4.0 AFFECTED ENVIRONMENT

TABLE OF CONTENTS

4.1 INTRODUCTION

Information discussed in this chapter has been collected from several sources, including, but not limited to, the following:

- 1990 US Census Data
- ***Douglas County Master Plan,*** 1997
- ***Douglas County Parks, Trails and Open Space Master Plan,*** 1998
- ***Douglas County 2015 Transportation Plan***
- ***Douglas County Master Plan Land Use Map***, September 2000
- ***Douglas County Zone District Map***, April 2000
- ***Douglas County Population and Development Report***, 1999
- Colorado Department of Labor and Employment, December 1999
- ***I-25 and US 85 Environmental Surveys and Studies,*** Sugnet & Assoc, 1998
- ***Castle Rock Town Wide Transportation Plan,*** 1994
- ***State Highway 85 Environmental Assessment: C-470 to I-25 at Castle Rock,*** 1994
- ***Colorado State Parks: Chatfield Web Site,*** 2000
- ***Town of Castle Rock Generalized Zoning Map***, October 2000
- ***Chatfield Reservoir Clean Lakes Study***, 1984
- ***Historic Resources Technical Report,*** May 2000

This chapter discusses the existing social, economic, and physical environment of the I-25 Corridor and US 85 Corridor. The project limits along I-25 are from C-470 to Douglas Lane and along US 85 from C-470 to Meadows Parkway.

4.2 SOCIOECONOMICS

Socioeconomics information was obtained from the ***Douglas County Population and Development Report,*** 1999, which provides current and forecasted population estimates and income. Information from the US Census Bureau and the ***Douglas County Master Plan,*** 1997 provided supplemental data.

Douglas County has had substantial population growth and development during the past 20 years, and has had the

distinction of being the fastest growing county in the United States. In the late 1970s, Douglas County, including Castle Rock and the project corridors, was a rural county with approximately 12,000 residents. In 1998 Douglas County had a population of more than 150,000 and the second highest per capita and median family income of all 63 counties in Colorado.

For additional information on socioeconomics, see the ***Socioeconomic Technical Memorandum South I-25 Corridor and US 85 Corridor,*** May 2000, amended November 2000, in the Technical Reports Volume of the ***South I-25 Corridor and US 85 Corridor FEIS.***

4.2.1 Demographics

According to figures from the ***Douglas County Population and Development Report***, 1999, the county's population was estimated at 221,774 for the low-growth scenario and 248,184 for the moderate-growth scenario in the year 2005. The two growth scenarios provide the envelope for the projected growth. Table 4.1 shows the projected growth rate for the county from 2005 to 2020. The 2005 population estimates represent a 260 percent increase for the low-growth scenario and a 304 percent increase for the moderate-growth scenario over the 1990 census, projecting Douglas County to be one of the nation's fastest growing counties during that period.

Table 4.1
Douglas County Population Projections, 2005-2020

	2005	2010	2015	2020
Douglas County Low-Growth Scenario	221,774	271,967	318,688	356,716
Douglas County Moderate-Growth Scenario	248,184	309,528	354,683	385,685

Source: Douglas County Population and Development Report, 2000

In 2010 there is a projected population increase from the year 2005 of an additional 23 percent for the low-growth scenario and an additional 25 percent for the moderate-growth scenario. In 2020 there is projected population increase from the year 2010 of an additional 31 percent for the low-growth scenario and an additional 25 percent for the moderate-growth scenario.

The Town of Castle Rock has a current population of 18,000, based on town figures from March 1999. Table 4.2 shows the 1999 average labor force in Douglas County.

Table 4.2
Douglas County Labor Force Data, 1999 Average
(Not Seasonally Adjusted)

	Total Labor Force	Total Employment	Number Unemployed	Percent Unemployed
Douglas County	85,174	83,914	1,260	1.5

Source: Colorado Department of Labor and Employment, 2000

The median age of the Douglas County population on January 1, 1997, was 33.2 years, with 5.7 percent of the population being 60 years and older, and 18.3 percent being under 10 years and under.

4.2.2 Environmental Justice

In February 1994 President Clinton issued Executive Order 12898 requiring federal agencies to incorporate consideration of environmental justice into the National Environmental Policy Act (NEPA) evaluation process. The purpose of the order is to ensure that minority communities and low-income communities do not suffer a disproportionate share of adverse environmental impacts resulting from federal actions that are not offset by project benefits. The order also requires that these parties have had adequate access to and opportunity for participation in project planning.

4.2.2.1 Minority Populations

The United States Department of Transportation (USDOT) defines minorities in its guidelines on implementation of the Environmental Justice Order, to be persons who are (1) Black (a person having origins in any of the black racial groups of Africa); (2) Hispanic (a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race); (3) Asian American (a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands); or (4) American Indian and Alaskan Native (a person having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition).

In 1990 the US Census determined the racial composition of Douglas County. As shown on Table 4.3, minority populations represent a much smaller percentage of the county population than is typical for the State of Colorado. Colorado's minorities represent 19.1 percent of the state's population. In contrast, minorities comprise only 5.2 percent of the Douglas County population.

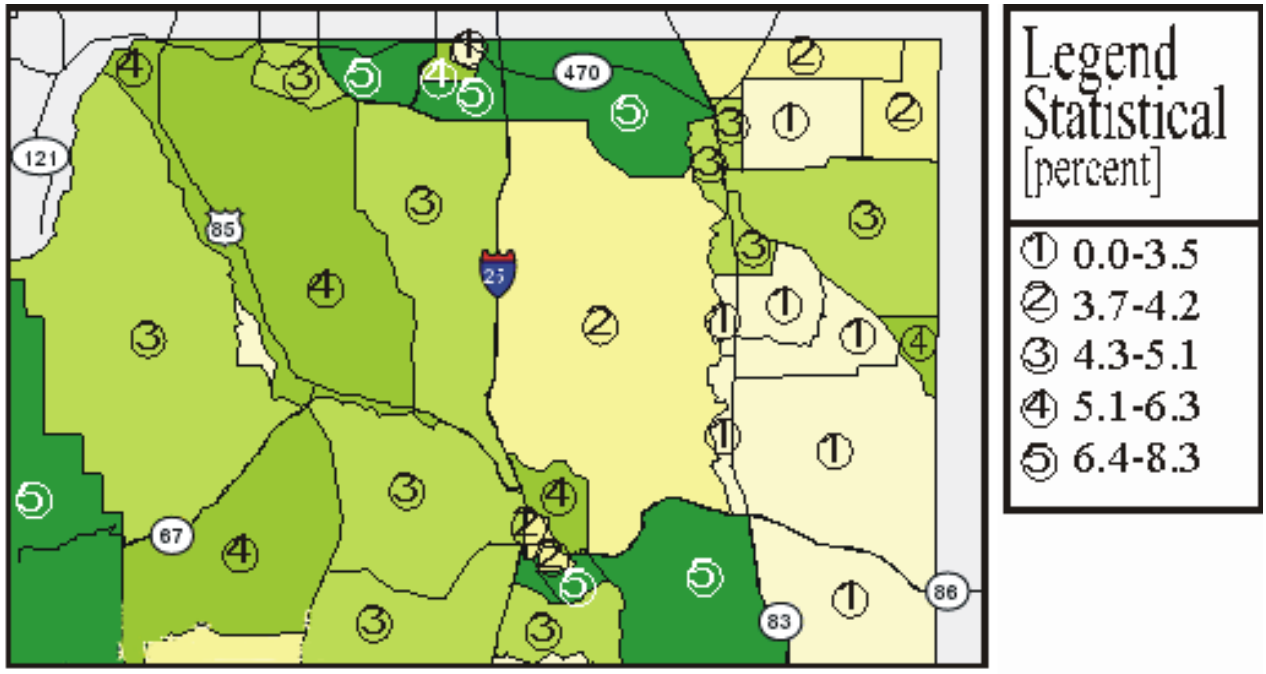
Table 4.3
Minority Populations, 1990

Minority	Douglas County Total Population	Douglas County Percent of Total Population	Colorado Total Population	Colorado Percent of Total Population
Hispanic	1,460	2.4	244,264	7.4
Black	407	0.67	131,223	4.0
American Indian	267	0.44	28,544	0.87
Asian/Pacific Islander	508	0.84	59,411	1.8
Other	527	0.88	165,778	5.0
Total Minority	3,169	5.2	629,220	19.1
Total Population	60,391	100	3,294,394	100
Source: 1990 US Census				

Figure 4.1a and Figure 4.1b illustrate the distribution of minority and Hispanic populations within Douglas County. Due to Census data limitations, maps depicting the geographic distribution of total minority populations are not available. As Figure 4.1a and Figure 4.1b indicate, percentages of minorities tend to be slightly higher along C-470 and within the US 85 Corridor. The area is characterized by slightly higher concentrations of

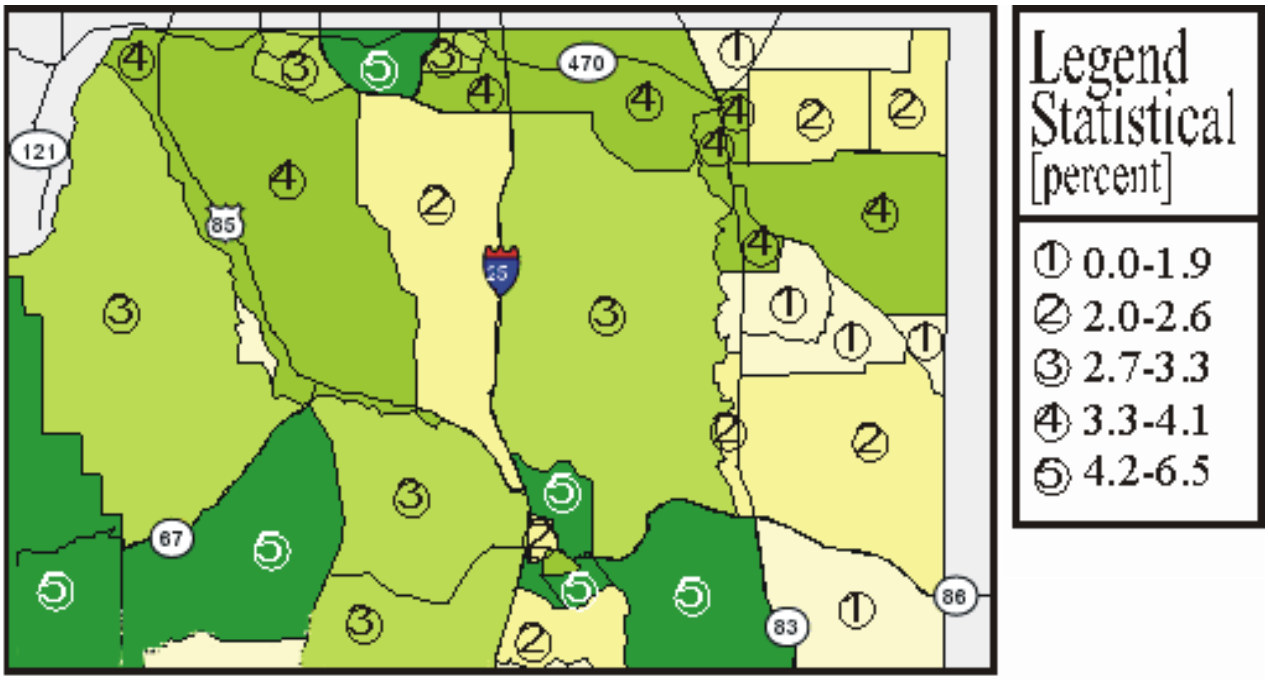
minority residents to the west of I-25 and slightly higher levels of Hispanics to the east.

Figure 4.1a
Douglas County Minority Population Distribution



Prepared with American Fact Finder
source: 1990 US census

Figure 4.1b
Douglas County Hispanic Population Distribution



Prepared with American Fact Finder
source: 1990 US census

4.2.2.2 Income

Per capita income in Douglas County has more than doubled since the early 1980s. Table 4.4 shows the increase in the per capita income for Douglas County over the last several years.

Table 4.4
Douglas County Per Capita Income

Year	Income (in current dollars)
1980	14,140
1985	22,427
1990	24,740
1991	26,084
1992	26,847
1993	28,606
1994	30,067
1995	30,448
1996	32,076
1997	34,264

Source: State of Colorado, Demography Section

4.2.2.3 Low Income Populations

The USDOT draft guideline addressing the Environmental Justice Order defines low income as "...a person whose median household income is below the US Department of Health and Human Services (HHS) poverty guidelines." These guidelines provide a formula based on the number of persons in a household or family and their annual income. The US Census provides population data based on these guidelines.

According to the State of Colorado, 1997 Douglas County per capita income was $34,264. This represents a 38 percent increase over the 1990 level of $24,740. In comparison, the annual per capita income for the area has traditionally been characterized by high per capita income, and recent increases in population have corresponded with higher incomes.

The 2000 national poverty level, according to HHS, was reported to be $17,050 per family. The median family income and per capita income for the residents of Douglas County was reported to be $77,000 and $34,264, respectively, by the Colorado Department of Labor and Employment in 1997. Table 4.5 provides the Douglas County poverty level as compared to the State of Colorado.

Table 4.5
Poverty Level

	Douglas County	Colorado
People of All Ages in Poverty	1,895	375,214
Percentage of Population in Poverty	3.1	11.3
Source: 1990 US Census		

Figure 4.1c illustrates the distribution of individuals living below poverty levels in 1990. Concentrations of people living in poverty are slightly higher along the US 85 Corridor and to the east of I-25. As Figure 4.1d illustrates, median incomes are highest to the west of I-25 and in areas along State Highway (SH) 83 in eastern portions of the county.

4.2.3 Lifestyle

Residents adjacent to I-25 between Lincoln Avenue and the Town of Castle Rock enjoy a semi-rural lifestyle. The only commercial development in this section is residential-supported (e.g., grocery stores and service stations). Homes are situated on large lots, with golf courses within short driving distance. Employment for residents in this area is primarily to the north in the Denver metropolitan area. Commuters going to and from the employment centers in the South East Business District (SEBD) and downtown Denver use I-25.

The Town of Castle Rock continues to maintain a small town ambiance while incorporating a growing low-density suburban fringe. Employment opportunities exist in the town in retail and in county government services. Castle Rock, the small communities along US 85, and residential areas along both corridors serve as bedroom communities for the Denver metropolitan region and to Colorado Springs to the south. Commuters use both I-25 and US 85 as their primary routes to work.

The east side of the US 85 Corridor is lined with large, open space areas and large ranches. The west side of the corridor has two communities, Sedalia and Louviers. US 85 parallels the Union Pacific Railroad and Burlington Northern Santa Fe Railroad. The west side of US 85 is paralleled by the Plum Creek floodplain that passes through a low-density developed area. The northern half of the US 85 Corridor is in close proximity to segments of strip commercial development and heavy industrial development.

The Douglas County Master Plan states that no additional urban development (beyond what is already approved) is planned in the valley, west of US 85, within the 2010 timeframe because of the existing inventory of approved development, and the major cost to provide infrastructure and service to this area.

4.2.4 Neighborhoods

Distinct neighborhoods and/or subdivisions are located adjacent to I-25 and US 85. Each of these neighborhoods is confined to one side of the existing highway. There are no neighborhoods or subdivisions that are spilt by the highway.

Along I-25, from the north to south, the following neighborhoods and municipalities currently exist: Surrey Ridge, Oak Hills, Castle Pines North, Castle Pines Villages, Happy Canyon, Silver Heights, Castle Rock, Yucca Hills, Twin Oaks and Bell Mountain Ranch. Along US 85, from the north to the south, the following neighborhoods and municipalities currently exist; Highlands Ranch, Chatfield Acres/Chatfield East, Louviers, and Sedalia. Table 4.6 displays information about these neighborhoods in terms of location and size.

Figure 4.1c
Douglas County Population Living Below Poverty Level

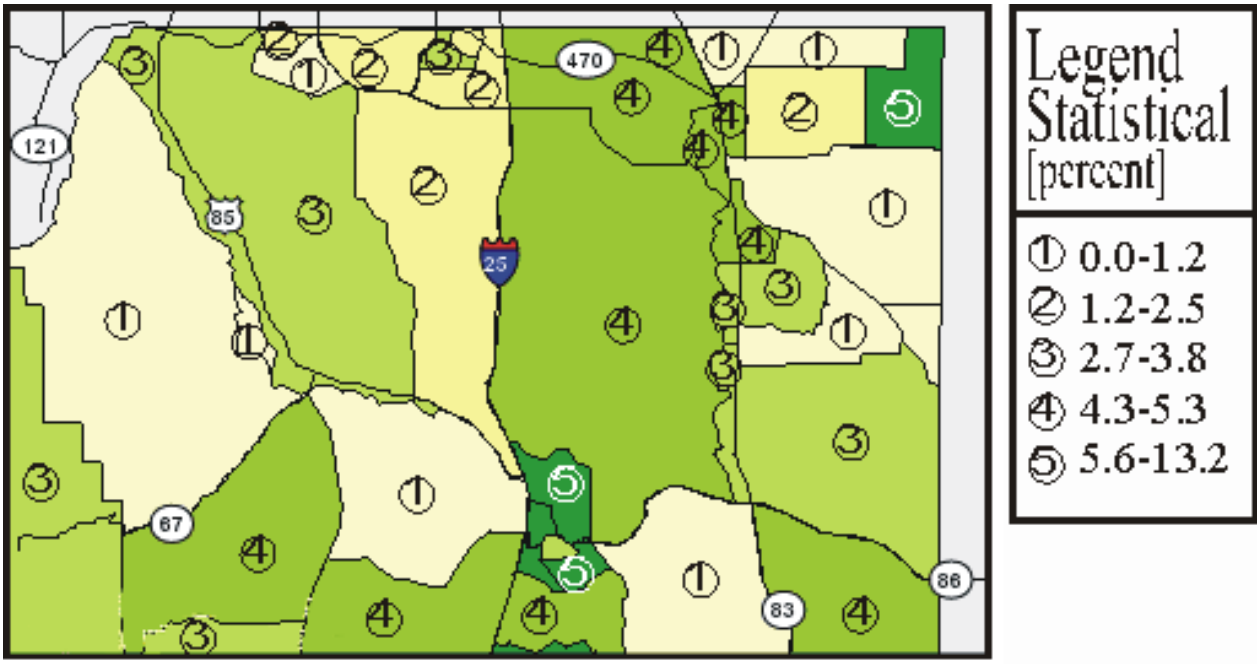


Figure 4.1d
Douglas County Median Income

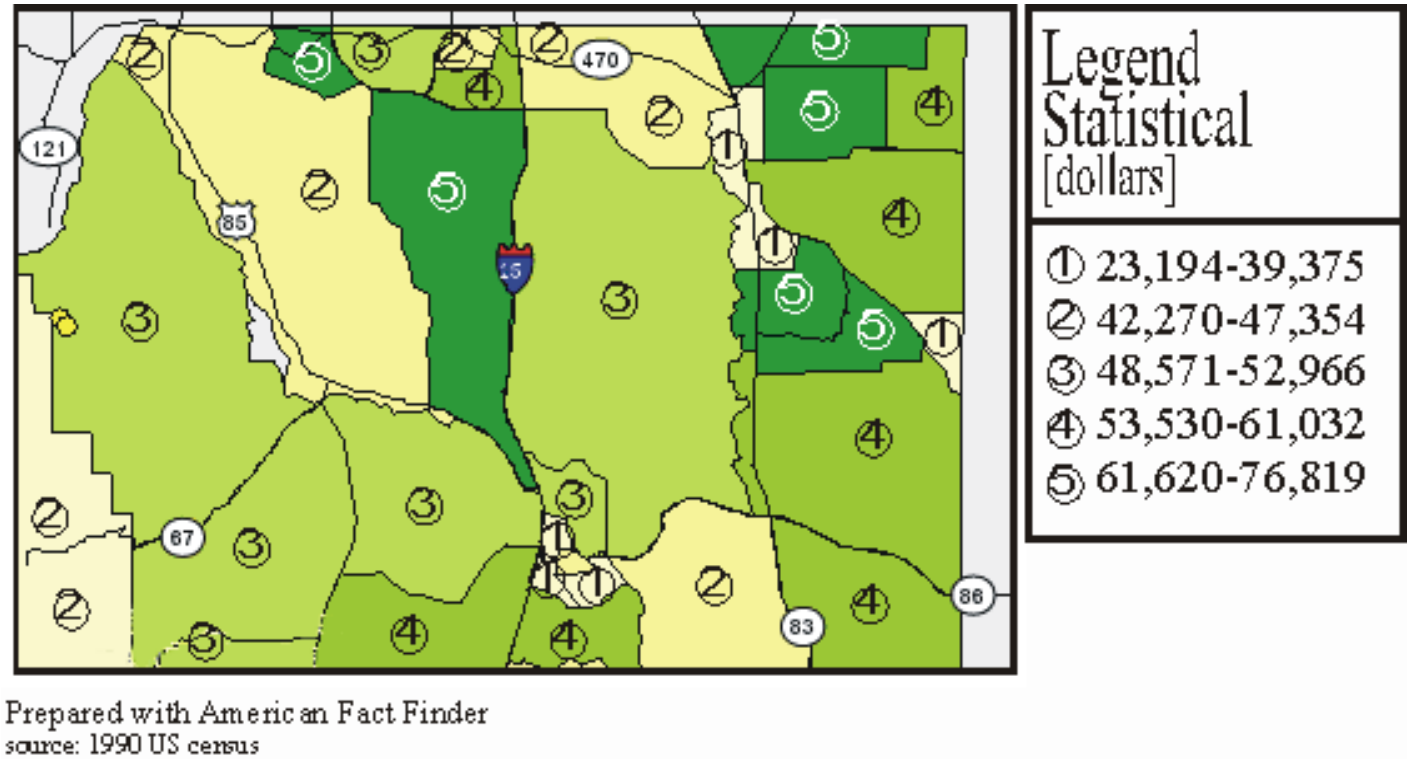


Table 4.6
Neighborhoods and Municipalities along the I-25 Corridor and US 85 Corridor

Neighborhoods			
I-25 Neighborhoods			
Neighborhood Name	**East or West Side of Highway**	**Number of Occupied Housing Units**	**Approximate Zoned Acreage**
Surrey Ridge	West	162	408
Oak Hills	West	72	504
Castle Pines North	West	1216	1697
Castle Pines (Villages)	West	802	2673
Happy Canyon	East	166	504
Silver Heights	East	108	80
Castle Rock	East and West	7216	20,000
Yucca Hills	West	27	180
Twin Oaks	West	42	635
Bell Mountain Ranch	East	70	2040
US 85 Neighborhoods Name	**East or West Side of Highway**	**Number of Occupied Housing Units**	**Approximate Zoned Acreage**
Highlands Ranch	East	36,700	21,796
Chatfield Acres/Chatfield East	East	41/97	100/601
Louviers	West	106	74
Sedalia	West	50	NA
Source: Douglas County Population and Development Report, 2000			

Many of these neighborhoods are considered rural or large lot neighborhoods, and have a significantly lower density than neighborhoods such as Highlands Ranch. These neighborhoods include Surrey Ridge, Oak Hills, Castle Pines Villages, Happy Canyon, Yucca Hills, Twin Oaks, Bell Mountain Ranch, and Chatfield East.

For planning purposes, Douglas County has identified incorporated towns and municipalities, primary urban areas and subareas of growth, defined with boundaries. Within the confines of this project, only the Town of Castle Rock is considered a municipality and Highlands Ranch is part of the Primary Urban Area. Subareas in the project include the Chatfield Valley Subarea, High Plateau Subarea, the Castle Pines Subarea, West Plum Creek Subarea and the Cherry Valley Subarea. The specific neighborhoods in these subareas that are adjacent to either I-25 or US 85 are included in the table above.

4.2.5 Economics

Douglas County is strategically located between Colorado's two largest cities, Denver and Colorado Springs. The county actively plans for, and pursues, well-managed, quality commercial development to provide local employment opportunities and to diversify its tax base. The county's strength as the centerpiece of the Denver/Colorado Springs Development Corridor comes from a blend of quality lifestyle and business environment.

4.2.6 Development

Douglas County continues to undergo rapid growth in both population and construction. Total building permit value rose 18.5 percent in 1998, with commercial construction value up a phenomenal 59 percent. New housing

starts were down slightly (2 percent) from the 1997 all-time high, attributable to a high number of apartment starts in 1997. Unincorporated Douglas County's single-family unit permits were up nearly 8 percent in 1998.

Building trends have been consistent for many years in Douglas County. The total number of residences by the end of 1999 totaled 60,502, an 11.2 percent increase over 1998. Since 1993, Douglas County has experienced housing growth rates more than 10 percent every year. Over 21 hectares (52 acres) of new commercial construction began in unincorporated Douglas County in 1999. Employment in the County has increased 268 percent since 1990.

To serve the growing population, retail growth has been explosive, with more than 278,710 square meters (3 million square feet) built in recent years. Just north of the I-25 Corridor, Park Meadows Town Center opened in Douglas County in August 1996, bringing scores of new retail shops to the area. Surrounding the mall, numerous complementary stores have opened. In 1997 Prime Outlets along I-25 at the Meadow/Founders Interchange completed a 9,290 square-meter (100,000 square-foot) expansion.

The county continues to seek quality commercial development. 1996 was a record year for commercial development, and included the start of the Merrill Lynch business campus, the 139,350 square-meter (1.5 million-square-foot) Park Meadows Town Center, and adjacent retail power centers. 1997 saw continued expansion of the Park Meadows Town Center and power centers, as well as office development along the northern I-25 Corridor.

Commercial development for 1998 focused on the Meridian International Business Center, with the new AT&T Cable Services, American Family Insurance headquarters, and First Data Corporation headquarters. In total, more than 185,810 square meters (2 million square feet) of commercial development occurred in the county in 1998. With commercial development proceeding, in 1999 the SEBD emphasized the development of 1,500 dwelling units for local employees earning less than the county's median family income level.

The County is actively planning to preserve quality of life through planning and zoning. The preservation of open space is a critical component in maintaining quality of life and quality of environment. The county has been aggressive in purchasing open space and conservation easements, particularly along the I-25 Corridor and the US 85 Corridor. The county has a goal of protecting areas of visual significance and of wildlife habitat to preserve the quality of life for the residents and to protect the image and identity of Douglas County. Several studies have been conducted on this issue, including the ***High Plateau Conservation Area Study and the Douglas County Open Space Plan***. These plans will aid in managing of growth and development. Large areas recently purchased or acquired in the program include the Cherokee Ranch along US 85 and the Greenland Ranch near Larkspur. Additionally, 3,320 hectares (8,200 acres) south of the developed portion of Highlands Ranch was planned by Mission Viejo for open space and recreation at the inception of the Highlands Ranch Development. The county supports planning for Open Space Conservation Area (OSCA) to ensure its preservation.

4.2.7 Recreation

The rapid population growth in Douglas County creates an increasing demand for recreational facilities, while at the same time depleting the available land for recreation areas. To maintain the area's natural environment, local, state, and federal agencies, as well as community volunteers and organizations, are working together to retain recreation areas, trails, and open space throughout the county.

I-25 and US 85, between C-470 and Castle Rock, provide access to many popular recreation areas adjacent to and

beyond the project area. These recreation areas include Pike National Forest, Chatfield State Park, Spring Gulch Equestrian Facility, Roxborough State Park, and Daniel's Park as well as other county, municipal, and local parks and trails. In addition, several public golf courses are close to the project area. These recreation areas are shown on Figure 4.2a and Figure 4.2b. Open space properties exist within the project area, but are not open to public recreation. For the purpose of this section, only trails and recreation areas adjacent to, or within the project area, are reviewed in detail; they are listed in Table 4.7 and illustrated in Figure 4.2c and Figure 4.2d.

For additional information on recreation, see the ***Recreation Technical Report,*** May 2000, amended November 2000**,** in the Technical Reports Volume of the ***South I-25 Corridor and US 85 Corridor FEIS.***

Table 4.7
Trails and Recreation Areas Within or Adjacent to the Project Area

Resource Description	Corridor	Property Type
Castle Rock Baseball Fields and Park Complex	I-25	Recreation Area
East Plum Creek Trail	I-25	Trail
Front Street Trail	I-25	Trail
Centennial Bike Trail	I-25/US 85	Trail
Chatfield State Park	US 85	Recreation Area
High Line Canal Trail	US 85	Trail
Spring Gulch Equestrian Facility	US 85	Recreation Area
Chatfield East Park	US 85	Recreation Area

4.2.7.1 Hiking/Bike Trails

Hiking and biking are popular activities in Douglas County. Governmental agencies, private citizens, and local organizations have attempted to preserve and improve existing trails, as well as plan for future trails in the area. The ***Douglas County Parks, Trails and Open Space Master Plan,*** 1998 provides a design for future interconnected trails throughout the project area.

In addition, other agencies and organizations including Chatfield Basin Conservation Network, Colorado State Parks, US Army Corp of Engineers (USACE), Highlands Ranch Metropolitan District, Denver Water Board, and South Suburban Park and Recreation District have set similar goals to improve existing trails and increase the number of interconnecting trails within the area.

Figure 4.2a
Recreation Resources along the I-25 Corridor

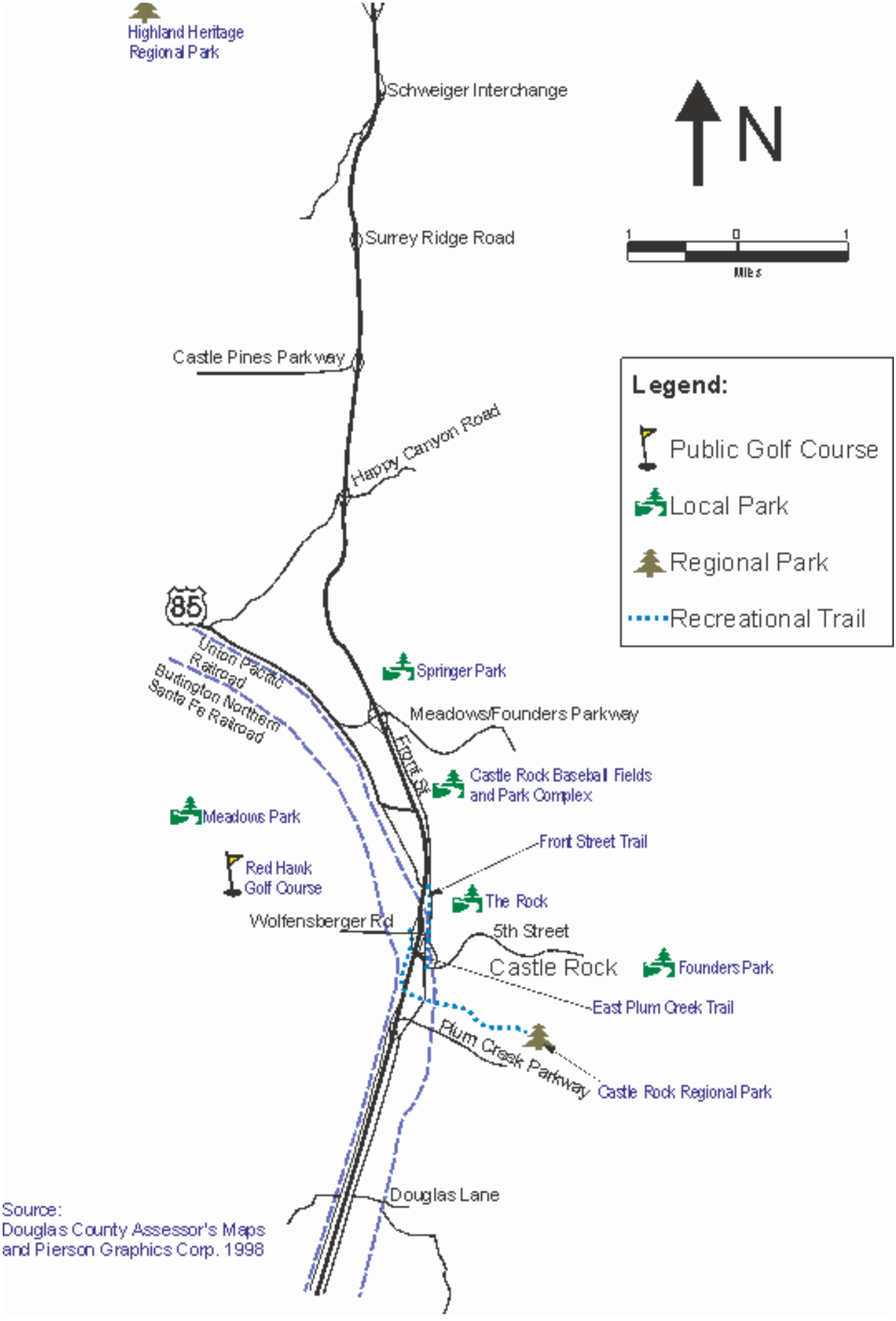

Highland Heritage Regional Park
Schweiger Interchange
N
1 0 1
Miles
Surrey Ridge Road
Castle Pines Parkway
Legend:
Public Golf Course
Local Park
Regional Park
Recreational Trail
Happy Canyon Road
85
Union Pacific Railroad
Burlington Northern Santa Fe Railroad
Springer Park
Meadows/Founders Parkway
Front St.
Castle Rock Baseball Fields and Park Complex
Meadows Park
Front Street Trail
Red Hawk Golf Course
The Rock
Wolfensberger Rd
5th Street
Castle Rock
Founders Park
East Plum Creek Trail
Plum Creek Parkway
Castle Rock Regional Park
Douglas Lane
Source:
Douglas County Assessor's Maps and Pierson Graphics Corp. 1998

