Appendix A.
Public Survey Form

West Elbert County
Transportation Master Plan

West Elbert County Transportation Master Plan
Survey

Number of people in your household_____
Does your family include children in grades K-12? Y or N

Where do you live?

- Town of Elizabeth
- Town of Kiowa
- Name of Subdivision_____
- Unincorporated Elbert County
- Other_____

How long have you lived in Elbert County?

Where do you work?

- Denver Metro area
- Colorado Springs Metro area
- Town of Elizabeth
- Town of Kiowa
- Unincorporated Elbert County
- Home
- Other_____

Do you commute to work? Y or N
Do you carpool to work? Y or N How frequently? ___
Do you telecommute (work at home for an off-site job)? Y or N How frequently? ____
Do you use public transit? Y or N How frequently? ____

If public transit were available in Elbert County would you use it to:

- Commute to Denver/Colorado Springs
- Travel within Elbert County
- Other_____

Does anyone in your family have special transportation needs?
Please specify_____

Please check transportation issues that affect your family living in Elbert County

- Safety of school buses/bus stops
- Traffic flow/congestion
- Quality/condition of roads
- Inadequate E-W and N-S road network
- Equine safety
- Accessibility to transit
- Bicycle/pedestrian routes
- Weather related road problems
- Transportation needs for rural health care provision
- Other

Comments on specific transportation issues in West Elbert County:

Optional: Email address (to receive notices of upcoming public meetings)_____

Thank you!

Appendix B.
Environmental Overview

West Elbert County
Transportation Master Plan

Environmental Overview

April, 2008

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Introduction

A transportation plan is being prepared for the western portion of Elbert County, from the western county line to County Road 101 to the east. The study area is shown on **Figure 1**. The purpose of the plan is to guide transportation decision making for the next thirty years. This document provides a general overview of the study area's environment and identifies any potential areas of concern. Information contained in this report is based on existing environmental data, which is somewhat limited for Elbert County. Therefore, it is recommended that a detailed environmental analysis be performed for any transportation corridors or projects identified in the Western Elbert County Transportation Plan in order to identify any environmental resources of concern that may exist in the vicinity of those projects.

Farmland

Elbert County is largely rural. Farmland classification data was obtained through the Soil Survey Geographic (SSURGO) Database. This annually updated database provides all soil classifications, including Prime and Unique Farmland, and Farmland of Statewide and Local Importance. SSURGO data indicated that there are scattered areas of soils classified as Farmland of Statewide Importance and Prime Farmland If Irrigated located throughout the study area. These areas are shown on **Figure 2**. Any potential impact or conversion of these soils will require coordination with the Natural Resources Conservation Service.

Environmental Justice

On February 11, 1994, Federal Executive Order 12898: *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* was issued to reinforce Title VI of the Civil Rights Act of 1964. The Civil Rights Act states that "No person in the United States shall, on the grounds of race, color or national origin be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." Executive Order 12898 states, "Each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low-income populations." Income and racial data for Elbert County was obtained from the 2000 U.S. Census.

Low-Income Populations

US Census 2000 data was used to identify areas of low-income populations in the study area. According to census data, the median household income in Elbert County is $62,480. Of the 6,760 households in Elbert County, approximately 61 percent fall below the county's median income level. Within the study area, the highest concentrations of households that fall below the county's median income are located in the southeast portion of the study area (see **Figure 3**).

