.6 m) of right of way. A secondary arterial facility to provide access to major arterials or limited access roadways

Figure III-7: CATSO 2025 Transportation Plan



servicing localized circulation and access needs. The roadway may be divided or undivided and typically supports the access requirements of concentrations of commercial or residential development. Minor arterials near I-70 include U.S. 40, Creasy Springs Road, West Road, Providence Road (north of I-70), Vandiver Drive, St. Charles Road, MO-Z (north of I-70) and Clark Lane east of U.S. 63.

Major Collector—Two or four lanes with up to 90 feet (27.4 m) of right of way. A lower capacity roadway, it provides local access and circulation to the arterial network. Major collectors near I-70 are the I-70 Drives, Bernadette Drive, Fairview Road, Strawn Road, Clark Lane west of U.S. 63, the eastern and western ends of Business Loop 70 and parts of Paris Road.

Neighborhood Collector—Two lanes with up to 66 feet (20.1 m) of right of way. A low-volume, low-speed roadway to provide access for local residential traffic to the collector and arterial network. Neighborhood Collectors near I-70 include Wehmeyer Road, Woodridge Drive, parts of Worley Street and Rollins Road.

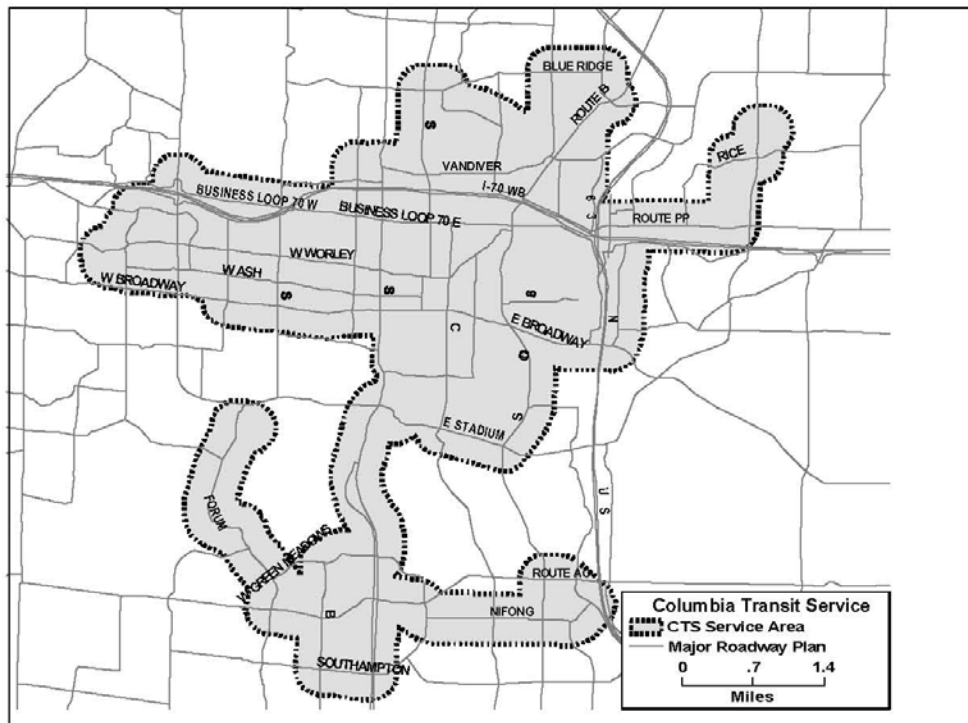
The CATSO 2025 Transportation Plan was developed with the expectation that I-70 would be improved, either through a bypass or within the existing corridor. It also incorporated the results of the U.S. 63/I-70 interchange MIS⁶. Using this information, transportation planners developed the plan to meet local needs. Specifically, the plan's future roadway projects seek to expand the metro area's arterial system. Arterials intersecting I-70 that were identified for future projects include Business Loop 70, Stadium Boulevard, Broadway and MO-163, MO-763 and Vandiver Drive. There has been detailed and substantive coordination between the I-70 project team and the local transportation planning agencies to insure that the proposed I-70 improvements are compatible with the planning goals of the Columbia area.

Mass Transit

Columbia Transit is the existing publicly funded bus system. It runs four full-service fixed routes and one commuter route and offers complementary paratransit service for disabled persons within the city of Columbia. There is no service beyond the city limits. Buses operate along the routes during peak travel hours (6:25 A.M. to 6:05 P.M.) from Monday through Saturday and evenings (till 10 P.M.) from Thursday through Saturday. Four transit routes cross or approach the project corridor. Route 1 is a north-south route that extends from Northland Acres, about one mile (1.6 km) north of I-70 at Range Line Road (MO-763), to the southern city limits. It crosses I-70 along Garth Avenue. Routes 2 and 3 are east-west routes that extend through the central city area and serve the Columbia Mall commercial area. Route 2 runs a circuitous route along Business Loop 70 and I-70 Drive SW, and Clark Lane, crossing the project corridor three times: Stadium Boulevard, Business Loop 70 West and Paris Road. Route 3 runs between the Columbia Mall area to Indian Hills Park, in the northeastern portion of the city, by way of the university. It crosses the project corridor along Paris Road. Route 4, also an east-west route, does not cross the project corridor, but serves the Columbia Mall area as well as the commercial area southeast of the U.S. 63 interchange. **Figure III-8** shows the Columbia transit service map.

⁶ Not only was the interchange configuration decision incorporated, but also the recommendations to relocate the eastern Business Loop interchange and the recommendation to downgrade the extension of MO-740 (U.S. 63 to St. Charles interchange) from an expressway to an arterial.

Figure III-8: Columbia Transit Service Map



The CATSO 2025 Transportation Plan recommends examining options for expanding public transportation services in the unincorporated portions of the Metro Area to improve ridership.

Air/Rail Service

Air and rail service in Boone County and the Columbia metro area is limited. The Columbia Regional Airport is a general aviation airport located 8.5 miles (13.7 km) southeast of Columbia. The airport is owned and operated by the City of Columbia. U.S. 63 and MO-H provide direct access to the airport. In addition to limited commercial passenger service, the airport provides aircraft charters, rentals, maintenance and repairs, aircraft and aviation fuel sales and flight instruction. Dedicated limousine service and commercial taxicab service are available between Columbia and the airport, and several local motels provide airport shuttle service. A Hertz car rental agency is based in the passenger terminal. The Columbia Regional Airport also provides terminal handling for unscheduled air freight shipping and receiving. Airborne Express and the U.S. Postal Service also use the airport.

Freight rail is provided by the Columbia Terminal Railroad (COLT), which is owned and operated by the City of Columbia. The railroad runs north-south between the communities of Centralia and Columbia, from a junction with the Norfolk and Southern rail in Centralia. The COLT has one locomotive and generally uses a two-man crew for train operations. In 1999, the COLT line carried 1,495 carloads of freight. The line served eight commercial customers during 1999, including the City of Columbia Water and Light Department, the department responsible for the COLT operation. The COLT has recently developed a multi-modal rail to truck transload facility. The COLT has identified several potential movements of freight into mid-Missouri that could be taken off the highways and put on the railroad with a suitable transload facility. There is no passenger rail service. The nearest passenger rail is the Amtrak line located in Jefferson City, 30 miles (48.3 km) south of Columbia.

Bicycle/Pedestrian Facilities

The bicycle master plan, called Pednet, was originally approved in July 1993. It was updated in 2001 by a more comprehensive pedestrian/bicycle network plan, included in the CATSO 2025 Transportation Plan, that covers the entire Columbia metro area (**Figure III-9**). The plan was designed to provide greater opportunities for bicycle and pedestrian travel. It includes a greenbelt trail system, existing sidewalk/bicycle routes and new pedways.

The greenbelt trail system is intended to provide an areawide transportation system dedicated entirely to pedestrians and bicyclists. Near I-70, the trails follow stream corridors, including Grindstone Creek, Hominy Branch, Perche Creek, Hinkson Creek and Harmony Creek. Another trail near I-70 is proposed along the COLT rail line (Katy [MKT] Trail Extension). None of these trails currently exists. The trails are identified as acquisition targets in the Columbia Parks Recreation and Open Space Plan (2002 update). **Exhibit III-5** depicts paths for the proposed trails.

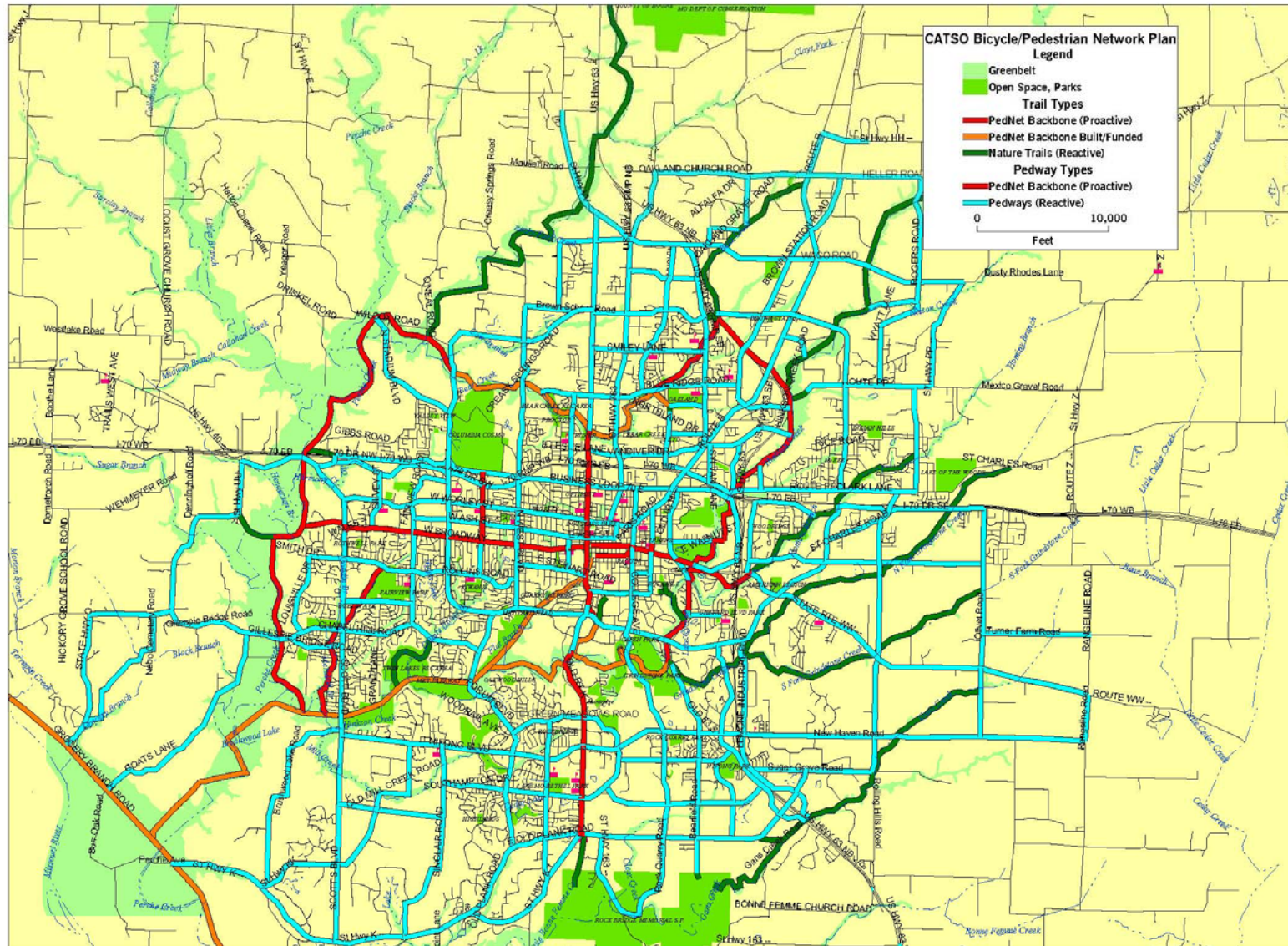
Most of the street mileage within the city of Columbia has no sidewalks. Over half of the arterial and collector roadways within the city have no sidewalks. Roughly 60 percent of the local streets have no sidewalks. To rectify the bicycle and pedestrian system needs, the 2025 Transportation Plan recommends an extensive program of bikeway/sidewalk.

The pedway concept includes two types of facilities. The traditional pedway would be a paved two-way path (10 to 12 feet [3.0 to 3.6 m] wide). The traditional pedway would be constructed on one side of the street. The other side of the road may be a typical sidewalk. A split pedway would be paved one-way pedways (six to eight feet [1.8 to 2.4 m] wide) on both sides of the road. The Pednet plan also prioritizes the facilities in terms of their importance to connectivity. Backbone facilities are those particularly important to connectivity.

d. Land Use Planning Environment

Land use planning as it affects the Improve I-70 project will be described in terms of the six main regional and local planning documents: the City of Columbia Land Use Plan, the City of Columbia Consolidated Plan, the Boone County Comprehensive Plan, the Columbia/Boone County Economic Development Master Plan, the City of Columbia zoning ordinances and the Boone County zoning ordinances.

Figure III-9: Bicycle/Pedestrian Network Plan



City of Columbia Land Use Plan

The City's current land use plan is *Metro 2020, A Planning Guide for Columbia's Future* (proposed final draft, January 2001). The plan is a "more generalized land use plan guided by policy;" that is, it lays down a framework of guidelines for development within various land use districts. The transportation infrastructure, as laid out in the Thoroughfare Plan, provides the framework for the location of land use districts. The plan covers the area within the city limits as well as urban fringe areas that may be subject to voluntary annexation in the future. The urban fringe, as defined in the plan and developed in cooperation with Boone County, extends east to the MO-Z interchange (near the eastern corridor terminus) and west to about one mile (1.6 km) east of MO-J/MO-O interchange. Thus, the plan covers all but the westernmost three miles (4.8 km) of the project corridor. See **Figure III-10**.

The plan identifies five general land use district types: neighborhoods, open space/greenbelt, commercial district, employment district and city center district. Within the city limits, most of the land along the I-70 project corridor is contained within commercial or employment districts. As a rule, commercial and employment districts are promoted at interchanges. Commercial and employment districts generally correspond to the existing commercial and industrial areas along both sides of I-70, extending as an almost continuous band from west of Stadium Boulevard to the St. Charles Road interchange. Several residential and open space/greenbelt districts interrupt the commercial and employment districts. Open space and greenbelts are located along the floodplains of Harmony Branch, Hinkson Creek, Hominy Branch and North Fork Grindstone Creek and at regional open space areas, such as Columbia Country Club, Cosmopolitan Recreation Area and Lake of the Woods Recreation Area.

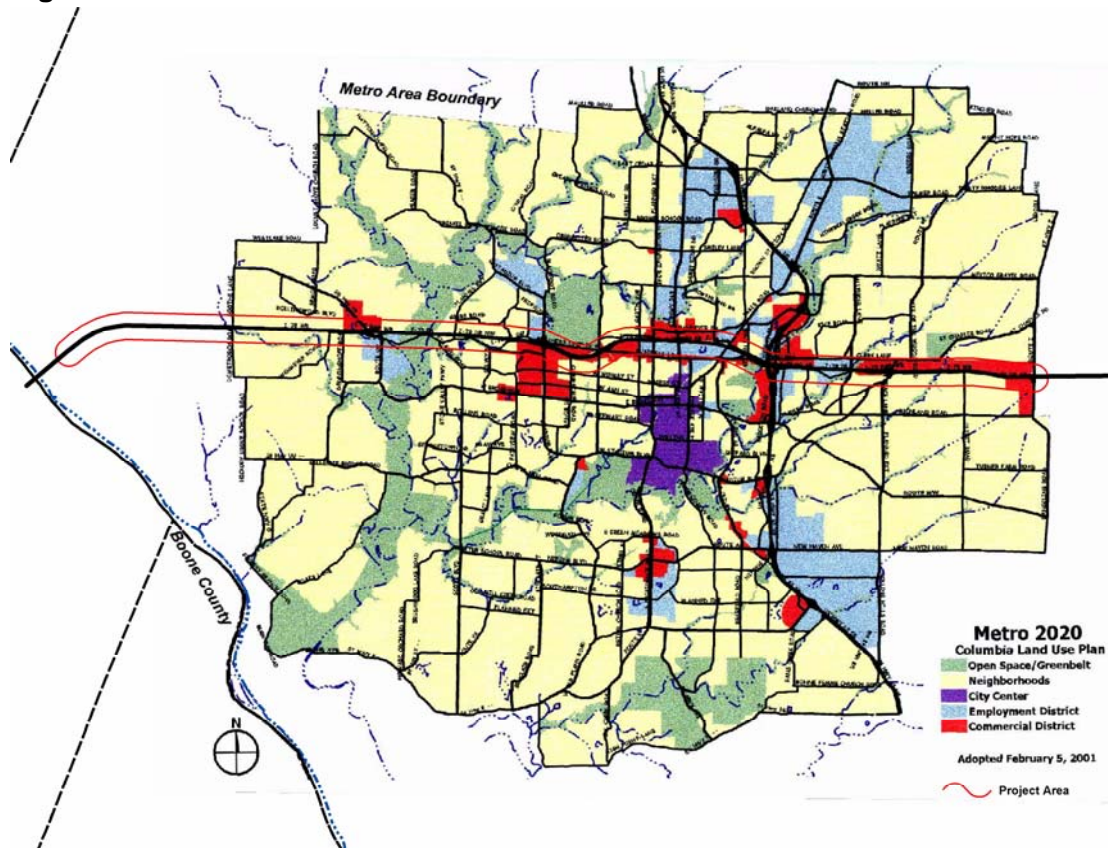
In the western urban fringe area, most land is designated residential. Commercial and employment districts are located at the U.S. 40 interchange area, and open space/greenbelt districts are designated along the Perche Creek, Harmony Creek and Sugar Branch floodplains. In the eastern fringe area, a continuous commercial district extends along the north side of I-70 to MO-Z, and a residential district extends along the south side of I-70.

The city center district (the educational and cultural center) is located south of Business Loop 70 near Columbia College and the University of Missouri and is outside the project corridor.

The stated goals of *Metro 2020* include the following:

- Containing urban development within a centralized area,
- Guiding commercial and industrial developments in appropriate locations,
- Providing efficient vehicular and pedestrian traffic,
- Promoting and protecting neighborhood integrity,
- Supporting the development of housing for low- and moderate-income families, and
- Maintaining the aesthetic qualities of urban and natural areas.

Figure III-10: Columbia Land Use Plan



The plan's land use initiatives seek to maintain the character of established neighborhoods and to avoid the inefficiencies of urban sprawl while supporting continued building of a sustainable economy. A main theme of *Metro 2020* is the development of residential neighborhoods with common amenities such as recreation facilities, parkways, trails, schools, churches and shopping at a neighborhood or community level to foster a sense of neighborhood identity.

Community appearance initiatives consider the compatibility of adjacent land uses, encourage context sensitive development, encourage the conservation and extension of greenbelts and the preservation of architecturally or historically significant buildings and open space.

The focus of the transportation portions of the plan are on the existing and future infrastructure that would be necessary to support the projected growth in the metro area through 2020. The future transportation system would ideally limit unnecessary through traffic in residential areas. The plan encourages the consideration of transit, bicycle and pedestrian traffic as alternatives for automobiles to reduce traffic volumes. It specifically supports the development of a comprehensive bicycle and pedestrian trail network for recreation and commuting. This includes incorporating improved pedestrian and bicycle access as part of all future improvements.

City of Columbia Consolidated Plan

The City of Columbia developed the Consolidated Plan to establish a unified approach for community development actions that would help the homeless, expand the stock of affordable

housing, strengthen infrastructure to ensure safety and livability of neighborhoods, protect the environment, enhance civic design and expand economic opportunities, particularly for low- and moderate-income persons. The Consolidated Plan establishes clear priority needs and identifies proposed projects to meet those needs with anticipated program income and funds received through federal and state programs. The plan identifies areas where populations of low or very low income and minorities are concentrated and where special projects are most needed.

Identified populations near the I-70 project occur southeast of the Stadium Boulevard interchange (within the Bluegrass and Alamo Place subdivisions), northwest of the Paris Road overpass and south of I-70 between West Road and Providence Road (within the Smithton Valley neighborhood). The needs identified for these areas include sidewalk, street and bridge improvements; access to parks and recreation; and access for physically disabled persons.

None of the projects implemented under this plan over the past two years is located in the project corridor (the immediate vicinity of I-70).

Boone County Comprehensive Plan

The *Boone County Comprehensive Plan* was completed in 1996. This plan included an inventory of land uses and infrastructure outside Columbia and recommendations for future growth. The plan reiterates the projected development of Columbia, with commercial areas concentrated at interchanges along I-70, as described for the *Columbia Metro 2020* plan. It recognizes that Columbia's continued role as the economic, cultural, medical and administrative center of mid-Missouri would drive continued development around the city. Maintaining adequate infrastructure, namely transportation, natural gas and water and sewer service is a primary concern for supporting urban development beyond the city limits.

There is strong citizen involvement in the continued planning and infrastructure investment for Boone County. The Boone County Vision Project was a county-wide land management study completed in 2001 (www.boonecountyvision.missouri.edu). The project was sponsored by the Boone County Commission and prepared by the Wallace House Foundation. This project sought the input of officials and citizens across the county regarding the future development and preservation issues and priorities. Some of the concerns identified during the project were preservation of prime agricultural lands in light of continued urban expansion, improvement of the safety and efficiency of the transportation network, preservation of exceptional natural and cultural areas, protection of private property rights and just compensation when private lands are converted to public use. The Boone County Smart Growth Coalition promotes goals and priorities similar to those identified in the Vision Project (smartgrowth.missouri.org/index.htm). The coalition is composed of a number of community and environmental groups with the common goal of promoting a sustainable, prosperous community while protecting private and public interests and striking a balance between urban and rural land use and between developed areas and natural spaces.

Columbia/Boone County Economic Development Master Plan

Prepared by Boone County Regional Economic Development Inc (REDI).⁷, this plan is intended to promote the development of the local work force to meet the needs of employment markets

⁷ Regional Economic Development, Inc. is a public/private partnership organized to promote positive economic expansion in Columbia and Boone County, Missouri. REDI seeks to provide increased economic opportunities for Columbia/Boone County while maintaining a superior quality of life.

and to encourage entrepreneurship and relocation of existing businesses within Boone County. An important feature of the plan is maintaining a core business area near the project corridor, defined by Business Loop 70 on the north, Elm Street on the south, U.S. 63 on the east and West Boulevard on the west. This area is designated for promoting small businesses that are eligible for special funding programs. Among the transportation needs identified in the plan that relate to I-70 are the improvement of Stadium Boulevard, the U.S. 63 interchange and MO-763.

The I-70 project team has coordinated with REDI regarding its role in developing strategies to assist in redeveloping the business areas immediately adjacent to the project area. Intelligent strategies would allow the post-construction corridor to better achieve the land use goals of its citizens. This coordination is ongoing. Related coordination in developing intelligent redevelopment strategies is under way with other agencies that have land use responsibilities. These efforts are outlined in the Measures to Minimize Harm portion of this document (Section III.B.3).

Zoning

The project corridor spans areas governed by zoning and subdivision ordinances of both the City of Columbia and Boone County.

The City of Columbia Code of Ordinances was most recently amended May 19, 2003. The City of Columbia's zoning ordinance identifies single- and multi-family residential, office, commercial, manufacturing (including research and development) and agricultural districts within the project corridor. The zoning ordinances also establish special overlay districts (urban conservation, scenic roadway, historic preservation and floodplain). The only special overlay districts in the project corridor are floodplain districts, which correspond to the Federal Emergency Management Agency (FEMA) mapping shown in **Exhibits III-4A through III-4J**. The Columbia zoning designations near the I-70 project so closely mirror the existing land uses depicted in **Exhibit III-2** as to be an adequate substitute.

Expansion of the I-70 right of way would involve the complete acquisition of some parcels and partial acquisition of others. Issues for partially acquired parcels include maintaining compliance with ordinance provisions and reconfiguring/rezoning, as needed. These issues could affect project design, impacts and costs. Zoning ordinance issues associated with the project may include the following:

- Buildings and building regulations, including provisions for minimum lot sizes and dimensions, visual clearance for traffic, building setbacks, stormwater management, landscaping and screening, communication antenna and towers, access and offstreet parking;
- Land preservation, including specifications for landscaping, soil erosion control and storm water management;
- Motor vehicles and traffic; in particular, one-way street designations; and
- Signs, including roadway and commercial signage.

Local streets would also be affected as part of the project. The ordinance encourages through streets wherever possible for efficient delivery of public and emergency services. The ordinance also specifies minimum right of way widths (depending on roadway classification), street grades, curves and intersection signage and orientation, sidewalk provisions and construction standards

and provision of street lighting on most public streets. The disposition of the local roadway network, under the reasonable alternatives is more easily seen on **Exhibits II-12 through 24** in Chapter II.

Boone County ordinances apply to unincorporated lands within Boone County. The objectives of the county zoning ordinance are to preserve good agricultural lands and to ensure compatibility of new developments with farming practices, available infrastructure (including utilities) and available public safety services. The county ordinance specifies agricultural, residential, commercial, industrial and recreational districts. Most of the land adjacent to I-70 beyond the city limits is zoned agricultural, with commercial areas around the interchanges and scattered residential areas. Sections of the county zoning (last amended September 3, 1991) and subdivision ordinances that may apply to this project as it affects existing roadways, developed lands or developable adjacent lands include the following:

- Minimum lot areas;
- Minimum yard requirements;
- Front yard setbacks;
- Sign, fence, wall, shrub or other obstruction to vision;
- Off-street parking requirements;
- Regulations that apply to land-based transmission facilities (such as communications towers); and
- Roadways, including right of way width and curves and grade changes, in accordance with Boone County's Roadway Regulations.

The county has no special overlay zones, although the Boone County Planning Division maintains the Flood Insurance Rate Maps and enforces flood plain regulations. A Character Preservation District ordinance for the county is currently under consideration but has not yet been adopted.

The Boone County zoning designations near the I-70 project so closely mirror the existing land uses depicted in **Exhibit III-2** as to be an adequate substitute.

2. Environmental Consequences

This text discusses the anticipated impacts to the social and economic resources as a result of the implementation of SIU 4 portion of the I-70 project. The impacts from all of the reasonable alternatives will be discussed, with special emphasis on the recommended preferred alternative.

See Chapter II for a detailed discussion of alternative development and evaluation process. **Exhibits II-12 through II-26** depict the layouts of the reasonable alternatives (where they differ). The reasonable alternatives are organized such that each individual portion of I-70 may have one or more reasonable alternatives (configurations). Each alternative is compatible with the adjoining alternatives. The Chapter III exhibits focus on the impacts of the recommended preferred alternatives, although because the reasonable alternatives are spatially very similar, the impacts of the other reasonable alternatives should be readily apparent. To clearly depict the resources effected by the recommended preferred alternative, only the footprint/direct impact area is shown on the Chapter III exhibits. Reference back to the Chapter II exhibits may

be necessary, in some cases. **Exhibit II-27** (A – F) depicts the entire recommended preferred alternative.

a. Acquisition Impacts—Structures

The recommended preferred alternative would result in the acquisition or displacement of 142 structures. **Appendix III-B** contains a summary of the structures potentially displaced by the project's reasonable alternatives. **Exhibit III-3** displays the locations of structures that would be acquired/displaced under the reasonable alternatives. The information in **Appendix III-B** is organized by the reasonable alternative that the structure acquisition occurs in (Stadium Loop or Stadium Split Diamond, for example). The other available data include the ID number used on **Exhibit III-3** to identify the acquisitions, the type of structure (single-family, commercial, etc.), the property identification number from the Boone County Assessors records, the names of all nonresidential operations, the number of business operations within the structure (a mini-mall may have several separate operations within a single building) and the number of dwelling units within each residential structure (an apartment may have more than one).

Table III-16 lists the displaced structures associated with the reasonable alternatives. It also summarizes the structure-related impacts for the recommended preferred alternative. The recommended preferred alternative results in 142 structure displacements: 43 residential, 66 commercial, 10 public/utility/fraternal and 23 various out-buildings and garages⁸. This represents 299 dwelling units and 66 business operations that would lose at least one existing building. Because they are so similar, there is little discernable difference between the structure impacts among the reasonable alternatives. The reasonable alternatives are described individually below.

MO-J/O: Southern Widening with Diamond Interchange (recommended preferred alternative)— This reasonable alternative is a component of the recommended preferred alternative. Within it, 11 structures would be displaced: five residential, one commercial, three public and two out-buildings. Two of the residences are mobile homes. There are no multi-family residences. The commercial operation is a fruit stand. The three public structures are associated with a MoDOT garage in the northeastern quadrant of the J/O interchange.

U.S. 40: Southern Widening with Enhanced Diamond Interchange (recommended preferred alternative)— This reasonable alternative is a component of the recommended preferred alternative. Within it, 17 structures would be displaced: four residential, six commercial buildings and seven out-buildings. Three of the residences are mobile homes. There are no multi-family residences. The commercial operations include Sorrels Used Auto Parts, an unnamed auto garage, Sapp Electrical/Look'n Good Flea Market and CMSI Controls (five business operations).

U.S. 40: Southern Widening with Southwestern Loop Ramp Interchange — This reasonable alternative is not a component of the recommended preferred alternative. Within it, 21 structures would be displaced: five residential, nine commercial buildings and seven out-buildings. Three of the residences are mobile homes. There are no multi-family residences. In addition to commercial structures listed for the enhanced diamond interchange, additional impacts occur to the Missouri Pork Producers Association and the former Rust & Martin Interiors building (a total of seven business operations).

⁸ Out-building include sheds, garages, agricultural structures such as barns and corn cribs, as well as other assorted non-commercial storage type structures.

Stadium: Symmetrical Widening with Northwestern Loop Ramp Interchange — This reasonable alternative is not a component of the recommended preferred alternative. Within this alternative, 33 structures would be displaced – 15 single-family residential units and one multi-family residential, 14 commercial, one public and two out-buildings. A total of 135 dwelling unit acquisitions are expected. The only multi-family structure is West Village Manor, a senior citizen care facility. According to the Boone County Tax Assessors, that facility has 96 units. Coordination with the West Village Manor, indicates that the facility has 120 beds (this is the number used in the dwelling unit calculation). A total of 14 business operations are affected including the Extended Stay America, the Baymont Inn and the American Heart Association building on I-70 Drive NW. The northwest loop displaces the Boone County Fire Protection District complex in the northwestern quadrant of the interchange.

Stadium: Symmetrical Widening with Tight Diamond or SPUI Interchange (recommended preferred alternative)— The footprints for the tight diamond and the SPUI are identical. The tight diamond interchange is a component of the recommended preferred alternative. Within this alternative, 31 structures would be displaced – 16 residential, 13 commercial and two out-buildings. A total of 135 dwelling unit losses are expected. All of the Stadium alternatives affect the West Village Manor. Over half of the single-family residences are mobile homes. The tight diamond also affects the Extended Stay America, the Baymont Inn and the American Heart Association building. The tight diamond/SPUI avoids the Boone County Fire Protection District complex.

Stadium: Symmetrical Widening with Split Diamond Interchange — This reasonable alternative is not a component of the recommended preferred alternative. Within this alternative, 31 structures would be displaced – 16 residential, 13 commercial and two out-buildings. A total of 135 dwelling unit losses are expected. All of the Stadium alternatives affect the West Village Manor. Over half of the single-family residences are mobile homes. The split diamond has 13 business operation impacts, including the Extended Stay America and the American Heart Association building. The split diamond avoids the Boone County Fire Protection District complex and possibly the Baymont Inn.

Business Loop West: Symmetrical Widening with Two-Point Interchange (recommended preferred alternative)— This reasonable alternative is a component of the recommended preferred alternative. Within this alternative, seven structures would be displaced – one multi-family residence and six commercial buildings. The multi-family residence is the Terrace Senior Living Apartments, which has 130 dwelling units according to the Boone County Tax Assessors data. Coordination with the Terrace, indicates that the facility has 128 units (this is the number used in the dwelling unit calculation). This alternative would acquire all 128 units. The commercial impacts include two of the three Market Place buildings, Ryan's Steakhouse, Conoco and two Auto Deal buildings (three business operations). Each Market Place building is assumed to be an independent operation.

MO-163/MO-763/Business Loop East: One-Way Frontage Road System (recommended preferred alternative)— This reasonable alternative is a component of the recommended preferred alternative. Within it, 33 structures would be displaced: six residential, 19 commercial, three public/utility/fraternal and five out-buildings. All residences are single-family. The commercial structures account for 26 business operations. Displacements include a Travel Lodge building, the Columbia Insurance Group and current construction on Westfall Drive. The OATS Inc. building on Texas Avenue would be displaced. OATS is a nonprofit organization providing transportation mainly for senior citizens and the disabled statewide. Public

displacements include Veterans of Foreign Wars (VFW) Post 280 (two buildings) and the Parole Board, Children Services and Social Services Building.

MO-163/MO-763/Business Loop East: Collector/Distributor System (recommended preferred alternative)— This reasonable alternative is not a component of the recommended preferred alternative. Within it, 38 structures would be displaced: ten residential, 20 commercial, three public/utility/fraternal and five out-buildings. The principal difference is the displacement of four additional residences and one additional commercial building. The four additional residences are multi-family (five units per building). This yields a total of 26 dwelling units. The commercial structures represent 26 business operations. The commercial and public displacements are virtually identical to those predicted for the one-way frontage road alternative. Among the important displacements are those associated with OATS Inc., the VFW Post and the Parole Board, Children Services and Social Services Building.

U.S. 63: Tight Right of Way Interchange (recommended preferred alternative)—This reasonable alternative is a component of the recommended preferred alternative. Within it, 20 structures would be displaced: seven residential, ten commercial, one public/utility/fraternal and two out-buildings. Two residential buildings are multi-family. Twenty dwelling units would be affected. The commercial structures represent five businesses. Among the displacements are facilities in the southern quadrant of the existing (old) U.S. 63 interchange, including the Break Time store and the La Quinta motel. The public/utility/fraternal displacement is a Union Electric building in the northwestern quadrant of the new U.S. 63 intersection with I-70.

St. Charles Road: Tight Diamond Interchange (recommended preferred alternative)— This reasonable alternative is a component of the recommended preferred alternative. Within it, five structures would be displaced: two residential, one commercial, one public/utility/fraternal and one out-building. All residences are single-family. The commercial structures represent a single business operation (Steamatic Car Wash). The public/utility/fraternal displacement is a Boone County Regional Sewer line structure.

St. Charles Road: Off-Set Diamond Interchange — This reasonable alternative is not a component of the recommended preferred alternative. Within it, 12 structures would be displaced: four residential, three commercial, two public/utility/fraternal and three out-buildings. All residences are single-family. The commercial structures represent four business operations (including the strip mall that houses the Columbia Tourism and Visitor's Center). The public/utility/fraternal displacements are both Boone County Regional Sewer line structures at the end of Demaret Drive.

MO-Z: Diamond Interchange and Transition to Rural Median Cross-Sections (recommended preferred alternative)— This reasonable alternative is a component of the recommended preferred alternative. Within it, 18 structures would be displaced: two residential, 10 commercial, two public/utility/fraternal and four out-buildings. All residences are single-family. The commercial structures represent 10 business operations (including several furniture stores, the Twin Woods Cottage Pre-School and ABC Laboratories). The public/utility/fraternal displacements include an AT&T and Century Telephone structures.

MO-Z: Diamond Interchange with NW Loop Ramp and Rural Transition — This reasonable alternative is not a component of the recommended preferred alternative. Within it, 16 structures would be displaced: two residential, nine commercial, two public/utility/fraternal and three out-buildings. All residences are single-family. The commercial structures represent 10 business

operations (including several furniture stores, the Twin Woods Cottage Pre-School, ABC Laboratories and Loveall's RV). The public/utility/fraternal displacements include an AT&T and Century Telephone structures.

b. Acquisition Impacts—Parcels

Exhibit III-3 shows the parcel boundaries, as depicted by the Boone County Tax Assessor. **Appendix III-C** summarizes the property to be acquired by the reasonable alternatives. Other data includes the PIN number from the Boone County Assessor's records, the total area of the parcel, the tax map class and land use code, the area of the project-related acquisition and the percentage of the take. The rationale for deciding that a parcel would be a total acquisition is the following:

- More than 50 percent of the parcel area is taken and less than 10,000 square feet (929 square meters) remain, or
- It is a residential parcel and the residence (other than a mobile home) is taken.

Table III-17 summarizes the land that would be required in association with the reasonable alternatives. Overall, the recommended preferred alternative affects 397 acres from 612 parcels. The total area of the affected parcels is about 5,620 acres, meaning only about seven percent of their total area would need to be acquired for the recommended preferred alternative. Given the density of development within the project corridor, there are relatively few complete parcel acquisitions (75). The typical acquisition is a narrow/linear band along the parcel edge. Most of the affected parcels along the entire project area are used for commercial and residential purposes (32 and 33 percent, respectively). Parcel acquisition from important community resources (such as churches, nonprofit organizations and public resources) is limited. Because the reasonable alternatives are so similar, there is little discernable difference.

MO-J/O: Southern Widening with Diamond Interchange (recommended preferred alternative)— This reasonable alternative is a component of the recommended preferred alternative. Within it, a total of 64 parcels would be involved in the right of way acquisition process. The total area of right of way acquisition would be 83 acres. Agriculture represents the largest land use, at 66 percent of the total acquired area. Five parcels are commercial (five percent of the area) and 13 residential (six percent of the area). Five parcels are anticipated to be complete acquisitions.

U.S. 40: Southern Widening with Enhanced Diamond Interchange (recommended preferred alternative)— This reasonable alternative is a component of the recommended preferred alternative. Within it, 88 parcels would be involved in the right of way acquisition process. The total area of right of way acquisition would be 62 acres. About 32 percent of the area to be acquired is farmland, followed by residential (31 percent) and commercial (21 percent). Eighteen parcels are commercial and 36 residential. About 0.2 acre would be acquired from the parcel containing the Columbia Public School Services Building. Six parcels would be complete acquisitions.

Table III-17: Land Acquisition Associated with Reasonable Alternatives

Location	Total # of Parcels within Footprint	Total Area of Parcels Effected by Reasonable Alternatives (acres)	Project- Related Acquisition (acres)	Percent of Total Parcel to be Acquired	Anticipated Total Parcel Takes	Number of Commercial Parcels	Number of Residential Parcels
J/O	64	1,381	83	6%	5	5	13
U.S. 40: Enhanced Diamond	88	1,227	62	5%	6	18	36
U.S. 40: SW Loop Ramp	94	1,369	82	6%	8	19	38
Stadium: NW Loop Ramp	91	669	54	8%	25	34	21
Stadium: Tight Diamond	86	642	41	6%	20	32	19
Stadium: SUPI	86	642	41	6%	20	32	19
Stadium: Split Diamond	89	660	48	7%	21	33	20
Business Loop West	46	96	10	10%	1	18	25
163/763/BL(e): One-Way	85	257	59	23%	20	44	19
163/763/BL(e): C/D	86	257	59	23%	23	44	20
U.S. 63	96	415	27	6%	18	44	35
St. Charles: Tight Diamond	91	521	26	5%	1	14	53
St. Charles: Offset Diamond	101	532	41	8%	5	16	56
MO-Z: Diamond	56	1,081	89	8%	4	18	18
MO-Z: NW Loop	58	1,300	75	6%	4	18	17
Total for Recommended Preferred Alternative	612	5,620	397	7%	75	193	218
Alternatives in BOLD denote the Recommended Preferred Alternative							

U.S. 40: Southern Widening with Southwestern Loop Ramp Interchange — This reasonable alternative is not a component of the recommended preferred alternative. Within it, a total of 82 acres over 94 parcels would be acquired (about 20 acres more than the enhanced diamond interchange). The proportion of acquired lands used for agriculture (29 percent), commercial (17 percent) and residential (22 percent) land uses varies only slightly from that for the enhanced diamond interchange alternative. There are 19 parcels engaged with commercial activities and 38 residential parcels. The alternative would result in a 0.3-acre acquisition from the Columbia Public School Services Building. Eight parcels would be complete acquisitions.

Stadium: Symmetrical Widening with Northwestern Loop Ramp Interchange — This reasonable alternative is not a component of the recommended preferred alternative. Within it, 54 acres over 91 parcels would be acquired. About one-third of the area to be acquired is farmland, followed by commercial (25 percent) and residential (23 percent). Thirty-four commercial and 21 residential parcels would be affected. Important community impacts include four acres from the Boone County Fire District parcel (including displacement of the structure), 2.4 acres from the American Heart Association (including displacement of the structure) and 0.9 acre from the Columbia United Church of Christ. Twenty-five parcels would be complete acquisitions.

Stadium: Symmetrical Widening with Tight Diamond/SPUI Interchange (recommended preferred alternative)— This reasonable alternative is a component of the recommended preferred alternative. The footprints for the tight diamond and the SPUI are identical. For either alternative, 41 acres would be acquired from 86 parcels. About 41 percent of the area to be acquired is farmland, followed by commercial (22 percent) and residential (19 percent). Thirty-two commercial parcels and 19 residential parcels would be affected. Important community impacts include 0.8 acre from the Boone County Fire District parcel, three acres from the American Heart Association (including displacement of the structure) and 0.9 acre from the Columbia United Church of Christ. Twenty parcels would be complete acquisitions.

Stadium: Symmetrical Widening with Split Diamond Interchange — This reasonable alternative is not a component of the recommended preferred alternative. Within it, 48 acres from 89 parcels would be part of the right of way acquisition process. About 40 percent of the area to be acquired is farmland, followed by residential (23 percent) and commercial (19 percent). Thirty-three commercial and 20 residential parcels would be affected. Important community impacts include 0.7 acre from the Boone County Fire District parcel, 2.7 acres from the American Heart Association (including displacement of the structure) and 0.9 acre from the Columbia United Church of Christ parcel. Twenty-one parcels would be complete acquisitions.

Business Loop West: Symmetrical Widening with Two-Point Interchange (recommended preferred alternative)— This reasonable alternative is a component of the recommended preferred alternative. Within it, 10 acres from 46 parcels would be acquired. About 66 percent of the area acquired would be commercial (18 parcels) and 15 percent residential (25 parcels). Important community impacts include less than 0.1 acre from the Memorial Services of Columbia parcel and 1.6 acres from the U.S. Army Reserve parcel. Only one parcel is anticipated to be a complete acquisition.

MO-163/MO-763/Business Loop East: One-Way Frontage Road System (recommended preferred alternative)— This reasonable alternative is a component of the recommended preferred alternative. Within it, 59 acres would be acquired from 85 parcels. About 52 percent of the area to be acquired is commercial, followed by agricultural (20 percent) and residential

(nine percent). Forty-four commercial and 19 residential parcels would be affected. The agricultural uses are the large undeveloped parcels near mile marker 127.6. About 14 percent of the land is in community resource parcels, including 1.6 acres from the Rusk Rehabilitation Center, 1.4 acres from the Social Services Building (including the displacement of the structure), 0.6 acre from the Church of God of Columbia, 0.9 acre from OATS Inc. (including displacement of the structure), 1.9 acres from the VFW Post 208 (including displacement of the structures) and 1.5 acres from assorted Columbia utility and railroad properties. Twenty parcels would be complete acquisitions.

MO-163/MO-763/Business Loop East: Collector/Distributor System — This reasonable alternative is not a component of the recommended preferred alternative. This alternative and the one-way frontage road alternative affect nearly the same total area and the same parcels, although the impact varies on a parcel-by-parcel basis near MO-763. The proportion of commercial, agricultural and residential lands is similar to that under the one-way frontage road alternative, except that it affects one additional residential parcel. Impacts to community resource parcels are similar to those of the one-way frontage road alternative. Twenty-three parcels would be complete acquisitions.

U.S. 63: Tight Right of Way Interchange (recommended preferred alternative)— This reasonable alternative is a component of the recommended preferred alternative. Within it, 27 acres would be acquired from 96 parcels. Commercial uses comprise 38 percent and residential 31 percent of the land area. Forty-four commercial and 35 residential parcels would be affected. Important community impacts include 0.2 acre from the Grand Lodge of Masons and 0.1 acre from the Praise Assembly of God. Eighteen parcels would be complete acquisitions.

St. Charles Road: Tight Diamond Interchange (recommended preferred alternative)— This reasonable alternative is a component of the recommended preferred alternative. Within it, 26 acres from 91 parcels would be involved in the right of way acquisition process. Agriculture comprises 33 percent of the land area (19 parcels), residential 26 percent (53 parcels) and commercial 10 percent (14 parcels). The alternative also would take narrow sections of the Praise Assembly of God parcel along I-70 and Clark Lane, totaling about 0.5 acre. There would be one complete parcel acquisition.

St. Charles Road: Off-Set Diamond Interchange — This reasonable alternative is not a component of the recommended preferred alternative. The alternative affects a slightly greater number of parcels (101) and area (41 acres) than the diamond interchange alternative. Agriculture comprises 37 percent of the land area (16 parcels), residential 33 percent (56 parcels) and commercial seven percent (16 parcels). This alternative would have the same impacts to the Praise Assembly of God as the tight diamond interchange. It varies from the tight diamond in that five parcels would be complete acquisitions.

MO-Z: Diamond Interchange and Transition to Rural Median Cross-Sections (recommended preferred alternative) — This reasonable alternative is a component of the recommended preferred alternative. Within it, 89 acres from 56 parcels would be acquired. Agriculture comprises 57 percent of the land area (12 parcels), commercial 25 percent (18 parcels) and residential seven percent (18 parcels). Important community impacts include 0.4 acre from the Prairie Grove Baptist Church. Four parcels would be complete acquisitions.

MO-Z: Diamond Interchange with NW Loop Ramp and Rural Transition — This reasonable alternative is not a component of the recommended preferred alternative. Similar to the diamond interchange alternative, 56 parcels would be involved in the right of way acquisition process, with a total acquisition of 75 acres. Relative impacts by land use are comparable to those of the diamond interchange: agriculture at 49 percent of the land area (14 parcels), commercial 16 percent (18 parcels) and residential six percent (17 parcels). Impact to the Prairie Grove Baptist Church parcel is identical to that of the standard diamond interchange alternative. Four parcels would be complete acquisitions.

c. Characteristics and Needs of Residential Displacements

Residential displacements were assessed to identify the number and type of housing units and the number of persons displaced by the reasonable alternatives. Housing units were categorized as single-family dwellings, multi-family dwellings and mobile homes. Two senior citizen residential facilities located along the project corridor were counted as multi-family units for this analysis.

The number of dwelling units that would be displaced by each of the alternatives is summarized in **Table III-18**. To acquire the proposed right of way, the recommended preferred alternative is estimated to require the displacement of 24 single-family residences, 260 multi-family dwelling units and 15 mobile homes.

Two senior citizen residential facilities (located between exits 124 and 125) account for the vast majority of the multi-family dwelling units to be acquired. West Village Manor, a nursing home with 120 beds, and the adjacent Terrace Retirement Community, an Adult Retirement Community with 128 apartments for seniors account for all but 32 of the multi-family units expected to be displaced by the recommended preferred alternative.

Table III-18 also estimates the total population anticipated to be displaced by each alternative. The recommended preferred alternative would displace an estimated 442 persons (based on census data averages). The rest of this text describes the methodology for estimating the displaced residents and presents a profile of select social and economic characteristics of persons displaced.

Table III-18: Residential Displacements by Reasonable Alternative

Location	Single- Family Dwelling Units	Multi-Family Dwelling Units	Mobile Homes	Total	Estimated Population to be Displaced
J/O Diamond	4	0	1	5	14
U.S. 40 Enhanced Diamond	1	0	3	4	10
U.S. 40 SW Loop	0	0	3	5	7
Stadium NW Loop	5	120	10	135	157
Stadium Tight Diamond or SPUI	5	120	10	135	157
Stadium with Split Diamond	5	120	10	135	157
Business Loop (West)	0	128	0	128	200
163/763/BL(E) One-Way Triplet	6	0	0	6	14
163/763/BL(E) CD System	6	20	0	26	67
U.S. 63 Four System Interchange	5	12	0	17	37
St. Charles Tight Diamond	1	0	1	2	5
St. Charles Offset Diamond	3	0	1	4	9
MO-Z Diamond	2	0	0	2	4
MO-Z NW Loop	2	0	0	2	4
Total (Recommended Preferred Alternatives)	24	260	15	299	442

Alternatives in **BOLD** denote the Recommended Preferred Alternative.