Figure 4.2b
Recreation Resources along the US 85 Corridor

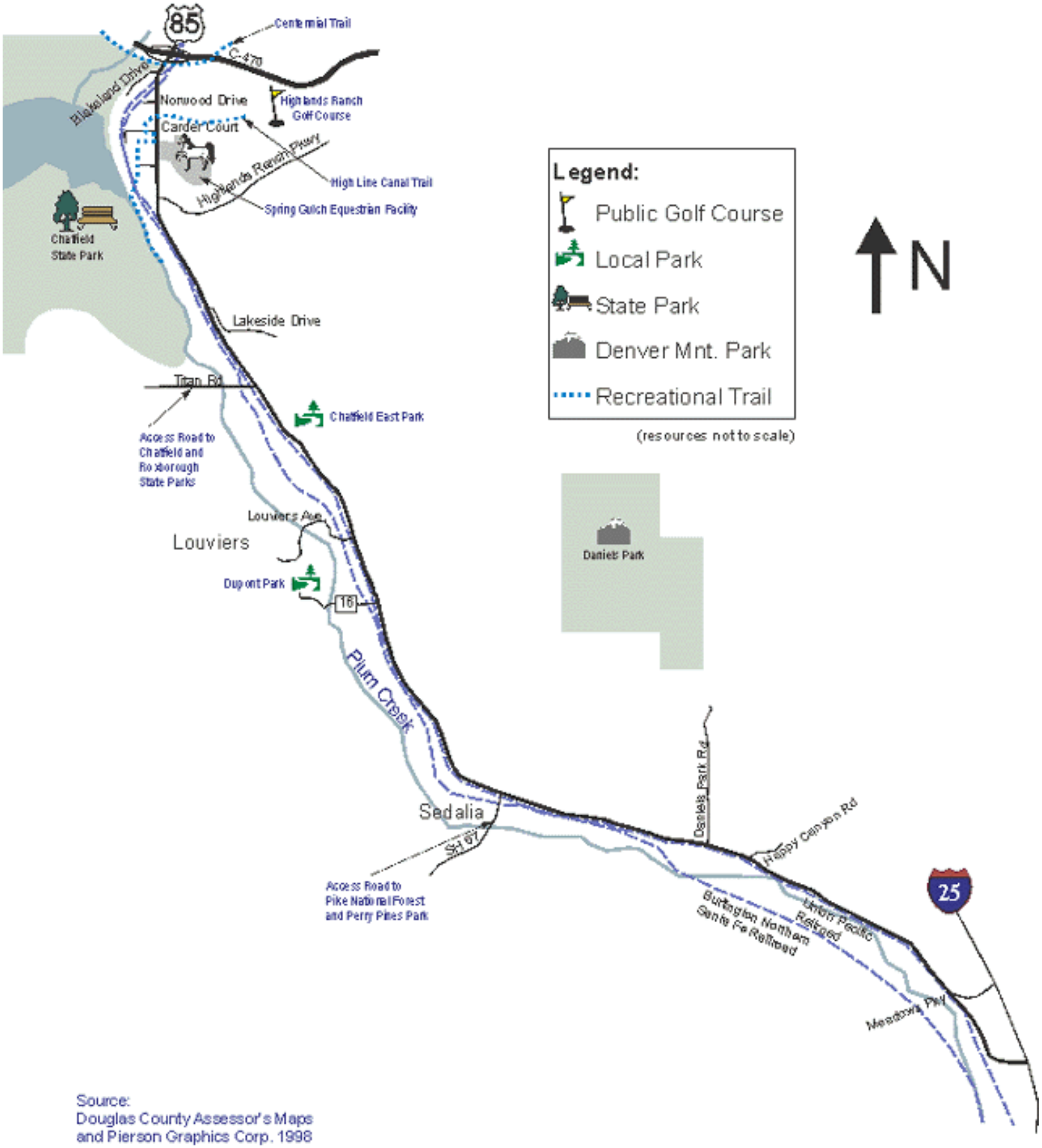
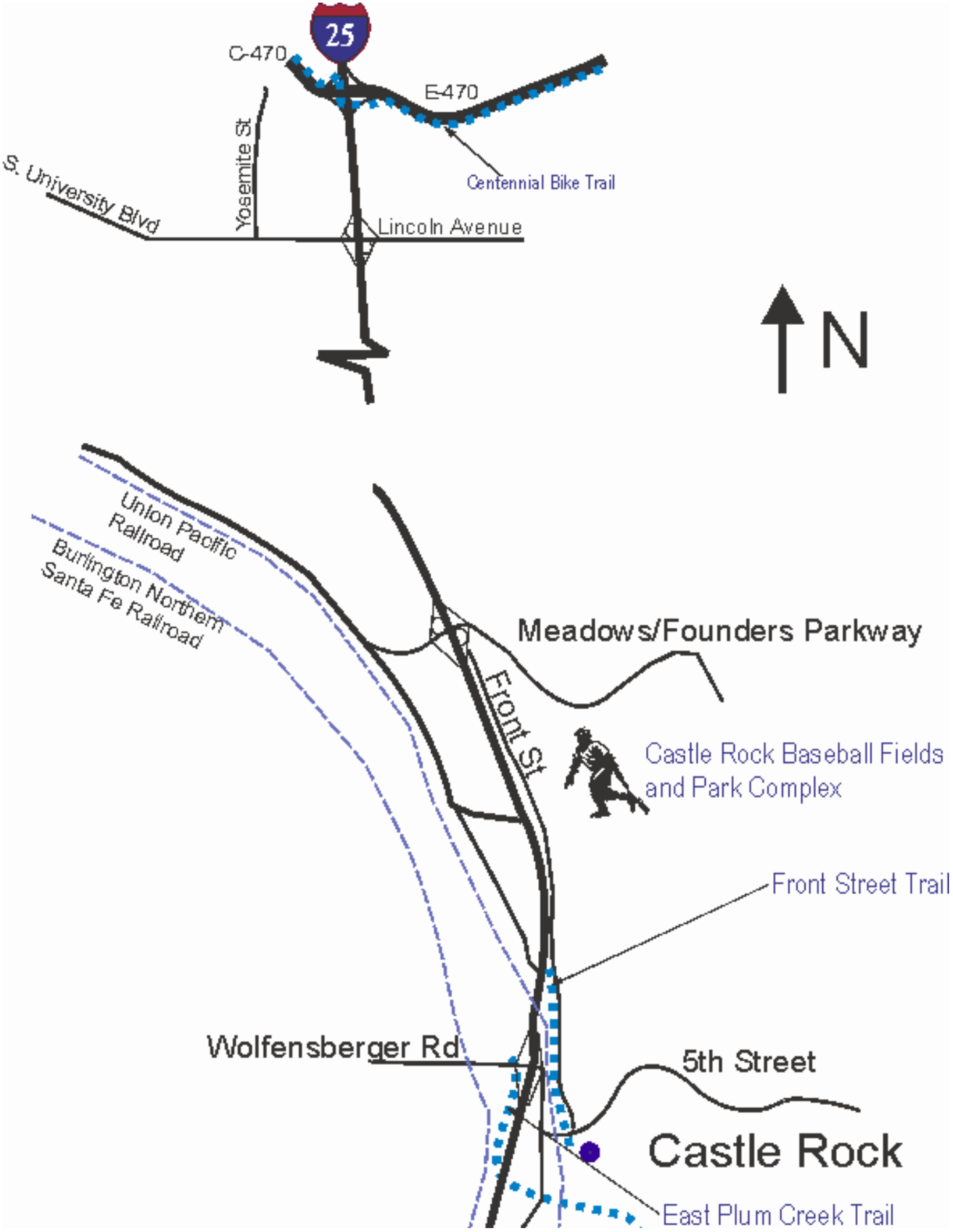


Figure 4.2c
Recreation Resources within the I-25 Project Area



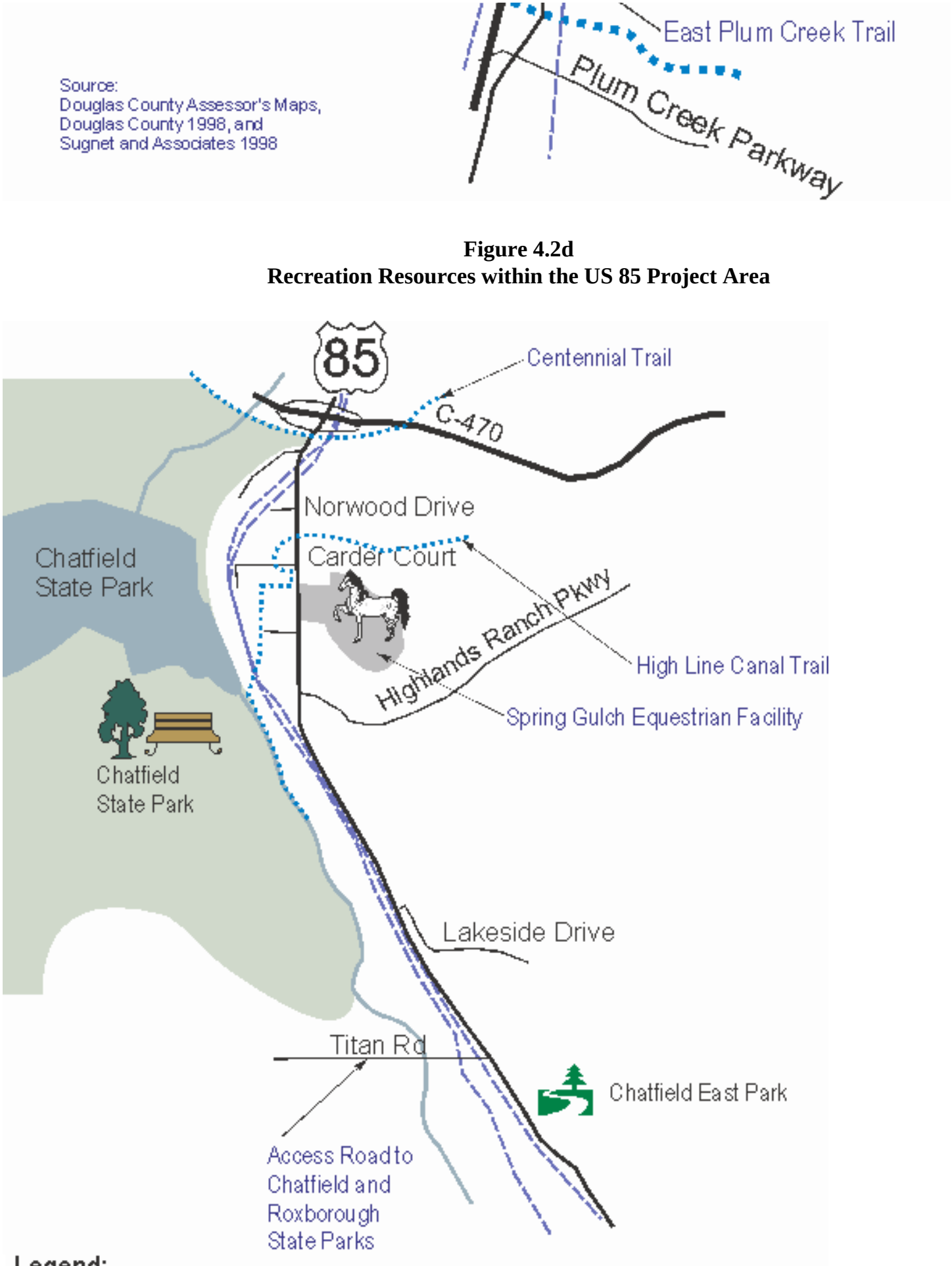
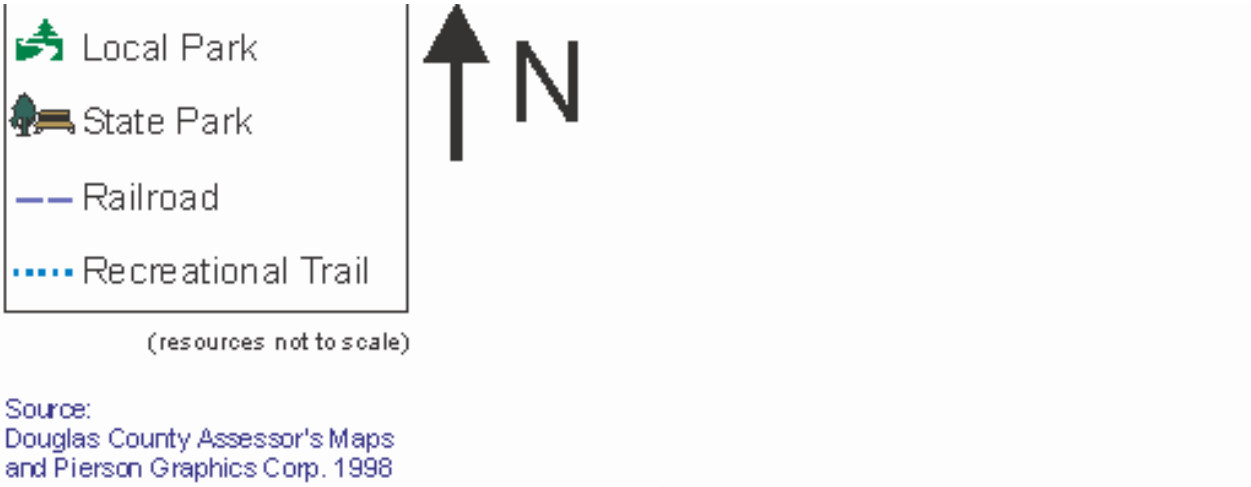


Figure 4.2d
Recreation Resources within the US 85 Project Area



Currently, four maintained trails exist within the project area: East Plum Creek Trail, Front Street Trail, Centennial Bike Trail, and High Line Canal Trail.

- East Plum Creek Trail in Castle Rock is a multi-use, paved trail extending south from Wolfensberger Road for approximately 0.9 kilometer (0.6 mile) along East Plum Creek on the west side of I-25. The trail crosses beneath I-25 at Third Street and continues southeast to the Douglas County Fairgrounds. Future Douglas County plans will extend the trail to the west through Plum Creek Valley to Titan Road.

- Front Street Trail in Castle Rock is a multi-use trail extending along the west side of Front Street for approximately 1.9 kilometers (1.2 miles). A short segment of the trail, directly south of the Liggett Road overpass on I-25, is within the project area.

- Centennial Bike Trail is paved and publicly owned. It is a multi-use trail extending approximately 40 kilometers (25 miles) along C-470 from Belleview Avenue to near the Town of Parker. The trail crosses US 85 at-grade immediately south of the US 85/C-470 Interchange. A spur of the trail also extends southwest from the main trail, ending on the east side of US 85 at approximately milepost (MP) 200. The Centennial Bike Trail also crosses the northern terminus of the I-25 Corridor at C-470.

- High Line Canal Trail is approximately 120 kilometers (75 miles) long, and runs alongside the High Line Canal. It includes both paved and unpaved segments and is used for walking, running, biking, and horseback riding. The trail crosses US 85 at-grade approximately 1.1 kilometers (0.7 mile) south of C-470 (approximately MP 199.5.) The trail begins approximately 1.6 kilometers (1.0 mile) south of Highlands Ranch Parkway, extending to I-70 and Tower Road.

In addition to the above four trails, Highlands Ranch Metro Districts, Douglas County, Chatfield State Park, Denver Water Department, and South Suburban Park and Recreation District maintain a series of trails in Douglas County that are outside the US 85 right-of-way (ROW). These groups and the Chatfield Basin Conservation Network are in the process of developing a trail plan that includes existing trail locations and identifies new trails and trail connections.

4.2.7.2 Recreation Areas

Four recreation areas are adjacent to or within the project area: Castle Rock Baseball Fields and Park Complex, Chatfield State Park, Spring Gulch Equestrian Facility, and Chatfield East Park. Each area offers unique

recreational activities to the general public.

- Castle Rock Baseball Fields and Park Complex, located on the east side of I-25 in Castle Rock, includes approximately 17.4 hectares (43.0 acres). The park is currently under construction and is adjacent to a future middle school site. When completed, the park will have four baseball fields, two inline hockey rinks, picnic tables with shelters, a small amphitheater, two playgrounds, a concession stand, and restrooms. The park is owned and maintained by the Town of Castle Rock and is designed for public use.

- Chatfield State Park is located on the west side of US 85. One of two entrances into the park is through Titan Road via US 85. The recreation area includes 2,853 hectares (7,050 acres), of which 2,266 hectares (5,600 acres) is ground surface and 586.8 hectares (1,450 acres) is water surface. Chatfield State Park offers a wide range of recreation opportunities including horseback riding, hiking, biking, camping, picnicking, wildlife viewing, water sports, fishing, and an area specifically designed for flying model airplanes and launching hot air balloons. Nearly 1.5 million people visit the park annually.

- Spring Gulch Equestrian Facility encompasses 42.5 hectares (105.0 acres), and is operated and maintained by Chatfield State Park through a lease with the USACE. In 1999, 8,565 visitors used the facility. The area is open to the public for equestrian training and competition-related activities. Access to the facility is from US 85.

- Chatfield East Park is located on the east side of US 85 at MP 196. The property was dedicated to the Douglas County Commissioners in 1978 by the developers of Chatfield East Subdivision. The property includes approximately 19.8 hectares (49.0 acres). A small playground and a horse arena are on the easternmost part of the property. The remainder of the property is open and undeveloped.

4.2.8 Land Use and Zoning

The study area is undergoing abundant growth and development. Rapid economic development and land use changes can accelerate the need for transportation improvements. The following discussion focuses on the existing conditions for land use and zoning. Land use is defined as how the property is used today. Figure 4.3a and Figure 4.3b show existing land uses in the I-25 Corridor and US 85 Corridor, respectively. This information was taken from the ***Douglas County Master Plan Land Use Map,*** September 2000. Zoning reflects the particular development purpose that has been approved by the appropriate governmental entity (Douglas County, Town of Castle Rock, or City of Lone Tree). Zoning information was taken from the ***Douglas County Zone District Map,*** April 2000, and the ***Town of Castle Rock Generalized Zoning Map,*** October 2000. Denver Regional Council of Governments (DRCOG) developed a comprehensive guide for future development that combines the separate plans for growth, development, transportation, and water quality for the eight-county region served by DRCOG into a single integrated plan. The implementation strategies and how they may affect future land use in this project is discussed in Section 5.3.2.6, *Land Use and Zoning Impacts*. Figure 4.3c and Figure 4.3d show the zoning in the I-25 Corridor and US 85 Corridor, respectively.

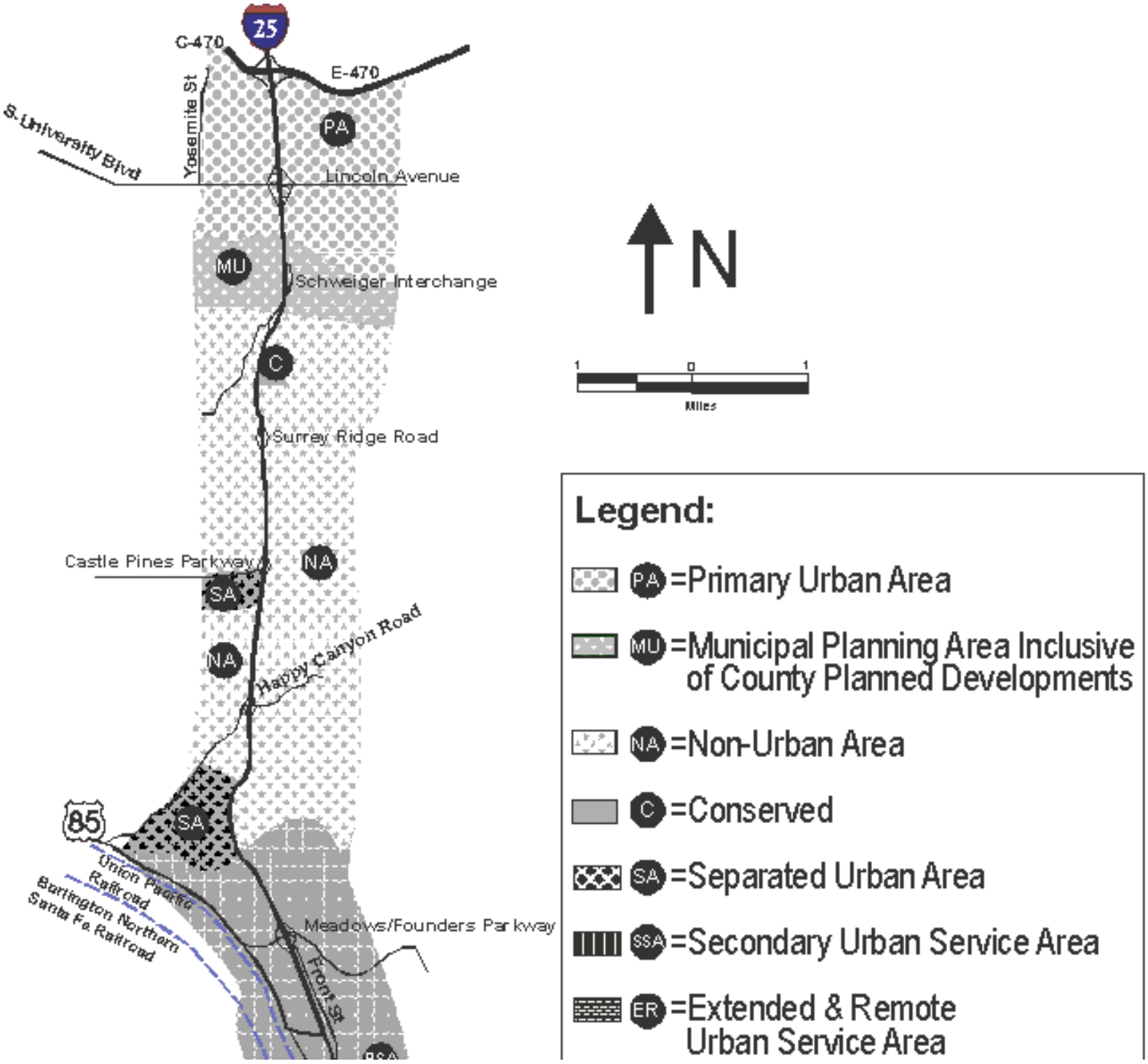
4.2.8.1 I-25 Corridor Land Use and Zoning

Land Use

At the northern limit of the project near Lincoln Avenue, land use is defined as primary urban area; this includes

residential in the vicinity of Yosemite, office parks in Meridian, and the currently undeveloped land in Rampart Range. Land use surrounding the Schweiger Interchange is classified as municipal planning area inclusive of county planned developments. Further south along I-25, in the vicinity of Surrey Ridge Road and Castle Pines Parkway, the land use definition changes to predominantly non-urban areas (primarily large ranches or large single-family lots), with some separated urban area (primarily residential). Through Castle Rock, the land use is primary urban service area. South of Castle Rock, the land use reverts to primarily urban area. Heading south, land uses quickly start to thin out from the urban nature of Castle Rock and move more into a rural theme where they are categorized by Douglas County as extended and remote urban service areas, secondary urban service areas, and non-urban areas.

Figure 4.3a
Land Use along the I-25 Corridor



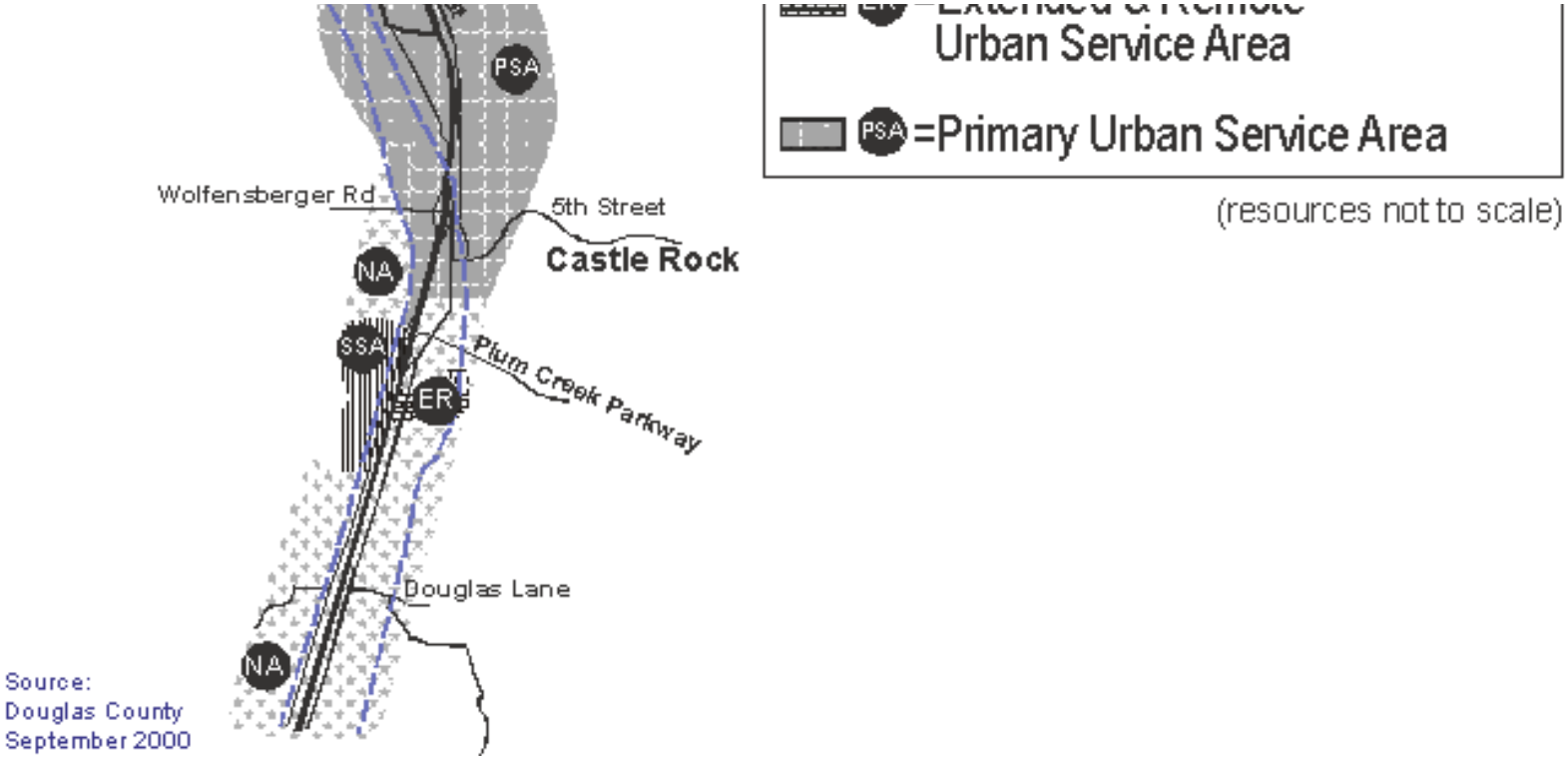
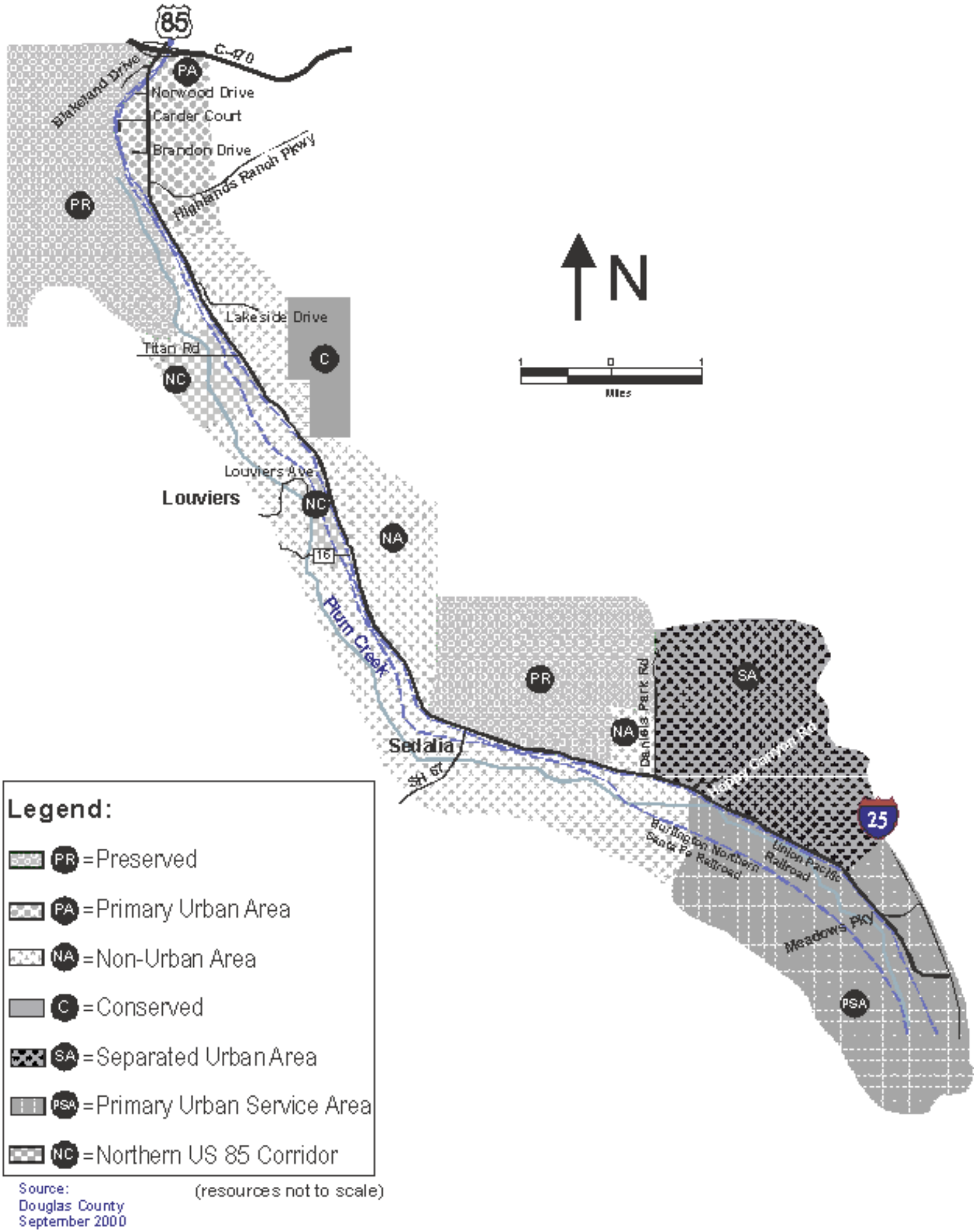


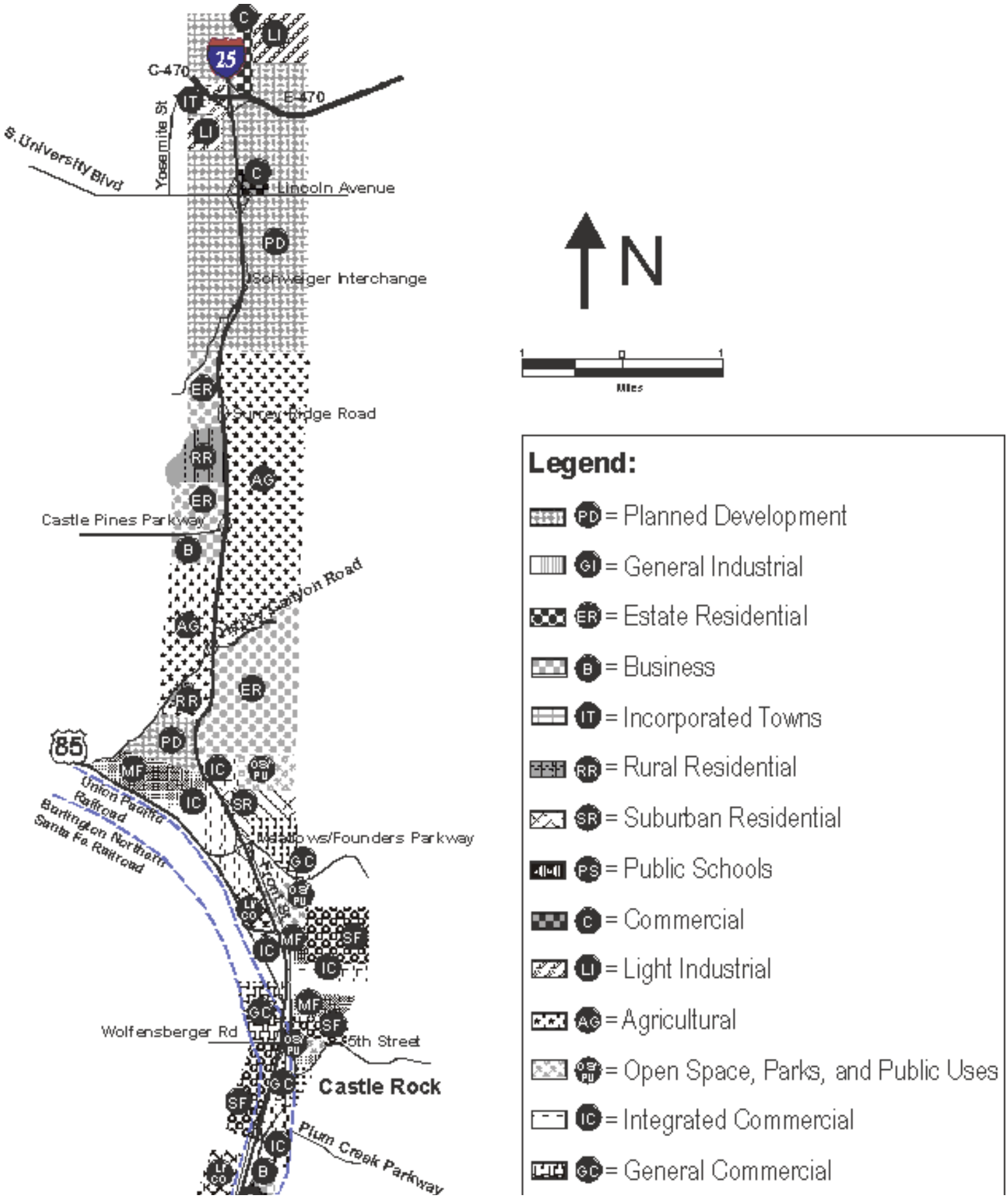
Figure 4.3b
Land Use along the US 85 Corridor



(resources not to scale)