Figure 1
Study Area

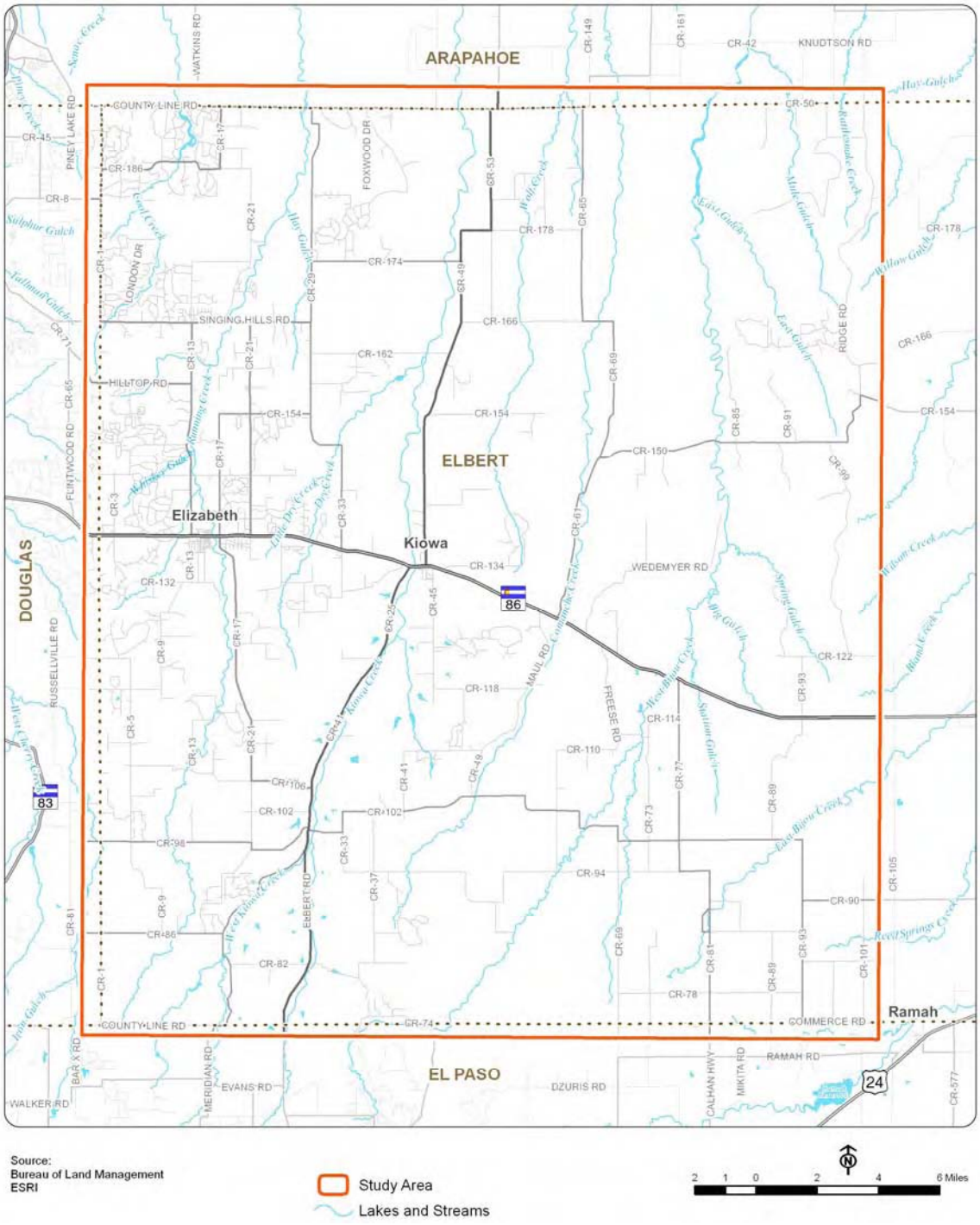


Figure 2
Farmland Soil Locations

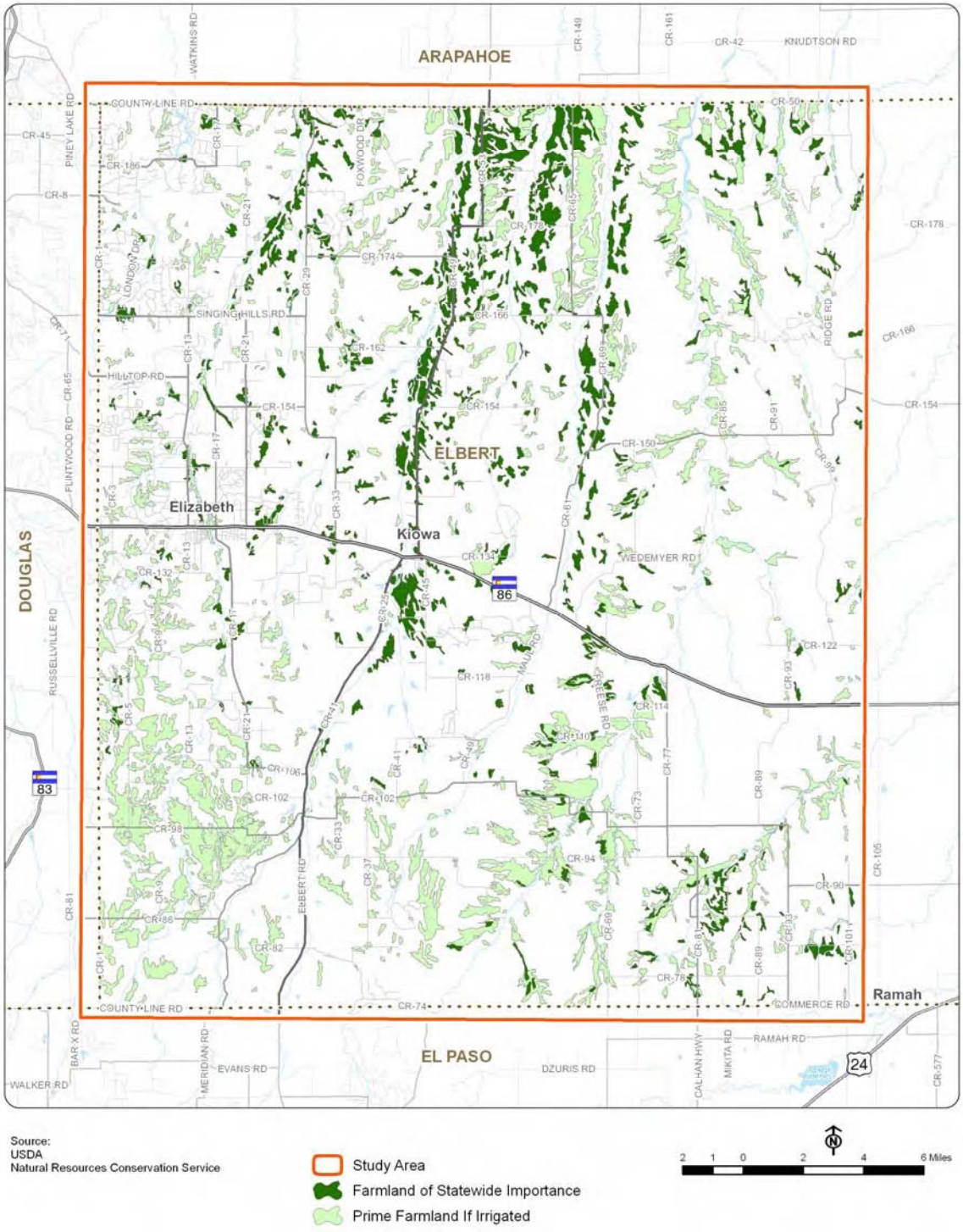
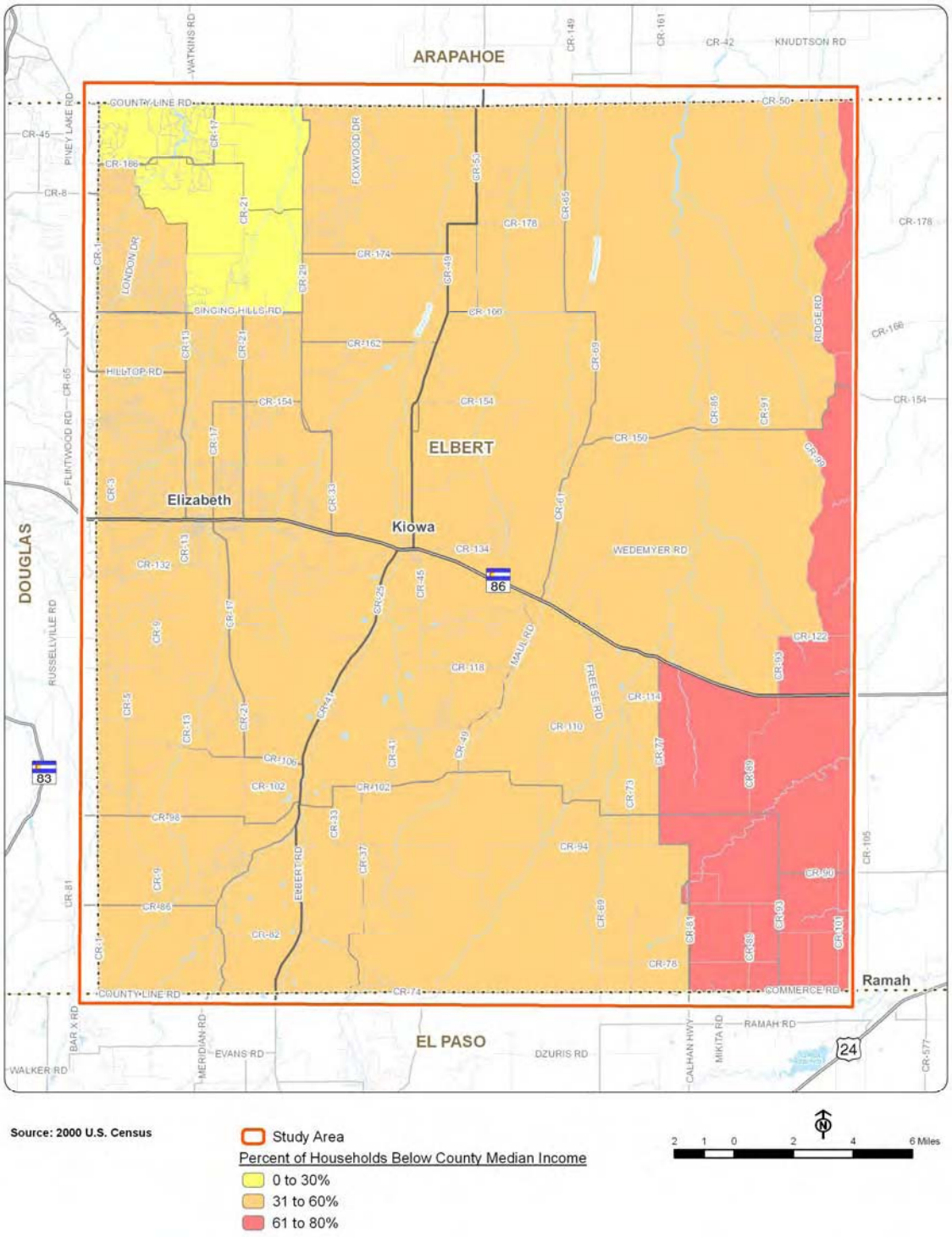


Figure 3
Households Below Median Income in Study Area



Minority Populations
US Census 2000 data was also used to identify areas of minority populations in the study area. Minority populations are described by two categories: race and ethnicity. Census data was collected at the block group level to be used in determining the composition of minority populations within the study area. Race includes seven exclusive categories: White, Black, American Indian and Alaska Native, Asian, Native Hawaiian or other Pacific Islander, some other race, and two or more races. The US Census Bureau separates Hispanic or Latino from the race category, and addresses it as an ethnicity.

According to the census data, Elbert County has a total population of 19,872 persons, of which seven percent are minorities. In general, minority populations in the study area are low. Block groups in the study area have minority populations between five and ten percent. Areas with a higher percentage of minorities are generally located in the north and eastern portion of the study area (see **Figure 4**).

Schools Located in Study Area

The following schools are located within the study area and are shown on **Figure 5**:

Elbert:
- Elbert Elementary School, 24489 Main Street
- Elbert Junior-Senior High School, 24489 Main Street

Elizabeth:
- Elbert County Charter School, 823 South Bannock Street
- Elizabeth Running Creek Preschool, 589 South Banner Street
- Running Creek Elementary School, 900 South Elbert Street
- Elizabeth Middle School, 34427 County Road 13
- Elizabeth High School, 36500 County Road 13
- Frontier High School, 589 South Banner Street

Kiowa:
- Kiowa Elementary School, 525 Commanche
- Kiowa High School, 525 Commanche
- Kiowa Middle School, 525 Commanche

Parks and Recreation Facilities

Information regarding parks and recreational facilities located in the study area was obtained from the Colorado Department of Transportation (CDOT), Colorado State Parks, and Elbert County. No national parks, national forests, or state parks are located in the study area. Areas designated as state lands are located throughout the study area (see **Figure 5**).