The senior center West Village Manor comprises 120 beds; the Terrace Retirement Community has 128 apartments within its premises. The total population that would be displaced from these two senior centers is estimated to be 320 persons.

To better understand the characteristics of the persons who would be affected, U.S. Census data were used. The number of potentially displaced people was estimated based on the reported average household sizes of individual block groups and the number of affected dwelling units. Further, the administrators of the two affected senior citizen residential facilities were interviewed to refine the population estimates by identifying the number of beds, room types, persons per room and typical occupancy rates of the affected facilities. Based upon the demographic data, it is possible to estimate the nature of the people displaced by the reasonable alternatives. **Table III-19** provides a profile of the displaced persons in terms of minority and poverty status. It is estimated that minorities would account for 18.1 percent and persons in poverty 14.0 percent of the total displaced population. By comparison, minority persons are 15.3 percent and persons in poverty 14.5 percent of Boone County population. The comparative proportions suggest that the project impacts under the recommended preferred alternative are not a disproportionate burden to low-income or minority populations.

Table III-19: Estimate of Persons Affected by Recommended Preferred Alternative

	Estimated Persons Displaced	Minority Population	Persons Living Below Poverty	Seniors
Recommended Preferred Alternative	442	80	62	336
Percentage	-	18.1	14.0	76.1

Source: U.S. Department of Commerce, Bureau of Census, U.S. Census of Population and Housing, 2000.

Because of the impacts to the two senior residential facilities, displacements fall more heavily upon senior populations; persons above 55 years of age are estimated to account for about 76 percent of all displaced persons under the recommended preferred alternative.

Median contract rents and the median housing values were identified to profile housing markets affected by the reasonable alternatives. By creating a profile of the rent levels and housing values of affected dwellings, it is possible to assess the supply and availability of comparable replacement dwellings. Such a profile also can prove useful for determining whether the market has an adequate supply. In the vicinity of the recommended preferred alternative, most of the affected dwelling units were renting for \$350 to \$450, based on data from the 2000 Census. The data also indicate the median housing values of the dwelling units, in the vicinity of the recommended preferred alternative, ranged from \$95,000 to \$105,000.

Table III-20 indicates a diverse supply of single-family housing stock available to absorb the designated acquisitions. Similarly, there appears to be a sufficient number of alternative mobile home parks. Field observations confirm that there are vacant pads to take the relatively small number of mobile homes expected to be displaced by the alternatives.

The reasonable alternatives would acquire two assisted living centers—West Village Manor and Terrace Retirement Community. Current or future residents would likely have to be relocated because of the structure acquisitions. The two senior citizen facilities fulfill a specific need within the community that would need to be either replaced or absorbed by comparable facilities. Because of the unique nature of these acquisitions, the MoDOT acquisition and relocation process is being actively implemented, as early as possible, in order to minimize negative impacts. Activities to date include planning, meetings and coordination. The relocation program being implemented is discussed more thoroughly in Chapter III.B.3.a. Among the techniques

currently under investigation include construction phasing, the availability of general assistance as well as the possibilities for specific assistance.

Existing facilities that provide assisted-living and nursing care services are described in **Table III-14**. As part of the EIS's evaluations information on levels of occupancy was obtained. Almost all the facilities and communities reported very high levels of occupancy. Waiting lists for units in these centers range from one to two weeks to several months. The West Village Manor is estimated to have 120 beds. The Terrace Retirement Community has 128 apartments located onsite. The total population that would be displaced from these units is estimated to be 320 persons.

Table III-20: Availability of Replacement Single-Family Housing within Columbia and the Urban Fringe Area

Area ¹	Number of Bedrooms	Number of Units Available	Price Range
CNE = SE of I-70 and Providence Road, north of Broadway	2	6	\$50,000–\$75,000
	3	1	\$50,000–\$75,000
	4	3	\$50,000–\$75,000
CNW = SW of I-70 and Providence Road, north of Broadway.	2	12	\$30,000–\$100,000
	3	11	\$30,000–\$150,000
	4	1	\$100,000–\$150,000
CSE = SE of Broadway and Providence, to U.S. 63 and Stadium Blvd.	3	2	\$100,000–>\$200,000
	4–5	2	\$100,000–>\$200,000
CSW = SW of Broadway and Providence, to Stadium Boulevard	2	1	\$100,000–\$150,000
	3	6	\$100,000–\$200,000
	4–5	4	\$50,000–>\$200,000
NE = NE of Rangeline Road and I-70	3	88	\$50,000–\$200,000
	4	13	\$75,000–>\$200,000
NW = NW of Rangeline Road and I-70	2	3	\$50,000–\$200,000
	3	50	\$30,000–>\$200,000
	4–5	8	\$100,000–\$200,000
SE = SE and east of U.S. 63, Stadium Boulevard and Providence Road	2	1	\$50,000–\$75,000
	3	13	\$100,000–>\$200,000
	4–6	15	\$100,000–>\$200,000
SW = South and West of Stadium Boulevard.	2	1	\$150,000–\$200,000
	3	58	\$100,000–>\$200,000
	4–6	116	\$100,000–>\$200,000
<i>Source: New Realtor.com/Columbia, 1/9/04.</i>			

d. Characteristics and Needs of Business Displacements

The business survey, administered in the autumn of 2003, was intended to investigate impacts on the business community. The survey included all businesses within the footprint of all the detailed concepts. This is a much larger area than the reasonable alternatives currently encompass. The survey was intended, in part, to help develop the reasonable alternatives. As described previously, a total of 326 businesses were included in the survey, 235 accepted surveys and 116 completed them. The analysis below focuses on the 27 businesses that completed the business survey and would have at least one of their structures acquired as part of the recommended preferred alternative.⁹

Type of Firms

Table III-21 identifies the 27 businesses (those that answered the business survey and would lose at least one structure) by type. This sub-sample of firms is comprised predominantly of retail firms (just under 30 percent) followed by several other types of business establishments including auto repair and services, automotive sales and rentals and several other sectors. The sub-sample is comprised of slightly more owners than renters. Eighteen of the firms interviewed report that the subject facility is their single establishment location. Another six firms identify that the subject facility is a branch establishment of a multi-locational business. Three firms considered the subject facility to be their headquarters, which generally implied that the operation may operate at one or more other locations.

Site Selection Preferences

Within the survey, firms were given a list of potential site selection factors to consider and rank in terms of their relative importance to their business. Proximity to the interstate was a major factor for the firms anticipated to be affected by the I-70 alternatives in having chosen their current location. The top five factors for current site selection were (in order of importance):

1. Proximity to interstate
2. Facility and site is suitable size
3. Proximity to local residents and consumers
4. Visibility from interstate
5. Good building/equipment/layout

Customer Service Area

The survey asked businesses to identify the customer service area or market area from which their sales are drawn. This question indicated that the businesses most reliant on regional markets (i.e., areas outside Boone County) tended to be hotels and lodging places, business services and manufacturing and warehousing/distribution.

⁹ Appendix III-A discusses the results of the business survey, as a whole.

Table III-21: Business Survey Results – Type of Business (respondents directly affected by reasonable alternatives)

Industry Sector	Firms	%	Employment	%	Own	Rent	Type of Facility
Retail Trade	8	29.6	99	17.5	5	3	Single Location: 5 Headquarters: 1 Branch: 2
Business Services	2	7.4	190	33.6	1	1	Branch: 2
Auto Repair and Services	4	14.8	12	2.1	2	2	Single Location: 4
Hotels and Lodging	2	7.4	19	3.4	2	0	Branch: 2
Automotive Sales and Rental	3	11.1	32	5.7	1	2	Single Location: 2 Headquarters: 1
Construction and Maintenance	2	7.4	53	9.4	1	1	Single Location: 2
Eating and Drinking Places	2	7.4	140	24.7	0	2	Single Location: 1 Headquarters: 1
Personal and Health Services	1	3.7	3	0.5	1	0	Single Location: 1
Manufacturing/ Warehousing/ Wholesale/Distribution	3	11.1	18	3.2	2	1	Single Location: 3
Total	27	100	566	100	15	12	Single Location: 18 Headquarters: 3 Branch: 6

Source: Improve I-70 Business Survey, The Louis Berger Group, 2003.

The businesses that reported the most local draw for business (i.e., surrounding neighborhoods and city of Columbia) were construction and maintenance, auto repair and services, automotive sales and rentals, eating and drinking places and retail trade. Eating and drinking places and business services reported patterns that were in some cases intensely local whereas others were more regional in the attraction of customers.

Visibility

The survey asked businesses to estimate the percentage of sales that were due to the visibility afforded by I-70 or from customer appreciation of the fact that the business is close to I-70 (see **Table III-22**). Of the subsample of affected respondents, visibility from I-70 was estimated as less important to sales for business services, eating and drinking places and auto repair and services establishments than for several other industries, particularly, hotels and lodging places, automotive sales and retail trade. In this limited sample, personal and health services and manufacturing and warehouse/distribution also estimated that visibility was critical to sales.

**Table III-22: Business Survey Results – Percentage of Sales Due to Visibility
(respondents directly affected by reasonable alternatives)**

Business Type	Percent
Construction and Maintenance	30
Business Services	5
Personal and Health Services	70
Manufacturing/Warehousing/Wholesale/Distribution	40
Retail Trade	42
Automotive Sales and Rentals	44
Auto Repair and Services	10
Eating and Drinking Places	18
Hotels and Lodging Places	50
Total	33

Source: Improve I-70 Business Survey, The Louis Berger Group 2003.

Business Response to Displacement

One of the survey’s overall goals was to assess the reaction of the business community to the impacts associated with typical highway construction and displacement resulting from the proposed improvement project. If displaced, the preference for relocation was to move to a site as close as possible to the respondent’s current location. About 48 percent of the firms (anticipated to lose at least one structure) felt that the best location for their business would be within one mile (1.6 km) of the I-70 exit. One-fourth of those businesses wanted to be as close to the exit as possible.

When firms were asked their relocation preferences if their entire parcel and buildings were purchased, nearly 60 percent indicated an interest in being within Columbia—40 percent near I-70 or close to their current location. Very few firms believed that they would relocate outside the city in Boone County, and none reported it would relocate elsewhere in Missouri. However, 19 percent of the potentially displaced businesses responded that if fully displaced, they would likely not reopen, whereas another 19 percent responded that they did not know what their reaction to displacement would be (see **Table III-23**).

While several businesses reported a strong interest in sites near I-70, most prevalent among the concerns of businesses regarding their prospective relocation was the perceived shortage of comparable, inexpensive highway-adjacent lots in the remaining areas of the I-70 corridor. Business owners whose operations have been longstanding in one location exhibited a particularly high degree of concern regarding the likelihood of their being able to relocate successfully to a suitable site. Overall, the sub-sample of firms that are anticipated to lose at least one structure, 70 percent of the firms indicated that they anticipated having difficulty finding a suitable site should their establishment be displaced.

Table III-23: Business Survey Results – Business Response to Displacement/Right of Way Acquisition (respondents directly affected by reasonable alternatives)

Business Type	Relocate Close to Current Locale	Near I-70	Within Columbia	Within Boone County	Will Not Reopen	Don't Know	Total
Construction and Maintenance		1	1				2
Business Services			1	1			2
Personal and Health Services		1					1
Manufacturing, Warehousing, Wholesale, Distribution	2				1		3
Retail Trade		4	1		2	1	8
Automotive Sales and Rentals	2				1		3
Auto Repair and Services			1		1	2	4
Eating and Drinking Places	1		1				2
Hotels and Lodging Places						2	2
Total	5	6	5	1	5	5	27
	18.5%	22.2%	18.5%	3.7%	18.5%	18.5%	100%

Source: Improve I-70 Business Survey, The Louis Berger Group 2003.

Estimated Number of Employees within Directly Affected Business Operations

It is estimated that a total of 66 business operations would have one or more of their current structures displaced by the recommended preferred alternative (see **Table III-16**). An estimate of the total number of employees within these business operations was prepared using the 1997 U.S. Economic Census: Summary Statistics for Columbia, MO Metropolitan Statistical Area (MSA). This assessment is summarized in **Table III-24**. By using the average number of employees for each business type, a total of 1,232 employees are estimated to work at the affected business operations.

Table III-24: Estimated Number of Displaced Employees Under the Recommended Preferred Alternatives

Business Type	Number of Business Operations Affected	Columbia MSA Establishments		Average Number of Employees	Estimate of Employees to be Displaced
		Establishments	Paid Employees		
Eating and Drinking Places	6	312	5,983	19	114
Auto Repair and Services	4	272	1,588	6	24
Automotive Sales and Rental	3	602	8,880	15	45
Manufacturing/ Warehousing/ Wholesale/ Distribution	4	87	5,703	66	264
Retail Trade	29	602	8,880	15	435
Hotels and Lodging Places	4	312	5,983	19	76
Business Services	10	272	1,588	6	60
Utilities	1	2	100-249	175	175
Telecommunications*	1	2,254	75,706	33	33
Personal and Health Services	1	230	1,263	6	6
Total	63**				1,232

Source: 1997 Economic Census: Summary Statistics for Columbia, MO MSA; 1997 NAICS Basis

CH2M HILL, 2004 and The Louis Berger Group, Inc., 2004

* Data for the Telecommunications Sector is not available at the MSA level. As a result, state-wide statistics has been utilized for this Sector.

** Three vacant properties are identified within the recommended preferred alternative.

The preliminary nature of this estimate cannot be understated. The business survey (see **Appendix III-A**) contained questions relating to number of employees. Over half of the respondents (57 percent) had less than 10 full-time employees and 87 percent had less than 10 part-time employees. However, the business survey data set was not used to make the employee estimate because the survey was not completed by all affected operations. A detailed field analysis would be needed to confirm the actual number of employees at these firms and the patterns of employment (i.e., part-time or full-time).

e. Travel Patterns and Accessibility

This text assesses how travel patterns, access and parking to residential areas and businesses may be effected by the reasonable alternatives.

MO-J/O: Southern Widening with Diamond Interchange (recommended preferred alternative)—There may be adverse short-term impacts to nearby residents and businesses due to construction of the frontage road. In the northwest and northeast quadrants of this interchange, minor long-term adverse impacts would result to business and residential areas because of additional travel distances on the frontage roads and from the relocation of access points. The new interchange may enhance the visibility of the businesses, creating beneficial affects. No community facilities or well-defined neighborhoods were identified between the mile markers. The proposed alternative is not expected to adversely affect the safety of travelers commuting to the businesses and residences.

U.S. 40: Southern Widening with Enhanced Diamond Interchange (recommended preferred alternative)—There may be adverse short-term impacts to nearby residents and businesses due to construction of the frontage road. There is no access or parking impacts in the northwest quadrant of this interchange. In the northeast quadrant, businesses may experience minor adverse effects from additional travel of about 0.25 mile (.4 km) on the frontage road. Business activity may be enhanced by signalization improvements at the frontage road/U.S. 40 intersection and by the connectivity of the north frontage. In the southwest quadrant, access to residential areas may be minimally affected because of additional travel of about a 0.5 mile (.8 km) on the frontage road and relocation of access. In the southeast quadrant, business may be enhanced by the connectivity of the south frontage road to the east with the new Perche Creek bridge.

No community facilities or well-defined neighborhoods were identified between the mile markers. The proposed alternative is not expected to adversely affect the safety of travelers commuting to the businesses and residences located in this quadrant.

U.S. 40: Southern Widening with Southwestern Loop Ramp Interchange—There may be short-term adverse impacts to the residents and businesses from construction of the frontage road. There are no access or parking impacts in the northwest quadrant of this interchange. Visibility changes at U.S. 40 may adversely affect business. Signalization improvements and more vehicle storage at the U.S. 40/Frontage Road intersection may enhance business. In the northeast quadrant, access to businesses may be affected by an additional 0.25 mile (.4 km) of travel on the frontage road. The beneficial impacts would be signals at the U.S. 40/Frontage Road intersection and the connectivity of the north frontage road to the east with the new Perche Creek bridge that may enhance business activity. In the southwest and southeast quadrants, there are no access or parking impacts. Business may be beneficially affected in the southeast quadrant due to greater connectivity of the south frontage road to the east with the new Perche Creek bridge.

No community facilities and neighborhood associations were identified near the interchange. The proposed alternative is not expected to adversely affect the safety of travelers commuting to the businesses and residences located in this quadrant.

Stadium: Symmetrical Widening with Northwestern Loop Ramp Interchange—There would be short-term adverse impacts to residents and businesses from construction of the frontage

road. Construction of the ramps connecting Fairview Road to I-70 may result in an increase in traffic on the local roads.

In the northwest quadrant of this interchange, access to residential areas may be affected by an additional 0.25 mile (.4 km) of travel on the frontage road. Displacement of businesses may adversely affect the local economy. In the southwest and southeast quadrants, minor long-term adverse impacts would affect residential areas and businesses because of an additional 0.25 to 0.5 mile (.8 km) of travel on the frontage road to Bernadette Drive for access to I-70. Parking availability would be reduced for businesses in the area because of reconstruction of the frontage road. Visibility to traffic-based businesses would be altered because the exit for the eastbound ramp would be moved to the west. However, addition of Fairview Ramps would benefit select businesses through improved regional and local access, generally on the western edge of the affected area. Access changes in the southeast quadrant may impede business because of the addition of frontage road traffic to Bernadette Drive. Access to public transportation should remain the same, although the bus route may change. Access to community facilities in the southeast particular quadrant is not expected to be affected adversely by the proposed alternative.

Stadium: Symmetrical Widening with Tight Diamond Interchange (recommended preferred alternative)—In the northwest and northeast quadrants of this interchange, the short-term impacts to the residential areas and businesses would be construction of the frontage road. The long-term adverse minor impacts would be on the access to the residential areas and businesses because of 0.25 to one mile (.4 to 1.6 km) of additional travel on the frontage road. The benefits would be the construction of I-70 closer to the businesses, which may enhance business activity. The neighborhood of Park de Ville is one of Columbia's westernmost neighborhoods. Parts of the neighborhood are near all of the Stadium alternatives. Construction of the ramps connecting Fairview Road to I-70 may result in an increase in traffic on the local roads.

In the southwest and southeast quadrants, the short-term impacts to the residents and businesses would be construction of the frontage road. The long-term adverse minor impacts would be on the access to residential areas and businesses because of an additional 0.25 to 0.5 mile (.4 to .8 km) of travel on the frontage road to Bernadette Drive for access to I-70. Parking availability would be reduced for the businesses due to reconstruction of the frontage road, and visibility to traffic-based businesses would be altered because the exit for the eastbound ramp would be moved to the west. Access to public transportation should remain the same, although the bus route may change. Addition of the Fairview Ramps would benefit select businesses with improved regional and local access, generally on the western edge of the affected area.

Stadium: Symmetrical Widening with SPUI Interchange—In the northwest and northeast quadrants of this interchange, construction of the frontage road would have short-term impacts on residential areas and businesses. Minor long-term adverse impacts would be on the access to the residential areas and businesses because of additional travel of 0.25 mile to one mile (.4 to 1.6 km) on the frontage road. The construction of I-70 closer to the businesses may enhance business.

In the southwest and southeast quadrants, construction of the frontage road would have short-term impacts to the residents and businesses. Minor long-term adverse impacts would be the access to the residential areas and businesses because of additional travel of 0.25 to a 0.5 mile

(.4 to .8 km) on the frontage road to Bernadette Drive for access to I-70. Parking availability would be reduced for the businesses due to reconstruction of the Frontage Road. Access changes may impede the business because of the addition of frontage road traffic to Bernadette Drive. Visibility to traffic-based businesses would be altered because the exit for the eastbound ramp would be moved to the west. Access to public transportation should remain the same, but the bus route would change. Addition of the Fairview Ramps would benefit select businesses with respect to improved regional and local access, generally on the western edge of the affected area. Construction of the ramps connecting Fairview Road to I-70 may result in an increase in traffic on the local roads.

Stadium: Symmetrical Widening with Split Diamond Interchange—In the northwest and northeast quadrants of this interchange, construction of the frontage road would have short-term impacts on the residential areas. Minor long-term adverse impacts would be on the access to the residential areas and businesses because of 0.25 to one mile (.4 to 1.6 km) of additional travel on the frontage road. The construction of I-70 closer to businesses may be beneficial to them.

In the southwest and southeast quadrants, construction of the frontage road would have short-term impacts to the residents and businesses. The long-term adverse minor impacts would be on the access to the residential areas and businesses because of additional travel of a 0.25 to 0.5 mile (.4 to .8 km) on the frontage road to Bernadette Drive for access to I-70. Parking availability would be reduced for businesses because of reconstruction of the frontage road. Access changes may impede business because of the addition of frontage road traffic to Bernadette Drive and the loss of access from the southwest outer road. Visibility to traffic-based businesses would be altered because the exit for the eastbound ramp would be moved to the west. Access to public transportation should remain the same, although the bus route would change. The addition of Fairview Avenue ramps benefit select businesses with improved regional and local access, generally on the western edge of the affected area. Construction of the ramps connecting Fairview Road to I-70 may result in an increase in traffic on the local roads.

Business Loop West: Symmetrical Widening with Two-Point Interchange (recommended preferred alternative)—Three neighborhoods were identified between mile markers 125.0 and 126.0 near I-70. The neighborhoods include Parkade to the north of I-70 and Highland Park and Smithton Valley to the south (**Exhibit III-1** displays the neighborhood boundaries). The Parkade neighborhood is adjacent to the I-70 right of way and bordered by residential and commercial development. Although access to community facilities in the neighborhoods may be altered during the construction of the proposed action, no long-term adverse impacts are expected on public safety or access to community facilities.

In the northwest quadrant and northeast quadrant of this interchange, the short-term impacts to the residential areas and businesses would be construction of the new ramp intersection west of the I-70 interchange and the widening of West Boulevard. Traffic-based businesses may be adversely affected by the westbound off-ramp connection to the east intersection because of visibility changes. However, with an eastbound off-ramp being connected to the west intersection, residential areas and businesses may be beneficially affected. In the southwest and southeast quadrants, the short-term impacts to the residents and businesses would be construction of the new ramp intersection east of the I-70 interchange and the widening of West Boulevard. Visibility to traffic-based businesses may be adversely affected by an eastbound off-ramp connection to the west intersection. Access to residential areas and

businesses may be beneficially affected because of the westbound off-ramp connection to the east intersection.

MO-163/MO-763/Business Loop East: One-Way Frontage Road System (recommended preferred alternative)—The proposed right of way of this alternative borders four neighborhoods near the project corridor. Parkade and White Gate to the north of I-70 and North Central and Benton-Stephens to the south of the Business Loop would be directly affected. Construction of the road connecting Vandiver Drive to the Business Loop should improve local connectivity between the neighborhoods. The proposed alternative would displace community resources within the proposed right of way.

In the northwest quadrant of this interchange, there would be short-term impacts to the residential areas and businesses during reconstruction of the interchanges at MO-163 and MO-763, construction of the new Business Loop West interchange and construction of the One-Way Frontage Road. Parking availability would be affected adversely by the acquisition of parcels along the proposed right of way. Visibility to businesses and access to residential areas and businesses would be affected adversely because of the westbound off-ramp being constructed at the Business Loop and access management at the interchanges. Some businesses may benefit from access to the One-Way Frontage Road.

In the southwest and southeast quadrants, there may be short-term adverse impacts to the residential areas and businesses during reconstruction of the interchanges at MO-163 and MO-763, construction of the new Business Loop East interchange and construction of the One-Way Frontage Road. The improvements may have long-term adverse impacts on parking availability, visibility for traffic-based businesses and access to residential areas and businesses because of construction of the eastbound off-ramp at the MO-163 interchange and access management at all of the interchanges. The One-Way Frontage Road would improve access to residential areas and businesses.

MO-163/MO-763/Business Loop East: Collector/Distributor System—In the northwest quadrant of this interchange, construction of the new interchanges at MO-163 and MO-763 and the collector/distributor C/D System would have short-term impacts on residential areas and businesses. Parking availability and visibility to traffic-based businesses would be impeded because of the new westbound off-ramp being constructed at the Business Loop East interchange and access management at the interchanges.

In the southwest quadrant, the short-term impacts to the residential areas and businesses would be during reconstruction of the interchanges at MO-163 and MO-763 and construction of the C/D System. Adverse impacts include potential reductions in parking availability, visibility losses to traffic-based businesses because of the eastbound off-ramp being constructed at the MO-163 interchange and access management treatments at the interchanges. In the southeast quadrant, short-term impacts to residential areas and businesses would occur during reconstruction of the interchanges at MO-763, construction of the new Business Loop East interchange and construction of the C/D System. Adverse impacts include potential reductions in parking availability, visibility losses to traffic-based businesses because of the eastbound off-ramp being constructed at the MO-163 interchange and access management at the interchanges. Construction of sidewalks and the new Business Loop East interchange may enhance non-motorist access to businesses and residential areas.

U.S. 63: Tight Right of Way Interchange (recommended preferred alternative)—Three neighborhoods are near the interchange (White Gate, Mexico Gravel and Woodridge). The proposed alternative is not expected to have long-term adverse affects on access to community facilities and the safety of residents.

In the northwest quadrant of this interchange, construction of Clark Lane and I-70 would have short-term impacts on the residential areas and businesses. The long-term adverse impacts would be loss of parking and access to local businesses because of the shift in traffic from Clark Lane to Towne Drive and White Gate Drive. In the northeast quadrant, parking availability for business would be a long-term impact because of construction of the new ramps and bridges at the U.S. 63 interchange. Visibility to traffic-based businesses would be affected adversely because of the westbound ramps to and from I-70. Businesses would benefit from direct access from Clark Lane to the Business Loop.

In the southwest quadrant, the short-term impacts to the residential areas and businesses would be during the extension of the frontage road along Conley Road and to parking availability. The long-term adverse impacts would affect the parking availability, and access from I-70 East would be impeded because of the removal of the westbound exit ramp to Business Loop 70. Access to residential areas and businesses from Route 63 would be enhanced because of the connection of Clark Lane to Business Loop 70. In the southeast quadrant, construction of the southeast frontage road would have short-term impacts on residential areas and businesses. Long-term adverse impacts include the parking and visibility losses due to the west I-70 ramps to and from U.S. 63 (south).

St. Charles Road: Tight Diamond Interchange (recommended preferred alternative)—The Fairway Meadows neighborhood is near the St. Charles interchange. It lies east of the interchange and is easily accessible by St. Charles Road, north of existing I-70.

In the northwest and northeast quadrant of this interchange, construction of the westbound on-ramp connecting I-70 to St. Charles Road would have short-term impacts on businesses and residential areas. Displacement of businesses would result in the acquisition of land leading to a loss of available parking. Residential areas and businesses may experience minor adverse impacts because of the relocation of access and access management. In the southwest and southeast quadrants, construction of the southeast frontage road and ramps would have short-term impacts on residents and businesses. Residential areas and businesses may experience minor adverse impacts from additional travel of a 0.25 mile (.4 km) on the frontage road, relocation of access and access management.

St. Charles Road: Off-Set Diamond Interchange—In the northwest and northeast quadrants of this interchange, construction of the westbound on-ramp and St. Charles Road and loss of available parking would have short-term adverse impacts on residential areas and businesses. The long-term adverse impacts of greater significance would be on the access to the residential areas and businesses because of access management and relocation of access to area businesses. In the southwest and southeast quadrants, construction of the southeast frontage road would have short-term impacts on residents and businesses. The long-term adverse impacts would be on the access to the residential areas and businesses because of additional travel of a 0.25 mile (.4 km) on the frontage road, relocation of access and access management.

MO-Z: Diamond Interchange and Transition to Rural Median Cross-Sections (recommended preferred alternative)—In the northwest quadrant of this interchange, an

additional 0.25 mile (.4 km) of travel on the frontage road may affect local businesses and residences. In the northeast quadrant, there would be short-term impacts to the businesses from construction of the westbound off-ramp connecting I-70 and MO-Z. Long-term adverse impacts would affect access to businesses because of access management, relocation of access to the businesses and loss of parking. In the southwest and southeast quadrants, construction of ramps and the southeast frontage road would have short-term impacts on residents and businesses. The proposed alternative would lead to a loss of parking because of acquisition of land for the proposed right of way. Residential areas and businesses may experience minor adverse impacts because additional travel of a 0.25 mile (.4 km) on the frontage road, relocation of access, access management and parking availability.

MO-Z: Diamond Interchange with NW Loop Ramp and Rural Transition—In the northwest and northeast quadrants of this interchange, the long-term adverse minor impacts would be on the access to the residential areas and businesses because of an additional 0.25 mile (.4 km) of travel on the frontage road.

In the southwest quadrant, construction of the southeast frontage road would have short-term impacts on parking availability for residents and businesses. The long-term adverse impacts of greater significance would be on the access to the residential areas and businesses because of a 0.25 mile (.4 km) of additional travel on the frontage road, relocation of access, access management and parking availability. In the southeast quadrant, construction of the ramps would have short-term impacts on residents and businesses. The long-term adverse minor impacts would be on the access to the residential areas and businesses because of a 0.25 mile (.4 km) of additional travel on the frontage road.

f. Community Resources Impacts: Facilities, Institutions and Service

Fire, Emergency Services and Police Protection

The preliminary engineering design plans were examined for disruptions to police, fire and emergency service delivery.

The Boone County Fire Protection District headquarters (located at 2201 I-70 Dr. NW) would be directly impacted by the Stadium interchange alternatives. One proposed alternative for the Stadium interchange—the Stadium NW Loop alternative—would directly affect the structure and require the acquisition of the entire parcel. The Stadium tight diamond/SPUI and the Split Diamond alternatives would not acquire the existing structure. They would, however, acquire part of the parcel. None of the area's fire stations would be directly affected by the proposed action (the headquarters is not a station, although it does fulfill some storage and training functions).

During construction of the proposed alternatives, fire service calls may be affected by construction-related activities. Fire response teams may require the use of I-70 and the other major connector roads in the city in responding to calls. Key routes may be closed temporarily during construction.

Emergency medical service facilities or police stations are not expected to be directly affected by the proposed alternatives. As with fire fighting services, construction would likely (temporarily) disrupt travel patterns for police and emergency services.

While in the short term it can be expected that important public safety services may be disrupted, the project alternatives can be expected to improve regional and local area circulation within the city of Columbia and the greater Boone County region. In the long run, the project would protect the public health, safety and welfare by addressing congestion, combating public safety risks and improving response times for fire trucks, emergency vehicles and police personnel.

Schools

No direct displacement impacts to schools are anticipated as a result of the proposed action.

However, the transportation routes (bus or private vehicles) of the following schools may be affected during construction: the Lee Elementary School, Paxton Keeley Elementary School, Ridgeway and Benton Elementary Schools, Shephard Boulevard Elementary School, Columbia Catholic School, West Boulevard Elementary School, Jefferson Junior High School, Oakland Junior High School, West Junior High School, Gentry Middle School, Midway Heights Elementary School, Hickman High School, Parkade Elementary School and the Smithton Middle School.

One of the indirect impacts of residential displacements would be the potential changes in school enrollment caused by the relocation of school-age children. Based on census data averages, it is estimated that roughly 51 households with school-age children would be displaced by the reasonable alternatives. Using the census data averages, it is further estimated that 24 children under 18 years old may reside in these households. The census data that was used to generate these estimates is summarized in the demographic and economic profile presented in Chapter III.B.1.a of this document.

Child Care Centers

The reasonable alternatives would displace the Twin Woods Cottage and Pre-School Center, located between exits 131 and 133 on the eastern periphery of the project corridor. Both reasonable alternatives for the MO-Z interchange—the MO-Z Diamond and the MO-Z NW Loop—would acquire the child care center building and some of the parking lot. The MO-Z Diamond would acquire roughly 0.68 acres of the property while the MO-Z NW Loop would acquire approximately 1.77 acres. Other child care centers located along the project corridor are not expected to be impacted directly by the project.

Hospitals and Health Care Facilities

Health care facilities within the city of Columbia are concentrated between exits 121 and 124 and the areas south east of exit 128A.

Both the 163/763 Business Loop East One-Way System and the 163/763 Business Loop East C/D System would affect part of the Rusk Rehabilitation property. The One-Way System would require 1.6 acres, the C/D system would require 1.1 acres. No impacts to the building or parking are anticipated. Neither alternative is expected to affect the operations of the health center.

The 163/763 Business Loop East One-Way System and 163/763 Business Loop East C/D System would also affect The New Horizons Community Support Services at 1408 Hathman Place. The structure and 15 percent of the parcel would be acquired under both reasonable alternatives.

The reasonable alternatives would not acquire new right of way from any other hospital/health center in the study area. Access to and from the existing health centers would not be affected adversely, but traffic delays during construction may impede circulation.

Senior Citizen Centers

Proposed improvements to I-70 between exits 124-125 would displace the West Village Manor (senior center) and the Terrace Retirement Community. **Table III-25** provides information on how the reasonable alternatives affect the two centers. Relative to these senior citizen centers, the impacts of the reasonable alternatives are approximately equal – all will result in the displacement of the existing centers. Given the size of the properties remaining after the I-70 acquisition, relocation of the facilities on the same sites appears possible. In order to examine the nature of the acquisition of these centers, coordination and meetings have occurred with the owners. These are private, for profit, facilities, and the eventual disposition of these businesses will be decided by the owners. No future plans have been released. Coordination with the owners and residents will continue as the project progresses. Again, the MoDOT acquisition and relocation process is being actively implemented, as early as possible, in order to minimize negative impacts to these resources. Activities to date include planning, meetings and coordination. The relocation program being implemented is discussed more thoroughly in Chapter III.B.3. No other senior citizen center is expected to experience direct or indirect impacts due to the proposed action.

Table III-25: Senior Citizen Centers Impacted by Reasonable Alternatives

Subsection (exits)	Senior Citizen Centers	Alternative	Impacts	Area to be Acquired (acres)
Subsection 4 (exits 124–125)	The Terrace Retirement Community West Village Manor	Stadium: NW Loop	Acquisition of Land, Displacement of Structure and Loss of Parking	1.81
			Acquisition of Land, Displacement of Structure and Loss of Parking	2.04
	The Terrace Retirement Community West Village Manor	Stadium: Tight Diamond or SPUI	Acquisition of Land, Displacement of Structure and Loss of Parking	1.81
			Acquisition of Land, Displacement of Structure and Loss of Parking	2.04
	The Terrace Retirement Community West Village Manor	Stadium: Split Diamond Interchange	Acquisition of Land, Displacement of Structure and Loss of Parking	1.75
			Acquisition of Land, Displacement of Structure and Loss of Parking	2.08
	The Terrace Retirement Community	I-70 Business Loop West	Acquisition of Land, Displacement of Structure and Loss of Parking	1.21
	Terrace Retirement Community, Parcel # 1631300010020001. Total Parcel Size: 8.1 acres			
West Village Manor, Parcel # 1631300070010001. Total Parcel Size: 3.9 acres				

Churches

Based on a review of the reasonable alternatives, four churches in the project corridor may be partially affected by the proposed action. It is not expected that structures would be required to meet right of way requirements, although land or parking areas may be required from some parcels, as discussed below.

The four Stadium interchange alternatives would acquire 0.9 acre from the Columbia United Church of Christ, located between exits 121 and 124. It is not anticipated that the alternatives would directly affect structures or onsite parking.

The First Church of God is located in part of the proposed right of way of the two alternatives for the Triplets (i.e., the 163/763 Business Loop East One-Way System and 163/763 Business Loop East C/D system). It is anticipated that 0.9 acre of church property would be acquired. Although the proposed right of way would not affect the structure, nearly one-half of the existing on-site parking spaces would be lost. Based on a review of the Boone County tax database, the First Church of God also owns an adjacent parcel that may compensate for the expected losses. On street parking is also available. Consequently, operations are expected to continue without substantial disruption.

The Praise Assembly of God, located between exits 128A-131, would lose 0.1 acre of land to the U.S. 63 interchange. The church would also be affected by the proposed alternatives for the St. Charles interchange. Both of the St. Charles Road alternatives would acquire 0.4 acre of land, but no direct impacts to the structure are expected. Additionally, no existing parking will be affected. As a result, the operations of the church would not be expected to be materially affected.

The MO-Z Diamond and MO-Z NW Loop alternatives would acquire 0.4 acre from Prairie Grove Baptist Church. However, the needed right of way would not affect the structure or onsite parking.

Churches and other facilities and services may experience disruption during the construction period. In particular, proposed Stadium interchange improvements may result in travel delays on Stadium Boulevard. The Centerpoint Church and Our Lady of Lourdes Catholic Church on Bernadette Drive have good connectivity to Stadium Boulevard. During construction, churchgoers may experience some travel delays during the construction phase of the project.

Other Community Resources

Several other types of community resources/services are located along the project corridor that would be affected by one or more of the reasonable alternatives (see **Table III-26**). The American Heart Association, the VFW Post 280, the Parole Board and Social Services Building and OATS Inc. (a local paratransit operator) are anticipated to be displaced and require relocation to continue to conduct their operations in the area. These facilities have strong community ties and their needs are not seen as difficult to replace. Consequently, relocation is not expected to substantially disrupt service delivery. Other community resources may experience loss of land or loss of parking but are not expected to be displaced by project alternatives. These include such organizations as the Grand Lodge of Masons, the Memorial Services of Columbia cemetery and the local offices of the U.S. Army Reserve. Again, substantial disruption is not expected.

g. Neighborhood and Community Cohesion

The reasonable alternatives improve I-70 along its existing alignment. This is expected not only to improve regional accessibility but also to improve local circulation within the city and in the surrounding urban areas. Widening of the interstate and improvements to the existing interchanges are expected to address out of date design elements, reduce traffic delays and improve public safety. The extension of the frontage road system is expected to reduce the use of the interstate for local trips, enhance north-south connectivity for local travelers through improvements connecting Vandiver Drive to Business Loop 70 East and address connectivity where the Business Loop meets with Creasy Springs and West Boulevard near Memorial and Cosmo parks. The balance of this discussion addresses topics related to the effects of the reasonable alternatives on neighborhood and community cohesion.

Physical Barriers

Neighborhoods bordering the reasonable alternatives include Parkade, Smithton Valley, North Central, Benton-Stephens, White Gate, Mexico Gravel and Fairway Meadows. The reasonable alternatives maintain the core element of the existing I-70 corridor and largely maintain the existing local roadway network/travel patterns. Consequently, new physical barriers are expected to be minor and the need to reroute/vacate local streets limited.

Regional Access and Mobility

Based on a review of the travel demand model's projected changes in travel time savings between future No-Build and Build Alternatives, the following neighborhoods may become relatively more accessible in a regional context due to the reasonable alternatives: Valley View Gardens, Highland Park, Smithton Valley, Parkade, Hunters Gate 1, Ridgeway and Douglas Park. Within the broader study area, neighborhoods along U.S. 63 (south of I-70), Nifong Boulevard and MO-WW are likely to experience improvements in regional accessibility. This impact is discussed further in the Secondary and Cumulative Impacts section.

Community Facilities and Public Services

Disruption to neighborhood cohesion is, in part, influenced by the degree of displacement of community facilities. The proposed action would not result in the permanent relocation of major community facilities, such as schools, parks and recreation areas, churches or hospitals. However, the VFW Post 280, the Parole Board and Social Services Building, New Horizons Community Support Services, the American Heart Association and OATS Inc. are facilities whose operations are anticipated to be displaced by the recommended preferred alternative (see **Table III-26**).

The VFW Post on Ashley Street (see **Exhibit III-3F**) offers a venue for civic organizations and community groups and provides money to community organizations through fundraising and events such as bingo. The post has a total membership of 600 veterans and is staffed primarily by local volunteers.

The New Horizons Community Support Services operates its Columbia facility, the Nyra Center, at 1408 Hathman Place (see **Exhibit III-3F**). New Horizons provides nonprofit psychiatric rehabilitation services. It is certified by the Missouri Department of Mental Health as a Community Psychiatric Rehabilitation Center and receives funding from the Department of Mental Health, the Division of Aging and Medicaid. The facility helps people with mental

illnesses by developing treatment plans to guide service delivery regarding employment and vocational training, work preparedness counseling, housing and family counseling. The program is designed to help individuals reengage and be contributing members of the larger community.

The American Heart Association at 2600 I-70 Drive NW (see **Exhibit III-3D**) is a branch office of the association's Heartland Affiliate. The Heartland Affiliate serves 18.7 million people in Arkansas, Iowa, Kansas, Missouri, Nebraska and Oklahoma. The primary goal of the organization is to reduce disability and death due to heart disease and stroke through various prevention, treatment and rehabilitation practices. The center also organizes support programs to benefit stroke survivors and persons with heart ailments. The association is actively involved with fund raising and increasing local awareness programs on health issues. Due to the nature of its activities, the centers frequently are visited by persons with heart ailments, family members and those involved with its daily activities.

Table III-26: Other Community Resources Impacted by Reasonable Alternatives

Subsections and Exits	Community Resources	Alternative	Impacts	Area to Acquire (ac)
Subsection 3 (exits 121–124)	CPS Services Building	U.S. 40: Enhanced Diamond	No impacts to structure/parking, acquisition of land	0.2
	CPS services Building	U.S. 40: SW Loop	No impacts to structure/parking, acquisition of land	0.3
Subsection 4 (exits 124–125)	American Heart Association	Stadium: NW Loop	Acquisition of land and displacement of structure	1.5
	American Heart Association	Stadium: Tight Diamond	Acquisition of land and displacement of structure	2.7
	American Heart Association	Stadium SPUI	Acquisition of land and displacement of structure	2.7
	American Heart Association	Stadium Split Diamond	Acquisition of land and displacement of structure	3.0
	Memorial Services of Columbia	I-70 Business Loop West	No impacts to structure/parking, acquisition of land	0.4
	U.S. Army Reserve	I-70 Business Loop West	No impacts to structure/parking, acquisition of land	1.6
Subsection 5 (exits 125–126)	VFW Post	163/763 BL(E): One-Way	Acquisition of land and displacement of structure	1.9
	Parole & Social Services Bldg.	163/763 BL(E): One-Way	Acquisition of land and displacement of structure	
	OATS Inc.	163/763 BL(E): One-Way	Acquisition of land and displacement of structure	0.9
	Columbia Utilities &RR	163/763 BL(E): One-Way	No impacts to structure, acquisition of land	2.5
	VFW Post	163/763 BL(E) CD System	Acquisition of land and displacement of structure	1.8
	Parole & Social Services Bldg.	163/763 BL(E) CD System	Acquisition of land and displacement of structure	
	OATS Inc.	163/763 BL(E) CD System	Acquisition of land and displacement of structure	0.9
	Columbia Utilities & R.R.	163/763 BL(E) CD System	No impacts to structure, acquisition of land	2.3
Subsection 8 (exits 128A–131)	Grand Lodge of Masons	U.S. 63 Interchange	No impacts to structure, acquisition of land	0.2
	Regional Sewer Line Structure	St. Charles Tight Diamond	Displacement of structure	-
		St. Charles Offset Diamond	Displacement of structure	-

The Board of Probation and Parole for District 6 of the Missouri Department of Corrections (Boone County) is located at 1512 Heriford Drive (see **Exhibit III-3**, Panel F). The recently constructed facility is located north of I-70 and south of Vandiver Drive, west of 763 and east of Burlington Street. The Board took space in the building in 2003, with a 10-year lease. The office oversees several programs and community partnerships related to probation and parole, including intensive supervision, absconder specialists, community service, substance abuse treatment, drug court, education and training and family violence counseling. There are 2,000 persons on parole in the region who are expected to visit the center monthly or more frequently. An estimated 20 to 30 persons work at the facility. The Department of Social Services, Child Support Division operates from the same building.

Another concern would be disruption of service provided by Columbia Transit or displacement of operations such as those provided by the OATS service, a curb-to-curb public transportation system. With a fleet of more than 550 vehicles statewide, OATS is a nonprofit transit provider serving seniors and persons with disabilities and also the rural general public. The service works to arrange transportation to medical appointments, grocery stores, education, work and senior centers. In the case of OATS, construction was recently completed on a new facility outside the primary area of impact (2501 Maquire Boulevard see **Exhibit III-3 E**) that would house its regional and local operations and replace the functions of the older site, including fleet parking, maintenance and training. With this relocation, transit-dependent populations effectively avoid being adversely affected in terms of access to jobs and other lifeline maintenance opportunities.

Social Interactions and Isolation

As the reasonable alternatives rely upon improving the I-70 corridor, the potential for creating isolated groups or neighborhoods generally is avoided or minimized. The proposed action would cause temporary local disruptions to aspects of community life that facilitate interaction among persons and groups—emergency response, use of public facilities, access and mobility—but would generally not have significant permanent adverse impacts to social interactions in neighborhoods and communities along the project corridor.

Business Displacements

The project would displace some businesses. Potential adverse impacts to local communities may occur from business displacement and the loss of business activity in the local community. Adverse impacts include (1) laying off or relocation of employees who live within the community; (2) economic losses to a business owner who lives in the community; (3) loss of professional, commercial and retail establishments serving the local community and (4) the loss of workers and businesses that utilize the goods and services purchased from local businesses in the primary study area that would be displaced.

The business survey conducted during the study affirms the linkages between business displacements and the local communities. For example, the businesses surveyed indicated that roughly 18 percent of their employees reside in surrounding neighborhoods and 46 percent in Columbia. Looking at the businesses that would be directly affected and who took part in the survey confirmed that the customer service area for retail trade, automotive sales and rentals and eating and drinking places drew more heavily from surrounding neighborhoods as a source of sales.

The availability of suitable relocation sites is key to minimizing disruptions to community interactions and patterns fostered by local businesses and institutions. With appropriate land use

and site planning (i.e., appropriate permitted land uses, densities, shared parking facilities, multiple-use tenants, landscaping and pedestrian connectivity) several types of institutions and businesses—both neighborhood- and region-serving—can still be accommodated. The displacement and relocation impacts present a challenge and an opportunity to strengthen the livability and quality of life of existing neighborhoods. Under a separate economic impact and land use study, the City of Columbia is taking steps toward identifying suitable sites for relocation. The work sponsored by the City of Columbia is not a component of this EIS. However, the EIS team coordinated with the City’s consultant in order to allow for the two efforts to be as consistent as possible.

A continuing commitment to public involvement, which has been a feature of this project, would continue as the project proceeds to the construction stage. This commitment and proactive and responsive relocation strategies in partnership with neighborhoods and businesses are essential to addressing the concerns of local residents and the surrounding region.

Based on an examination of the reasonable alternatives, none of the alternatives is expected to disrupt the quality of life of residents significantly and permanently.

h. Parks and Recreation Areas and Public Use Lands

None of the reasonable alternatives require any publicly owned park land.

One of the primary challenges of the Improve I-70 project in SIU 4 is to design improvements that would ensure safe, reliable regional mobility for vehicles and preserve the livability of the area. One important consideration is to recognize and integrate consideration of CATSO’s 2025 Transportation Plan with respect to Pednet, its plan for expanding bikeways and sidewalks along major routes to provide a safer and better-connected bicycle/pedestrian system and an alternate mode of transportation. All trails in the primary study area are proposed (none currently exist). Sidewalk impacts are limited. Considerations of pedestrian and bicycle facilities are discussed further in Chapter III.B.3.e – Commitment to Pedestrian/Bicycle Connectivity.

i. Property Values/Tax Revenues of Acquisitions

As noted, 354 acres from 667 individual parcels and 137 existing structures would be acquired to implement the recommended preferred alternative. The reasonable alternatives would improve the existing components of I-70 through Boone County. For the most part, the land immediately adjacent to the highway is developed for residential, commercial and industrial uses, especially within the city of Columbia. Additional right of way must be acquired to satisfy the purpose of and need for the project. Acquisition would remove ratable resources from the tax rolls, potentially to the detriment of the economy and the community. This text addresses the magnitude of such losses; concentrating on market (appraised) values, assessed values and property taxes of the real estate intersecting the footprint of the reasonable alternatives.