Source:
Douglas County
September 2000

Figure 4.3c
Zoning along the I-25 Corridor



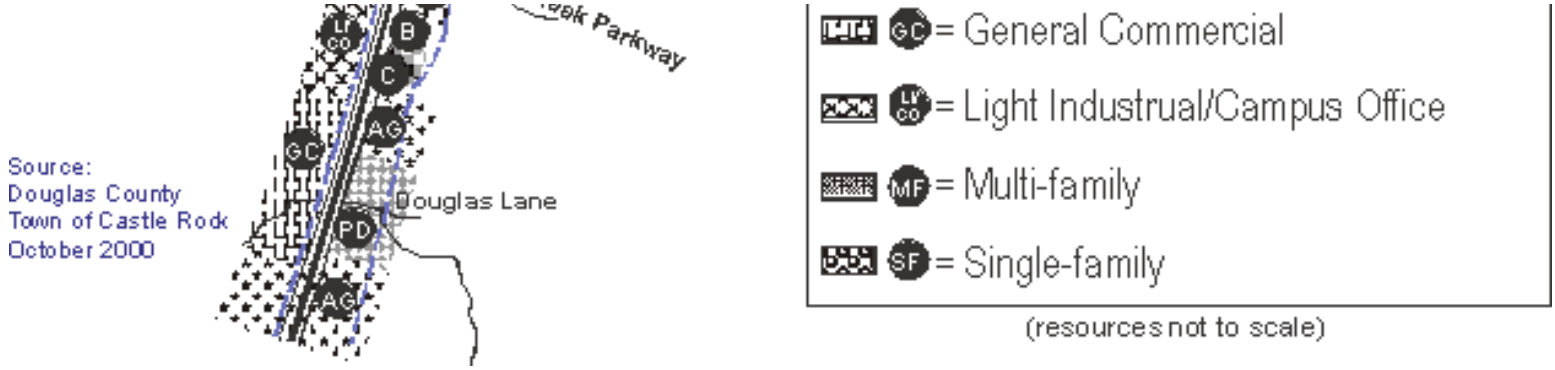
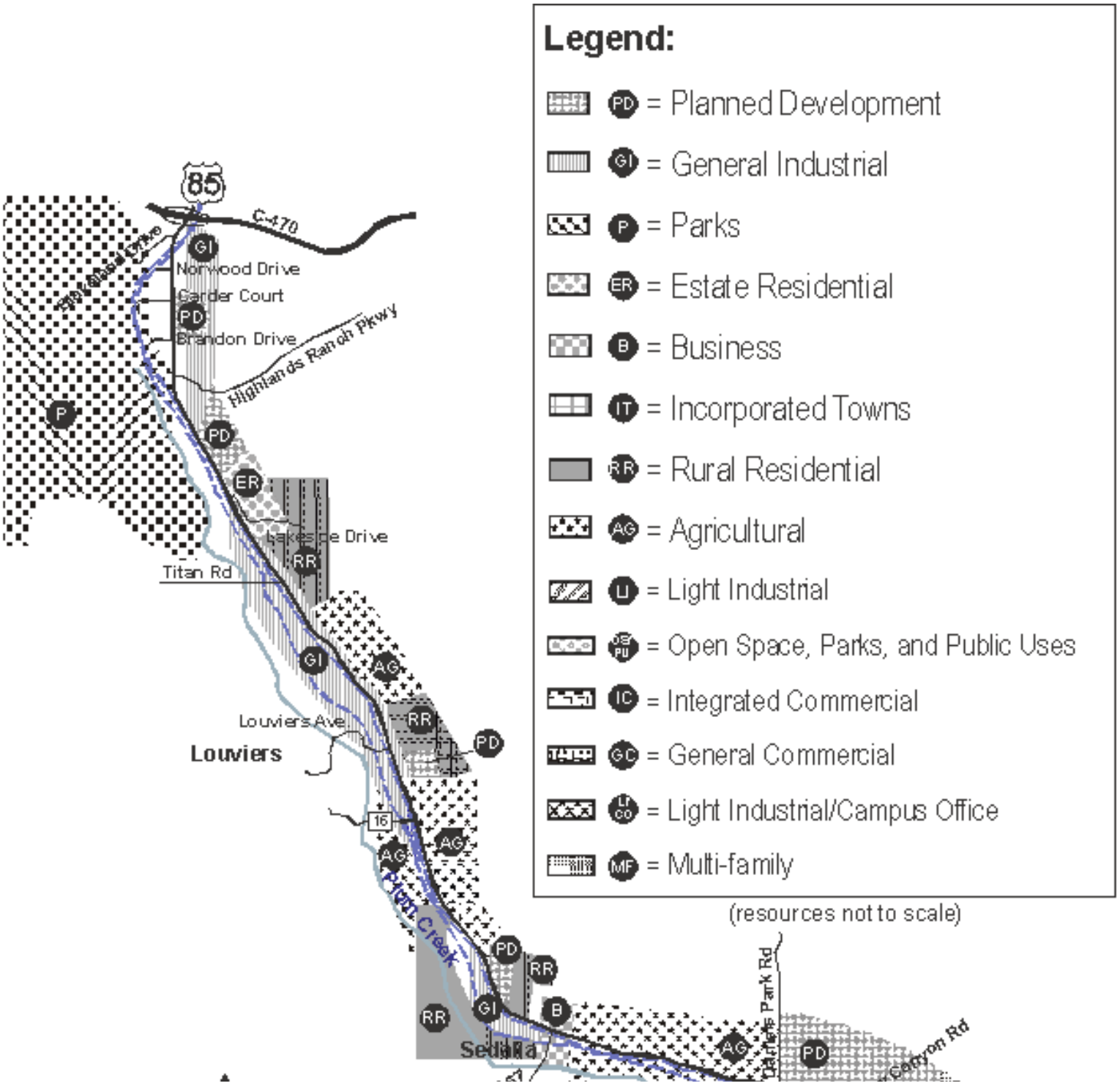
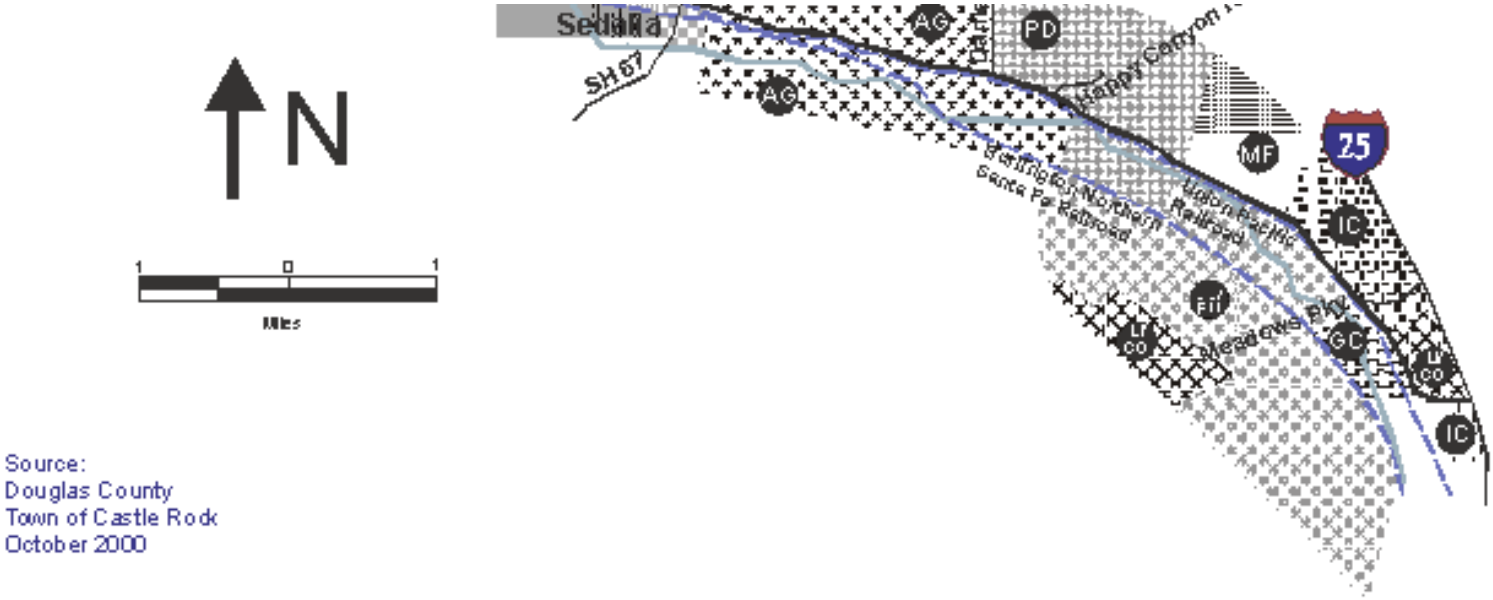


Figure 4.3d
Zoning along the US 85 Corridor





Zoning

The area surrounding the C-470/I-25 Interchange consists of various zoning such as commercial, light industrial, incorporated towns, and planned development. The I-25 Corridor from C-470 to just north of Surrey Ridge Road is zoned as planned development land. The west side of I-25 from Surrey Ridge Road to Castle Pines Parkway is zoned rural residential and estate residential land. The east side is zoned agricultural. The area between Happy Canyon Road and Meadows/Founders Parkway along I-25 is predominantly rural residential and suburban residential. In the Town of Castle Rock between US 85 and 5th Street, the east side of I-25 is predominantly zoned as single-family and multi-family with a public school (Douglas County High School) and open space along Front Street. On the west side of I-25, the area is zoned primarily general and integrated commercial. South of 5th Street to Plum Creek Parkway, the land to the east of I-25 is zoned general and integrated commercial, and land to the west of I-25 is zoned single-family. South of Plum Creek Parkway to Douglas Lane, land is zoned general commercial to the west and business/commercial to the east. At Douglas Lane, land is zoned planned development.

4.2.8.2 US 85 Corridor Land Use and Zoning

Land Use

At the northern limit of the project near C-470, the ***Douglas County Master Plan Land Use Map,*** September 2000, depicts primarily urban area (Highlands Ranch) to the east and preserved land (Chatfield State Recreation Area) to the west. This area of Highlands Ranch is currently undergoing development. From just north of Lakeside Drive through the towns of Louviers and Sedalia, land use is primarily non-urban area (large ranches and large single-family lots) on both sides of US 85, along with a substantial number of low-density, general industrial uses. The Douglas County map also lists Louviers and Sedalia as rural town centers. The east side of US 85 in the vicinity of Sedalia has preserved land uses, which cover about 2 miles; this preserved land is part of the Cherokee Ranch. The southern portion of US 85 is shown as a separated urban area near Castle Pines, which is mostly single-family residential. South of that, the land use is shown as urban service area (Town of Castle Rock).

Zoning

The west side of US 85 from C-470 to Highlands Ranch Parkway is zoned general industrial land. West of this industrial area from C-470 to Titan Road is zoned parkland. The east side of US 85 begins as general industrial land at C-470 and continues to Highlands Ranch Parkway. Douglas County has planned development land beginning along the east side of US 85 that becomes estate and rural residential areas until reaching Titan Road. Along both sides of US 85 south of Titan Road to south of Louviers Avenue, zoning is general industrial. Just north of County Road (CR) 16, on the east side of US 85, is an area of rural residential and planned development land. Sedalia and its surroundings are made up of various zoned parcels such as general industrial, rural residential, planned development, agricultural, and business. South of Daniels Park Road is planned development land to the east and agricultural and planned development land to the west. At the southern end of the US 85 Corridor, zoning is comprised of integrated and general commercial to the east and open space to the west.

4.2.9 Applicable Transportation Plans

Transportation plans adopted by governing bodies in the study area include the ***DRCOG Metro Vision 2020 Plan***, the ***1999 Regional Transportation Plan (RTP)***, ***1994 Castle Rock Town Wide Transportation Plan*** and the ***Douglas County 2015 Transportation Plan***. Impacts to each of the plans are outlined in Section 5.3.2.6, *Land Use and Zoning Impacts*.

DRCOG Metro Vision 2020 Plan

The ***DRCOG Metro Vision 2020 Plan*** is the Denver region's plan for addressing future growth of the metropolitan area. The plan outlines strategies and implementation steps to preserve the region's quality of life while also positioning the region to benefit from growth. The plan is organized around six core elements addressing the development pattern of the region, the necessary transportation system, and the actions needed to preserve air quality and water quality. The six core elements are:

- Extent of urban development
- Open space
- Free-standing communities
- Balanced/multi-modal transportation system
- Urban centers
- Environmental quality

Regional Transportation Plan

The RTP is the fiscally constrained version of the ***DRCOG Metro Vision 2020 Plan***. It includes those elements of the Metro Vision that can be provided through the year 2020, based on reasonably expected revenues.

Elements included in the DRCOG RTP along the I-25 Corridor include:

- Eight lanes from C-470 to Meadows/Founders Parkway
- Six lanes from Meadows/Founders Parkway to MP 178
- Car pool lot

Elements included in the DRCOG RTP along the US 85 Corridor include:

- Six lanes from C-470 to Highlands Ranch Parkway
- Four lanes from Highlands Ranch Parkway to Meadows Parkway

Castle Rock Town Wide Transportation Plan

The ***Castle Rock Town Wide Transportation Plan***, completed in 1994, outlines recommended transportation improvements for the Town of Castle Rock.

Douglas County Transportation Plan

The ***Douglas County 2015 Transportation Plan*** is an element of the ***Douglas County Master Plan*** completed in 1997. The plan outlines transportation improvements that will be needed in Douglas County in 5-year increments for the next 15 years. Douglas County is about to start updating the current transportation plan.

4.3 PHYSICAL ENVIRONMENT

4.3.1 Air Quality

The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for six criteria pollutants to protect the public from the adverse health effects associated with air pollution. These six criteria pollutants are carbon monoxide (CO), ground level ozone (O_3), oxides of nitrogen (NO_x), sulfur dioxide (SO_2), fine particulate matter (PM_{10}), and lead (Pb).

4.3.1.1 Meteorology and Climate

The geographical and meteorological characteristics of Douglas County contribute to the air quality conditions within the study area. Douglas County is located at the foot of the Rampart Range of the Rocky Mountains. It is the subdrainage basin of Plum Creek, which drains into the Platte River Basin north of Douglas County.

The climate is moderate with average monthly temperatures ranging from –1.8° C (28.7° F) in January to 29.9° C (85.8° F) in July, with low relative humidity. Prevailing winds are from the south at an average of 12.9 kilometers per hour (km/h) (8.0 miles per hour [mph]). The average annual precipitation is 43.7 centimeters (17.2 inches).

4.3.1.2 Air Quality Levels

Douglas County is a part of the Central Front Range Air Quality Control Region along with Boulder, Gilpin, Clear Creek, Adams, Arapahoe, Denver, and Jefferson counties. The Denver metropolitan area consists of Boulder, Adams, Arapahoe, Denver, Jefferson, and Douglas Counties. The Denver metropolitan area is currently classified as non-attainment for CO and PM_{10}. The project area is the northern portion of Douglas County. No violations of the NAAQS in the project area have been reported for the last 11 years. According to the ***Colorado Air Quality Control Commission Report to the Public, 1998-1999***, there are no monitors in the project area to provide CO, NO_x, hydrocarbons (HC), and O_3 air quality data; therefore, actual levels of these pollutants are not available. PM_{10} monitoring in the Town of Castle Rock has shown no PM_{10} violations in the last 11 years in Douglas County. Emission inventories projected for the Denver non-attainment area are represented in Table 4.8.

It is predicted that motor vehicle operation on paved and unpaved roads will contribute approximately 90 tons per day of PM_{10} of the total projected emissions of 112 tons per day or about 80 percent. About 95 percent of these emissions are contributed by road dust, sand, and unpaved roads. Actual vehicle PM_{10} emissions are 5 percent of the total motor vehicle operation.

Table 4.8
Emission Inventories for the Denver Non-Attainment Area
(Tons per Day)

Source Category	2001 Attainment SIP			2006 Interim Year			2013 Maintenance		
Pollutant	CO	NO_x	VOC*	CO	NO_x	VOC*	CO	NO_x	VOC*
Point Sources	70.2	121.8	45.8	46.7	123.4	52.4	46.7	126.0	55.8
On-Road Sources	875.2	139.4	123.8	844.7	115.2	84.4	867.2	117.2	73.6
Non-Road Sources	61.6	64.4	66.7	46.9	51.2	39.9	41.3	40.4	39.5
Area Sources	196.3	6.9	73.7	187.1	9.8	72.8	170.2	10.9	80.0
Total Sources	1203.3	332.5	310.0	1125.4	299.6	249.6	1125.4	294.5	248.9
Mobile Source Contribution (%)	72.7	41.9	39.9	75.1	38.5	33.8	77.1	39.8	29.6

** Volatile organic compound (VOC) is the same as HC for purposes of this report.*

4.3.1.3 State Implementation Plan

Colorado Air Quality Control Commission Regulation No. 10, "Criteria for Analysis of Conformity" requires that a transportation improvement plan (TIP), or RTP (a long-range plan) must conform to the state implementation plan (SIP). As part of the SIP development process, an emissions budget for CO is established for non-attainment and maintenance areas to maintain the NAAQS. Because the Denver Metropolitan Area is currently classified as non-attainment for CO and $PM_{10,}$ projected emissions of these pollutants resulting from the TIP or RTP must not exceed the emissions budgets set forth in the SIP. The CO emissions budget for the Denver Metropolitan Area in the horizon years (2010 and 2020) is set at 800 tons per day. The PM_{10} emissions budget for the Denver Metropolitan Area in the horizon years is set at 60 tons per day.

In addition, Regulation No. 10 sets the requirements for air quality analysis for regional and "hot-spot" air quality on a project level. This includes the requirements for modeling and screening analysis of the selected project. These requirements have been incorporated in the air quality analysis for the South I-25 Corridor and US 85

Corridor EIS.

4.3.1.4 Conformity Requirements

Section 176 (c) of the Clean Air Act (CAA) and related requirements of the Transportation Equity Act for the 21st Century (TEA-21) and the Federal Transit Act, require that transportation plans, programs, and projects that are developed, funded, or approved by USDOT and by metropolitan planning organizations or other recipients of funds under TEA-21 or the Federal Transit Act, must demonstrate and assure conformity of such activities to the applicable SIP. The provision related to conformity applies in all non-attainment and maintenance areas for transportation-related criteria pollutants for which the area is designated non-attainment or has a maintenance plan.

An RTP is the official intermodal metropolitan transportation plan that is developed through the metropolitan planning process for the metropolitan planning area. A TIP is a staged, multi-year, intermodal program of transportation projects covering a metropolitan planning area, which is consistent with the metropolitan transportation plan. The RTP specifically describes the transportation system envisioned over the next 20 years. The RTP quantifies and documents the demographic and employment factors influencing expected transportation demand, including land use forecasts. Additions and modifications to the transportation network must also be sufficiently specific to show there is a reasonable relationship between expected land use and the envisioned transportation system. It is a requirement that the RTP, TIP, and their approved projects respond to anticipated growth, showing the relationship of these projects to land use, population growth, and employment.

Table 4.9 and Table 4.10 summarize the results of the emission inventory and dispersion modeling analyses on the 2001-2006 DRCOG TIP conformity transportation networks.

Table 4.9
Denver-Boulder Carbon Monoxide Non-Attainment Area

Parameter*	2001 Transportation Model Results (Model EA01)	2010 Transportation Model Results (Model OA10)	Base year 2020 Regional Transportation Model Results (Model 5A20)
VMT	56,796,900	72,014,700	84,488,200
CO – tons/day	805.6	791.1	735.6
Budget	825.0	800.0	800.0

**National low-emissions vehicle included*
VMT, Vehicle miles traveled

Table 4.10
Denver PM_{10} State Implementation Plan Modeling Domain

Parameter	2010 Transportation Model Results (Model OA10)	Base year 2020 Regional Transportation Model Results (Model 5A20)
VMT	62,712,700	72,491,900
PM_{10} – tons/day	53.10	55.54
PM_{10} Budget – tons/day	60.0	60.0
NO_x – tons/day	131.29	130.12
Tier II/Low Sulfur NO_x adjustment – tons/day	-27.27	-41.64
NO_x w/ Tier II – tons/day*	104.02	88.48
NO_x Budget – tons/day*	119.4	119.4
Dispersion modeling*	<150 $\mu g/m^3$	137.5 $\mu g/m^3$

** National low-emissions vehicle not included; Tier II included; 2010 and 2020 cut-point = 1.5 grams per mile*

4.3.1.5 Other Pollutants of Concern

Toxic Air Constituents

In addition to the NAAQS set forth by EPA for the six criteria pollutants, EPA has also established a list of 33 urban hazardous air pollutants. These pollutants include air toxics emitted from stationary (factories), non-road (lawnmowers, airplanes, etc.), and road (cars, trucks, and buses) sources.

To better understand the harmful effects road sources have on human health, the EPA has also developed a list of 22 mobile source air toxics (MSAT), such as benzene, formaldehyde, diesel exhaust, lead, and 1,3 butadiene. People are exposed to these MSATs in six basic ways: airborne emissions from burning of fuel; airborne emissions from partially burning the fuel; emissions from evaporating fuel primarily at filling stations; chemical reactions that transform MSATs once they are released to the air into other MSATs; airborne exposure to worn engine parts, tires or brakes, and direct exposure to toxics from leaking underground fuel storage tanks through drinking water sources.

The EPA is currently conducting studies to better understand the rates at which these MSATs are emitted. They are also developing an air toxics model called the Assessment System for Population Exposure Nationwide (ASPEN). The ASPEN will help predict areas where toxics may be concentrated based on emission estimates of toxic air pollutants and meteorological data from the National Weather Service.

Greenhouse Gas

Carbon dioxide (CO_2) is a greenhouse gas of global concern. The Colorado Air Pollution Control Division (APCD) has developed a list of CO_2 reduction strategies and will be considering CO_2 reduction options that will affect point, area, and mobile sources on a region-wide basis.

For additional information on air quality, see the ***Air Quality Analysis South I-25 Corridor and US 85 Corridor,*** November 2000**,** in the Technical Reports Volume of the ***South I-25 Corridor and US 85 Corridor FEIS***.

4.3.2 Water Quality and Quantity

4.3.2.1 Surface Water

The I-25 Corridor and US 85 Corridor are located in portions of two watersheds: Upper South Platte and Middle South Platte-Cherry Creek. Both watersheds eventually drain into the South Platte River and can be characterized by high plains and rolling foothills, with elevations ranging from approximately 1,676 meters above mean sea level (amsl) (5,500 feet amsl) to 2,134 meters amsl (7,000 feet amsl). Groundcover in these watersheds is largely grass, although some forested areas do exist. Drainages in the corridors can be characterized as sandy washes with streambanks populated by upland vegetation species. Drainages in both corridors flow intermittently, typically in response to spring snowmelt or high-intensity precipitation events. The Upper South Platte watershed includes the entire US 85 Corridor and portions of the I-25 Corridor occurring south of Happy Canyon Road.

The US 85 Corridor parallels, but does not include, the northerly banks of Plum Creek and East Plum Creek between Castle Rock and Highlands Ranch Parkway. Surface water drainage between Highlands Ranch Parkway and C-470 flows into either Spring Gulch or Marcy Gulch (see Figure 4.6b in Section 4.3.8, *Floodplains)*. Spring Gulch discharges into a reservoir situated between US 85 and Chatfield Reservoir, and Marcy Gulch discharges into the South Platte River. Thirty-three ephemeral or intermittent tributaries of Plum Creek or East Plum Creek flow under US 85 including Highlands Gulch and Haskins Gulch.

East Plum Creek flows under I-25 in the Town of Castle Rock and also flows through Castle Rock northwesterly, discharging into Plum Creek near Sedalia (see Figure 4.6a in Section 4.3.8, *Floodplains*). I-25 crosses eight drainages including Hangman's Gulch and seven unnamed drainages that are tributary to East Plum Creek. Plum Creek continues northwesterly, discharging into Chatfield Reservoir. Chatfield Reservoir was completed in 1976 for flood control, silt control, recreation, fish and wildlife, and water supply storage. The High Line Canal, constructed in 1883 as an irrigation ditch, flows under US 85 to the northeast.

A segment of I-25, north of Happy Canyon Road, occurs in the Middle South Platte-Cherry Creek watershed. Seven natural, ephemeral, or intermittent drainages flow through this portion of the study area into Cherry Creek or Cherry Creek Reservoir: Cottonwood Creek, Newlin Gulch, Happy Canyon Creek, and unnamed tributary drainages. The Arapahoe Canal Pipeline also flows through the study area. Cherry Creek flows to the north, approximately 8.0 kilometers (5.0 miles) east of the I-25 project corridor, and discharges into Cherry Creek Reservoir, a water supply and flood control reservoir completed in 1950.

For additional information on surface water drainageways, see the ***Floodplain and Drainage Assessment Technical Report,*** May 2000, amended November 2000***,*** in the Technical Reports Volume of the ***South I-25 Corridor and US 85 Corridor FEIS.***

4.3.2.2 Groundwater

Groundwater quality is generally considered good in the project area, although population growth may be causing a decline in aquifer levels. Groundwater pumped within the project corridors is primarily used for domestic and agricultural purposes, although commercial and industrial uses predominate within the Town of Castle Rock.

Groundwater underlies the project corridors in a series of unconfined and confined aquifers. The Plum Creek alluvial aquifer is the primary aquifer in the vicinity of US 85. The vertical extent of the Plum Creek aquifer saturated zone occurs at an elevation slightly higher than that of Plum Creek, or between 6 and 24 meters (20 to

80 feet) beneath US 85, depending on the proximity to Plum Creek or East Plum Creek. The Plum Creek alluvium is about 30 meters (100 feet) thick and is underlain by the 60- to 70-million-year-old semi-confined Dawson Formation.

The I-25 Corridor follows a ridge north from Castle Rock. Groundwater under this corridor occurs in the Dawson Formation at depths of 61 meters (200 feet) or greater. Some saturated alluvium does occur adjacent to the surface water drainages. These alluvial aquifers have small yields and are of limited use for water supply purposes.

4.3.2.3 Water Quality

Urbanization is affecting water quality in both corridor watersheds. The increase in impervious surfaces brought about by urbanization generates elevated stormwater flows. As the natural vegetated land surface is replaced with roads, parking lots, houses, sidewalks, golf courses, and other landscaped areas, the area of soil available for stormwater infiltration diminishes and storm-related runoff increases, thus resulting in three primary impacts to water quality:

- *Release of pollutants*. Runoff from developed areas typically contains pesticides, herbicides, fertilizers, hydrocarbons, salts, volatile and semivolatile organics, heavy metals, bacteria, and other contaminants.
- *Erosion*. Gully erosion occurs when increased overland flows are concentrated in drainageways.
- *Sediment loading*. Sediment loading to surface waters occurs when snowmelt or precipitation contacts disturbed lands laid bare from construction activities.

East Plum Creek, Plum Creek and Cherry Creek receive runoff from residential and commercial development. Gully erosion and sediment inflows can result in large quantities of sediment being delivered to East Plum Creek, Plum Creek, and Cherry Creek. Suspended solids will be transported downstream until the material settles out in a dormant reach, such as Chatfield Reservoir and Cherry Creek Reservoir.

Upper South Platte

The mainstems of East Plum Creek and Plum Creek are classified by the CDPHE Water Quality Control Division (WQCD) as Cold Water Aquatic Life, Class 1; Recreation, Class 2; Water Supply; and Agriculture.

The *Cold Water Aquatic Life, Class 1* designation is applied to waters capable of sustaining a wide variety of cold-water biota, including sensitive species. The *Recreation, Class 2* secondary contact designation is applied to those surface waters that are suitable or are intended to become suitable for recreational uses on or about but not in the water. Recreation, Class 2 generally results in a standard of 2,000 fecal coliforms per 100 milliliters.

All tributaries of the East Plum Creek system, including all lakes and reservoirs not on National Forest lands, are classified by CDPHE WQCD as Warm Water Aquatic Life, Class 2; Recreation, Class 2; and Agriculture. Warm Water Aquatic Life, Class 2 waters are not capable of sustaining a wide variety of warm water biota, including sensitive species, due to physical habitat, water flows or levels, or uncorrectable water quality conditions that result in substantial impairment of the abundance and diversity of species.

Waters that flow through and along the US 85 Corridor are not currently listed on either the state 303(d) list of impaired waters or the state monitoring and evaluation list. However, some reaches of East Plum Creek and Plum Creek outside of the project corridor are included on the state monitoring and evaluation list. Identified impairments for these reaches include sediment, temperature, and aquatic life. Reaches of East Plum Creek and Plum Creek adjacent to and through the project corridor exhibit many of these same characteristics. Sections of Plum Creek, for example, have obvious sediment deposition problems. Sediment build-up is changing the nature of the stream, possibly making this reach uninhabitable for aquatic species. Continued degradation of the streams in and along the project corridor may lead to 303(d) listing in the future and additional restrictions on projects adjacent to the impaired waters.

The ***Chatfield Reservoir Clean Lakes Study,*** 1984, presented the following water quality findings relevant to the Plum Creek drainage:

- Concentration of total and dissolved phosphorus are generally greater in Plum Creek than the other two streams discharging into Chatfield Reservoir: Deer Creek and the South Platte River
- The average concentration of total suspended solids (TSS) is high in Plum Creek flows; this condition is attributed to the fine sediments that occur on the channel bottom
- Concentrations of all contaminants are higher during storm flow events

In 1985, following the Clean Lakes Study, DRCOG established the Chatfield Basin Task Force (Task Force) to make recommendations regarding water quality issues in drainages upstream from Chatfield Reservoir, including Plum Creek. The Task Force collects and disseminates ambient water quality data for Plum Creek at Titan Road. Total phosphorus, nitrate, and nitrite concentrations in 1999 were similar to the 1986 through 1999 average values of 0.13 mg/l, 0.50 mg/l, and 0.01 mg/l, respectively. Annual average phosphorus concentrations ranged from a high of 0.42 mg/l in 1987 to 0.05 mg/l in 1996, the 1998 and 1999 average concentrations were 0.16 mg/l and 0.13 mg/l, respectively. The Chatfield Reservoir Control Regulation has set the goal of a 50 percent reduction in phosphorus loading from non-point sources, including stormwater runoff. Specific conductance, an indicator of dissolved solids and total suspended solids, were higher in 1998 and 1999, compared to the 1986 through 1999 averages of 274.8 microsiemens/centimeter (µ s/cm) and 161.6 mg/l. It is difficult to draw any conclusions from the limited data points; however, these studies suggest that Plum Creek water quality has not changed significantly since 1986.

Middle South Platte-Cherry Creek

All tributaries to Cherry Creek, including all lakes and reservoirs, from the source of East and West Cherry Creeks to the confluence with the South Platte River, are classified by CDPHE WQCD as Warm Water Aquatic Life, Class 2; Recreation, Class 2; and Agriculture. None of the project corridor streams in the Middle South Platte-Cherry Creek Basin are currently listed on the state 303(d) list or in the state monitoring and evaluation list.

Land use in the Middle South Platte-Cherry Creek basin is changing from agrarian to suburban residential, with associated development. Urbanization is accompanied by changes in water quality and water quality concerns. Forest and rangeland are sources of nutrients, suspended sediment, dissolved solids, and metals in surface water. Suburban environments typically generate greater volumes of stormwater as homes, yards, roads, and other impervious surface areas replace undeveloped land. Increased stormwater can result in higher quantities of

sediment and nutrients (e.g., phosphorus and nitrogen) discharged into surface waters as well as increased levels of HC and VOCs.

Cherry Creek Reservoir, like Chatfield Reservoir, is susceptible to eutrophication from upstream point and non-point source pollutant loading. Eutrophication is the process by which a body of water becomes enriched in dissolved nutrients that stimulate the growth of aquatic plant life, usually resulting in the depletion of dissolved oxygen. Phosphorus is the nutrient most responsible for causing eutrophication in reservoirs and aquatic plant growth in streams. The most significant source of phosphorus in Cherry Creek Reservoir is stormwater runoff, as identified in the 1984 ***Cherry Creek Reservoir Clean Lakes Study.*** The Water Quality Control Commission (WQCC) set a phosphorus standard for Cherry Creek Reservoir in August 1984.

The narrative standard states the goal of achieving a 50 percent overall reduction in non-point source phosphorus discharges for the entire Cherry Creek Basin, including the Middle South Platte-Cherry Creek, through the use of detention and rapid infiltration basins for the treatment of stormwater runoff. The Cherry Creek Basin Authority (CCBA) is using this narrative standard as a target for development of point and non-point source pollution control strategies. The CCBA was established specifically to develop a water quality program to control pollutant loading upstream of the reservoir.

4.3.3 Vegetation

Several factors influence the distribution and abundance of plants across a landscape, including latitude, elevation, aspect, slope, soils, precipitation, and land use. Within the APE, latitude and precipitation differences are minimal; therefore, differences in the remaining factors primarily influence the composition and distribution of plant species within the I-25 Corridor and US 85 Corridor. The topography of the APE consists of rolling hills, with elevation increasing from north to south. Elevations in the study area generally range from 1,646 meters (5,400 feet) at C-470 and US 85 and 1,798 meters (5,900 feet) at C-470 and I-25 to approximately 1,890 meters (6,200 feet) in Castle Rock.

Wetland vegetation types are discussed in the wetland section of this document. Dominant upland vegetation types in the APE include:

- Grasslands
- Shrublands
- Woodlands
- Riparian
- Urban

These vegetation types were mapped from aerial photography along I-25 within a range of 150 to 245 meters (500 to 800 feet) from each side of the highway (Table 4.11). Along US 85, plant communities were mapped within a range of 30 to 305 meters (100 to 1,000 feet) from each side of the highway. Although the APE is likely to be 30 meters (100 feet) from the existing ROW for US 85 and 60 meters (200 feet) from the existing ROW for I-25, the larger vegetation type mapping area provides context for impact analysis. Due to rapid urbanization in Douglas

County, acreage estimates may vary slightly from those presented in Table 4.11.

For additional information on vegetation, see the ***Vegetation Technical Report***, May 2000, amended November 2000, in the Technical Reports Volume of the ***South I-25 Corridor and US 85 Corridor FEIS.***

Table 4.11
Area Estimates for Vegetation Types Adjacent to
I-25 and US 85, Douglas County

Vegetation Type	I-25 Hectares (Acres)	US 85 Hectares (Acres)
Grasslands	521 (1,287)	495 (1,223)
Shrublands	84 (208)	41 (101)
Woodlands	83 (205)	4 (10)
Riparian	30 (74)	21 (52)
Urban	127 (314)	145 (358)
Total Area	845 (2,088)	706 (1,744)

4.3.3.1 Grasslands

The grassland vegetation type dominates (65 percent of total area mapped) much of the landscape along both highway corridors. Immediately adjacent to both highways, introduced grasses such as smooth brome (*Bromopsis inermis*) and crested wheatgrass (*Agropyron cristatum*) are common. Weeds such as Japanese brome (*Bromus japonicus*), musk thistle (*Carduus nutans*), Canada thistle (*Breea arvense*), yellow sweetclover (*Melilotus officinale*), and diffuse knapweed (*Acosta diffusa)* are also prevalent. Japanese brome is also common further from I-25 in historically grazed areas and is often indicative of depleted rangeland from livestock grazing or other land use. Of the above-mentioned weeds, Canada thistle, diffuse knapweed, and musk thistle are among the top 10 weed species in Colorado.