Figure 4
Minority Populations in Study Area

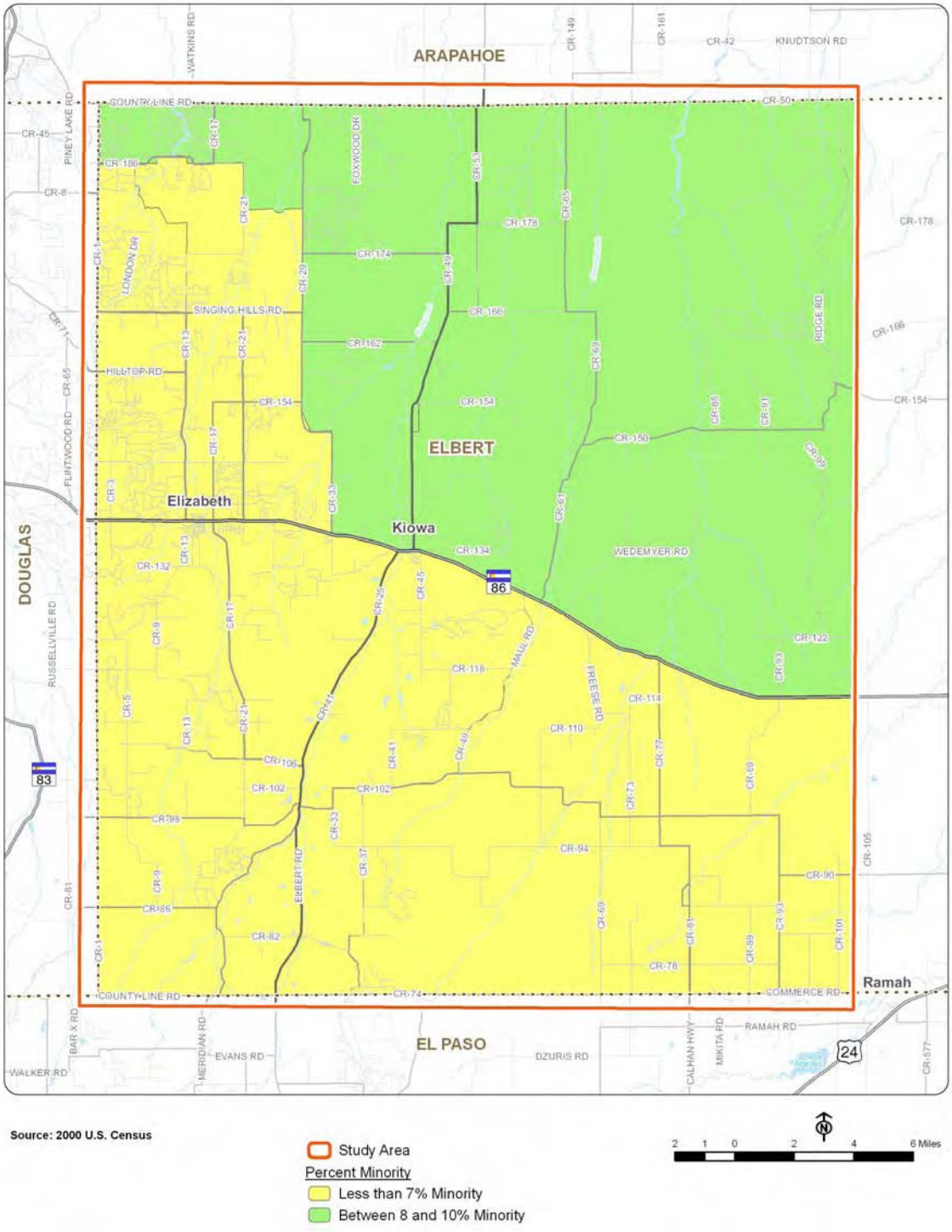
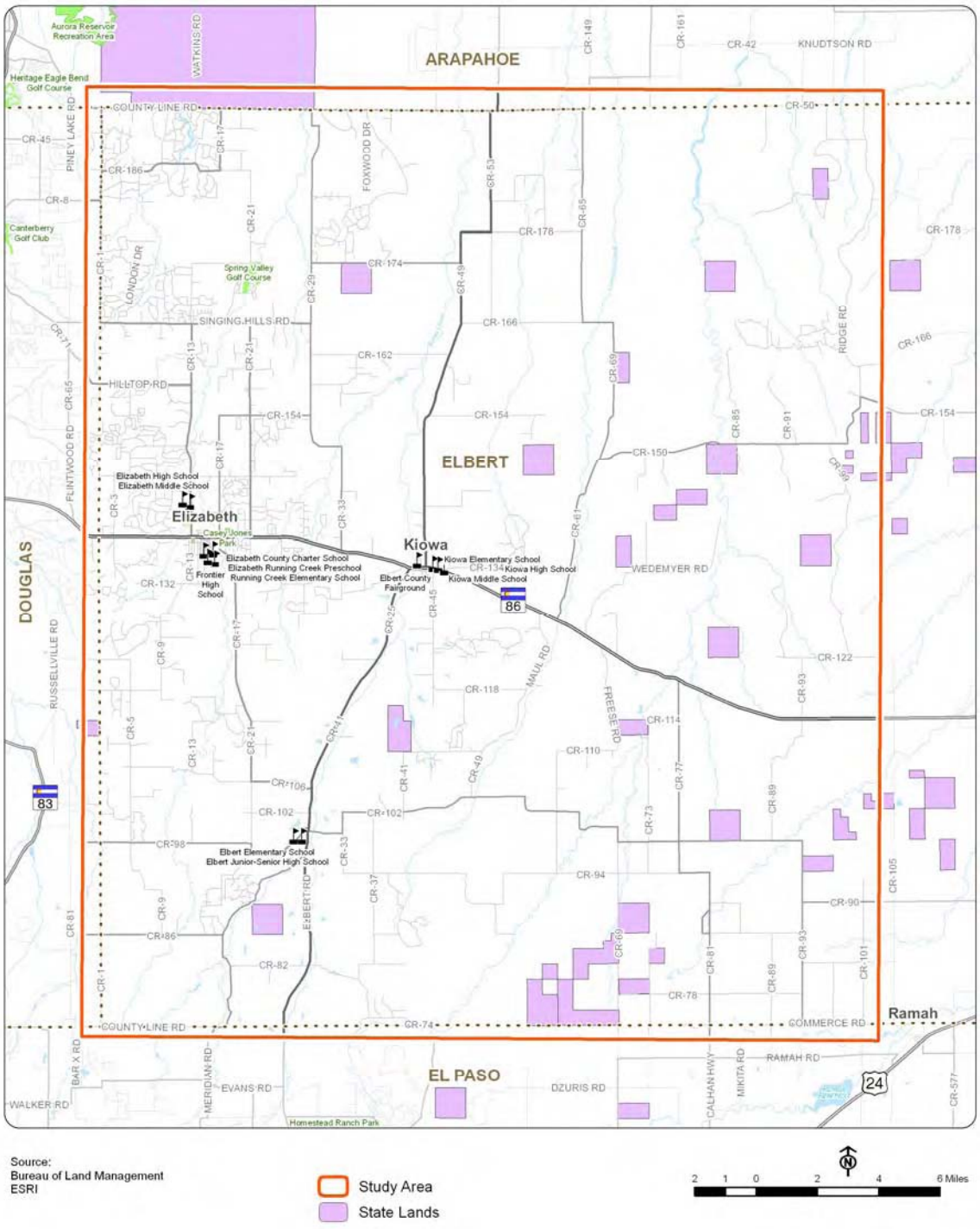


Figure 5
Park/Recreation Areas, Schools, and State Land in Study Area



Public parks and public recreation facilities located in the study area include the following (see **Figure 5**):

Town of Elizabeth:

- **Casey Jones Park/Elizabeth Rodeo Ground**. Facilities at this park include three baseball diamonds, rodeo arena, campground, and skateboard park.
- **Spring Valley Golf Course** located at 42350 County Road 17-21 in Elizabeth. This 18-hole golf course is a public golf course that was built in 1997.

Town of Kiowa

- Elbert County Fair Ground

Town of Elbert:

- Park facilities include a track and field facility, baseball field, football field, and picnic area.

Cultural Resources

Information for known cultural resources located in the study area was obtained from the National Park Service, CDOT, Colorado Historical Society Office of Archaeology and Historic Preservation, and the National Register of Historic Places. No national historic landmarks or Indian reservations are located in the study area.

The study area contains five identified historic sites. Four sites are listed on the Colorado State Register and one site is listed on the National Register of Historic Places. These sites are shown on **Figure 6**. Any potential impacts to historic properties will require coordination with the State Historic Preservation Office.

- **Denver & New Orleans Railroad Segment** (State Register), located along Elbert Road south of Elbert, Colorado (Site No. 5EL.299.1/5EP.868.1). The Denver and New Orleans Railroad operated over this now-abandoned grade between 1881 and 1936. The Denver and New Orleans Railroad was the first standard gauge railroad to operate between Denver, Colorado Springs, and Pueblo. This railroad segment runs southerly from a point south of Elbert and just north of the county line, approximately 1.1 miles to a point 1 mile south of the El Paso County line, and includes the 1.1 miles of right-of-way itself and a strip of land 50 feet wide along each side of the right-of-way center line. Trackage was removed from the segment in 1936 when the railroad was abandoned.

- **Hubert Building (Carlson Building)** (State Register), 239 Main Street, Elizabeth, Colorado (Site No. 5EL.295). The 1890 building is typical of late 19th century storefronts. It contained a variety of retail and wholesale enterprises and contributed to the commercial history of Elizabeth.

- **J Bar Double C Ranch** (State Register), 21441 County Road 35-41, Elbert vicinity (Site No. 5EL.656). The 388-acre J Bar Double C Ranch is significant for its development and use between 1952 and 1967 as a western summer camp for children of Jewish heritage.

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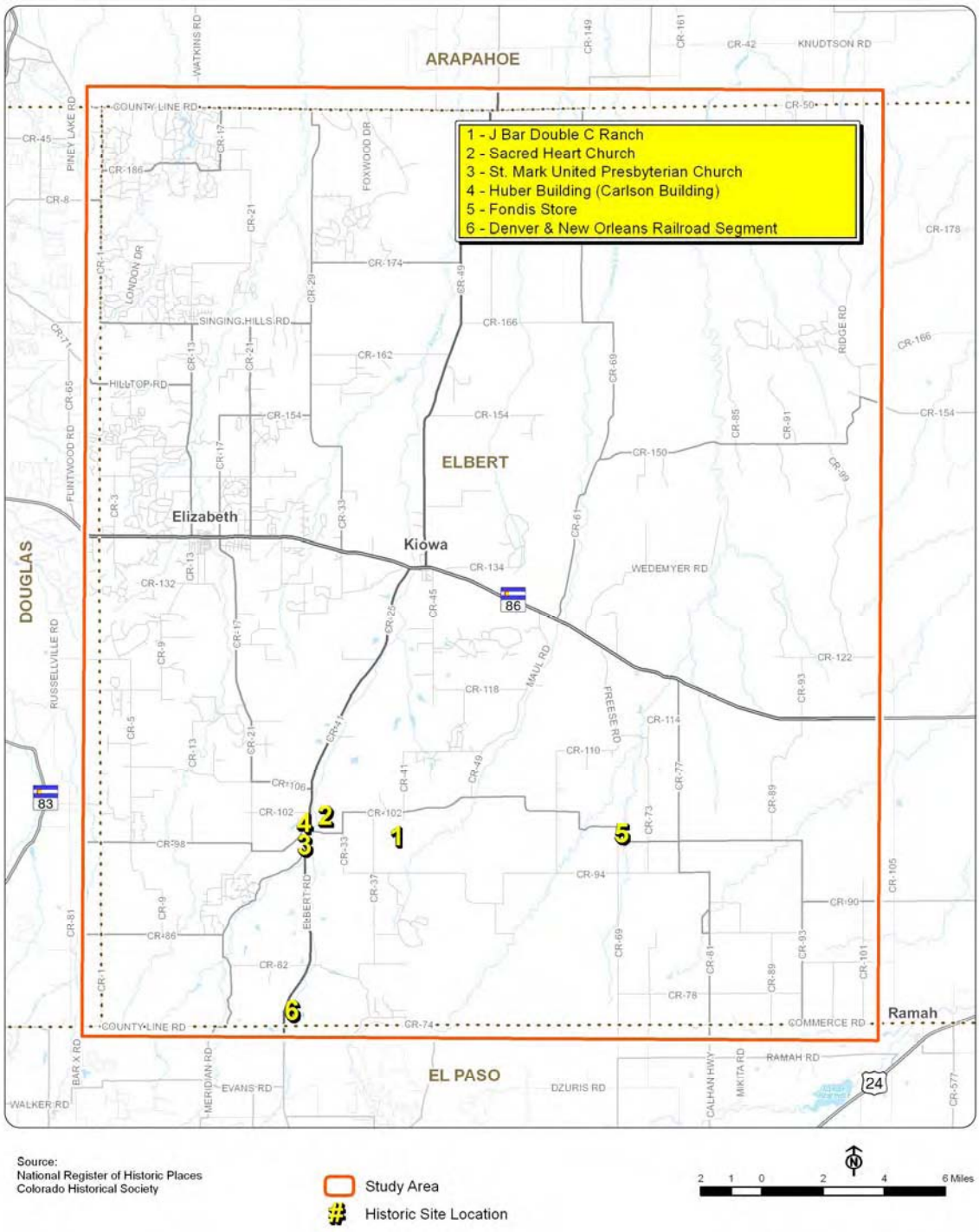
Figure 6
Known Historic Properties in Study Area



- Beginning on the East Coast after World War I, children's summer camps geared to the Jewish community spread westward after the World War II. The J Bar Double C Ranch camp was the Denver Jewish community's response to the need for such a facility in the area and is one of only two Jewish summer camps in Colorado.