Property tax calculation starts with a parcel’s appraised value and converts it into an assessed value based on the parcel’s class. The assessed value of residential classes (R) is 19 percent of the appraised value of the parcel, that of commercial classes (C) 32 percent of the appraised value and that of agricultural classes (F) 12 percent of the appraised value of the parcel. Property taxes are calculated based on the assessed value. There are about 50 tax rates between six and seven percent.

Based on the Boone County database, the parcels that intersect the footprint of the preferred reasonable alternative have an appraised value of \$220 million: \$160 million in buildings and \$60 million in land. The assessed value of these resources is about \$67 million, and the property taxes total \$4.5 million per year.

Using the same database, the total market (appraised) value of structures to be acquired is estimated at \$28 million and that of the land at \$6 million, for a total market value of \$34 million. The total assessed value of the properties is roughly \$9 million. Property taxes associated with the land and structures to be acquired are estimated to be approximately \$600,000. The values of the alternatives that compose the recommended preferred alternative are roughly equivalent to the alternatives not in the recommended preferred alternative. These losses are estimates. The following elements have shaped the nature of these impacts:

- The engineering team has worked to minimize the acquisition of new right of way. Among the engineering techniques used to accomplish that goal included urban widths, utilization of existing interchange locations, rehabilitation of frontage and service roads, prudent use of retaining walls and other space-saving devices and efficient use of the existing right of way.
- The business community finds access to I-70 essential to its existence. Consequently, businesses would reconfigure or relocate, as necessary, to maintain their access to and visibility from I-70. The business survey contained several findings that support the notion that businesses would relocate to maintain access and visibility. For example, four-fifths of all responding businesses indicated that they expected to reopen if required to relocate. Three of the top five site selection criteria used by existing businesses involved I-70: proximity to I-70, visibility from I-70 and access to I-70. This applied not only to the initial decision to site their businesses in their existing locations but also for any project-related relocations of their businesses. Further, 60 percent indicated that they would seek a site within the city of Columbia if they must relocate.
- Improvement of I-70 would improve the vitality of the I-70 corridor and allow it to better support commercial development and thus generate higher revenues. The I-70 project would improve highway operation, increase local connectivity and allow the area's interchanges to function effectively. The business survey found that 56 percent of the respondents (business owners potentially facing displacement) agreed that the Improve I-70 project would be good for the economy of Columbia and Boone County.
- The project team is working with the community to develop sound redevelopment strategies. When asked, 75 percent of the survey respondents indicated they expected to have difficulty finding suitable sites for their businesses. In response to this finding, the project team began including information on the right of way acquisition process within the project's public involvement plan. It was hoped that by removing the element of unfamiliarity from the process, that apprehension could be reduced. The project team has cooperatively worked with the City of Columbia in its efforts to produce strategies for sensibly redeveloping the I-70 corridor.

j. Potential Construction Easements

Temporary construction easements may be required across some properties adjacent to I-70 and local roadways. Construction easements may be needed for temporary disturbances, such as utility line relocation, local roadway reconstruction, bridge construction, heavy equipment access, borrow areas and equipment and supply staging (storage) areas. The rental of temporary easements is negotiated with affected landowners, who retain ownership, and usually includes restoring the area to preconstruction or otherwise acceptable conditions. Temporary easements usually are located to avoid structures and minimize permanent damage to the property.

k. Consistency with Local Transportation Planning

The project team has worked closely with the local entities responsible for transportation planning within the study area (principally Boone County, CATSO and Columbia). The goal has been to ensure that significant negative and avoidable impacts to the transportation network are avoided or minimized from implementing the I-70 project. The benchmark for comparison is the project's impact on the area's long-range transportation plan (CATSO's 2025 Transportation Plan – Major Roadway Plan). Overall, the reasonable alternatives are consistent with the Major Roadway Plan. The Major Roadway Plan was developed with the expectation that I-70 would be improved, either through a bypass or within the existing corridor. The Major Roadway Plan also incorporated the results of the U.S. 63/I-70 interchange MIS (June 2000). Based on these expectations, the local transportation planners developed the Major Roadway Plan to meet local needs through 2025. During coordination between the I-70 project team and local transportation planning agencies, the reasonable alternatives were reviewed and the CATSO Technical Committee developed a technical memorandum addressing areas with the potential for negative impacts to the local transportation network and the Major Roadway Plan.

Desire for a New Interchange, West of Stadium

Projects that involve the Interstate Highway System must balance the needs of through traffic and local traffic. As described in Chapter I, a critical element of the project's purpose and need is to "accommodate all users of I-70." This, of course, includes the large number of local users. For local users, new interchanges increase mobility. However, new interchanges have the potential to degrade the primary purpose of the interstate, which is to facilitate long distance, through traffic movements. They also include additional social, economic and environmental impacts that need to be considered. During the development of SIU 4, one evaluation measure was the investigation of whether the existing interchange could be reconstructed and/or modified in accordance with the applicable operational standards and without considerable impacts to the surrounding environment. New interchanges would only be considered if the existing interchange could not be modified with an acceptable level of impact.

After initiation of the Second Tier EIS, the CATSO Coordinating Committee amended the Major Roadway Plan to include a placeholder for a new interchange, between Perche Creek and the Stadium interchange. The placeholder was intended to acknowledge that a new interchange was planned in the general vicinity but that the exact location would be determined at a later date. The amendment also included new extensions to Scott Boulevard and Route E to connect the new interchange to the local roadway network. The new interchange is often referred to as the Scott interchange. The CATSO undertook the amendment because a local developer proposed an interchange in this general location and CATSO believed that a new interchange

west of Stadium would provide substantial benefit to Columbia's regional roadway system (on the west side of the city).

Because the I-70 study was ongoing and was analyzing traffic operations at the Stadium interchange, CATSO agreed to retain the placeholder status of the new interchange until the SIU 4 project team completed their analysis of the Stadium interchange. After the SIU 4 project team analysis was completed, CATSO would move forward based on the outcome of the analysis.

The detailed traffic analysis revealed that in the design year 2030, heavy volumes at the intersection of Bernadette and Stadium would cause the Stadium interchange to operate at an unacceptable LOS. Traffic queues at this intersection extended to the Stadium interchange and caused substantial traffic problems along Stadium Boulevard and at the ramp terminals. To address this situation, the study team investigated potential new access points to I-70, starting with the CATSO placeholder location, in order to reduce the volumes using the existing Bernadette/Stadium intersection and Stadium interchange.

The traffic analysis was performed after reviewing and updating land use assumptions in this part of Columbia with CATSO. This land use update involved substantive coordination with and concurrence from CATSO staff to determine what types of land use would be expected with the addition of a new access point onto I-70 in this general area.

The traffic analysis performed showed that the CATSO placeholder location, while providing a benefit to traffic flows to the regional roadway network, was too far away from Stadium Boulevard and therefore did not address the traffic operations problems at the Stadium interchange. The SIU 4 project team then analyzed potential new interchanges at locations closer to the existing Stadium interchange. Through this analysis it was determined that ramps to and from the east at Fairview Road provided the most effective traffic relief to allow the Stadium interchange, and the Bernadette/Stadium intersection, to operate at acceptable LOS.

Because it was determined that a new interchange near the location of CATSO's placeholder would not provide operational benefits to the Stadium interchange, the Scott interchange was eliminated from further consideration as part of the Improve I-70 project. Consequently, the responsibility to justify a Scott interchange lies with its local proponents. To assist them, the I-70 project team has provided traffic modeling data that include a new interchange. This would assist in the determination of how extensive local benefits might be. Additionally, the I-70 project team has identified the geographic area within which a new interchange would not conflict with the recommended preferred alternative. This would allow any local engineering studies to focus their efforts.

Broadway Extension

The Major Roadway Plan includes an extension of Broadway from its terminus at Scott Boulevard to MO-UU. The major obstacle to this plan is the crossing of Perche Creek. Because the reasonable alternatives include completion of the I-70 frontage roads over the Perche Creek, need for the extension of the Broadway is being reevaluated locally.

Sorrels Overpass Drive

Because of the interest in a Scott interchange, CATSO's Technical Committee is concerned about the replacement of the overpass at Sorrels Overpass Drive (mile marker 122.8). The reasonable

alternatives would replace the overpass in its existing location. This would provide the local stakeholders the greatest possible window for placement of a Scott interchange while maintaining the existing traffic pattern.

Stadium Interchange

To allow the Stadium interchange to operate effectively, all of the reasonable alternatives employ direct ramps that would connect the interchange directly to Fairview Road—a roadway parallel to, and 0.4 mile (.64 km) west of, Stadium Boulevard. This would give users the opportunity to bypass Stadium for some movements. One ramp could be used by Columbia travelers destined for eastbound I-70, the other by travelers exiting I-70 (westbound) destined for Columbia south of I-70.

Currently, Fairview Road is a two-lane roadway. It has two intersections with Worley Street that are off-set by approximately 200 feet (61.0 m). The Major Roadway Plan identifies Fairview as a major collector. Major collectors are lower capacity roadways providing local access and circulation to the arterial network (two or four lanes with up to 90 feet (27.4 m) of right of way). With the connection to I-70, Fairview would likely require widening to a four-lane section and the installation of signals at Bernadette, Worley and Ash. Additionally, the potential need for traffic calming and the need to redesignate Fairview Road as an arterial have been discussed with CATSO.

The projected traffic increases from the addition of the direct ramps to Fairview Road, south of Worley, are expected to be less than 2,200 vehicles per day. Even under the No-Build scenario, Fairview Road traffic is expected to increase substantially, over time. Consequently, Fairview's designation may need to change, even without the proposed ramps. Nevertheless, the project team acknowledges that the addition of the ramp connections would alter the expected traffic patterns of the area, especially north of Worley. Consequently, MoDOT commits to assist local investigations and participate in any local improvements necessary to allow the Fairview/Worley intersection to operate in a manner consistent with CATSO's concerns. Relative to the I-70 project, the footprint for direct impacts extends just south of the Fairview/Worley intersection.

Business Loop East Interchange

The reasonable alternatives include replacing the existing ramps between I-70 and Business Loop I-70. The existing ramps must be relocated to construct the new U.S. 63/I-70 interchange. To replace these movements, an interchange is proposed just west of Paris Road (MO-B). This new interchange would provide access to and from all directions on I-70, whereas the existing interchange provides access only to and from the east. To the south, the new interchange would intersect with the business loop at the existing Bowling Street intersection. To the north, a new road would be constructed to connect the interchange to Vandiver Drive. The intersection would be at the existing Parker Street intersection. The CATSO Technical Committee notes that the "northern street connection would follow the alignment of the planned extension of Heriford Drive to Vandiver Drive as shown on the MRP." However, it is concerned about volumes that the interchange might bring to the intersection and where they would go from there. The Major Roadway Plan (MRP) depicts the extension of Parker (through Albert-Oakland Park). If completed, traffic from the new interchange may use the Parker extension, adversely affecting the surrounding neighborhoods.

Compared with the impact of not replacing the I-70/Business Loop ramps, the potential impacts associated with local improvements cannot be considered significant. Furthermore, this situation is best handled on the local level if the Parker Street extension is developed.

Ballenger Extension

The MRP includes extending Ballenger Road (mile marker 130–131), overpassing I-70 and connecting to a proposed extension of MO-740. The reasonable alternatives involve a symmetrical widening of I-70 and continued use of the existing frontage roads (minimal horizontal or vertical alignment changes). Our analysis showed that the proposed I-70 improvements would not affect the proposed actions at Ballenger Road.

Clark Lane/Business Loop Connection

The reasonable alternatives propose a new roadway connection between Clark Lane and the Business Loop over I-70. This improvement is expected to improve local connectivity near the U.S. 63/I-70 interchange. It is not opposed by the Technical Committee. It may, however, require that the MRP be amended.

I. Land Use Planning Impacts

The reconstruction of I-70 along its current alignment is consistent with Columbia's *Metro 2020* plan, Consolidated Plan, Boone County's Economic Development Plan and the County Comprehensive Plan. It is also listed on the CATSO Long-Range Transportation Plan. While individual parcels would be affected by the recommended preferred alternative, and some relocations of businesses and residences would occur, the overall use of the lands adjacent to the corridor are not expected to change. Most of the corridor through the city would remain commercial and industrial, with interspersed residential neighborhoods. The business survey found that three of the top five reasons given for selecting the current (and any future) site are proximity to I-70, visibility from I-70 and access to I-70. Further, 65 percent of businesses, if displaced, would seek a site within the city of Columbia (overall, only 12 percent of potentially displaced businesses expected not to reopen).

The transportation system in the study area has the potential to affect and to be affected by existing and future land use. Transportation improvement projects respond to existing and future congestion or safety problems that result from growth and land use changes beyond the authority of the transportation agency (i.e., MoDOT). While MoDOT supports land use planning where it exists, the authority for such controls rests with local government. Missouri Department of Transportation's authority is limited to that which occurs in the highway right of way. Although a highway can influence land use, MoDOT has no jurisdiction in controlling land use.

The project would not create a barrier to future land development. Continued development and redevelopment of the urban and urban fringe areas, as outlined in the *Metro 2020* and County Comprehensive plans, could proceed under any of the reasonable alternatives as permitted by local authorities.

3. Measures to Minimize Harm

The benefits of Improving I-70 within its existing corridor far outweigh the benefits of all the other improvement schemes evaluated. Nevertheless, the project would displace numerous residential,

commercial and industrial developments. To mitigate the negative impacts of these displacements, several techniques would be employed. These include the Relocation Assistance Program associated with MoDOT's land acquisition process, support for the development of local strategies for the relocation of those commercial operations displaced by the project, implementation of site-specific avoidance and minimization techniques within the development plans and compliance with the American Disabilities Act of 1990. This text will review the measures to minimize harm, as they relate to socio-economic resources.

a. Relocation Assistance Program

The Missouri Department of Transportation acquisition and relocation process is conducted in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (the Uniform Act). The Uniform Act, as well as Missouri state law, requires that just compensation be paid to the owner of private property taken for public use. The appraisal of fair market value is the basis of determining just compensation to be offered to the owner of property to be acquired.

An appraisal is defined in the Uniform Act as a written statement independently and impartially prepared by a qualified appraiser setting forth an opinion of defined value of an adequately described property as of a specific date, supported by the presentation and analysis of relevant market information.

Further, the Civil Rights Act of 1964 and the Relocation Assistance Program provides for benefits to residential and business displacements. Among the provisions of the Relocation Assistance Program are that any displaced owner-occupant or tenant of a dwelling who qualifies as a displaced person is entitled to payment of his or her actual moving and related expenses, as MoDOT determines to be reasonable and necessary. A displaced owner-occupant who has occupied a displacement dwelling for at least 180 days is also eligible to receive up to \$22,500 for a replacement housing payment. This includes the amount by which the cost of a replacement dwelling exceeds the acquisition cost of the displacement dwelling, increased interest costs and incidental costs. A displacement owner-occupant who has occupied a displacement dwelling for at least 90 days but less than 180 days and a tenant who has occupied a displacement dwelling for at least 90 days is entitled to a payment not to exceed \$5,250 for either rental or down payment assistance.

Any displaced business, farm operation or nonprofit organization that qualifies as a displaced person is entitled to payment of their actual moving and related expenses, as MoDOT determines to be reasonable and necessary. In addition, a business, farm or nonprofit organization may be eligible to receive a payment, not to exceed \$10,000 for expenses incurred in reestablishing their business, farm operation or nonprofit organization at a replacement site.

A displaced business may be eligible to choose to receive a fixed payment in lieu of the payments for actual moving and related expenses and actual reasonable reestablishment expenses. The payment amount for this entitlement alternative is based on the average net earnings of the business. This fixed payment amount cannot be less than \$1,000 or more than \$20,000.

Other related policies include the availability to use mediation, in lieu of court proceedings, to arrive at a settlement and provisions to ensure that displaced persons are resettled into adequate replacement housing, regardless of the existing circumstances—so called last resort housing. Missouri Department of Transportation (Central District) is responsible for land acquisition associated with the project. Missouri Department of Transportation relocation

professionals can be reached at P.O. Box 718, 1511 Missouri Boulevard, Jefferson City, MO 65102.

The relocation planning process is intended to minimize the disruptions experienced by displaced persons. This can be accomplished in part by confirming the characteristics and needs of individuals, families, businesses, non-profits and others who will be relocated. This environmental document begins this process by conducting a business survey, contacting existing operators of adult or senior citizen residential facilities, and inventorying the residential characteristics section-by-section of the project corridor. During this stage, consideration has been given to whether there is suitable replacement housing supply and alternate site locations that can function as replacement dwellings or business sites in terms of the tenure, price, condition, function and locational needs of the affected displaced populations.

Since the property acquisition and relocation process may not begin for some time after the completion of this environmental document, a subsequent housing market analysis may need to be prepared to determine appropriate actions for relocation. Such a study would confirm the demand and supply issues described above and consider whether and to what extent special relocation advisory services may be needed to address solutions for particular segments or populations (e.g., assisted-living residents, adult retirement communities; low-income renters).

Missouri Department of Transportation right-of-way professionals will interact with other professionals and agencies engaged in real estate and social services during the right-of-way acquisition and relocation phase. Coordination with several different Federal, State and local agencies, non-profits or private parties such as realtors or developers will improve this process.

Displaced households and businesses and other organizations need to be fully informed as early as practicable of the process and the availability and attributes of potential replacement sites for commercial development and alternative residential dwellings. Potential sources for assistance during relocation should be identified. Neighborhood organizations that will be affected through relocation either by the acquisition of properties or the siting of new development also need to be informed. Toward this objective, public workshops and outreach programs have already been conducted during this environmental impact assessment stage to identify the prospective needs of displaced populations and assess anticipated project impacts. The business survey was implemented to profile the characteristics, siting needs and preferences of potentially affected businesses. Future follow-up one-on-one surveys and workshops can further advance open communications as the project proceeds through right-of-way acquisition.

Workshops and one-on-one interviews can be particularly effective with developers, potentially displaced residents or businesses, and state and local government representatives. Outreach and coordination and partnering with such groups can prove valuable in exploring and leveraging resources and services. This coordination should include determining the type and amount of various federal and state grants and loans and federal designated monies for highway relocation to bring residents out of sub-standard dwellings (e.g., housing of last resort) or to replace community facilities that are to be displaced that are in effect functionally obsolete (functional replacement program). These techniques can identify services as well as potential partners for delivering effective relocation assistance.

b. Relocation Strategies

The I-70 project team has worked to foster an environment where the local land use planning and economic development agencies could develop strategies to make the process of relocating the displaced commercial operations along I-70 as easy and as beneficial to the community, as possible. The initiation of the business inventory and business survey were parts of this coordination, as were the project's extensive public involvement and outreach program. The City of Columbia Planning Department has chosen the Economic Development Research Group to examine how the proposed I-70 widening undertaking would affect the city's businesses and economy. This analysis will also take a longer-term examination of redevelopment strategies for the improved I-70. Ultimately, the Economic Development Research Group would make recommendations on what can be done to promote parts of the city that have yet to attract development into land uses that would benefit from an improved interstate.

Even though improvement of I-70 would acquire the minimum amount of property necessary, numerous businesses would be displaced. The process would occur over a long period. The time between selection of the preferred alternative and the start of construction is years in length. The long time associated with highway construction projects typically allows the affected businesses to be relocated by the time construction begins. The locally sponsored relocation plans should assist with the process and ease the transition required by affected operations.

c. Continued Coordination with Local Planning Agencies

The I-70 Study Team has engaged and worked cooperatively with local agencies, stakeholders, the general public and especially the local transportation officials. This includes CATSO and the affiliated City of Columbia officials. City staff (the planning director and his staff) are important members of the Improve I-70 Study Team and have played key roles in screening alternatives. They have had full access to all work products and have had the opportunity to take part in all internal project meetings. Boone County and City officials are members of the project's Advisory Group. The local transportation planning community has also participated in the project on a technical basis, including numerous state, city and county departments/agencies. Chapter V documents the project's extensive outreach process. As this EIS study continues, the I-70 Study Team is committed to continuing this level of stakeholder involvement. Specifically, the Study Team has committed itself to the following:

- Before the Final EIS is completed, CATSO would be asked to review and comment on the preferred alternative as identified in the Draft EIS.
- Ongoing involvement with the Improve I-70 Study Team and Advisory Group.
- CATSO's ongoing communication about the Improve I-70 effort to appropriate City and County departments and elected officials.

The I-70 Study Team has provided work product/data to the local transportation planning agencies to assist with their local efforts. Among the data transferred were results from the study's traffic modeling, results from the business survey, engineering expertise and impact determinations. The I-70 Study Team will continue to supply useful data to local stakeholders, to the extent practicable. Specifically, the Study Team has committed itself to the following:

- The I-70 Study would generate and provide traffic modeling data on a new (Scott) interchange. Although the Scott interchange does not provide benefits to the operation of I-70, it does provide some regional and area benefits that may justify it outside the context of the I-70 project. A summary of these benefits is provided in **Table III-27**.
- The I-70 Study would identify any limitations that the proposed I-70 improvements might place on the general location and configuration for a Scott interchange. Location in this sense is defined as a range of possibilities along I-70; it is not defined as a specific alignment or spot for the improvement.
- The I-70 Study Team would work with Columbia to determine whether it is possible to rebuild the Sorrels Overpass Drive so that it meets the needs of the widened I-70 facility and leaves room for (or serves as) a possible Scott Boulevard extension and interchange.
- The I-70 Study Team acknowledges that the City of Columbia would require a public hearing to meet its requirements for changing the classification of Fairview from a major collector to a minor arterial. This hearing is scheduled for October 27, 2004. As part of the NEPA process, the EIS also requires a public hearing. To that end, the project team would work with the City to coordinate the two public hearings to the extent possible, recognizing that each would have its own requirements related to timing, content, format, etc.
- The I-70 Study would identify any limitations that the proposed I-70 improvements might place on the general location and configuration for a Ballenger Overpass. Location in this sense is defined as a range of possibilities along I-70; it is not defined as a specific alignment or spot for the improvement.

Table III-27: Regional and Area Benefits of a Scott Boulevard Interchange

As part of the I-70 Second Tier EIS, a traffic modeling study was conducted that included a new (Scott) interchange. Although the Scott interchange does not provide benefits to the operation of I-70 (and specifically to the operations at the Stadium interchange), it provides some regional and area benefits that may justify it outside the context of the I-70 project.
Regional Benefits
Decrease in vehicle hours traveled (VHT) of 1,100 hours per day
No change in vehicle miles traveled (VMT)
Decrease in volume to capacity ratio (V/C) of one percent
Increase in future capacity across I-70 of 7.5 percent
Area Benefits*
Decrease in V/C on Stadium, north of Broadway, of 14 percent
Decrease in V/C on Broadway, west of Stadium Boulevard, of 18 percent
Decrease in V/C on Broadway, east of Scott Boulevard, of 15 percent
Increase in area cordon of 7,800 vehicles per day (two percent)
Decrease in VMT on Broadway (32 percent) between Scott and Stadium boulevards
Decrease in VHT on Broadway (34 percent) between Scott and Stadium boulevards
Decrease in VMT on Fairview Road (two percent) between Broadway and Kunlun Drive
Decrease in VHT on Fairview Road (four percent) between Broadway and Kunlun Drive
<i>*Area, in this context, means the area in the immediate vicinity – Scott Boulevard to Stadium Boulevard/I-70 to Broadway</i>

d. Local Roadway Improvements

The implementation of the recommended preferred alternative would not only improve existing through lanes on I-70 but would also improve numerous connector, frontage roads and cross roads. The improvements outlined in this text would enhance local traffic operations.

Frontage Roads

Over time, existing discontinuous frontage roads would be connected where necessary throughout the project area. With the exception of the area between the MO-J/O interchange and the U.S. 40 interchange and between Stadium and U.S. 63, continuous frontage roads on both sides of I-70 would be developed as part of the recommended preferred alternative. Between Stadium and U.S. 63, discontinuous frontage roads would be developed as part of the recommended preferred alternative. Between MO-J/O and U.S. 40, the frontage road would be only on the south side of I-70. Between Stadium and U.S. 63, the existing street system serves as the frontage road system. The existing roadway alignment and profile would be used to the extent possible. **Exhibit 27** shows the estimated extent of new and existing frontage roads. Completion of the frontage roads is expected to measurably improve mobility and increase connectivity. Such completion would also improve local emergency response capabilities.

All new frontage roads will be constructed over time as the need and funding for such improvements becomes established.

Fairview Road/Bernadette Drive Upgrades

As a component of the Stadium interchange, direct ramps would divert some movements to Fairview Road. As part of the recommended preferred alternative, Fairview Road would be improved down to the Worley Street intersection. Part of Bernadette Drive also would be improved. The I-70 Study Team acknowledges that the City of Columbia would be required to change the classification of Fairview Road from a major collector to a minor arterial on its MRP. The I-70 Study Team would develop appropriate traffic projections for the ramps at Fairview Road. Traffic projections are also being developed for Fairview Road with no I-70 ramps. This would help determine what improvements could be required based on growth associated with the land use and development projections in the area that are reasonably foreseeable in the next 30 years, regardless of what happens on I-70. This would assist in the transition expected in this area.

Broadway Extension

The Major Roadway Plan includes an extension of Broadway from its terminus at Scott to MO-UU. The CATSO estimates this project may cost \$15 million. The major obstacle to the extension plan is the crossing of Perche Creek. Because the reasonable alternatives include the completion of the discontinuous frontage roads over Perche Creek, the extension of Broadway may not be necessary. However, constructing the extension of Broadway would not eliminate the need for the I-70 frontage roads over Perche Creek. The elimination of the need for the Broadway extension is clearly beneficial to the area. It saves costs, eliminates environmental impacts, reduces habitat fragmentation and reduces sprawl.

One-Way Frontage Roads

The recommended preferred alternative for the Triplets (MO-163/MO-763/Business Loop East) is for a one-way frontage road system. This would create a new one-way frontage road, parallel to I-70, between mile markers 126.5 and 128. The on- and off-ramps at each of the three interchanges would be controlled by signalized intersections. Texas Turnarounds (see **Figure II-4**) would allow traffic destined for the opposite frontage road to avoid the signalized intersections. The one-way frontage road system could also permit limited right-in/right-out movements between the frontage road and the adjoining businesses in a few select locations. Access is limited for operation and safety reasons and because of physical limitations due to the topography between the frontage road and the adjacent parcels. A maximum of seven access points could be implemented. The influence of traffic volumes entering the frontage road system has not been evaluated since development levels are unknown. It is possible that the influence of traffic volumes could reduce the number of possible access points. On the north side of I-70, three potential access points have been identified, all between the MO-763 and Business Loop East interchanges. On the south, four possible access points have been identified: three between the MO-763 and Business Loop East interchanges and one between the MO-163 and MO-763 interchanges. This information has been forwarded to local stakeholders for their input.

Business Loop East Interchange

All the reasonable alternatives include relocation of on- and off-movements between I-70 and Business Loop. The connection would provide access to and from all directions on I-70,

whereas the existing interchange provides access only to and from the east. Removal of the existing ramps is made necessary by the improvement of the U.S. 63 interchange. The reasonable alternatives place this new interchange at about one mile (1.6 km) east of the MO-763 interchange. A new connector road provides access to the Business Loop (to the south) and Vandiver Drive (to the north).

Business Loop/Clark Lane Connection

The recommended preferred alternative provides a new I-70 overpass between the Business Loop and Clark Lane. Completion of the overpass is expected to measurably improve mobility and increase connectivity. It also provides an additional pathway across I-70. The connectivity improvements are generally supported locally.

Business Loop/Conley Connection

The recommended preferred alternative provides a new connection between the Business Loop and Conley Road (along the southwestern quadrant of the U.S. 63 interchange, see **Exhibit III-1G and H**). This is essentially a continuation of the frontage road concept. Completion of this road is expected to measurably improve mobility and increase connectivity.

e. Commitment to Pedestrian/Bicycle Connectivity

The Missouri Department of Transportation would continue coordination with Columbia to develop an access plan that would make appropriate provisions for bike, pedestrian and wheelchair access across I-70 wherever possible and reasonable, but most likely not at every crossing. For example, it is probably not reasonable to provide access on U.S. 63 over I-70 due to high traffic volumes and traffic mix. This study would not determine a specific plan for pedestrian, bicycle and wheelchair access across I-70. However, improvement alternatives being considered would not preclude that access.

As a result of strong public support and a MoDOT commitment to maintaining pedestrian and bicyclist access, a bridge crossing I-70 is proposed near Clinkscapes Road (mile marker 125). The principal benefit of this pedestrian/bicycle only crossing would be better access to Cosmo Park from the neighborhoods on the south side of I-70 (see **Exhibit II-15**). Another similar facility (albeit, of limited public utility) is the pedestrian underpass proposed at mile marker 122 for the golf course on I-70 Drive (southwest). The underpass is visible on **Exhibit II-13**.

Although pedestrian/bicycle travel is not permitted on I-70 itself, there is an acknowledged need for east-west bicycle transportation across the state. The frontage road system improvements within the recommended preferred alternative are expected to advance this goal.

f. Federal Functional Replacement Program

The recommended preferred alternative would require acquisition of real property, including public facilities. Property losses would affect essential public services. In such circumstances, FHWA recognizes that functional replacement, an alternative means of acquisition, may be needed to serve the public interest. The use of functional replacement is limited to publicly owned, public use facilities.

In the typical acquisition, the offer to acquire represents an estimate of just compensation determined through the appraisal of fair market value. Under functional replacement, the facility,

including land and improvements, may be replaced by another with FHWA participating in the cost of a facility of equivalent utility. For example, if a community fire station with two bays must be acquired, FHWA may participate in the cost of a new fire station of equivalent utility. Should the community choose to build a four-bay facility or add functions or services not present at the acquired site, FHWA participation generally would be limited to the level of function provided by the original facility.

Functional replacement has been a key tool for surmounting long-standing constraints to project development. The program can pay the necessary costs to replace a publicly owned facility with a similar facility that offers the same utility, including betterments and enlargements required by existing local laws, codes and reasonable prevailing standards for similar facilities in the area (see CFR 710.599).

The use of the functional replacement approach is at the option of MoDOT, provided that it is permissible under state law. Exercise of functional replacement requires concurrence that the project is a public necessity or in the public interest.

The use of the functional replacement approach is at the option of the affected public agency, requiring MoDOT's concurrence. The option must also be permissible under Missouri state law. Exercise of functional replacement requires FHWA concurrence that the project is a public necessity or in the public interest.

Because construction of a replacement facility can be highly complex, early and frequent consultation with the City, MoDOT and FHWA would be important. Agreement between the parties must be established clearly establishing the conditions and responsibilities of each respective party in advance of FHWA concurrence in the construction award, with appropriate FHWA review and approval of the project specifications and estimates.

C. Environmental Justice

Executive Order 12898, issued in 1994, directs federal and state agencies to incorporate environmental justice as part of their mission by identifying and addressing the effects of all programs, policies and activities on minority and low-income populations. The fundamental principles of environmental justice are as follows:

- Ensure the full and fair participation by all potentially affected communities in the transportation decision-making process;
- Prevent the denial of, reduction in or significant delay in the receipt of benefits by minority and low-income populations; and
- Avoid, minimize or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.

In 1997, the United States Department of Transportation (USDOT) issued its *Order to Address Environmental Justice in Minority Populations and Low-Income Population (USDOT Order)* to summarize and expand upon the requirements of Executive Order 12898 on environmental justice. The *USDOT Order* set forth the transportation agency's policy to promote the principles of environmental justice in all policies, programs and other activities that are undertaken, funded

or approved by the FHWA, the Federal Transit Administration (FTA) or other USDOT entities. A determination on whether the project would have disproportionately high and adverse effects on minority and low-income populations is required. Disproportionately high and adverse effects are adverse effects predominantly borne by a minority or low-income population or suffered by the minority or low-income population and would be appreciably more severe or greater in magnitude than the adverse effects that would be suffered by the non-minority or non-low-income population.

In making determinations regarding disproportionately high and adverse effects on minority and low-income populations, mitigation and enhancement measures that would be taken and all offsetting benefits to the affected populations may be taken into account. The design, comparative impacts and relevant number of similar existing system elements in non-minority and non-low-income areas also may be considered.

Any programs, policies or activities that would have a disproportionately high and adverse effect on minority populations or low-income populations would be carried out only if (1) further mitigation measures or alternatives that would avoid or reduce the disproportionately high and adverse effect are not practicable; and (2) a substantial need for the program, policy or activity exists based on overall public interest and alternatives that would have fewer adverse effects on protected populations but still satisfy the need would have other adverse social, economic, environmental or human health impacts that would be more severe or would increase cost by an extraordinary magnitude.

The study team began with an analysis of whether the minority and low-income populations near the project activities would experience adverse impacts from the construction and operation of the Improve I-70 project. The team also considered whether adverse impacts met the threshold of disproportionately high and adverse—that is, whether the adverse impacts would be predominantly borne or appreciably more severe or greater in magnitude than the impacts experienced by non-low-income and non-minority populations.

The environmental justice analysis for the Improve I-70 Second Tier EIS follows the guidance and methodologies recommended in the Federal Council on Environmental Quality's (CEQ's) *Environmental Justice Guidance under the National Environmental Policy Act* (December 1997) and the DOT's *Final Order on Environmental Justice* (April 1997). The major steps in this process are the following:

1. Identify study area.
2. Compile population characteristics and identify locations with populations of concern for environmental justice.
3. Conduct public outreach.
4. Identify adverse effects on populations of concern.
5. Evaluate project's overall effects.

1. Identify Study Area

The study area SIU 4 extends over an 18-mile (29.0-km) corridor area along the alignment of I-70 that includes both the urban center of the city of Columbia and rural areas of Boone County

to the east and west. For the purpose of the environmental justice evaluation, the study area was defined as the area within 0.25 mile (0.4 km) of I-70 extending to a 0.5 mile (0.8-km) radius area around existing interchanges. The study area reflects the geographic area most likely to experience the direct impacts and, in most cases, the indirect community, human health and environmental impacts of the temporary construction and permanent operational impacts of I-70 improvements.

Ensuring environmental justice calls for assessing whether the direct and indirect adverse impacts of I-70 Improvements would fall disproportionately upon low-income and minority populations. For comparison purposes, the demographic composition of the study area was compared and benchmarked against the larger city of Columbia and Boone County region.

Minority and low-income populations were identified using data on race and income from the U.S. Census Bureau. Demographic data on race are available at the census block level. Socioeconomic data on income and poverty are reported at the larger census block-group level. Both demographic and socioeconomic data for minority and low-income populations in the corridor were compiled and mapped to assess spatial patterns.

2. Compile Characteristics and Identify Populations of Concern for Environmental Justice

Population and income characteristics from the 2000 U.S. Census of Population and Housing were analyzed to identify populations of concern for environmental justice. The following information was collected for specific block and block groups and aggregated to represent the study area:

- **Racial and Ethnic Characteristics**—Population in each census block of the primary study area was characterized using the racial categories White, Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian and Other Pacific Islander and Other. These categories are consistent with the affected populations requiring study under Executive Order 12898.
- **Percentage of Minority Population**—In response to questions on the census, persons of Hispanic origin characterized themselves as White, Black or African American, American Indian and Alaska Native. For purposes of this analysis, persons of Hispanic origin who identified themselves as White were included in the calculation of minority population. (CEQ guidance indicates that areas where more than 50 percent of the total population is minority are considered minority communities.)
- **Low-Income Population**—The percentage of persons living below the poverty level, as defined in the census, was one of the indicators used to determine the low-income population in a given census block or census tract. The median household income was the second measure used to characterize the income levels.

In 2000, an estimated 22,156 persons lived in the census blocks of the study area. **Table III-28** presents the population and economic characteristics for the study area and the surrounding regions. Overall, the study area had a larger proportion of minority residents compared to the residents of Columbia and Boone County. Specifically, minority persons accounted for

22.6 percent of the primary study area blocks, compared to 20.5 percent for the larger study area block groups, 18.5 percent of all Columbia residents and 14.6 percent of all Boone County residents. Minority persons living within the primary study area accounted for just under one-third (32.1 percent) of Columbia's minority population and one-quarter (25.4 percent) of Boone County's minority population.

Blacks or African Americans accounted for the largest share of the minority population of the primary study area and larger study region. Approximately 16 percent of the primary study area residents characterized themselves as Black or African American, 2.5 percent as Asian and 1.6 percent as Hispanic. Percentages of persons of Hispanic origin within the study area census blocks were lower than the percentages observed in the larger census block groups.

Although data on income and poverty are not available at the census block level, an analysis of census block groups within the primary study area found that 15.4 percent of persons nearest the project corridor reported incomes below the poverty level in 1999. This level of poverty is somewhat lower than the levels of poverty observed for the persons residing within Columbia (19.2 percent) but somewhat higher than reported for Boone County (14.5 percent).

In terms of concentrations of poverty, the primary study area accounted for 41 percent of Columbia's total number of persons in poverty and just over one-third of (33.9 percent) of Boone County's persons in poverty.

Per-capita incomes of residents in the study area were lower than those in the city of Columbia at large. However, median household incomes showed a reverse pattern. The median household income in the primary study area was found to be \$37,350 for 1999 compared to \$33,729 within the city. However, both areas had lower median incomes when compared to Boone County (\$37,485).

Table III-28: Population and Economic Characteristics of Primary Study Area and Region, 2000

	Census Blocks of the Primary Study Area		Census Block Groups of Primary Study Area		City of Columbia		Boone County	
	Number	%	Number	%	Number	%	Number	%
Race								
White Alone	17,145	77.4	34,379	79.5	68,923	81.5	115,714	85.4
Non-White Alone	5,011	22.6	8,828	20.5	15,608	18.5	19,740	14.6
Black or African-American	3,496	15.8	5,854	13.6	9,173	10.9	11,572	8.5
American Indian and Alaska Native	107	0.5	224	0.5	331	0.4	567	0.4
Asian Alone	553	2.5	1,147	2.6	3,636	4.3	4,015	3.0
Native Hawaiian and Other Pacific Islander	6	0.0	21	0.04	30	0.0	42	0.0
Other *	849	3.8	1,582	3.7	2,438	2.9	3544	2.6
Total	22,156	100.0	43,207	100.0	84,531	100.0	135,454	100.0
Hispanic Origin	360	1.6	1,131	2.6	1,924	2.3	2,688	2.0
Minority Population**	5,011	22.6	8,828	20.5	15,608	18.5	19,740	14.6
—Minority Share of Columbia	—	32.1	—	56.6	—	100.0	—	—
—Minority Share of Boone County	—	25.4	—	44.7	—	79.1	—	100.0
Age (Years)								
Less than 17 Years	5,248	23.7	10,683	24.7	16,679	19.7	30,902	22.8
18-34	7,122	32.1	14,326	33.1	36,028	42.6	47,563	35.1
35-49	4,678	21.1	9,597	22.2	15,709	18.6	28,918	21.3
50-64	2,747	12.4	4,945	11.5	8,835	10.5	16,432	12.1
65 Years and Older	2,361	10.7	3,656	8.5	7,280	8.6	11,639	8.6
Total	22,156	100.0	43,207	100.0	84,531	100.0	135,454	100
Number of Households	9,641	—	18,312	—	33,689	—	53,094	—
Percentage of Persons Below Poverty	—	—	—	15.4	—	19.2	—	14.5
—Low-Income Share of City of Columbia	—	—	—	41.1	—	100.0	—	—
—Low-Income Share of Boone County	—	—	—	33.9	—	62.4	—	—
***Per-Capita Income (1999)	—	—	\$18,395	—	\$19,507	—	18,366	14.5
***Median Household Income (1999)	—	—	\$37,350	—	\$33,729	—	\$37,485	—

Source: U.S. Department of Commerce, Bureau of Census, U.S. Census of Population and Housing, 2000. SF1 and SF3 data tables.

Note: The primary study area assumes a quarter-mile (.4-km) buffer along I-70 and a half-mile (.8-km) buffer radius along existing interchanges. *The Other Category includes 'some other race alone' and 'two or more races.' ** The total minority population includes all those who are Black, Hispanic Whites, American Indian or Alaskan Native, Asian, Native Hawaiian, Other Pacific Islander and Other Categories. *** The median household income was calculated by taking the weighted average of the median incomes of all the census tracts in a given study area.

3. Locations of High Minority and Low-Income Persons in Primary Study Area

Boone County averages for minority residents (14.6 percent) and persons living below poverty (14.5 percent) were chosen as the basis to determine areas of high minority concentrations and persons living below poverty within the primary study area. Block groups that displayed county averages higher than these were further analyzed and are summarized in **Table III-29**. To provide a larger area of reference, data on minority residents and persons living below poverty for all block groups in a particular section are also provided.

Table III-29: Census Block Groups with High Minority and High Poverty Residents

Section	Census Tract	Block Group	Population	% Minority	% Poverty
Subsection 3 (exits 121-124)	13	2	1,687	26.1	21.6
Entire Subsection			7,297	14.5	9.6
Subsection 4 (exits 124-125)	14	3	1270	17.6	12.7
	13	1	578	78.9	64.3
	13	3	602	20.4	24.6
	7	2	1,487	20.8	14.8
Entire Subsection			3,937	28.2	23.2
Subsection 5 (exits 125-126)	9	2	801	60.2	30.7
	7	3	1,434	28.2	24.6
	7	1	785	55.7	13.5
Entire Subsection			4,589	31.7	15.9
Subsection 6 (exits 126-127)	9	1	1,061	37.0	40.5
	14	1	2,157	20.9	14.9
Entire Subsection			3,218	26.2	23.4
Subsection 7 (exits 127-128)	15.01	6	1,074	33.7	33.7
	15.02	3	939	35.0	35.0
	2	1	580	29.7	29.7
	15.01	3	4,089	18.4	18.4
	15.01	5	1,880	26.2	7.2
Entire Subsection			8,562	26.0	20.3
Subsection 8 (exits 128-128 A)	15.02	1	1,752	35.6	27.0
	10.01	2	860	26.9	19.1
Entire Subsection			2,612	32.7	24.4
Subsection 9 (exits 128A-131)	15.02	2	3,071	18.4	10.7
	16.01	2	3,693	18.6	10.3
Entire Subsection			8,753	16.4	11.4

Source: U.S. Department of Commerce, Bureau of Census, U.S. Census of Population and Housing, 2000.

Note: Figures for Percent Minority and Percent Poverty represented in **bold** and italic indicate the census block groups that exceed the county averages for Percent Minority of 14.6 percent and percentage of persons in poverty of 14.5 percent.

A large proportion of the block groups within the urban portions of the project corridor (between exits 124 and 128A) were found to have larger concentrations of minority residents and persons living below poverty. Within the block groups, the smaller census blocks immediately adjacent to

or near I-70 were further examined for their demographic composition. Residents of those blocks would be most likely to face any immediate impacts of the proposed action (**Table III-30** shows the census blocks with the highest concentration of minority residents within the study area). Further analysis found that the tracts within the census blocks with the highest percentage of minority residents included tracts 9 (such as the recently dismantled Rainbow Village mobile home park), 14 (parts of the Parkade neighborhood), 15.02 and 16.01 (Fairway Meadows). Because of these findings, an aggressive public involvement strategy was pursued to ensure these residents had numerous opportunities to shape the Improve I-70 project.

4. Conduct Public Outreach

It is critical that all affected communities—particularly low-income and minority populations—have a meaningful opportunity to participate in the project’s planning and environmental studies. Chapter V describes the overall public outreach program. Efforts designed to involve low-income and minority populations affected by proposed I-70 improvements are described below.

a. GIS Mapping and Identification of Specific Communities of Concern

As noted, steps were taken to identify the presence and location of low-income and minority populations within the project study area. This was done using census data and GIS mapping programs. After the GIS data indicated the minority and low-income populations within the corridor, the locations of churches, neighborhood associations and other community facilities most likely to be affected by proposed improvements could also be identified and mapped electronically. This helped identify potentially affected interests to be targeted during public involvement efforts, including residents, churches and businesses in:

- **Fairway Meadows.** To the east of exit 131 and north of I-70, there is a row of residences in the Fairway Meadows neighborhood. Eighty-four dwelling units on 24 parcels are directly adjacent to the highway in that area. Demographic characteristics for the census block indicate that 32.6 percent of the total population is classified as minority and 10.3 percent of the total population of the block group lives below the poverty line (income data are not reported for blocks but for the substantially larger block group area). Churches in the vicinity include the Charity Baptist Church, Unity of Christ AME Zion Family Worship Center and Prairie Grove Baptist Church. The churches were placed on the project mailing list and contacted various times throughout the project to ensure their congregations were alerted to opportunities to provide input.
- **Parkade Neighborhood.** Located northeast of exit 125, 43 parcels with 37 dwelling units are adjacent to the I-70 alignment. Demographic characteristics for the census block indicate that 32.1 percent of the population is classified as minority and 12.7 percent of the total population of the larger block group lives in poverty. Representatives from the Parkade neighborhood participated in the Improve I-70 Advisory Group, and a neighborhood meeting was held there in March 2004. (See **Chapter V.A.5** for more detail.) With the emergence of feasible alternatives, the two neighborhoods along with Whitegate, Sunrise Estates and Park DeVille were targeted for supplementary public involvement events in recognition that the communities would be most affected by the reasonable alternatives.

Table III-30: Census Blocks with High Minority Residents

Section	Census Tract	Block Group	Blocks Adjacent to or Near I-70	Total Population	Number of Minorities	Percent Minority
Subsection 3 (exits 121–124)	13	2	2000, 2003, 2004	0	0	0.0
Subsection 4 (exits 124–125)	14	3	3012, 3018, 3019, 3023	341	71	20.8
	13	1	1000	0	0	0.0
	13	3	3000, 3001, 3002	206	82	39.8
	7	2	2000	0	0	0.0
Entire Subsection				547	153	28.0
Subsection 5 (exits 125–126)	9	2	2000, 2001, 2002, 2003	23	9	39.1
	7	3	3005, 3006, 3007	104	4	3.8
	7	1	1004	125	32	25.6
Entire Subsection				252	45	17.9
Subsection 6 (exits 126–127)	9	1	1015, 1017	77	25	32.5
	14	1	1025	4	0	0.0
Entire Subsection				81	25	30.9
Subsection 7 (exits 127–128)	15.01	6	6004	18	0	0.0
	15.02	3	3006, 3008, 3009	0	0	0.0
	2	1	1001	0	0	0.0
	15.01	3	3066	0	0	0.0
	15.01	5	5018, 5019, 5022	209	69	33.0
Entire Subsection				227	69	30.4
Subsection 8 (exits 128–128 A)	15.02	1	1039, 1040, 1041	384	108	27.9
	10.01	2	2000, 2001, 2002	51	9	17.6
Entire Subsection				435	117	26.9
Subsection 9 (exits 128A–131)	15.02	2	2017, 2020, 2021, 2023, 2026, 2033, 2035	229	52	22.7
	16.01	2	2034, 2035, 2045, 2046, 2047, 2048, 2050, 2054	661	257	36.0
Entire Subsection				890	309	34.7

Source: U.S. Department of Commerce, Bureau of Census, U.S. Census of Population and Housing, 2000.