Native grasses such as buffalograss (*Buchloë dactyloides*), blue grama (*Chondrosum gracile*), side-oats grama (*Bouteloua curtipendula*), and little bluestem (*Schizachyrium scoparium*) are more common further from I-25. Other native species common in upland grasslands along I-25 are *Alyssum* spp., yucca (*Yucca glauca*), and prickly pear (*Opuntia* spp.*).*

Sand dropseed (*Sporobolus cryptandrus)* is the dominant native grass along much of US 85. Other native grass species include buffalograss, blue grama, side-oats grama, little bluestem, and big bluestem (*Andropogon gerardii*). Additional plant species observed includes yucca and prickly pear.

4.3.3.2 Shrublands

Shrublands occur in mesic draws and on hillsides within the project area of both highways (8 percent of the total mapped area). These areas are dominated by a Gambel oak (*Quercus gambelii*) overstory. Though not dominant, ponderosa pine (*Pinus ponderosa*) is found in some areas, scattered among the Gambel oak. The mid-canopy is composed of mixed shrubs such as skunkbrush (*Rhus aromatica trilobata* spp.), hawthorn (*Crataegus* spp.), snowberry (*Symphocarpus occidentalis*), and wild rose (*Rosa woodsii*). The herbaceous understory is typically depauperate; some western wheatgrass (*Pascopyrum smithii*), bluegrass (*Poa* spp.), and Oregon grape (*Mahonia repens)* occur along the interface between grasslands and shrublands. Some shrubland communities located near

the tops of hills with northern aspects are dominated by mountain mahogany (*Cercocarpus montanus*) and have a grass understory with some Oregon grape.

4.3.3.3 Woodlands

Woodlands are dominated by ponderosa pine and occur primarily along I-25 between Happy Canyon Road and Meadows/Founders Parkway (6 percent of the total mapped area). Some ponderosa pine woodlands also occur along the southern section of US 85 near Daniels Park Road. Woodlands are typified by a ponderosa pine overstory and a patchy mid-canopy layer comprised of Gambel oak. In the understory, patches of snowberry, wild rose, and yucca are common. Grasses typically found with this association include little bluestem, big bluestem, smooth brome, and Canada wildrye (*Elymus canadensis*).

4.3.3.4 Riparian

Riparian areas occur primarily along Happy Canyon Creek, East Plum Creek, Marcy Gulch, Spring Gulch, and Plum Creek (3 percent of the total mapped area). Where an overstory occurs, it is dominated by cottonwood (*Populus* spp.), with some crack willow (*Salix fragilis)* and boxelder (*negundo aceroides*). The shrub canopy is primarily coyote willow (*Salix exigua)* and shining willow (*S. lutea*). The understory is mixed and includes patches of snowberry, wild rose, smooth brome, Canada wildrye, and Kentucky bluegrass (*Poa pratensis*). Herbaceous hydrophytic species, such as sedges (*Carex* spp.) and rushes (*Juncus* spp.), generally occur in wetter locations and are discussed in Section 4.3.4, *Wetlands.*

4.3.3.5 Urban

The urban vegetation type represents landscaped areas associated with residential and commercial development (18 percent of the total mapped area). Area estimates include both impervious surface (e.g., buildings and parking lots) and landscaped areas (e.g., lawns). Non-native grass (e.g., bluegrass) and ornamental shrubs and trees are the dominant vegetation in these areas.

4.3.4 Wetlands

Wetlands are defined using three criteria:

- Occurrence of at least 50 percent hydrophytic vegetation
- Wetland hydrology
- Hydric soils

Jurisdictional wetlands exhibit all three criteria and are under the jurisdiction of the USACE through their administration of Section 404 of the Clean Water Act. Non-jurisdictional wetlands are those wetlands that exhibit all three criteria, but USACE did not take jurisdiction over them. A letter dated May 5, 2000, from the USACE concurred with the wetland delineations, and is included in Appendix A of this document.

In compliance with Executive Order 11990, "Protection of Wetlands," 23 CFR 771 and 777, Technical Advisory

T6640.8A, and Section 404 of the Clean Water Act, wetland surveys were performed from May 1999 through April 2000 within 60 meters (200 feet) of the existing I-25 ROW and 30 meters (100 feet) of the existing US 85 ROW. A combination of routine and comprehensive wetland delineation methods, as detailed in the USACE ***Wetlands Delineation Manual,*** 1987, was used. Wetlands identified within the survey area (APE) are depicted in Figure 4.4a and Figure 4.4b. The majority of wetlands within the APE occur as non- jurisdictional, roadside ditch wetlands. Jurisdictional wetlands in the APE occur primarily along East Plum Creek, Happy Canyon Creek, Marcy Gulch, and along small drainages where stream flow patterns or damming by beavers provides the necessary wetland hydrology and soil saturation for a prevalence of hydrophytic vegetation to exist.

For additional information on wetlands, see the ***Wetland Technical Report,*** May 2000, amended, November 2000***,*** in the Technical Reports Volume of the ***South I-25 Corridor and US 85 Corridor FEIS.***

4.3.4.1 Classification of Wetlands and Other Waters of the United States

Wetlands are classified in accordance with the Cowardin classification system. Palustrine wetlands within the APE occur in the form of emergent wetlands, willow shrublands, and cottonwood/willow forests.

East Plum Creek, Happy Canyon Creek, Plum Creek, Marcy Gulch, Newlin Gulch, and other perennial or intermittent streams that exhibit a defined streambed and bank are classified as Other Waters of the US and are jurisdictional waters regulated by the USACE. Wetlands may or may not be associated with these jurisdictional waters. Several stormwater detention ponds in upland sites were identified as Waters of the US in the DEIS; however, the USACE determined these ponds to be non-jurisdictional waters and they have been removed from this FEIS.

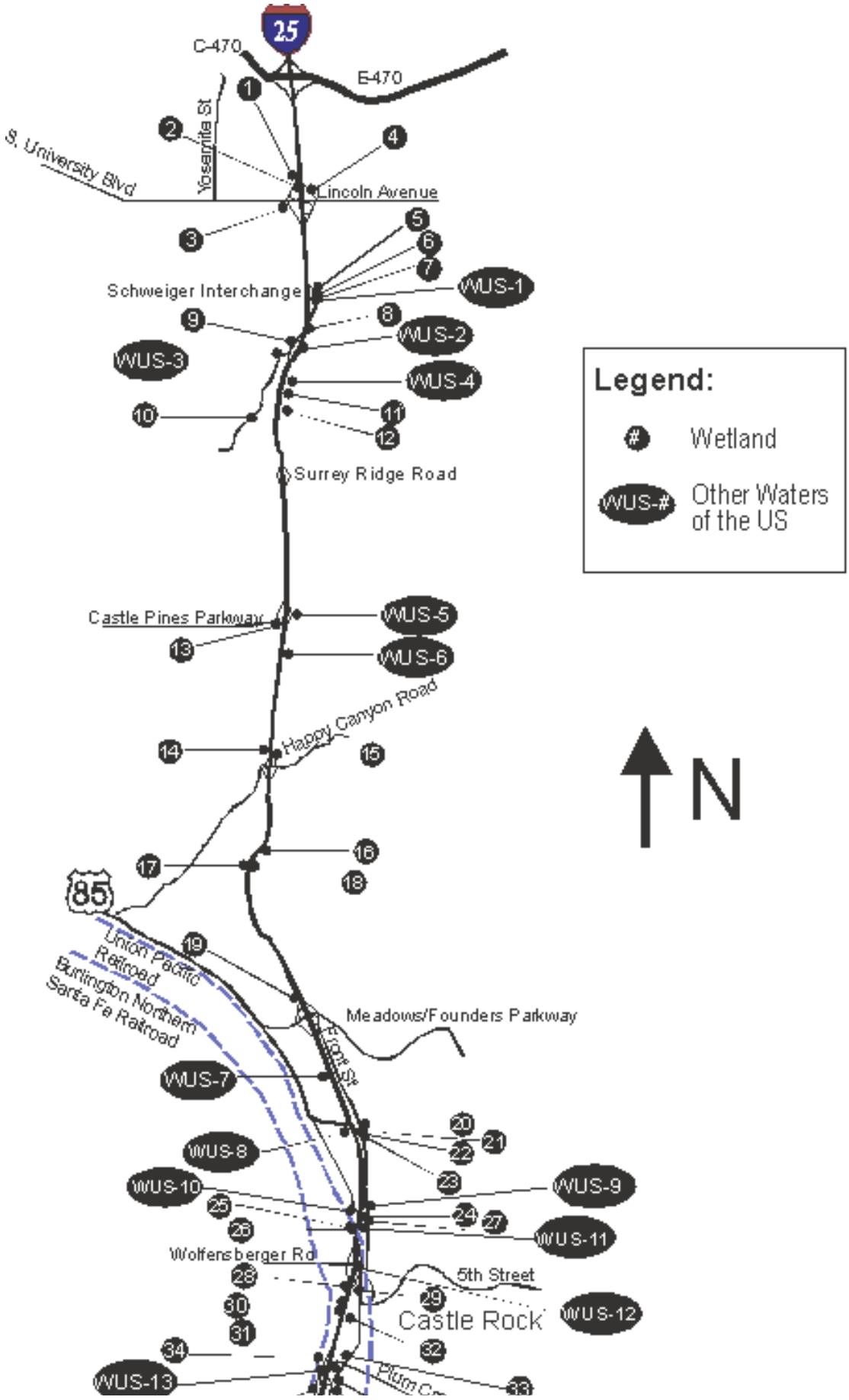
4.3.4.2 Wetland Vegetation

Botanical names follow Weber and Wittmann (1996). Determinations of hydrophytic vegetation indicator status are based on Reed (1998) and include the following categories:

- Obligate (OBL) plants almost always (> 99 percent probability) occur in wetlands.
- Facultative Wet (FACW) plants usually (> 67 percent probability) occur in wetlands.
- Facultative (FAC) plants are equally likely (34 to 66 percent probability) to occur in wetland or upland habitat.
- Facultative Upland (FACU) plants usually (67 to 99 percent probability) occur in uplands.
- Obligate upland (UPL) plant species, under natural conditions, almost always (>99 percent probability) occur in upland habitat.

Wetlands occur as inclusions within upland plant communities throughout the APE. Upland plant communities found in the project area are described in Section 4.3.3, *Vegetation,* and include upland grasslands, shrublands, woodlands, riparian, and urban.

Figure 4.4a
Wetlands and Other Waters of the US
along I-25 Corridor



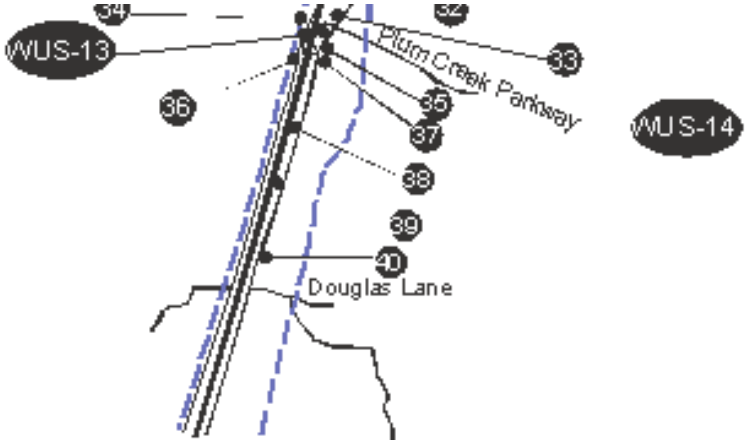
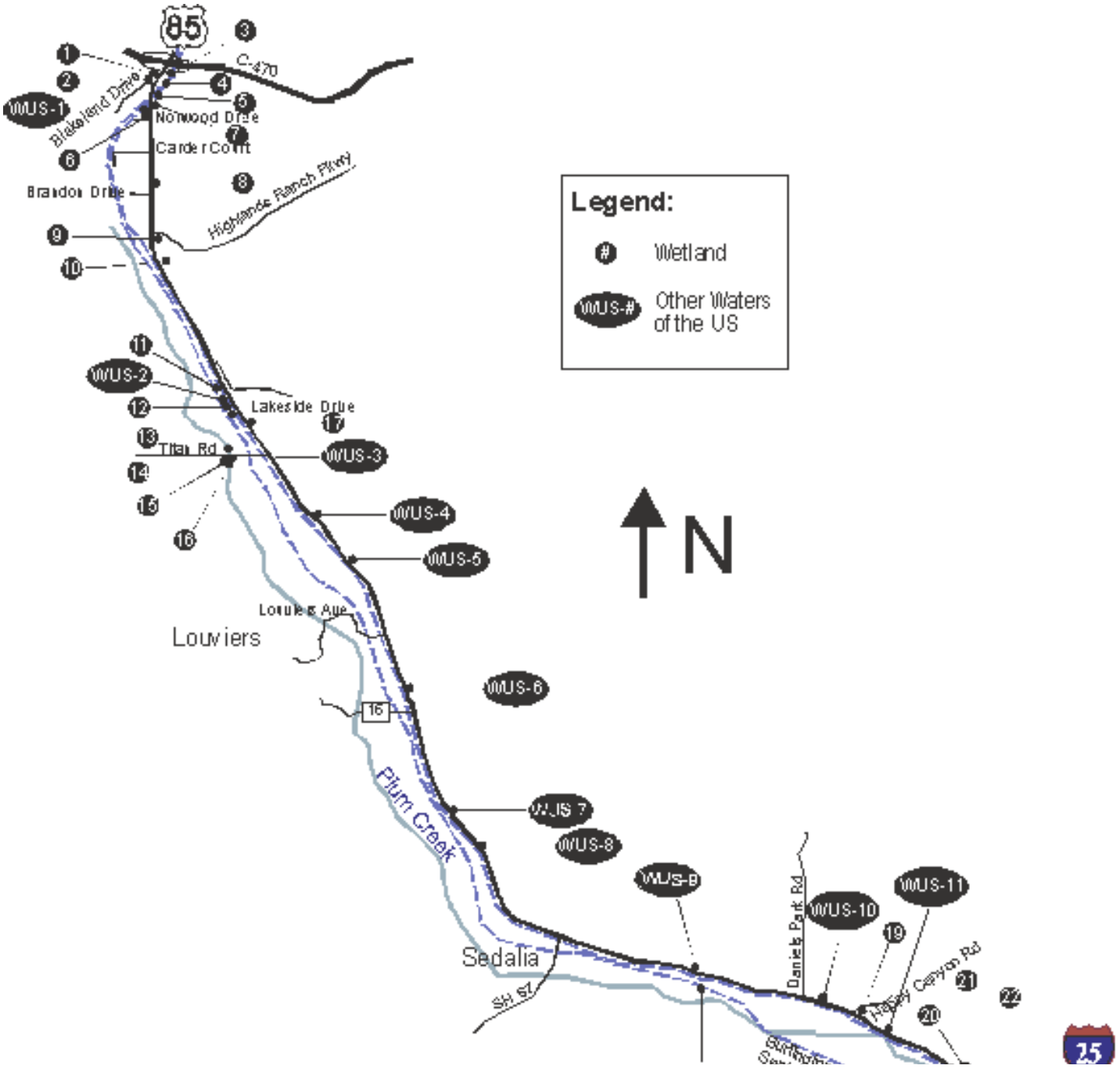
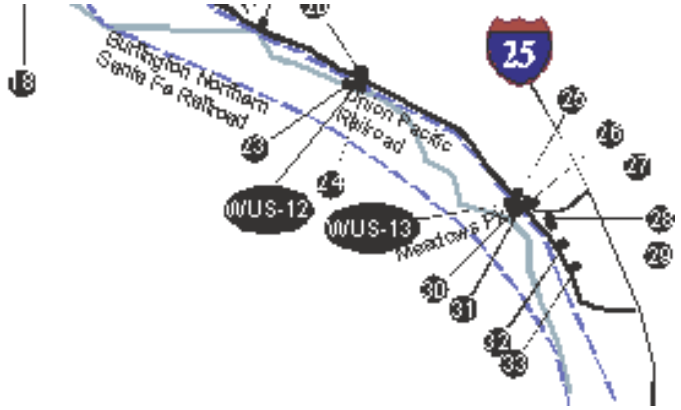


Figure 4.4b
Wetlands and Other Waters of the US
along US 85 Corridor





4.3.4.3 Wetland Soils

Soil pits were excavated to a depth of approximately 40 centimeters (16 inches), and soil horizons were described by thickness, texture, and color. Soils within the floodplains of East Plum Creek and Plum Creek are composed of stratified sand, loamy sand, and gravel classified as sandy wet alluvial land. In upland areas within the I-25 APE, the Fondis-Kutch association (F-K), Razor-Denver association (R-D), and the Loamy Alluvial Land-Sampson association (LAL-S) predominate. These soil associations range from deep to moderately deep loamy upland soils in the F-K association, to deep to moderately deep clayey upland soils in the R-D association, and deep loamy and sandy soils in the LAL-S association. Soils within the US 85 APE consist primarily of the LAL-S association and the R-D association.

Many of the wetland soils sampled in the project area lack hydric soil field indicators due to the relatively recent formation of a wetland, ditch maintenance activities, and/or sediment deposition in roadside ditches from highway sanding and erosion along the highway. These circumstances are considered normal for these areas. In these cases, topographic position and wetland hydrology were relied on for the determination.

4.3.4.4 Wetland Hydrology

A site is generally considered to exhibit wetland hydrology if soil saturation occurs continuously for a minimum of 5 percent of the growing season. The growing season within the study area is 147 days, making the number of consecutive days required for wetland hydrology 7.35 days, (or 7 days). Along East Plum Creek, wetland hydrology was determined through the use of groundwater monitoring wells. Throughout the rest of the project area, wetland hydrology was determined through primary and secondary indicators.

Visual observation of rapid downcutting within the primary channel at East Plum Creek was observed during the summer of 1999. Incision of the primary channel along East Plum Creek appears to have lowered the water table within the floodplain, consequently disconnecting wetland vegetation from the relatively shallow, subsurface water. Due to the rapidity at which this channel incision is occurring, wetland delineations will need to be updated in these areas immediately prior to construction.

4.3.4.5 Wetland Function

The specific functions a wetland provides, and the degree to which it performs those functions, depend on several factors including the type, size, plant diversity, and location of the wetland. A qualitative assessment of wetland functions was performed for the following functions:

- Dynamic water storage
- Flood flow attenuation
- Production export/aquatic food chain support
- Nutrient and pollutant removal/sediment retention
- Shoreline stabilization/sediment control
- Wildlife habitat

In general, most wetlands along the I-25 Corridor and US 85 Corridor are small, isolated, roadside ditch wetlands created by roadside runoff that exhibit low plant species diversity and limited functionality. Relatively larger wetlands along the corridors are typically associated with natural drainages, exhibit higher plant species diversity, and higher functionality. Those wetlands associated with East Plum Creek, Happy Canyon Creek, Marcy Gulch, and Plum Creek exhibit the highest functionality of all project area wetlands; however, study surveys indicate that hydrologic and other non-transportation-related changes in these drainages may limit their functionality.

4.3.4.6 I-25 Corridor Wetlands

Forty wetlands totaling 1.72 hectares (4.25 acres) (Figure 4.4a) occur within the I-25 APE (Table 4.12). Wetlands include 27 palustrine emergent (PEM) (0.98 hectare [2.41 acres]), 11 palustrine scrub-shrub (PSS), (0.67 hectare [1.65 acres]) and two palustrine forested (PFO) (0.08 hectare [0.19 acre]). PEM, narrow (0.3 to 0.9 meter [1 to 3 feet] wide) fringe wetlands exist adjacent to East Plum Creek, and PSS narrow fringe wetlands (Wetland 8) exist along one reach of Happy Canyon Creek (Figure 4.4a). Narrow fringe wetlands occur sporadically and can change rapidly during high-runoff events.

Hydrophytic vegetation common to I-25 Corridor PEM wetlands includes Nebraska sedge (*Carex nebrascensis*, OBL), clustered field sedge (*C.* p*raegracilis*, FACW), spikerush (*Eleocharis palustris*, OBL), wiregrass (*Juncus arcticus*, OBL), curly dock (*Rumex crispus*, FACW), foxtail barley (*Critesion jubatum*, FACW), and barnyard grass (*Echinochloa crusgalli*, FACW). Most PEM wetlands occur in roadside ditches where wetland hydrology is created by ponding of highway runoff.

Jurisdictional PSS wetlands were found at five locations including a narrow fringe adjacent to Happy Canyon Creek (Wetlands 5, 6, 7, 8, and 10), and at three locations adjacent to East Plum Creek (Wetlands 26, 30, and 32). This type of wetland is typically dominated by sandbar willow (*Salix exigua*, OBL), shining willow (*S. lutea*, OBL), and reed canarygrass (*Phalaroides arundinacea*, FACW) or Nebraska sedge. Three non-jurisdictional PSS wetlands (Wetlands 27, 29, and 37) were found in roadside ditches and dominated primarily by sandbar willow.

Two PFO (Wetlands 9 and 25; Figure 4.4a) were found within the I-25 APE (Table 4.12). These wetlands are dominated by cottonwood (*Populus* spp.), crack willow (*Salix fragilis*, FAC), sandbar willow, shining willow, reed canarygrass, sedges (*Carex* spp.), and wiregrass.

4.3.4.7 US 85 Corridor Wetlands

Thirty-three wetlands totaling 1.56 hectares (3.86 acres) (Table 4.13, Figure 4.4b) were found within the US 85 APE. Twenty-six PEM (0.96 hectare [2.37 acre]), five PSS (0.1 hectares [0.25 acre]), and two PFO (0.50 hectare [1.24 acres]) wetlands were identified (Table 4.13).

Five PSS seasonally flooded wetlands in the APE are dominated by an overstory of sandbar willow and cottonwood saplings, and a mixed understory of narrow-leaved cattail (*Typha angustifolia*, OBL), Meadow fescue (*Festuca pratensis*, FAC), Kentucky bluegrass (*Poa pratensis*, FACU), and barnyard grass. Highway runoff is the primary source of water for four of the wetlands, while East Plum Creek provides overbank-flow to Wetland 15.

Table 4.12
Area Calculations, Wetland Classification, and Preliminary Jurisdictional Status for Wetlands within the I-25 Corridor Project Area

Wetland ID	Hectares (Acres)	Square Meters (Square Feet)	Classification*	Jurisdictional Status
1	0.001 (0.003)	10.5 (113)	PEM1C	Non-jurisdictional
2	0.004 (0.011)	43.2 (464)	PEM1C	Non-jurisdictional
3	0.037 (0.091)	369.0 (3,968)	PEM2C	Non-jurisdictional
4	0.026 (0.065)	262.8 (2,826)	PEM1C	Non-jurisdictional
5	0.147 (0.363)	1,471.5 (15,823)	PSS1C	Jurisdictional
6	0.041 (0.102)	413.0 (4,449)	PSS1C	Jurisdictional
7	0.018 (0.044)	178.6 (1,920)	PSS1C	Jurisdictional
8	0.007 (0.018)	71.7 (772)	PSS1C	Jurisdictional
9	0.062(0.153)	619.9 (6,665)	PFO1C	Jurisdictional
10	0.147 (0.362)	1,466.5 (15,769)	PFO1C	Jurisdictional
11	0.055 (0.135)	547.1 (5,883)	PEM1C	Jurisdictional
12	0.05 (0.123)	497.0 (5,344)	PEM1C	Jurisdictional
13	0.007 (0.018)	73.1 (786)	PEM2C	Non-jurisdictional
14	0.024 (0.059)	239.4(2,574)	PEM1C	Jurisdictional
15	0.075 (0.186)	753.4 (8,101)	PEM1C	Jurisdictional
16	0.003 (0.007)	28.6 (308)	PEM1C	Non-jurisdictional
17	0.023 (0.057)	232.2 (2,497)	PEM1C	Jurisdictional
18	0.006 (0.014)	56.8 (611)	PEM1C	Jurisdictional
19	0.039 (0.096)	387.9 (4,171)	PEM2C	Non-jurisdictional
20	0.005 (0.011)	45.8 (488)	PEM1C	Non-jurisdictional
21	0.009 (0.023)	92.6 (996)	PEM1C	Non-jurisdictional
22	0.001 (0.992)	8.6 (92)	PEM1C	Non-jurisdictional
23	0.005 (0.013)	53.3 (573)	PEM1C	Non-jurisdictional
24	0.027 (0.068)	273.8 (2,944)	PEM1C	Jurisdictional
25	0.016 (0.039)	158.5 (1,704)	PFO1C	Jurisdictional
26	0.094 (0.233)	943.5 (10,145)	PSS1C	Jurisdictional
27	0.001 (0.002)	9.9 (107)	PSS1C	Non-jurisdictional
28	0.308 (0.761)	3,079 (3,143	PEM1C	Jurisdictional
29	0.024 (0.060)	242.7 (2,609)	PSS1C	Non-jurisdictional
30	0.067 (0.165)	667.8 (7,181)	PSS1C	Jurisdictional

30	0.067 (0.165)	667.8 (7,181)	PSS1C	Jurisdictional
31	0.024 (0.059)	240.3 (2,584)	PEM1C	Jurisdictional
32	0.11 (0.270)	1,095.1 (11,775)	PSS1C	Jurisdictional
33	0.129 (0.319)	1291.5 (13,887)	PEM1C	Jurisdictional
34	0.070 (0.173)	698.9 (7,515)	PEMIC	Non-jurisdictional
35	0.001 (0.003)	12.4 (133)	PEMIC	Non-jurisdictional
36	0.001 (0.003)	10.4 (112)	PEM2C	Non-jurisdictional
37	0.011 (0.028)	111.6 (1,200)	PSS1C	Non-jurisdictional
38	0.035 (0.085)	346.3 (3,723)	PEMIC	Non-jurisdictional
39	0.009 (0.022)	90.6 (974)	PEMIC	Non-jurisdictional
40	0.002 (0.004)	16.5 (177)	PEMIC	Non-jurisdictional
Total =	1.72 (4.25)	17,196.7 (185,106)		

**PEM1C=palustrine persistent emergent seasonally flooded; PEM2C=palustrine non-persistent emergent seasonally flooded; PSS1C=palustrine scrub-shrub seasonally flooded; PFO1C=palustrine forested broad-leaf deciduous seasonally flooded.*

Table 4.13
Area Calculations, Wetland Classification, and Preliminary Jurisdictional Status for Wetlands within the US 85 Corridor Project Area

Wetland ID	Hectares (Acres)	Square Meters (Square Feet)	Classification*	Jurisdictional Status
1	0.002 (0.004)	15.2 (163)	PEM1C	Non-jurisdictional
2	0.005 (0.011)	45.2 (486)	PEM1C	Non-jurisdictional
3	0.019 (0.047)	191.5 (2,059)	PEM1C	Non-jurisdictional
4	0.022 (0.053)	216.7 (2,330)	PEM1C	Non-jurisdictional
5	0.021 (0.052)	209.3 (2,250)	PEM1C	Non-jurisdictional
6	0.002 (0.005)	21 (225)	PEM1C	Jurisdictional
7	0.036 (0.09)	363 (3,903)	PEM1C	Jurisdictional
8	0.095 (0.234)	948 (10,194)	PFO1F	Jurisdictional
9	0.004 (0.01)	41.9 (450)	PEM1C	Non-jurisdictional
10	0.002 (0.006)	23.3 (251)	PEM1C	Non-jurisdictional
11	0.018 (0.043)	175.3 (1,885)	PEM2C	Non-jurisdictional
12	0.007 (0.016)	65.2 (701)	PEM1C	Non-jurisdictional
13	0.005 (0.011)	46.1 (496)	PEM1C	Non-jurisdictional
14	0.407 (1.005)	4,070 (43,773)	PFO1C	Jurisdictional
15	0.078 (0.193)	780.3 (8,390)	PSS1C	Jurisdictional
16	0.013 (0.033)	134.3 (1,444)	PEM2C	Non-jurisdictional
17	0.001 (0.002)	9.8 (105)	PEM1C	Non-jurisdictional
18	0.031 (0.075)	304.7 (3,276)	PEM1C	Non-jurisdictional
19	0.004 (0.01)	41.7 (448)	PEM2C	Non-jurisdictional
20	0.011 (0.028)	111.6 (1,200)	PEM2C	Non-jurisdictional
21	0.652 (1.608)	6,515.8 (70,062)	PEM2C	Non-jurisdictional
22	0.048 (0.117)	476 (5,118)	PEM2C	Non-jurisdictional
23	0.005 (0.013)	54.3 (584)	PEM2C	Non-jurisdictional
24	0.014 (0.035)	143.3 (1,542)	PEM2C	Non-jurisdictional
25	0.002 (0.005)	19.6 (210)	PSS1C	Non-jurisdictional
26	0.011 (0.027)	109.4 (1,176)	PEM2C	Non-jurisdictional
27	0.01 (0.023)	94.6 (1,017)	PSS1C	Non-jurisdictional

26	0.011 (0.027)	109.4 (1,176)	PEM2C	Non-jurisdictional
27	0.01 (0.023)	94.6 (1,017)	PSS1C	Non-jurisdictional
28	0.011 (0.026)	105.7 (1,136)	PEM2C	Non-jurisdictional
29	0.002 (0.005)	19.3 (208)	PEM2C	Non-jurisdictional
30	0.004 (0.009)	37.0 (398)	PSS1C	Non-jurisdictional
31	0.007 (0.017)	67.6 (727)	PSS1C	Non-jurisdictional
32	0.006 (0.015)	61.4 (660)	PEM2C	Non-jurisdictional
33	0.01 (0.025)	100 (1075)	PEM2C	Non-jurisdictional
TOTAL =	1.56 (3.855)	15,602 (167,942)		

**PEM1C=palustrine persistent emergent seasonally flooded, PEM2C=palustrine non-persistent emergent seasonally flooded, PSS1C=palustrine scrub-shrub broad-leaf deciduous seasonally flooded, PFO1F=palustrine forested broad-leaf deciduous semi-permanently flooded.*

PFO wetlands are dominated by cottonwoods, crack willow, coyote willow, reed canarygrass, and broadleaved cattail. Overbank flows at Plum Creek (Wetland 14) and dam release waters at Spring Gulch (Wetland 8) support these wetlands.

4.3.5 Geology

A survey of recent geotechnical reports along the I-25 Corridor and the US 85 Corridor was made to compile soil characteristics within the area affected by roadway, major structure, and drainage construction. Design and construction plans are determined using soil properties to develop structural information for paving and construction of major structures. Soil information generated from testing and research information allows a determination of how drainage structures and erosion control can be impacted by soil conditions.

For additional information on geology, see the ***Geology Technical Memorandum South I-25 Corridor and US 85 Corridor,*** November 2000**,** in the Technical Reports Volume of the ***South I-25 Corridor and US 85 Corridor FEIS.***

4.3.5.1 I-25 Corridor Geology

Data from recent geotechnical (science that deals with the application of geology to engineering) investigations along the I-25 Corridor indicate the following geomorphology (relief features of the earth).

Northern Area

From the C-470 Interchange to the Meadows/Founders Interchange, is the high bluff topography that is part of the Colorado Piedmont section of the Great Plains physiographic province. The Colorado Piedmont is a broad erosional trench that separates the Southern Rocky Mountains from the High Plains. Structurally, the site lies along the western flank of the Denver Basin. Relatively flat uplands and broad valleys characterize the present-day topography of the Colorado Piedmont in this region.

Geomorphology

Surficial geologic conditions at the Happy Canyon Creek Bridge site, as mapped by the US Geological Survey (USGS), consist of Piney Creek Alluvium of Holocene age. These alluvial materials have been described as yellowish brown to grayish brown poorly sorted silt, clay, sand, and interbedded gravel. The

Piney Creek Alluvium is commonly about 1.5 to 4.5 meters (5 to 15 feet) in thickness, but locally may be as much as 9 meters (30 feet) thick.

Onsite claystone materials are not recommended for use beneath structural areas of the site or as backfill. Should claystone materials be used for general site grading, placement in fills at non-structural locations on the site is recommended.

Bedrock

Bedrock underlying the surface units consists of the Dawson and Denver Formations of Paleocene age. The Dawson Formation unit at the Happy Canyon Creek Bridge site has been described as interbedded olive claystone and sandstone. The Denver Formation at the site has been described as medium gray to grayish brown claystone. In the Parker Quadrangle, the thickness of the Dawson Formation is reported to be approximately 460 meters (1,500 feet), while the Denver Formation is about 6 to 15 meters (20 to 50 feet). It should be recognized that the information presented in this USGS publication is of a generalized nature, and local variations are possible.

Swell Potential

Mapping completed by the Colorado Geological Survey indicates the Happy Canyon Creek Bridge site is in an area of low to very high swell potential. The Surrey Ridge Bridge site is in an area of moderate swell potential. Potentially expansive materials mapped in this area include bedrock, weathered bedrock, colluvium, and surficial deposits.

Seismic Risk

The I-25 Corridor is located in Seismic Risk Zone I of the Seismic Zone Map of the United States as indicated on Figure 16-2 of the ***1997 Uniform Building Code***. The principal structural components of the project will be bridges. Seismic design of bridges is governed by the ***Standard Specifications for Highway Bridges***, 16th Edition. These specifications place the I-25 Corridor project in Seismic Performance Category A. No detailed seismic analysis is required for bridges in Seismic Performance Category A; although, specific requirements for connections between the substructure and the superstructure and for the length of the beam seat must be met.

Groundwater

Based upon review of USGS maps, regional groundwater is expected in unconsolidated alluvial deposits on the Happy Canyon Creek site, at depths ranging from 1.5 to 3.0 meters (5 to 10 feet) below the existing ground surface. For the Surrey Ridge Interchange site, regional groundwater beneath the project area is located in the Dawson Aquifer, generally below a depth of 6 meters (20 feet), and commonly more than a depth of 30 meters (100 feet) below present ground surface. Locally, shallow groundwater can be found in alluvial and colluvial deposits along modern streambeds.

Slope Stability

Existing cut slopes are 2:1 (horizontal: vertical) or slightly flatter, reaching a maximum height of 17

meters (55 feet) in the cut west of the southbound lanes and 10 meters (33 feet) at the cut east of the northbound lanes. A near vertical cut face in the sandstone caprock known as "The Bluffs" caps the east cut. This near vertical cut is an additional 5 meters (18 feet) high.

The slopes in the cut area west of the highway form ridges and swales sloping steeply down to the east toward the highway. Slopes east of the highway, in this area, extend gently to the east toward Happy Canyon Creek.