- **Sacred Heart Church** (State Register), 7211 County Road 98, Elbert, Colorado (Site No. 5EL.294). Originally built on the banks of Boxelder Creek, a devastating flood in 1935 nearly swept the building away and resulted in its move to higher ground east of town. The church is a striking local expression of the Gothic Revival style.

- **St. Mark United Presbyterian Church** (National Register), 225 Main Street, Elbert, Colorado (Site No. 5EL.138). St. Mark United Presbyterian Church, a one-and-one-half-story clapboard structure on a wooden foundation, has a high gabled roof and brick chimney. It was built in 1889 by prospective members under the direction of a local carpenter, Taylor Green. A tower, topped with a spire and four-sided cupola, houses the narthex in its base. The first Protestant church to be organized and constructed in Elbert County, the building represents the architecture common in the eastern plains churches of that era. It provided shelter for worship and social gatherings as well as serving as a relief station during area floods of 1935.

Section 4(f) Properties

Section 4(f) applies to publicly owned lands that are managed as parks and recreation areas, wildlife or waterfowl refuges, and to all "significant" historic sites regardless of ownership. Impacts to Section 4(f) resources resulting from transportation improvements must be avoided if possible. If avoidance is not feasible and prudent, then all possible planning to minimize harm to these resources must be included in the project. There are two types of impacts to a designated Section 4(f) property that require an evaluation and determination as set forth in the statute:

1. A direct impact to the Section 4(f) property that results from a taking of a portion of or all of the property.

2. Any action by the project, while not amounting to a direct taking, which would "substantially impair" the current use of the property by intrusions such as noise, air or visual impacts, as well as vibration impacts, could constitute a "constructive use" of the Section 4(f) property.

For historic properties, Section 4(f) land is significant if land is taken from a property that is listed in or eligible for inclusion in the National Register of Historic Places (NRHP) and these properties are impacted with loss of property or other adverse effects.

Known properties located within the study area that would fall under Section 4(f) protection are those listed in the "Parks and Recreation Facilities" and "Cultural Resources" sections of this report.

Section 6(f) Properties

Section 6(f) applies to public recreational areas developed with partial or complete funding provided through the Land and Water Conservation Fund Program, Assistance to States and Urban Parks (L&WCF). According to the National Park Service, no properties that were acquired or developed with the use of L&WCF funds are located in the study area.

Vegetation, Wildlife, Threatened & Endangered & Sensitive Species

The study area lies within the boundaries of the Shortgrass Prairie Initiative, which is a cooperative effort between CDOT, Federal Highway Administration, US Fish and Wildlife Service, Colorado Department of Natural Resources, Colorado Division of Wildlife, and The Nature Conservancy to work together, along with landowners and communities, to preserve thousands of acres of shortgrass prairie in eastern Colorado and effect regional conservation of declining species on Colorado's eastern plains.

Information for vegetation, wildlife, threatened and endangered, and state sensitive species was obtained from the Colorado Division of Wildlife, CDOT, and the Colorado Natural Heritage Program (CNHP). No state wildlife areas (SWAs), state trust land, or wilderness areas are located in the study area.

Species known to occur in Elbert County are shown in Table 1.

Table 1
Species Known to Occur in Elbert County

Major Group	Common Name	Scientific Name	Status
Amphibians	Plains Leopard Frog	*Rana blairi*	state special concern
Birds	Ferruginous Hawk	*Buteo regali*	state special concern
	McCown's Longspur	*Calcarius mccowni*	--
	Mountain Plover	*Charadrius montanus*	state special concern
	Lewis's Woodpecker	*Melanerpes lewis*	--
	Long-billed Curlew	*Numenius americanus*	state special concern
	Plains Sharp-tailed Grouse	*Tympanuchus phasianellus jamesi*	state endangered
	Wild turkey		--
Fish	Arkansas Darter	*Etheostoma cragini*	state threatened
Insects	Sandhill Fritillary	*Boloria selene sabulicollis*	--
	Moss's Elfin	*Callophrys mossii schryveri*	--
	Colorado Blue	*Euphilotes rita coloradensis*	--
Mammals	Black-tailed Prairie Dog	*Cynomys ludovicianus*	state special concern
	Northern Pocket Gopher Subsp	*Thomomys talpoides macrotis*	state special concern
	Swift Fox	*Vulpes velox*	state special concern
	Meadow Jumping Mouse Subsp	*Zapus hudsonius preblei*	federal and state threatened
	White tail deer	*Odocoileus virginianus*	--
	Pronghorn	*Antilocapra americana*	--
	Mule Deer	*Odocoileus hemionus*	--
	Elk	*Cervus elaphus*	--
Natural	Xeric Tallgrass Prairie	*Andropogon gerardii* -	--

Major Group	Common Name	Scientific Name	Status
Communities		*Sporobolus heterolepis*	
	Northern Sandhill Prairie	*Andropogon hallii - Calamovilfa longifolia*	--
	Great Plains Mixed Grass Prairie	*Andropogon hallii - Carex inops ssp. heliophila*	--
	Shortgrass Prairie	*Bouteloua gracilis - Buchloe dactyloides*	--
	Scarp Woodlands	*Juniperus scopulorum / Schizachyrium scoparium*	--
	Great Plains Mixed Grass Prairie	*Pascopyrum smithii - Nassella viridula*	--
	Montane Riparian Forest	*Populus acuminata*	--
	Plains Cottonwood Riparian Woodland	*Populus deltoides - (Salix amygdaloides) / Salix (exigua, interior)*	--
	Plains Cottonwood Riparian Forests	*(Populus deltoides / Panicum virgatum - Schizachyrium scoparium)*	--
	Cottonwood/Sand Dropseed	*Populus deltoides / Sporobolus cryptandrus*	--
	Peachleaf Willow Alliance	*Salix amygdaloides*	--
	Strapleaf Willow-Coyote Willow	*Salix exigua - Salix ligulifolia*	--
	Coyote Willow/Mesic Graminoid	*Salix exigua / Mesic Graminoids*	--
	Montane Willow Carr	*Salix ligulifolia*	--
	Montane Riparian Shrubland	*Salix lucida ssp. caudata*	--
	Great Plains Mixed Grass Prairies (Sandstone/Gravel Breaks)	*Schizachyrium scoparium - Bouteloua curtipendula*	--
	Prairie Slough Grass	*Spartina pectinata*	--

Source: Colorado Division of Wildlife, Colorado Natural Heritage Program
-- = no status

One species, the Burrowing Owl (*Athene cunicularia*), is a State of Colorado threatened species, and is also protected under the Migratory Bird Treaty Act. There are no known major populations of Burrowing Owl in Elbert County; however, potential habitat such as abandoned prairie dog burrows does exist.

Wildlife Species Most Likely to be Affected Within the Study Area

- **Preble's Meadow Jumping Mouse**: Based on the CNHP, overall range for the Preble's Meadow Jumping Mouse (PMJM) is located throughout the western half of the study area. Five known locations of PMJM populations were identified within their overall range in the study area. PMJM is a federally listed threatened species; any potential impacts associated with this species or its primary habitat will require coordination with U.S. Fish and Wildlife Service.

- **Pronghorn**: Pronghorn have an overall range that spans the study area, with heavy concentration of populations in the south and southeastern areas of the study area. The majority of mapped pronghorn populations are identified as occurring south of US 86 and east of 25-41 Road. Any potential impacts to pronghorn will require coordination with the Colorado Division of Wildlife.

- **Mule Deer**: Mule deer populations are generally concentrated in the western and southern portions of the study area. Resident mule deer populations are noted as occurring primarily in the areas north and west of Elizabeth near Gold Creek, Whiskey Gulch, Bayou Gulch, and Russellville Gulch. Any potential impacts to mule deer populations or mule deer migration corridors will have to be coordinated with the Colorado Division of Wildlife.

- **Elk**: Elk are a resident general wildlife species within the study area and primarily are found residing throughout the southwestern corner of the study area. Any potential impacts to elk populations or elk migration corridors will require coordination with the Colorado Division of Wildlife.

Figure 7 shows locations within the study area that have been identified by the Colorado Natural Heritage Program as areas containing significant biodiversity. These locations typically contain areas of primary habitat for a variety of wildlife species and are of significant ecological importance. Locations shown in **Figure 7** are designated as containing very high, high, or moderate biodiversity significance.

Floodplains

Floodplain mapping was obtained from the Federal Emergency Management Administration (FEMA) for the study area. Elbert County has not participated in the National Flood Insurance Program, and floodplain mapping for the study area is very limited and only includes the towns of Elizabeth and Kiowa.

Running Creek flows through the northeast portion of the Town of Elizabeth. Kiowa Creek traverses the western part of the Town of Kiowa. Mapping also indicates two other unnamed waterways that traverse the Town of Kiowa. All of these creeks have associated floodplains that are classified as Zone A floodplains. “Zone A” identifies an approximately studied special flood hazard area for which no Base (100-year) Flood Elevations (BFEs) have been provided.

Wild and Scenic Rivers

Information on wild and scenic rivers in the study area was obtained from the National Park Service Wild and Scenic Rivers System website. No wild and scenic rivers are located in the study area.