Note: Figures for Percent Minority represented in **bold** and in *italic* indicate census blocks that exceeded the county averages for Percent Minority of 15.3 percent.

b. Community Facilities and Organizations as Venues and Contacts

Churches and neighborhood associations within the project area were among the community facilities and institutions identified in the early stages of project scoping and baseline environmental study as potential venues for formal and informal public outreach events. Contact information was compiled to ensure these facilities and organizations were included on public involvement mailing lists. Area churches and neighborhood associations were contacted by phone, fax and e-mail prior to public meetings to invite participation and to ensure that their constituents were alerted to opportunities to provide input.

c. Formation and Recruitment to Advisory Group

An Advisory Group was established as a forum to solicit input as the project progressed on the various traffic and transportation, preliminary design and environmental studies. Members of the Advisory Group included persons residing or working in the area and individuals who work for the local government, organizations or agencies. (See Chapter V-A.4.) Efforts were made to recruit minority representatives, representatives from predominantly minority areas and other community associations to the group, resulting in membership by the Parkade neighborhood and elected officials who represented the neighborhoods along I-70. The eleven Advisory Group meetings were open to the public and promoted by news releases and e-mail. Advisory Group members were encouraged to notify their constituents and neighborhoods of public involvement opportunities.

d. Web Site, Telephone Hot Line, Newsletters, Public Open Houses and One-on-One Presentations

Other public involvement opportunities included a project Web site, 24-hour telephone hot line, three newsletters distributed to more than 1,100 residents, seven public open houses and at least 11 presentations to local civic and community groups to achieve greater and diverse public participation in the planning of the project. All participants were placed on a mailing list that was continually updated to ensure that informational and notification materials were properly distributed. The CATSO's neighborhood outreach specialist assisted the study team in spreading the word at neighborhood meetings about opportunities for involvement and a standing invitation to meet with anyone interested in knowing more about the effort.

e. Conducting Outreach through a Business Survey

A survey was conducted by telephone and by face-to-face interviews to gather information from area businesses on probable impacts and relocation strategies that might be necessary due to the proposed widening and rebuilding of I-70. After making nearly 1,400 phone calls to ensure the appropriate survey recipients, questionnaires were distributed to 235 businesses by fax, mail and personal interviews. A total of 116 businesses responded (see **Appendix III-A** for a complete methodology and findings).

5. Determination of Disproportionately High and Adverse Effects on Populations of Concern

Determining whether the recommended preferred alternative would have adverse impacts on minority or low-income populations or impacts disproportionately higher than those upon the general population requires (1) review of evidence in areas with high concentrations of minority

or low-income persons of previous environmental degradation or burdens caused by past major projects and (2) assessment of whether these affected populations of concern are disproportionately affected by highly significant project-generated adverse impacts.

The first consideration addresses projects and patterns caused in the past that may still be affecting communities largely inhabited by targeted populations of concern within the primary study area. One purpose of Executive Order 12898 is to assess the I-70 widening project in the context of a community's prior experiences with investments and siting decisions. Areas with predominantly minority and low-income populations are not to be the locations for locally unwanted land uses or to fail to receive an equitable share of beneficial investments and maintenance. At issue is whether past siting decisions and investment patterns of various agencies (including the state transportation agency) have led to a degraded environment in terms of human health, public safety and quality of life for places inhabited principally by populations of concern. This is central to understanding the local community context within which I-70 would be widened and to assessing cumulative effects.

The second consideration was to determine whether the recommended preferred alternative was purposely directed toward populations of concern because of factors such as lower property values or expectations that there might be less citizen opposition in those areas than in non-minority or non-low-income communities.

a. Prevailing Land Use Patterns and Siting Policies

Previous environmental degradation can arise from past projects or decisions that had major burdening impacts, or from an accumulation of land uses that caused adverse impacts. Post-war expansion of the University of Missouri was instrumental to the growth of Columbia in the 1950s and 1960s. The construction of I-70 itself in the early 1960s separated the city along a north/south divide and has had significant effects on land development patterns. The city's power plant, the COLT railroad and heavier industrial land uses in the vicinity of Paris and Providence roads, and along Route B are all located near I-70 within the primary study areas. Over the long term, I-70's historic impact on the city of Columbia and Boone County has been to foster linkages with commercial and industrial land uses in urbanized sections and at the periphery. The city's older residential housing stock was often found to be located near the interstate.

The interstate has attracted commercial, institutional and industrial uses to the benefit of Columbia's tax base, but the interstate's more intrusive qualities (e.g., truck traffic, noise, visual resources) have influenced housing choice for those who can afford it, leaving a less diverse and lower value inventory closer to the corridor in several areas. Several mobile home parks, including some of substandard physical condition, are dispersed along the I-70 corridor. Select residential settlement pockets near I-70 also exhibit a proportionately greater percentage of low-income and minority populations than elsewhere in Boone County or the city of Columbia. Along with an older housing stock, these predominantly urbanized sections are characterized by lower contract rents and lower owner-occupied housing stock values.

b. Comparative Evaluation of Adverse Project Impacts

The potential for an improved I-70 to adversely affect low-income and minority populations in the primary study area was compared to impacts likely to be experienced by all population groups in those areas. In analyzing the distribution of environmental/socio-economic impacts of the proposed project, several issues were considered: residential displacement due to right of

way and property acquisition, business displacement, community facilities and noise impacts. These represent the principal types of impacts expected to occur with a roadway widening project.

Residential Displacements

When comparing the recommended preferred alternative to the rest of the study area, residential displacements generally did not fall more heavily upon minorities or low-income populations. Using census block groups, minorities were estimated to comprise 18.2 percent of the total number of persons (439), which is proportionate to the city's minority share of 18.5 percent but slightly greater in comparison to the Boone County threshold of 14.5 percent. With respect to persons in poverty, the recommended preferred alternative would displace 13.9 percent of persons estimated to be in poverty, compared to the overall average rate of 19.2 percent impoverished Columbia residents and 14.5 percent of Boone County residents.

The recommended preferred alternative was preferable to other reasonable alternatives as fewer minority and low-income persons would likely be affected in absolute or relative terms. The shares of displaced persons in poverty (19.9 percent) and minority persons (16.8 percent) who would be affected would both be higher if other alternatives were pursued.

Seniors living in West Village Manor and the Terrace Retirement Community between exits 124 and 125 would likely be heavily affected under any of the alternatives and comprised the largest share of persons displaced. This senior citizen population includes minorities and persons on fixed/low incomes – a population that would require taking proactive measures to minimize adverse effects. Because of the unique nature of these acquisitions, the MoDOT acquisition and relocation process is being actively implemented, as early as possible, in order to minimize negative impacts. Activities to date include planning, meetings and coordination. The relocation program being implemented is discussed more thoroughly in Chapter III.B.3.a. Among the techniques currently under investigation include construction phasing, the availability of general assistance as well as the possibilities for specific assistance.

Business Displacements

Business survey interviews and field investigations did not offer evidence that the businesses' displacement burdens would be borne in greater severity or magnitude by minority owners or that the shops and industries affected predominantly catered to minority or low-income shoppers.

Community Facilities and Services

Low-income communities are served by OATS, the Probation and Parole Board and New Horizons facilities that would be affected directly by the recommended preferred alignment. These facilities and services are not exclusively targeted or solely intended for low-income persons. Adverse impacts can be avoided or minimized by relocating these functions and services to suitable sites near their current locations to continue to serve their respective populations and accomplish their missions.

Noise Impacts

While several areas near I-70 exhibit a noise-affected environment, neighborhoods most likely to experience an incremental increase in noise include the following:

- Fairway Meadows (Census Tract 16.01, Blocks 2034, 2035, 2044–2046),
- Parkade (Census Tract, Blocks 3012, 3018, 3019, 3023),
- White Gate (Census Tract 15.02, Blocks 1029, 1039, 1040, 3004, 3007), and
- Pine Grove Village Mobile Home Park (Census Tract 15.02, Blocks 2019–2021, 2023, 2024).

These communities exhibit higher proportions of low-income and minority populations than the city and county thresholds. To avoid adverse noise impacts, MoDOT would work with local communities to identify local preferences and preferred noise mitigation strategies (e.g., noise barriers) during the project's design phase (as warranted in accordance with the MoDOT Noise Policy).

The Missouri Department of Transportation is committed to taking the steps to ensure that neighborhoods along the project corridor adversely affected by noise generated by the widening improvements have an opportunity to express preferences regarding the potential construction of noise walls to minimize and mitigate noise impacts.

Cumulative Effects

Analysis of cumulative effects provides additional context for assessing the impacts of the recommended preferred alternative. This was possible by reviewing descriptions of key plans, private development projects, public investments and land use and annexation decisions. As the metropolitan region has grown, land development pressures in the outer region in unincorporated areas of Boone County have outpaced population and employment growth in the center. Like in other communities across the country, this has led to an auto-centered lifestyle, sprawl patterns of development and increasing concern by some citizens about the need to employ smart growth policies to manage growth. The study team analyzed projected spatial patterns of employment, travel time and population growth anticipated by CATSO, the region's transportation planning agency (see **Figures III-11 to III-14** in Chapter III.E – Secondary and Cumulative Impacts). The figures highlight the fact that employment growth in the city center is projected to flatten in favor of development near interchanges at I-70 (e.g., exits 121, 124, 133), corridor development north of I-70 (e.g., along MO-763, Highway B, Ballenger Lane and Highway PP) and areas south of Stadium Boulevard, such as Providence Road, Nifong Boulevard and U.S. 63.

In the absence of proactive measures to create a balanced affordable housing supply (e.g., price levels, rentals), this growth may exacerbate conditions for spatial mismatch between centers of employment growth and the traditional population areas that supply needed labor force for jobs. The trend is likely to present a growing set of challenges for Columbia Transit and other transportation planners to develop and finance route systems to ensure continued job access for transit-dependent populations (e.g., zero-car households) who would need to reverse-commute from residences in the city's core to businesses on the outer edges of the primary study area.

Residential and economic development in the outer regions also must be built to standards that ensure access for bicyclists, pedestrians and transit riders along with automobile users. As jobs grow outside the urbanized sections, low-income and minority communities would need to be able to access jobs opportunities and the services or resources vital to social advancement and

the maintenance of self and family. The quality and sustainability of *all* city and county neighborhoods depend on facilitating safe and reliable access to these opportunities (e.g., jobs, schools and higher educational institutions, hospitals, shopping, child care, social services, churches, etc.). Local communities must also be protected adequately by the more adverse effects created by transportation systems (e.g., excessive traffic volumes, noise, air quality).

In this growth context, residents of both urban and suburbanizing areas face the challenge of attracting the necessary resources to manage growth and minimize or mitigate its adverse effects. The growth trends have implications for the quality and sustainability of the built urban form, the vitality and quality of community life, the reliability of transit service and the opportunities available to existing low-income and minority communities. These trends suggest there is need for further coordination between transportation, economic development and housing decision-makers in the region over the prioritization of investments to avoid declining investments in the urban core, to preserve livability in urbanized areas and to promote socially balanced development patterns as the metropolitan region expands. Encouragement of all persons to participate fully and fairly in planning processes, such as transportation decision-making, is an important means for effectuating this essential balance.

With a generally higher concentration of minority and low-income residents in urban areas, yet with significantly more growth anticipated in the non-core areas of Boone County, residential communities remaining within the urbanized sections closest to the interstate can be expected to continue to absorb impacts (i.e., the physical barriers and noise-intrusiveness of the interstate corridor and high-traffic zones near approach roads and at interchange crossings) from an expanded I-70 as they have in the past. Although communities would not be significantly or newly isolated by the proposed widening and interchange improvements, they would lose some residences and some local and region-serving businesses and community institutions due to the I-70 project. As in the past, the impacts warrant mitigation commitments through design elements or redress through enhancements, collaborative planning and partnering initiatives (e.g., improved access management, land use and site planning, traffic calming, sidewalks and bikeways) with local county and city government.

The proposed I-70 widening project is not the cause for growth and development pressures already experienced in the region, and failure to improve I-70 is not an alternative that will markedly improve the quality of neighborhoods. The project is being designed to deliver offsetting benefits to the neighborhoods that have been burdened historically by the regional transportation system. The intent is to provide community enhancing investments to improve the livability and sustainability of the city's residential neighborhoods, to the extent possible.

In reviewing programs and priorities for future investments, the fundamental principles of environmental justice should be considered carefully, including the core tenet of equity inspired by Title VI of the Civil Rights Act of 1964—to prevent the denial of, reduction in or significant delay in the receipt of benefits by minority and low-income populations.

D. Environmental and Related Resources

Section of Independent Utility 4 falls along the irregular east-west boundary between two major physiographic provinces, defined by the extent of the most recent (Pleistocene) glaciation: the Dissected Till Plain Province (glaciated) to the north and east and the Ozark Highlands Province (unglaciated) to the south and west (MDNR Geological Survey). The topography along the corridor can generally be characterized as rolling, with medium and narrow ridges and moderate to steep valley side slopes. Elevations in the corridor range from approximately 580 feet (177 m) NGVD along the Perche Creek floodplain, west of Columbia, to about 890 feet (271 m) near the eastern project terminus. **Figure III-1** depicts the location of the project, as well as the general land forms that characterize the region. It also depicts the general extent of the project corridor or primary study area described within the affected environment sections of this text. The directly impacted areas associated with the reasonable alternatives are shown on the exhibits located at the end of this chapter.

1. Soil and Mineral Resources

a. Affected Environment

Mississippian and Pennsylvanian age limestone are the primary bedrock types across the county. In the eastern half of the project corridor, Pennsylvanian-aged shale, sandstone and coal, as much as 100 feet (30 m) thick overlie the limestone (NRCS Soil Survey, 2001). The corridor crosses no major geologic faults.

The limestone bedrock, particularly the highly permeable Mississippian age limestone beneath the western half of the project corridor, is prone to the development of sinkholes and caves, known as karst topography. Groundwater is particularly susceptible to contamination from the surface in those areas because the sinkholes provide direct connections to the groundwater. The irregular drainage patterns and topography at the western end of the project corridor are typical for such areas. The Missouri Department of Natural Resources (MDNR) has identified significant sinkhole areas in Boone County, including areas northwest of Columbia (Midway) and southwest of Columbia (Pierpont). Sinkholes have been identified by MDNR west of the SIU 4 project corridor near the MO-BB interchange, and there are significant sinkhole areas farther south. Additionally, losing streams, which also drain to groundwater through bedrock fissures, have been identified in the western end of the project corridor. These karst features are further discussed below under Section 3 – Groundwater and Water Supply. The limestone bedrock is valuable as an agricultural lime additive, as well as for construction uses. Two large active quarries are located about 0.5 mile (0.8 km) north of I-70 at Creasy Springs Road and Stadium Boulevard (Boone Quarry). A coal seam has been mined at a number of surface mines and deep mines within Boone and Callaway counties north and east of SIU 4. The coal surface mine nearest to the project is two to three miles (three to five km) north of I-70. There are a number of abandoned mines (coal and other minerals) north of I-70 between U.S. 63 and St. Charles Road interchanges, within and east of the Columbia city limits. Most of the abandoned mines are within the city limits, in an area undergoing urban and suburban development. They are being closed under an ongoing statewide program administered by the MDNR.

Variable thickness of ancient glacial till (gravel, sand, silt and clay) covers the bedrock. The uppermost layer in the project area is fine, windblown material known as loess. The thickness of

the loess and glacial till depends on topographic position (particularly steepness of slope) and the amount of historical erosion. Loess is the parent material for most soils in the area. As a result, most soils tend to be silty or clayey and range from well drained to poorly drained. On side slopes, the loess is thin or nonexistent. Soils on the slopes developed more from the underlying glacial till material or the limestone bedrock and tend to be better drained. In the floodplain areas along the streams, the main parent material is material deposited by overbank flooding, known as alluvium. The soils can be very poorly to well drained, depending on the frequency of flooding and the seasonal high water table.

The most abundant soil types in the study area are the moderately well-drained Weller, Keswick and Winfield soils (see **Table III-31**). Together, they comprise one-third of the soils in the project corridor. The somewhat poorly drained Freeburg soils, well-drained Haymond soils and moderately well-drained Wilbur soils derived in alluvial (floodplain) deposits are prominent along stream valleys. Soils prone to erosion include Hatton, Keswick, Leonard, Menfro, Mexico, Weller and Winfield soils, which cover more than 70 percent of the project corridor.

Much of the corridor is mapped as urban land complexes, meaning the soils have been altered by land development. Urban land complexes are probably more extensive than the map indicates because more land has been developed since the soils were mapped.

b. Environmental Consequences

The No-Build Alternative would have minimal effect on the soil and mineral resources in the study corridor. Bridge and pavement rehabilitation and replacement activities may require excavation, however, this work would largely occur in areas previously disturbed by highway construction. A No-Build Alternative would have no impact to agricultural lands, assuming that all future maintenance would be performed within the existing right of way .

All reasonable alternatives would require excavation of earth to create a safe roadway geometry. To the extent possible, earth excavated in one area would be relocated as fill material to another part of the project. This effort would minimize the cost of hauling and disposal of excess material or borrowing fill material from another site. Therefore, most earth materials would originate and remain within the project area. The reasonable alternatives may require permanent removal of some soil resources from the project corridor. If excavated material cannot be used on the new roadway slopes, an upland disposal area or temporary stockpile site would be required. Typically, excess soil and rock can be used nearby for other projects. Conversely, some additional materials may need to be imported to the site. These materials would be obtained from local quarries or from new or existing borrow sites. Borrow sites are usually negotiated just before construction by the contractor and individual landowners near the fill site. At this early stage of planning, the areas or amounts of fill material needed from offsite cannot be estimated.

c. Measures to Minimize Harm

Most of the soils along the project corridor erode easily. Removing vegetation and topsoil during initial clearing, grubbing and grading activities presents the potential for erosion. Areas adjacent to the creeks, streams, wetlands and sinkholes crossed by the reasonable alternatives would have the greatest potential for adverse water quality impacts. Drainage ditch construction also provides a source of sedimentation to adjacent waterways.

Table III-31: Summary of Soil Types in the Project Corridor

Soil Unit Name	Drainage Class ^a	Parent Material	Landscape Position	Proportion of Project Corridor	Importance ^b
Urban Land Complexes (Keswick, Mexico, Harvester and Weller)	MWD-SPD	Loess over till	Developed areas	28%	—
Weller Silt Loam	MWD	Loess	Benches of ridges on uplands	4%	PF
			Shoulders of ridges on uplands	10%	SW
Keswick Silt Loam	MWD	Loess over clayey till	Backslopes of hills on uplands	10%	SW
Winfield Silt Loam	MWD	Fine silty loess	Shoulders of hills on uplands	9%	SW
			Steep backslopes of hills on uplands	1%	—
Leonard Silt Loam	PD	Fine silty loess over till	Shoulders of ridges on uplands	5%	PF
Mexico Silt Loam	SPD	Loess over sediment	Ridgetops on uplands	5%	PF
Rocheport-Bonnefemme Complex	MWD	Fine silty loess and/or clayey residuum derived from limestone	Steep backslopes of hills on uplands	5%	—
Bardley-Clinkenbeard Complex, very stony	WD	Colluvium over clayey residuum derived from cherty limestone	Steep backslopes of hills on uplands	4%	—
Haymond Silt Loam, frequently flooded	WD	Alluvium	Floodplains in river valleys	3%	PF ^c
Vanmeter Clay Loam	MWD	Residuum derived from clayey shale	Backslopes of hills on uplands	3%	—
Freeburg Silt Loam	SPD	Alluvium	Stream terraces in river valleys	2%	PF
Menfro Silt Loam	WD	Fine silty loess	Shoulders or backslopes of hills on uplands	2%	SW

Table III-31: Summary of Soil Types in the Project Corridor

Soil Unit Name	Drainage Class ^a	Parent Material	Landscape Position	Proportion of Project Corridor	Importance ^b
Wilbur Silt Loam, frequently flooded	MWD	Coarse loamy alluvium	Floodplains in river valleys	2%	PF ^c
Auxvasse Silt Loam, rarely flooded	SPD	Alluvium	Stream terraces in river valleys	1%	PF
Darwin Silty Clay Loam, occasionally flooded	VPD	Clayey alluvium	Floodplains in river valleys	1%	PF ^d
Hatton Silt Loam	MWD	Loess over fine silty sediment	Shoulders of hills on uplands	1%	PF
Marion Silt Loam	SPD	Clayey loess	Summits of ridges on uplands	1%	PF
Moniteau Silt Loam, occasionally flooded	PD	Fine-silty alluvium	Floodplain steps in river valleys	1%	PF ^d
Perche Loam, frequently flooded	MWD	Coarse loamy alluvium	Floodplains in river valleys	1%	PF ^c
Winnegan Loam	MWD	Clayey till	Steep backslopes of hills on uplands	1%	—

^{a.} *WD = well drained; MWD = moderately well drained; SPD = somewhat poorly drained; PD = poorly drained; VPD = very poorly drained.*

^{b.} *Importance: PF = prime farmland, SW = soil of statewide importance.*

^{c.} *Prime farmland where protected from flooding or not frequently flooded during the growing season.*

^{d.} *Prime farmland where drained.*

Source: U.S. Department of Agriculture, Boone County NRCS

During and following construction, proper sediment and erosion control measures would be implemented to control the loss of soil to erosion, in accordance with MoDOT *Standard Specification Book for Highway Construction*. Topsoil would be stockpiled away from surface waters, protected from erosion and replaced in areas temporarily disturbed for construction. Permanent vegetative cover would be reestablished in all temporarily disturbed areas following construction.

2. Farmland Resources

a. Affected Environment

Based on soil characteristics, the NRCS has classified about 41 percent of the land in Boone County as prime farmland. Prime farmland is land best suited to food, feed, forage, fiber and oilseed crop and is available for these uses. It could be cultivated land, pastureland, forestland or other land, but it is not urban or built-up land or water areas. Prime farmland produces the

highest yield with minimal expenditure of energy or economic resources, and farming it results in the least damage to the environment. About one-third of the I-70 project corridor (SIU 4) is considered prime farmland. Another third is considered farmland of statewide importance (see **Table III-32**), which includes lands not considered prime due to slope, drainage or flooding, but that produce high yields of crops when treated and managed according to modern farming methods. Some farmland of statewide importance may produce as high a yield as prime farmland, if conditions are favorable. **Exhibit III-5** depicts the distribution of prime farmland and farmland of statewide importance.

Suitable soils and landform have made active agriculture the main land use in Boone County, occupying about 53 percent of the total area of the county. Roughly 30 percent of the county land area is used for row crops and hay, and 23 percent is used for livestock pasture. The average farm size in the county is 204 acres. Soybean is the most extensively grown row crop in the county, followed by wheat, corn and grain sorghum. Other row crops include tobacco, canola, popcorn and sunflowers. Boone County ranks in the 50th to 70th percentile of Missouri counties for most agricultural commodities. Agricultural lands in the county that are unsuitable for row crops are generally dedicated to livestock pasture/hay production. The annual income from active row cropland ranges from about \$140 per acre for hay to about \$300 per acre for corn. According to the Missouri Department of Agriculture (MDA), total cash receipts in Boone County for agricultural products were \$40 million in 1997 and \$31 million in 2001. Recent declines in agricultural land use have resulted from continuing urban and suburban development.

According to data provided by the Boone County tax assessor, there are 80 farms (as defined by ownership) along the project corridor, ranging in size from less than one acre to 224 acres. Although the average size is 42 acres, more than half are less than 20 acres.

About 40 percent of the cropland and 50 percent of the pastureland in the county is under some form of soil conservation management, such as the Conservation Reserve Program (CRP). The program encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as native grasses, wildlife plantings, trees, filter strips or riparian buffers. This action stabilizes the soil against erosion, and thereby reduces sedimentation in streams and lakes, improves water quality, establishes wildlife habitat and enhances forest and wetland resources. Farmers receive an annual rental payment for the term of the multiyear contract (negotiated for each landowner but typically ranges from \$50 to \$75 per acre per year) and cost sharing is provided to establish the vegetative cover practices. A similar program is the Wetland Reserve Program (WRP), which encourages farmers to avoid impacts to wetlands and to allow farmed wetlands to revegetate naturally. Portions of three properties within the project corridor are dedicated to the CRP (**Exhibits III-4A through III-4J**): one south of I-70 along the Perche Creek floodplain, the other two are along the north side of I-70 east of MO-J/O interchange. There are no WRP sites in the project corridor.

b. Environmental Consequences

As the project consists primarily of widening of the existing right of way, the impact would mostly be along the edges of the farms that border I-70.

In accordance with the Farmland Protection Policy Act (FPPA), the impact of a federally funded project is coordinated with the NRCS to determine whether agricultural resources and support services are significantly affected. A Farmland Conversion Impact Rating Form was completed in

cooperation with the NRCS (**Appendix III-D**). This analysis of farmland impacts focuses on the portion of the land that is prime farmland or farmland of statewide importance (based on the mapped soil types), the area of potential farmland affected compared to the total area of farmland in the county and the value of the affected lands relative to farmlands in the county as a whole. Impacts are rated on a scale of zero to 260. The impact rating was performed for a footprint that includes the area of all reasonable alternatives, with no exclusion of existing highway right of way; that is, a worst-case scenario. For projects receiving a total score of less than 160, the impact is considered minimal and no additional alternatives need to be evaluated. The project footprint received a rating of 106, indicating that regardless of the interchange designs selected, the reasonable alternatives would not cause substantial impacts to farmland.

The impacts of the reasonable alternatives can be compared using two measures. First, the area of prime farmland and farmland of statewide importance (based on mapped soil types) can be measured, excluding existing right of way. The range of impacts among the reasonable alternatives varies only slightly, with total impacts ranging from 125 to 150 acres of prime farmland soils and from 113 to 139 acres of farmland of statewide importance. The recommended preferred alternative is at the low end of the range, affecting 140 acres of prime farmland and 113 acres of statewide important farmland.

A second way of quantifying farmland impacts is to compare the area assessed as farm by the county tax assessor. Again, the impact varies only slightly among the reasonable alternatives, ranging from 170 to 199 acres. The greatest impact to farms would be near the MO-J/O and MO-Z interchanges. The total area of farms affected by the recommended preferred alternative would be about 174 acres from over 80 different farms (based on ownership). The average impact would be about two acres per farm, although half the farms along the project corridor would lose less than one acre. About 10 farms would lose between five and 19 acres each. Using corn as the index crop (at about \$300 per acre), the potential loss of productivity per farm would range from less than \$300 a year to as much as \$5,700 a year, the average being about \$600. Again, the recommended preferred alternative tended to minimize farmland impacts. The U.S. 40 Diamond with Southwest Loop Ramp interchange, the Stadium split diamond interchange and the modified diamond interchange at St. Charles Road would affect more farmland than the corresponding reasonable alternatives in the recommended preferred alternative.

Table III-32: Farmlands Impacts

Subsections	Reasonable Alternative	Prime Farmland Soils (ac)	Statewide Important Farmland Soils (ac)	Properties Assessed as Farms (ac)
MO-J/O Interchange: Mile Markers 115 to 120	1. Diamond*	5	63	60
U.S. 40 Interchange: Mile Markers 120 to 124	1. Enhanced Diamond*	34	22	23
	2. Diamond, SW Loop Ramp	42	35	39
Stadium Interchange: Mile Marker 124 to Mile Marker 125	1. Northern Loop	5	5	14
	2. Tight Diamond Interchange*	5	5	13
	3. Single Point Urban Interchange	5	5	13
	4. Split Diamond Interchange	5	7	16
Business Loop (West): Mile Marker 125 to 126	1. Two-Point Interchange*	0	0	0
MO-163, MO-763 and Business Loop (East): Mile Marker 126 to Mile Marker 128	1. One-Way Frontage Road System*	0	0	11
	2. Collector/Distributor System	0	0	11
U.S. 63 Interchange: Mile Marker 128 to Mile Marker 130	1. Tight Right of Way Interchange*	5	2	3
St. Charles Interchange: Mile Marker 130 to Mile Marker 132	1. Diamond Interchange*	10	13	15
	2. Off-Set Diamond Interchange	12	24	21
MO-Z Interchange: Mile Marker 132 to Mile Marker 133	1. Diamond Interchange*	81	8	50
	2. Diamond with NW Loop Ramp	66	8	46
Total Impact – Recommended Preferred Alternative		140	113	174
<i>*Included in the recommended preferred alternative</i>				

Only one of the three CRP properties in the project corridor would be affected by the reasonable alternatives. All reasonable alternatives include extending I-70 Drive SW across Perche Creek, unavoidably taking a small portion of the CRP parcel in the Perche Creek floodplain. The taking of this small parcel (0.2 acre) would affect the small rental amount paid to the farmer for its preservation. The right of way would not be expanded to the north east of the MO-J/O interchange, so that the other CRP properties would not be affected.

All reasonable alternatives would affect the Bourne Feed and Supply Company, on I-70 Drive SE between U.S. 63 and St. Charles Road. The project would take several structures and part

of the property. The Missouri Pork Producers headquarters near U.S. 40 interchange would not be taken by the recommended preferred alternative but would be by the SW loop alternative.

c. Measures to Minimize Harm

Conversion of farmland cannot be avoided but can be minimized. An Interagency Cooperative Agreement has been accepted by FHWA, MoDOT, Farm Service Agency (FSA) and NRCS regarding agricultural lands impacts from the Improve I-70 project (**Appendix III-D**). Under this agreement, the impacts to farmlands and CRP properties would continue to be coordinated between the agencies. During final design, MoDOT would consider options to reduce new right of way required from farm properties while meeting engineering design standards. Existing agricultural field access from cross roads or service roads would be maintained, although modifications to field entrance locations may be needed to improve safety. Existing field drainage systems would be inventoried and would be maintained and incorporated in the drainage design of the roadway.

3. Groundwater and Water Supply

a. Affected Environment

Aquifers

Groundwater is important as a drinking water supply throughout Boone County. It is also important to maintaining flow in perennial streams, by way of springs.

The most important water supply aquifer in the project area is the Ozark Aquifer, also known as Cambrian-Ordovician Aquifer. The Ozark Aquifer comprises water held in sandstone and dolomite rock formations in the Eminence, Chouteau, Gunter, Roubidoux and Potosi groups. The Ozark Aquifer is about 1,300 feet (400 m) thick near Columbia and is encountered 150 to 400 feet (50 to 120 m) below ground. The aquifer contains ancient water and is not dependent on short-term surface recharge. Glacial drift, Pennsylvanian, Mississippian and Devonian-aged strata overly the Ozark aquifer in this area and may produce small amounts of water to private wells.

The regional groundwater gradient generally dips to the south and west toward the Missouri River. About three-quarters of the water that reaches the major rivers in Missouri's karstlands, including Boone County, has passed through groundwater systems for some distance.

Public Water Sources

There are no surface water drinking sources near the SIU 4 project area, and the project area is not within the drainage basin of any public drinking water surface impoundment or river intake.

Groundwater is the primary drinking water source in the project area. The City of Columbia originally used groundwater from deep bedrock wells located throughout the metropolitan area to supply customers with potable water. Declining water levels and limited expansion sites led the City to install a shallow alluvial wellfield in the McBaine Bottom in 1972. The alluvial wellfield and McBaine water treatment plant are located about six miles (10 km) south of the I-70 project corridor at the McBaine Bottom along the Missouri River.

There are 11 other public water supply wells located within one mile (1.6 km) of the I-70 corridor. **Table III-33** describes the public water supply wells; **Exhibit III-5** shows the locations of the wells.

Five of these wells are former supply wells for the City of Columbia. None are presently in service but are reserved for emergency use. These wells were last used in 1999. The City has converted one well (outside the corridor study area) to an Aquifer Storage and Recovery (ASR) well, which is recharged with water from McBaine during the winter and pumped out to meet peak demands. Based on the success of this first well, Columbia may decide to convert their other wells to ASR in coming years.

Two wells maintained by Boone County Public Water Supply are located just west of the MO-Z interchange. The Airpark well located near MO-Z south of I-70, is active, but the Sunrise well roughly one mile (1.6 km) west of MO-Z is inactive.

Table III-33: Public Water Source Wells within One Mile of the Project Corridor

MDNR Well ID	Public Water Supply System Name	Local Well Name	Drill Date	Yield (gpm)	Last Update	Status
40356	Blackfoot Estates Subdivision	—	1962	N/A	07/01/97	Inactive
28438	Boone Co. Public Water Supply District #9	Airpark Well	1981	175	11/05/98	Active
25051	Boone Co. Public Water Supply District #9	Sunrise Well	N/A	N/A	10/29/97	Inactive
45854	Columbia City	Old Well #1, Power Plant	N/A	750	11/02/98	Emergency
45856	Columbia City	Old Well #5, Mexico Gravel	N/A	750	11/02/98	Emergency
45857	Columbia City	Ash St. At Reservoir	1957	910	11/02/98	Emergency
46123	Columbia City	Old Well #4, Bowling St.	N/A	750	11/02/98	Emergency
45855	Columbia City	Old Well #6, East Blvd.	1954	750	1976 (abandoned)	Emergency
25258	Stonegate Mobile Home Park	Well #1	1967	165	10/05/99	Active
40362	Gyger Mobile Home Park	Well #1	1974	27	10/13/99	Active
46343	Les Bourgeois Bistro	Irrigation Well	N/A	N/A	10/14/99	Inactive

Source: Missouri Spatial Data Information Service (MSDIS), <http://msdis.missouri.edu>

The four other wells are privately owned. Two of the wells are active and supply mobile home parks: the Stonegate Mobile Home Park, north of I-70 about one mile (1.6 km) east of U.S. 63 and the Gyger Mobile Home Park, at the western project terminus along MO-BB roughly 0.25 mile (0.4 km) south of I-70. One well at the Blackfoot Estates subdivision, about one mile

(1.6 km) north of the Stadium Boulevard interchange is inactive, as is the irrigation well at the Les Bourgeois Bistro about one mile (1.6 km) west of the western project terminus.

In general, the wells extend to depths of 500 to 700 feet (150 to 215 m), with static water levels ranging from 260 to 400 feet (80 to 120 m) below ground. The water in the wells is primarily from the deep regional Ozark aquifer.

Wellhead Protection

Wellhead protection is accomplished under the Missouri Code of State Regulations Title 10 Chapter 23, which establishes regulations for the construction of all wells, including water, oil, gas, injection and any other wells. There are no state regulations that limit land use within any of the watershed areas in the project area. There are no wellhead protection laws that would preclude construction of additional lanes on the existing alignment. The U.S. Environmental Protection Agency (USEPA) has designated no Sole Source Aquifers in Missouri.

Because of the possibility for infiltration of surface waters directly into the aquifers through sinkholes and losing streams in areas of karst topography, groundwater contamination is always a concern. The Missouri Environmental Geology Atlas (MEGA) database (maintained by the MDNR) shows two losing streams at the western end of the project corridor, namely Sinking Creek and Bell Branch. Additionally, all of the tributaries that drain the project area west of MO-J/O interchange drain to one or the other of these losing streams. The MDNR has also identified several significant sinkhole areas in Boone County that may be particularly susceptible to groundwater contamination through infiltration, notably the Pierpont area southwest of Columbia, the Midway area northwest of Columbia and the Rocheport area along the Missouri River. The nearest sinkholes identified in MEGA in the project area are located south of I-70 approximately 0.5 mile west of the western project terminus, near the MO-BB interchange. There are no known sinkholes within the footprint of the reasonable alternatives.

b. Environmental Consequences

A No-Build Alternative would not affect groundwater or drinking water supply.

None of the reasonable alternatives are expected to affect drinking water supplies adversely. Water supply in the Columbia area is primarily from groundwater wells within the main wellfield some six miles (10 km) south of the project corridor along the Missouri River. The project would not affect the wells or their recharge areas.

None of the reasonable alternatives would encroach directly upon the wells in the project area. The closest impact to a public water supply well would be improvements to MO-Z south of I-70, which may approach within 20 feet (six meters) of the PWSD #9 Airpark well. Two of the city's emergency wells, Old Well 4 and Old Well 6, are within 100 feet (30 m) of the project footprint. These and other public wells access a deep regional aquifer that is not dependent on a localized recharge area. The addition of impervious surface for the expansion of the highway would not affect the recharge of the wells.

There are only a few limited karst features that are known to exist within the footprint of the reasonable alternatives, namely two losing streams. Infiltration of contaminants into these losing streams could impact the water quality in caves, springs and shallow groundwater in this area. However, the redevelopment of the highway along the existing alignment is expected to have minimal impact on the conditions of these waters.

c. Measures to Minimize Harm

Implementation of best management practices to protect surface waters would reduce the risk of contamination of groundwater resources through losing streams or sinkholes. These measures include sediment and erosion control, spill protection during construction and long-term stormwater runoff treatment measures. These practices are discussed in greater detail below in Section 5, Water Quality.

Through the design and construction of the project, the discovery of additional sinkholes or losing streams should be brought to the attention of the design team, to ensure that appropriate design solutions are implemented for all karst features.

4. Surface Water Resources

a. Affected Environment

The project area is located in the Lower Missouri-Moreau Basin (the USGS eight-digit hydrologic unit 10300102). The Lower Missouri-Moreau Basin covers 3,400 square miles (8,806 square km) and includes 273 stream miles (440 km), 3,176 stream acres (1,285 hectares) and 3,175 lake acres (1,285 hectares) within Boone County.

The SIU 4 project corridor drains to four watersheds within the Lower Missouri-Moreau Basin (from west to east): the Montineau Creek Watershed, which includes Montineau Creek and other small tributaries to the Missouri River, the Perche Creek Watershed, the Hinkson Creek Watershed and the Cedar Creek Watershed. The Perche Creek and Hinkson Creek watersheds drain about 85 percent of the project corridor. The western 2.5 miles (four km) of the project corridor drains to Sinking Creek and to Bell Branch, directly to the Missouri River. The extreme eastern end of the project corridor drains to Cedar Creek by way of small tributaries to Little Cedar Creek.

The project corridor is crossed by a number of north and south flowing streams. **Table III-34** summarizes and characterizes the major (perennial and intermittent) streams and creeks crossing the I-70 corridor. All jurisdictional waters are depicted on **Exhibits III-4A through III-4J**.

The largest stream in the corridor is Perche Creek, a fifth order stream.¹⁰ Perche Creek is classified as a P stream according to the state's Water Quality Regulation (10 CSR 20-7); that is, a stream that maintains permanent flow during droughts. The Perche Creek watershed includes parts of Randolph, Howard and Boone counties. Agricultural land makes up about 35 percent of the watershed area, forest about 55 percent and urban uses the remaining 10 percent.

The next largest stream is Hinkson Creek, a third order stream. It is classified as a C stream; that is, it ceases flow during droughts but maintains permanent pools. Hinkson Creek drains a watershed of roughly 90 square miles (230 square km) contained entirely in Boone County, the

¹⁰ Stream order generally indicates the size of a stream and it is determined through the use of the USGS topographic maps. Beginning at the upper reaches of a watershed, the first headwater stream shown is considered a first order stream. Thereafter, order is sequentially increased when two streams of the same size flow together (for example, two first order streams joining equals a second order stream, two second order streams joining equals a third order stream, etc.). Stream orders range from one through six for permanent, wadeable Missouri streams, with orders three through five being most common (Missouri DNR *Stream Habitat Assessment Procedure*, 2000).

lower one-third within the Columbia city limits. Perche and Hinkson creeks are both identified as Riverine-Lower Perennial-Unconsolidated Shore (R2US) on the U.S. Fish and Wildlife Service's (USFWS) National Wetland Inventory maps.

Sugar Branch, a second order tributary to Perche Creek, drains 7.5 square miles (19 square km) of primarily agricultural area. Other second order streams in the project corridor are Harmony Creek, Henderson Branch and North Fork Grindstone Creek. Harmony Creek and Henderson Branch are both tributaries to Perche Creek. Harmony Creek drains 3.9 square miles (10 square km), mostly in the city limits. Henderson Branch drains two square miles (five square km) of largely agricultural area. North Fork Grindstone Creek is a tributary to Hinkson Creek and drains 6.5 square miles (17 square km) of primarily agricultural land east of Columbia. Sugar Branch is listed as a C stream up to I-70, but none of the other streams is classified in the state Water Quality Regulations. None of the streams is identified on the National Wetland Inventory maps but would be considered either Riverine-Upper Perennial (R3) or Intermittent (R4) streams under the USFWS classification.

Finally, there are numerous small, ephemeral tributaries within the project area. Those streams generally flow only during wet seasons and during intense rain storms in drier seasons. Nevertheless, they are considered waters of the United States, if there is a discernible ordinary high water mark present, and are regulated under the Clean Water Act (CWA). The locations of the ephemeral streams have been established by field studies. **Exhibits III-4A through III-4J** depict all the ephemeral streams and jurisdictional roadside ditches.¹¹

The Missouri Department of Conservation has not conducted any biological assessments in the watersheds that include the project corridor, and none are planned for the near future. The Missouri Fish and Wildlife Information System lists nongame fish known from Boone County streams to include shiners, minnows, darters, madtom, shad, stonerollers and chubs. Game fish include largemouth, smallmouth, spotted, striped and white bass, sunfish, black and white crappie, bullheads, carp and suckers.

Fisheries in the streams along the corridor generally depend on the amount of flow available at any time during the year. Perennial streams within the study area may provide habitat for fish and aquatic macroinvertebrates, such as crayfish, stoneflies, damselflies and mayflies. The value of the streams in the study area as fisheries is mostly as headwaters suitable for spawning and nursery areas.

¹¹ Roadside drainage ditches are typically not regulated, unless they are realignments of natural stream channels (Department of the Army, Corps of Engineers, 1999, *Army Corps of Engineers Standard Operating Procedures for the Regulatory Program*).

Table III-34: Streams in the Project Corridor

Stream Name	State Classification*	Classification per USGS	Stream Order	Crossing Location
Moniteau Creek and Small Tributaries to Missouri River				
Tributaries to Bell Branch (2)	—	Intermittent	1	Near western project terminus
Sinking Creek	—	Intermittent	1	West of MO-J/O
Tributaries to Sinking Creek (2)	—	Intermittent	1	West of MO-J/O
Perche Creek				
Perche Creek	P	Perennial	5	East of U.S. 40
Sugar Branch	C	Perennial	2	Between U.S. 40 and MO-J/O
Tributaries to Sugar Branch (4)	—	Intermittent	1	Between U.S. 40 and MO-J/O
Henderson Branch	—	Intermittent	2	Near the U.S. 40 interchange
Tributaries to Henderson Branch (2)	—	Intermittent	1	Near the U.S. 40 interchange
Harmony Creek	—	Perennial	2	Between Stadium Boulevard and Perche Creek
Tributaries to Harmony Creek (2)	—	Intermittent	1	Between Stadium Boulevard and Perche Creek
Tributaries to Bear Creek (2)	—	Intermittent	1	West of Business Loop 70 West interchange and east of MO-763 (Range Line Road)
Hinkson Creek				
Hinkson Creek	C	Perennial	3	West of U.S. 63
Tributaries to Hinkson Creek (2)	—	Intermittent	1	North and south of U.S. 63 interchange
Hominy Branch	—	Perennial	2	West of St. Charles Road
Tributary to Hominy Branch	—	Intermittent	1	West of St. Charles Road
North Fork Grindstone Creek	—	Perennial	2	Between MO-Z and St. Charles Road
Tributary to North Fork Grindstone Creek	—	Intermittent	1	North of MO-Z interchange
*State Classification according to 10 CSR 20-7.031: Class P streams maintain permanent flow even in drought periods. Class C streams may cease flow in dry periods but maintain permanent pools, which support aquatic life.				

While Perche Creek, the largest stream in the corridor, is classified as a permanent stream, about every 10 years it is subject to a week-long period where it has no flow (seven-day Q10 low flow equals 0). This fact likely limits the diversity of fish, particularly larger game species, and possibly other aquatic biota that inhabit the stream, although larger pools in Perche Creek might support game fish, such as bullheads, during drought periods.

The presence of many permitted wastewater discharges throughout the Columbia area likely diminishes the suitability of streams for this purpose as well. Hinkson Creek was listed on the 1998 303(d) list because of urban nonpoint lagoon runoff, suggesting limited fish habitat in this stream. Hinkson Creek was also nominated (but not approved) for the 2002 list.

As a result of their sizes and sources of degradation, angling is not widespread on the streams in the study area. The primary sport fisheries in the project area are the ponds and lakes at city parks (Cosmo Recreation Area, Lake of the Woods Recreation Area, Cosmo-Bethel Park and Twin Lakes Recreation Area) that are stocked by the MDC.

A model of watershed sensitivity to development pressure was created by the Center for Agricultural, Resource and Environmental Systems (CARES) at the University of Missouri for a number of watersheds in central Boone County. The model is an attempt to prioritize areas that require more intensive developmental controls and provides an overall barometer of the conditions of the watersheds. The model relates the topography, geology, soils, land use, use designations of the streams, floodplain area, vegetation, area of wetlands, presence of endangered species and stream length in the watershed into a numerical score of the environmental sensitivity of the watershed. According to the model, Harmony Creek and Hominy Branch are of low sensitivity, while Hinkson and Grindstone creeks are of moderate sensitivity. The Perche Creek watershed and others to the west have not yet been evaluated with the model.

b. Environmental Consequences

All crossings of regulated waters, including all streams and connected ponds and wetlands, require permission from the Army Corps of Engineers (USACE) under Section 404 and the MDNR under Section 401 of the CWA. The impacts to all regulated waters for the project would likely be considered as a whole under a single Individual Section 404 permit and Section 401 water quality certification. Section 404 permits and Section 401 certifications typically require analysis of alternatives to avoid impacts to streams and wetlands, measures to minimize impacts and then mitigation for unavoidable wetland and stream impacts.

Understanding the purpose and need for a project, evaluating alternatives to minimize environmental impacts and weighing the benefits against the impacts of the project under the CWA by the USACE and MDNR is comparable to the MoDOT and FHWA's planning process under NEPA. Therefore, these agencies have been pursuing a policy of merging the highway NEPA review and compliance with Section 404 of the CWA (NEPA/Section 404 merger) in order to improve the efficiency of review of these projects.

Key to merging the review is the coordination between the MoDOT and FHWA with the USACE and MDNR at several concurrence points. In this way, the full rationale of the decisions by the Department of Transportation and FHWA can be shared with the regulators as the decisions are made, reducing the potential for having to revisit critical planning decisions at a later time. Also, the requirements for project review under the Section 404(b)(1) guidelines can be considered at each step. Concurrence is usually sought for the purpose and need of the project, and the range

of alternatives; identification of feasible alternatives; and identification of the preferred alternative. The USACE and MDNR have already been involved in the project review through the First Tier EIS. As a continuation of the process, the USACE and MDNR will receive a copy of this DEIS for review and comment. The USACE, FHWA and MoDOT will hold a joint public hearing for the recommended preferred alternative. The agencies would also receive a copy of the FEIS with the selected alternative. Ultimately, the application for the Section 404 permit and Section 401 water quality certification will be submitted for the project along with the Final EIS.

A No-Build Alternative would have minimal impact on the stream habitats in the project corridor. Impacts may occur during bridge or culvert repair and replacement. The area of impact of this normal maintenance would be restricted to the right of way in the area of the stream that was affected during original construction. The impact area would recover to a similar condition within a few years.

All reasonable alternatives would require an expanded right of way, stream fills and additional crossings of streams. Impacts to streams among all alternatives range from about 24,000 to 27,000 linear feet (7,315 to 8,230 m), including the lengths of streams crossed by bridges but excluding the 9,000 feet (2,740 m) of existing culverts (see **Table III-35**). The total length of streams affected by the recommended preferred alternative would be at the low end of this range, about 24,200 linear feet (7,380 m).

About 5,500 feet (1680 m) of perennial and larger intermittent streams would be affected by the project, regardless of the selected alternative. Total impact to the smaller streams would range from about 17,000 to 20,200 linear feet (5,180 to 6,160 m). The recommended preferred alternative would affect about 17,500 linear feet (5,330 m) of smaller intermittent and ephemeral streams.

The bridges over Perche Creek would be widened and relocated. Two new bridges would cross Perche Creek to develop continuous frontage roads north and south of I-70. Each would be parallel to and within 100 feet (30 m) of the I-70 bridges, making the entire length of Perche Creek within the construction area less than 500 feet (150 m). The new or widened bridges would not require piers in the streams but may have piers and some fill material in the stream's floodplain. Riparian vegetation would be removed along the stream banks in the area of the new bridges and bank stabilization would be necessary to secure the bridge abutments against high water erosion.

Hinkson Creek is crossed by five bridges in the U.S. 63 interchange area: two along mainline I-70, one along Clark Lane and two along U.S. 63. The project would widen and relocate the existing Clark Lane and I-70 bridges and add three new bridges: two for new interchange ramps and one to extend Business Loop 70 as a continuous frontage road. In total, the length of the stream within the footprint is 1,100 feet (335 m). Assuming the U.S. 63 bridges would remain intact, only about 750 feet (230 m) of the stream would be within the new bridge construction limits, most of which is within existing right of way.