Southern Area

As the alignment transitions from the high bluff topography between C-470 and the Meadows/Founders Interchange to the Plum Creek floodplain, the geomorphology changes; this is detailed in recent bridge foundation geotechnical reports, from studies between the Meadows/Founders Parkway Interchange and the Plum Creek Parkway Interchange.

US 85/I-25 Interchange

The subsoils encountered in exploratory borings consist of approximately 0.6 to 5 meters (2 to 17 feet) of silty to clayey, slightly gravelly to gravelly sand fill or 1.1 to 1.2 meters (3.5 to 4 feet) of slightly clayey to clayey sand overlying very hard, weakly-cemented sandstone bedrock to the maximum explored depth of approximately 11 meters (35 feet). The lateral and vertical extent of the fill was not determined. A thin layer of topsoil or asphalt was encountered at the ground surface in three of the borings. Groundwater was encountered in two of the borings at depths between approximately 7 and 8.5 meters (23 and 28 feet) at the time of drilling and in the two borings checked at depths between approximately 2.1 and 2.4 meters (7 and 8 feet) when measured 31 days after drilling.

Wolfensberger Road Interchange

The surrounding terrain consists of rolling to mountainous topography drained by nearby Plum Creek. Site topography consists of sloping embankment material constructed for the existing G-17-R. Exploratory borings were drilled at the following locations of the proposed bridge abutments and pier for the bridge over Plum Creek:

Abutment 1

Subsurface material consists of up to 1.1 meters (3.6 feet) of embankment fill consisting of sandy clay. Underlying the embankment fill is Plum Creek floodplain alluvium consisting of 5.0 meters (16.5 feet) of loose silty gravelly sand to slightly denser sandy gravel. Underlying the overburden materials is a soft, friable, gray sandstone grading to harder blue-gray shale. The water table was encountered near elevation 1,875 meters (6,135 feet).

Pier 2

Subsurface materials at Pier 2 consist of approximately 0.6 to 0.9 meter (2 to 3 feet) of fill. Underlying the fill was approximately 6.4 meters (21 feet) of naturally deposited loose to medium, dense, gravelly sand. Underlying the gravelly sand was a sandy claystone to shale bedrock. The

gravelly sand was weathered claystone bedrock containing a petroleum residue and odor. The water table was encountered near elevation 1,872 meters (6,143 feet).

Abutment 3

Subsurface materials at abutment 3 consist of approximately 7 meters (23 feet) of embankment fill. The fill consists of loose and gravelly clay to soft, silty, and gravelly clay. Underlying the fill material is 2.1 meters (7 feet) of thick naturally deposited medium dense gravelly sand. Sandy claystone grading to harder sandy shale underlies the gravelly sand at elevation 1,872 meters (6,143 feet). The water table was encountered at elevation 1,872 meters (6,143 feet).

5th Street over Plum Creek and I-25

The geotechnical investigation reported the following soils and geologic conditions at the site:

The subsurface conditions encountered as part of this study vary greatly, but are generally consistent with the Colorado Geologic map. Most of the valley and hillsides contain some old artificial fill at the surface, although the thinnest sections are in the creek flood plain, and the thickest are near the planned abutment locations. The fill generally overlies a thick section of alluvial deposits of sand with some gravel and occasional clay layers.

The creek and the valley are incised into bedrock of the relatively flat-lying Dawson Arkose Formation. The Dawson Arkose Formation is of Paleocene Age and consists of conglomerate, sandstone, shale, and claystone. On the project site itself, there is an outcrop of weathered claystone, sandstone, and conglomerate immediately downstream of an existing railroad bridge near where a culvert is planned.

Slope Stability

In general, the geotechnical investigations along I-25 agree that slopes graded at 2 meters (6 feet) horizontal to 0.6 meter (2 feet) vertical (2:1) will provide long-term stability. However, to provide a gentle slope for the recovery of errant vehicles, revegetation, slope stability, and appearance, exposed slopes should ideally be no greater than 1.2 meters (4 feet) horizontal to 0.3 meter (1 foot) vertical (4:1). Care should be taken when planning these slopes to avoid triggering ancient landslides.

Soils

With the exception of the Happy Canyon area, soil conditions along the I-25 Corridor from Arapahoe County to Newman Gulch primarily consist of soils in the Fondis-Kutch association. These areas are characterized by deep, nearly level to gently sloping, loamy and sandy soils on floodplains and terraces. Fondis soils are deep and have clay subsoil that is underlain by calcareous older soil. Kutch soils are generally found at lower elevations than Fondis soils and have clay subsoil that is underlain by shale or sandstone.

Near Happy Canyon, and to the south of Newman Gulch, I-25 crosses soils of the Bressler-Newlin-Stapleton association. These are deep, gently sloping to moderately steep sandy and gravelly soils. Most of

the soils in this association have good bearing strength for foundations. Close to Castle Rock, near the US 85/I-25 Interchange, soil conditions change to the loamy, alluvial land of the Sampson association. These soils are deep and nearly level to gently sloping, loamy, and sandy soils on floodplains and terraces. Flooding is a hazard in these areas, especially in lower lying areas. Gullies are common in areas of alluvial land. Table 4.14 describes characteristics of the specific soil types found along the I-25 Corridor.

Hazards and Constraints

Much of the northern portions of the I-25 Corridor from C-470 to the Happy Canyon Interchange are designated as areas containing unstable or potentially unstable slopes. In these areas, evidence exists of past slope movement or geologic conditions favorable to slope failure. An area of potential rockfall or rockslide and debris avalanche hazard is located along I-25 from an area near the Happy Canyon Interchange south for about 3.2 kilometers (2 miles). These areas are subject to falling, sliding, or avalanching of individual blocks of rock or accumulations of blocky material, usually during heavy rainstorms. In addition to these classifications, most of the I-25 Corridor is designated as moderate to high erosion susceptibility, which include areas that are susceptible to erosion due to slope, composition, poor consolidation of surficial materials, sparse vegetation cover, or proximity and similarity to areas already undergoing accelerated erosion. A small portion of the corridor to the north of Newlin Gulch is classified as a low erosion susceptibility area. These areas are often characterized by materials that are difficult to excavate and by poorly defined surface drainage.

Table 4.14
Common Soil Types Found Along the I-25 Corridor

Symbol	Name	Description	Slopes (%)	Erosion Hazard	Size of Areas	Runoff	Primary Use
KtE	Kutch sandy loam	Strongly sloping to moderately steep soil located on alluvial fans, valley side slopes below rock cliffs, and below stony land along major drainageways.	5-20	Moderate	> 40 hectares (100 acres)	Rapid	Grazing
KwF	Kutch Newland Stapleton complex	Composed of 35% Kutch soils, 25% Newlin soils, 25% Stapleton soils, and 15% other soil types.	8-40	Moderate	N/A	Rapid	Grazing Wildlife
FoD	Fondis clay loam	Located on uplands in northern portions of the corridor. Gullies are found on larger drainageways not protected by grass.	3-9	Moderate	Irregular, 16-240 hectares (40 to 600 acres)	Medium	Cultivated (grains) Grazing
Fu	Fondis Kutch Association	Strongly sloping to steep soils on upland areas. Composed of 50% Fondis loam and 35% Kutch sandy loam. Other soil types comprise about 15% of the association.	5-40	Moderate to severe	N/A	Medium to Rapid	Grazing Wildlife

Note: N/A – Data not available
Source: U.S Department of Agriculture, Soil Conservation Service, Soil Survey of Castle Rock Area, Colorado, November 1994

During construction of additional southbound climbing lanes approximately 0.8 kilometer (0.5 mile) south of

Lincoln Avenue in the spring of 2000, the contractor triggered two landslides. The slides propagated uphill and daylighted outside of the CDOT ROW at the crest of the steep natural slopes located above the existing cut slopes. The contractor had decreased the proposed lower slope angles and pushed the toe of the new cut slope further to the west, in order to generate more fill material. The cause of the slides, although not specifically defined in the report, ***Engineering Geology for Proposed Cuts to Widen Interstate 25, CDOT Project No. IM 02052-038,*** August 19, 1998, appears to be the result of general unloading of the toe of the steep upper slope.

These slope failures, although not catastrophic, emphasize the need for detailed geologic and geotechnical investigations prior to any slope modifications along the I-25 Corridor. The constructed slopes in question were less steep than the 2:1 slopes present along a majority of this corridor, and they were still subject to failure because of the presence of weak shear zones in the Denver Formation. The ***Engineering Geology for Proposed Cuts to Widen Interstate 25, CDOT Project No. IM 02052-038,*** document states: "The potential for triggering possible landslide movements should be carefully considered in performing evaluations for future roadway projects and private developments on the west and east side of the highway adjacent to and within the project vicinity."

4.3.5.2 US 85 Corridor Geology

A survey of available geologic reports along the US 85 Corridor was made to identify subsurface geology within the area affected by roadway, major structure, and drainage construction. Soil information generated from research allows a determination of how drainage structures and erosion control can be impacted by soil conditions.

The US 85 Corridor is located in Seismic Risk Zone I of the Seismic Zone Map of the United States as indicated on Figure 16-2 of the ***1997 Uniform Building Code***.

The review of these reports indicated that the soil and subsurface conditions of US 85 are as follows.

Northern Area

The northern area begins at the US 85 and C-470 Interchange and extends south approximately 5.2 kilometers (3.3 miles) through the Lakeside Drive and US 85 Intersection.

Geomorphology

Surficial geologic conditions in the northern area were mapped by the USGS as eolian (wind-blown) sand and Broadway Alluvium. For this portion of the US 85 Corridor, the roadway parallels Plum Creek in a southerly direction, remaining on the east side of the creek. The eolian sand deposit is described as fine to medium sand derived mainly from alluvium of streams and distributed east of the source area by the wind. The Broadway Alluvium is described as gravel, sand, silt and clay that forms an alluvial terrace above the present creek level. Deposits of major streams east of the South Platte River are mostly sand. This deposit is a source of sound aggregate. The Broadway Alluvium is commonly less than approximately 7.6 meters (25 feet) thick.

Bedrock

Bedrock underlying the surface units consists of the Dawson, Denver, and Arapahoe Formations of Paleocene to Upper Cretaceous age. The formations are all described as containing sandstone, siltstone, claystone, and conglomerate and are highly locally variable. It should be realized that the information presented in this FEIS is of a generalized nature and local variations are possible. No large exposures are present in highway cuts along this section of the alignment.

Swell Potential

Swell potential of the subsoils in this area is low, although a significant risk of collapse is present with eolian soils, present over a significant portion of this area.

Groundwater

Shallow local groundwater is expected in unconsolidated alluvial deposits at this portion of the alignment, at or slightly below the water level in Plum Creek.

Slope Stability

Existing slopes on the east side of the highway are very flat and range from 40:1 (horizontal: vertical) or slightly flatter to 8:1 and up to 39.6 meters (130 feet) high. The topographic relief present to the east is located a significant distance from the present alignment which can be described as flat to very flat with some slight rolling hills toward the south of this area.

Central Area

The central area begins at the Lakeside Drive and US 85 Intersection, and extends south approximately 10 kilometers (6.3 miles) to 1.6 kilometers (1.0 mile) north of the intersection of SH 67 and US 85 in Sedalia.

Geomorphology

Surficial geologic conditions in the central area were mapped by the USGS as Broadway, Louviers, and Piney Creek Alluvium. For this portion of the US 85 Corridor, the roadway parallels Plum Creek in a southeasterly direction, remaining on the east side of the creek. The primary surficial materials are the Louviers and Piney Creek Alluvium, described as gravel, sand, silt, and clay of modern stream plains and slightly older low terraces less than 6 meters (20 feet) above stream level. The Piney Creek Alluvium is present in the northern portion of this section and in fingers that extend eastward from the main Plum Creek drainage in small valley fan drainages. In streams east of the South Platte River, the Piney Creek deposits are mainly sand. Sand, silt, and clay compose the deposits in small streams and tributaries. The Post-Piney Creek and Piney Creek Alluvium are commonly less than approximately 6 meters (20 feet) thick. Present to a lesser degree is the Broadway Alluvium, described above as gravel, sand, silt, and clay.

Bedrock

Bedrock underlying the surface units consists of the Dawson and Arapahoe Formation of Paleocene to Upper Cretaceous age. The formation is described as containing sandstone, siltstone, claystone, and

conglomerate and is highly locally variable. It should be recognized that the information presented in this FEIS is of a generalized nature and local variations are possible.

Two large exposures of the bedrock are present approximately 3.2 kilometers (2.0 miles) north of Sedalia on the east side of the existing highway. These cut slopes are between 6 and 12 meters (20 and 40 feet) high and are cut almost vertically. Weathering and raveling of the slope is evident from the small piles of loosened material present at the base of these cuts. The predominant material exposed in these cuts is a tan to orange sandstone with bands of claystone up to 0.9 meter (3.0 feet) in thickness. Capping the exposure is an alluvial deposit with sand, gravel, cobbles, and large boulders up to 1.5 meters (5.0 feet) in diameter.

An additional exposure is located approximately 1.6 kilometers (1.0 mile) north of Sedalia on the east side of the highway. Sandstone is again the predominant material in this almost vertical road cut. Also present was a very hard capping layer of highly cemented sandstone that had resisted weathering and raveling and showed relief from the remaining cut.

Slope Stability

Existing slopes on the east side of the highway are more steep in this section and range from 10:1 (horizontal: vertical) or slightly flatter to 4:1 and up to 40 meters (140 feet) high. The topographic relief present to the east is located adjacent to the present alignment. Two major and one minor cut slopes, described above in the geology discussion, are close to vertical in slope and range in height up to 12 meters (40 feet).

Swell Potential

Vegetation consists of native rangeland grasses, yucca, other shrubs, herbs, small cactus, and brush. Most of the existing near-vertical cut slopes are devoid of vegetation. Mapping completed by the Colorado Geological Survey indicates this central portion of the US 85 alignment is in an area of low to high swell potential. Potentially expansive materials in this area include bedrock, weathered bedrock, and surficial deposits. The swell potential of the claystone present in isolated layers in the Arapahoe formation is high. The swell potential of the subsoils and bedrock along this section is high, dependent on the presence of clay lenses in the alluvial materials, weathered bedrock zones, and whether the alignment intersects the expansive claystone bands in the Arapahoe Formation.

Groundwater

Shallow local groundwater is expected in unconsolidated alluvial deposits at this portion of the alignment, at or slightly below the water level in Plum Creek.

Southern Area

The southern area begins 1.6 kilometers (1.0 mile) north of the intersection of SH 67 and US 85 in Sedalia, and extends approximately 11.6 kilometers (7.3 miles) south of the US 85/I-25 Interchange.

Geomorphology

Surficial geologic conditions in the south area were mapped by the USGS as Slocum, Louviers, and Piney Creek Alluvium. For this portion of the US 85 Corridor, the roadway parallels Plum Creek in a southeasterly direction, remaining on the east side of the creek, turning almost eastward at Sedalia. The primary surficial materials are the Slocum and Louviers Alluvium. The Louviers Alluvium is described as gravel, sand, silt, and clay of modern stream plains and underlies much of the Piney Creek Alluvium in channels of major streams. It is a major source of commercial sand and gravel. The Slocum Alluvium is described as bouldery cobble gravel near the mountain front, decreasing in grain size eastward away from the mountains. The Piney Creek Alluvium is present in fingers that extend eastward from the main Plum Creek drainage in small valley fan drainages. In streams east of the South Platte River, the Piney Creek deposits are mainly sand. Sand, silt, and clay compose the deposits in small streams and tributaries. The Piney Creek Alluvium is commonly less than approximately 6 meters (20 feet) thick.

Bedrock

Bedrock underlying the surface units consists of the Dawson and Arapahoe Formation of Paleocene to Upper Cretaceous age. The formation is described as containing sandstone, siltstone, claystone, and conglomerate and is highly locally variable. It should be recognized that the information presented in this FEIS is of a generalized nature and local variations are possible. No large exposures are present in highway cuts along this section of the alignment.

Slope Stability

Existing slopes on the east side of the highway are very flat and range from 20:1 (horizontal: vertical) or flatter to 40:1. The topographic relief present to the east is located at least 305 meters (1,000 feet) from the present alignment, which can be described as flat to very flat with some slight rolling hills.

Swell Potential

Vegetation consists of native rangeland grasses, yucca, other shrubs, herbs, small cactus, and brush. Mapping completed by the Colorado Geological Survey, indicates this southern portion of the US 85 alignment is in an area of low to high swell potential. Potentially expansive materials in this area include bedrock, weathered bedrock, and surficial deposits. The swell potential of the claystone present in isolated layers in the Arapahoe Formation is high. The swell potential of the subsoils and bedrock along this section is highly dependent on the presence of clay lenses in the alluvial materials, weathered bedrock zones, and whether the alignment intersects the expansive claystone bands in the Arapahoe Formation.

Groundwater

Shallow local groundwater is expected in unconsolidated alluvial deposits at this portion of the alignment, at or slightly below the water level in Plum Creek.

Soils

Soil conditions along the US 85 Corridor are characteristic of the loamy, alluvial land of the Sampson association. These soils are deep, nearly level to gently sloping, loamy, and sandy soils located on the floodplains and terraces of Plum Creek. Flooding is a hazard in these areas, especially in lower lying areas. Gullies are common in areas

of alluvial land. In areas near Riverside and Sedalia, the corridor crosses the Bressler-Newlin-Stapleton association. These are deep, gently sloping to moderately steep sandy and gravelly soils. Most of the soils in this association have good bearing strength for foundations. Table 4.15 describes characteristics of the specific soil types found along the US 85 Corridor.

Hazards and Constraints

Through most of the corridor, US 85 follows the border between an area of low-erosion susceptibility to the west and south, and an area of medium to high erosion susceptibility with unstable or potentially unstable slopes to the east and north. The northern and eastern slopes show evidence of past slope movement or display geologic conditions favorable for slope failure. Areas to the south and west along Plum Creek are subject to occasional flooding and deposition of sediment. In many locations, stream bottomlands are aggrading by deposition of sediment produced by accelerated modern erosion in uplands.

4.3.6 Wildlife

The APE for the I-25 Corridor and US 85 Corridor encompasses an area 60 meters (200 feet) from either side of the existing I-25 ROW and an area 30 meters (100 feet) from either side of the existing US 85 ROW. The following wildlife and habitat descriptions are based on surveys of the APE. A broader level of analysis and description is also provided for landscape adjacent to the APE.

Table 4.15
Common Soil Types Found Along the US 85 Corridor

Symbol	Name	Description	Slopes (%)	Erosion Hazard	Size of Areas	Runoff	Primary Use
Bo	Blakeland-Orsa Association	Gently sloping soils on footslopes and alluvial fans in northern portion of the county	1-4	Slight to moderate	Long, irregular, >8.1 ha (20 acres)	Slow to medium	Native grass Cultivated (dryland grain, irrigated alfalfa)
Sa	Sampson loam	Gently sloping soils on terraces along major drainageways in northern portion of the county	1-4	Slight	Long, irregular, > 40.5 ha (100 acres)	Slow	Cultivated
BsE	Bresser-Louvier complex	Sloping to steep soils on side slopes	7-30	Moderate to high	Irregular, > 16.2 ha (40 acres)	Medium to rapid	Grazing Wildlife
BrD	Bresser sandy loam	Soil is located on uplands in northern portion of the county	3-9	Moderate	< 64.7 ha (160 acres)	Medium	Cultivated (various) Grazing
BrB	Bresser sandy loam	Nearly level soil located on terraces and uplands in northern portion of the county	1-3	Slight to moderate	< 24.3 ha (60 acres)	Slow	Cultivated

> greater than
< less than
Source: U.S Department of Agriculture, Soil Conservation Service, Soil Survey of Castle Rock Area, Colorado, November 1994

The APE and surrounding landscape occur within the western edge of the Great Plains – Palouse Dry Steppe

Province. Native habitats within the APE include grasslands, shrublands, woodlands, and riparian areas. Steppe is synonymous with short-grass prairie and describes a class of short grasses usually bunched and sparsely distributed. Common native short grasses in this ecoregion include blue grama (*Chondrosum gracile*) and buffalograss (*Buchlo• dactyloides*). Other grasses include western wheatgrass (*Pascopyrum smithii*), needle and thread grass (*Heterostipa comata*), fescue (*Festuca* spp.), and bluegrass (*Poa* spp.). The grasslands east of the Rockies have scattered trees and shrubs, such as plains cottonwood (*Populus deltoides*), ponderosa pine (*Pinus ponderosa*), rabbitbrush (*Chrysothamnus nauseosus*), and Gambel oak (*Quercus gambelii*).

Vegetation along streams within the APE is dominated by plains cottonwood, box elder (*Negundo aceroides*), and an understory of crack willow (*Salix fragilis*), peachleaf willow (*Salix amygdaloides*), and sandbar willow (*Salix exigua*). These riparian habitats may represent the most important wildlife habitats in the APE and the adjacent landscape due to the abundance and richness of species they support. Riparian areas also provide excellent wildlife movement corridors.

Most wildlife habitat within the APE is dominated by human activity due to its past use as a transportation corridor; associated residential, commercial, and industrial development; and historic cattle ranching. Despite human impacts on the landscape, Douglas County maintains an abundance of wildlife and wildlife habitat. In the ***Douglas County Parks, Trails, and Open Space Master Plan (1998)***, preservation of wildlife was stated by the public as a high priority. Identification of wildlife use areas was an important criterion in determining suitable or priority areas for conservation.

Douglas County has more than 15,000 hectares (37,000 acres) of open space within the county, which is managed by Douglas County Division of Open Space and Natural Resources. Douglas County Parks currently manages 120 hectares (293 acres) of developed parkland, and more than 970 hectares (2,400 acres) of unimproved open space.

In addition to County-managed open space, nearby protected areas such as Chatfield State Park, Plum Creek Riparian Corridor, Roxborough State Park, Pike National Forest, Woodhouse State Wildlife Area, Cherokee Ranch Foundation, and Highlands Ranch Open Space Conservation Area also exist. These areas serve as refuges for wildlife and become increasingly important as surrounding lands are converted from agriculture and natural landscape to developed areas. Additionally, much of the project area between Daniels Park Road and Titan Road along US 85 is relatively undeveloped. A recent wildlife tracking study indicated that wildlife regularly moves across and under US 85 within the undeveloped area.

For additional information on wildlife, see the ***Wildlife Technical Report,*** May 2000, amended, November 2000, and the ***Wildlife Tracking and Habitat Connectivity Study US Highway 85 Corridor***, October 2000, in the Technical Reports Volume of the ***South I-25 Corridor and US 85 Corridor FEIS.***

4.3.6.1 Mammals

Big game species found within the APE and adjacent landscape include elk (*Cervus elaphus*), mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocioleus virginanus*), pronghorn (*Antilocapra americana*), black bear (*Ursus americanus*), and mountain lion (*Felis concolor*). A resident elk population uses habitat west of I-25 to the foothills west of US 85. In addition, a foothills population of elk uses severe-winter range within the northwest portion of the project area. The primary east-west elk movement corridor across I-25 is south of the Town of Castle Rock, outside the APE. Elk activity within the study area along US 85 appears to concentrate near

South Pollock Gulch in the northern portion of the study area and on Cherokee Ranch and adjacent properties in the southern portion of the study area. Cherokee Ranch has a year-round elk population of approximately 400. Winter field surveys of the APE revealed elk movement south of Cherokee Ranch across Daniels Park Road into adjacent developed areas north of Castle Rock and east toward the interstate. According to the CDOW, elk cross I-25 primarily south of Castle Rock; however, evidence of unsuccessful elk crossing on I-25 has been recorded north of Castle Rock near the Castle Pines Parkway Interchange. (See ***Wildlife Technical Report*** for elk range map.)

Mule deer travel and forage within the APE and are abundant in adjacent winter and severe-winter range along US 85 and summer range to the west. Mule deer concentrate on winter and severe winter range due to the availability of resources, particularly forage that is scarce or inaccessible in other portions of their range. Winter range condition and availability can be a limiting factor for ungulate species survival within a population. Therefore, threats to connectivity between ungulate winter range and other seasonal ranges can have serious negative consequences at the population level. White-tailed deer are relatively common along riparian corridors and adjacent uplands within the APE. (See ***Wildlife Technical Report*** for mule deer range map.)

Pronghorn occur east of US 85 in the northeast section of the project area near Highlands Ranch. Pronghorn also occur east of I-25; however, numbers are few because both corridors are undergoing rapid development. Pronghorn have been observed on several occasions during winter surveys near South Pollock Gulch on the east side of US 85. (See ***Wildlife Technical Report*** for pronghorn range map.)

Black bears in Colorado are most common in sub-alpine forests at moderate elevations, montane forests, and shrublands and within well-developed stands of oakbrush or berry-producing shrubs such as chokecherry (*Padus virginiana*) or serviceberry (*Amelanchier alnifolia*). Black bears likely use oak and mountain mahogany shrublands during their hyperphagic phase in late summer and fall, when abundant nuts and berries allow them to gorge prior to hibernation.

Mountain lions are common in rough, broken foothills often in association with montane forests and shrublands. Evidence from wildlife tracking stations includes a mountain lion crossing beneath US 85 between Louviers and Sedalia.

Other mammalian predators exist within the project area, including coyote (*Canis latrans*), red fox (*Vulpes vulpes*), bobcat (*Lynx rufus*), raccoon (*Procyon lotor*), badger (*Taxidea taxus*), long-tailed weasel (*Mustela frenata*), western spotted skunk (*Spilogale gracilis*), and striped skunk (*Mephitus mephitus*). These predators have all been detected crossing tracking stations set up in culverts under I-25 and US 85 within the APE.

Gray fox (*Urocyon cinereoargentus*) habitat occurs throughout Douglas County in broken terrain, montane shrublands, riparian areas, and weedy margins of fields; however, their presence may be limited by competition with red fox. Swift fox (*Vulpes velox* – State Species of Concern and candidate species for federal protection under the Endangered Species Act [ESA]) reside in Colorado on the eastern plains in flat or very gently rolling topography and its presence is documented in eastern Douglas County. However, the highly eroded terrain interspersed with gullies and washes east of I-25, and the brushy habitat west of I-25 are not likely swift fox habitat (see Section 4.3.9, *Threatened, Endangered, and Other Special-Status Species*).

Other carnivores whose range includes Douglas County are ringtail (*Bassaricus astutus*), short-tailed weasel (*Mustela erminea*), black-footed ferret (*Mustela nigripes* – State Endangered and Federal Endangered) (see

Section 4.3.9, *Threatened, Endangered, and Other Special-Status Species*), and mink (*Mustela vison*).

Upland grasslands within the project area contain colonies of black-tailed prairie dogs (*Cynomys ludivicianus* – State Species of Concern and Federal Proposed Candidate Species). Desert cottontails (*Sylvilagus audubonii*) are often associated with black-tailed prairie dog colonies and grassland habitat with scattered shrubs. Grasslands also provide habitat for the thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*). Black-tailed jackrabbits (*Lepus californicus*) may use areas east of I-25. Mountain cottontails (*Sylvilagus nuttalii*) are found within the shrubland (oak and mountain mahogany) habitats west of US 85, as are rock squirrels (*Spermophilus variegatus*). Golden-mantled ground squirrels (*Spermophilus lateralis*), least chipmunks (*Tamias minimus*), and Colorado chipmunks (*Tamias quadrivittatus*) are found in mountain shrublands and ponderosa pine communities. Abert's squirrels (*Sciurus aberti*) are dependent upon ponderosa pine for nesting and food. Abert's squirrels were observed within the APE during field surveys. Eastern cottontails (*Sylvilagus floridanus*) and fox squirrels (*Sciurus niger*) inhabit riparian areas within Douglas County, as do beavers (*Castor canadensis*) and muskrats (*Ondatra zibethicus*). Beavers and their dams were observed in East Plum Creek in Castle Rock.

Small mammal sign is abundant along the I-25 APE and US 85 APE, particularly deer mouse (*Peromyscus maniculatus*) and bushy-tailed woodrat (*Neotoma cinerea*). The five general habitat types within the APE likely support a diverse, small mammal population. Grasslands are habitat for the northern grasshopper mouse (*Onychomys leucogaster*) and the prairie vole (*Microtus ochrogaster*). Gambel oak and mountain mahogany shrublands contain small mammals such as Mexican woodrat (*Neotoma mexicana*) and brush mouse (*Peromyscus boylii*). Montane vole (*Microtus montanus*), longtailed vole (*Microtus longicaudus*), and heather vole (*Phenacomys intermedius*) are all found in ponderosa pine woodlands. Riparian areas within the project area provide habitat for the threatened Preble's Meadow Jumping Mouse (*Zapus hudsonius preblei* – State Threatened and Federal Threatened) (see Section 4.3.9, *Threatened, Endangered, and Other Special-Status Species*) and the meadow vole (*Microtus pennsylvanicus*).

The western small-footed myotis (*Myotis ciliolabrum*) occurs in all the habitat types present within the project area. Little brown bats (*Myotis lucifugus*) would likely occur within wooded habitats (cottonwood and ponderosa) of the project area. Mountain shrublands provide habitat for the fringed (*Myotis hysanodes*) and long-eared myotis (*Myotis evotis*), big brown bat (*Eptesicus fuscus*), and Townsend's big-eared bat (*Plecotus townsendii*).

4.3.6.2 Birds

Breeding birds found in upland grass communities within the APE and surrounding landscape include horned lark (*Eremophila alpestris*), meadowlark (*Sturnella neglecta*), lark sparrow (*Chondestes grammacus*), common night hawk (*Chordeiles minor*), Swainson's hawk (*Buteo swainsoni*), northern harrier (*Circus cyaneus*), and burrowing owl (*Athene cunicularia* – State Threatened). Common breeding birds within Gambel oak and mountain mahogany shrublands include the spotted towhee (*Pipilo maculatus*), green-tailed towhee (*Pipilo chlorurus*), Virginia's warbler (*Vermivora peregrina*), orange-crowned warbler (*Vermivora ruficapilla*), scrub jay (*Aphelocoma coerulescens*), black-headed grosbeak (*Pheucticus melanocephalus*), and wild turkey (*Meleagris gallopavo*). Ponderosa pine forests provide breeding habitat for the Stellar's jay (*Aphelocoma coerulescens*), chipping sparrow (*Spizella passerina*), mountain chickadee (*Parus gambeli*), white-breasted nuthatch (*Sita carolinensis*), and flammulated owl (*Otus flammeolus*). Low-elevation riparian areas are breeding habitat for Bullock's oriole *(Icterus graduacauda*), yellow warbler (*Dendroica petechia*), black-billed magpie (*Pica pica*), northern flicker (*Colaptes auratus*), house wren (*Troglodytes aedon*), and great horned owl (*Bubo virginiana*).

An active golden eagle (*Aquila chrysaetos*) nest is on the Cherokee Ranch south of Sedalia, approximately 1 kilometer (0.6 mile) from US 85. The nest site was active in March 2000 and has been consistently active in past years. Raptors observed within the APE and surrounding landscape during site visits include northern harrier (*Circus cyaneus*), ferruginous hawk (*Buteo regalis* – State Species of Concern), red-tailed hawk (*Buteo jamaicensis*), golden eagle (*Aquila chrysaetos*) and American kestrel (*Falco sparverius*). Other raptors that may be present within the study area include bald eagle (*Haliaeetus leucocephalus* – State Threatened and Federal Threatened) (see Section 4.3.9, *Threatened, Endangered, and Other Special-Status Species*), peregrine falcon (*Falco peregrinus* – State Species of Concern), prairie falcon (*Falco mexicanus*), and rough-legged hawk (*Buteo lagopus*), a winter resident in Colorado's grasslands. Sharp-shinned (*Accipiter striatus*) and Cooper's hawks (*Accipiter cooperii*) may occupy woodland habitats adjacent to the APE.

Chatfield Reservoir is a production area for breeding waterfowl and a staging area for migratory waterfowl. The South Platte River below the Chatfield Dam is winter range for waterfowl. Canada geese are commonly observed in agricultural fields and other habitats within the APE and adjacent landscape.

4.3.6.3 Tracking Study

Results from a wildlife tracking study in the I-25 and US 85 APE indicate that a variety of wildlife use bridges and culverts to cross under highways. Tracking stations that identify wildlife species crossing under bridges and through culverts, and quantify the number of crossing events, were established at four locations in November 1999 and at two additional stations in January 2000 along the I-25 Corridor and US 85 Corridor (Figure 4.5a and Figure 4.5b). Table 4.16 summarizes the crossings at each station.