Figure 7
Areas of Biodiversity in the Study Area

Hazardous Materials

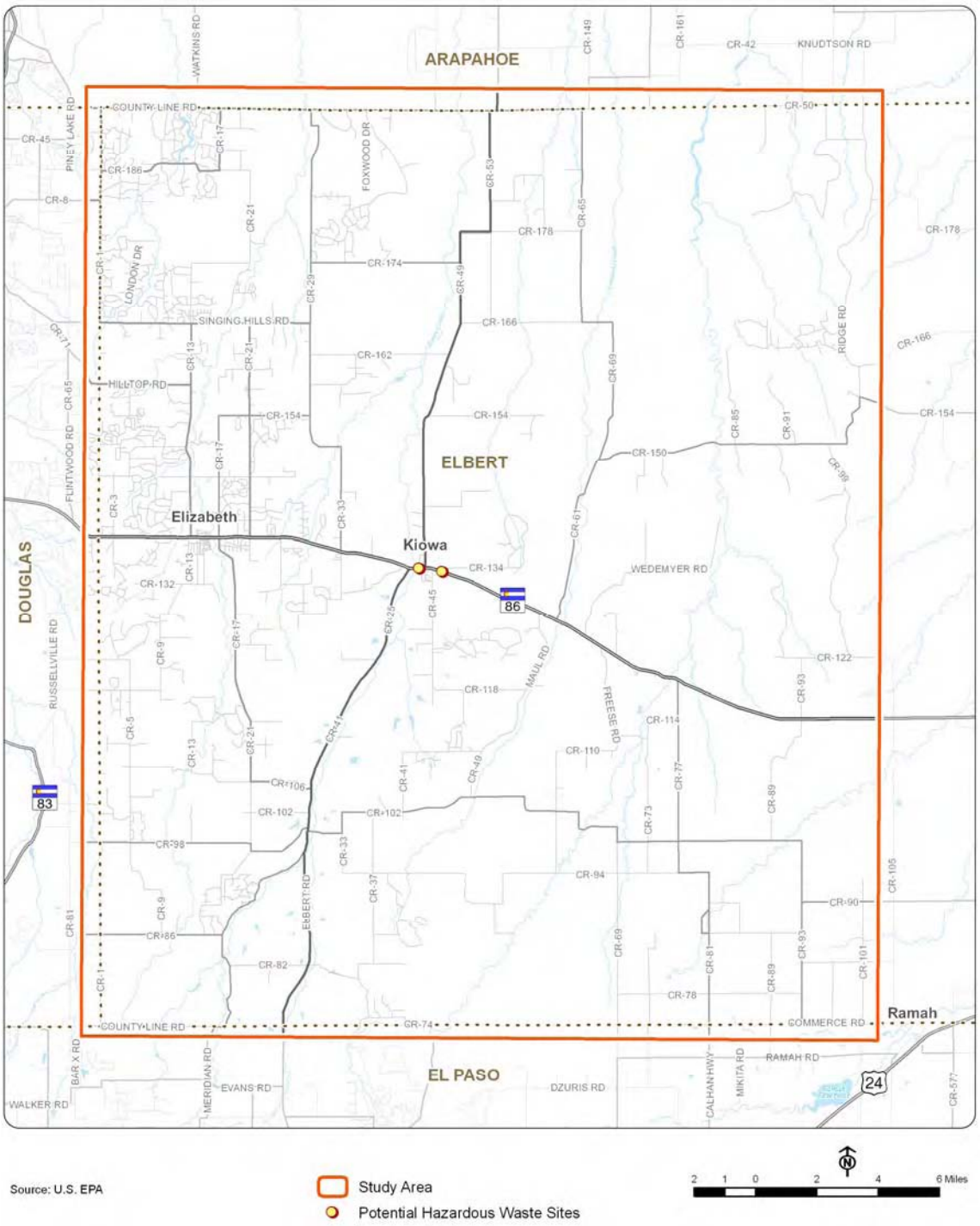
According to the US EPA, two hazardous waste areas are identified in the study area. Both are located in the Town of Kiowa along Highway 86; one is located on the east side of Kiowa and the other is located on the west side of Kiowa. These areas are shown on **Figure 8**. Note that a list of Tier 1 and Tier 2 sites was requested from Elbert County's Office of Emergency Management. When received, that information will be appended to this report.

Water Resources and Water Quality

Information for water resources and water quality was obtained from Elbert County, CDOT, and the US EPA. No major lakes or rivers are located in the study area. No impaired water bodies or impaired streams are located in the study area. Waterways located in the study area are listed below and shown on **Figure 1**:

- Antelope Creek
- Bayou Gulch
- Big Gulch
- Bland Creek
- Box Elder Creek
- Coal Creek
- Comanche Creek
- Dry Creek
- East Bijou Creek
- East Cherry Creek
- East Gulch
- Gold Creek
- Gopher Creek
- Hay Gulch
- Henderson Gulch
- Kiowa Creek
- Little Dry Creek
- Lone Tree Gulch
- Middle Bijou Creek
- Mule Gulch
- Mule Gulch
- Neffs Gulch
- Rattlesnake Creek
- Reed Springs Creek
- Running Creek
- Russellville Gulch
- Spring Gulch
- Spring Branch
- Station Gulch
- West Bijou Creek
- West Kiowa Creek
- Whiskey Gulch
- Wilson Creek
- Wolf Creek

Figure 8
Potential Hazardous Waste Sites in Study Area



Wetlands

Existing historical and current wetland data for the study area is limited to a narrow band along the western edge of Elbert County. Numerous waterways are located throughout the study area that may have associated wetlands and riparian areas. Based on the lack of existing wetland information and high volume of waterways in Elbert County, it is recommended that a site survey for wetlands and riparian habitat be conducted prior to any proposed construction activities to help ensure proper location and identification of wetland resources, determination of potential impacts, and proper coordination with the U.S. Army Corps of Engineers.

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Appendix C.
Traffic Projections and LOS Method and Results

Technical Memorandum

To: Project File/Report Appendix, Western Elbert Transportation Plan

From: Scott Jones, Jacobs Carter Burgess

RE: Methodology for Forecasting Future Traffic

Date: April 9, 2008

Purpose

The purpose of this memorandum is to document the method for forecasting future traffic volumes in western Elbert County. The land use data is a primary input in the travel modeling process. Analysis was performed using a spreadsheet model developed for this process.

Travel Forecasting Process

Elbert County is forecast to have approximately 14,200 new homes in the study area by 2035. To evaluate these demands and best prepare for future growth, a three step forecast method was followed. The forecast process employed a spreadsheet-based model. The process includes:

1. Land use allocation
2. Trip generation
3. Trip distribution/assignment

The forecasting process is explained as follows.

Land Use Allocation

Travel patterns and the routes used are largely a result of geographic location. The magnitude of travel between point 'A' and 'B' is a function of density, proximity, and available routes between the two areas. To reflect this, transportation analysis zones (TAZ) were established to define local neighborhoods and groups that likely have homogenous travel patterns.

The northwestern area of the County was given smaller zones, whereas the east portion of the study area was given larger zones. The forecast of 14,200 new homes where then

allocated to each TAZ. Allocation was based on foreseeable development patterns and densities and information received from the County. The amount of commercial and retail employment located in each of the zones was also estimated.

Trip Generation

Total daily trips were calculated for each of the zones. According to ITE statistics, approximately 9.57 (land use code 210) trips per day[1] will enter and exit each of these new homes according to national statistics. These statistics represent single family detached housing that is common in the area. Although, one study of Elbert County traffic counts showed that rates for the County are currently about 7.5 trips per household per day. This lower trip rate is likely the result of the longer distances needed to travel to/from work and for other household goods. Generally, when distances are greater more trip-chaining occurs. Trip chaining is the combining of multiple trips throughout the day. For example, trips to the grocery store might be combined with a trip home from work rather than making two separate trips. Trip chaining is projected to diminish as the area develops to provide additional services nearby. With a better mix of land uses, trip and travel characteristics are expected to gravitate towards more average conditions documented by ITE. Therefore, for 2035, a trip rate of 9.57 per household was assumed for forecasting purposes.

Trip rates found in ITE were used for commercial and retail uses. The specialty retail center (land use code 814) was determined to be the most applicable for planning purposes. This land use is described as generally small strip shopping centers that contain a variety of retail shops and specialized in quality apparel; hard goods; and services. These types of uses are expected to intensify in the areas of Elizabeth and Kiowa. The Singing Hills road corridor is also expected to provide these services in the future. The average daily trip rate for this use is 44.32 per 1,000 feet of retail.

The State demographer statistics were also used to estimate future retail square footage. According to state projections, Elbert County is expected to growth from 6,900 jobs (year 1995) to 23,500 jobs by 2035. Many of these jobs are expected to be service sector jobs and located in the Western Portion of the County. According to ITE statistics, on average, one employee equate to 200-500 sf of retail/service space.

Trip Distribution/Trip Assignment

These two steps were combined during application of the spreadsheet model. **Figure 1** includes a screen capture of this process. In general terms, percentages were assigned to each of the zones based on a review of existing traffic volumes, origin destinations,

[1] Trip Generation, 7th Edition. Institute of Transportation Engineers. 2003.

and Census Journey to work data. This process encompasses trip distribution/ assignment.

For example, a particular TAZ would have access to 4 roadways. Traffic to/from the zone was estimated to access each of those roads on a proportion that accounted for 100% of the trips. If the roadway provided a more direct connection to areas to/from the Denver Metro area they received a larger proportion of the trips.

This process was first performed to replicate existing conditions. Once existing conditions were replicated within reasonable levels, this process was repeated for the future. The best predictor of future travel is existing travel; however, adjustments were necessary to reflect existing flows and changes in traffic patterns as development occurs. For example, adjustments were made to reflect increased intensities in retail services along the Singing Hills corridor.