Bridges at Hominy Branch and North Fork Grindstone Creek would be widened or replaced, affecting about 500 feet (150 m) of each stream.

Bridges across these major streams would have relatively little direct impact. Except for possible temporary impacts during construction, these stream habitats would remain essentially intact.

Culvert extensions, relocated culverts and additional culvert crossings would be required along Sinking Creek, Sugar Branch, Harmony Creek and all unnamed intermittent and ephemeral

streams with any alternative. Impacts of new or extended crossings would include installation/extension of culverts, concrete headwalls/aprons and stone stabilization at outlets of the culverts. Some streams that run parallel to the highway (other than roadside drainage ditches) or frontage roads may require relocation. Notably, several hundred feet of Sugar Branch and Harmony Creek would likely be relocated to correct substandard curvature in the southern frontage road with any alternative.

The extension and installation of culverts would reduce the aquatic habitats somewhat, but the impacts to the stream habitats generally would be minor and short-lived. Impacts to aquatic species include the temporary reduction of some populations, particularly of less mobile and more sensitive species, such as some invertebrate populations. The upstream and downstream reaches of each stream would provide refuge for mobile aquatic species during construction. Given that these alterations would be localized, they would not result in a permanent change in the diversity of the stream system. Stream relocations would be more disruptive, but the area of permanent open surface water would generally be replaced in the new channel.

The primary difference between alternatives is the lengths of smaller intermittent and ephemeral streams that would be affected, especially at the U.S. 40 and Stadium Boulevard interchanges.

Table III-35: Stream Impacts

Subsections	Reasonable Alternatives	Streams		
		# of Crossings	Linear Feet Bridged	Linear Feet Culverted**
MO-J/O Interchange: Mile Markers 115 to 120	1. <i>Diamond*</i>	18	0	4,200
U.S. 40 Interchange: Mile Markers 120 to 124	1. <i>Enhanced Diamond*</i>	17	500	4,900
	2. Diamond, SW Loop Ramp	17	500	5,400
Stadium Interchange: Mile Marker 124 to Mile Marker 125	1. Northern Loop	9	0	2,600
	2. <i>Tight Diamond Interchange*</i>	7	0	2,000
	3. Single Point Urban Interchange	7	0	2,000
	4. Split Diamond Interchange	10	0	3,200
Business Loop (West): Mile Marker 125 to 126	1. <i>Two-Point Interchange*</i>	1	0	30
MO-163, MO-763 and Business Loop (East): Mile Marker 126 to Mile Marker 128	1. <i>One-Way Frontage Road System*</i>	2	0	1,000
	2. Collector/Distributor System	2	0	1,000
U.S. 63 Interchange: Mile Marker 128 to Mile Marker 130	1. <i>Tight Right of Way Interchange*</i>	7	1,100	3,800

Table III-35: Stream Impacts

Subsections	Reasonable Alternatives	Streams		
		# of Crossings	Linear Feet Bridged	Linear Feet Culverted**
St. Charles Interchange: Mile Marker 130 to Mile Marker 132	1. <i>Diamond Interchange*</i>	13	900	3,500
	2. Off-Set Diamond Interchange	14	900	4,400
MO-Z Interchange: Mile Marker 132 to Mile Marker 133	1. <i>Diamond Interchange*</i>	8	100	2,200
	2. Diamond with NW Loop Ramp	8	100	2,200
Total Impact, Recommended Preferred Alternative		73	2,600	21,630
*Included in the recommended preferred alternative.				
**Number excludes the length of streams in existing culverts.				

At U.S. 40, the footprint areas of both alternatives include a similar length of Henderson Branch. For the Diamond with SW Loop Ramp Alternative, much of the roadway and southern ramps would be located over the stream, requiring culverts for nearly 1,600 continuous linear feet (488 m) of stream. Conversely, the Enhanced Diamond Alternative, which is part of the recommended preferred alternative, would have three transverse crossings of Henderson Branch within 1,800 linear feet (550 m) of stream. While the length of stream within the footprint of this alternative is slightly greater, this alternative may provide more opportunity to reduce the impact to the stream by placing fill material and culverts only at the crossing locations.

The realignment of I-70 Drive NW at Stadium Boulevard accounts for the difference between alternatives in the length of the Harmony Creek affected at this interchange. All alternatives would require extension of culverts and relocation of a part of the Harmony Creek south of I-70. The alternatives vary in impact to the stream northwest of the interchange. The tight diamond or SPUI Alternatives would have the least impact on the stream, requiring a perpendicular crossing. The Northern Loop Alternative would require one additional oblique crossing and the Split Diamond would require several additional crossings or relocation of a section of the stream. The recommended preferred alternative includes the tight diamond design.

c. Measures to Minimize Harm

Each stream crossing would be given consideration during detailed engineering design to reduce impacts to the maximum extent practicable. Implementation of standard erosion control measures and restricting construction within stream channels to dry or low flow conditions would minimize erosion and sedimentation impacts.

Coordination with the USACE under the NEPA/Section 404 Merger will ensure compliance with Sections 401 and 404 of the CWA. This coordination would address impacts to streams, wetlands and other waters of the United States during the design process. The permit application process will be initiated with the FEIS. Clean Water Act permits would require a detailed delineation and evaluation of waters and wetlands affected by the project and minimization of impacts. In accordance with established procedure, the wetland delineation results will be presented in the Final Environmental Impact Statement. During the design phase specific impacts to wetlands and other waters of the United States would be assessed to determine if those impacts can be avoided or further minimized. Unavoidable impacts to

wetland and streams would require mitigation. Development of mitigation strategies would be determined through the permitting process with the USACE and the MDNR. Construction in or near streams, creeks and adjacent wetlands would be performed in accordance with MoDOT's *Standard Specification Book for Highway Construction*. Measures to avoid and minimize impacts to aquatic communities within the project limits have been developed through years of coordination between MoDOT, the USFWS and the MDC. Those measures overlap standard conditions of Section 401 certification, which become conditions of the Section 404 permit, and include the following:

- Prohibition of frequent fording of streams or other bodies of water with construction equipment or operation of mechanized equipment in streambeds except for the construction of temporary or permanent in-stream structures.
- Excavated materials would not be stored or stockpiled within stream channels.
- Clearing of vegetation, including both standing and downed timber, would be limited to that which is absolutely necessary for construction of the project.
- Sediment runoff and soil erosion would be minimized to reduce suspended solids, turbidity and downstream sedimentation, which may degrade water quality and adversely affect aquatic life. Missouri Department of Transportation would ensure strict adherence to the design, placement and maintenance of such temporary and permanent erosion control measures as stated in *Standard Specifications*.
- Petroleum products, other chemicals and construction debris would be prevented from entering the water or otherwise contaminating the riparian or streamside environment. Reports of any accidental releases of petroleum products or other contaminants that could harm fish and other aquatic life would be reported immediately to MDNR.
- Use of riprap for stream bank protection would be limited to bank areas that might experience severe erosion before vegetation becomes established. Riprap would consist of clean rock, broken concrete or similar materials that are free of pollutants and extraneous debris, including exposed rebar. Bank stabilization materials would not constrict the width of the stream channel. Efforts would be made to use bioengineered structures when constructing stream crossings such as incorporating native plant material into bank stabilization areas.
- Permanent culverts would be designed so as not to change the low-flow characteristics of streams. Where practicable, culverts would be designed to keep the original stream substrate intact.
- Wherever possible, riparian areas disturbed by the project would be revegetated with grasses, shrubs and trees immediately after or concurrent with project implementation, and follow-up efforts would be implemented to ensure adequate and permanent establishment of vegetation.

Coordination with federal and state agencies would continue during design and implementation through the Section 404/401 permitting process.

5. Water Quality

a. Affected Environment

The quality of waters that drain central Boone County is a function of the underlying geology and the land uses in their watersheds. Most of the land in the area is underlain by moderately permeable Pennsylvanian-aged limestone bedrock, which is generally beneficial to stream water quality. Based on their natural water quality conditions, parts of Perche Creek, Hinkson Creek and Sugar Branch within the project area have been assigned beneficial uses in the Water Quality Regulations (10 CSR-20-7.031), namely livestock and wildlife watering and protection of warm water aquatic life and human health-fish consumption. There are no outstanding national resource waters (designated under the national Wild and Scenic Rivers Act) in the project area. None of the streams in the project area have been designated by the Clean Water Commission as coldwater sport fisheries or outstanding state resource waters.

Point and nonpoint sources of pollution affect the natural water quality in project area streams. Outside the Columbia urban area, the watersheds of most streams are influenced by agricultural land uses. Potential nonpoint pollution from agriculture includes fertilizer and pesticides, sedimentation from erosion in tilled lands and high nutrient runoff from livestock operations. As a result, surface waters tend to be somewhat turbid and are affected by sediment deposition from soil erosion. Runoff from abandoned mine lands in the northern part of the county also affects area streams. Within the Columbia urban area, waters are affected by additional factors. Urban land development is known to have had a deleterious effect on the waterways within the project corridor, particularly Hinkson Creek, because of the changes in stormwater flow patterns as well as from entrained pollutants from buildings, parking lots, lawns and roadways. The city of Columbia's wastewater is processed at the treatment plant southwest of the city, but several communities and subdivisions discharge wastewater effluent from sewage treatment lagoons to the streams in the project area.

The MDNR's 303(d) list names waters that are degraded and for which current pollution discharge limitations are not stringent enough to meet the water quality standards and to assure protection and propagation of the resident aquatic life. The list establishes total maximum daily loads (TMDLs) or the primary pollutants (which may vary for each stream) and a priority ranking for restoring the waters, taking into account the severity of pollution and uses to be made of the streams. No waters within the project corridor are designated Section 303 (d) waters. Two tributaries to Perche Creek upstream of I-70—Rocky Fork and Kelley Branch—are on the 303(d) list for adverse effects from wastewater treatment, abandoned coal mine drainage or other contamination. The streams in the watershed have also been subject to habitat loss and sediment impacts. Although it receives flow from both streams, Perche Creek is not on the 303(d) list. Hinkson Creek, which originates in an agricultural area north of the I-70 corridor, is affected by urbanization south of I-70. The lower 11-mile (18 km) reach of the stream (ending roughly one mile (1.6 km) south of I-70) was included on 1998 303(d) list for unspecified pollutants from urban nonpoint sources. Hinkson Creek was also nominated (but not approved) for the 2002 list.

b. Environmental Consequences

Potential impacts to water quality are associated with constructing, operating and maintaining the new highway.

The primary short-term impact is the potential for erosion of soils exposed during construction and sedimentation in streams and creeks, wetlands and sinkholes. Soil types, drainage patterns, terrain and extent and duration of highway construction influence the degree to which erosion and sedimentation could occur at a given location. The potential for erosion and sedimentation under a No-Build Alternative would be minimal and would be associated with future maintenance work or localized improvement projects within highway right of way. Construction work for all reasonable alternatives would include substantial clearing and grading, placing fill in low areas, building new structures over streams, drainage ditch construction and other work which could cause erosion and sedimentation. Differences among reasonable alternatives are negligible in this regard.

The primary long-term impact includes altered stormwater runoff patterns due to the additional pavement, pollutants in stormwater runoff from vehicles and roadway maintenance and continued risk of discharge of pollutants by accidental spillage from vehicles along the roadway. The magnitude of the impact of the highway on water quality depends on the contribution of the highway relative to other sources of pollution and on the water quality of each receiving stream.

Under a No-Build Alternative, stormwater runoff from the roadway would continue at the current rate. Over time, with the gradual increase in traffic that is projected for I-70, the level of pollutant loads in runoff from the highway may also gradually increase.

All reasonable alternatives would add a minor amount of impervious surface draining to streams. The additional roadway would occupy minimal surface area relative to other urban and agricultural land uses in each watershed, and thus is not expected to have a significant impact on the volume or quality of stormwater discharging to the streams. As traffic is projected to increase along I-70, with or without the project, little or no difference is expected among the effects of the reasonable alternatives and a No-Build Alternative on water quality.

The incidental discharge of fuels, lubricants or other harmful contaminants from equipment during construction could also occur. An anticipated long-term benefit of the project is the additional protection from catastrophic spills or vehicular crashes afforded to all local streams due to a safer roadway.

c. Measures to Minimize Harm

Waters in the state of Missouri are regulated under the Missouri Clean Water Commission in accordance with Title 10, Chapter 20, Section 7 of the Code of State Regulations. Generally, the rules stipulate that the quality of state water shall be maintained and protected at its existing level. Allowable discharges of pollutants are specified in the regulations, depending on the classification of the waterway and its assigned beneficial uses.

To protect waterways from sedimentation during highway construction, MoDOT must comply with the provisions of the MDNR's stormwater regulations found at 10 CSR 20-6.010 and the NPDES requirements of the CWA. Missouri Department of Transportation operates under the provisions of General State Operating Permit number MO-R100007, issued by MDNR for road construction projects statewide (see **Appendix III-D**). The permit limits the amount of pollutants that can leave a job site and requires the installation of erosion controls in accordance with the guidelines and specifications in MoDOT's Project Development Manual and the *Standard Specification Book for Highway Construction*.

As a matter of practice, MoDOT construction plans include Temporary Erosion and Sediment Control Plans on all projects that disturb land. This policy has been approved by MDNR and

would apply to this project. The Missouri Department of Transportation's Pollution Prevention Plan specifies berms, slope drains, ditch checks, sediment basins, silt fences, seeding and mulching as well as other erosion controls. After construction is completed, disturbed areas would be seeded and mulched or sodded as quickly as possible. Although no sinkholes or losing streams are known to occur in the project corridor, it would be particularly important to properly design, place and maintain siltation and erosion control measures near any sinkholes or losing streams that are identified during construction as a means of guarding against adverse impacts to groundwater quality.

To reduce the risk of spills during construction, contract specifications would require implementation of Best Management Practices to prevent petroleum products, other toxic substances and construction debris from entering surface waters or otherwise contaminating the riparian or stream environment. Any spills would be immediately reported to MoDOT and the MDNR.

While stormwater runoff from an operational highway is known to carry pollutants, such as heavy metals, sediments and petroleum hydrocarbons, studies by FHWA have concluded that runoff from highways typically is not a serious problem with normal treatment practices. Missouri Department of Transportation routinely uses two operational water quality control methods along highways. The methods promote the settling of suspended solids from the water and the filtering of pollutants by plants and soil. First, runoff from the roadway flows through grass filter strips before entering the stormwater drainage system. Grass filter strips are an efficient and cost-effective water treatment practice. Next, vegetated drainage swales, as opposed to concrete-lined channels, are used as part of the stormwater conveyance system; they also provide for filtration and removal of conventional pollutants. Both methods would be employed with any reasonable alternative. Other methods, such as dry detention, treatment wetlands or infiltration basins, may be implemented as needed to meet the current water quality criteria at the time of construction. Stormwater runoff would also be managed in compliance with local stormwater management plans to the maximum extent practicable.

6. Floodplains

a. Affected Environment

Floodplains provide flood and stormwater attenuation by decreasing water velocities and providing temporary water storage. By temporarily storing water, floodplains help to remove sediments and provide erosion control. Floodplains also provide important ecosystem functions, such as nutrient export, increased primary productivity and wildlife habitat and movement corridors. These functions can vary from one location to another depending on vegetative structure, stream hydrology and distance from the stream. Floodplains are often fertile and used for agriculture. Consequently, the wooded areas of most floodplains in the project corridor tend to be narrow and confined to the area immediately adjacent to the stream channel. Floodplains can also provide recreation opportunities as linear parks or greenways.

Floodplain information for the project corridor is available from the Missouri Spatial Data Information Service, as derived from the Flood Insurance Rate Maps published by FEMA for Boone County and Columbia. The Federal Highway Administration and FEMA guidelines 23 CFR 650 have identified the base (100-year) flood as the flood having a one percent probability of being equaled or exceeded in any given year. The base floodplain is the area of 100-year flood hazard within a county or community. The regulatory floodway is the channel of a stream

plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood discharge can be conveyed without increasing the base flood elevation more than a specified amount. Federal Emergency Management Agency has mandated that projects can cause no rise in the regulatory floodway and a one-foot cumulative rise for all projects in the base (100-year) floodplain. For projects that involve the state of Missouri, the State Emergency Management Agency (SEMA) issues floodplain development permits. In the case of projects proposed within regulatory floodways, a no-rise certificate, if applicable, should be obtained prior to issuance of a permit.

Mapped floodplains are depicted on **Exhibits III-4A through III-4J**. Within the study area are FEMA floodplains along Sinking Creek, Sugar Branch, Henderson Branch, Perche Creek, Harmony Creek, Hinkson Creek, Hominy Branch and North Fork Grindstone Creek. Perche Creek has the widest floodplain at roughly 0.5 mile (0.8 km). Floodplains along Hinkson Creek and Hominy Branch are 700 to 800 feet (215 to 240 m) wide at their widest points near the I-70 crossing. Floodplains are typically more narrow (a few hundred feet) along the other streams in the project corridor. Floodways are also mapped by FEMA for Sugar Branch, Henderson Branch, Perche Creek, Harmony Creek, Hinkson Creek and Hominy Branch within the study area.

Much of the floodplain along Perche Creek is used for agriculture. This is also true for the Sugar Creek and Henderson Branch floodplains. Golf courses are also located within the Perche Creek and Hinkson Creek floodplains. Future greenways (trails) are planned for the floodplains associated with Hominy Branch, Hinkson Creek and Harmony Creek.

The State Emergency Management Agency can purchase flood prone properties using FEMA funding through the Hazard Mitigation Grant Program and Section 404 of the Stafford Act and Flood Mitigation Assistance Program, provided there are state and local governmental agency matching funds. The flood buyout properties are then owned by the city or county that has jurisdiction. After a property has been purchased through the program, deed restrictions prohibit development on the properties, including the placement of fill for road construction or bridge abutments and piers. According to the Chief Engineer, Department of Public Works, City of Columbia and director of the Boone County Planning Division, there are no flood buyout properties in the SIU 4 project corridor.

b. Environmental Consequences

Executive Order 11988, *Floodplain Management*, requires that federal agencies, in carrying out proposed projects, take action to reduce the risk of flood loss; minimize the impacts of floods on human safety, health and welfare and restore and preserve the natural and beneficial values provided by floodplains. Development within floodplains is regulated under the National Flood Insurance Program. Local participation in the program is required to receive federal and state funding. Both Boone County and the City of Columbia participate in the program and regulate impacts to floodplains. In accordance with MoDOT's Bridge Design Manual, encroachments into the floodplain, including bridge construction, replacements or culvert extensions, would require a floodplain development permit from SEMA.

A No-Build Alternative would have no impact on floodplains. Bridge and culvert rehabilitations or replacements would be evaluated as new structures if any work is required that could potentially change the flood elevation. Little or no additional fill would be placed in floodplains.

Project-related activities within floodplains would be nearly identical for all reasonable alternatives, affecting 69 to 72 acres (**Table III-36**). Work within the floodplains would include

replacing or improving existing bridges, lengthening existing culverts, constructing bridge approaches, widening of road embankments and other miscellaneous fill material placement within the floodplain. New or expanded crossings of floodplains along Perche Creek, Hinkson Creek, Hominy Branch and North Fork Grindstone Creek would be transverse (perpendicular) crossings where I-70 crosses, thereby reducing the area of impact at each site. While some parts of the floodplain unavoidably would be filled for roadway approaches, bridges would be installed at each location to avoid fill placement in the floodway. New transverse culvert crossings and culvert extensions would be required at Sinking Creek near the MO-J/O interchange. Frontage road improvements to correct substandard curvatures at locations along Sugar Branch and Harmony Creek would encroach longitudinally (parallel to the stream) on the floodplain and floodway. The encroachments would require either culvert crossings or stream relocation and appropriate compensation for floodplain encroachment.

The primary difference in floodplain impacts among the reasonable alternatives is associated with the U.S. 40 interchange design. The footprint of the Enhanced Diamond Alternative, which is part of the recommended preferred alternative, includes about two acres more of the Henderson Branch floodplain area than the Diamond with SW Loop Ramp Alternative. The Diamond with SW Loop Ramp Alternative would locate much of the southwest interchange ramps in the floodplain area, requiring continuous fill over nearly 1,500 linear feet (460 m) of stream and adjacent floodplain. Conversely, the Enhanced Diamond Alternative would have three transverse crossings of Henderson Branch, providing an opportunity to limit the area of fill to the minimum necessary for each crossing.

Table III-36: Floodplain Impacts

Subsections	Reasonable Alternatives	Stream Name	Average Width of Floodplain at Proposed Crossing (feet)	Length of Proposed I-70 Crossing (feet) ^a	Total 100-Year Floodplain Impact (ac) ^b
MO-J/O Interchange: Mile Markers 115 to 120	1. Diamond*	Sinking Creek	230	980	6
U.S. 40 Interchange: Mile Markers 120 to 124	1. Enhanced Diamond*	Perche Creek	1600	460	43
	2. Diamond, SW Loop Ramp	Perche Creek	1600	460	41
Stadium Interchange: Mile Marker 124 to Mile Marker 125	1. Northern Loop	---	---	---	1 ^c
	2. Tight Diamond Interchange*	---	---	---	1^c
	3. Single Point Urban Interchange	---	---	---	1 ^c
	4. Split Diamond Interchange	---	---	---	1 ^c
Business Loop (West): Mile Marker 125 to 126	1. Two-Point Interchange*	---	---	---	0

Table III-36: Floodplain Impacts

Subsections	Reasonable Alternatives	Stream Name	Average Width of Floodplain at Proposed Crossing (feet)	Length of Proposed I-70 Crossing (feet) ^a	Total 100-Year Floodplain Impact (ac) ^b
MO-163, MO-763 and Business Loop (East): Mile Marker 126 to Mile Marker 128	1. One-Way Frontage Road System*	---	---	---	0
	2. Collector/Distributor System	---	---	---	0
U.S. 63 Interchange: Mile Marker 128 to Mile Marker 130	1. Tight Right of Way Interchange*	Hinkson Creek	350	1085	14
St. Charles Interchange: Mile Marker 130 to Mile Marker 132	1. Diamond Interchange*	Hominy Branch	390	420	7
	2. Off-Set Diamond Interchange	Hominy Branch	390	420	7
MO-Z Interchange: Mile Marker 132 to Mile Marker 133	1. Diamond Interchange*	North Fork Grindstone Creek	100	450	1
	2. Diamond with NW Loop Ramp	North Fork Grindstone Creek	100	450	1
Total Impact – Recommended Preferred Alternative			-	3395	72
<p>*Included in the recommended preferred alternative.</p> <p>a. Length measured parallel to the stream including adjacent road improvements, if any.</p> <p>b. Includes area of impact of mainline and adjacent road improvements, if any.</p> <p>c. Impact to floodplain from frontage road improvement only.</p>					

c. Measures to Minimize Harm

Impacts to floodplains would also be coordinated with the local floodplain administrators at the City of Columbia and Boone County. Crossings would be designed to be consistent with SEMA floodplain management goals and objectives. Additional fill and structures would be designed so as not to increase flood elevations and to avoid interruption to public transportation due to flood damage to the roadway or structures. For floodplain administrators to issue floodplain development permits, they must receive a no rise certification that the proposed work would not increase the water elevations in the regulatory floodway. Projects usually are evaluated using HEC-2 or other computer analysis programs to ensure that floodwater elevations would not be increased by the projects before they are approved by floodplain regulation administrators. All floodplain permits (and a no practicable alternative finding) would be obtained in accordance with applicable floodplain regulations.

Erosion control measures would be implemented during construction to prevent sedimentation in the floodplain and streams. Following construction, the areas would be reseeded with a mix of fast-growing grasses. Further protection of the area from erosion would be accomplished using

native vegetation, along with some annual grasses, to provide cover until the permanent cover can become established. Disturbed areas would be stabilized as soon as practical. In addition, construction debris would be kept out of the floodplain.

As a result, the proposed improvements are not expected to have significant, long-term impacts on natural and beneficial floodplain values.

7. Wetlands and Ponds

a. Affected Environment

The Corps of Engineers and the USEPA jointly define wetlands as:

Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Wetlands contribute to sediment retention and removal, water quality protection, wildlife habitat and biodiversity. Wetlands may also provide shoreline protection, flood/storm water attenuation, groundwater recharge and discharge. For example, the water quality protection functions, such as sediment retention and nutrient removal, are important in agricultural areas where nutrient levels and sediment in runoffs may be high. Forested and nonforested wetlands along drainageways also provide important wildlife habitat in areas where agricultural land use is predominant. A wetland may serve one or more functions depending on such factors as landscape position, plant community composition and hydrologic regime.

While the Corps of Engineers is the primary regulatory agency for wetlands, in accordance with the CWA, the determination of wetlands in active agricultural lands is deferred to the NRCS in accordance with the Food Security (Swampbuster) Act. Areas that retain wetland conditions most years but which may not normally support wetland vegetation because they are farmed are designated farmed wetlands and are regulated under the CWA. Coordination with NRCS indicates there are no farmed wetlands nor WRP lands in the project area.

Federal agencies often interpret the presence of hydric soils as being indicative of potential wetland soil conditions and jurisdictional wetlands. Hydric soils generally are subject to flooding or ponding of water for more than one to two weeks per year, or have a water table less than 18 inches (46 cm) from the ground surface during the growing season. According to the NRCS, the Leonard, Darwin and Moniteau soils in the project area are considered hydric soils. These soils account for only about seven percent of the project corridor area. Examination of recent aerial photos reveals that large portions of these soil types have already been converted to agricultural or urban uses.

National Wetlands Inventory (NWI) mapping and field reconnaissance were used to identify wetlands in the project corridor, in accordance with the identification protocols provided by the MoDOT,. Generally, the abundance, size and type of wetlands observed during field reconnaissance were in agreement with the NWI. Field reconnaissance identified a few small additional wetland areas and eliminated a few areas that do not qualify as wetlands. **Exhibits III-4A through III-4J** depict the jurisdictional wetlands present within the SIU 4 study area.

Wetlands are not abundant within the project corridor. Most of the wetland features consist of palustrine forested (PFO) wetlands that occur in association with streams and creeks. Palustrine emergent (PEM) and palustrine scrub-shrub (PSS) wetlands are rare in the project corridor. These wetland types are described below.

Palustrine Forested (PFO)—These broad-leaved, deciduous forested wetlands include swamps, floodplain forests or wet-mesic forests. Within the project corridor, these communities consist primarily of narrow areas of floodplain forest along or in association with creeks and drainages. Most of the areas are labeled temporarily flooded on the NWI map. Trees in the forested wetlands are largely composed of cottonwood (*Populus deltoides*), black willow (*Salix nigra*), sycamore (*Platanus occidentalis*), pin oak (*Quercus palustris*), swamp white oak (*Quercus bicolor*), river birch (*Betula nigra*), American elm (*Ulmus americana*), hackberry (*Celtis laevigata*), and box elder (*Acer negundo*). Some species common to the shrub and herb layers are nettle (*Urtica dioica*), smartweeds (*Polygonum* spp.), poison ivy (*Toxicodendron radicans*), various sedges (*Carex* spp.), touch-me-not (*Impatiens capensis*), and green bulrush (*Scirpus atrovirens*). Forested wetlands are most common along Perche Creek, Hinkson Creek, Hominy Branch and North Fork Grindstone Creek. Field investigation has confirmed the presence of most of the riparian woodlands identified on the NWI map, although those along North Fork Grindstone Creek do not appear to be jurisdictional wetlands.

Palustrine Emergent (PEM)—Palustrine emergent wetlands consist of wet meadows, wet prairies, marshes and sloughs dominated by herbaceous vegetation adapted to wet conditions. Emergent wetlands in the project corridor are dominated by common sedge species such as Frank's sedge (*Carex frankii*), ravenfoot sedge (*Carex crus-corvi*), and blunt broom sedge (*Carex tribuloides*), common cattail (*Typha latifolia*), fowl meadow grass (*Glyceria striata*), Canada germander (*Teucrium canadense*), Indian hemp (*Apocynum cannabinum*), and green bulrush. Occasional shrubs and small trees in these wetlands include red elm (*Ulmus rubra*), sandbar willow (*Salix exigua*), and cottonwood. Only three small areas of PEM are identified in the project corridor on the NWI map. Field investigation has determined that the two areas nearest I-70 have been filled. The third, located at the Perche Creek Golf Course, has developed into a scrub-shrub wetland. Field investigation also identified several unmapped drainage areas and depressions within or adjacent to the existing right of way that support emergent wetland vegetation, primarily cattails.

Palustrine Scrub-Shrub (PSS)—Palustrine scrub-shrub wetlands are typically dominated by shrubs and small trees such as willows, cottonwoods, and elms. Only one PSS is shown on the NWI map near the project corridor north of I-70 east of St. Charles Road. The wetland has been confirmed by field investigation.

A number of ponds also occur in the project area. Most of these features in the study area are excavated or impounded agricultural stock ponds, sewage treatment ponds and recreational ponds that are designated palustrine unconsolidated bottom wetlands (PUB) in the USFWS classification system. The PUBs generally are constructed in undulating uplands. Field investigation confirmed many of the ponds as shown on the NWI map. The ponds are mostly one acre in size or less and occasionally support a band of shoreline vegetation. Usually constructed for agricultural or other purposes, the ponds are often not regulated as wetlands or other special aquatic sites under Section 404 of the CWA.

b. Environmental Consequences

Executive Order 11990, *Protection of Wetlands*, requires federal agencies to avoid, to the extent practicable, long- and short-term adverse impacts associated with the destruction or modification of wetlands. More specifically, the Order directs federal agencies to avoid new construction in wetlands unless there is no practicable alternative and, where wetlands cannot be avoided, the proposed action must include practicable measures to minimize harm to the wetlands.

All wetlands and ponds that have a surface water connection to streams are regulated as waters of the United States pursuant to Sections 404 and 401 of the CWA. Isolated wetlands and ponds that do not have a surface water connection to a stream are not regulated under the Act. Ponds created where wetlands were not present historically, such as stock watering ponds, sewage lagoons or aesthetic pools, also are not regulated.

The No-Build Alternative would affect few, if any, wetland habitats in the project area. However, future maintenance or replacement of bridges and culverts may affect streams or adjacent wetlands and may require Section 404/401 permits.

Many wetland features occur within or adjacent to the I-70 right of way. As a result, there are no prudent and feasible alternatives that would completely avoid all wetland impacts. Further, few wetlands occur near interchanges with multiple alternatives. Therefore, wetland impacts generally would be the same regardless of the interchange alternatives selected. The total area of wetlands affected by the recommended preferred alternative is estimated to be 8.3 acres (**Table III-37**).

Wetland impacts would largely result from extensions of existing crossings and parallel relocation of frontage roads. Wooded riparian wetlands along Perche Creek, Hinkson Creek and Hominy Branch would be partially affected, mostly by removal of woodland vegetation. The permanent placement of fill in the wetlands could be minimized because these stream corridors would be bridged. Wetlands along other drainages would be filled for roadway embankments at culvert extensions and relocations.

The project would also affect four wetlands not along riparian corridors. The reconstruction of the MO-Z interchange and realignments of service roads would affect three emergent wetlands and one small, forested wetland under all reasonable alternatives.

Non-wetland pond impacts would range from 1.75 to 2.9 acres. The recommended preferred alternative would affect four ponds with a total area of 2.2 acres. It is assumed that ponds that cannot be avoided or would be only marginally affected would be completely filled. Four farm and recreational ponds near I-70 would be affected under all reasonable alternatives. At the St. Charles interchange, the offset diamond alternative would affect two recreational ponds in the southwest quadrant, but the standard diamond alternative would affect no ponds. One farm pond near MO-Z affected by the standard diamond alternative would be avoided by the NW Loop Alternative.

The actual impact of the project on wetlands may vary from the estimates, depending on the design of the project and the detailed wetland delineation study. A detailed wetland delineation field study would be performed for the selected alternative to determine the areas that meet the federal definition of wetlands and waters of the United States. Wetland delineations would be confirmed through the Kansas City District of the USACE.

Table III-37: Wetlands and Pond Impacts

Subsections	Reasonable Alternatives	Wetlands (ac)	Ponds (ac)
MO-J/O Interchange: Mile Markers 115 to 120	1. Diamond*	0	0.5
U.S. 40 Interchange: Mile Markers 120 to 124	1. Enhanced Diamond*	4.3	0
	2. Diamond, SW Loop Ramp	4.3	0.3
Stadium Interchange: Mile Marker 124 to Mile Marker 125	1. Northern Loop	0	0.5
	2. Tight Diamond Interchange*	0	0.5
	3. Single Point Urban Interchange	0	0.5
	4. Split Diamond Interchange	0	0.5
Business Loop (West): Mile Marker 125 to 126	1. Two-Point Interchange*	0	0
MO-163, MO-763 and Business Loop (East): Mile Marker 126 to Mile Marker 128	1. One-Way Frontage Road System*	0	0
	2. Collector/Distributor System	0	0
U.S. 63 Interchange: Mile Marker 128 to Mile Marker 130	1. Tight Right of Way Interchange*	2.4	0
St. Charles Interchange: Mile Marker 130 to Mile Marker 132	1. Diamond Interchange*	1.0	0
	2. Off-Set Diamond Interchange	1.0	0.5
MO-Z Interchange: Mile Marker 132 to Mile Marker 133	1. Diamond Interchange*	0.6	1.2
	2. Diamond with NW Loop Ramp	0.6	0.7
Total Impact – Recommended Preferred Alternative		8.3	2.2
<i>*Included in the recommended preferred alternative.</i>			

c. Measures to Minimize Harm

The MoDOT would coordinate with the USACE during preparation of the DEIS and FEIS under the NEPA/Section 404 Merger to ensure compliance with Sections 401 and 404 of the CWA. This would address impacts to streams, wetlands and other waters of the United States during the design process. Clean Water Act permits would require a detailed delineation and evaluation of waters and wetlands affected by the project and minimization of impacts.

In accordance with established procedure, MoDOT protocols and the footprint of the recommended preferred alternative, a delineation of wetlands is currently being performed along the SIU 4 corridor. The results will be presented in the Final Environmental Impact Statement. During the design phase, specific impacts to wetland and other 'Waters of the U.S.' would be assessed to determine if those impacts can be avoided or further minimized. Unavoidable impacts to wetland and streams would require mitigation. Development of mitigation strategies would be determined through the permitting process with the USACE and the MDNR.

A meeting was held on June 24, 2004 to discuss the potential mitigation options, and to gather feedback and comments regarding wetland mitigation preferences for the entire (statewide) I-70 improvement project. The following agencies were represented: Missouri Department of Natural Resources (MDNR), Missouri Department of Conservation (MDC), Natural Resources

Conservation Service (NRCS), U.S. Army Corps of Engineers (USACE), Federal Highway Administration (FHWA), and Missouri Department of Transportation (MoDOT). The following three mitigation options were discussed: on-site mitigation (either concentrated at one site or dispersed at several sites), off-site mitigation (through the use of a wetlands bank) and off-system mitigation (that is, MoDOT would fund the development of wetlands at a site or sites identified by another agency that have been designated as a very high priority for acquisition and development as wetlands, or the development of wetlands on an agency-owned site that is currently lacking funding).

MoDOT prefers to concentrate wetland mitigation in a single, large area, however, based on the discussion and preferences expressed by the resource agencies, it may be more realistic to utilize more than one site or option within the corridor. Although most of the agencies prefer on-site mitigation, or mitigation within the same watershed, they also realized that it may be more practical to develop a few larger, concentrated sites rather than several small dispersed sites for a long linear project such as this. There was also a consensus that the Loutre River valley was an excellent location for wetlands mitigation.

8. Upland Habitats and Wildlife

a. Affected Environment

Most of the corridor, including the section through Columbia and to the west, is in the Ozark Border physiographic region. The region comprises transitional hills between the Ozarks to the south and the flatter glaciated regions to the north. The eastern end of the corridor, east of Columbia, falls within the Eastern Glaciated Plain physiographic region. The Ozark Border region was dominated by oak-hickory forests in presettlement times, while tallgrass prairie was prominent in the Eastern Glaciated region. The deep fertile soils throughout the Eastern Glaciated region made it suitable for agriculture, and much of the area was cleared for that purpose.

The existing I-70 right of way vegetation consists primarily of resilient nonnative plants, such as tall fescue. Most of the right of way is mowed regularly. The parts of the right of way that are not mowed support a mixture of native and nonnative deciduous shrubs and small trees, scattered evergreens, such as red cedar, grasses and forbs.

Upland habitats adjacent to or outside the right of way are influenced largely by current and historical land uses. The study area has a long history of disturbance, and only plants and animals that have adapted to change likely have remained. Roughly one-half of the corridor passes through the city of Columbia. Habitats in the urban/suburban environment vary from commercial areas with lawns and scattered landscape trees to a few wooded park lands and stream valleys. The other half of the corridor, east and west of Columbia, can be considered rural. Rural areas are largely a mosaic of active agricultural fields (row crops and pasture), old fields, hedgerows and woodland. There are no remnant native prairies within or adjacent to the corridor. Active croplands support scattered common agricultural weedy plant species in addition to the planted crops. Pastures are dominated by a mixture of pasture grasses and native grasses and herbs. Fields that are not grazed support invasive small tree and shrub species, such as eastern redcedar. Trees along hedgerows and fence lines include species, such as hackberry and osage-orange.

Woodlands comprise the most natural habitats in the project area. Only about 10 to 15 percent of the project corridor, both rural and urban, is woodland, including forests with closed canopy and scrub-shrub lands (intermediate between forest and open fields). Much of the woodland is

dense, young woodland less than 50 years old. More mature woodlands are restricted to steep valley slopes or riparian areas adjacent to Hinkson, Perche and Harmony creeks, Hominy Branch, Sugar Branch and their tributaries. In general, drier upland woodlands in the region are typically dominated by a variety of oaks, hickories and sugar maple. Woodlands in riparian areas contain eastern cottonwood, green ash, boxelder, pin oak, black willow, red maple, silver maple and sweet gum, among others (Faber-Langendoen 2001).

The City of Columbia Code of Ordinances regulates the loss of climax forest at land development sites greater than one acre. They define climax forest as “any woodland community of over twenty thousand (20,000) square feet which is dominated by climax species such as oak, hickory, sugar maple or bottomland hardwoods such as river birch, basswood, sycamore and hornbeam and which includes an area of 5,000 square feet with a maximum aspect ratio of 4:1.” The City arborist has indicated there is virtually no climax forest along I-70 through the urban area. Some forest areas north and south of I-70 may qualify as climax forest near Lake of the Woods Recreation Area (near the St. Charles Road interchange) and west of Stadium Boulevard.

Wildlife is distributed according to predominant habitat. Typical urban wildlife is composed primarily of birds (such as American robin, pigeon, house sparrow, house wren, northern cardinal and European starling) and small mammals (such as squirrels, chipmunks and rabbits). Waterfowl, such as Canada goose, mallard and other ducks, are common in open areas near water bodies. The rural habitat mosaic and mature woodland corridors support a somewhat greater diversity of wildlife. Migratory and resident songbirds, game birds and raptors found in rural areas include eastern bluebird, eastern meadowlark, mourning dove, American goldfinch, northern mockingbird, woodpeckers, sparrows, warblers, wild turkey, bobwhite quail, ring-necked pheasant, red-tailed hawk, American kestrel and owls. The diversity of birds during migratory periods is potentially quite high, as Boone County is located at the junction of two major migratory routes between Canada and Central America (the Mississippi and Central Flyways).

Small mammals common in rural areas include cottontail rabbit, red squirrel, gray squirrel, flying squirrel, mice, shrews and several species of bats. Large mammals, such as gray and red fox, woodchuck, opossum, striped skunk, raccoon, coyote and white-tailed deer, are also relatively common. Reptiles include the eastern hognose snake, garter snakes, black rat snake, northern fence lizard and three-toed box turtle.

b. Environmental Consequences

The No-Build Alternative would have minimal impact on the upland habitats in the project area. Future roadway maintenance would likely be confined to the existing right of way. Unmowed areas of the right of way that have developed more natural vegetation and that are affected by localized projects would likely recover to a similar condition within a few years.

Most of the habitats affected by expansion of the highway right of way would be early growth woodland, agricultural lands and regularly mowed areas. A large percentage of the native vegetation has already been given way agricultural lands and various urban land uses. Approximately half the corridor passes through urban lands. As an expansion of an existing roadway, the impact to upland habitats would largely be encroachment on the edges rather than fragmentation of large, contiguous habitats.

The most substantial impact to natural upland communities would be to woodlands (forest and scrub-shrub lands). Total impact to woodlands, including areas within the existing right of way, under the recommended preferred alternative would be 143 acres and would vary only slightly

with the reasonable alternatives (**Table III-38**). Most woodland impacts occur west of Columbia. The realignment of the southern frontage road intersection at MO-J/O would have the largest impact on a single contiguous woodlot at about 10.5 acres. Between MO-J/O and U.S. 40, the realignment of the southern frontage road and widening of I-70 would encroach on about 30 acres of woodland in a number of woodlots. East of Columbia, impacts to woodlands would occur from U.S. 63 through the MO-Z interchange and would be essentially the same, despite the alternatives selected. Impacts to woodlands along stream corridors throughout the project corridor would be nearly identical regardless of the reasonable alternative selected.

The largest variation in impacts between the reasonable alternatives occurs at the U.S. 40, Stadium Boulevard and St. Charles Road interchanges. At these interchanges, the recommended preferred alternative incorporates the design with the least woodland impact.

Table III-38: Natural Communities Impacts

Subsections	Reasonable Alternatives	Woodland Impact Area (ac)
MO-J/O Interchange: Mile Markers 115 to 120	1. Diamond*	51
U.S. 40 Interchange: Mile Markers 120 to 124	1. Enhanced Diamond*	36
	2. Diamond, SW Loop Ramp	48
Stadium Interchange: Mile Marker 124 to Mile Marker 125	1. Northern Loop	23
	2. Tight Diamond Interchange*	16
	3. Single Point Urban Interchange	16
	4. Split Diamond Interchange	19
Business Loop (West): Mile Marker 125 to 126	1. Two-Point Interchange*	0
MO-163, MO-763 and Business Loop (East): Mile Marker 126 to Mile Marker 128	1. One-Way Frontage Road System*	12
	2. Collector/Distributor System	11
U.S. 63 Interchange: Mile Marker 128 to Mile Marker 130	1. Tight Right of Way Interchange*	7
St. Charles Interchange: Mile Marker 130 to Mile Marker 132	1. Diamond Interchange*	13
	2. Off-Set Diamond Interchange	15
MO-Z Interchange: Mile Marker 132 to Mile Marker 133	1. Diamond Interchange*	8
	2. Diamond with NW Loop Ramp	7
Total impact – Recommended Preferred Alternative		143
* Included in the recommended preferred alternative.		

Losses of terrestrial habitats would reduce the habitat available for wildlife, although the project would not likely affect the overall diversity of vertebrate wildlife populations in the area. The wildlife that occurs in these areas is already adapted to the conditions (noise, activity) of the existing highway. Some wildlife could relocate to nearby alternative habitats, as the mobility of the species and the carrying capacity of those habitats allow. The bridges over Perche and Hinkson creeks would continue to provide viable wildlife migration corridors across I-70.

c. Measures to Minimize Harm***Corridor Enhancement Planning***

Local, state and federal agencies are jointly promoting the I-70 Corridor Enhancement Plan, an initiative for enhancements and natural area development throughout the entire I-70 corridor. This effort is intended to provide opportunities for scenic landscapes for travelers and overall environmental enhancement. The object of the plan is to avoid and minimize, to the extent possible, impacts to natural vegetation, particularly large trees and riparian trees and to restore trees and other natural habitats to disturbed areas, whenever driver visibility is not an issue. The enhancement plan also promotes habitat connectivity across (under) the highway along stream crossings. Missouri Department of Transportation already allows some roadside areas to revert to natural vegetation, mostly along steeper slopes, to promote scenic value and to reduce maintenance (mowing) costs. Although none of the SIU 4 is specifically referenced in the enhancement plan, the plan's Habitat Enhancement Guidelines would be incorporated to the extent practicable.

Noxious Weed Control

Executive Order 13112 calls on federal agencies to work to prevent and control the introduction and spread of invasive species. Invasive species are nonnative flora and fauna that can rapidly invade and cause significant changes to ecosystems, upset the ecological balance and cause economic harm to agricultural and recreational sectors. By their nature, transportation systems can serve as vectors for the spread of plant and animal species outside their natural ranges.

The Executive Order directs federal agencies, to the extent practicable and permitted by law, to prevent the introduction of invasive species, to detect and monitor invasive species populations, to provide for environmentally sound control of invasive species populations, to provide for restoration of native species and habitat conditions in ecosystems that have been invaded and to conduct research on invasive species and develop technologies to prevent introduction. Federal agencies cannot authorize, fund or carry out actions that would likely cause or promote the introduction or spread of invasive species unless feasible and prudent measures to minimize risk of harm would be taken in conjunction with the actions. In cooperation and communication with conservation organizations and other agencies, highway programs can offer coordinated response against the introduction and spread of invasive species and roadside vegetation management issues on both highway construction activities and maintenance programs. The Order directs federal agencies to target invasive plants as listed on the official noxious weed list of the state in which the work occurs.

The Missouri Revised Statutes, Chapter 263, Insect Pests and Weeds (August 28, 2003) defines noxious weeds to include bindweed (*Convolvulus arvensis*), Johnson grass (*Sorghum halepense*), common teasel (*Dipsacus fullonum*), cutleaf teasel (*Dipsacus laciniatus*), kudzu (*Pueraria lobata*), multiflora rose (*Rosa multiflora*), Canada thistle (*Cirsium arvense*), musk thistle (*Carduus nutans*), Scotch thistle (*Onoprodum acanthium*), purple loosestrife (*Lythrum salicaria*) and marijuana (*Cannabis sativa*). The statute directs all public utilities, including MoDOT, to:

- Control noxious weeds and prevent their regrowth and reinfestation;
- Employ methods of control and for preventing regrowth and reinfestation of noxious weeds as directed by the county weed control board; and

- Comply with all orders, rules and regulations promulgated by the county commission pursuant to the provisions of sections 263.450 to 263.474.

The primary goal for weed management along the I-70 corridor would be to control the spread of noxious species from the construction zone to adjoining areas. Current MoDOT standards control the establishment of weeds in construction sites by specifying very low amounts of weed seed in seed mixes, mulch and erosion control blankets applied to the right of way and the application of herbicides and soil sterilants as needed where invasive weeds are present. Revegetation of the area as soon as possible after construction would help to reduce the establishment and dominance of invasive species. Monitoring of the right of way by maintenance crews and adjacent landowners would help to identify the presence of noxious species.

9. Threatened and Endangered Species

a. Affected Environment

Rare plant and animal species are protected under federal and state laws. Active programs of recording and monitoring known populations of rare species are managed by the Missouri Department of Conservation through the Natural Heritage Program and the USFWS.

Two Internet-accessible databases were used to identify protected species that occur or potentially occur in the project corridor. The USFWS Region 3 Web site provides a county-by-county distribution of known populations of federally listed species. The Missouri Natural Heritage Program Database is a compilation of known occurrences of state-listed species (which also includes federal species) by county. **Table III-39** lists information available from the databases.

Federal Listed Species

The federal Endangered Species Act (ESA) protects species listed by the USFWS as endangered, meaning a species in danger of extinction throughout all or a significant part of its range, or threatened, meaning a species likely to become endangered within the foreseeable future. The act protects against injury or harassment of any individuals of these species as well as direct impacts to their critical habitats. All federal agencies must consult with the USFWS regarding potential impacts to listed species and consider alternatives to any project that would potentially negatively affect a listed species. As a federally funded and reviewed project, the Improve I-70 project must comply with the stipulations of this act.

Eight species listed by the USFWS as endangered, threatened or candidate species have been recorded in Boone County (**Table III-39**). Of these, only two are recorded within three miles (4.8 km) of the study corridor: the endangered gray bat (*Myotis grisescens*) and the endangered Indiana bat (*Myotis sodalis*).