Table 4.16
Summary of Wildlife Tracking Station Records for Culverts and Bridges Under I-25 and US 85 as of May 31, 2000

	TRACKING STATION						
Species	**1**	**2**	**3**	**4 (I-25)**	**5-East**	**5-West**	**Total**
	MP 195.1	MP 192.0	MP 189.6	MP 188.0	MP 192.4	MP 192.4	
Mt. Lion	0	1	0	0	0	0	1
Bobcat	0	39	20	0	5	5	69
Coyote	3	1	1	7	10	4	26
Red fox	4	8	8	0	19	21	60
Badger	0	0	0	0	0	1	2
Raccoon	2	19	16	2	4	5	48
Striped skunk	0	15	5	0	27	31	78
Weasel	1	2	0	0	0	0	3
Cottontail	6	12	5	12	0	0	35
Squirrel	2	35	12	0	15	8	72
Woodrat	0	14	5	57	171	136	383
Dog	22	2	6	0	4	5	39
Domestic cat	42	0	3	0	0	0	45
Human	38	2	1	10	8	18	77
ATV *	2	0	0	0	0	3	5
Total Records	**122**	**150**	**83**	**88**	**263**	**237**	**943**
Total Tracking Days	**196**	**196**	**196**	**154**	**147**	**147**	

**All-terrain vehicle*

Figure 4.5a

Wildlife Tracking Station Locations
along the I-25 corridor

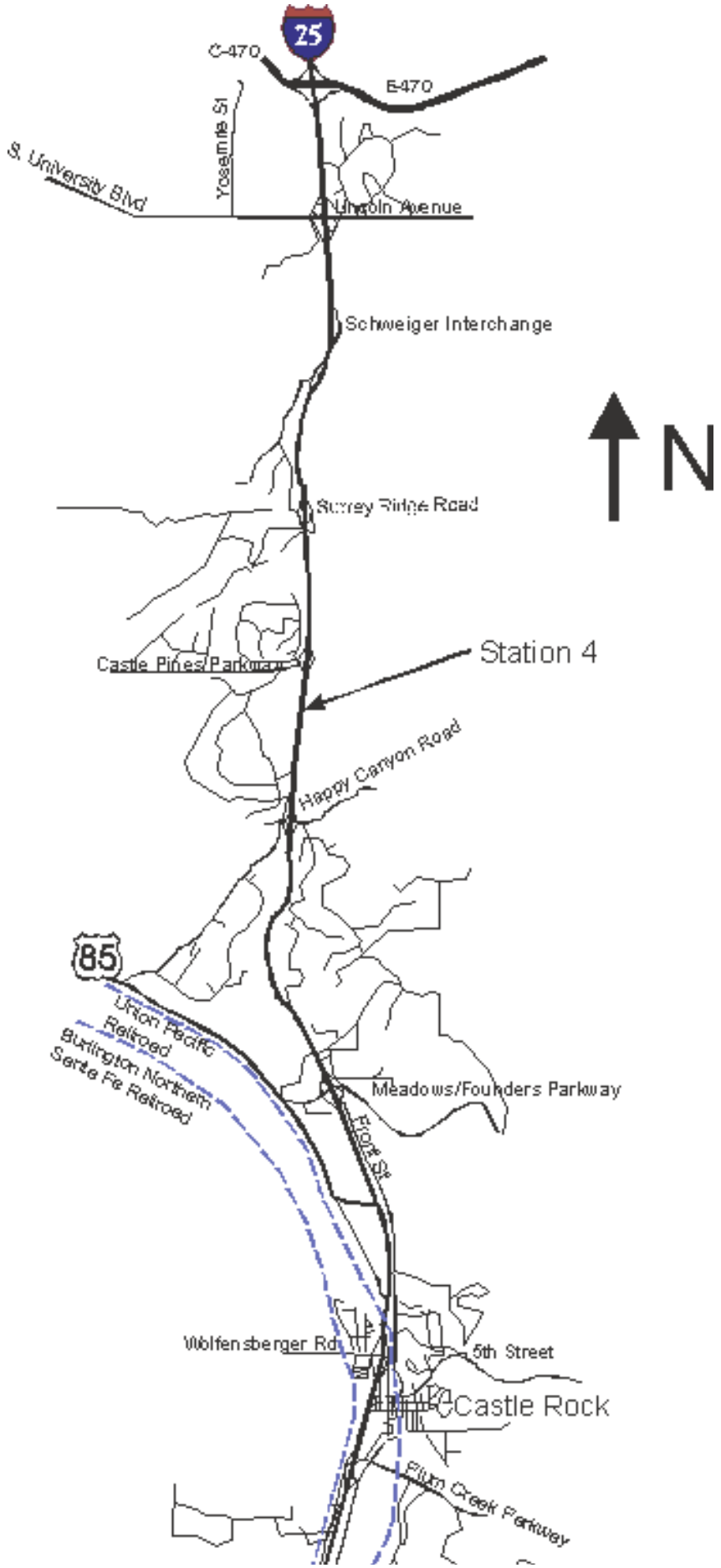
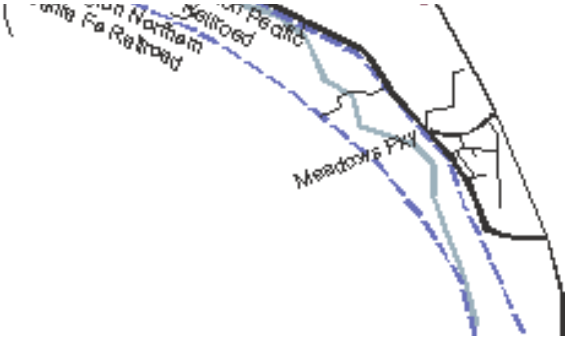


Figure 4.5b
Wildlife Tracking Station Locations along the US 85 Corridor



From November 15, 1999, through May 31, 2000, 943 crossing events were detected for 11 wildlife species (excluding mice). Eight of these were carnivores (bobcat, mountain lion, coyote, red fox, badger, weasel, skunk, and raccoon), and three were small mammals (woodrat, squirrel, and cottontail). Mice and voles were also recorded at the six tracking stations; however, the high number of records may be skewed by individuals living within the structure. One hundred and sixty-six domestic crossings were also recorded including dogs (39), domestic cats (45), all-terrain vehicles (ATV) (5), and human (77). No ungulate crossings were detected at any of the tracking stations; however, elk and deer were recorded crossing at grade.

Several factors that may affect ungulate and other wildlife use of bridges or culverts within the study area were noted during tracking surveys. Human occupation or related effects (e.g., noise, lighting, pets) may inhibit wildlife crossing. Artificial substrate (e.g., concrete) size (i.e., openness factor), structural barriers (e.g., riprap, fencing), and adjacent landscape features could also limit suitability of underpasses for some species.

An underpass may also appear long and confining so as to preclude passage by ungulates. Relative openness of an underpass, described as the "openness factor," may be a primary stimulus to ungulates approaching a potential crossing. The openness factor is calculated as (height x width)/length. A CDOW study indicates that an openness factor of greater than 0.6 is required for motivated deer to use culverts or other below-grade structures. Elk, which are generally 30 percent larger than deer, require a larger opening. All six crossings monitored in the tracking study possess at least one of the above-described inhibiting factors to ungulate crossing.

Table 4.17 identifies the tracking stations and potentially inhibiting features for deer and other wildlife.

Although a small openness factor may preclude use of some underpasses by some species of wildlife (e.g., ungulates), this same feature may not deter or may be preferred by other wildlife (i.e., carnivores). As shown on Table 4.17, the small openness factor of Station 2 does not appear to inhibit use of the culvert by carnivores relative to other tracking stations.

Moreover, some research indicates that openness may not be a reliable predictor of wildlife use of structures. Fencing and other management tools may be more important than openness in motivating wildlife use of structures to cross highways.

Tracking results at highway crossings along US 85 (Stations 1, 2, 3, 5-East, and 5-West) indicate that available bridges and culverts within the project area are being used to varying degrees by carnivores and small- to medium-sized mammals. Although US 85 bisects the range of residential populations of deer and elk, current bridges and culverts under US 85 appear inadequate as crossing structures for deer and elk due to size, fencing, substrate, and proximity to human disturbance.

Additional tracking surveys, conducted after snow events, focused on detecting wildlife movement over the highway. Coyotes (1) and red fox (2) are the most frequently detected animals crossing over US 85, and they were detected at a higher rate than through monitored culverts. Next in crossing frequency are rodents, mule deer, and elk.

Table 4.17
Station Number, Structure, Site Description, Openness Factor, and Potential Inhibiting Features to Wildlife Movement for Wildlife Tracking Stations Under I-25 and US 85

Station No. (Milepost)	Structure	Site Description	Openness Factor	Potential Inhibiting Features
1 (195.2)	Bridge	Bar, liquor store on west side of US 85	4.50	Noise, lighting, human activity, and fencing
2 (192.0)	2.43m x 3.64m x 97.97m (8'x12' x 320')(west) 2.73m x 3.64m x 97.07m (9'x12' x 320')(east) Multi-directional stone culvert	Undeveloped both side US 85	West-0.30 East-0.34	Long and confining passage, openness factor, and fencing
3 (189.6)	2.44m x 2.44m x 16.46m (8'x8'x54') concrete box culvert	House and 3 dogs, west side of US 85	1.19	Dogs, human activity, concrete substrate, and openness factor
4 (188.0)	2.13m x 1.82m x 57.30m (7'x6'x188') concrete box culvert	Undeveloped both sides of I-25	0.22	Concrete substrate, culvert structural barrier, openness factor
5-East (192.4)	1.82m x 1.82m x 25.78m (6'x6'x85') concrete box culvert	Undeveloped east side of US 85; horse pasture on west side	0.42	Fencing, openness factor
5-West (192.4)	1.82m x 1.82m x 27.30m (6'x6'x90') concrete box culvert	Horse pasture on east side; undeveloped on west side	0.40	Fencing, openness factor

Wildlife habitat was evaluated in three primary connectivity zones that cross US 85 within the study area. These zones were designated A, B, and C. Zone A represents the northernmost zone of viable habitat connectivity in the study area. This zone is dominated by the Beeman Creek and South Pollock Gulch drainages, both of which arise east of US 85 at an approximate elevation of 1,920 meters above mean sea level (amsl) (6,300 feet amsl). These drainages flow west, ultimately crossing beneath US 85 at bridge structures. Neither drainage supports a year-round, permanent flow of surface water. The topography of this zone features a gentle slope from high ground in the vicinity of Daniels Park, to a low elevation represented by the channel of Plum Creek, west of US 85. The landforms are relatively diverse, offering creek bottoms, ridgelines, and slopes facing north, west, and south.

The plant communities of Zone A are dominated by a shrubby understory of Gambel oak, three-leaf sumac, and chokecherry. Herbaceous vegetation in the zone includes several graminoids (e.g., buffalograss, thread-leaved sedge, smooth brome, and needle and thread) and forbs (e.g., yucca, prickly pear cactus, purple mustard, and chiming bells). Evidence of wildlife observed during the habitat evaluation of the area included direct observations of an antelope buck, a mule deer doe, a coyote, and several bird species, including mourning dove, scrub jay, and Bullock's oriole. In general terms, vegetation along the banks of South Pollock Gulch drainage appears to offer good forage potential and cover (i.e., large patches of oak and sumac brush).

Wildlife tracking in Zone A (Station 1 within South Pollock Gulch) recorded tracks for large mammals (coyote and fox), medium mammals (raccoon and weasel), and small mammals (cottontail and squirrel). The total number of wild animal tracks (excluding humans and domestic species) counted at Station 1 versus the other four tracking stations along US 85 is low, ranking last out of six stations and accounting for only 2.4 percent of all wild animal passages under the highway at the six underpasses. Human and other domestic tracks at Station 1 were numerous, possibly due to the proximity of a liquor store and bar, and other human activities in the immediate vicinity. Human presence in Zone A and domestic passages through Station 1 underpass combine to explain the lower number of wildlife tracks recorded in the vicinity of South Pollock Gulch Bridge. In terms of both underpass and at-grade tracks, Zone A ranked lowest in terms of total wild animal tracks counted (18 underpass and 36 animals for six tracking events). Despite the lower track counts for this zone, Zone A still represents an important wildlife habitat connection. Reasons include the short distance between OSCA and the Plum Creek Riparian Corridor via South Pollock Gulch (approximately 1.6 kilometers [1.0 mile]), presence of relatively undisturbed terrain (development is primarily north of this zone) and the relatively simple techniques required to improve existing habitat (i.e., planting shrubs along drainages, replacing/removing fences, and managing existing development).

Zone B is dominated by streams draining the Cherokee Ranch property on the east side of US 85. These streams flow westward beneath US 85 at Stations 2, 5-E, and 5-W. As with Zone A drainages, the unnamed drainages of Zone B arise at an approximate elevation of 1,920 meters (6,300 feet), and drop to the low point of the valley represented by the channel of Plum Creek (elevation approximately 1,731 meters [5,680 feet]). The topography east of US 85 is also very similar to that found in Zone A, featuring dissected upland, prominent ridgelines, and slopes facing north, west, and south.

The dominant vegetation of Zone B includes ponderosa pine (*Pinus ponderosa*) in several of the drainages, as well as relatively large patches of Gambel oak (*Quercus gambelii*), three-leaf sumac (*Rhus aromatica* subsp. *trilobata*) and chokecherry (*Padus virginiana*). Other understory species included currant (*Ribes* sp.), wild rose (*Rosa woodsii*), and mountain mahogany (*Cercocarpus montanus*). The herbaceous vegetation included the graminoids Indian ricegrass (*Achnatherum hymenoides*), crested wheatgrass (*Agropyron cristatum*), smooth brome (*Bromopsis inermis*), big bluestem (*Andropogon gerardii*), blue grama grass (*Chondrosum gracile*), sand dropseed (*Sporobolus cryptandrus*) and thread-leaved sedge (*Carex filifolia*). Diverse forbs were also observed, including chiming bells (*Mertensia lanceolata*), Nelson's larkspur (*Delphinium nuttallianum*), green gentian (*Frasera speciosa*), lupine (*Lupinus* sp.), sand lily (*Leucocrinum montanum*), blue flax (*Adenolinum lewisii*), Fremont's geranium (*Geranium caespitosum*), milkvetch (*Astragalus* sp.), golden banner (*Thermopsis montanum*), senecio (*Senecio* sp.), fleabane (*Erigeron* sp.), several species of mustard, yucca (*Yucca glauca*), and prickly pear cactus (*Opuntia* sp.) Vegetative cover is substantial and continuous through the drainages that ultimately join and go beneath US 85 at Stations 2, 5-E, and 5-W. Bird life, especially in the areas near ponderosa pine and oak thickets, is diverse. Some of the observed species in Zone B include blue-gray gnatcatcher (*Polioptila caerulea*), western bluebird (*Sialia mexicana*), western meadowlark (*Sturnella neglecta*) spotted towhee (*Pipilo maculatus*), warbling vireo (*Vireo gilvus*), a species of warbler, several species of sparrow, magpies (*Pica pica*), brown-headed cowbird (*Molothrus ater*) (frequently associated with habitat fragmentation and edge effects), Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), and broad-tailed hummingbird (*Selasphorus platycercus*). Evidence of mammals in this zone included mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus*), fox (*Vulpes vulpes* and *Urocyon cinereoargenteus)*, cottontail rabbit (*Sylvilagus floridanus*), and porcupine (*Erethizon dorsatum*). Abundant elk sign was on the Navratil, C. Thomas, and Sedalia Land Co. properties. This sign included scat, browsed vegetation, fresh tracks, and fresh rubs on pine saplings. The elk sign was found both in drainages and on ridgelines within the zone.

The wildlife tracking data in Zone B, for Stations 2, 5-W, and 5-E indicate that this area acts as an important travel corridor for mammals, especially predators. Of note are the tracks at Station 2 for a mountain lion (*Felis concolor*), and significant track evidence for bobcat (*Lynx rufus)* and fox. Medium-sized mammals, especially raccoons (*Procyon lotor*) and skunks (*Mephitis mephitis, Spilogale putorius)*, were noted to use the culverts of this zone. Small mammals, particularly woodrats (*Neotoma* sp.), heavily used Stations 5-E and 5-W. The at-grade track record for this zone reveals a relatively high count for large mammals (112). However, of these 112 large-bodied mammals, only 3 were ungulates. Zone B ranked first in wild animal tracks counted, with 608 underpasses, and 121 at-grade tracks counted, for a total of 729. Thus, Zone B is considered an important wildlife habitat connection based on the high quality of habitat observed during site reconnaissance, connectivity of this zone to conservation areas on both sides of US 85, the higher track counts detected at track stations and at-grade crossings in this zone, and the presence of little commercial or industrial properties to fragment the landscape or interfere with animal movements. As in both of the other two zones, some presence of noxious weeds and residential development is to be considered, but the habitat fragmentation is less severe than in other portions of the study area.

Zone C lies on the southern end of the study area. This zone is dominated by an unnamed drainage that flows south from Cherokee Ranch and beneath US 85 at Station 3. This zone is narrower and shorter than the two previous zones, due to the close proximity of Cherokee Ranch to the East Plum Creek Riparian Corridor. As with Zones A and B, topography on the Cherokee Ranch side of US 85 is generally steep and dips toward the creek channel found immediately south of the tracking station.

Zone C features some ponderosa pine habitat on the north side of US 85, especially the drainage leading to Station 3. Other dominant vegetation near Station 3 includes plains cottonwood, western wheatgrass, crested wheatgrass, smooth brome, chicory (*Cichorium intybus*), yucca, and spiderwort (*Tradescantia occidentalis*). Wildlife tracking data for Station 3 recorded fewer overall mammals than detected at Stations 2, 5-W, and 5-E, but more than were recorded at Station 1 in Zone A. Bobcats, red fox, coyote, raccoons, skunks, badgers, squirrels, cottontails, and woodrats were all detected crossing under US 85 at Station 3. Perhaps more significantly, the at-grade tracking data for Zone C revealed more than 80 mammals recorded, including 11 ungulates. The ungulate count for this zone is higher that either of the other two zones. Two elk bulls were directly observed in the immediate vicinity of Station 3. The direct and relatively short distance between Cherokee Ranch and the East Plum Creek Corridor, coupled with a large resident elk herd on Cherokee Ranch, appears to warrant consideration of a crossing structure large enough to accommodate elk in Zone C.

These three zones represent key elements in maintaining at least a minimum of habitat connectivity between important wildlife conservation areas in the Chatfield Basin. It should also be noted that other portions of the US 85 Corridor, outside the three designated connectivity zones, may be integral to the continued overall connectivity across US 85. Examples of these other areas include grasslands, which provide elk forage, and ponderosa pine/Gambel oak forest, which provide excellent bird habitat. Much of this portion of the landscape is on private lands, outside the three connectivity zones.

4.3.7 Wild and Scenic Rivers

The Wild and Scenic Rivers Act (WSRA), 16 USC 271 *et seq.*, establishes requirements applicable to water resource projects affecting wild, scenic, or recreational rivers within the National Wild and Scenic Rivers System, as well as rivers designated on the National Rivers Inventory. No designated wild and scenic rivers occur within the project corridors.

4.3.8 Floodplains

Executive Order 11988, Floodplain Management, requires federal agencies to avoid direct or indirect support of floodplain development whenever a practicable alternative exists. The base flood (100-year flood) is the regulatory standard used by federal agencies and most states to administer floodplain management programs. As described in 23 CFR 650 Subpart A, floodplains provide natural and beneficial values serving as areas for fish, wildlife, plants, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquaculture, forestry, natural flood moderation, water quality maintenance, and groundwater recharge.

Flood insurance rate maps (FIRM) from the Federal Emergency Management Agency (FEMA) were used to identify drainages with 100-year floodplains within the APE. The APE includes both the I-25 Corridor and US 85 Corridor. These roadways generally lie outside of existing 100-year floodplains, but do intersect several drainages in the Plum Creek and Cherry Creek watersheds (Figure 4.6a and Figure 4.6b). US 85 and I-25 both intersect nine drainages, with 100-year floodplains.

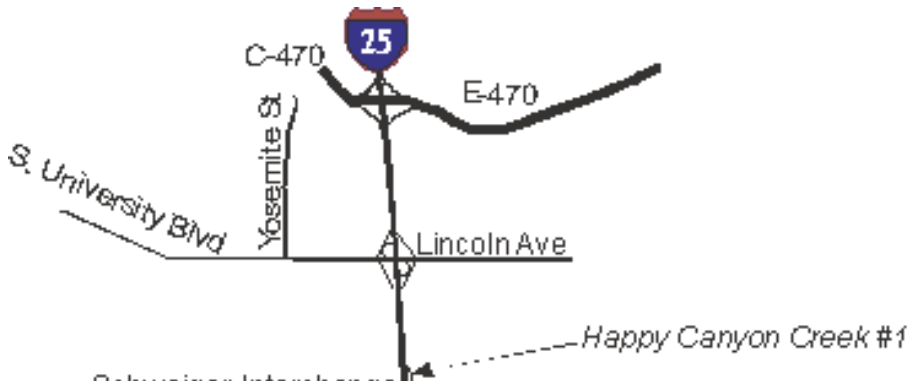
With the exception of East Plum Creek (Segment 1 and Segment 2, Figure 4.6a), and Happy Canyon Creek (Segment 1 and Segment 2, Figure 4.6a), I-25 and US 85 generally cross these drainages perpendicularly. In Castle Rock, I-25 runs parallel to East Plum Creek. Approximate widths of floodplain intersections within the APE are shown in Table 4.18. The majority of drainages in both project corridors are ephemeral streams, typically active only during high-intensity rainfall events. These areas are sandy washes with upland shrubs common along the banks.

Marcy Gulch on US 85 and East Plum Creek on I-25 are the only perennial streams within the APE. These creeks have sand beds and exhibit bank sloughing and channel incision. Well-developed riparian communities exist within the 100-year floodplain along both streams.

Although Happy Canyon Creek is intermittent, it also has a well-developed riparian zone within the 100-year floodplain. These three creeks exhibit considerable beneficial use for flood attenuation, groundwater recharge, water quality maintenance, wildlife habitat, and aesthetics.

Flooding in Douglas County is typically a result of intense rainfall. Under appropriate conditions, flooding at roadway intersections with 100-year floodplains is possible; however, potential for roadway flooding is reduced by an increase in elevation of the road surface above intersected floodplains (e.g., I-25 Bridge over East Plum Creek) and appropriately sized drainage structures.

Figure 4.6a
Floodplains along the I-25 Corridor



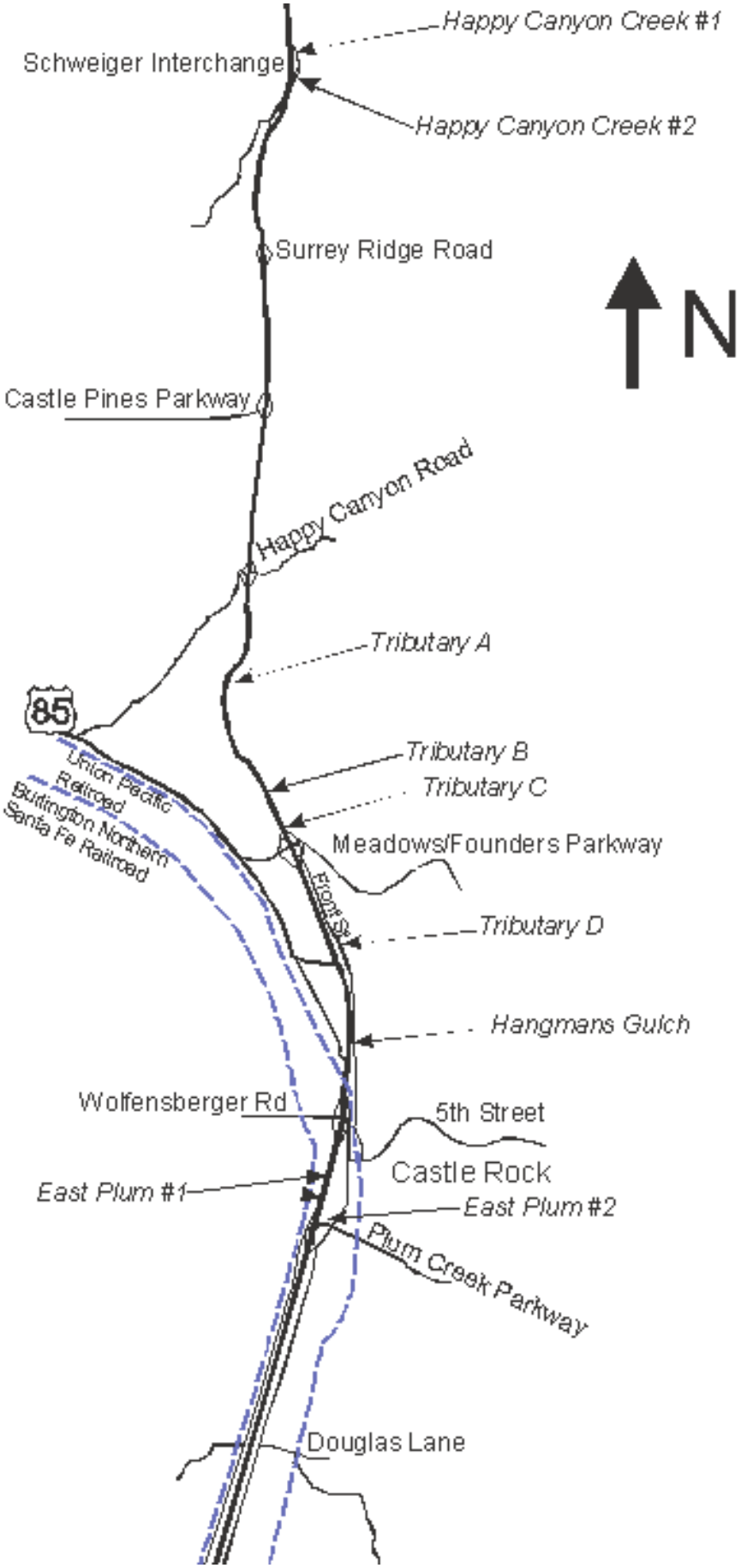


Figure 4.6b
Floodplains along the US 85 Corridor

Table 4.18
Intersection Widths of Identified 100-year Floodplains within the

Area of Potential Effect, Douglas County, Colorado

Drainage	Highway	Intersection Width meters (feet)
1. Happy Canyon Creek 1	I-25	122 (400)
2. Happy Canyon Creek 2	I-25	1,036 (3,400)
3. Tributary A	I-25	58 (190)
4. Tributary B	I-25	38 (125)
5. Tributary C	I-25	37 (120)
6. Tributary D	I-25	172 (565)
7. Hangman's Gulch	I-25	70 (230)
8. East Plum Creek 1	I-25	1,556 (5,105)
9. East Plum Creek 2	I-25	459 (1,505)
10. Marcy Gulch	US 85	314 (1,030)
11. No name 1	US 85	213 (700)
12. No name 2	US 85	107 (350)
13. Indian Creek	US 85	238 (780)
14. No name 3	US 85	238 (780)
15. Tributary A	US 85	37 (120)
16. Tributary B	US 85	110 (360)
17. Tributary C	US 85	67 (220)
18. Tributary D	US 85	274 (900)

For floodplain and drainage details, see the ***Floodplain and Drainage Assessment Technical Report,*** May 2000, amended November 2000, in the Technical Reports Volume of the ***South I-25 Corridor and US 85 Corridor FEIS.***

4.3.9 Threatened, Endangered, and Other Special-Status Species

The US Fish and Wildlife Service (USFWS) has provided comments on federal threatened, endangered, and candidate species that occur, or whose historic range is, within Douglas County. A USFWS updated list in 1999 added lynx (*Lynx canadensis)* as a species potentially present in Douglas County. Species of interest to the State of Colorado were identified through consultation with the CDOW. Table 4.19 identifies the species considered in this section along with their status and likelihood of occurrence in the APE. Although surveys for threatened and endangered (T&E) species were restricted to within 30 meters (100 feet) of the existing ROW for US 85 and 60 meters (200 feet) from the existing ROW for I-25, the APE extends beyond these boundaries to encompass adjacent habitat and for consideration of secondary impacts in Chapter 5.0, *Environmental Consequences.*

For additional information on threatened and endangered species, see the ***Special Status Plant and Animal Species Technical Report,*** May 2000, amended November 2000, in the Technical Reports Volume of the ***South I-25 Corridor and US 85 Corridor FEIS.***

Table 4.19
Status and Likelihood of Occurrence in the Area of Potential Effect for Threatened and Endangered Species, Candidates for Federal Listing, and State of Colorado Threatened, Endangered, or Species of Concern

Species	Status	Occur in APE?
Fauna		
Bald Eagle (*Haliaeetus leucocephalus*)	FT and ST	Yes
Mexican Spotted Owl (*Strix occidentalis lucida*)	FT and ST	Not Likely
Black-Footed Ferret (*Mustela nigripes*)	FE and SE	Not Likely
Preble's Meadow Jumping Mouse (*Zapus hudsonius preblei*)	FT and ST	Yes
Greenback Cutthroat Trout (*Onccorhyncus clarki stomias*)	FT and ST	Not Likely
Pawnee Montane Skipper (*Hesperia leonardus montana*)	FT	Not Likely
Black-Tailed Prairie Dog (*Cynomys ludivicianus*)	WBP and SSOC	Yes
Mountain Plover (*Charadrius melodus*)	FC and SSOC	Not Likely
Swift Fox (*Vulpes velox*)	FC and SSOC	Possible
Lynx (*Lynx canadensis*)	FC and SE	Not Likely
Wolverine (*Gulo gulo*)	FS and SE	Not Likely
Plains Sharp-Tailed Grouse (*Tympanuchus phasianellus jamesi*)	SE	Possible
Burrowing Owl (*Athene cunicularia*)	ST	Possible
Northern Redbelly Dace (*Phoxinus eos*)	SE	Possible
Common Shiner (*Notrropis cornutus*)	ST	Possible
Brassy Minnow (*Hybognathus hankinsoni*)	ST	Possible
Iowa Darter (*Etheostoma exile*)	SSOC	Possible
American Peregrine Falcon (*Falco peregrinus*)	SSOC	Possible
Ferruginous Hawk (*Buteo regalis*)	SSOC	Yes
Northern Leopard Frog (*Rana pipiens*)	SSOC	Yes
Flora		
Ute Ladies' Tresses Orchid (*Spiranthes diluvialis*)	FT	Not Likely
Colorado Butterfly Plant (*Gaura neomexicana*)	FC	Not Likely
Abbreviations: *FC – Federal Candidate for Listing*		

4.3.9.1 Bald Eagle

In the Denver area, bald eagles are known to nest in large cottonwoods at the edge of reservoirs; however, no known active nests are in Douglas County. Bald eagles are winter visitors to Chatfield Reservoir in the northwest portion of the project area and likely use the Plum Creek drainage as a movement corridor. In addition, bald eagles are known to use black-tailed prairie dog colonies, where they pirate kills from ferruginous hawks.

4.3.9.2 Mexican Spotted Owl

In Colorado, Mexican spotted owls are known to inhabit three habitat types: older coniferous forests with complex vertical structure, sparsely forested canyons, and slickrock canyons in the southwest. The Mexican spotted owl currently nests in two known locations in Colorado; however, adequate breeding habitat does not exist within the project area, and no known active nest sites occur within Douglas County.

4.3.9.3 Black-Footed Ferret

The black-footed ferret has co-evolved with the black-tailed prairie dog, and their ranges and habitats overlap closely in short and mid-grass prairie and semi-desert shrublands. Ferrets use black-tailed prairie dog towns as a source of food and shelter. They are currently known to exist in remnant-restored populations in Shirley Basin, Wyoming, and in captive breeding populations at various locations across the country. No known population exists within the project area or in Douglas County. A local rancher near the south end of the project area reported two sightings (May 1986 and July 1989). Both sightings were at least 1.6 kilometers (1 mile) from US 85 and unconfirmed. No documented occurrences of black-footed ferrets exist for Douglas County. Because the active black-tailed prairie dog colonies located within and adjacent to the APE are well below 32 hectares (80 acres), they do not fall within USFWS guidelines for areas requiring surveys for the black-footed ferret.

4.3.9.4 Preble's Meadow Jumping Mouse

The Preble's Meadow Jumping Mouse (PMJM), a subspecies of the meadow jumping mouse (*Zapus hudsonius*), is known to occur only in portions of Colorado and Wyoming in moist lowlands with dense vegetation. The PMJM appears to require at least two habitat components: open water and dense cover. Known habitats along the Colorado Front Range include riparian corridors with diverse vegetation including shrubs such as willows (*Salix* spp.), but also areas heavily influenced by man such as more sparsely vegetated irrigation and runoff ditch habitats. PMJM presence has been confirmed, through field surveys, within the I-25 APE along East Plum Creek in Castle Rock (Figure 4.7a and Figure 4.7b). For more detail, see the ***Preble's Meadow Jumping Mouse Biological Assessment for Interstate I-25/US 85 Environmental Impact Statement, Douglas County, Colorado***, October 2000.

4.3.9.5 Greenback Cutthroat Trout

The greenback cutthroat trout was originally found in mountain and foothill headwaters of the South Platte and Arkansas River drainages within Colorado and a small area of southeast Wyoming. Greenback cutthroat trout are not known to be present within the project area.

4.3.9.6 Pawnee Montane Skipper Butterfly

The Pawnee montane skipper butterfly occurs in Douglas County but only within South Platte Canyon, no further south than the Town of Deckers and not below 1,890 meters (6,200 feet).

4.3.9.7 Black-Tailed Prairie Dog

The black-tailed prairie dog exists in colonies in short grass or mixed prairie. They feed primarily on annual forbs, native grasses, and roots of forbs and grasses during late fall and winter. Eleven active black-tailed prairie dog colonies have been mapped within the APE along I-25. Two abandoned colonies were also noted within the APE along I-25. These colonies are long-abandoned and overgrown, and many of the burrows are filled in. Therefore, they are not considered active black-tailed prairie dog habitat. Fifteen black-tailed prairie dog colonies within the APE along US 85 have been mapped. Locations of black-tailed prairie dog colonies within the APE are depicted in Figure 4.7c and Figure 4.7d.

4.3.9.8 Mountain Plover

Nesting mountain plovers use short grass prairie grazed by black-tailed prairie dogs or cattle. Black-tailed prairie

dog colonies are considered a positive habitat image when conducting surveys for mountain plovers. Despite the presence of black-tailed prairie dog colonies, the likelihood of mountain plover occupancy within the project area is low. Mountain plover do not normally occur in western Douglas County. Additionally, the fragmented nature of the habitat makes occupancy unlikely.

4.3.9.9 Swift Fox

Swift fox typically inhabit flat grasslands, and their presence is documented in eastern Douglas County. The broken and shrubby nature of topography within the APE provides for marginal habitat for swift fox.

4.3.9.10 Lynx

The distribution of lynx is tied to boreal forest, generally above 2,400 meters (7,800 feet) in Colorado and Utah. Lynx populations in the southern Rocky Mountains occur at the periphery of the species' range in North America. Lynx in Colorado exist at low densities in fragmented distributions and are rare even within suitable habitat. No suitable lynx habitat exists within the project area; therefore, lynx presence is unlikely.

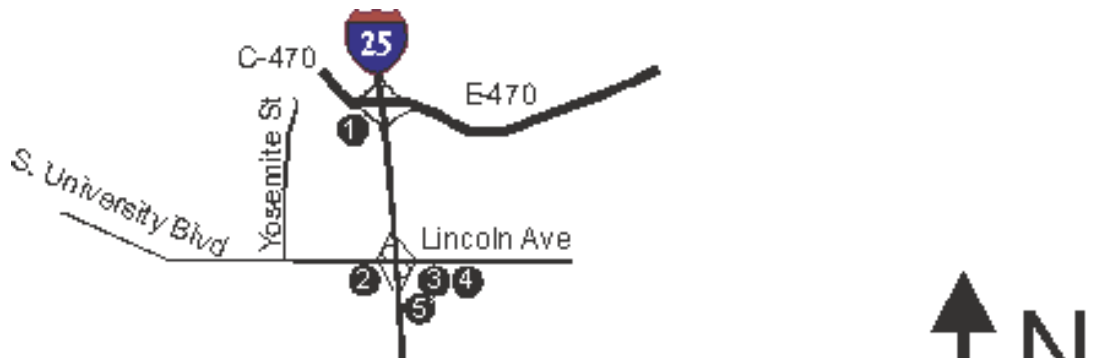
4.3.9.11 Wolverine

In addition to its federally sensitive and state endangered designations, the USFWS was recently petitioned to list the wolverine as threatened or endangered. Wolverines have one of the lowest densities of any carnivore, and their occurrence in Colorado has never been high. They have, however, been documented as far south as southern Colorado. Wolverines are generally restricted to sparsely populated wilderness areas in boreal forests, tundra, and similar habitats of the western mountains, where a year-round food supply is available. For these reasons, the probability of their occurrence within the APE (short grass prairie landscape) is low.