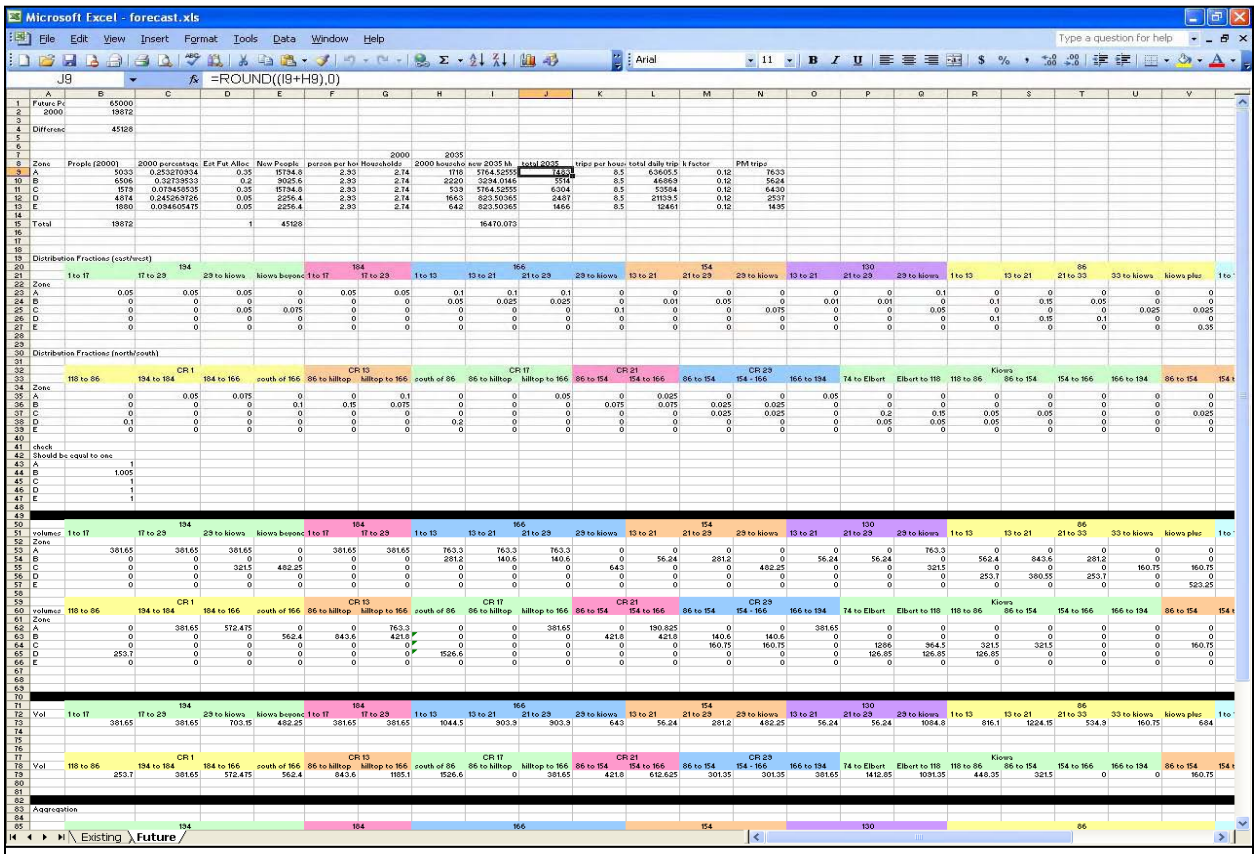

Figure 1: Spreadsheet Model

Elbert County
Determining the Level of Service (LOS) on Two-Lane Two-Way Highways

The Highway Capacity Manual (HCM) Methodology

The Highway Capacity Manual methodology (HCM 2000[1]) presented in Chapter 12 and Chapter 20 can be used to determine the LOS on two-lane two-way highways if the base conditions listed in HCM exist in the study area.

The base conditions used to determine the LOS for a two-lane highway in HCM assumes no restrictive geometric, traffic, or environmental factors. In addition, the base conditions include:

- Lane widths greater than or equal to 12 feet
- Clear shoulders wider than or equal to 6 feet
- No no-passing zones
- All passenger cars
- No impediments to through traffic, such as traffic control or turning vehicles
- Level terrain and
- 50/50 directional split of traffic.

HCM methodology considers traffic operations on two-lane two-way highways to be different from those on other uninterrupted-flow facilities. Typically, on a two-lane two-way highway, lane changing and passing are possible only in the face of oncoming traffic in the opposite lane. As traffic volumes increase, passing demand will increase rapidly and passing capacity in the opposite lanes will decline. Therefore, on two-lane two-way highways normal traffic flow in one direction influences flow in the other direction.

HCM also states that efficient mobility is the principal function on major two-lane highways, hence, delay-as indicated by the formation of platoons-is considered more relevant as a measure of service quality on these highways. Two performance measures are listed in the HCM to describe the service quality for two-lane highways: percent time-spent-following and average travel speed. The LOS criteria defined by the HCM for two-lane highways use both these measures.

Further, HCM categorizes two-lane highways into two classes for analysis –

- Class I – These are two-lane highways on which motorists expect to travel at relatively high speeds. Two-lane highways that are major intercity routes, primarily arterials connecting major traffic generators, daily commuter routes, or primary links in state or national highway networks generally are assigned to Class-I.

- Class II – These are two-lane highways on which motorists do not necessarily expect to travel at high-speeds. Two-lane highways that function as access routes

[1] Highway Capacity Manual 2000, Transportation Research Board, 2000

to Class-I facilities, serve as scenic or recreational routes that are not primary arterials, or pass through rugged terrain generally are assigned to Class II. Class II facilities most often serve relatively short trips, the beginning and ending portions of longer trips, or trips for which sightseeing plays a significant role.

HCM Exhibit 20-2 depicts the LOS Criteria for two-lane Class I highways.

Exhibit 20-2 LOS Criteria For Two-Lane Highways in Class I

LOS	Percent Time-Spent Following	Average Travel Speed (mph)
A	<=35	>55
B	> 35-50	>50-55
C	>50-65	>45-50
D	>65-80	>40-45
E	>80	<=40

HCM Exhibit 20-4 depicts the LOS Criteria for two-lane Class II highways.

Exhibit 20-4 LOS Criteria For Two-Lane Highways in Class II

LOS	Percent Time-Spent Following
A	<=40
B	> 40-55
C	>55-70
D	>70-85
E	>85

Applying the HCM methodology to two-lane two-way roads

The HCM Methodology to determine LOS on two-lane two-way roads does not apply to the Elbert County roads because of the following base conditions violations –

- Impediments to through traffic, such as traffic control or turning vehicles, exist on the study area highways
- Clear shoulders wider than or equal to 6 feet does not exist on all highways under study
- No passing zones exist either due to geometric or traffic constraints

HCM provides no guidance on minimum speed limit considered to formulate Exhibit 20-2 and Exhibit 20-4. Highway Capacity Software (HCS) assumes a minimum speed limit of 45 miles per hour (mph) for LOS calculations on two-lane two-way highways.

As per Exhibit 20-2 to determine LOS for Class I highways, an average travel speed equal to or less than 40mph on any section of highway is considered as operating at LOS E. A number of roadways in the study area have a posted speed limit of 25 or 35mph; hence, this methodology can not be applied to those highways.

Exhibit 20-4 to determine LOS for Class II highways does not apply since roadways in the study area violate a number of base conditions listed in the HCM (listed above).

In the absence of an appropriate HCM methodology an empirical method is used to determine LOS on Elbert County roadways. A table depicting the Average Daily Traffic (ADT) range corresponding to typical roadway characteristics is prepared for streets in the Denver front range area. The range of ADTs is based on existing examples in the Denver front range area and capacity analysis done for other similar planning projects. The volumes listed reflect near-capacity or capacity traffic levels for the types of roads, which means peak hours have tolerable delay and queuing at intersections (LOS D, with some turning movements at LOS E or F).

ADT Range and Typical Roadway Characteristics

Type	ADT Range Low End	ADT Range High End	Typical Characteristics (may include some or all)	Denver/Boulder Example
2-lane minor collector	4,000	8,000	Poor access control, 25mph to 35mph, almost no turn lanes at intersections	Perry St., Pearl St. in SW Denver, 46th Ave. in NW Denver, Holly, Monaco along Smith Rd
2-lane collector	8,000	10,000	Poor access control, 30mph to 35mph, some turn lanes at intersections, on street parking,	Prince St. in Littleton, Logan St in Englewood, Lowell / 32nd in NW Denver
2-lane minor arterial	10,000	16,000	Fair access control, 35mph to 40mph, expanded lanes at intersections, continuous median	Downing St.,Garrison St., Quebec south of Colfax, Washington, Pecos in Adams Co.
2-lane highway	16,000	24,000	Excellent access control, 45mph to 55mph, good turn lanes at intersections	SH 93 in Golden, SH 7 east of Boulder, SH 7 in Broomfield
4-lane minor arterial	24,000	32,000	Fair access control, 35mph to 40mph, limited continuity, intermittent medians	North Boradway in Boulder, Yale west of I-25, Dry Creek Rd, Yosemite in Centennial, 38th Ave
4-lane arterial	32,000	40,000	Good access control, 40mph to 45mph, good turn lanes at intersections	University Blvd. south of 285, Sheridan Blvd. in Arvada/Westminster
4-lane expressway	40,000	45,000	Excellent access control, 45mph to 55mph, maximized intersection turn lanes, some interchanges	Santa Fe in Littleton, US 287 in Broomfield, Kipling north of 285
6-lane arterial	45,000	55,000	Fair/Good access control, 40mph to 45mph, good turn lanes at intersections	Wadsworth near Quincy, Colorado Blvd, Colfax near Speer
6-lane expressway	55,000	66,000	Excellent access control, 45mph to 55mph, good intersection turn lanes, some interchanges	Parker Rd near 225, 285 west of 85

Items below contribute to the variation in range

- Land uses served (peak hour patterns)
- Downtown/urban/suburban/rural (peak hour and directional patterns)
- Expanded intersection at large crossroads
- Number of and configuration of bottleneck intersections
- Lane widths, median widths
- Shoulder, bike lanes, on street parking
- Number of intermediate access points, auxiliary lanes for accesses

Appendix D.
Information on Roundabouts

West Elbert County
Transportation Master Plan

Roundabouts

November 30, 2007

West Elbert County
Transportation Master Plan

Design Guidelines

Federal Highway Administration publication
Dated: June 2004

Roundabouts: An Informational Guide

West Elbert County
Transportation Master Plan

Benefits

- Vehicle Safety
- Pedestrian Safety
- Traffic Operation
- Environment and Aesthetics