The gray bat (*Myotis grisescens*) was listed by the USFWS as endangered in 1976. The gray bat has a limited geographic range and uses caves or mine shafts, year round, for its habitat. The species' habitat requirements are very specific and only a fraction of the caves within the geographic range would meet the species' habitat parameters.

The gray bat is particularly vulnerable to habitat disturbance during their winter hibernation periods in caves. Many of the caves where these bats are known to occur have had access limited by the construction of gates, which allow for free movement of the bats but minimize

human intrusion. The hibernation period, during winter months, is when the bats are most susceptible to human disturbances. Other caves are used in summer months for the rearing of their young. These summer caves are located near rivers or lakes, almost always within 0.5 mile (0.8 km).

The gray bats are known to inhabit Rocheport Cave (also known as Boone Cave) and Lewis & Clark Cave. These caves are located between one and three miles (1.6 and 4.8 km) south of I-70 in the Overton Bottoms area of the Missouri River. These sites are the only known colonies within five miles (eight km) of I-70. Rocheport Cave is known generally as one of the most important gray bat caves in Missouri. These caves are used by gray bats as maternity caves but are not used by them during the winter. Generally, gray bats begin arriving at the caves in June and stay until August. A recent MDC census places the number of gray bats present in the range of 34-36,000 individuals.

Indiana bats (*Myotis sodalis*) may be found throughout the state. The wintering range is generally south of the Missouri River and the summer range generally north. According to the MDC, there are fewer than 30 caves or mines that are known to have sizable Indiana bat colonies. The bats have very specific habitat requirements for their winter hibernation sites.

The Indiana bats are known to inhabit Rocheport (Boone) Cave during the winter months. The Indiana bats come into the cave shortly after the gray bats have left, generally in October, and stay until March. According to a recent MDC census, approximately 200 Indiana bats are present over the winter months. However, not all of the bats will leave the cave's vicinity during the summer months. Some of the Indiana bats will stay near the cave and continue to forage nearby.

There are likely additional areas within the I-70 corridor that provide seasonal (summer) habitat to the Indiana bat. While caves are used for hibernacula in the winter, females and their young spend the summer months in maternity colonies in both riparian and upland woodlands where suitable roost trees are present. The preferred roost/maternity colony trees have exfoliating, loose or platy bark or scars from fire or lightning strikes or other damage that allow the bats entry in a hollow or cavity in the tree. The tree could also be dead or declining vigor and the bark is in the process of sloughing off. Female maternity colonies prefer to roost under the sloughing bark.

Running Buffalo clover (*Trifolium stoloniferum*) is a native clover of Missouri and was thought to be gone from the state until 1989, when it was rediscovered. It is a perennial that grows from four (10 cm) to 20 inches (51 cm) tall, blooming generally from mid-May through June.

There are no known populations of the Running Buffalo clover (*Trifolium stoloniferum*) in the SIU 4 project corridor, although new populations have been recently discovered near existing I-70 in other SIUs. The sites where the plants were found appear to be in or adjacent to disturbed areas in riverine settings, along the first wooded terrace or bench above the river. It has been thought that disturbance, such as that provided by the herds of buffalo in Missouri, were instrumental in the species propagation and distribution. Running Buffalo clover does not appear to compete well with other species of clover. Currently mowing and grazing can provide that disturbance which appears to be necessary for the plant's distribution.

Table III-39: Rare Species with Populations Recorded in Boone County

Common Name	Scientific Name	Federal Status	State Status	Habitat Type
Plants				
Running Buffalo Clover	<i>Trifolium stoloniferum</i>	E	E	Disturbed bottomland meadows; usually found in areas receiving moderate disturbance such as that caused by grazing and mowing. A single population is known in Missouri.
Mammals				
Gray Bat	<i>Myotis grisescens</i>	E	E	Restricted entirely to undisturbed caves or cave-like habitats for hibernating as well as summer roosting sites, usually within 1.2 miles (1.9 km) of a large stream, river or reservoir for foraging. A corridor of mature woodland is necessary between the cave and forage sites.
Indiana Bat	<i>Myotis sodalis</i>	E	E	Select caves for winter hibernacula; migrate north and use trees with loose bark or large cavities in wooded areas for summer roosts and maternity colonies. Often forage for insects in riparian areas and over streams, but also may forage in upland woods and along woodland edges.
Birds				
Bald Eagle	<i>Haliaeetus leucocephalus</i>	T	E	Deciduous and mixed woods near large open water bodies; prefer areas with limited human activity.
Fish				
Flathead Chub	<i>Platygobio gracilis</i>		E	Missouri River
Sicklefin Chub	<i>Macrhybopsis meeki</i>	C		Missouri River
Sturgeon Chub	<i>Macrhybopsis gelida</i>	C		Missouri River
Topeka Shiner	<i>Notropis topeka</i>	E	E	Pools of small streams with clear water and sand, gravel or rubble bottoms, Bonne Femme Creek watershed.
Lake Sturgeon	<i>Acipenser fulvscens</i>		E	Missouri River
Pallid Sturgeon	<i>Scaphirhynchus albus</i>	E	E	Missouri River
<i>E = endangered; T = threatened; C = candidate species</i>				

State-Listed Species

Rule 3CSR10-4.111 of the *Wildlife Code of Missouri* protects wildlife and plant species with a state status of endangered as determined by the Missouri Department of Conservation (MDC). The code is comparable to the federal ESA, except that it applies to those species that are in danger of being extirpated from the state. The state law has no designation comparable to the federal threatened status.

Within Boone County, eight state-listed endangered species have been recorded. Most of these are also federally listed species, except for the lake sturgeon and the flathead chub, both of which are known from the Missouri River. Within three miles (five km) of the study corridor, the only state endangered species are the gray bat and the Indiana bat, which also have federal endangered status (as discussed above).

Other Species of Special Concern

The state also maintains a list of plants and animals known to be rare in the state but not listed as endangered in accordance with the Wildlife Code. These species are given a State Rank relative to their rarity. Species with a rank of 1, 2 or 3 are considered Missouri species of conservation concern. These ranks are defined by the MDC as:

S1 = Critically imperiled in the state because of extreme rarity or because of some factors making it especially vulnerable to extirpation from the state (typically five or fewer occurrences or very few remaining individuals)

S2 = Imperiled in the state because of rarity or because of some factors making it very vulnerable to extirpation from the state (six to 20 occurrences or few remaining individuals or acres)

S3 = Rare and uncommon in the state (21 to 100 occurrences)

The Natural Heritage Database search identified one known population of the bristled cyperus (*Cyperus setigerus*) in the study corridor along the I-70 right of way. This wetland species is listed as State Rank 1 by the MDC and is considered a Missouri species of conservation concern. The population in the study corridor is the only known populations in the state, and it is at risk from any improvements of I-70 as well as normal maintenance of the existing highway right of way. Consequently, MoDOT is cooperating with the MDNR, MDC and the USFWS to transplant this population to a suitable habitat on lands owned by one of these agencies.

b. Environmental Consequences

Federally Listed Species

The federal ESA protects species listed by the USFWS as endangered or threatened. The act protects against injury or harassment of any individuals of these species and direct impacts to their critical habitats. All federal agencies must consult with the USFWS regarding potential impacts to listed species and consider alternatives to any project that might affect a listed species adversely. As a federally funded and reviewed project, the Improve I-70 project must comply with the stipulations of the act.

There is some concern on the part of the USFWS about construction impacts on Rocheport Cave and disturbance of the gray and Indiana bats from the I-70 project. The Rocheport Cave is

located in karst topography. Both of the caves in question are robust and likely have limited vulnerability to the effects of construction activity. Construction would be of limited scope and duration and occur over one mile (1.6 km) away. According to MDC cave and endangered species representatives, the limestone structure does dampen sound and vibration effectively. Therefore, no anticipated impact on the gray and Indiana bat would result from the Improve I-70 project.

The Indiana bat uses woodlands with a variety of species and age classes during the summer months for foraging or roosting habitat. The project would require the removal of woodland vegetation along the edge of the right of way. As such, it is possible for the I-70 project to encroach on potential Indiana bat habitat.

State-Listed Species

Within the project corridor there are no known populations of any species listed as endangered in accordance with the Wildlife Code of Missouri. However, the bristled cyperus, a Missouri species of conservation concern, is known to occur in the study corridor along the existing I-70 right of way. This population is at risk under the No-Build Alternative from normal maintenance of the existing right of way and is also at risk under any of the reasonable alternatives. It is unlikely that the reasonable alternatives could be designed to avoid this population.

c. Measures to Minimize Harm

The Missouri Department of Transportation would conduct a survey for the Running Buffalo Clover. This survey would take place at least one year prior to construction and clearing activities at any new areas identified from the Natural Heritage Data Base. Missouri Department of Transportation is committed to working with the USFWS and MDC to avoid, minimize and mitigate, as appropriate, impacts of their projects. Because it would likely be a number of years before the I-70 improvement is constructed, the distribution of rare species could change over time. Missouri Department of Transportation would periodically review the Natural Heritage Database for updated information on the locations of federal and state listed species in the I-70 project area and coordinate with USFWS and MDC through the project development process regarding these species prior to construction.

To avoid potential negative impacts on the Indiana bat, the USFWS previously used a guidance that focused on not cutting suitable Indiana bat roost trees during the breeding season (April 1 through September 30). The USFWS now advocates reviewing projects on a case-by-case basis focusing on the following criteria: the project's proximity to known hibernacula; maternity, male roosts and/or important foraging areas; the composition of the woodland; the land use of the area after the project is complete; location in Knox, Macon and Shelby counties and consideration of the magnitude, scope, frequency and duration of the proposed action with regard to the importance of the area to the Indiana bat.

To address USFWS and MDC concerns, MoDOT would review the Natural Heritage Data Base periodically during the project development process to identify any new locations of Indiana bat activity. Missouri Department of Transportation would continue consultation with the USFWS to avoid or minimize potential impacts to this species.

Missouri Department of Transportation is already cooperating with the MDNR, MDC and the USFWS to transplant the population of bristled cyperus to a suitable habitat on lands owned by one of these agencies.

10. Hazardous Waste

a. Affected Environment

An investigation was conducted to identify sources of hazardous waste and to assess the potential for encountering sites that may contain environmental contaminants. The investigation began with a search of federal and state regulatory databases of known contamination sites or hazardous waste storage or waste generators. The database search dated July 23, 2003, was provided by Environmental Data Resources, Inc. The database search encompassed a study area 0.5 mile (0.8 km) wide, consisting of 0.25 mile (0.4 km) on either side of existing I-70 and included the following federal databases:

- *Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS)* contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies or individuals.
- *National Priority List (NPL)* a subset of CERCLIS, that identifies sites for priority cleanup under the Superfund Program.
- *Corrective Action Reports (CORRACTS)* identifies hazardous waste handlers with Resource Conservation and Recovery Act (RCRA) corrective action activity.
- *Resource Conservation and Recovery Information System (RCRIS)* includes selective information on sites that generate, transport, store, treat and/or dispose of hazardous waste as defined by RCRA. Resource Conservation and Recovery Information System sites can be further categorized as a transfer, storage and disposal (TSD) site, a large quantity generator (LQG) or a small quantity generator (SQG).
- *Emergency Response Notification System (ERNS)* records and stores information on reported releases of oil and hazardous substances.
- *Facility Index System (FINDS)/Facility Identification Initiative Program Summary Report* contains both facility information and sources for more detailed information.
- *Material Licensing Tracking System (MLTS)*, maintained by the Nuclear Regulatory Commission (NRC), contains a list of sites that possess or use radioactive materials and are subject to NRC requirements.

State maintained databases included in the search were the following:

- *State Hazardous Waste Sites (SHWS)* including MDNR Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites in Missouri, MDNR Missouri Hazardous Waste Treatment, Storage and Disposal Facilities list, MDNR Solid Waste Facilities list and Missouri Petroleum Storage Tank Insurance Fund database.
- *Solid Waste Facilities (SWF)/Landfill Sites (LF)* contains an inventory of solid waste disposal facilities or landfills in a particular state. Although it varies by state, these sites may be active or inactive facilities or open dumps failing to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal facilities.
- *Leaking Underground Storage Tanks (LUST)* contains an inventory of reported LUST incidents.

- *Underground Storage Tanks (UST)* is regulated under Subtitle I of RCRA and must be registered with the MDNR’s UST section.
- *Voluntary Cleanup Program (VCP)* is a program in which property owners, business operators or prospective buyers can enroll a site not contaminated by sources addressed by any of MDNR’s regulatory programs such as Emergency Response, Superfund, RCRA or Petroleum Storage Tanks. The site must be remediated to standards acceptable to the state to receive some type of certification from MDNR regarding site cleanup.
- *Aboveground Storage Tanks (AST)* contains a list of registered AST sites.
- *SPILLS Environmental Response Tracking Database* is a list of reportable spills from a variety of sources.

A total of 151 recorded sites were identified within 0.25 mile (0.4 km) of I-70. None were NPL Sites, CERCLIS Sites, RCRIS TSD Facilities, SHWSs or State Landfill Sites. Based on a review of these records and a limited onsite investigation, 34 of the sites were determined to warrant further site assessment, if they are within the potential area of effect of the project. **Exhibit III-5** shows the locations of these sites.

b. Environmental Consequences

Federal and state laws and regulations do not prohibit the location of a roadway over a hazardous waste site. However, in accordance with several federal laws, including RCRA, CERCLA and the Superfund Amendments and Reauthorization Act (SARA), any hazardous waste encountered during construction would require special handling and disposal to minimize risk to the workers and the public at large. Sites with substantial contamination of the soil or groundwater are avoided when possible, because the time and cost of further investigations, identifying and negotiating with the parties who are primarily responsible for the contamination and remediation of these sites can substantially affect the reasonableness of an alternative.

A No-Build Alternative would not affect any identified sites of concern.

Although the extent of contamination from any one source is difficult to assess without detailed surface and subsurface investigations, the potential interaction of the project with hazardous waste sites appears roughly equivalent regardless of the selected alternatives. Fifteen sites were identified in proximity to the reasonable alternatives and would require further site assessment. **Table III-40** identifies the sites that are expected to require further evaluation pursuant to the recommended preferred alternative.

Table III-40: Sites Potentially Requiring Further Site Assessment

Site Name	Address	Potential for Contamination	Regulatory Status
Interstate 66	U.S. 63/I-70 – Interstate Dr.	Medium	LUST/UST
Gas Pump	Ashley Street	Medium	Not Listed
I-70 Amoco	1704 North Providence	High	LUST/UST
Northside Conoco	210 E. Texas Avenue	Medium	UST
US & Gentges, Inc.	1512 Illinois Street	Low	LUST/UST

Table III-40: Sites Potentially Requiring Further Site Assessment

Site Name	Address	Potential for Contamination	Regulatory Status
Sinclair Retail #24003	1106 I-70 Drive Southwest	Low	LUST/UST
Stadium Convenience Center	1004 North Stadium Boulevard	Medium	LUST/UST
Xtreme Towing	1910 I-70 Business Loop West	Low	Not Listed
Midway Auto Truck Plaza	6401 West Highway 40	High	LUST
Mr. G's Tire and Auto, Inc.	803 Business 70 West	Medium	UST/SPILLS
Analytical Bio-Chemistry Laboratory	7200 East ABC Lane	High	RCRIS-LQG/MLTS
Sorrells Auto Salvage	4313 I-70 Drive Southwest	High	RCRIS-SQG/FINDS
In Line Auto Body	4795 I-70 Drive Southwest	Low	RCRIS-SQG/FINDS
Columbia Power Plant	East Business Loop 70	Medium	Not Listed
Telephone Pole Storage Yard	Ashley Street	Low	Not Listed

Further investigations would be required to determine the impact the sites would have on the project. The following four sites appear to pose the greatest potential impact to the project, because the cost to clean up the sites could be high.

I-70 Amoco

Both soil and groundwater contamination were reported from a LUST. Cleanup efforts began in August 1993, and no completion date was reported. Improvements to MO-163 (Providence Road) as part of any reasonable alternative could affect this property. See **Exhibit III-5F**.

Midway Auto Truck Plaza

A LUST release occurred in December 1998 that affected both soil and groundwater. Cleanup began in December 1998, but no completion date was provided. Improvements to U.S. 40 (under any reasonable alternative) could affect this property. See **Exhibit III-5C**.

Analytical Bio-Chemistry Laboratory

The facility was identified as a RCRIS LQG that has been cited with 28 RCRA violations dating back to 1985. The extension of I-70 Drive NE under all reasonable alternatives would traverse this property. An investigation of this facility is warranted prior to disturbance. Cleanup costs could range from low to high depending on the results of the investigation. See **Exhibit III-5J**.

Sorrells Auto Salvage

The auto parts salvage yard encompasses two tracts on both sides of Sorrells Overpass Drive. The location was identified as a RCRIS-SQG/FINDS site with no violations reported. However, salvage yards can be a potential source of soil and groundwater contamination. Fluids such as gasoline, oil and engine coolant can leak from vehicles in a salvage yard. The widening of I-70 and the improvement of Sorrells Overpass Drive and I-70 Drive SW could affect this property. See **Exhibit III-5C**.

c. Measures to Minimize Harm

Further studies would be performed during the design phase in a stepwise progression to identify the presence of a hazard, delineating its extent and developing appropriate remediation. The process generally follows this pattern:

- Phase 2 investigations involve taking samples of soil and water to confirm or dismiss the possibility of contamination. This is done by drilling holes in the proposed right of way and having the soil and water analyzed for various contaminants. If the soil or groundwater is contaminated, MDNR is notified, and potential responsible parties are identified and notified of remediation responsibilities. Facility audits and detailed file reviews and interviews may be completed to limit the extent of drilling required.
- Phase 3 investigation involves determining the extent of contamination and developing the remediation plan.
- Phase 4 investigation involves carrying out the remediation and any associated long-term monitoring.
- The Missouri Department of Transportation would work with concerned parties to ensure disposition of any contamination to the satisfaction of the MDNR and the FHWA before acquisition of any questionable site and before advertising the project for construction.

11. Air Quality

a. Affected Environment

The federal Clean Air Act Amendments (CAAA) of 1970 required the adoption of air quality standards. These were established in order to protect public health, safety and welfare from known or anticipated effects of air pollutants. National Ambient Air Quality Standards (NAAQS) were established for sulfur dioxide, particulate matter, carbon monoxide, nitrogen dioxide, ozone and lead. In addition to these pollutants, the State of Missouri has established additional criteria for hydrogen sulfide and sulfuric acid.

The Clean Air Act (CAA) established two types of national air quality standards. Primary standards set limits to protect public health, including the health of sensitive populations, such as asthmatics, children and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation and buildings.

The Missouri and NAAQS are listed in **Table III-41**.

Table III-41: Missouri and National Ambient Air Quality Standards

Pollutant	Averaging Time	Concentration
Sulfur Dioxide	Annual Arithmetic Mean: Primary 24-hour ^a : Primary 3-hour ^a : Secondary	80 $\mu\text{g}/\text{m}^3$ (0.03 ppm) 365 $\mu\text{g}/\text{m}^3$ (0.14 ppm) 1,300 $\mu\text{g}/\text{m}^3$ (0.50 ppm)
Particulates (PM-10)	Annual Arithmetic Mean: Primary and Secondary 24-hour ^b : Primary and Secondary	50 $\mu\text{g}/\text{m}^3$ 150 $\mu\text{g}/\text{m}^3$
Fine Particulates (PM-2.5)	Annual Arithmetic Mean: Primary and Secondary 24-hour ^b : Primary and Secondary	15 $\mu\text{g}/\text{m}^3$ 65 $\mu\text{g}/\text{m}^3$
Carbon Monoxide	1-hour ^a : Primary 8-hour ^a : Primary	40 mg/m^3 (35 ppm) 10 mg/m^3 (9 ppm)
Ozone	1-hour ^c 8-hour ^d	0.12 ppm 0.08 ppm
Nitrogen Dioxide	Annual Arithmetic Mean	100 $\mu\text{g}/\text{m}^3$ (0.053 ppm)
Lead	Calendar Quarter Arithmetic Mean: Primary and Secondary	1.5 $\mu\text{g}/\text{m}^3$
Hydrogen Sulfide ^f	1/2-hour ^e 1/2-hour ^g	70 $\mu\text{g}/\text{m}^3$ (0.05 ppm) 42 $\mu\text{g}/\text{m}^3$ (0.03 ppm)
Sulfuric Acid ^f	24-hour ^h 1-hour ⁱ	10 $\mu\text{g}/\text{m}^3$ 30 $\mu\text{g}/\text{m}^3$
<p>^a. Not to be exceeded more than once per year. ^b. Statistically estimated number of days with exceedances is not to be more than one per year. ^c. One hour average not to be exceeded more than one day per year. ^d. The three-year average of the fourth-highest daily maximum eight-hour average ozone concentration each year must not exceed 0.08 ppm. ^e. Not to be exceeded more than twice per year. ^f. Missouri Air Quality Standards. ^g. Not to be exceeded more than twice in any five consecutive days. ^h. Not to be exceeded more than once in any 90 consecutive days. ⁱ. Not to be exceeded more than once in any two consecutive days. ppm = Parts per million parts of air (by volume) at 25°C. $\mu\text{g}/\text{m}^3$ = micrograms per cubic meter of air.</p> <p>Source: Code of Federal Regulations; Title 40 Part 50: Amended July 1998; Missouri Code of State Regulations; Title 10, Division 10, Chapter 6: last amended 9/30/03.</p>		

The CAAA of 1977 required all states to submit to the USEPA a list identifying those air quality control regions, or portions thereof, which meet or exceed the NAAQS or cannot be classified because of insufficient data. Portions of air quality control regions that are shown by monitored data or air quality modeling to exceed the NAAQS for any criteria pollutant are designated nonattainment areas for that pollutant.

The 1990 CAAA established procedures for determining the conformity of State Implementation Plans (SIPs) with the requirements of the federal regulations. These procedures are published in 40 CFR Parts 51 and 93.

Section of Independent Utility 4 falls within the Northern Missouri Intrastate Air Quality Control Region (AQCR #137). This AQCR has a designation of better than national standards for PM₁₀ and SO₂, unclassifiable/attainment for CO, attainment for ozone, cannot be classified or better

than national standards for NO₂, and no designation for Pb. The Missouri SIP does not contain any transportation control measures for this AQCR.

Boone County is a designated attainment area for the NAAQS. Only PM_{2.5}, fine particulates, is actually monitored in Boone County. For 2003, maximum 24-hour averages ranged from 28 to 33 µg/m³, and the annual average was 12.5 µg/m³. For 2004 to date, the maximum 24-hour average has been 28 µg/m³, and the annual average was 11.5 µg/m³. These values are below the NAAQS.

b. Environmental Consequences

According to the Intermodal Surface Transportation Efficiency Act of 1991, a federal agency may not approve or fund a transportation project unless it conforms to the State Implementation Plan (SIP) for air quality as required by Section 176(c)(4) of the CAAA of 1990. Section 176(c)(4) of the CAAA would cover projects funded under Title 23 U.S.C. (Federal Aid Highways Act). To conform to the SIP, a project cannot cause or contribute to a new violation of NAAQS, increase the frequency or severity of any existing violations of any NAAQS or delay timely attainment of any NAAQS or any required interim emissions reductions or other milestones.

The I-70 project is included in the Statewide Transportation Improvement Plan (for preliminary engineering) and has been included as part of the State Implementation Plan. Consequently, the I-70 project should not cause non attainment for any NAAQS.

There is potential for temporary localized air quality impacts caused by emissions from construction equipment, fugitive dust from the construction sites and haul roads, aggregate crushing and washing operations or concrete batch plants. Burning of woody debris may also affect air quality.

c. Measures to Minimize Harm

During construction of the project, construction methods and operations would be conducted in accordance with MDNR and MoDOT regulations, particularly concerning batch plant operations and clearing and grubbing functions. Standard construction specifications incorporate provisions for minimizing air quality impacts during construction.

Measures would be taken to reduce fugitive dust and other emissions generated during construction. Fugitive dust control would be accomplished by applying water or soil stabilizer compounds to haul roads and other construction areas during dry conditions. Emissions from construction equipment would be controlled in accordance with emission standards prescribed under state and federal regulations. Materials resulting from clearing and grubbing, demolition or other operations (except materials to be retained) would be removed from the project, burned or otherwise disposed of by the contractor. Any open burning will be accomplished in accordance with Missouri's standards at 10 CSR 10-3.030 (Open Burning Restrictions).

12. Noise Impacts

a. Noise Analysis

Missouri Department of Transportation's Traffic Noise Policy, developed in accordance with FHWA procedures for highway noise analysis and abatement contained in 23 CFR 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise, was used to identify and evaluate potential noise impacts associated with the proposed SIU 4 improvements.

Evaluation of the traffic noise impacts expected from construction of a highway involves the following:

- Identification of existing activities and developed lands that may be affected by traffic noise from the highway,
- Prediction of traffic noise levels,
- Determination of existing noise levels,
- Determination of traffic noise impacts, and
- Examination and evaluation of alternative noise abatement measures for reducing or eliminating noise impacts.

Existing and predicted noise levels are calculated in decibels (dBA). Noise abatement criteria (NAC) are noise impact thresholds established by FHWA for considering abatement. A traffic noise impact occurs when noise levels predicted to occur as a result of the proposed project approach or exceed the NAC or when predicted traffic noise levels substantially exceed (by 15 dBA or more) the existing noise level, even though the predicted levels may not exceed the NAC. **Table III-42** identifies the established NAC.

Table III-42: Noise Abatement Criteria, Hourly A-Weighted Sound Level – decibels (dBA)

Activity Category	L_{eq} (1 Hour)	Description of Activity Category
A	57 dBA (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the lands are to continue to serve their intended purpose.
B	67 dBA (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries and hospitals.
C	72 dBA (exterior)	Developed lands, properties or activities not included in Categories A or B above.
D	—	Undeveloped lands.
E	52 dBA (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

Source: Code of Federal Regulations, Title 23 Part 772, Revised October 1997.

Specific land uses have been identified by FHWA as noise-sensitive receptors. These include residences, churches, schools, libraries, hospitals, nursing homes and apartment buildings and condominiums. The SIU 4 proposed improvements follow the existing alignment closely. Consequently, the noise-sensitive receptors that likely would be affected by traffic noise are near existing I-70. Most of the sensitive receptors in the project corridor are residences, many of which occur in neighborhood clusters. Other sensitive receptors include Columbia Korean Baptist Church, Columbia United Church of Christ, First Church of God, Praise Assembly Church, Prairie Grove Baptist Church, Candlelight Lodge Retirement Center and Cosmo Park.

b. Impacts

The Traffic Noise Model (TNM®) was used to determine existing and projected noise levels in the SIU 4 corridor under No-Build and Build scenarios for 2030. The No-Build scenario assumes no improvements would be made to I-70, whereas the Build scenario assumes construction of the recommended preferred alternative.

Representative noise modeling receptors were chosen along the corridor at 10 locations. These receptors represent numerous properties located at similar distances from I-70 exposed to similar traffic conditions. The modeled receptors are shown on **Exhibit III-5** and described in **Table III-43**.

Table III-43: Design Hour Noise Levels, SIU 4 Corridor

Representative Receptor ID#	Land Use*	No. of Receptors Represented	NAC Category and Level	Noise Level (L _{eq}) (Design Hour)				
				2000 Existing (dBA)	2030 Build (dBA)	Increase over Existing (dBA)	Impacts**	2030 No-Build (dBA)
1	SF	25	B (67dBA)	69	73	4	25	73
2	SF	27	B (67dBA)	71	77	6	27	75
3A	SF	11	B (67dBA)	71	78	7	11	74
3B	SF	1	B (67dBA)	72	75	3	1	75
3C	CL	1	B (67dBA)	65	73	8	1	69
4	SF	44	B (67dBA)	74	77	3	44	77
5	SF	10	B (67dBA)	73	80	7	10	76
6	SF	52	B (67dBA)	72	77	5	52	76
7	MF	26	B (67dBA)	77	82	5	26	81
8	SF	9	B (67dBA)	76	82	6	9	80

*SF = single-family residence, MF = multi-family residence, CL = Candlelight Lodge
 **Impacts are defined as approaching or exceeding the Noise Abatement Criteria in the year 2030.

The TNM® analysis indicates existing noise levels are fairly consistent throughout the corridor and exceed the 67 dBA NAC at all but one receptor (**Table III-43**). The analysis for projected noise levels in 2030 indicates that noise levels would exceed the NAC criteria at every receptor, under either a Build or No-Build scenario. Under the recommended preferred alternative, future noise levels would increase between three and eight dBA over existing noise levels, with the exception of receptor 5. At this location, redesigned ramps to I-70 would act as a noise barrier to the receptor, thereby causing a slight decrease in the noise level. Nevertheless, the noise level would still exceed the 67 dBA NAC.

The TNM® also was used to develop a 66 dBA contour using design hour traffic, grade and natural barriers. **Table III-44** presents the setback distances to the 66 dBA contour, measured perpendicular to the centerline, of both the Build and No-Build Alternatives in 2030. Within the setbacks, the noise level would be 66 dBA or greater.

Table III-44: Setback Distances from Centerline for Residential Receptors

Location	Setback Distances (feet) from Centerline to 66 dBA	
	2030 Build	
	North Side	South Side
<i>Mile Marker 116.2 to 120.0</i>	450	585
<i>Mile Marker 120.0 to 123.6</i>	590	655
<i>Mile Marker 123.6 to 125.2</i>	883	845
<i>Mile Marker 125.5 to 126.0</i>	1,000	710
<i>Mile Marker 126.0 to 128.0</i>	820	890
<i>Mile Marker 128.0 to 130.0</i>	610	770
<i>Mile Marker 130.0 to 132.0</i>	600	625
<i>Mile Marker 132.0 to 134.0</i>	635	625

c. Mitigation

When potential noise impacts are identified, noise abatement is considered and implemented if found to be both reasonable and feasible. When noise abatement measures are being considered, every reasonable effort is made to obtain substantial noise reductions. Reasonable and feasible factors include the following:

- The noise wall must provide noise reduction of at least five dBA.
- The noise wall must provide attenuation for more than one receptor.
- The noise wall must be 18 feet (5.5 meters) or less in height above normal grade.
- The noise wall must not interfere with normal access to the property.
- The noise wall must not pose a traffic safety hazard.
- The noise wall must not exceed a cost of \$30,000 per benefited receptor. A benefited receptor is defined as a receptor that receives a noise reduction of five dBA or more.
- A majority of the affected residents must concur that a noise wall is desired.

Applying the MoDOT Noise Policy and using TNM®, abatement measures were investigated for five different locations. In these locations, residences are clustered and immediately adjacent to the interstate where a noise wall could provide noise mitigation. In addition, sufficient area is available for a wall so that normal access to each property would be maintained, and no traffic safety hazards would be incurred. Using TNM®, the noise walls were modeled in the proposed right of way between existing residences and the highway. These locations are shown in **Exhibit III-5**.

Results of the noise model analysis indicate that mitigation of noise impacts at all five locations would provide a noise reduction of at least five dBA for all identified receptors. As shown in **Table III-45**, the cost of each wall would not exceed \$30,000 per benefited receptor.

Table III-45: Noise Wall Modeled Areas

Area Modeled	Noise Wall Length (ft)	Average Height (ft)	Cost at \$18/ ft ²	Number of Benefited Receptors	Cost per Benefited Receptor
Noise Wall Area 1: North of I-70 between Loop 70 West and MO-163	3,682	12	\$795,352	38	\$20,930
Noise Wall Area 2: North of I-70 between U.S. 63 and St. Charles Road	1,030	12	\$222,480	22	\$10,113
Noise Wall Area 3: North of I-70 between St. Charles Road and MO-Z	2,676	13	\$626,184	48	\$13,045
Noise Wall Area 4: North of I-70 between MO-E/MO-740 and Loop 70 West	513	14.5	\$133,893	6	\$22,315
Noise Wall Area 5: South of I-70 between MO-163 and MO-763	838	14	\$211,176	10	\$21,118

Based on the study completed, mitigation of noise impacts for the proposed project appears to meet the MoDOT criteria for reasonableness; therefore, noise mitigation measures would continue to be considered for the proposed project. A public review process would be conducted to determine whether most affected residents concur with the construction of noise walls. As the project continues development through detailed design, noise abatement would continue to be reviewed. However, no commitments can be made until final design. Changes in horizontal or vertical alignment can have demonstrable impacts to the cost and effectiveness of the barriers.

d. Construction Noise

To reduce the impacts of construction noise, MoDOT has special provisions in the construction contract which requires that all contractors comply with all applicable local, state and federal laws and regulations relating to noise levels permissible within and adjacent to the project construction site. Construction equipment would be required to have mufflers constructed in accordance with the equipment manufacturer’s specifications. Further, MoDOT would monitor project construction noise and require noise abatement in cases where the criterion is exceeded.

The major construction elements of the project are expected to be demolition, earthmoving, hauling, grading, paving and bridge construction. General construction noise impacts for passersby and individuals living or working near the project can be expected particularly from demolition, earthmoving and paving operations. Noise generated by construction equipment would vary greatly depending on the equipment type, mode and duration of operation and specific type of work in progress. Considering the short-term nature of construction noise, impacts are not expected to be substantial.

13. Cultural Resources

a. Affected Environment

Cultural resources consist of archaeological sites, architectural buildings and structures, bridges, National Register places and districts and cultural landscapes that are significant to American history, architecture, archaeology, engineering and culture. According to the criteria in the National Historic Preservation Act (NHPA), significant sites or properties are those that possess integrity of location, design, setting, materials, workmanship, feeling and association. Further, a property must be shown to be significant for one or more of the following four criteria for evaluation:

- **Criterion A—Events:** Properties associated with events that have made a significant contribution to the broad patterns of our history.
- **Criterion B—Persons:** Properties associated with the lives of persons significant in our past.
- **Criterion C—Design:** Properties that embody the distinctive characteristics of a type, period or method of construction, or that represent the work of a master, or that possess high artistic values or that represent a significant and distinguishable entity whose components may lack individual distinction.
- **Criterion D—Information:** Properties that have yielded or may be likely to yield information important in prehistory or history.

Properties considered significant according to these criteria are eligible for listing on the NRHP. Planning for federally funded, licensed or permitted projects must consider impacts to properties listed on or determined as eligible for listing on the NRHP to be in compliance with Section 106 of the NHPA, as well as Section 4(f) of the Transportation Act.

Archaeological

The Tier I study documented 46 previously recorded archaeological sites within 0.25 mile (400 meters) of the studied alternatives in records of the State Historic Preservation Office (SHPO) and other available archives. Most of the sites were recorded in the 1930s, before the construction of existing I-70. Any sites within the Area of Potential Effects (APE) of the archaeological survey of the preferred alternative will be evaluated for NRHP eligibility during that survey.

Historic Architectural Properties

One property in the project corridor is listed on the NRHP, the Pierce Pennant Motor Hotel, now known as the Candlelight Lodge Retirement Center, 1406 Business Loop 70 West.

Exhibit III-5E shows the location of this property. The property is located roughly 700 feet (213.3 m) north of I-70 between the Business Loop 70 West and Stadium Boulevard interchanges. It is an example of an early twentieth century Colonial Revival motor hotel, and qualified for listing on the NRHP under Criteria A, Transportation and C, Architecture.

An architectural survey was completed for other properties in the SIU 4 project area. The survey was designed to identify and document architectural resources (i.e., buildings, structures, objects, bridges and districts/landscapes) that may be eligible for listing on the NRHP. The Area

of Potential Effects (APE) used for the survey was 100 ft (30 m) outside the limit of the alternatives developed for the project along existing I-70 and interchanges. Properties with buildings dating after 1970 were not documented unless the buildings were of high design or had unique architecture; if so, they were photographed. Properties with buildings dating between 1945 and 1970 were only photographed unless they were of high design or had unique architecture, in which case they were documented with a one-page Missouri State Historic Preservation Office Architectural/Historic Inventory Survey Form. Properties with any buildings or other features built before 1945 (and qualifying younger ones) were documented with photographs and a one-page Missouri State Historic Preservation Office Architectural/Historic Inventory Survey Form. The survey is detailed in the technical report *Interstate 70, SIU 4: Historical and Architectural Survey, Vol. 9, MoDOT Job No. J411341G*, by David M. Quick, Neal H. Lopinot, Michael D. Conner, and Gina S. Powell

Inventory form were completed for 40 properties in the project area. Of those, four are recommended eligible for the NRHP and one (4BO84, the Candlelight Lodge Retirement Center) is currently on the NRHP. **Exhibit III-5** displays the location of the properties, and **Table III-46** provides some information about them.

Table III-46: Listed and Eligible Historic Properties in the Project Corridor

Resource Number	Name	Location	Type of Property	NRHP Status	Notes
4BO4	Amerman Farm	Old Rocheport Road, 0.5 mile west of MO-J	Large Queen Anne House, some out-buildings	Eligible, Criterion C	Some outbuildings close to the house are contributing, but the entire farm is not eligible.
4BO28	Dougherty Log Building	Van Horn Tavern Road, southeast of U.S. 40 interchange	Log building	Eligible, Criterion D	1820s tavern, relocated and now used as agricultural out-building.
4BO84	Candlelight Lodge Retirement Center	700 feet north of I-70 between the Business Loop 70 West and Stadium Boulevard interchanges	Early twentieth century Colonial Revival hotel	Listed, Criteria A and C	Built in 1929, it is the former Pierce Pennant Motor Hotel. Considered significant for its architecture and history.
4BO91	Dunscob e Insurance Lustron House	West Road, 250 feet south of I-70 Drive SW	Prefab steel Lustron House, garage	Eligible, Criteria A and C	High integrity.
4BO147	Bowling-Napier Estate	Southwest of Paris Road overpass	1913 Eclectic Revival Colonial brick mansion	Eligible, Criterion C	Surrounding lands may be integral to the building's context and therefore included as part of the historic resource.

Cemeteries

There are two cemeteries in the project corridor. The Memorial Park Cemetery is located northwest of the intersection of Business Loop 70 and Creasy Springs Road (adjacent to Cosmo Park). The Memorial Park Cemetery is visible on **Exhibit III-1**, Panel E. The small Cochran Family Cemetery was identified during one of the project's public involvement events. It is located roughly at mile marker 118, south of the I-70 frontage road (Sontag Drive).

Bridges

The APE used for bridges was the same used for other architectural resources and also included any bridge resources on I-70. Thirty-five bridge resources occur in the APE; 10 of these postdate 1961; the 25 that date to 1961 and earlier were photographed and mapped. None are on the list of included bridge resources in the 1996 *Missouri Historic Bridge Inventory* prepared by Clayton Fraser, and none are recommended eligible for the NRHP.

Interstate I-70 History

Missouri is sometimes credited as the first state to initiate interstate highway construction, breaking ground on a 2.6-mile (4.2 km) section of Interstate 70 in St. Charles County, after the state signed the first contracts under the new interstate program on August 2, 1956. During the I-70 First Tier Study, discussions began regarding the potential historic significance of I-70 and its possible eligibility for the NRHP. The interstate system is approaching the 50-year-old threshold for consideration of eligibility and is currently being studied by a national task force. Discussions within Missouri led to the development of a memorandum of understanding (MOU) that outlines a course of action to be followed with regard to I-70. The MOU specifies that an assessment of the eligibility of I-70 will be prepared when it reaches 50 years of age, that good faith efforts to gather documentation on the history of I-70 will be conducted and, should any part of I-70 be determined to be eligible for the NRHP, consultation pursuant to 36 CFR 800 will be conducted. A summary of the historic environment and a signed copy of the MOU are contained in **Appendix III-E**.

b. Environmental Consequences

Section 106 of the NHPA requires FHWA to coordinate any impacts to NRHP listed properties or properties eligible for listing on the NRHP with the SHPO.

Archaeological

None of the recorded archaeological sites have been investigated beyond the record search level for this study. Archaeological sites generally are considered significant under Criterion D above; namely, they are significant because of the important historic or prehistoric information they can yield. Consequently, because of the cost and effort required to perform detailed field studies, these studies are reserved for the recommended preferred alternative only. The Phase I archaeological survey will be performed for an Area of Potential Effects (APE) consisting of a 50-m-wide (164 ft) area adjacent to the existing right-of-way (or outer road right-of-way) where lane expansion is to take place. A similar area will be surveyed for construction of any new outer roads. At interchanges, all new right-of-way will be surveyed. The survey will include intense visual inspection of the ground surface where visibility permits and shovel testing in a 30- to 50-foot grid where surface visibility is poor. If any significant archaeological sites are found that would unavoidably be adversely affected by the project, a recovery plan

would be developed in cooperation with the SHPO. Artifacts ultimately would be excavated systematically and curated in a facility that meets federal standards.

Historic Architectural Resources

The one recorded NRHP property in the project corridor, the Pierce Pennant Motor Hotel (Candlelight Lodge Retirement Center, 4BO84), would be avoided by the reasonable alternatives. The recommended National Register boundary for the property includes only the area occupied by the one remaining building of three originally present (the approximate listed NRHP boundary is what is depicted on **Exhibit III-5E**). Consequently, the reasonable alternatives would not directly impact the property. Further, given that the property is located in a developed area near the interstate highway, the reasonable alternatives would not affect the context of the property. Therefore, there would be no adverse effect.

The Amerman Farm (4BO4) consists of a large 1904 Queen Anne house, three outbuildings that date from about the same time, and seven other more recent buildings. This house is considered eligible for the National Register under Criterion C, Architecture, because of its impressive character and high level of integrity. The period of significance would be 1904, the date of construction. The three older outbuildings would be contributing secondary buildings. Since the historic boundary of the farm is not intact, the recommended NRHP boundary is an area about 100 feet north-south by 140 feet east-west encompassing the house and contributing buildings. This property is within the APE but outside the limit of proposed improvements. There would be no adverse effect.

The Van Horn Tavern (4BO28) was originally built in the 1820s. In 1914, it was moved about 100 yards northeast of its original location and converted to a barn by the addition of lean-tos on the east and west sides. The property also contains a 1914 I-house, a more recent house, and a storm cellar. Because of the move and the condition of the building, the tavern no longer has the integrity for the National Register under Criteria A or C. However, it is recommended as eligible under Criterion D as embodying information about building details, materials, and techniques from a very early historical period in Missouri. Although moved, it is considered eligible under Criteria Consideration B because the relocation does not affect its significance under Criterion D. None of the other resources on the property have the integrity for the National Register. The period of significance is ca. 1820, the date the tavern was constructed. The recommended NRHP boundary is the footprint of the barn/tavern. The building is within the APE but outside the limit of proposed improvements, which will be limited to the lane additions on the north end of the parcel and road improvements on the south end. There would be no adverse effect.

A single property, recommended eligible for the NRHP through the architectural survey, would be adversely affected by the reasonable alternatives: the Bowling-Napier Estate.

The Bowling-Napier Estate property (4BO147) consists of roughly 30 acres (12.1 hectares). There are two houses (a 1913 Eclectic Revival Colonial brick mansion and a 1908 stucco four-square house) and five outbuildings on the property; only one of the outbuildings dates before 1945. Interstate 70 forms the property's northern border. To the west are Bowling Street and the Columbia Municipal Power Plant. The Business Loop of I-70 is the southern border. Industrial/commercial properties adjoin the property's eastern boundary with the COLT rail line/Paris Road (MO-B) nearby. There is a single drive/access road across the site, and roughly the northern half of the property is wooded. The configuration of the property is shown on **Exhibit III-5F**.

Based on fieldwork conducted by the Center of Archaeological Research and a field review by MoDOT and the SHPO, the 1913 mansion was found to be eligible for the NRHP under Criterion C with a period of significance of 1913. The 1908 house would be a contributing resource. The NRHP boundary was tentatively determined to be the entire 30-acre (12.1 hectares) parcel.

Under both the collector/distributor and one-way frontage road alternatives, the project would include extending Bowling Street across the northwest corner of the property to a new Business Loop 70 East interchange. The proposed ramps along I-70 would also result in a narrow encroachment along the property's entire northern border. While no buildings would be displaced, the project will likely have an adverse effect on the property due to changes in the setting of the principal building, the brick mansion.

Overlapping Section 106 review is Section 4(f) of the Department of Transportation Act, which requires consideration of impacts to historic properties. Section 4(f) requires an analysis of feasible and prudent alternatives that would avoid the impact. Full discussion of the alternative analysis is provided in the Section 4(f) chapter of this EIS.

The Dunscombe Insurance Lustron House (4BO91) consists of a steel Lustron house and a Lustron garage. The Lustron Corporation (1946–1950) produced prefabricated steel houses in a surplus World War II Curtiss-Wright fighter plane factory in Columbus, Ohio. The Lustron Corporation received financial assistance from the Reconstruction Finance Company, a federal agency, in order to produce houses to meet the major postwar housing shortage. The houses were sold as individual units and brought to the site from the factory on specially constructed trucks. The Lustron house was supported by the federal government to meet the post-World War II needs for both affordable housing and employment by recycling a no longer needed war production plant. The venture failed after the production of relatively few houses.

A number of Lustron houses are on the NRHP, although none are listed in Missouri. This house and the adjacent garage are recommended eligible for the NRHP under Criterion A, Industry, and Criterion C, Architecture. Both buildings appear to have near complete integrity. The period of significance is 1949–1950, the date of construction. The recommended NRHP boundary is the current lot, which measures about 185 feet (56.4 m) by 82 feet (25.0 m). The property is within the APE but outside the limit of proposed improvements. There would be no adverse effect.

Cemeteries

The redesign of the Business Loop 70 West interchange may affect a small strip of the Memorial Park Cemetery property adjacent to the Business Loop 70 right of way. No structures or burial plots at the cemetery would be affected. The Cochran family cemetery would be avoided by the reasonable alternatives.

c. Measures to Minimize Harm

Relative to Section 106, coordination with the SHPO has been on-going. The impacts discussed in this document have been developed pursuant to that coordination. A final assessment of the impacts of the project would be made by the SHPO. A course of action to minimize the impacts would be developed in consultation with the SHPO. A draft copy of the SIU 4 Section 106 Programmatic Agreement is located in **Chapter IV.B.9**.

14. Visual Resources

a. Affected Environment

Introduction and Important Terms

An analysis of the existing visual resources within the SIU 4 project corridor was conducted. The analysis conformed to FHWA DOT-FH-11-9694 and American Society of Landscape Architects (ASLA) visual assessment guidelines. Field investigations and photographic analysis were the primary techniques used to assess visual resources and the visual character of the project corridor. The analysis focused on *viewers* and the visual resources that appear within their *viewshed* or angle of view. The views documented here are those that would be seen from the proposed project by travelers (those using the highways) and those of the highway as seen by neighbors (those who own property adjacent to the project).

Visual resources consist of land forms, such as mountains, and land cover including water, vegetation and the manmade development. Visual resources determine a landscape's *visual character*. For example, visual resources in the study corridor along I-70 from Stadium Boulevard to U.S. 63, the most urbanized section of the corridor, are a complex land cover of manmade development or densely located high-rise buildings, busy interchanges, scarce views of open space, numerous overhead signs, street lights and overpasses. Along rural portions of the interstate, the scene is less visually complex, notably a rolling, pastoral landscape with limestone outcroppings, oak-hickory forests and some low areas on both sides of the roadway.

Visual character of a landscape is formed by visual elements, such as form, line, color and texture. The interrelationships of these forms can be described in terms of the prominence, scale, diversity and continuity of landform and land cover.

Aesthetics is the science or philosophy concerned with the quality of the sensory experience; in this case, the visual experience.

Viewers comprise groups that have different exposures to the view and different preconceptions of the visual environment. The combination of viewer exposure and viewer's perception or sensitivity results in the viewer's response to the environment. For example, viewers driving on a city street in heavy traffic likely would concentrate on driving conditions and foreground views of vehicles, street signs and traffic signals and have low awareness or perception of adjacent historic buildings or background mountains. Drivers' views of foreground visual resources would be brief. Residents of adjacent houses, who have stationary viewpoints, would be exposed to views of long duration and have a greater awareness of views beyond the immediate roadway than would drivers.