Figure 4.7a
I-25 Corridor Preble's Meadow Jumping Mouse Habitat

Figure 4.7b
I-25 Corridor Preble's Meadow Jumping Mouse Habitat

Figure 4.7c
Black-Tailed Prairie Dog Colonies along the I-25 Corridor



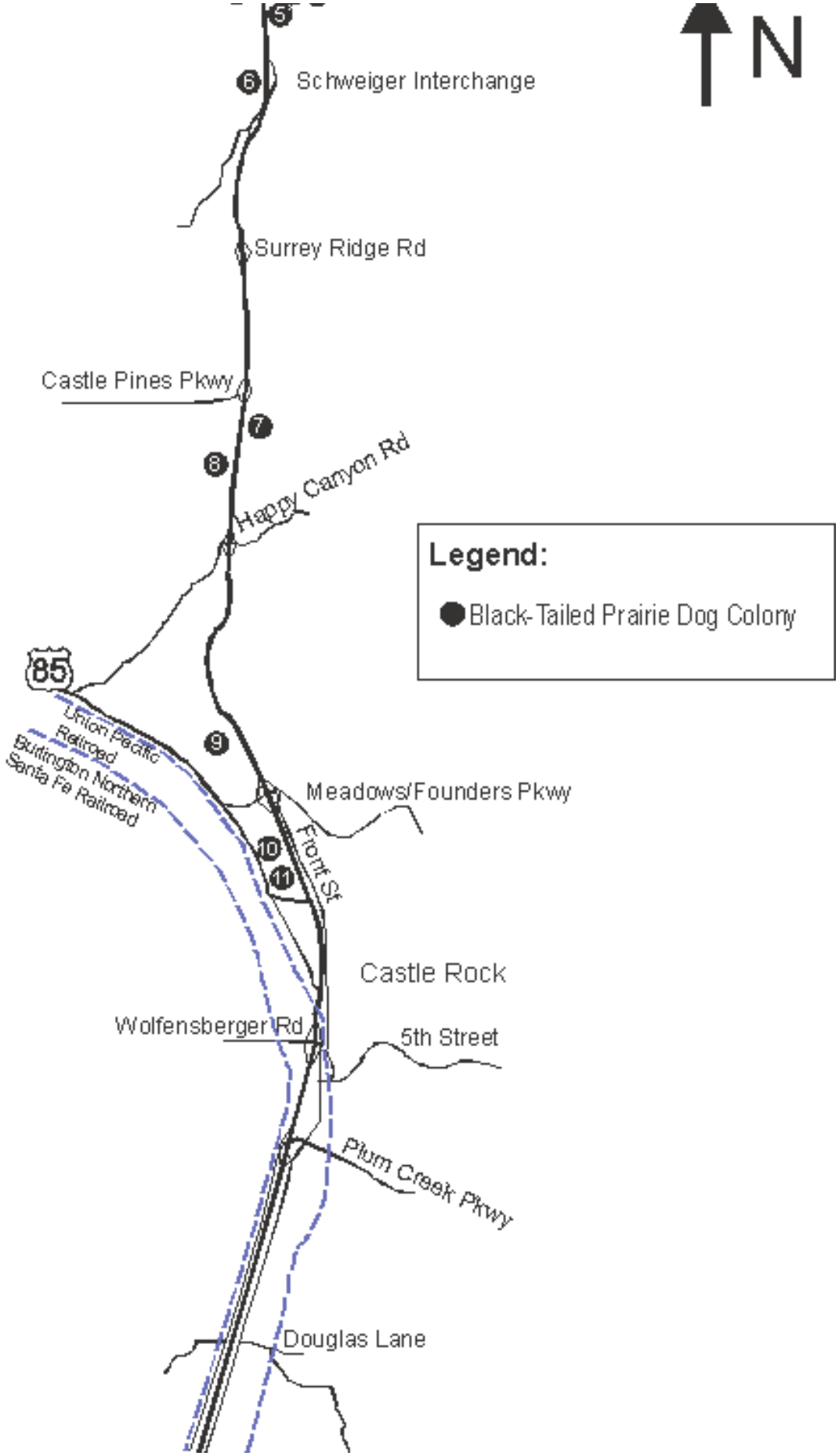
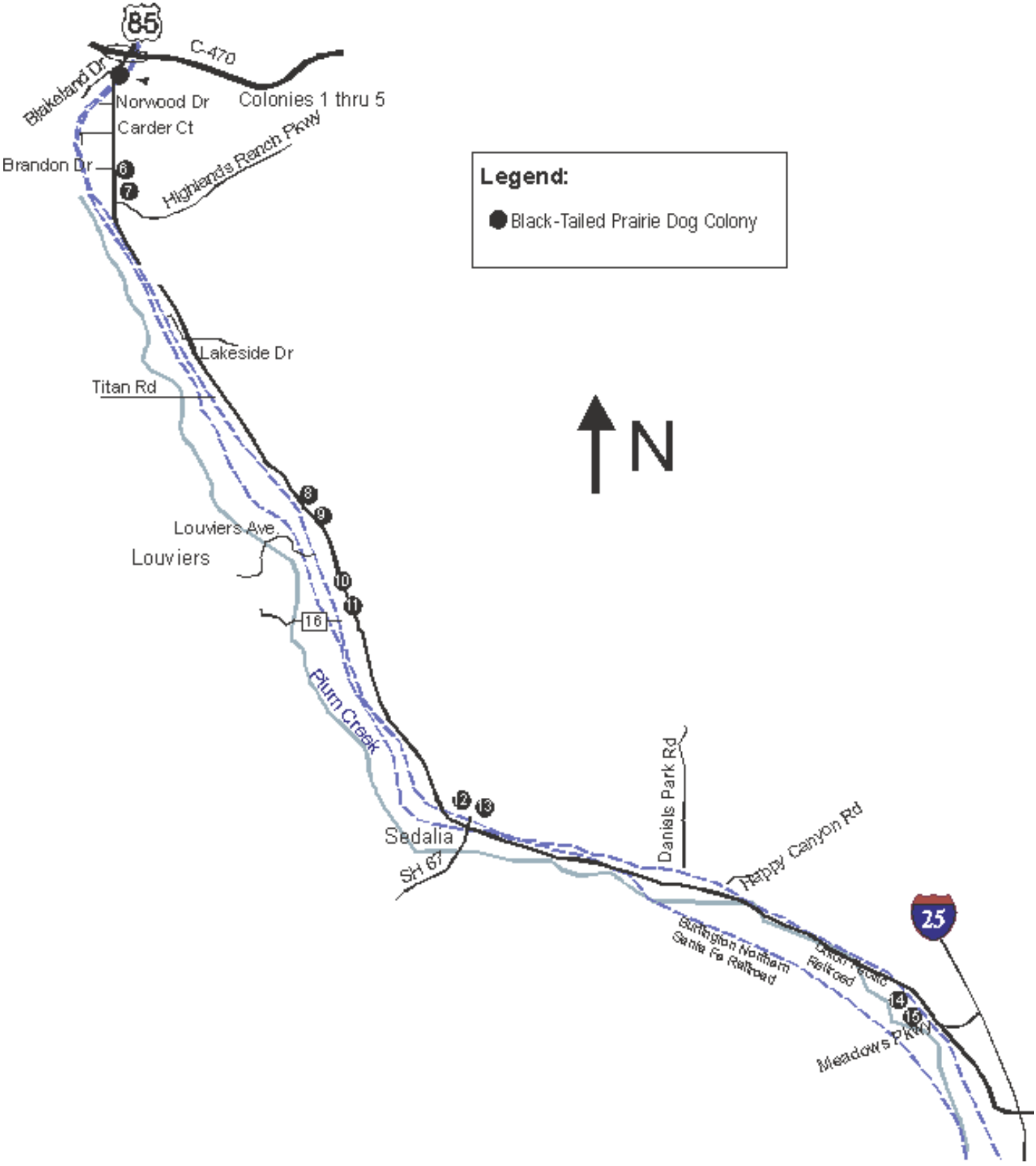

N
5
6
Schweiger Interchange
Surrey Ridge Rd
Castle Pines Pkwy
7
8
Happy Canyon Rd
Legend:
Black-Tailed Prairie Dog Colony
85
Union Pacific Railroad
Burlington Northern Santa Fe Railroad
9
Meadows/Founders Pkwy
10
11
Front St
Castle Rock
Wolfensberger Rd
5th Street
Plum Creek Pkwy
Douglas Lane

Figure 4.7d

Black-Tailed Prairie Dog Colonies along the US 85 Corridor



4.3.9.12 Plains Sharp-Tailed Grouse

The plains sharp-tailed grouse historically occurs in a narrow strip from El Paso County north to Larimer County within an area of short and mixed grass prairie containing abundant shrubs. Sharp-tailed grouse in Douglas County are the only remnants of this group surviving today. Douglas County sharp-tails use rolling hills interspersed with oak thickets and glades. Sharp-tailed grouse populations are only known to occur at three sites in Douglas County within the scope of the project area:

- Woodhouse State Wildlife Area
- Around Dakan Mountain Road
- Cherokee Ranch population (west of the Meadows Development)

None of these populations occur within the APE.

4.3.9.13 Burrowing Owls

Burrowing owls nest in rodent burrows within grasslands, shrublands, and deserts. Some populations also occupy habitat in grassy urban areas such as golf courses. Burrowing owls may prefer black-tailed prairie dog colonies using the burrows for shelter, mounds for perching, and cropped vegetation that affords an unobstructed view. When black-tailed prairie dog colonies become depopulated and vegetation starts growing higher, burrowing owls often abandon the burrows. A burrowing owl has been detected in a small black-tailed prairie dog colony in the northwest quadrant of the intersection of I-25 and C-470 adjacent to the project study area. Additional individuals may use black-tailed prairie dog colonies within the project area although none have been observed to date. Surveyors with the Colorado Breeding Bird Atlas Project confirmed one breeding occurrence of burrowing owls in northern Douglas County north of the APE.

4.3.9.14 Other Fish

Four species of fish listed as State of Colorado threatened or endangered potentially occur within the project area: the endangered northern redbelly dace, the threatened common shiner, the threatened brassy minnow, and the Iowa darter, which is listed as a species of concern. Plum Creek, immediately adjacent to the project area, is potential habitat for these four species. A documented occurrence of northern redbelly dace south of Sedalia in Plum Creek was made September 19, 1985. No occurrence has been documented since that time. The common shiner has been reported to occur in West Plum Creek, the brassy minnow in the South Platte River, and the Iowa darter in Plum Creek.

4.3.9.15 American Peregrine Falcon

Peregrine falcons nest on foothill and mountain cliffs from 1,370 meters (4,500 feet) to more than 2,740 meters (9,000 feet), often above pinyon/juniper or ponderosa pine forests. The project corridor does not contain nesting habitat, and the nearest known nesting peregrines are 24 kilometers (15 miles) southwest of Castle Rock and 26 kilometers (16 miles) west of Sedalia.

4.3.9.16 Ferruginous Hawk

Ferruginous hawks nest in large expanses of lightly grazed, short grass prairie, in trees or on the ground. Approximately 90 percent of their diet consists of medium-sized mammals (jackrabbits and cottontails west of the Continental Divide, and black-tailed prairie dogs and ground squirrels east of the Divide). Colorado's ferruginous hawks prey heavily on black-tailed prairie dogs, particularly in the winter. Ferruginous hawks have been observed within the project corridor on two occasions during field visits. Both observations occurred in the vicinity of the Castle Pines Parkway/I-25 Interchange.

4.3.9.17 Northern Leopard Frog

Water associated with ponds, streams, marshes, lakes, reservoirs, and beaver ponds, and that has rooted vegetation, is potential habitat for the northern leopard frog. On April 29, 1951, an occurrence was documented north of the project area in the vicinity of I-25/E-470 Interchange around Cottonwood Creek. During 1999, CDOW staff identified approximately 20 northern leopard frogs in a borrow ditch and along a small stream east of and adjacent to I-25 near MP 186.

4.3.9.18 Ute Ladies' Tresses Orchid

Wetlands and areas adjacent to wetlands (within the geographic range of the project area) are potential habitat for the federally threatened Ute ladies' tresses orchid. Surveys to detect presence of the Ute ladies' tresses orchid in the APE were negative. A letter dated January 12, 2000, was received from the USFWS concurring with these survey results and is included in Appendix of this FEIS.

4.3.9.19 Colorado Butterfly Plant

The Colorado butterfly plant within the project area was listed as threatened on October 18, 2000. Its known distribution is within Boulder, Douglas, Larimer, and Weld counties. However, the last documented occurrence within Douglas County was August 31, 1942. This plant typically inhabits sub-irrigated alluvial soils of drainage bottoms surrounded by mixed-grass prairie between elevations of 1,768 meters (5,800 feet) and 1,890 meters (6,200 feet). Surveys for Colorado butterfly plant within the project APE were negative. A letter dated January 12, 2000, was received from the USFWS concurring with these survey results and is included in the Appendix of this document.

4.3.10 Historical Resources

Historic resources are standing architectural and engineering features, such as buildings, bridges, roads, and railroads older than 50 years. Significant historic resources, as other cultural resources, are protected under Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended and Section 4(f) of the USDOT Act of 1966. Only significant historic resources warrant consideration with regard to adverse impacts resulting from a proposed action. Significant historic resources are either eligible for, or listed on, the National Register of Historic Places (NRHP). To be eligible for the NRHP, a resource must meet one or more of the criteria (as defined in 36 CFR 60.4) for inclusion on the NRHP.

NRHP-eligible resources are those:

- That are associated with events or have made a significant contribution to the broad patterns of our history

- That are associated with lives of persons significant in our past
- 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
- That have yielded, or may be likely to yield, information important in prehistory or history

Significant historic resources were identified through a records search at the Colorado Historical Society Office of Archaeology and Historic Preservation in Denver, a review of previous surveys in the area, and a complete inventory of historic resources in the project area. The most recent full-scale field investigations were concluded in August 1998. The methods and results of the literature review and surveys are detailed in ***Historic Resources Survey Interstate 25/State Highway 85 Douglas County, Colorado***, August 1998.

Eight significant resources exist within the project area. The project area includes the I-25 Corridor from C-470 to Castle Rock, including the CDOT ROW plus 60 meters (200 feet) on either side of the ROW, the US 85 Corridor from C-470 to Castle Rock, including the CDOT ROW plus 30 meters (100 feet) on either side of the ROW. Two resources are listed on the NRHP and six are eligible for the NRHP. Two of the six eligible resources are railroads that pass through both the I-25 Corridor and the US 85 Corridor.

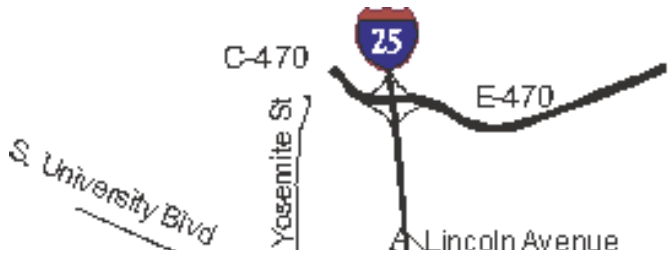
The State Historic Preservation Officer (SHPO) has concurred with the determinations of eligibility and effect on all resources recorded in association with this project.

For additional information on historic resources, see the ***Historic Resources Survey Interstate 25/State Highway 85 Douglas County, Colorado***, August 1998; and the ***Historic Resources Technical Report,*** May 2000, amended November 2000 and the ***Review of the Sugnet (1998) Technical Report: Historic Resources,*** March 1999, in the Technical Reports Volume of the South I-25 Corridor and US 85 Corridor FEIS.

4.3.10.1 I-25 Corridor Historical Resources

The I-25 Corridor from C-470 to Castle Rock was surveyed for historic resources between June and August 1998. Four significant historic resources exist within the I-25 Corridor. Three resources are eligible for the NRHP, and one is listed on the NRHP (Table 4.20). These include the Denver and Rio Grande (D&RG) Railroad Depot (5DA216), the Stewart Residence (5DA1258), and two linear resources: the D&RG Railroad (5DA921.1) and the Atchison, Topeka, and Santa Fe (AT&SF) Railway (5DA922 Segment #1 and Segment #3). The locations of these historic resources are shown on Figure 4.8a.

Figure 4.8a
Historic Resources along the I-25 Corridor



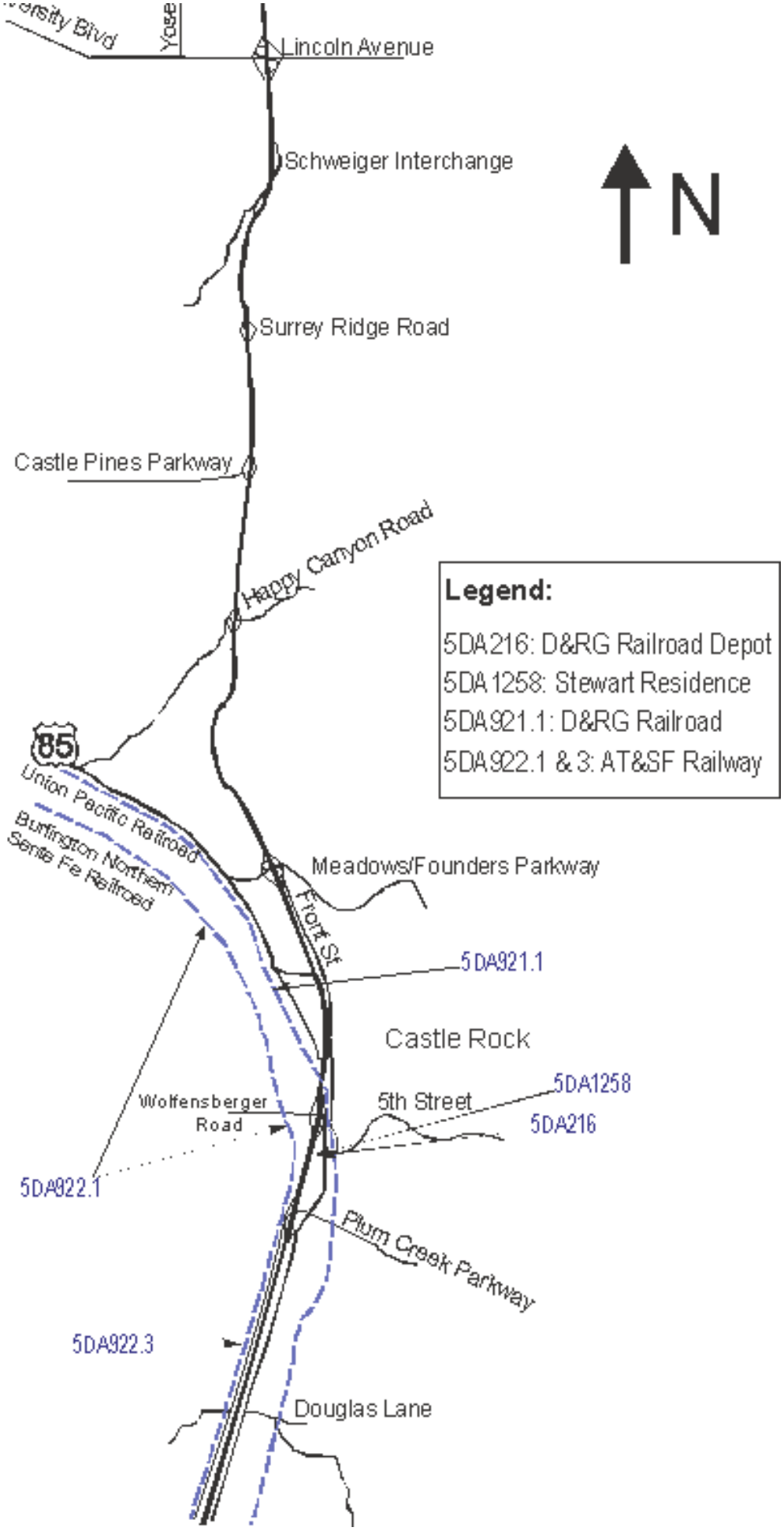

Lincoln Avenue
Schweiger Interchange
N
Surrey Ridge Road
Castle Pines Parkway
Happy Canyon Road
Legend:
5DA216: D&RG Railroad Depot
5DA1258: Stewart Residence
5DA921.1: D&RG Railroad
5DA922.1 & 3: AT&SF Railway
85
Union Pacific Railroad
Burlington Northern Santa Fe Railroad
Meadows/Founders Parkway
Front St
5DA921.1
Castle Rock
5DA1258
5th Street
5DA216
Wolfensberger Road
5DA922.1
Plum Creek Parkway
5DA922.3
Douglas Lane

Table 4.20
Significant Historic Resources within the I-25 Corridor

Site Number	Property Description	NRHP Status
5DA216	D&RG Railroad Depot	Listed
5DA1258	Stewart Residence	Eligible
5DA921.1	D&RG Railroad*	Eligible
5DA922.1 & 3	AT&SF Railway*	Eligible

Listed: Listed on the NRHP
Eligible: Officially eligible for the NRHP
**This resource passes through both the I-25 Corridor and US 85 Corridor.*

The Denver and Rio Grande Railroad Depot (5DA216)

The D&RG Railroad Depot is located at 420 Elbert Street. It was constructed of local rhyolite stone in 1875. The depot was moved to its present location in 1970 and was listed on the NRHP in 1974. The depot currently houses the Castle Rock Historical Society Museum.

Stewart Residence (5DA1258)

The Stewart Residence is located at 422 Elbert Street. The house is a one-and-one-half-story frame bungalow-style structure with a front gabled roof, overhanging eaves, asphalt shingle roofing, and a brick chimney with corbelled top. The upper exterior walls are clad with coursed shingles; the lower walls are clad with narrow lap siding. This house is significant as one of the best-preserved examples of early 20th century bungalow-style construction in Castle Rock.

Denver and Rio Grande Railroad (5DA921.1)

The D&RG Railroad, currently operating as the Union Pacific Railroad, runs parallel to the south side of most of the project area. It follows Plum Creek for the majority of its length between Douglas County's northern boundary and Castle Rock. It is a standard gauge rail constructed of steel and timber with concrete and timber bridges. The standard gauge rail replaced the original narrow gauge rail in 1881. Until 1881, the D&RG Railroad held a monopoly on the lucrative trade between Colorado Springs and Denver when the railroad agreed to share its line with the AT&SF Railway. Over the years, the railroad contributed greatly to the growth of Douglas County ranching, as well as merchandising, lumbering, and coal mining. The D&RG Railroad remains in operation today and retains much of its original alignment throughout the Plum Creek Valley. This property is eligible for the NRHP because of its connection to the early transportation and development of the area, and it maintains integrity of design.

Atchison, Topeka, and Santa Fe Railway (5DA922.1 and 5DA922.3)

AT&SF Railway, currently operating as the Burlington Northern Santa Fe Railroad, runs parallel to the south side of most of the project area. It is a standard gauge rail constructed of steel track on wooden ties set in rock ballasts. The grade is about 1.2 meters (4 feet) high and 7.6 meters (25 feet) across. This

segment, built in 1887, is a significant portion of the AT&SF Railway Company line into Denver from Colorado Springs and Pueblo. The AT&SF Railway's entry into the Colorado market enhanced the state's transportation as well as its accessibility to the rest of the nation. It also provided competition to other lines. This segment of the railway is significant because it follows the original ROW and maintains integrity of design. It is officially eligible for the NRHP because of its connection to the early transportation and development of the area.

4.3.10.2 US 85 Corridor Historical Resources

The US 85 Corridor was surveyed for historic resources between June and August 1998. Five significant historic resources and one historic district exist within this corridor (Table 4.21). The five resources are eligible for the NRHP, and the historic district is listed on the NRHP. The locations of these historic resources are shown on Figure 4.8b.

Table 4.21
Significant Historic Resources within the US 85 Corridor

Site Number	Property Description	NRHP Status
5DA600	High Line Canal	Eligible
5DA914	Residence – Cook Ranch	Eligible
5DA708	Cherokee Ranch Historic District	Listed
5DA921.1	D&RG Railroad*	Eligible
5DA922.1	AT&SF Railway*	Eligible
5DA1385	Sedalia Water Tank	Eligible

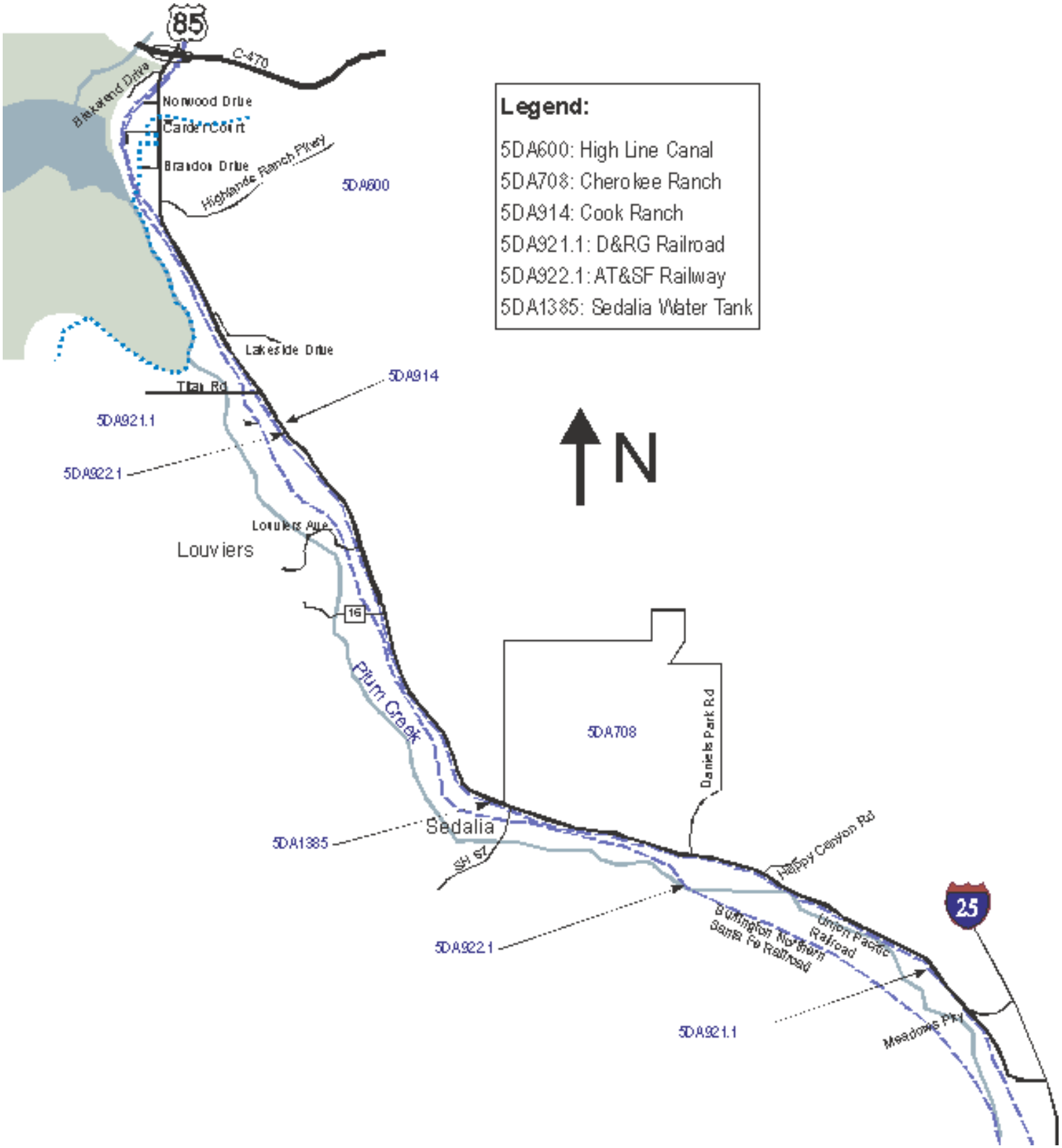
Listed: Listed on the NRHP
Eligible: Eligible for the NRHP
** This resource passes through both the I-25 Corridor and US 85 Corridor.*

The following descriptions discuss NRHP-eligible or listed properties within the US 85 project area. The D&RG Railroad and the AT&SF Railway are located in both the I-25 Corridor and the US 85 Corridor and are described in Section 4.3.10.1, *I-25 Corridor Historical/Cultural Resources*.

High Line Canal (5DA600)

The High Line Canal crosses beneath US 85 at Blakeland approximately 1.2 kilometers (0.7 mile) south of the Arapahoe/Douglas County line, and again enters the APE 0.9 kilometer (0.6 mile) south of that point. The Northern Colorado Irrigation Company constructed the canal between 1879 and 1883. It flows approximately 113 kilometers (70.2 miles) from the South Platte River northeast to Second Creek. The Denver Water Board has owned and operated the property since 1924. The canal is eligible for the NRHP because of its association with agricultural and urban uses of water and irrigation and with the early settlement and development of Denver. The segment within the APE where the High Line Canal crosses beneath US 85 is a non-contributing segment of the canal.

Figure 4.8b
Historic Resources along the US 85 Corridor



Cook Ranch (5DA914)

According to local history sources, the Cook Ranch property served as an important stage stop along the First Territorial Road in the 1860s. However, the existing house, which belonged to Cook's daughter, was constructed

circa 1885. During the 1890s, the ranch became a popular resting place for bicyclists traveling between Denver and Palmer Lake. The house is considered eligible for the NRHP because of its architectural significance. The house is a good representation of a late 19th century farmhouse with a vernacular frame and Queen Anne details. It is particularly unusual because of the random-coursed ashlar stonework on the first story, and the use of vertical board and batten siding.

Sedalia Water Tank (5DA1385)

The Sedalia water tank is located between the AT&SF railroad tracks and US 85, and approximately 245 meters (800 feet) northwest of the intersection of SH 67 and US 85. The tank, built circa 1890 by the AT&SF Railway, is a cylindrical, steel water tank composed of sections of steel joined together. The tank is about 11 meters (36 feet) high and 5 to 5.5 meters (16 to 18 feet) in diameter with a capacity of 530,000 liters (140,000 gallons). The north side of the tank (facing US 85) bears the following information: "SEDALIA" and "ELEV. 5,835." This structure is considered eligible for the NRHP because of its connection to the historic themes of transportation and engineering. It is one of the last surviving steel water tanks in Colorado.

Cherokee Ranch Historic District (5DA708)

Cherokee Ranch Historic District includes approximately 1,330 hectares (3,280 acres). The district borders US 85 for approximately 3.2 kilometers (2.0 mile) east of Sedalia. It was listed on the NRHP in 1994 because of its significant association with local exploration and settlement of the area, as well as the property's wide variety of construction types, periods, and methods. Twenty-six contributing and 10 non-contributing resources are within the historic district. Of the 26 contributing resources, two exist within the APE. One resource is a decorative stone and wrought iron gate at the ranch entrance in Sedalia. Burnam Hoyt, the castle architect, designed the gate between 1925 and 1926. It consists of two stone piers on either side of Rattlesnake Road connected to a stone wall. Two metal poles support a sign bearing the name "Cherokee Ranch." A ponderosa pine is planted on each side of the gate. The other contributing resource is Rattlesnake Road. Built by Elmer Blunt and his son Ray in 1924, it is the original road leading into the ranch. The road has never been paved and is no longer in use.

4.3.11 Archaeological Resources

The Colorado Piedmont and foothills region contains archaeological remains indicating nearly continuous occupation by Native American groups for more than 12,000 years. In accordance with federal laws and regulations, a records search of the I-25 Corridor and US 85 Corridor was conducted through the Colorado Office of Archaeology and Historic Preservation to identify previously recorded archaeological localities, and an intensive survey along I-25 was completed soon thereafter. The US 85 Corridor was inventoried in 1990 under the auspices of an earlier CDOT action. The survey results were revisited in 1999.

As mandated by Section 106 of the National Historic Preservation Act (as amended) and the revised Advisory Council on Historic Preservation regulations (36 CFR 800), seven federally recognized Native American tribes with an established interest in Douglas County, Colorado have been notified of the project and invited to initiate cultural resource consultation, at their discretion. Consultation with an Indian tribe recognizes the government-to-government relationship between the Federal Government and tribal groups, and Federal agencies are sensitive to the fact that historic properties of traditional religious and cultural significance may be located on ancestral, aboriginal, or ceded lands beyond reservation boundaries. None of the tribes has expressed an interest in the consultation process for this undertaking. However, tribal entities may choose to enter the consultation process at

any time. FHWA and CDOT have fulfilled their initial legal obligations by contacting the appropriate Native American tribes; the opportunity for consultation by the Indian community will continue until such time as it is determined that any issues of concern have been addressed to the satisfaction of FHWA and the pertinent tribe(s).

Full documentation of archaeological resources is included in the following reports in the Technical Reports Volume of the ***South I-25 Corridor and US 85 Corridor FEIS***: ***Cultural Resources Management Report,*** January 1999***; An Intensive Archaeological Resources Survey Along Interstate 25 and US Highway 85 In Arapahoe and Douglas Counties, Colorado,*** December 1999; and ***Survey Report Addendum for Colorado Department of Transportation Project IM 0252-317, Lincoln Avenue to South Castle Rock (I-25 Frontage Road and Interchange Development),*** April 2000.

4.3.11.1 I-25 Corridor Archaeological Resources

The area of potential effect (APE) to archaeological remains along I-25 was generally considered to be the existing CDOT ROW and a corridor extending 60 meters (200 feet) beyond the ROW on both the east and west sides of the highway. The survey area was expanded in areas where the proposed frontage road alignment extends beyond the 60-meter (200-foot) limit, and/or where interchange modifications or new interchanges are planned. Eight prehistoric sites and 19 isolated finds were identified, recorded, and evaluated for significance according to criteria established for the NRHP. In consultation with SHPO, three sites may meet the criteria for NRHP listing. These localities will be avoided during construction so testing is not appropriate. Depending upon the final alignment, however, if avoidance is not feasible subsurface testing to determine whether buried deposits are present will be necessary to determine eligibility. The remaining sites and isolated finds are considered to lack characteristics that would make them eligible for the NRHP, and no further actions are required.