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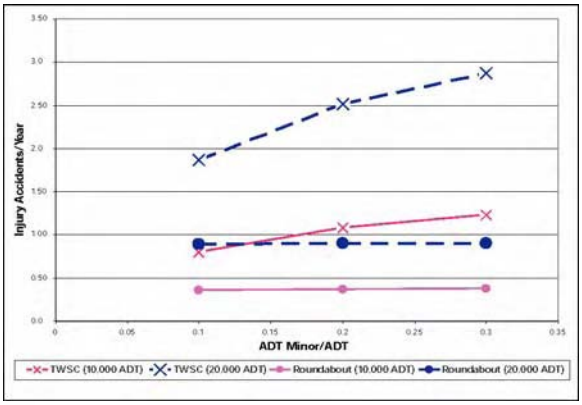
West Elbert County
Transportation Master Plan

Safety

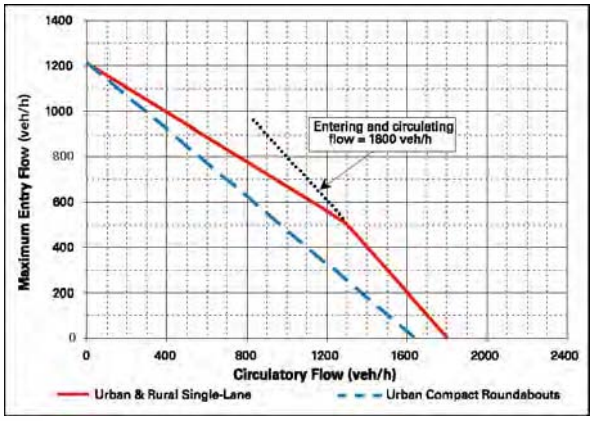


Comparison of predicted roundabout injury crashes with rural two-way stop controlled (TWSC) intersections.

JACOBS

West Elbert County
Transportation Master Plan

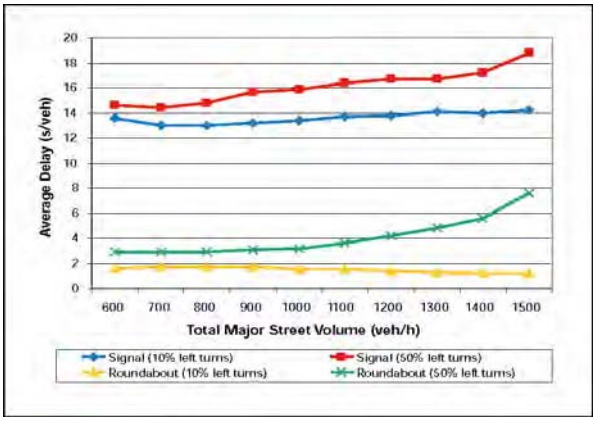
Traffic Operations



Approach capacity of a single lane roundabout. A typical signalized intersection can process 1900 vehicles per hour per hour of green time per lane.

West Elbert County
Transportation Master Plan

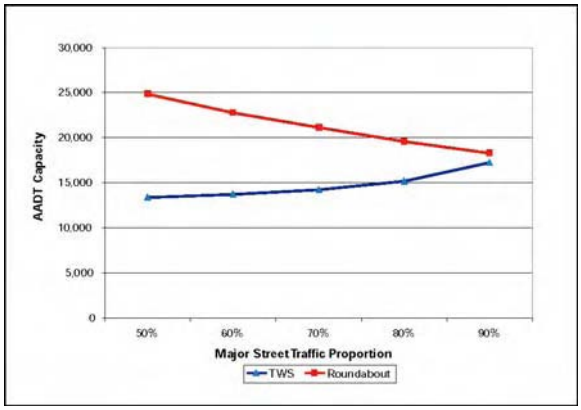
Traffic Operations



Average delay per vehicle at the Manual on Uniform Traffic Control Devices (MUTCD) peak hour traffic signal warrant threshold.

West Elbert County
Transportation Master Plan

Traffic Operations



Comparison of two-way stop controlled intersection (TWSC) and single-lane roundabout capacity.

West Elbert County
Transportation Master Plan

Challenges

- Safety for Visually Impaired Persons
- Initial Confusion and Driver Unfamiliarity
- Potential Increase in Minor Collisions
- Inappropriate Locations:
  - Intersections with sight distance constraints
  - Locations with very high large vehicle turning movements (semi-trucks)
  - Locations where adequate space is not available
  - Locations where entering flows exceed 2,400-2,800 vehicles per hour (for single-lane roundabout)

West Elbert County
Transportation Master Plan

Additional Issues

- Public Acceptance of Roundabouts
- Impacts to Bicyclists
- Parking
- Trailers

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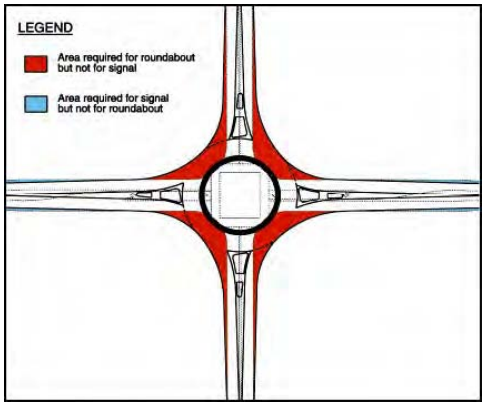
West Elbert County
Transportation Master Plan

Space Requirements



Area comparison: Urban single-lane roundabout vs. comparable signalized intersection.

JACOBS

West Elbert County
Transportation Master Plan

Costs

Roundabout operation and maintenance costs are slightly higher than signalized intersections for:

- Illumination
- Signing
- Pavement marking
- Landscaping

Signalized intersections have additional operation and maintenance costs O&M costs for:

- Signal power
- Bulb replacement
- Detection maintenance
- Signal maintenance

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Examples of Roundabout Policy and Guidance

- New York State
- Loveland/Ft Collins – Larimer County
- Douglas County

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Transportation Master Plan

New York State

"When the analysis shows that a roundabout is a feasible alternative, it should be considered the Department's preferred alternative due to the proven substantial safety benefits and other operational benefits…"

-New York State Highway Design Manual
August 2006

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West Elbert County
Transportation Master Plan

Larimer County

"Roundabouts are considered a form of traffic control. Roundabouts shall be designed in accordance with the Roundabout Design Manual…"

-Larimer County Urban Area
Street Standards
April 2007

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West Elbert County
Transportation Master Plan

Douglas County

"*Safety and mobility within the network can be improved through various intersection treatments. Treatments to intersections may include building auxiliary lanes, installing traffic signals or installing alternative intersection control measures such as modern roundabouts. Appropriate intersection control and intersection improvements are typically determined through a detailed engineering study on a case by case basis …*"

-Douglas County Transportation Master Plan
Adopted April 2004

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Questions?

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The number of modern roundabouts in the United States is increasing rapidly. Modern roundabouts are precisely designed facilities that have capacity elements and provide traffic control features, much like a traffic signal. "Traffic circles" seen in a growing number of residential streets are not roundabouts. Residential traffic circles provide traffic calming benefits, but are not designed to handle a large volume of traffic. Many communities like Alamo have few local examples of roundabouts, and few opportunities to learn about their potential benefits and constraints. Following is a list of "pros and cons" associated with roundabouts, compiled from several sources including the Federal Highway Administration (FHWA) publication *Roundabouts: An Informational Guide*.

Pros

Vehicle Safety

- Roundabouts have 75 percent fewer vehicle "conflict points," or locations where vehicles cross paths, than conventional intersections.
- The Insurance Institute for Highway Safety analyzed before-and-after safety conditions at existing intersections that have been converted to roundabouts. The results indicate a 39 percent decrease in total crashes, a 76 percent decrease in injury-producing crashes, and a 90 percent decrease in fatal crashes.
- Some of the most serious types of collisions, including head-on and broadside, cannot occur at roundabouts.

Pedestrian Safety

- Pedestrians only have to cross one single-lane direction of traffic at a time, and have considerably less exposure to vehicles than at conventional intersections.
- At an intersection such as Danville Boulevard and Orchard Street, pedestrians would cross two separate 14-foot traffic lanes, in contrast to the existing 80-foot crossing distance.
- The conversion of existing intersections to roundabout-controlled intersections has been found to decrease the number and severity of pedestrian accidents (by as much as 73 percent according to a Dutch study).

Traffic Operation

- For a given approach width, roundabouts are capable of handling a higher volume of vehicles than other types of intersection controls.
- Roundabouts can often have lower average vehicle delays and better Levels of Service than conventional intersections.
- The ability to make U-turns is relatively easy and safe at roundabout-controlled intersections. This can facilitate parking circulation, and can improve access from driveways along adjacent street segments where left turns are difficult or prohibited.
- Roundabouts regulate vehicle speeds, and can be useful tools on corridors such as Danville Boulevard where lower traffic speeds are desired.

Environment and Aesthetics

- By reducing the amount of rapid acceleration and deceleration associated with other types of intersection controls, as well as idling, roundabouts typically cause vehicles to consume less fuel and correspondingly lead to lower vehicle emissions.
- Roundabouts provide an excellent opportunity for landscaping and/or public art, and most people find them more attractive than traffic signals.

Cons

Safety for Visually Impaired Persons

- Roundabouts do not have the same audible queues used by visually-impaired pedestrians to cross stop-controlled and signalized intersections, and may require special design treatments to accommodate these users.

Initial Confusion and Driver Unfamiliarity

- Drivers who are unfamiliar with roundabouts may become timid or uncertain upon approach to the intersection, and may violate yield controls or stop at inappropriate times, potentially resulting in minor accidents.

Potential Increase in Minor Collisions

- Though roundabouts typically result in an overall decrease in collisions and a substantial decrease in serious collisions, they may result in an increased frequency of minor collisions such as rear-end and low-speed sideswipes.