Viewsheds consist of all surface areas visible from an observer's point of view and the surface areas from which an important object or viewpoint is seen. For example, the Cancer Center and many hotels along I-70, because of their height and large scale, can be seen from many near and distant viewpoints in all directions along I-70. They have a large viewshed. On the other hand, most of the development surrounding I-70 and frontage roads has a mix of residential and commercial uses of lower height that have a small viewshed.

Visual quality measures how pleasing a visual perception of a given view or environment is to the viewer. What viewers want to see in a proposed corridor alignment relates directly to their

self-interest: travelers want to easily locate a place to eat or sleep in a safe, attractive part of town, whereas retailers want to be sure their establishments are clearly visible to potential clients from the proposed highway alignment. Visual quality is the composite perception of neighbors and travelers with regard to their surroundings.

Landscape Context and Visual Resources

The most striking visual characteristic of the SIU 4 project corridor is the visual contrast between the urban and rural environments. For the visual analysis, the urban part of the project corridor is defined as the area between Stadium/exit 124 and U.S. 63/exit 128A. The rural parts are east and west of Columbia.

While the near urban views change somewhat, depending on location and terrain, the views along I-70 generally consist of various types of real estate development, the most distinctive being commercial developments, particularly hotels and restaurants. Overall, the urban area can be considered fully developed. Along the arterials in this part of the project corridor, the views are of a mixed-use nature and can include hospitals, residential areas, commercial developments and industrial infill. In most instances, the developments are one to two stories in height and only occasionally higher, typically for hospitals and hotels. Commercial centers with detached buildings and parking in front are a common type of commercial development on the arterials. Big-box shopping centers are common and prominent at all major intersections. Visually speaking, the intersections do not provide cohesive examples of the built environment within the project area. There are more buildings in this six-mile area than in all the other areas combined. There is little visual cohesion in terms of design integrity with relation to signage, setbacks, layout of parking lots, access to commercial establishments, etc. Substantial views to open space are limited to Cosmo Park and Memorial Cemetery. The Candlelight Lodge Retirement Center, a property listed on the National Register of Historic Places, is located within the project corridor adjacent to Memorial Cemetery. The Candlelight Lodge is not visible from I-70. Views of developed areas are widely variable and interspersed with agricultural and other lands that eventually would be developed as part of the urban commercial fabric. Large residential neighborhoods of varying socioeconomic status are found within the area. Existing views of I-70 from most neighborhoods are effectively obstructed by vegetation, frontage roads and other buildings. Overall, the visual environment in the urban zone and along the arterials is disharmonious and disorderly.

The rural visual environment is largely shaped by the relatively flat terrain throughout this portion of I-70. Because of the topography, there are few substantial distant views of natural elements. The most common views of natural areas occur in the agricultural open spaces and at the Perche Creek. Views of the Perche Creek floodplain, between U.S. 40 and Sorrell's Overpass (approximately mile marker 122) rank among the most important views of natural areas in the project corridor. However, these views can not be considered outstanding or unique. Views of the Missouri River and its scenic limestone cliffs do not exist from any area within the project corridor. The residential communities within the rural areas range from trailers to single family homes, typically developed in an urban/suburban rather than rural style with small lots and homes close together. Many of the residential communities have an architectural character indicative of the middle-class Midwest, with ranch-style and two-story homes with hip roofs being typical. The visual resources of the rural lands are a noticeable contrast to the urban density within the city of Columbia. As the city expands in the future, these lands may be swallowed up by urban expansion. Overall, however, the visual environment in the rural areas contains few important or sensitive elements (such as water resources or plant communities).

Important visual resources are limited by the relatively flat terrain and the emergence of prototypical roadside commercial developments.

Exhibit III-6 is a photolog of some of the important visual elements within the project corridor.

b. Environmental Consequences

This section analyzes the potential impacts to the typical visual character of the project area traversed by each alternative. Impacts to visual character were evaluated using the methodologies promulgated by FHWA Office of Environmental Policy (DOT-FH-11-9694) and the ASLA. The visual quality assessment also followed the goals of the “I-70 Corridor Enhancement Plan, Aesthetic Enhancements for the Second Tier Environmental Studies” as prepared by the Missouri Department of Transportation in July 2003. Locations were selected for their typical views, for visual characteristics that help to give the Columbia area a special identity; or for heavily traveled routes, where large numbers of people would be expected to view the setting. Views were evaluated for their potential to alter near or distant views of the roadway and views from the roadway.

The analysis considers landform, water, vegetation and human-made components of the near and distant views, how a new alignment of I-70 could alter these visual characteristics and what viewers would see of and from the new roadway alignments and structures. For this analysis, the viewer groups include those individuals with views from the adjacent buildings along the roadway and the travelers or drivers along the existing roads.

Views of the Road: In many instances, the presence of a highway in the rural setting outside of the city of Columbia would result in only a moderate degree of contrast as the highway is not an unexpected or foreign element for those exposed to views of the road. Rather, over time, the highway becomes more entrenched as a thread in the fabric of the landscape, as part of the overall composition with the existing topography, water bodies and vegetation as well as the manmade developments. In other locations, such as those through the densely urbanized sections of I-70 that pass through the city of Columbia, construction of a new alignment would tend to cause visible changes to the local setting but not substantially alter the regional landscape character.

Views from the Road: Views from the proposed I-70 alignments in the rural portion of the project area could be expected to offer drivers the typical farmland views: fields, streams, outcroppings and rolling hills. In the urbanized sections of I-70 through the city of Columbia, views from the new I-70 alignment could be expected to offer drivers views of typical urban commercial and residential elements: lodging, restaurants, some open space and neighborhoods.

Engineering features of the proposed alternatives, which would include pavement surface, median, cut and fill slopes, retaining walls and abutments, underpasses, crossings, bridges and noise walls were evaluated for their impacts to the existing visual character.

At some locations, the proposed I-70 alignments could cause some negative visual impacts by altering the existing near or distant views of visually sensitive resources, such as historic sites and special naturally occurring or manmade features. There is also the possibility that the displacement of land uses along the I-70 corridor due to the proposed corridor improvements and related right of way acquisition could open attractive views and provide additional open space in areas previously populated with buildings. In areas where bridges are to be replaced or where noise walls may need to be placed, aesthetically pleasing structures and appropriate

landscaping and noise wall design could create an improvement in the visual quality of the urban experience.

With the exception of the proposed improvements at the Stadium interchange and the addition of three new bridges between mile markers 126 and 128, none of the alternatives would have appreciable negative impacts to the visual environment. In addition, the displacements of buildings that are proposed to occur at the Stadium and the U.S. 63 interchanges would provide opportunities to enhance the area. The removal of buildings adjacent to the highway corridor could create new open space for possible enhancements.

MO-J/O: Southern Widening with Diamond Interchange – In this portion of I-70, a single reasonable alternative was evaluated.

Views of the Road: Primary viewer groups would include farm residents along this rural stretch of I-70 and employees or customers of businesses that front the highway. In this area, the road is dominated by agricultural lands.

Views from the Road: Due to the proposed widening of the median, the views of on-coming traffic from the opposite side travel lanes would be buffered by the widened space and vegetation. Views to adjacent lands would remain rural in nature.

Visual impacts: The Preferred Alternative would not result in major impacts to the existing rural landscape.

U.S. 40: Southern Widening with Enhanced Diamond and Loop Ramp Interchange – Within this portion of I-70, two interchange alternatives were evaluated. Both alternatives have different design elements, which would result in some differences in visual impacts.

Views of the Road: The primary viewer groups for both alternatives would be the travelers along the frontage and interchange roads, local farm residents and employees or customers of the businesses that are located along the frontage road.

In the Enhanced Diamond alternative, new frontage roads in the southwest and southeast quadrants cut through existing undeveloped areas surrounded by existing vegetation. Near views of these new frontage roads may be seen by a few commercial enterprises in that vicinity. Distant views of the frontage and interchange roads would be obscured by existing vegetation in most areas; however, views of the I-70 mainline would be visible from the frontage and interchange roads. The views of the realigned frontage road in the northeast and northwest quadrants largely follow existing roadways and views of the roads do not vary widely from the existing condition.

In the Diamond with Southwest Loop alternative, extensive road realignments are proposed; in all quadrants, new frontage roads, interchange ramps and cross roads are located through some previously undeveloped areas. North of I-70, views of the relocated U.S. 40, interchanges, ramps and frontage road alignments would be screened largely by existing vegetation and terrain. These new alignments would be seen by a few farm residences and one commercial establishment from a distance. The near and distant views of the road by the user groups would be improved substantially by the removal of buildings and parking lots north of I-70 that are marginally pleasing.

Views from the Road: The primary viewer groups for both alternatives would be the travelers along the frontage and interchange roads and I-70.

In the Enhanced Diamond alternative, distant views from I-70 and the interchange roads, ramps and frontage roads south of I-70 at Perche Creek and at U.S. 40 in the southeast and southwest quadrants would include open panoramas of the rural landscape. Near views from I-70 at U.S. Route 40 would be of several commercial-industrial developments, the same as the existing condition.

In the Diamond with Southwest Loop alternative, the proposed project would result in opening views of the rural countryside for travelers on I-70 and the frontage and interchange roads with the removal of various commercial-industrial structures. The development of the new southwest loop and the paralleling of the cross road and frontage road south of I-70 offers opportunities for plantings and beautification in areas that are void of vegetation currently.

Visual Impacts: While there are numerous new alignments for frontage and cross roads in these alternatives, the distances between roads, the location of existing vegetation and terrain and the dominant rural character of the area, it is not expected that the alternatives for the U.S. 40 interchange would result in any substantial visual impacts to the existing rural landscape along this portion of the project corridor. In fact, in the Diamond with Southwest Loop alternative, the removal of several large buildings would improve the views of the rural landscape for travelers, customers at businesses and local residents within the project. Newly created open spaces in the loop and between new roads offer opportunities for native plantings and other amenities.

Stadium: Symmetrical Widening with Northwestern Loop Ramp, Tight Diamond, SPUI and Split Diamond Interchange – In this area, four interchange alternatives were evaluated, all of which have design elements that would result in similar impacts in this already heavily developed area.

Views of the Road: For all of the reasonable alternatives, the primary viewer groups include the residents in adjacent neighborhoods, the employees and customers of the businesses along the I-70 frontage road and the interchange and the approach roads in the vicinity of the interchange. In this area the road is located in a viewshed that is dominated by large box developments, a hotel/restaurant building and other commercial frontage and the intersecting streets adjacent to I-70. For the trailer residents north of I-70 in proximity to mile marker 125, the views of the proposed I-70 improvements could be obscured by a potential noise wall in this location.

In the Northwest Loop Ramp alternative, the displacement of the Extended Stay America, the Antique Market and other buildings adjacent to I-70 could open new views from the remaining commercial and residential areas to existing open space and from the frontage and interchange ramps to I-70. In all alternatives, between mile marker 125 and 126, buildings which currently obscure the Candlelight Lodge Retirement Center would be removed, opening new views of I-70 from this point.

In the tight diamond and SPUI alternatives, I-70 is realigned further from its original alignment than in the other two alternatives. This realignment has the potential for creating wider areas between the frontage roads and the mainline. This open area could be used for beautification and could improve views of I-70 for travelers on ramps and frontage roads, residents and commercial customers.

Views from the Road: The displacement of buildings in the northwest quadrant could open up open space views in the cloverleaf area in the Northwest Loop Ramp alternative for travelers along the ramps and frontage roads. A noise wall could serve to block views of the residential development from I-70 while the noise wall would block the view of I-70 and the interchange from the adjacent residential area. After building displacements are accomplished in proximity to the Candlelight Lodge Retirement Center, the back side of the center would dominate the near views in proximity to mile marker 125. The required acquisition of several properties would result in expanded views of the historic motor lodge from I-70.

Visual Impacts: This portion of the project is already heavily developed and visually very urban in character. Additional road improvements reflect only a rearranging of views of development and would not substantially change the overall visual quality of the area. In the Northwest Loop Ramp alternative, the views from the road would actually be improved over the existing condition with the displacement of the Antique Market, parking lot and adjacent building. In all the alternatives, near and distant views of residences and businesses adjacent to the I-70 frontage roads would not be substantially altered or changed with any of these alternatives, with the possible exception of the neighborhoods potentially behind a noise wall in the future. The design and construction of the recommended noise wall at this location would be consistent with the aesthetic goals identified in the "I-70 Corridor Enhancement Plan, Aesthetic Enhancements for the Second Tier Environmental Studies" as prepared by MoDOT. Views of the new wall structures from I-70 could alter the aesthetic character of the area, if the walls are not designed to complement their surroundings. Views of and from the historic lodge, however, could be impacted because the visual buffer created by other existing structures would be removed as part of the proposed realignment of I-70. Removal of the existing structures would expose the back of the historic lodge to the highway, creating negative views of I-70 from the historic lodge from I-70 to the lodge.

Business Loop (West): Symmetrical Widening with Two-Point Interchange – In this portion of I-70, a single reasonable alternative was evaluated.

Views of the Road: Primary viewer groups would be drivers and employees or customers of businesses along the frontage road and local single-family residents in the Parkade neighborhood. A potential noise wall could shield views of the I-70 improvements from the Parkade neighborhood.

Views from the Road: The near and distant views would chiefly be limited to large box developments, hotel/restaurant building and other commercial frontage and intersecting streets adjacent to I-70. Drivers along I-70 would continue to view the array of commercial activities along I-70. The potential noise wall could obscure views of residential development from I-70 drivers.

Visual Impacts: The design and construction of a noise wall at this location would be consistent with the aesthetic goals identified in the "I-70 Corridor Enhancement Plan, Aesthetic Enhancements for the Second Tier Environmental Studies" as prepared by the MoDOT. Views of a potential noise wall structure from I-70 could substantially alter or change the aesthetic character of the area, if the walls are not designed to complement their surroundings.

MO-163/MO-763/Business Loop East: One-Way Frontage Road System and Collector/Distributor System – Within this area, two alternatives were evaluated, both of which have similar design elements but which would result in some differences in visual impacts.

Views of the Road: In both alternatives, the primary viewer groups would be drivers along the frontage/collector/distributor roads and local residents and employees or customers of businesses that front the road. In both alternatives, the addition of three new bridges, “the Triplets,” is proposed at MO-163, MO-763 and west of Paris Road. A potential noise wall could shield views of the I-70 improvements and frontage/collector/distributor roads from existing residential areas, including a multi-family apartment complex in both alternatives.

In the collector/distributor system alternative, the double set of collector/distributor roads would be more visible to local residents, travelers along I-70 and commercial customers than would the single one-way frontage roads in the frontage road system alternative. The residential areas displaced by both alternatives would roughly be the same, although the area between the one-way frontage roads and I-70 would be wider in the frontage road alternative than in the other alternative. The wider area could be used as open space to enhance the visual quality of the road for all viewer groups.

Views from the Road: For both alternatives, the near and distant views would chiefly be limited to large box developments, hotel/restaurant building and other commercial frontage and intersecting streets and neighborhoods adjacent to MO-163 and MO-763. Drivers along I-70 would continue to view the array of commercial activities along I-70 with the addition of new bridge structures (“the Triplets”). However, in the frontage road alternative there is an opportunity to screen the frontage road from I-70 in the open space between the frontage road and I-70. If this were to happen, this alternative could enhance views from I-70 to the frontage roads and from the frontage roads and adjacent residential/commercial areas. In both alternatives, a noise wall could obscure the view by travelers of residential developments. Views from I-70 of the noise wall could be enhanced with native plantings.

Visual Impacts: In both alternatives, the addition of three new bridges, “the Triplets,” proposed at MO-163, MO-763 and west of Paris Road would create substantial visual impacts to the surrounding environment. The addition of a new bridge west of Paris Road would have the most impact because it did not exist previously. East of mile marker 127, views of a potential noise wall on the south side of I-70 could alter the aesthetic character of the area, if the noise walls are not designed to complement their surroundings. The design of the new bridges and any new noise walls would incorporate the elements contained in the “I-70 Corridor Enhancement Plan, Aesthetic Enhancements for the Second Tier Environmental Studies” prepared by the MoDOT in July 2003. When treated appropriately by incorporating aesthetically pleasing design elements, views of the new bridge and wall structures could be a positive visual addition to the area. Views of and to the frontage roads would have less impact than views of the multiple-lanes in the collector/distributor system. Use of space between the frontage roads and I-70 for plantings or other amenities could enhance visual character along I-70.

U.S. 63: Tight Right of Way Interchange – In this portion of I-70, a single reasonable alternative was evaluated.

Views of the Road: Primary viewer groups would be drivers, employees or customers of businesses that front I-70. The displacement of buildings adjacent to I-70, such as the La Quinta Inn at exit 128A, could open views from other commercial entities and residential areas. A potential noise wall at mile marker 130 could shield views of the I-70 improvements from the mobile home neighborhood.

Views from the Road: The near and distant views of the surrounding residences and the numerous businesses that front I-70 would be similar to the present existing condition. A potential noise wall could obscure views of a mobile home neighborhood for I-70 drivers and could alter or change the aesthetic character of the area, if the walls are not designed to complement their surroundings.

Visual Impacts: The design of the new bridges and any new noise walls would incorporate the elements contained in the “I-70 Corridor Enhancement Plan, Aesthetic Enhancements for the Second Tier Environmental Studies” prepared by the MoDOT in July 2003. When treated appropriately by incorporating aesthetically pleasing design elements, views of the new bridge and wall structures could be a positive visual addition to the area.

St. Charles Road: Diamond Interchange and Off-Set Diamond Interchange – Within this area, two alternatives were evaluated. Although they have similar design elements some differences in visual impact may arise.

Views of the Road: In both alternatives, primary viewer groups would be neighborhood residents and employees or customers of the few businesses that front the road. In both alternatives, a new interchange ramp and frontage road in the southeast/southwest quadrants outline an area that would be developed. In the Diamond alternative, the interchange ramp is located closer to the I-70 mainline than in the other alternative and views of the ramp from adjacent businesses and travelers on I-70 would be similar to the current views of the existing frontage road. However, the visual environment could be improved if the new area created between the proposed interchange and I-70 is used to provide vegetative screening of the ramp. In the Offset Diamond alternative, new area created between the proposed interchange and I-70 is larger than in the other alternative and affords a greater opportunity to screen the interchange ramp and the frontage road than in the other alternative.

North of I-70 in the Diamond alternative, the proposed interchange road displaces several commercial buildings, which would open views of the interchange ramp from I-70 and open views of I-70 from the ramp. The open space created between the ramp and I-70 offers the potential for screening I-70 and the ramp.

In both alternatives, the construction of a future noise wall could shield views of the I-70 improvements from the multi-family home neighborhood at mile marker 131.5.

Views from the Road: In both alternatives, the near and distant views are chiefly of residential neighborhoods, rural landscapes, backyards, building frontage and intersecting streets adjacent to St. Charles Road. In both alternatives, the new interchange ramp south of I-70 would be located close enough to I-70 that it be visible from I-70; the new frontage road which outlines the area to be developed in either alternative would not be readily seen due to its distance from I-70. In the Offset Diamond alternative, however, the paralleling of the interchange ramp and the frontage road south of I-70 toward MO-Z would be substantially visible from I-70. The area between the ramp and the frontage road offers an opportunity for vegetative screening.

Visual Impacts: Both alternatives would displace existing development north of I-70 while providing a new frontage road south of I-70. Visually, in the long run, these layouts would increase the urban character of the area as development south of I-70 expands. Until that time, the new frontage road would have minor visual impact on this portion of the project.

MO-Z: Diamond Interchange and Diamond Interchange with NW Loop Ramp and Rural Transition – Within this area, two alternatives were evaluated, both of which have similar design elements and some difference in impacts.

Views of the Road: In both alternatives, the primary viewer groups would be a few farm residents along this rural stretch of I-70 and employees or customers of businesses that front the road. In this area, mainline I-70, the interchange ramp and frontage road are located in a viewshed that is dominated by agricultural lands. In the Diamond with Northwest Loop alternative, the northwest loop with associated ramp and frontage road increase the amount of roadway that would be seen from I-70; the open spaces between the loop and the ramp afford the opportunity for vegetative screening of the ramp and frontage road. In both alternatives, the frontage roads north and south of I-70 are extended twice as far from I-70 as the current frontage road is. This distance reduces the visual impact of the frontage roads from I-70; however, the longer frontages become more visible to the businesses that front on them.

Views from the Road: Due to the proposed widening of the median in both alternatives, the views of on-coming traffic from the other lanes would be buffered by the widened space and vegetation. Distant views to adjacent lands would remain rural in nature, especially from the frontage roads north and south of I-70 in both alternatives. In the diamond interchange alternative, views of the rural landscape from the new frontage road northeast of I-70 would be improved while views from I-70 of the interchange ramps and frontage roads would be substantial. In the Diamond with Northwest Loop alternative, views from I-70 of the new loop with associated ramp and frontage road would be substantial without screening.

Visual Impacts: While the two alternatives have different configurations with respect to locations of frontage roads and interchange ramps, the locations of these new roads are situated a substantial distance from the I-70 mainline. These configurations are spread out sufficiently from I-70 to visually lessen the impact of their presence due to topography and some existing vegetation. The northeast frontage road in the diamond interchange alternative may be seen by some residences. Balancing the improvement of some views of the rural landscape with some negative views of new roadway areas, overall, these two alternatives would have little visual impact on views which are presently dominated by the rural landscape. Strategic placement of vegetative screening materials would ameliorate negative views of both alternatives.

c. Measures to Minimize Harm

The I-70 First Tier EIS documented the commitments of MoDOT and FHWA to provide corridor-wide impact coordination, impact mitigation and considerations of corridor enhancements. The document provided agencies and communities the assurance that an enhancement master plan would be developed, and that corridor-based considerations would be fulfilled and appropriate special considerations would be provided for each of the Second Tier studies.

A Corridor Enhancement Subcommittee, one of three subcommittees of the Study Management Group for the I-70 corridor, is a consortium of the project team and local, state and federal agency technical staff. This subcommittee developed a proposed enhancement plan for the overall I-70 corridor. The goals of the enhancement plan include creating an approximately 200-mile I-70 transportation corridor that does the following:

- Complements the existing natural environment;
- Maintains sensitivity to the existing context of the corridor;

- Provides a sense of consistency along the entire route;
- Showcases Missouri natural resources through enhancements, which also highlight Missouri history, cultural resources and economy; and
- Establishes baseline enhancements for the entire corridor and identifies opportunities for additional enhancements by local communities and other partnering agencies.

Included in the conceptual plan are a program for aesthetic enhancements for the existing natural features in the corridor; visual design treatments to build elements that reduce their sense of scale; an overall design theme for enhancements to complement the visual context of the corridor (context sensitive solutions); corridor landscape enhancements for both the mainline and interchanges; riparian habitat enhancement and wildlife corridors treatment.

Appropriate baseline enhancement features would be incorporated into the major reconstruction efforts along the I-70 corridor, dependent upon the availability of adequate funding. This baseline enhancement concept includes bridge enhancement, landscaping using native grasses and flowers and habitat enhancement at major stream and river crossings. Additional beyond-baseline enhancements are dependent upon the participation and funding by local communities and resource agencies.

As provided for in the I-70 Corridor Enhancement Plan, the following text would explore the aesthetic enhancements that potentially apply to SIU 4. Many of the design elements would require further evaluation, as design activities proceed, to ensure that they are appropriate and would truly enhance the post-construction environment. The following design elements are currently under consideration for SIU 4:

Railing and Fencing

The I-70 Corridor Enhancement Plan addresses two types of railing and fencing: those for the protection of pedestrians and those used for right of way demarcation purposes.

Pedestrian Railing and Fencing is appropriate at locations where pedestrian and bicyclist safety may be compromised. Applicable treatments include roadway barriers, railing, special paving and signage. Barriers can also be used to separate vehicular and pedestrian traffic on bridges. The barriers may include concrete barriers, decorative metal railings or a combination of barrier and railing. Several initial designs for these elements have been developed in the First Tier Corridor Enhancement Plan. However, as with other elements, these designs would be further explored in the detailed design process to arrive at the final design.

Right of Way Fencing at a minimum, would denote the project's right of way boundary in pedestrian areas and would be chain link fencing. Site-specific alterations may be possible. The height of the fencing would need to be consistent with its location and use.

Bridge Treatments

The I-70 Corridor Enhancement Plan provides for the possibility of an aesthetic design program to unify the visual theme of the corridor. Among the possible design element treatments (appropriate to SIU 4) include bridge abutments, piers and roadway/bridge barriers.

Bridge Abutment treatments can include adding form liners to concrete walls in order to create a customized texture. Complementing/mimicking the natural rock outcroppings along I-70 is one possible treatment using form liners.

Bridge Pier enhancements would focus on ways to reduce the top-heavy appearance of bridges that span distances as wide as those required for the I-70 project. Creating a strong visual connection between the center piers and the end abutments would help balance the image.

Roadway/Bridge Barrier treatments vary based on use. Several types are specified for use on I-70, including standard concrete traffic barriers, tubular steel guardrails, corral and F-shaped rails. Some flexibility in the application of barrier types is anticipated. However, the aesthetic treatments must focus on maximizing the visual benefit to the travelling public. No treatments would be considered that are not visible to the travelling public. Five noise walls have been determined to be feasible – at mile markers 124, 126, 127, 130 and 131.5. At these locations, noise walls could also serve to screen residential development from the I-70 improvements. The design of an aesthetically pleasing noise wall would add visual interest along the highway corridor and with appropriate landscaping could be considered an enhancement.

Bicycle Trail Crossings

Aesthetic treatments can also help increase safety. Although there are no existing trail crossings of I-70, several are proposed (see **Exhibit III-5**) and MoDOT is committed to facilitating these crossings. All treatments must comply with all applicable regulations (including ADAAG, AASHTO, etc.).

Lighting

Lighting for the new I-70 corridor would follow the same general pattern of the existing system. All poles and fixtures would be dark brown anodized aluminum in color. Existing street lighting would be replaced, in kind.

Landscape Enhancements

Consistent with the I-70 Corridor Enhancement Plan, landscape plantings would be a component of the design program for enhancing the SIU 4 corridor. Enhancements in the median area could include naturalizing the median with vegetative treatments, such as native Missouri wildflower plantings or other plantings, which could provide a vertical element in the median with trees and shrubs as contrasted to the flat horizontal character of the highway and existing wide median.

Community Partnership Opportunities

Across the United States communities and transportation agencies are working together to create attractive gateways to their communities. The I-70 project provides an excellent opportunity for that type of cooperation. It would require the communities to participate financially in the design, implementation and maintenance costs.

15. Construction Planning

Construction of the project would affect traffic along I-70, all roadways that cross the corridor, frontage roads and the surrounding transportation system.

The project is not expected to be constructed as a single, large effort, but rather be broken down into smaller units. This would minimize the disruptions to the roadway network and to the affected community. Each construction unit would require temporary access points for heavy equipment and temporary equipment and supply staging (storage) areas. These sites may cause some peripheral impacts to the transportation system.

An extensive Maintenance of Traffic Plan would be needed to minimize the potential impacts to the transportation network. During design, detailed traffic control and detour plans would be developed to ensure that adequate access is maintained to residences, businesses, schools, hospitals and other community facilities. **Appendix II-B** contains data compiled regarding construction planning.

16. Energy

Energy consumption related to highway projects involves both construction and operational energy. Construction energy is that required in raw materials and equipment to build or maintain the highway. Operational energy is the direct consumption of fuel by vehicles using the roadway. Fuel usage is affected by vehicle type, highway grades and other geometric characteristics, speed, congestion and queuing caused by high traffic volumes and intersection stop conditions.

Energy consumption for a No-Build Alternative would be associated with long-term fuel usage and effects due to increased congestion on the existing highway.

The reasonable alternatives would all require the investment of energy for excavating, filling, hauling, pavement construction and material manufacturing necessary to construct the new roadway and appurtenances. Operational energy under the reasonable alternatives would be less than under the No-Build Alternative because of more efficient traffic operations and fewer delays. The energy saved because of the new pavement, uniform travel speed and decrease in the number of crashes would help offset the energy consumption required for construction.

17. Local Short-Term Uses and Long-Term Productivity

Highway construction projects require the investment or commitment of resources in the project area. Short-term uses refer to the immediate consequences of the project, whereas long-term productivity relates to its direct and secondary effects on future generations.

The No-Build Alternative would involve minimal short-term and localized construction impacts associated with maintenance of pavement and structures and spot safety improvements. However, projected traffic growth in the study area would further reduce the operational efficiency of the existing highway, resulting in reduced safety and mobility and possibly the loss of economic growth opportunities.

Relative to short-term uses and long-term productivity, the reasonable alternatives are roughly equivalent. The consequences of the reasonable alternatives are expected to include the following:

- Removing private property from local government tax rolls, thereby temporarily reducing the local tax base.
- Committing public funds to construct the highway improvements. Because highway funding is derived from vehicle user fees and motor fuel taxes, those using the highway ultimately pay for the improvements.
- Converting residential and commercial land, wetland, agricultural land and other resources to transportation use.
- Displacing residences and businesses. Displacement costs would be reimbursed through state and federal relocation assistance programs. Suitable replacement residential properties exist near the proposed displacements. The business community has demonstrated a desire to remain in the Columbia/Boone County area. The City of Columbia has initiated a process to develop strategies to promote the successful relocation of the displaced businesses.
- Right of Way acquisition from some properties may result in nonconforming lot sizes.
- Inconvenience and added travel time during the construction period for through and local traffic, area residents and businesses.
- Construction noise and dust that may affect residences and businesses near the construction areas.

The local, short-term impacts and use of resources for the project is appropriate in light of the maintenance and enhancement of long-term productivity that would result from the project.

18. Irreversible and Irretrievable Commitment of Resources

Land acquired for construction is considered an irreversible commitment during the period land is used for highway purposes. Considerable amounts of fossil fuel, labor and highway construction materials, such as cement, aggregate and asphaltic material, would be required. Considerable labor and natural resources would be used in the fabrication and preparation of construction materials. These resources generally are not retrievable. However, they are expected to remain in adequate supply.

Expenditure of public funds for construction of the project is an irretrievable commitment. Land converted from private to public use would tend to lower local tax revenues by reducing the overall area of land, but overall local revenues would not suffer substantially. Implementation of the project would improve operations on I-70, thereby improving the overall business climate. The business community would benefit directly from the operational improvements.

The proposed commitment of resources is based on the concept that residents in the study area, region and state would benefit from the improved quality of the highway. Benefits that are expected to outweigh the commitment of resources would include improved safety and travel time savings.

19. Environmental Commitments

During the design and implementation of the selected alternatives, MoDOT is committed to obtaining necessary permits and performing other actions that would minimize and mitigate the impacts of the project on the environment. Those commitments, stated above in various sections of the document, are summarized below:

- Relocation assistance would be provided for all businesses, nonprofit organizations and residents that must be relocated. Assistance would be provided by MoDOT in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act as amended. Relocation assistance under the program would be made available without discrimination to all who are relocated. Additional information on relocation assistance can be found at <http://www.fhwa.dot.gov/realestate/pdq10.htm> and <http://www.modot.state.mo.us/design/specbook/spec.htm>.
- The I-70 Study Team would continue to coordinate with local planning agencies, including CATSO and the Columbia Planning and Building Department.
- A maintenance of traffic plan would be developed for the construction phases. Through traffic would be maintained along I-70 and at access points to the interstate from cross roads. It is likely that some interchange ramps and cross roads would be closed and temporary detours required. Construction schedules, road closures and detours would be coordinated with police forces and emergency services to reduce impact to response times of these agencies.
- Provisions would be made for bike, pedestrian and wheelchair access across I-70 wherever possible and reasonable.
- The design of roadway crossings over I-70 and bridges over streams in the Columbia area would be coordinated with the City Planning and Building Department and the Parks and Recreation Department to make the crossings as compatible as possible with plans to extend bicycle and pedestrian trails and pathways along the roadways and stream corridors.
- Detailed design of the project would include early coordination with City and County public works departments and the Missouri One Call System to identify utilities in the project area. The design process would include periodic consultation of utility owners to ensure compatibility of the roadway design with continued service, proper design of any utilities requiring relocation, construction techniques and timing and technical assistance during construction.
- During the final design process, the MoDOT would consider options to reduce new right of way acquisition from farm properties.
- The MoDOT would coordinate with the USACE under the NEPA/Section 404 Merger to ensure compliance with Sections 401 and 404 of the CWA. This would address impacts to streams, wetlands and other waters of the United States during the design process. Clean Water Act permits would require a detailed delineation and evaluation of waters and wetlands affected by the project and minimization of impacts. A wetland delineation is currently being performed along the project corridor and, in accordance with established procedure, the wetland delineation results will be presented in the Final Environmental Impact Statement. During the design phase

- specific impacts to wetland and other Waters of the U.S. would be assessed to determine if those impacts can be avoided or further minimized. Unavoidable impacts to wetland and streams would require mitigation. Development of mitigation strategies would be determined through the permitting process with the USACE and the MDNR.
- Best management practices would be implemented to prevent and reduce soil erosion and sedimentation in local waterways and sinkholes. Missouri Department of Transportation would employ methods for stormwater management during and after construction in accordance with its *Standard Specifications Book for Highway Construction* and NPDES stormwater permit, as well as methods included in the joint Columbia/Boone County NPDES Phase II stormwater permit. Disturbed areas would be restored with suitable vegetation to stabilize the area over the long term.
 - Floodplain permits would be obtained from State Emergency Management Agency.
 - Landscaping in the right of way would include native plant species and other enhancements in accordance with the statewide I-70 Corridor Enhancement Plan to the maximum extent possible. In accordance with MoDOT standards, new seed mixes, mulch and plant materials would be free of invasive weedy species to the extent possible to reduce the spread of invasive species along the highway to natural areas and adjacent properties.
 - Weed management along the corridor would be performed in accordance with Missouri Department of Transportation standards.
 - A survey of trees suitable for Indiana bat roosting habitat would be performed in the area of the preferred alternative. To avoid potential impacts to the bat during the period when the bat would most likely use these habitats, MoDOT would not cut suitable maternity roost trees during the period April 1 to September 30. If cutting of suitable trees during that period is unavoidable, biologists would perform a complete assessment of the habitat in advance to certify that the habitat is not currently in use by the bat.
 - Surveys for populations or potential habitat of the Running Buffalo clover would be performed prior to construction activities.
 - Missouri Department of Transportation would cooperate with MDNR and USFWS to relocate the population of bristled cyperus known to occur within the right of way and would ensure that the population is completely relocated to other publicly owned lands prior to construction.
 - Additional study and proper remediation of hazardous waste sites that would be encountered by construction would be performed as needed to minimize exposure of construction workers and the public to hazardous wastes and to ensure proper disposal of contaminated earth and other substances. This includes proper disposal of demolition debris in accordance with state law.
 - Dust control during construction would be performed in accordance with MoDOT's standard methods, which require application of water or approved dust control measures on haul roads and during grading. Pavement material batch plants would be situated in accordance with the *Standard Specifications* or any special provisions

developed during coordination with MDNR regarding air quality standards and emissions. Portable material plants would be operated in accordance with MDNR air quality requirements/guidelines. A permit must be obtained from the MDNR to open burn or open burn with restrictions.

- Noise barriers would be further investigated at five locations, as identified in the study of sensitive receptors, where their installation is feasible and the cost of the barriers does not exceed the state noise policy, approved by FHWA. This process would comply with MoDOT standard procedures and include more detailed evaluations of cost and effectiveness, public involvement and outreach and, potentially, barrier design and implementation.
- Missouri Department of Transportation would coordinate with the State Historic Preservation Office to ensure compliance with Section 106 of the NHPA. This would include the completion of any needed Programmatic Agreements and whatever additional work that might be included in that agreement.
- The design of new structures such as bridges and noise barrier walls would incorporate the elements contained in the I-70 Corridor Enhancement Plan to the maximum extent possible.
- Missouri Department of Transportation would consult with emergency responder agencies involved in traffic incident management on I-70 in the future design and maintenance of traffic plan development as the Improve I-70 program progresses.

E. Secondary and Cumulative Impacts

1. Introduction

The assessment of secondary and cumulative impacts in NEPA documents is required by CEQ regulations. Secondary and cumulative impacts result when the effects of one project are added to the effects of all of the other projects that would take place in a particular place and within a particular time. Secondary and cumulative impacts may occur outside the highway right of way and be generated as a result of changes in development patterns. Secondary or cumulative impacts may also be the unintended consequences of roadway improvements. Impacts may include increases in traffic volumes outside the study corridor; or changes in population, housing, employment, tax base or other land use changes.

The key terms used in the indirect and cumulative impact assessment include the following:

- Direct impacts are those “caused by the action and occur at the same time and place” (CEQ 1986, 40 CFR Section 1508.8 (a)). Direct effects have been addressed throughout the previous sections of Chapter III.
- Secondary impacts¹² are those “caused by the action and are later in time and farther removing in distance, but are still reasonably foreseeable.” Secondary impacts “may include growth-inducing effects and other effects related to induced

¹² Secondary effects are also known as indirect effects. The terms effects and impacts are used synonymously in the CEQ regulations (see in 40 CFR Section 1508.8 (b)).

changes in the pattern of land use, population density or growth rate and related effects on air and water and other natural systems, including ecosystems.” (CEQ 1986, 40 CFR Section 1508.8(b)).

There are three main forms of secondary impacts (National Cooperative Highway Research Program 1998):

- **Encroachment-Alteration Effects** are changes in the behavior and functioning of the affected environment caused by project encroachment (physical, chemical or biological) on the environment.
- **Induced Growth Effects** are changes in the intensity of the use to which land is put that are caused by the action/project. These changes would not occur if the action/project does not occur. For transportation projects, induced growth is attributed to changes in accessibility caused by the project.
- **Induced Growth-Related Effects** are changes of the behavior and functioning of the affected environment attributable to induced growth.

A project may involve one or more of these types of effects.

Cumulative impacts are “environmental impacts resulting from the incremental effects of an activity when added to other past, present and reasonably foreseeable future activities regardless of what entities undertake such actions. Cumulative impacts can result from individually minor but collectively significant activities taking place over time and over a broad geographic scale, and can include both direct and indirect impacts.” (See 40 CFR Section 1508.7.)

The Council on Environmental Quality (1998) issued a handbook on cumulative impacts that organizes such effects into four types:

- Type 1—Repeated additive effects from a single proposed project.
- Type 2—Stresses from a single source that interact with receiving data to have an interactive (nonlinear) net effect.
- Type 3—Effects arising from multiple sources (projects, point sources or general effects associated with development) that affect environmental resources additively.
- Type 4—Effects arising from multiple sources that affect environmental resources in an interactive (i.e., countervailing or synergistic fashion).

Secondary and cumulative impacts require determining the boundaries and time period of the analysis. Setting these depends on the characteristics of the resources affected, the magnitude and scale of the project’s impacts and the environmental setting. To avoid extending data and analytical requirements beyond those relevant to decision-making, a practical delineation of the spatial and temporal factors is needed. For this project, the existing spatial factor is the I-70 corridor from Kansas City to St. Louis and the time period would cover the 1950s through 2030. For the purpose of the overall secondary and cumulative impacts evaluation, the length of the I-70 corridor is about 200 miles (321.9 km), the width for evaluation is resource dependent and the time period covers 75 years. The secondary and cumulative impacts evaluation for each section of independent utility (SIU) covers the same period. The secondary and cumulative impact analysis considered impacts due to past, present and reasonably foreseeable actions.

2. Existing I-70 Overall Corridor

a. Land Use

Beginning in the 1910s and 1920s, Missouri improved and paved its first major cross-state highway. The route was designated Highway 40, and by the 1930s it was carrying cross-state and national traffic. A number of small communities arose along the highway to provide basic services for travelers such as fuel, food and lodging. When the I-70 corridor was located and constructed during the 1950s and 1960s, the direct and secondary impacts included noticeable changes to land use.

Most of former Highway 40 was either incorporated into the new interstate or changed into a local access road along the I-70 corridor. Local access was lost to the controlled-access I-70 facility, and as a result many unincorporated villages along the corridor and their transportation-related businesses disappeared. Although the primary land use within the corridor is still rural in character, the change from forest and agricultural lands to the location of development was highly related to the selection of the new corridor and also the existing interchanges. Economic development generated new jobs, which in turn increased the demand for housing, commercial and retail services and fundamental community infrastructure, such as schools, libraries, police and fire protection and sewer and water service. The economic growth and the secondary growth that follows are cumulative impacts. The I-70 transportation corridor, past, now and in the future, would continue the economic development trend and hence, impacts to land use. Transportation contributes to and helps facilitate economic development.

The existence or creation of adequate utilities and other infrastructure was an attraction for development. Communities or areas with such facilities were and are able to attract development. Development is a generator of tax revenues that contribute to further investment in the utilities and infrastructure. Over time, the expansion of the population, households and employment took place with the accompanying increase in the tax base. The cumulative impacts of the corridor have continued with development until the present, and it is expected that these trends would continue with the reconstruction and widening of the I-70 corridor.

Agricultural uses, scattered residential and retail development, mining and forested and natural areas distinguish the rural areas. More dense and urbanized land uses occur within the cities located along the I-70 corridor. These include Columbia, Warrenton, Wright City and Wentzville. Smaller urbanized areas are found at Oak Grove, Grain Valley, Higginsville, Odessa, Concordia, Boonville, Kingdom City and High Hill. Eastern Jackson County and western St. Charles County are generally characterized by low density, suburban development and represent the outermost reaches of the Kansas City and St. Louis metropolitan areas, respectively. The development trend is especially expected to continue on the fringe or edges of the urban areas of Kansas City, Columbia and St. Louis. The basic infrastructure is already in place, the typical level of traffic is high and non-interstate roadways usually have unrestricted access. These three features are important factors to attract development. With the ultimate improvement of I-70, there would be some residential and business displacements along the existing roadway. Provided that suitable sites for siting remain within the corridor, it is likely that these displacements would tend to relocate close to or within the I-70 corridor area, especially transportation-dependent businesses. This, in turn, would cause an additional change in land use, from non-developed to developed uses, or redevelopment of currently underutilized sites toward their highest and best use.

b. Park Lands

Section 4(f) of the U.S. Department of Transportation Act of 1966, as codified and amended, has afforded publicly owned park land protection from being converted to uses other than park and recreation. Consequently, and over time, federal-aid highway projects have avoided or mitigated any impacts to the taking of park land. Most often, park land has been avoided and if impacted, the impact has been minor and appropriately mitigated.

In general, reconstructing and widening the existing I-70 corridor could result in secondary and cumulative impacts resulting from improved transportation access. As ensuing development expands around existing park land facilities, particularly in urban areas, some encroachment could occur because of street widening or changes in land use/zoning. Increased development could result in increased noise levels and visual impacts in park lands that were previously somewhat isolated.

Another secondary impact could occur in urban areas in the form of park system expansion. As development expands, a responsible jurisdiction such as a city or county may elect to purchase more property for preservation or recreation in response to growth as part of a park land plan or to establish open space corridors and greenways. This land use determination might have otherwise been at the discretion of private developers and individual property owners. With the reconstruction of the interchanges, there would be opportunity to provide more trails and bicycle and pedestrian infrastructure. These areas could also provide the opportunity for community-initiated enhancement features.

c. Prime Farmland

The proposed reconstruction and widening of I-70 may result in secondary impacts to prime farmland due to farmland conversion along the new required right of way. It is estimated that approximately 1,300 acres of farmland would be directly impacted along the entire length of the corridor. Farmers affected by the conversion of all or part of their land to the development of the roadway may choose to no longer farm or cultivate their land. As a result, more farmland soils could be taken out of production if farmers choose to sell their land for non-farm uses. If the farmland is sold, it may be subdivided and converted to commercial and residential land use.

The improved roadway may, at some time in the future, act as a catalyst for increased growth, relocated development and expansion in the region. Historically, this has taken place in the I-70 corridor. New development would depend on the location, and such development would be expected to occur in areas already near the main population centers. However, with the proposed reconstruction and widening of existing I-70, overall secondary and cumulative impacts to the prime farmland resource are expected to be minimal.

d. Terrestrial and Aquatic Communities

The direct loss of forest acreage can eliminate or reduce the size of habitats, but secondary and cumulative impacts can occur as a result of habitat fragmentation, which can adversely affect species diversity and connectivity. It is estimated that approximately 230 acres of forest land would be directly affected along the length of the corridor. Habitat fragmentation in both terrestrial and aquatic areas can create variable-sized parcels or islands of viable habitats that become isolated. Secondary and cumulative impacts could also result by inducing more development within the corridor. Forested areas and watersheds across the I-70 corridor are resources that have been impacted by the initial location and construction of I-70. With the

reconstruction and widening of I-70, as more land is encroached upon by private development, the potential for additional disturbance of terrestrial and aquatic areas increases.

e. Threatened and Endangered Species

Much of the land near and adjacent to the I-70 corridor already exhibits appreciable amounts of disturbance and/or development. Most such areas are unlikely to harbor listed species that could be impacted by secondary development. Most of the recorded habitat locations are remote and are far enough removed from the I-70 corridor not to be secondarily impacted by reconstructing and widening existing I-70. Because of this, the potential for cumulative impacts to listed threatened and endangered species is considered to be low.

f. Wetlands and Waters of the U.S.

The proposed reconstruction and widening of the I-70 corridor may contribute to secondary and cumulative impacts to wetlands and other waters of the United States. Construction activities that impact these sites through sedimentation, changes in the nature of stream hydraulics or clearing of vegetation in riparian habitat, are likely to have impacts on wetland functions and values of downstream or down slope waters of the U.S., including wetlands. It is estimated that approximately 80 acres of wetlands would be directly impacted along the I-70 corridor. It should be noted that wetland mitigation would be planned within the corridor to ensure, at a minimum, no net loss of wetlands as a resource. Major floodplain and floodplain complexes across the 200-mile (321.9-km) corridor include the Blackwater, Lamine, Missouri and Loutre rivers. The Missouri River floodplain and Overton Bottoms wetlands complex are special areas within the I-70 corridor.

g. Air Quality

The proposed reconstruction and widening of the 200-mile (321.9-km) long I-70 corridor falls within the Metropolitan Kansas City Interstate Air Quality Control Region, the Southwest Missouri Intrastate Air Quality Control Region, the Northern Missouri Intrastate Air Quality Control Region and the Metropolitan St. Louis Interstate Air Quality Control Region. The Metropolitan Kansas City Interstate Control Region is classified a maintenance area for ozone, while the Metropolitan St. Louis Interstate Air Quality Control Region is classified as non-attainment for Ozone. Corridor-wide emissions are projected to decrease in the next 20 to 30 years. These reductions in emissions would offset the increase in free-flow traffic volumes along the study corridor. It is recognized that development trends are expected to continue throughout the foreseeable future. With the improved mobility and access management policy implemented with the reconstructed I-70 corridor, the project is not anticipated to cause a violation of the National Ambient Air Quality Standards. At the western and eastern termini, conformity statements may be required from the metropolitan planning organizations.

h. The Land and Visual Quality

The I-70 corridor runs through several physiographic regions of north-central Missouri. The western portion of the study corridor is located in the Western Glaciated Plains, consisting of gentle to moderate slopes with rolling hills. Much of this area has been cleared for use as agricultural cropland and pastureland.

The middle portion of the corridor includes the Lower Missouri River and the adjacent Ozark Border. The Lower Missouri River region consists of level river bottoms in a wide floodplain

area, most of which has been cleared and is used for cropland. Some areas remain as wetlands and riparian forests. The Ozark Border is characteristically rugged with forested hilly terrain of steep to moderately steep slopes and narrow valleys. Some of this area has remained forested.

The eastern portion of the study corridor is located in both the Eastern Glaciated Plains and the Ozark Border adjacent to the Missouri River. The Eastern Glaciated Plains consist of gentle to moderate slopes with rolling hills, most of which has been cleared for agricultural use over time. The Ozark Border is characterized by hilly terrain similar to that of the middle portion of the corridor; however, there is much more remaining forested land in Callaway, Montgomery and Warren counties, between Kingdom City and Wright City, especially in the area south of I-70.