4.3.11.2 US 85 Corridor Archaeological Resources

The area of potential direct impacts to archaeological sites along US 85 involved an area 150 meters (490 feet) east and 60 meters (200 feet) west of the present highway alignment. Eleven prehistoric sites and nine isolated finds were identified during field investigations. Ten sites and the isolated finds failed to meet the criteria for listing on the NRHP. In consultation with the SHPO, one site may meet the criteria for listing on the NRHP. Preservation in place is likely possible, so testing has been indefinitely postponed until final alignment is selected. If avoidance is not feasible, further consultation with the tribes and testing of the site will be necessary prior to re-initiating consultation with the SHPO to establish site eligibility. If a NR eligible site would be impacted by construction, FHWA and CDOT will consult with the SHPO and ACHP to reach a memorandum of agreement on the appropriate resolution of impacts. Such an agreement would be carried out in full prior to any construction activities on the site.

The site recommendations have been formulated in consultation with the SHPO.

4.3.12 Paleontological Resources

Paleontological Resources compliance is mandated by the Colorado Historical, Prehistorical, and Archaeological Resources Act of 1973. Paleontological surveys were completed in the summer of 1997 and June 1998. A literature survey was conducted to evaluate the potential for scientifically substantial paleontological resources included within the geologic units of the study area. In addition, the fossil databases of the University of Colorado Museum (UCM) and the Denver Museum of Nature and Science (DMNS), which are both state and federally

recognized repositories for paleontological resources, were searched to determine whether fossils had been previously found within the study corridor. The field work was conducted by completing a drive through reconnaissance of the entire study area while looking at road cuts. More detailed investigations were conducted by hiking and visually inspecting the relevant road cuts on foot.

The lithology throughout the majority of the I-25 and US 85 study area is Denver Formation and Dawson Arkose. In the area between Denver, Colorado Springs, and Limon, the Denver Formation has produced Late Cretaceous leaves and dinosaur bones as well as early Paleocene leaves and mammal, reptile, and amphibian bones and teeth. Only two invertebrate fossil occurrences in the Denver Formation have been documented. Fossils are very rare in the Dawson Arkose. Known Dawson Arkose fossil localities include approximately five fossil leaf localities, and one identifiable vertebrate fossil locality, which produced a single mammal tooth.

Full documentation of paleontological resources is included in the following reports in the Technical Reports Volume of the ***South I-25 Corridor and US 85 Corridor FEIS***: ***CDOT Project #IM 0252-0317 Paleontological Survey of the I-25 Improvement Options Between Castle Pines and Lincoln Avenue and the Extended Burlington Northern Railroad Project Area,*** April 2000 and ***Paleontologic Resources Along the Southeast Interstate Corridor, Arapahoe and Douglas Counties, Colorado,*** February 1999.

4.3.12.1 I-25 Corridor Paleontological Resources

Six sites were found along the I-25 Corridor: DMNS 916, 917, 1200, 2134, 2135, and "new" site. Sites 917, 1200, 2134, and "new" are in the Denver Formations; sites 916 and 2135 are in the Dawson Arkose. The weathered remnants of several episodes of fossil quarrying by DMNS parties were observed at site 1200. This site is a very rare, possibly unique, leaf fossil locality that has produced specimens of more than 120 fossil plant species from a time period when the typical flora in western North America consisted of 8 to 10 species. This locality preserves a record of a very unusual, perhaps unique, paleoenvironment heretofore unknown from western North America from the time period represented by Denver Formation sediments. Other leaf fossil localities of this age and with similar broad species diversity may exist in the area between Denver and Colorado Springs, but further research into the nature of those localities is required before DMNS 1200 could even be considered only rare, rather than unique. Very faint, almost unnoticeable, leaf impressions were observed at site 2135. This site was ultimately determined not scientifically significant and was destroyed during construction of the CDOT I-25 Climbing Lanes Phase I Early-Action project. Mitigation plans for salvage excavation of and onsite monitoring of construction affects to sites 916, 917, and 2134 were completed. Several previously unrecorded fossil localities were discovered and excavated adjacent to site 2134 during construction. The "new" site probably was one of these excavated sites. Completed mitigation efforts may remove any future need to monitor or mitigate impact to fossils within the corridor recently impacted by construction of the CDOT I-25 Climbing Lanes Phase I Early-Action project.

4.3.12.2 US 85 Corridor Paleontological Resources

One site, UCM 92164, which lies in Denver Formation lithology, has been identified along the US 85 Corridor. UCM 92164 has been partially excavated previously, but collections made to date are small and most likely do not include a statistically valid representative sample of the preserved paleoflora. Previous excavation has produced suggestions of a paleoflora that may be as rare or unique as fossil locality DMNS 1200 (previously described) and possibly younger in age.

4.3.13 Prime and Unique Farmlands

US Congressional Public Law 95-87 (Federal Register January 31, 1978: Part 657) requires the US Department of Agriculture, Natural Resources Conservation Service (NRCS) to identify and locate prime and unique farmland. These farmlands are protected in accordance with the Farmland Protection Act of 1981.

Prime farmlands are considered to be of national importance and have been defined as being land with the best combination of physical and chemical characteristics for producing feed, forage, fiber, and oilseed crops, and are available for these uses. No prime farmland exists within the project area. Unique farmland is land other than prime farmland that is used for the production of specific, high-value crops. No unique farmland exists within the project area as determined by the NRCS.

In addition to the prime and unique lands, the farmland program encourages the identification of farmland of statewide and local importance. Farmlands of statewide importance fall into three categories:

- Irrigated lands (not Prime)
- Irrigated Land (water supply inadequate)
- High Potential Dry Cropland

Comparison of the ***Soil Survey of Castle Rock Area, Colorado***, with the ***Important Farmland Inventory – Colorado***, identified two farmland soils of statewide importance within the APE (Table 4.22). These soils occur as pockets scattered throughout each transportation corridor. Within the US 85 APE, statewide important soil types occur generally south of Titan Road and north of Louviers, and between Sedalia and Daniels Park Road. Within the I-25 APE, statewide important soil types occur generally just north of the Meadows/Founders Parkway Interchange, and just south of the US 85/I-25 Interchange. Using soil survey maps, and in consultation with the Natural Resource Conservation Service District Conservationist, areas were estimated for the two soil types (Table 4.22). Due to the scale and level of precision associated with soil mapping, area estimates are considered approximate.

Table 4.22
Estimated Area of Farmland Soils of Statewide Importance within the I-25/US 85 Area of Potential Effect

Statewide Important Soil Type	I-25 Hectares (Acres)	US 85 Hectares (Acres)
Bresser sandy loam (BrB) (1-3 percent slopes)	8 (19.8)	5.7 (14)
Sampson sandy loam (Sa)	0.1 (0.25)	31.2 (77)
Total	8.1 (20)	36.9 (91)

For additional information on prime and unique farmlands, see the ***Farmland Technical Report,*** May 2000, amended November 2000, in the Technical Reports Volume of the ***South I-25 Corridor and US 85 Corridor FEIS.***

4.3.14 Noise

Based on land use, the Federal Highway Administration (FHWA) and CDOT have established guidelines defining Noise Abatement Criteria (NAC) for maximum acceptable traffic noise levels (Table 4.23). These levels represent a balance between a desirable noise level and an achievable noise level. Noise levels are measured in decibels (dB) on the "A" weighted scale (dBA). This scale most closely approximates the response characteristics of the human ear for low-level sound. Noise levels are reported in Leq (h), which describes the average noise energy level over one hour. The FHWA endorses Leq (h) as the acceptable noise descriptor used on highway transportation projects. An impact is noted when the predicted noise level approaches or exceeds the acceptable NAC for that land use (67 dBA for residences and 72 dBA for businesses) or when there is an increase of 10 or more dBA from roadway improvements. Colorado regulations further define an impact at an "approaching" level of 1 dBA below the NAC. An increase of 10 dBA is perceived as a doubling of the noise level, whereas a doubling of traffic will generally cause a 3-dBA increase in noise. Section 5.3.3.14, *Noise Impacts*, describes existing and year 2020 noise levels within the study corridor.

Along I-25 are six existing noise barriers as described below and as shown on Figure 5.7d and Figure 5.7f in Section 5.3.3.14, *Noise Impacts*.

- Two overlapping noise walls, 5.0 meters (16.5 feet) high, are located on the east side of I-25 north of the Meadows/Founders Parkway Interchange and were constructed as part of the Meadows/Founders Interchange project

- A berm, varying in height up to 3.5 meters (11.5 feet), is located on the west side of I-25 south of the Happy Canyon Interchange (Castle Pines Village area) and was constructed as part of the Castle Pines Village development

- A berm, varying in height up to 4.2 meters (14.0 feet), is located on the west side of I-25 north of the Surrey Ridge Road Interchange and was constructed as part of the Climbing Lanes Phase I project

- A berm, varying in height up to 4.2 meters (14.0 feet), is located on the west side of I-25 south of the Surrey Ridge Road Interchange and was constructed as part of the Climbing Lanes Phase I project

- A noise wall, 4.2 meters (14.0 feet) high, is located on the west side of I-25 north of the Castle Pines Parkway Interchange and was constructed as part of the Climbing Lanes Phase I project

Table 4.23
Noise Abatement Criteria

Activity Category	Acceptable Levels (Leq(h))	Description of Activity Category
A	57 (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 area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreational areas, hospitals, residences, playgrounds, active sports areas, parks, motels, hotels, schools, churches, and libraries.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B.
D	--	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: Federal Register, Volume 47, No. 131, July 8, 1982, Rules and Regulations
Exterior: Noise levels measured from outside
Interior: Noise levels measured from inside

Climbing Lanes Phase II, an Early-Action project, has recommended and designed noise barriers that will be constructed within the project area. A 4.2-meter (14.0-foot) berm on the east side of I-25 south of Happy Canyon Road and a 4.2-meter (14.0-foot) berm on the east side of I-25 across from the existing Castle Pines Village berm are both currently recommended for construction under the Climbing Lanes Phase II project. A third berm of 4.2 meters (14.0 feet) will most likely be constructed as part of the Climbing Lanes Phase II project. The barrier will extend the existing Castle Pines Village berm both north and south. These barriers are included in the No-Action Alternative, the Preferred Alternative, and the Other Alternative. The Climbing Lanes Phase II Early-Action noise barriers are shown on Figure 5.7e and Figure 5.7f in Chapter 5.0, *Environmental Consequences.*

Full documentation of noise is included in the ***South I-25 Corridor and US 85 Corridor FEIS Traffic Noise Analysis***, November 2000.

4.3.15 Visual Character

Visual quality is a subjective judgment. It is important in an objective analysis to apply a systematic process to minimize personal bias. This is achieved by determining significant viewpoints in the project area, determining existing conditions of visual elements, and comparing those to resulting conditions with various alternatives. The elements of visual quality include line, form, color, and texture. The location of an alternative within a particular view (foreground, middleground, and background) is also important.

For additional information on visual character, see the ***Visual Resource Technical Memorandum South I-25 Corridor and US 85 Corridor,*** May 2000, amended November 2000, in the Technical Reports Volume of the ***South I-25 Corridor and US 85 Corridor FEIS.***

4.3.15.1 I-25 Corridor Visual Character

Traveler's View

From the traveler's point of view, the existing visual landscape along the I-25 Corridor between C-470 to south of the Town of Castle Rock consists of three distinct areas.

Northern Area

The northern area, from approximately C-470 to Schweiger (Exit 191), is gently rolling landscape framed by a major bluff line to the south (Figure 4.9a). The view to the east is down to the Cherry Creek flood plain with the Town of Parker in the background. To the west are steeper bluffs and new suburban residential development in Lone Tree and Highlands Ranch. Commercial office development is limited to the north of Lincoln Avenue with the Meridian Development to the east and a few office buildings to the west in the Heritage Hills development. The natural landscape is predominantly short grassland prairie with trees limited to the draws. The background of the western view is dominated by front range mountain peaks and hogbacks.

Central Area

The central area, from approximately Schweiger (Exit 191) through Happy Canyon Road, consists of steeper bluffs that restrict distant views to either side of I-25. Between Castle Pines Parkway and Happy Canyon Road, the viewshed opens to the south with a spectacular view of Pikes Peak framed by the adjacent bluffs (Figure 4.9b). The surrounding landscape includes suburban low-density development between Surrey Ridge Road and Castle Pines Parkway. There are no commercial buildings near I-25. The vegetation transitions from the low grassland prairie to the north to evergreen forest between Castle Pines Parkway and Happy Canyon Road. Low-density residential development to the south of Happy Canyon Road is screened from I-25 by evergreen trees.

Southern Area

Along the southern area, from Happy Canyon Road to south of the Town of Castle Rock, I-25 descends from the bluff-top area to the Plum Creek floodway. The views of Pikes Peak to the south continue, obstructed only in part by the namesake bluff of Castle Rock (Figure 4.9c).

The rural-to low-density residential development transitions into the small urban environment of the Town of Castle Rock.

Figure 4.9a
I-25 Visual Resources - Lincoln Avenue Interchange (facing south)

Figure 4.9b
I-25 Visual Resources – View of Pikes Peak from Happy Canyon (facing south)

Figure 4.9c
I-25 Visual Resources – View of the Rock, Castle Rock (facing south)

The I-25 alignment is depressed below the adjacent landscape between the Meadows/Founders Parkway and Plum Creek Interchange following the Plum Creek floodplain. The factory stores development and the Douglas County Justice Center dominate the immediate foreground west of I-25 at the Meadows/Founders Parkway Interchange. Restaurant and service station buildings are to the west of the Wolfensberger Road Interchange, with high mast signs being the predominant visual interest.

To the south of Wolfensberger Road, the historic homes and buildings along Elbert Street and Jerry Street are visible from I-25. To the west, Plum Creek is adjacent to I-25, providing a respite from the clutter of commercial development to the north. South of the Plum Creek Interchange, I-25 returns to a rural setting with short grasslands and very low-density residential development among the buttes and mesas. The Burlington Northern Santa Fe Railroad is in close proximity to I-25, with mile-long coal trains often obstructing views of the area.

Adjacent Property Views

Adjacent properties in the area offer only limited views of the I-25 Corridor. As described above, I-25 is generally in-cut. The residential properties between Surrey Ridge Road and Happy Canyon Road are further prevented from viewing I-25 by evergreen trees. Sound mitigation measures recently constructed in this area, including noise walls and noise berms, further restrict views of I-25. Through the Town of Castle Rock, I-25 is visible from all adjacent properties, but it does not obstruct distant views of the Rampart Range or to the east.

4.3.15.2 US 85 Corridor Visual Character

The US 85 Corridor begins at the C-470 Interchange and proceeds southeast to Meadows Parkway. US 85 is one of the original federal interstate highways and becomes identified as Santa Fe Drive in the Denver metropolitan area. Santa Fe Drive has historically been a major transportation route and a major commercial and industrial route. Supported by the railroad lines and US 85, the project area developed as an industrial area, predominately from C-470 to Louviers. Most of the industrial and commercial development occurs on the west side of the highway. Residential development adjacent to the highway is older and of historic significance. The northern 2

miles of the corridor are more recent commercial and residential development on both sides of the highway (Figure 4.9d).

US 85 parallels Plum Creek, and is the dividing line for most of the corridor between the rising hilly terrain on the east side of the highway and the Plum Creek Valley on the west. The viewsheds are predominately to the west; however, the views from US 85 between Sedalia and Meadows Parkway are open on both sides of the highway (Figure 4.9e). There are views of the Pikes Peak Forest and mountain ranges to the Plum Creek Valley. North of the Cherokee Ranch/Sedalia area on the east side, the views are minimal with terrain constraints. The views on the east side from Sedalia to Meadows Parkway range from evergreen tree areas to open views at the Cherokee Ranch, with pastureland and the steep rising peaks beyond. The east side of the roadway from Sedalia to Meadows Parkway is being planned and or developed commercially and residentially to Daniels Park Road at the beginning of the Cherokee Ranch.

Figure 4.9d
US 85 Visual Resources – Approaching C-470 Interchange (facing north)

Figure 4.9e
US 85 Visual Resources – Sedalia Intersection (facing north)

Figure 4.9f
US 85 Visual Resources – Railroad Tracks (facing north)

The Burlington Northern Santa Fe Railroad and Union Pacific Railroad closely parallel US 85 through almost the entire corridor (Figure 4.9f). The view of the valley and the mountain range to the west, through the corridor, is intermittently affected by railroad track beds and residential and business development near the highway. Approximately 0.8 kilometer (0.5 mile) of US 85 beginning at Meadows Parkway is a large commercial center. On the west side is the Meadows, a large housing development. The view is open to the west and the mountain range. The setting in this area is urban.

Douglas County, in its Master Plans, has planned for and is accumulating open space east of US 85 from Daniels Park Road to the north. These open space areas are not within the viewshed of US 85.

4.3.16 Hazardous Waste Sites

Hazardous waste includes contaminants such as pesticides, petroleum products, heavy metals, and organic compounds. Hazardous waste sites are primarily regulated by the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

In accordance with FHWA and CDOT guidance, the potential for highway projects impacting hazardous waste must be evaluated. A Modified Environmental Site Assessment (MESA) is first prepared, which includes conducting a records search and a visual inspection of the project area. If potential hazardous waste sites are located from the MESA and can not be avoided, a site investigation/site assessment is required to determine the type and extent of contamination. The following steps were followed in the MESA:

- Communicated with property and business owners.
- Reviewed available state and federal environmental databases such as the RCRA list for Colorado, the EPA Superfund National Priorities List, and the CERCLA list.
- Reviewed files from the following sources: CDPHE, Colorado Department of Labor and Employment Oil Inspection Section, and the Tri-County Health Department. Also reviewed the list of underground storage tanks in Colorado.
- Reviewed aerial photographs of the study corridor.
- Reviewed historic maps of the study corridor.

Full documentation of potential hazardous waste sites is included in the ***Phase I Environmental Site Assessment: I-25 Corridor; Lincoln Avenue to Castle Rock,*** January 1999, and in the ***Modified Phase I Environmental Site Assessment: State Highway 85 Corridor; C-470 to I-25,*** July 1999.

4.3.16.1 I-25 Corridor Hazardous Waste Sites

Seventeen recognized hazardous waste sites have been identified along the I-25 Corridor (Figure 4.10a). The recognized environmental conditions along I-25 include nine bridges; one landfill; four leaking underground storage tank (LUST) sites; a wastewater pond; a spill site; and a CDOT maintenance facility.

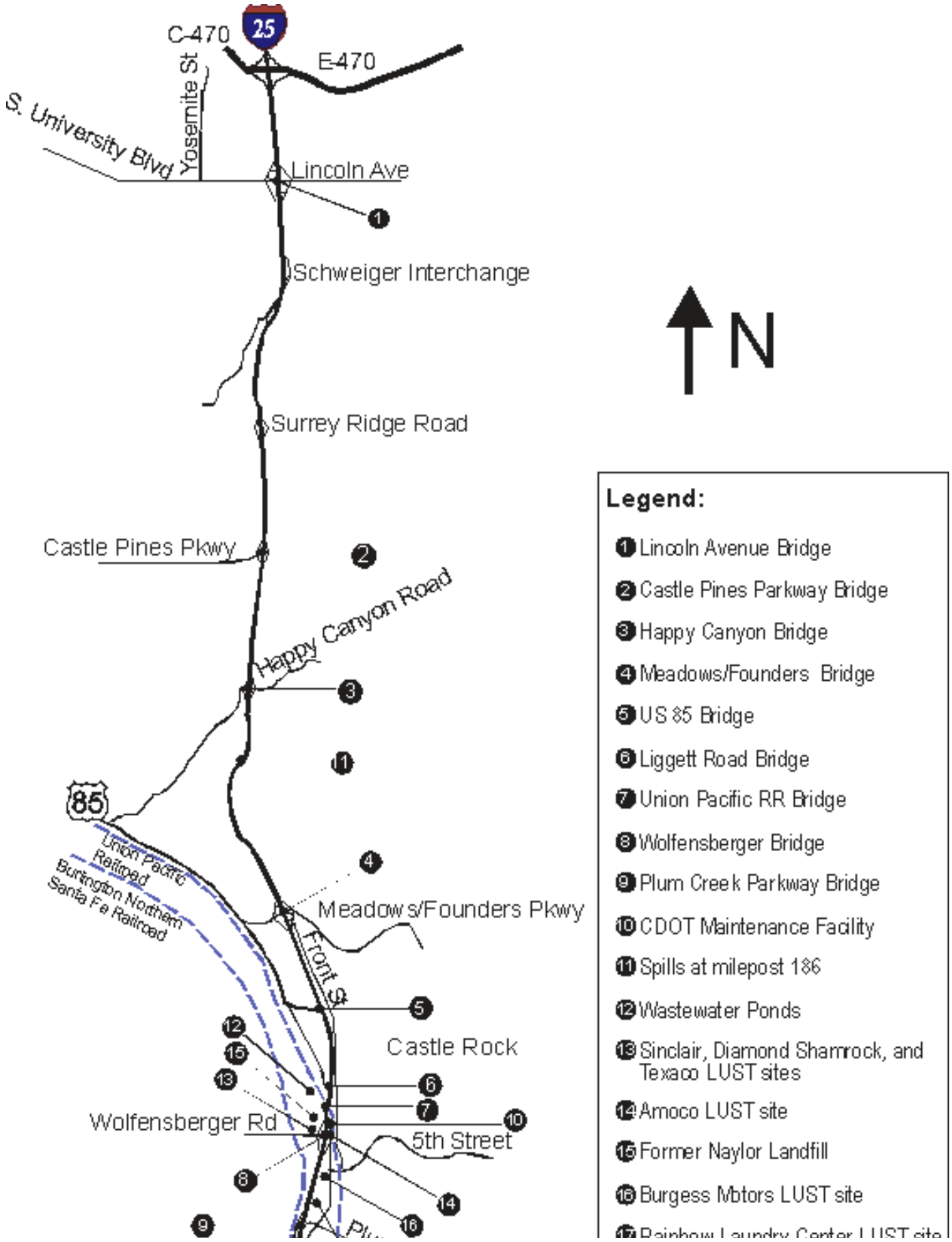
Nineteen potential hazardous waste sites were located within the study area (Figure 4.10b). These sites of potential concern could be within future highway construction zones.

4.3.16.2 US 85 Corridor Hazardous Waste Sites

Eight recognized hazardous waste sites have been identified along the US 85 Corridor (Figure 4.10c). The recognized environmental conditions along US 85 include two landfill sites, two bridges, and four LUST sites.

Fifty-one potential hazardous waste sites were located within the study area (Figure 4.10d). These sites of potential concern could be within future highway construction zones.

Figure 4.10a
Recognized Hazardous Waste Sites
along the I-25 Corridor



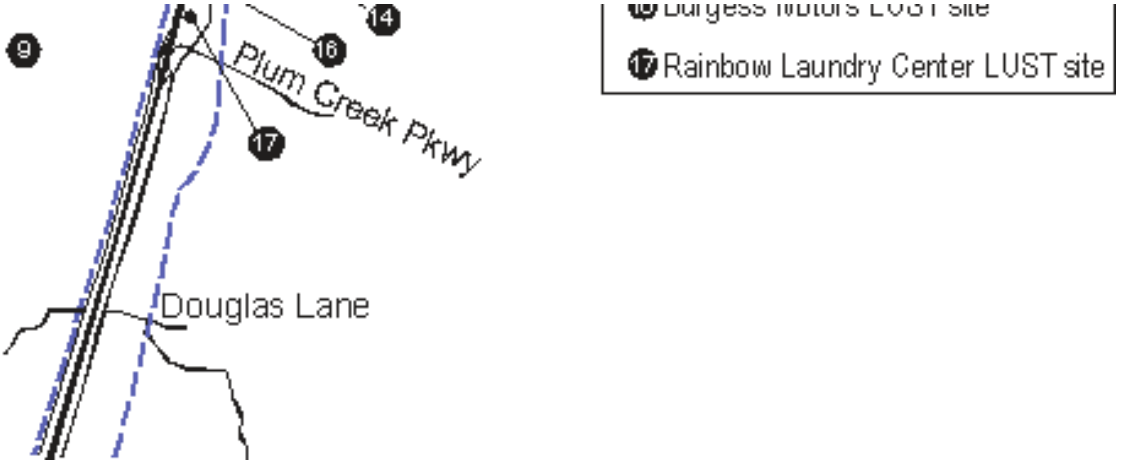
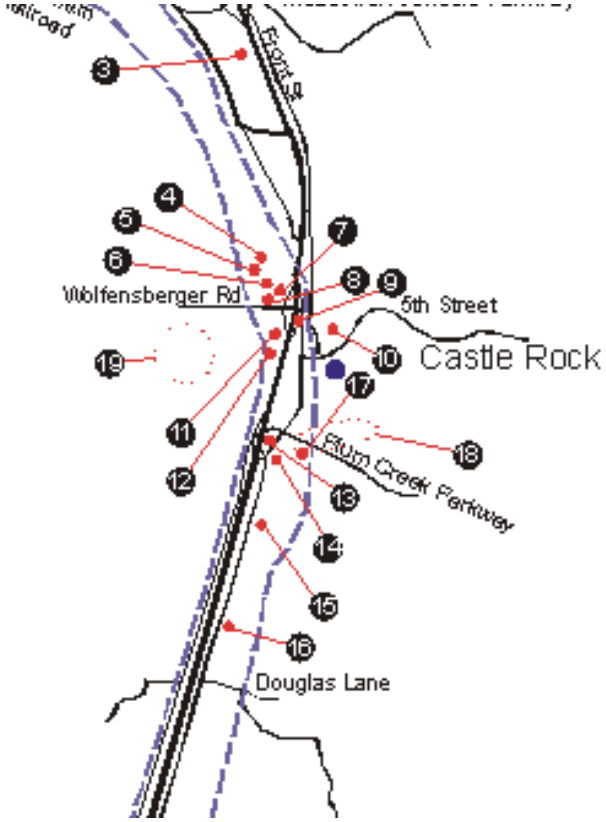


Figure 4.10b
Potential Hazardous Waste Sites
along the I-25 Corridor



18 Andrews Addition Landfill

19 SW of Brick Facility Landfill

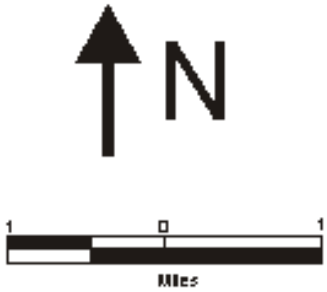


Figure 4.10c
Recognized Hazardous Wastes Sites
along the US 85 Corridor

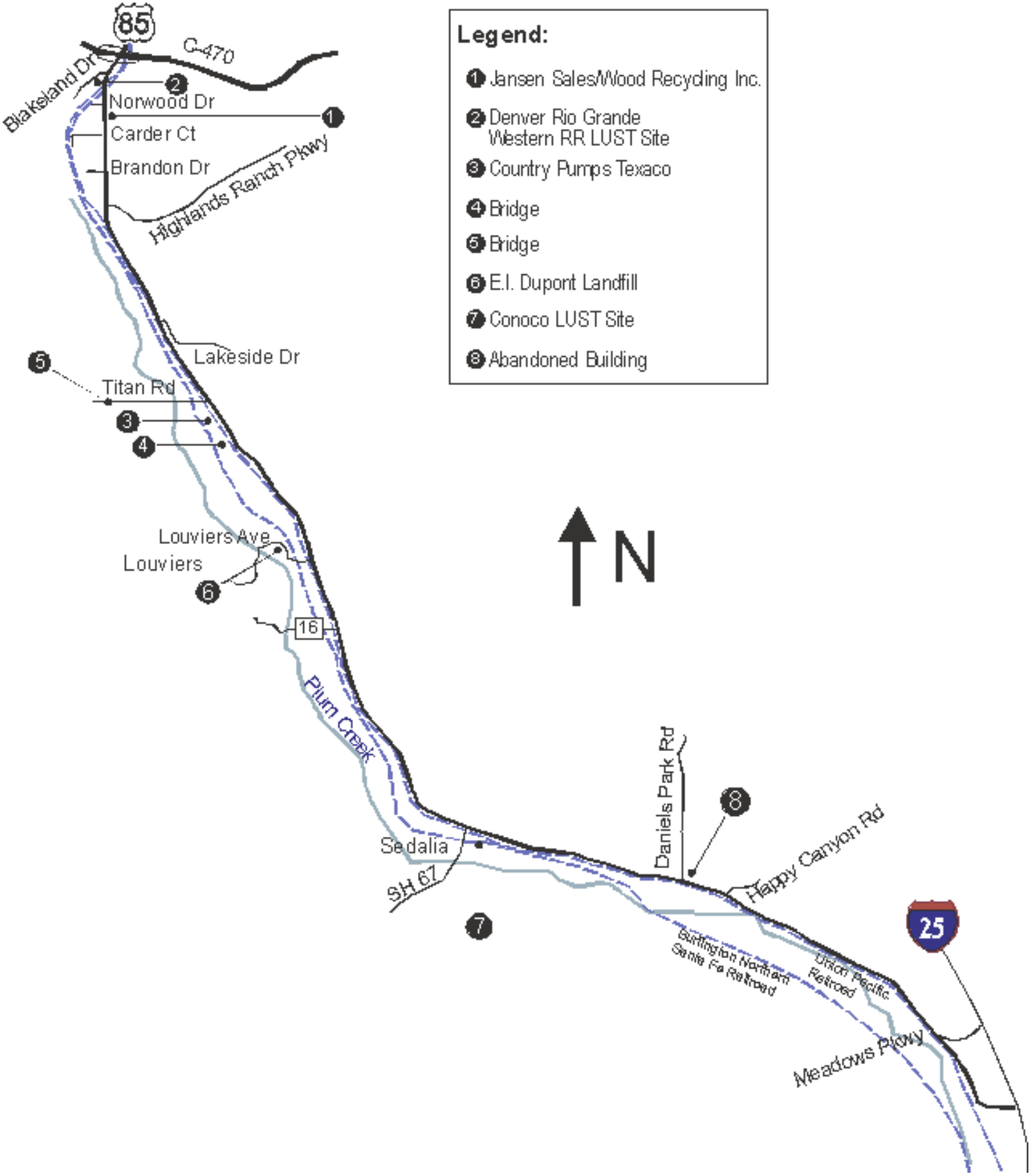
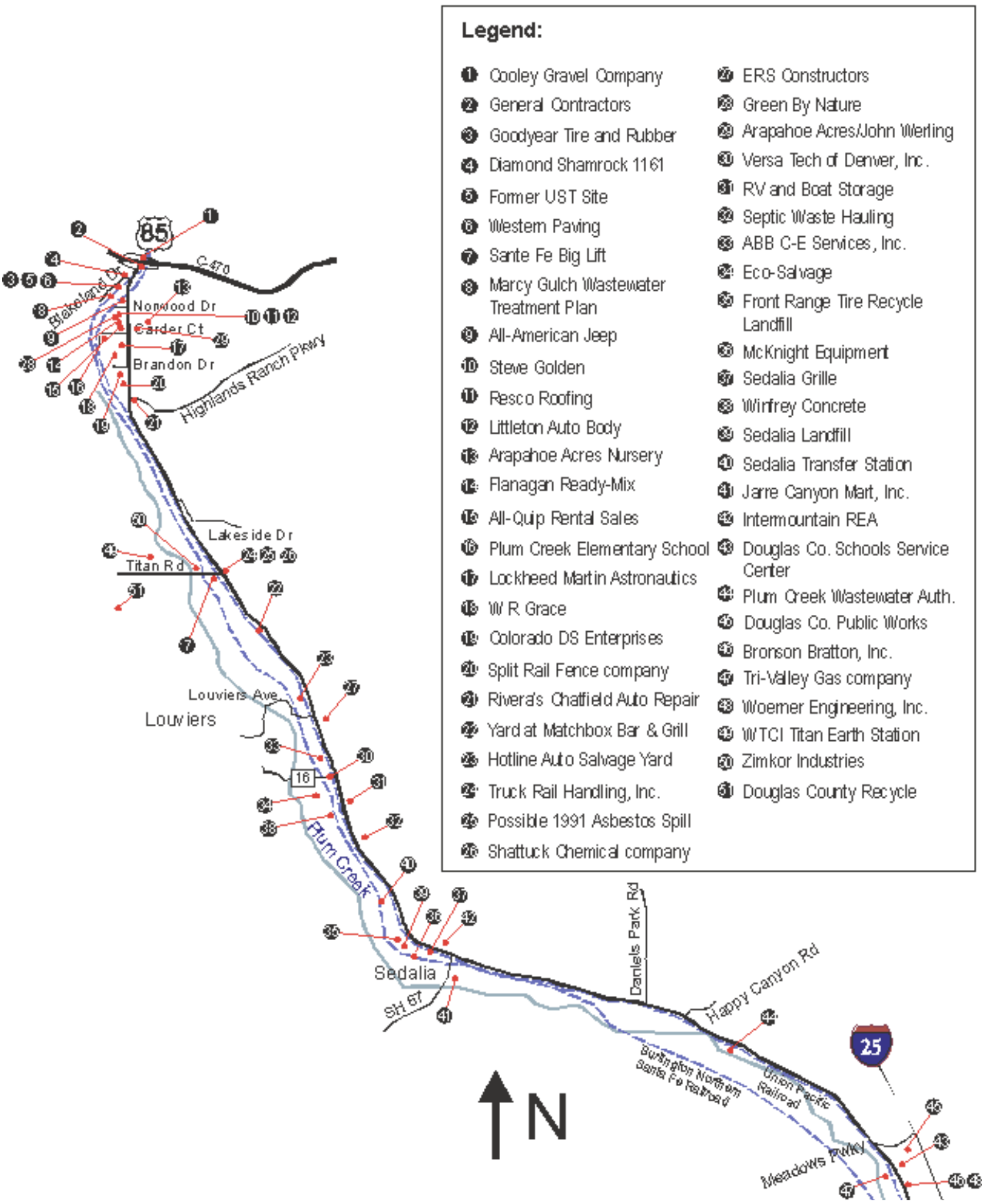
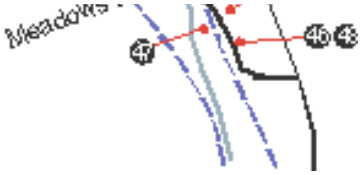


Figure 4.10d
Potential Hazardous Waste Sites

along the US 85 Corridor




Meadows
47
46
43