In addition to the Missouri River valley, the study corridor includes several other perennial and intermittent stream valleys. Each of these provides a unique visual environment, which is composed of water, trees and rocks or bluffs.

The majority of the built environment is concentrated within the larger towns and cities such as the east side of the Kansas City metropolitan area, the west side of the St. Louis metropolitan area and the city of Columbia. There is a sharp contrast between the built and natural environments in these areas. In most cases, the edges of urbanized or built-up areas tend to include highway corridors with adjacent commercial and industrial uses that lack harmonious or cohesive aesthetic relationships. In contrast, smaller towns in the study corridor are less intrusive and can be more aesthetically pleasing, depending upon architectural styles and maintenance practices.

The proposed reconstruction and widening of existing I-70 would secondarily and cumulatively impact the visual quality of the environment as increases in growth, development and traffic volumes occur as a result of the proposed improvement. However, the visual quality of the corridor would be enhanced in accord with the appropriate elements of an I-70 Corridor Enhancement Plan.

3. Secondary and Cumulative Impacts within SIU 4

a. Introduction/Data Sources

In order to make an informed judgment regarding the nature and extent of secondary and cumulative impacts resulting from the reconstruction and widening of the existing I-70, this EIS follows several steps, drawing from the data collection and impact assessment findings of the resource topics of the EIS as well as from additional research summarized in this chapter:

- An evaluation of the demographic and land consumption trends toward decentralization within Missouri and Columbia,
- An inventory of known development projects throughout the region to serve as a guide to the future regarding the regional spatial patterns of growth and changes in density,
- A review of key land use planning that would affect development, traffic and transportation and other human environment and natural resources,
- An evaluation of major Infrastructure investments to assist in understanding the location and capacity of the infrastructure response created by growth, and

- A literature review of the relationships and linkages between transportation and business siting and residential choice.

Decentralization Trends

A recent report by the Brookings Institute profiles recent historic growth in the state of Missouri and its metropolitan and rural regions. The study shows that the state's population is dispersing beyond the major metropolitan areas of Kansas and St. Louis into rural areas and also smaller metropolitan regions. Forty-five percent of Missouri's population lives outside the major metropolitan areas, compared with 41 percent in 1970. Nearly every section of the state shared in the growth and movement of persons to the unincorporated areas, but the rural areas are also growing unevenly.

Land consumption in the state is outpacing population growth. Missourians developed more land in the five years between 1992 and 1997 (219,600) than over the ten years between 1982 and 1992. While this was primarily fueled by growth in the Lake of the Ozarks region, the Branson area and the southeast Ozarks, but growth in the smaller metropolitan areas, including Columbia, was also a component. According to the Brookings Institute, the Columbia metropolitan region had the seventh fastest land consumption rate of 76 Midwestern Metropolitan Statistical Areas. This translates into a 15 percent reduction in density.

Overall, Columbia's central city grew faster than any other of the state's central cities (22 percent between 1990 and 2000), but most of the growth occurred at the edge of the city, rather than in its center. For example, the city's central business district declined by 20 percent during the 1990s. Subdivisions such as The Hamlet and Stone Ridge to the west and Vanderveen and Timber Ridge to the north fueled residential growth at the region's edges. Growth occurred not in the inner ring core (within three miles [4.8 km]), which grew by five percent, but in locations within an arc of three and six miles (9.7 km) away from the downtown, which grew at a rate of 51 percent over the decade. The city extended its boundaries substantially through the annexation of lands over the 1990s, growing from 44.3 square miles (11,474 ha) to 53.1 square miles (13,753 ha). There are no other incorporated cities adjacent to Columbia that prevent its continued expansion. Boone County's growth and development within unincorporated lands continued to grow, particularly to the north and south, adding 6,500 persons or 18 percent. Boone County authorized more than 4,736 single-family and multi-family dwelling units over the 1990s.

Land Use Planning

The City's 2020 Metro Plan warns that the critical issue facing Columbia is leapfrogging development. The Metro Plan notes that several subdivisions have been developed in unincorporated areas outside the city limits and sewer service areas. Amid farmlands and open space, these subdivisions are built at urban densities without centralized sewer systems. Dependent on private sewage lagoons and package plants for wastewater treatment, the systems suffer from outfall drains with discharges directly or indirectly into creeks running through the metropolitan area. This approach, the Metro Plan warns, results in degraded water quality in urban streams and potential health hazards for those using trails and parks in greenbelt corridors. Sprawl is the probable outcome in the urban fringe when approvals are granted for lot by lot development without subdividing. The Metro Plan also disapproves of the practice of permitting large-lot residential developments with driveways that directly access state routes. Large rural lots along roadways create islands of land that become unavailable for development. It follows that residential developers must move farther out to create subdivisions.

This leapfrog or discontinuous development generates higher infrastructure costs for extension of sanitary sewer lines and additional fiscal burden to taxpayers. The Metro Plan also warns against large lot zoning (five+acres) developed with septic systems or individual lagoons as a major barrier to compact development and public service sewers. The Metro Plan urges that Boone County and Columbia develop plans jointly for a planning area that reflect (1) service-area boundaries that could be served by extensions of city sewers, (2) groups of properties adjacent to the city that could request voluntary annexation or (3) CATSO boundaries for the metropolitan area.

Known and Anticipated Development Projects and Other Major Actions by Others

Below is a brief summary of some major development projects and major actions being taken by public and private-sector parties. Many of these projects and investments are likely to be completed in advance of reconstruction and widening of I-70 within SIU 4. Some projects on the list may have a longer time-horizon and could share a common space or timing with the I-70 project. The projects and plans discussed clearly indicate that growth and development are not evenly distributed within the region. These activities provide a background context for understanding the growth trends and pressures under which the I-70 project is being contemplated.

Significant active land development is expected to occur in Columbia and Boone County before the widening and reconstruction project. An inventory of recently constructed and proposed residential, commercial and transportation projects in the city of Columbia and Boone County have been compiled to provide an appropriate context for assessing the secondary and cumulative effects of the proposed project.

Residential Projects

Within Columbia and surrounding municipalities, several residential development projects are in various stages of development approval, and they can be reasonably foreseen to characterize the future built environment prior to reconstruction and widening of I-70:

- Within the Smithton Ridge subdivision, residential development has been approved on Plats 5 and 6. The area is located south of I-70 and west of Silvey Street.
- Timber Creek, a proposed planned unit development is approximately 37.25 acres in size, located on the west side of Stadium Boulevard (State Route E). The proposed development would consist of 244 attached, townhouse residential structures.
- A proposed PUD (Planned Unit Development) site plan known as Hawks Ridge, 3.98 acres in size, is located on the north side of St. Charles Road, east of Upland Creek Road. The proposed development would consist of one-, two- and four-unit residential structures, for a total of 23 dwelling units.
- A proposal for approval of a PUD site plan known as The Villas at Vintage Falls is awaiting final approval from the City planning and zoning commission. The property is approximately 39.91 acres in size, on the northwest corner of Silvey and West Worley streets.
- Forest Ridge, 24.87 acres in size, is located on the northeast corner of Brown School and North Providence roads. The proposed development would consist of 68 two-family structures, for a total of 126 dwelling units.

- Auburn Hills 8, a proposed residential development 7.22 acres in size, is bounded by Brown School Road, Derby Ridge Drive, Citadel Drive and Edenton Boulevard. This planned residential development is proposed to have a development density of not more than 13 dwelling units per acre.
- The Schuelen Acres development, northwest of the Stadium Boulevard interchange, is anticipated to include multi-family residential development.
- The Rock Haven/Rosecliff Subdivision, along the north side of I-70 Drive NW, is 0.3 mile (.48 km) west of Stadium Boulevard adjacent to Valley View Place and anticipated to include single-family residences;
- Prime Development Corporation plans a 355-home subdivision called Southfork off the Grindstone, a 0.5 mile (.8 km) east of the city.
- Developer Billy Sapp plans a 940-house subdivision on 630 acres with a golf course northeast of Southfork off the Grindstone development.
- Developer Elvin Sapp proposes the construction of a mix of homes, condominiums, offices and retail shops on a 489-acre farm, the Phillips Tract, along the southeast border of the city. The Columbia City Council has approved the zoning and annexation request for the land. Separate development and water quality plans for the nine tracts must be approved before construction can proceed. The developer is expected to sell and donate land for a 500-acre park land development near Nifong Park and Rock Bridge Memorial State Park.
- Continued development of residential plats is expected to occur in the St. Charles interchange area.

Commercial Projects

Several sites and buildings are at various stages of development approval as future commercial development within the City of Columbia and Boone County. They include hotels, planned business districts and retail outlets. Commercial projects that are underway or anticipated to be constructed in the near future are discussed below:

- A 27.02 acre (10.93 ha) parcel on the south side of Vandiver Drive and on the west side of U.S. 63 is proposed to be developed by Centerstate Properties, LLC, as a planned business district known as Bass Pro at Centerstate Crossings.
- Woodland Springs, an 80-room hotel to be constructed on property located south of Clark Lane (State Route PP), east of Creekwood Parkway, is awaiting final approval.
- A 53.01-acre (21.45 ha) area on the north side of Grindstone Parkway, between Green Meadows Road extended to Rock Quarry Road, is proposed as a planned business district known as Grindstone Plaza. The proposal has been put forth by Red Oak Investment Company.
- A proposed business district known as The Broadway Shops consists of retail development of 94,000 square feet (0.87 ha) of floor area, to be located on the northwest corner of East Broadway (State Route PP) and Brickton Road.
- The West Vandiver Industrial Park, located northeast of the I-70/763 interchange, is proposed to be occupied with commercial businesses and industrial units.

- Woodland Springs, an area northeast of the I-70/63 intersection, is proposed for commercial development.
- The Jay Ousley subdivision, located south of I-70 between U.S. 63 and the Lake of the Woods interchange, would accommodate commercial development in the future.
- Commercial and residential development has been approved in the Eastport Subdivision located SE of I-70 and the St. Charles Road intersection.

Transportation Projects

CATSO's 2025 Long-Range Transportation Plan identifies several projects, studies and activities to address deficiencies in the existing transportation network and to plan for future improvements to handle prospective travel demand:

- Consistent with the U.S. 63/I-70 Major Investment Study, the CATSO plan recommends examining options to widen I-70 or construct an I-70 bypass, downgrade extension of MO 740 (Stadium Boulevard) from an expressway to an arterial and removal of ramps on- and off I-70 to Business Loop 70 East and consideration of a new interchange at exit 125. The Major Investment Study also recommends examining options either to widen I-70 or to construct a bypass to improve circulation patterns in the future.
- The CATSO plan also recommends improvements to address local circulation deficiencies within the area. Four key roadways need improvements: (1) Business Loop 70; (2) Broadway extension; (3) Providence Road extension and (4) the creation of a circumferential roadway system.

Other recommendations include suggestions to improve key roads and specific bottlenecks in the city and metro area that are causing delays in the local and regional circulation system. Roadways that have been identified for future improvements include the following:

- Route E to I-70 Drive Southwest,
- I-70 Drive Southwest to College Avenue,
- College Avenue to Old 63,
- Old 63 to Conley Road, and
- Route WW to Route TT improvements.

Other major MoDOT projects slated for Boone County that would have an immediate effect on the circulation patterns in the city of Columbia and region include the following:

- **I-70/63 Interchange Improvement Project**—Construction of the project was started in the spring of 2004. The project includes widening the northbound U.S. 63 connector from two lanes to three from the U.S. 63 mainline to the eastbound I-70 on-ramp. It also involves moving the intersection of Conley Road and I-70 SE 200 feet (60.9 m) farther south. The proposed project involves reconfiguring turning lanes and associated turning movements along I-70 and U.S. 63.
- **Route AC (Nifong) Relocation**—This recently completed project widened Route AC from Route 163 (Providence Road) east to Grindstone Avenue to U.S. 63. The other

proposed improvements included increasing the number of lanes from four to five and construction of a new four-lane road along Grindstone Avenue. The entire length of the project is 2.2 miles (3.5 km) with an estimated cost of \$9.8 million.

- **Guardrail Replacement**—The project was completed in the spring of 2004, the project involved upgrading all guardrails on I-70 to current standards throughout central Missouri.

In addition to these projects, the 2004–2008 Highway and Bridge Construction Schedule prepared by MoDOT proposes routine maintenance along sections of major highways and bridges in the county.

In order to provide a suitable context to assess the secondary and cumulative impacts of the Improve I-70 project, other proposed plans that may be implemented prior to the construction of the proposed action were also examined. These proposals help clarify the local development pressures and measures to alleviate the concerns of the local communities.

Wastewater Infrastructure Projects

The rapid development of communities located outside the city's limits and the demand for provision of sewer and other infrastructure facilities have been a continuing subject of debate within the metropolitan region. In order to finance plans to connect these developments to sewer lines and sewage treatment plans, bond issues have been used to raise the required financial resources.

City voters recently approved a bond issue that would generate \$18.5 million for improving the wastewater network in the city. Projects to be funded include the following:

- \$6 million toward extending sewer lines to meet the needs of developments occurring up to 80 acres from the end point of sewer mains,
- \$2.5 million for replacing sewer mains,
- Replacing and upgrading a sewer pump station in south Columbia at a cost of \$1.2 million,
- Mill Creek Outfall sewer relief at a cost of \$1.6 million affecting the Clear Creek region,
- Bear Creek Outfall extension to move sewage from the North Hampton pump station at a cost of \$1.5 million,
- Improvements to the Southwest Outfall to relieve pressure on an overloaded line at a cost of \$1.5 million,
- Replacing a 20-year-old centrifuge at a municipal wastewater treatment plant at a cost of \$1.3 million,
- Replacing and upgrading the Clear Creek pump station in the Little Bonne Femme Watershed at a cost of \$1.2 million,
- Extending the sewer line to South Grindstone Outfall sewer to eliminate the lagoon serving El Chaparral and Concorde Estates subdivisions at a cost of \$684,000, and

- Expanding sewer capacity to the southern part of the University of Missouri campus at a cost of \$484,000.

The County Regional Sewer District is also proposing a \$3.85 million Boone County issue to address the concerns of providing sewer lines to Boone County residents. The District currently operates 14 of the 17 package plants under its control and operates 36 sewer lagoons. The prevailing practice of the City—paying to extend sewer lines to newly developing areas on the periphery—is a strain on its financial resources. Projects that would be taken up upon approval of the bond issue include the following:

- Closure of three lagoons and three package plants to help centralize the sewage disposal system, and
- Eliminating nearly 10 miles (16.0 km) of privately owned sewer lines at a cost of \$750,000.

These bond issues were passed, but local organizations registered their concern about the watersheds and taxpayer burdens associated with the induced development effects of wastewater improvements, such as the Clear Creek pumping station.

b. Identification of Secondary and Cumulative Impacts

This section identifies all known secondary impacts and attempts to account for impacts that are not known but reasonably foreseeable—actions *likely to occur* or are *probable*, rather than merely possible. This section also assesses cumulative impacts—that is, environmental impacts resulting from the incremental effects of an activity when added to other past, present and reasonably foreseeable future activities regardless, of the entities who undertake such actions.

Spatial Patterns of Anticipated Growth, 2000–2030

The Columbia Area Transportation Study Organization uses a traffic demand model developed to replicate existing travel characteristics and forecast future daily traffic volumes in the Columbia region. The model comprises 295 traffic analysis zones (TAZ), 14 external stations and more than 2,100 highway link records and 1,500 nodes. Nearly 28 percent of the study links have a MoDOT traffic count collected in 2000 or 2001.

Based on a review of the Baseline (year 2000) and Baseline Future (year 2030, including the recommended preferred alternative) population forecasts derived from the model, the regional population represented in the model is expected to increase from 102,812 persons in 2000 to 152,581 in 2030. This represents an annual growth rate of 1.6 percent. Households are predicted to increase from 40,855 in 2000 to 71,026 in 2030, or an annual growth rate of 2.5 percent.

In general, TAZs north of I-70 are expected to increase their population concentration over the next 30 years. The population of the eastern fringes of the city is also expected to grow. In contrast, the central core of the city, between U.S. 63 and Stadium Boulevard, which is predominantly commercial, would have only marginal levels of population growth. **Figure III-11** illustrates how these changes are anticipated to occur within the region at the TAZ level.

It is also possible to predict employment changes using the CATSO traffic demand model (no-build vs. build). The TAZs along major roads and near the existing interchanges show

noticeable increases in employment. This trend confirms the opinion of business survey respondents, that access to major roads and local streets and improved visibility are two primary factors that would determine future site selection. Specific TAZs that witness increases in employment include those near exits 121, 124, 128A and 131. **Figure III-12** illustrates employment change by TAZ between 2000 and 2030.

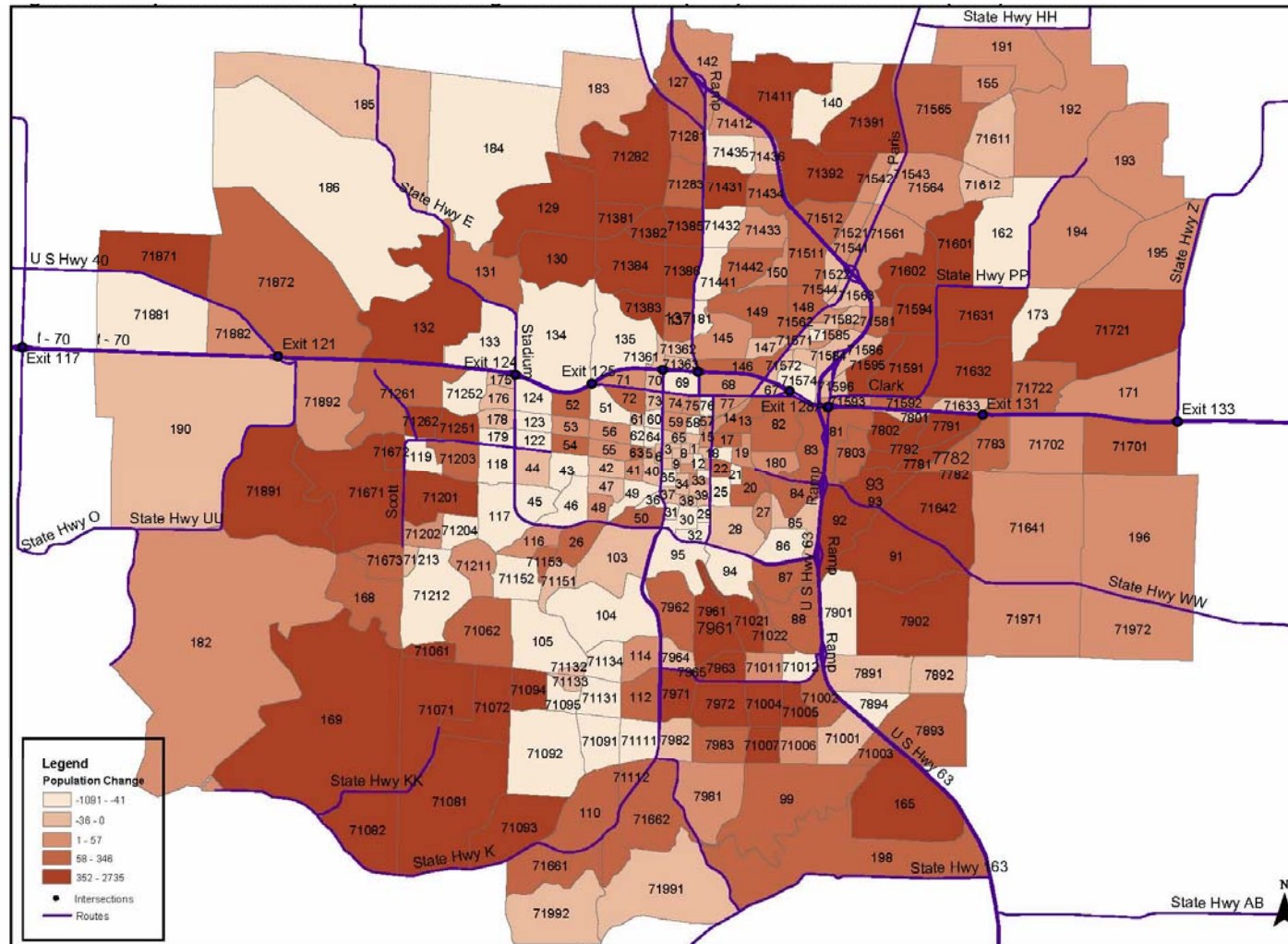
Spatial Patterns of Travel Time Savings, 2030 Build vs. No-Build 2030

The cumulative travel times between zones for the 2030 build vs. 2030 no-build scenarios were examined, using the CATSO traffic demand model, to identify those particular areas that are anticipated to have the greatest improvement in accessibility (i.e., travel-time savings) based on the proposed action.

Areas located along the western periphery and along north and south of existing I-70 up to interchange 127 are expected to experience improvements in travel times and improved accessibility from the proposed action. The major roads in this area bordering the interstate include U.S. 40, State Highway E, Stadium Boulevard and State Highway 763. The neighborhoods identified within these areas include Valley View Gardens, Highland Park, Smithton Valley, Parkade, Hunters Gate 1, Ridgeway and Douglas Park. Areas located in the southeastern parts of the metro area such as those located along U.S. 63 south of existing I-70 and State Highway WW are also expected to benefit from the proposed action. Neighborhoods in the vicinity of these roads include Shepard Boulevard and Moon Valley Heights. Areas located along either side of Nifong Boulevard, between Providence Road and U.S. 63, such as the Grindstone Rock Quarry, would also experience improvements in travel times.

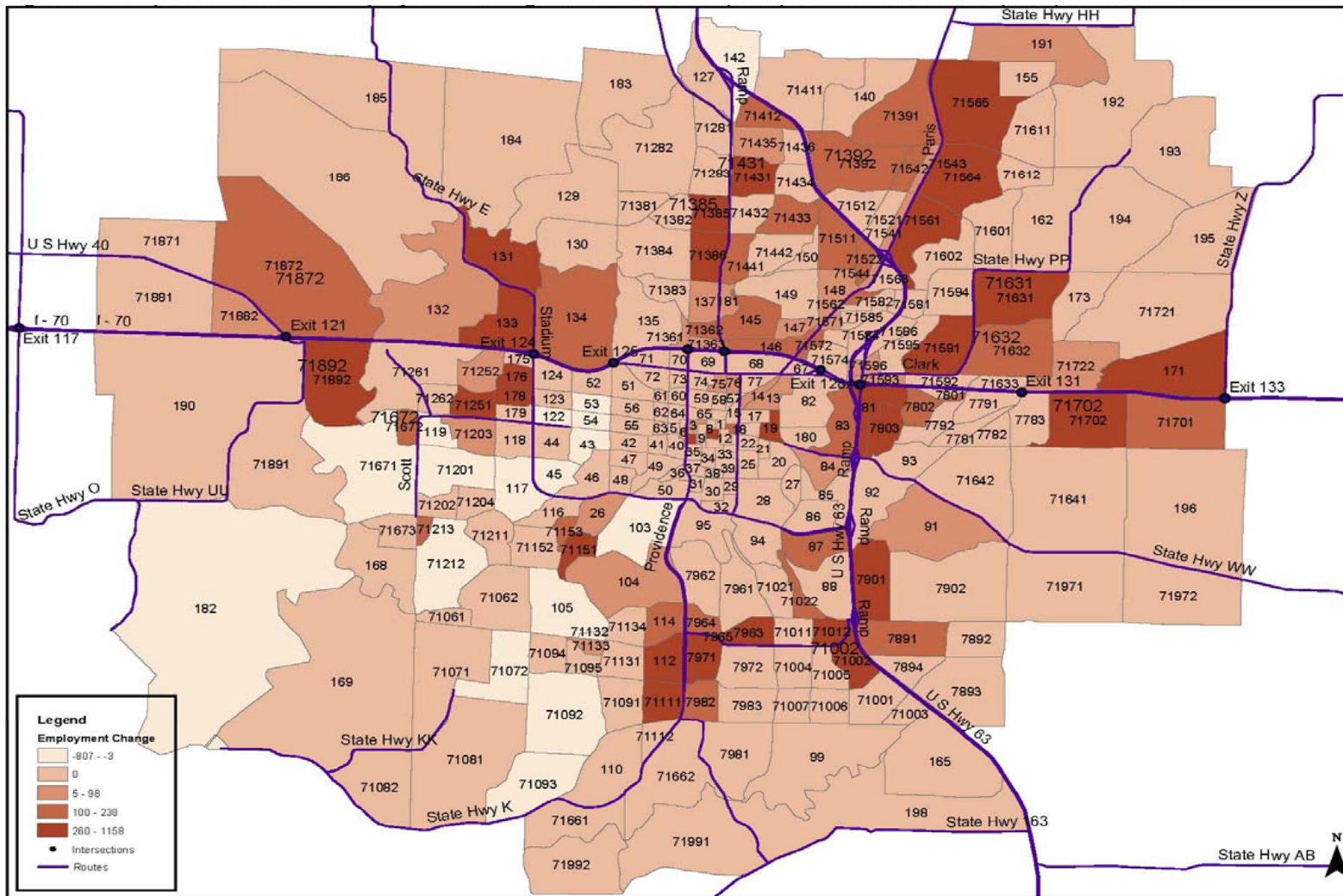
Based on the model output, minor increases in travel times are expected in areas located in the northern and eastern peripheries of the metro area. **Figure III-13** and **III-14** illustrate the spatial patterns of travel time savings both on a time and on a percentage change basis.

Figure III-11: Spatial Patterns in Population Change for the No-Build (2000) vs. No-Build Future (2030) Scenarios



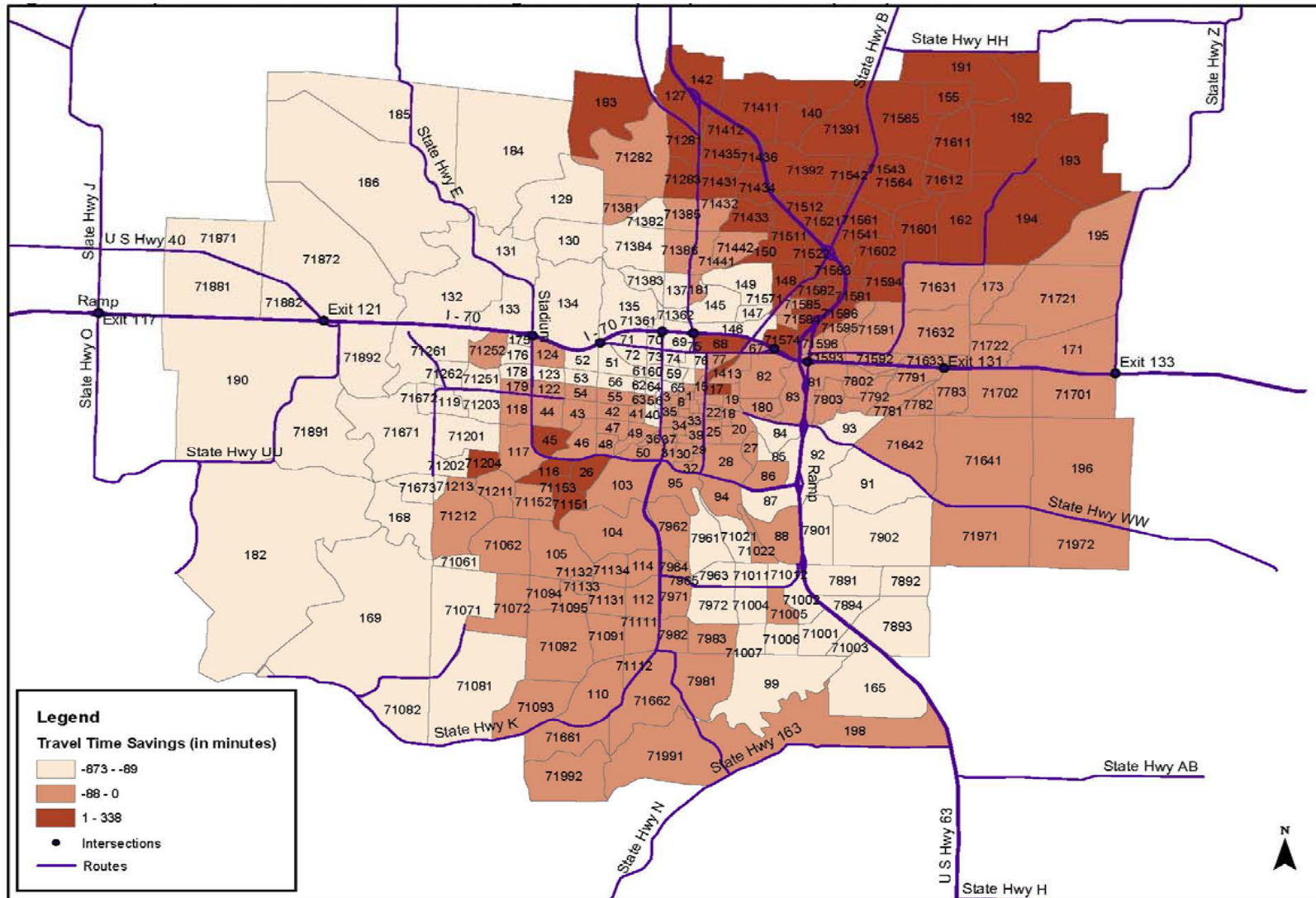
Source: CATSO Travel Demand Model, 2003.

Figure III-12 Spatial Patterns in Employment Change for the No-Build (2000) vs. No-Build (2030) Scenarios



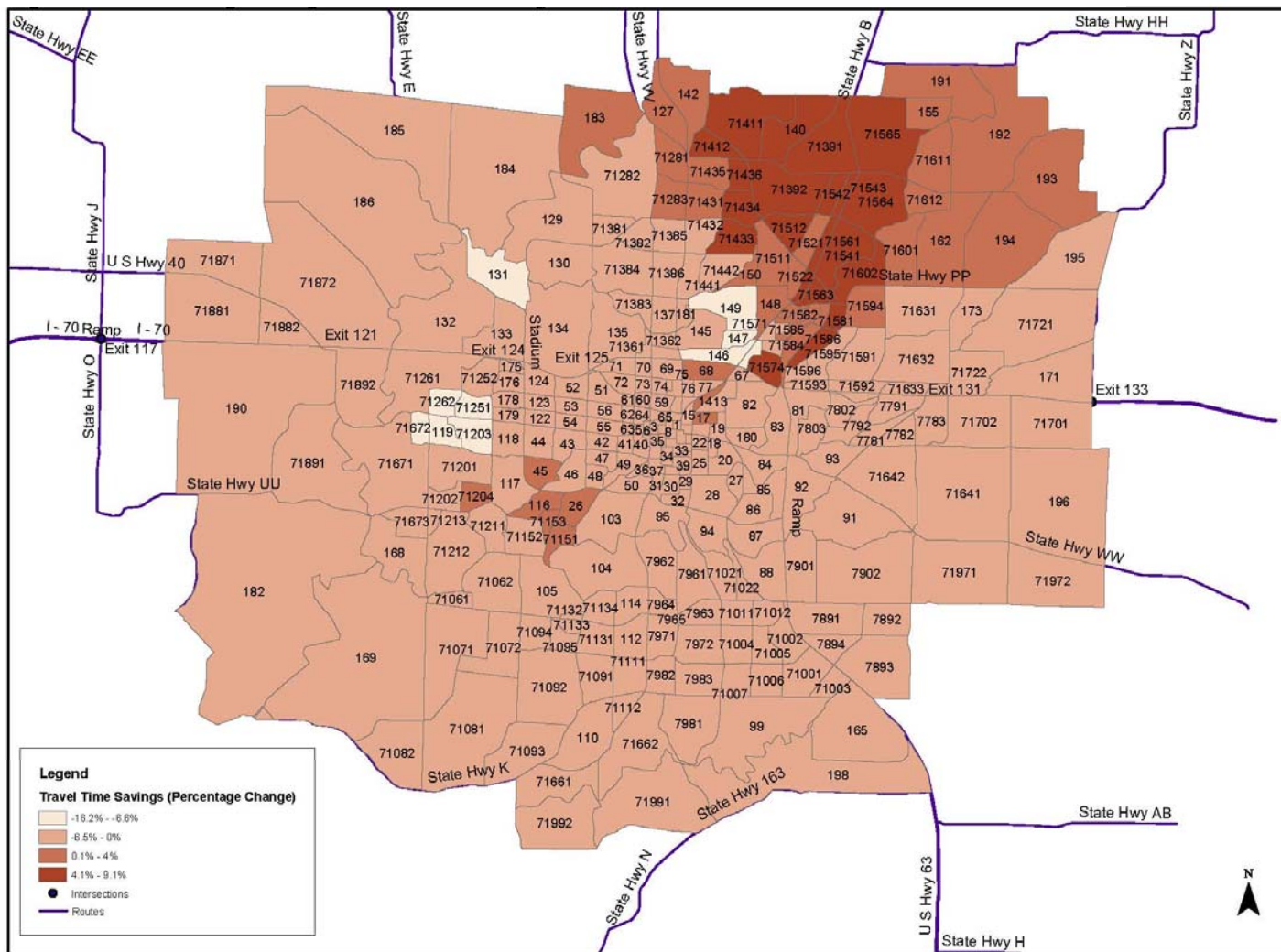
Source: CATSO Travel Demand Model, 2003.

Figure III-13: Spatial Patterns of Travel Time Savings for Build (2030) Scenario vs. No-Build (2030) Scenario



Source: CATSO Travel Demand Model, 2003.

Figure III-14: Percentage Change in Travel Time Savings with Build Scenario



Source: CATSO Travel Demand Model, 2003.

Identification of Impact-Causing Activities

Transportation improvements can reduce the time and cost of travel and enhance the attractiveness of surrounding land to developers and consumers. Development on vacant land, or conversion of the built environment to more intensive uses, often is a consequence of highway projects. Growth in population and employment attributable to a direct project effect (change in accessibility) is an indirect effect that can produce its own effects on the environment.

To understand the nature and extent of indirect and cumulative effects that can be anticipated from the project alternatives, a summary is provided below of impacts related to siting behavior, regional growth and transportation:

- As the steady nature of commute times suggests, suburbanization of households has been accompanied by regional decentralization of employment. Employers seeking to attract and retain labor have located in suburban areas, leading to an increase in the number of intra-suburb commutes over the traditional suburb to central city pattern. Highway access, as in the case of existing I-70, has made outlying locations equally accessible or more accessible for businesses than have the central cities.
- Regions with some level of urbanization generally experience higher levels of growth related to highway improvements than predominately rural areas. However, Missouri has experienced rapid conversion of formerly rural lands and significant land consumption over the 1990s. Rapid land consumption has led the City of Columbia 2020 Metro Plan to warn of ruburbia—urban densities adjacent to farmlands and open space.
- New highways can reduce the accessibility premium enjoyed by existing central locations, fostering decentralization of employment and housing. The fringes of urban areas tend to benefit at the expense of the center. This trend is already underway with existing I-70, even before widening and reconstruction. Continuation of this trend is foreseeable from examination of the anticipated growth areas, review of development applications and infrastructure plans and examination of the specific sub-areas of the region enjoying travel-time savings under the build scenario.
- Growth in population and employment in local areas (i.e., census tracts) is directly associated with the level of highway access available to residents and employees in that area. *The spatial patterns of anticipated growth according to CATSO and the areas likely to experience beneficial travel time savings for the I-70 widening and reconstruction are generally similar and often near the exits or along connecting major highways such as U.S. Highway 63 (south of I-70), Stadium Boulevard, U.S. 40 and State Highway E.*
- The growth of employment at the urban fringe may contribute to a spatial mismatch between low-skill job opportunities and residences of low-skilled workers, a general social cost that can be an indirect or cumulative effect of improvements in accessibility in suburban and fringe areas. As development extends from core areas, persons with disabilities become more isolated. For the I-70 project, under Environmental Justice, this spatial mismatch is a reasonably foreseeable outcome. It would become an important challenge to the private market and various officials (i.e., civic leadership, economic and community development, housing and transportation, social services delivery) to develop products and appropriate policies (e.g., rental

dwellings, housing affordability, new community facilities) to avoid, minimize and mitigate adverse effects for local communities or populations potentially left behind due to change.

- Complementary land development, such as highway-oriented businesses (gas stations, rest stops, motels), is more likely near interchanges in rural areas, where property values originally were low. Interchanges in suburban or urban areas where property values were higher before project planning and implementation are more likely to support a greater proportion of higher density uses, as well as a greater mix of uses. Factors influencing the likelihood and rate of development near rural interchanges include distance to a major urban area (proximity corresponds to higher probability of development), traffic volume on the intersecting road (higher volumes correspond to higher probability of development), presence of a frontage road (greater potential for intensive development) and availability of water and sewer and other infrastructure (greater potential for development). These development effects most often are found up to one mile (1.6 km) around a freeway interchange and up to two to five miles (3.2 to 8.0 km) along major feeder roadways to the interchange.

For the I-70 improvements, these factors are generally already present and would continue to emerge on the eastern and western ends of the primary study area. It can be anticipated that the frontage roads in particular would contribute to induced growth effects, such as strip commercial developments or discontinuous residential developments without appropriate access-management and land use policies (see City of Columbia 2020 Metro Plan). Feeder roadways to interchanges are from prior actions, and the project would likely continue to their growth.

General circumstances influencing the likelihood of induced development shifts typically include the following:

- **Extent and maturity of existing transportation infrastructure**—The influence of highway projects generally diminishes with successive improvements because each new improvement brings a successively smaller increase in accessibility. Still, the presence of additional highway frontage or improved interchange access (e.g., Fairview ramps) in an environment of continued economic growth and regional through-travel creates opportunities to capture pass-through traffic at sites enjoying visibility and convenience. These are siting factors embraced by the existing business community, as reported in the business survey.
- **Land availability and price**—Development cannot take place without the availability of land at a quality and price suitable for development. Property values are de facto indicators of the potential for land use change because investment decisions revolve around market prices. Land prices are likely to reflect a parcel's suitability for development (favorable topography), availability of other suitable parcels in the area, attractiveness of location and many other factors listed below. An abundance of suitable, low-priced land may be indicative of potential development if other factors are present. Scarcity of land or high price does not necessarily indicate a lower probability of development, however. If the other factors described here are favorable, high-density development may occur where land is scarce or high priced. Despite the scarcity of land in urbanized areas, the project's direct takings of business and residential properties create the conditions through proactive redevelopment planning to relocate operations in planned developments at select, suitable sites.

- **State of the regional economy**—Even if changes in accessibility are great, development is not likely to occur if the regional economy would not support new jobs and households, if credit or financing is not readily available or if firms conclude that the availability of labor, suppliers or local markets for goods are insufficient. The Columbia metro region has continued to attract significant growth in persons and jobs along the existing I-70 and its connecting roadways in recent decades.

Effects of Project Upon Growth and Density

The area of influence for considering secondary impacts can be generally assumed to be within one to three miles (1.6 to 4.8 km) on each side of the I-70 corridor, with the greatest impacts falling within 0.5 mile (.8 km). These distances are sufficient to broadly outline the probable zones for future development and land use changes reasonably associated with improvements to I-70.

The project would create site-specific development opportunities and changes in density. It would disrupt existing business operations and displace others, creating an extraordinary opportunity to promote more intensive redevelopment and planned land developments. As significant as this opportunity may be, it should not be forgotten that the proposed project generally follows an existing alignment and that there are prevailing patterns of land use and development envisioned in the City and County Comprehensive Plans, with or without improvements to I-70. The urban section of the project corridor is characterized predominantly by commercial and industrial land uses with residential pockets. Continuation of these land uses along the urban corridor is assumed in current land use plans and zoning districts.

Local improvements in circulation attributable to the I-70 reconstruction and widening may make the remaining available developable properties in the urbanized sections more attractive for development. It is also likely, however, that interest in developing these lands would occur regardless of the project, mostly depending on market factors and proximity to I-70. Consequently, no substantial induced changes in land use along the existing alignment in the urbanized section are anticipated to be solely attributable to the project.

Select vacant and underutilized parcels exist within the urbanized section that enjoy good regional and local access but are not attracting their highest and best use. Those sites may prove ideal targets for more intensive use through redevelopment planning or new zoning initiatives in tandem with displacements cause by the widening and reconstructing I-70. Redevelopment strategies for these areas could be collaboratively planned with the object of minimizing dislocation impacts for community facilities, businesses and residences that are displaced.

The City of Columbia is concerned about the displacement of businesses and the loss of jobs, wages and tax revenues that may result from the proposed action. To address these issues, Columbia has initiated a separate study to examine the economic impacts of the subject project on the city's business and economy. The study proposes to identify suitable locations that could act as potential sites for relocating the displaced businesses.

Moving away from the urbanized sections, the following indirect effects might occur with improvement of I-70 in the suburbanizing areas:

- Increase in amount of agricultural land converted to other uses,
- Increased demand for urban services,

- A shift in the type of development (residential to commercial) and low to moderate increase in the intensity of residential, commercial and industrial development,
- Increase in development along local roads that connect to I-70 (such as U.S. 40, MO-J/O and MO-Z),
- Aesthetic impacts, including less green space, more pavement and more advertising signs, change in rural character of the corridor, and
- Effects on quality of life, increases in stormwater runoff and increases in air and noise pollution.

Development induced by the project is not expected to differ substantially from that already expected in City and County Land Use Plans, primarily because the project would be located along the existing interstate corridor and because these development trends have been anticipated. The proposed improvements at Fairview Road may make some properties more accessible and therefore more desirable for development than assumed in the land use plans.

While there is significant interest in land development, even without widening and reconstructing I-70, an improved frontage road system along the eastern and western edges of the urban fringe would tend to encourage land development. In the absence of planning controls, there may be a general preference toward strip or single-box commercial development along frontage roads in the urban fringe.

These development opportunities can create sprawl-type impacts. Such impacts can be avoided or minimized most effectively through effective land use, urban design and access management policies. Through access management, the number of access points can be minimized and direct access from frontage roads discouraged. As appropriate, direct access from frontage roads should be limited to cases where key criteria are met (i.e., convenient, sufficient design, well-marked, direct, perpendicular or parallel). Ideally, mixed use planned developments of sufficient scale are encouraged to create noteworthy destinations. Planned development projects tend to have multiple tenants and multiple uses, such as commercial and residential, shared parking and encourage pedestrian use.

Regional leadership, economic development practitioners and private developers can reorganize the landscape effectively by proactively exploring agglomeration opportunities caused by business displacements and future growth trends, in both the core and peripheral regions. This can be accomplished through development and redevelopment planning and developing strategies focused on place-making and branding the identity of a development project or sub-area within Columbia or Boone County based on specific assets and resources that it can attract.

Communities confronted by highway expansions can be redesigned to capitalize on agglomeration through land use planning and access management. For example, retail or wholesale centers can draw regional attention by clustering home-improvement products or contractor supplies (e.g., plumbing, lumber, glass, home furnishings, etc.) with other needed services (e.g., architectural, interior design, carpentry or engineering service) that might otherwise be scattered along a corridor of small box establishments into a multi-tenant design center facility. Customers, suppliers and contractors may find that improved densities create economies offering more choice and selection for customers and better networking between suppliers of goods and services. Auto dealership and repair zones could be designed in this fashion.

Encouraging planned developments of sufficient scale and discouraging single-box wholesalers or retailer would enable the region to explore more fully the promise of smart growth. Planned developments can tap the regional accessibility afforded by the frontage road but be designed to integrate effectively with neighboring residential communities. Through promotion of a mix of land uses, an appealing jobs–housing development balance can be created that would reduce the length, if not the number, of daily local trips required to satisfy household demand. Scale economies of infrastructure can also be explored through this mixed-use development pattern.

Similarly, by encouraging a range of housing affordability, planned developments can also avoid becoming exclusive enclaves of single-family residences—often a hallmark of urban fringe development—thereby effectively redressing the prospects for a spatial mismatch. Through performance zoning or by offering a density bonus for mixed use projects or for meeting an inclusionary standard (e.g., 15 percent of units must be affordable to persons earning less than 50 percent or 80 percent of median income), developers can provide a means of bringing a diverse labor force to emerging job locations and enable the region to grow equitably.

Both the City and County zoning and subdivision ordinances emphasize preserving floodplains and environmental corridors by prohibiting development in such areas. Improving I-70 along the existing corridor would not forego preserving environmental resources in accordance with these ordinances.

There are several tools in place today or that could be implemented in the future to protect and preserve natural resources, historic sites, farmland, recreational land and other open space, such that secondary and cumulative impacts to these resources are minimized to the extent practicable. The following existing tools help address potential secondary effects:

- City and County governments can have land use plans to guide where development would be allowed and where land should be preserved for agricultural, recreational, open space or other uses.
- The City and County can have zoning regulations in effect to guide the type and location of buildings, lot sizes and setbacks, sign type, size and location and access to local roads connecting to I-70.
- The City and County can encourage planned development and subdivision reviews to improve and encourage more compact forms and less land consumptive forms of development. The regulations also must vigilantly address the use of buffers, noise berms, open space, stormwater facilities, internal circulation roads and amenities to make subdivisions more compatible with adjacent highways.

Effects on the Environment

The construction of highways can have a substantial impact on the degradation and loss of natural ecosystems, especially in less developed areas (USEPA, 1994). Although the actual areas covered by highway rights of way may cover only a small proportion of a region, the fragmentation of habitats caused by highway development is often severe. Transportation routes can be described as disturbance corridors that disrupt the natural, more homogenous landscape. This is particularly true in forested environments where disturbances can cause (1) dramatic physical disruption to the continuous vegetative community; (2) disruption to the function and structure of habitat and (3) impacts to resident wildlife, which must negotiate, tolerate and cope with habitat barriers. Disturbance corridors created by forest fragmentation

also alter the natural mix of habitats and species by providing conditions suitable for early successional plants and animals.

The scale of habitat conversion and habitat fragmentation effects caused by highway development varies with the size of the project. The impacts of projects also vary according to the environmental setting (e.g., urban, suburban, rural or woodland), especially the degree of naturalness in the local and regional ecosystems. The cumulative impact of highway systems can seriously affect entire regions, disrupting migratory pathways and other ecosystem processes. The growth-influencing aspect of highways discussed previously may augment these effects; e.g., the land conversions to commercial or residential uses.

Hydrological systems, which include ground and surface waters and wetlands, can be vulnerable to impacts from land development. New residential and commercial development can cause adverse hydrological impacts, which can have consequential effects on associated terrestrial and aquatic ecosystems. Hydrological impacts can include changes in drainage systems, alterations in groundwater flow or runoff that can lead to land and stream channel erosion pollution and impacts on wildlife and vegetation. Consequential effects can include loss of wetland habitat through filling or dredging and impacts on habitat quality and composition. Enclosed ecosystems such as lakes and ponds and associated wetlands are particularly vulnerable to adverse effects of development.

In addition to specific impacts on particular species and adverse hydrological impacts, new residential and commercial development can adversely affect terrestrial habitat. Loss of undeveloped land invariably leads to a net loss of wildlife unless new habitat is created to compensate, as artificially created habitat rarely supports as much wildlife as established areas. New development can result in creation of artificial barriers, such as roads and fences, and loss of natural wildlife corridors, such as linear woodlands and streams. This can cause habitat fragmentation and destruction, affecting species dispersal and survival and changing ecosystem composition. Less mobile species, such as reptiles and amphibians, are particularly vulnerable to habitat loss and fragmentation. Roads can also increase wildlife mortality through road kills.

Development can also cause reduction in habitat quality and suitability and increase pollution of air, water and soil, all of which adversely affects wildlife. Increased human activity from recreation and traffic can cause disturbances that have significant effects on the breeding patterns and success of many species. The addition of roadway surface (additional through lanes and ramps) may result in the use of increased use of ice and snow removal chemicals. There will also be an increase in the need for storage facilities to house these materials.

Residential and commercial development can affect resources in addition to ecosystems by (1) destroying or altering archaeological sites or historic properties; (2) replacing vegetative cover with impervious surfaces, thereby increasing stormwater runoff peak flows and pollutant loadings to streams; (3) increasing the per-capita cost of municipal services and tax rates and (4) relocating employment and retail centers to locations difficult to reach except by automobile, among other effects.