Inappropriate Locations

- Roundabouts should not be located at intersections with sight distance constraints, locations with very high large vehicle turning volumes (such as semi trucks), or locations where adequate space is unavailable.
- Single-lane roundabouts generally should not be used in locations with entering flows exceeding 2,400 to 2,800 vehicles per hour.

Pro/Con

Public Acceptance of Roundabouts

- In the United States, it has been found that many communities experience public opposition to roundabouts in the early planning stages. After construction and some time to acclimate, however, public opinion typically shifts in a much more positive direction.

Impacts to Bicyclists

- Studies of bicycle safety at roundabouts have yielded mixed results. Roundabout design must consider the degree of anticipated bicycle activity and incorporate design elements that protect bicyclist safety. In the case of Danville Boulevard, this includes allowing faster/more confident bicyclists to proceed through the roundabout as a vehicle, while providing "escape ramps" on the entries and exits for slower/less confident riders to bypass the roundabout.
- Many bicyclists prefer roundabouts to traffic signals because they are not required to stop, and because vehicle speeds are decreased to near bicycle speeds at the intersection itself.

Parking

- The space consumed by roundabouts sometimes results in lost parking spaces adjacent to an intersection. This configuration can have a positive effect on parking supply just beyond roundabout intersections, however, as the removal of turn lanes and/or through lanes may create more available street width for on-street parking.

More information on roundabouts can be found at these sites:

FHWA Publication Roundabouts: An Informational Guide
http://www.tfhrc.gov/safety/00068.htm

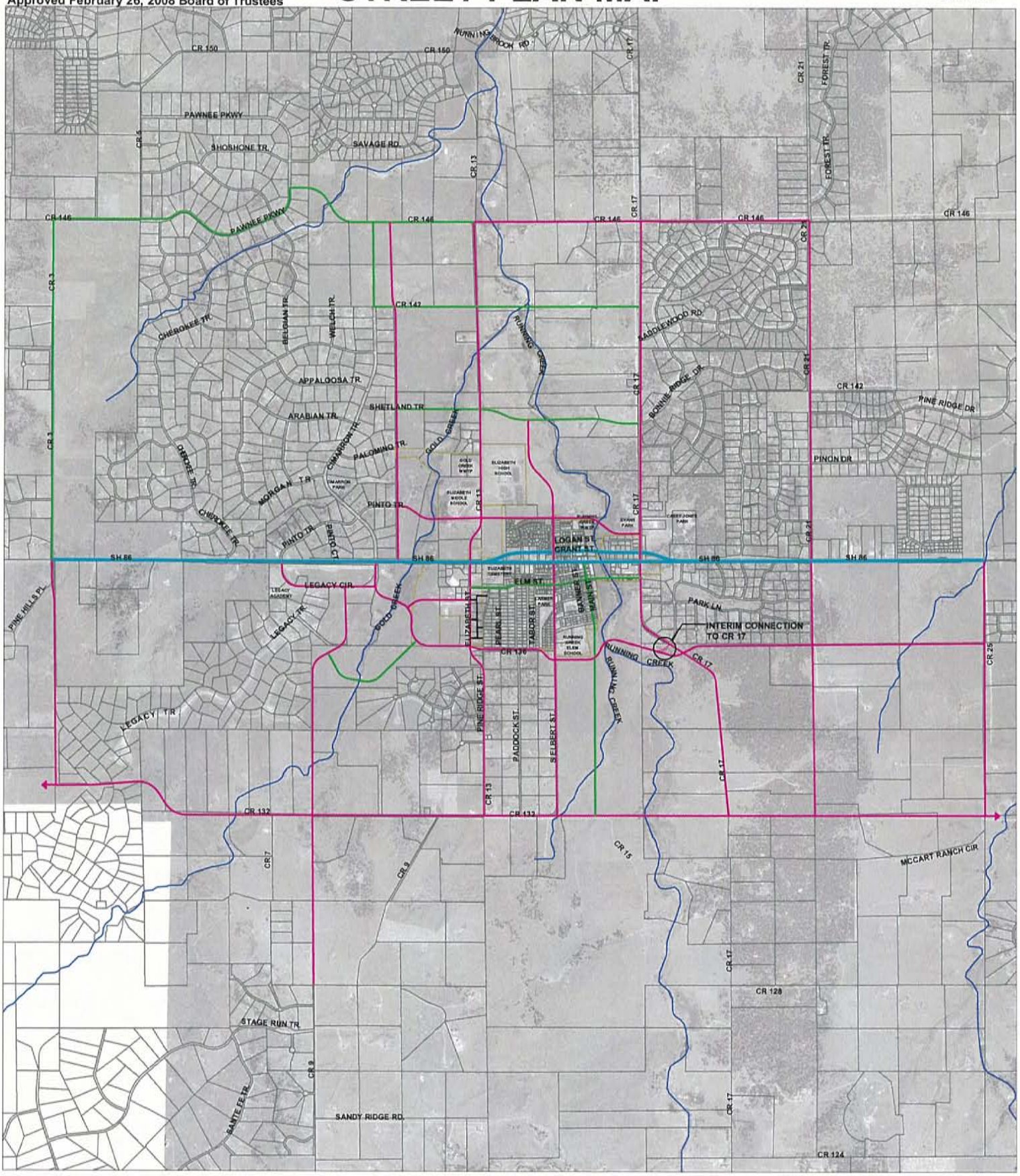
Kansas State University Modern Roundabouts Information
http://www.ksu.edu/roundabouts/

Caltrans Roundabout Design Bulletin
http://www.dot.ca.gov/hq/oppd/dib/dib80-01.htm

Appendix E.
Town of Elizabeth Street Plan

TOWN OF ELIZABETH
STREET PLAN MAP

Adopted February 19, 2008 Planning Commission
Approved February 26, 2008 Board of Trustees



LEGEND

- Arterial
- Major Collector
- Minor Collector
- Local
- Parcel Line
- Town Boundary
- Waterways

DRAFT

SCALE: 1"=4000'

N

Appendix F.
Cost Estimates for Collectors and Arterials

Elbert County Roadway Improvement Unit Costs

Improvement	Roadway Classification	ROW	Width of Pavement	Gravel Walk	Curb & Gutter	Concrete Walk	Cost Per Foot	Cost per Mile
6" Asphalt Pavement	Local Type II - Rural	70	36	0	No	No	$99	$522,720
	Major Collector - Rural	90'	40	6	Yes	No	$113	$596,640

Improvement	Roadway Classification	ROW	Width of Pavement	Gravel Walk	Curb & Gutter	Concrete Walk	Cost Per Foot	Cost per Mile
7" Asphalt Pavement	Minor Art - 2 lane Rural	107'	40	0	Yes	8	$159	$839,520
	Major Art - 4 lane Rural	120'	64	0	Yes	8	$236	$1,246,080

Elbert County Roadway Costs Assumptions

Bridge Cost	$	400,000.00	*Bridges assumed are: 50 feet wide and 80 feet long bridge @ $100 per sq foot*			
Signalized Inter Cost	$	250,000.00	*Assume $200,000 for signal, and $50,000 for additional turn lanes and paving*			
ROW Cost / SF	$	1.00				

Future ROW Width	Improvement Code	Description	Overlay COST Per Mile	Sub-Surface COST Per Mile	Walkway Width (Bothsides)	Effective Sub Surface Width (Pvmt plus 2'), Earthwork (Pvmt + 32')
60	1	Local - 70 foot ROW	$ 522,720.00	$ 667,235.56	0	38
90	2	Two Lane Collector - 90 foot ROW	$ 596,640.00	$ 713,386.67	6	42
107	3	Two Lane Minor Arterial - 107 foot ROW	$ 839,520.00	$ 713,386.67	8	42
120	4	Four Lane Arterial - 120 foot ROW	$ 1,246,080.00	$ 990,293.33	8	66

Local - 70 foot ROW		**Cost per Cu yd**	**Depth in feet**	**Surface Width (Pvmt plus 2'), Earthwork (Pvmt + 32')**	**Volumes in Cu Yds per mile**	**Total Cost**
	Cut/Fill	$ 13.00	3	68	39,893	$ 518,613.33
	ABC	$ 30.00	0.667	38	4,954	$ 148,622.22
						$ 667,235.56
Two Lane Collector - 90 foot ROW						
	Cut/Fill	$ 13.00	3	72	42,240	$ 549,120.00
	ABC	$ 30.00	0.667	42	5,476	$ 164,266.67
						$ 713,386.67
Two Lane Minor Arterial - 107 foot ROW						
	Cut/Fill	$ 13.00	3	72	42,240	$ 549,120.00
	ABC	$ 30.00	0.667	42	5,476	$ 164,266.67
						$ 713,386.67
Four Lane Arterial - 120 foot ROW						
	Cut/Fill	$ 13.00	3	96	56,320	$ 732,160.00
	ABC	$ 30.00	0.667	66	8,604	$ 258,133.33
						$ 990,293.33

Numbers in Green are used in calculations

NOTE: All existing roads are assumed at 60 feet ROW

Roadway Plan Cost Estimate

East West Segments

Roadway Segment		Total Segment DISTANCE (In Miles)	Future ROW	Extra ROW Needed	Extra ROW Needed for Entire Segment (In SF)	Number of Inter-sections	Number of Bridges	Bridges Cost	Overlay Cost Per Mile	Overlay Cost	Sub Surface Cost Per Mile	Sub Surface Cost	Paving and Subbase Subtotal (X)	Drainage	Other Unlisted Items (Mob, Util, Misc, Signing, Traf Control...)	Total of Construction Bid Items	Prelliminary and Construction Engineering (10% + 15%)	Right-of-way Cost	Grand Total Cost
													=SUB+OVERLAY	=10% of Subtotal	35% of Br, subtotal, sig and Drainage		=25% of subtotal of items		(Const + PE + CE + ROW)
Corridor	Logical Segments																		
Countyline Rd	CR1 to CR-17	4	120	60	1267200	1	1	$ 400,000	$ 1,246,080	$ 4,984,320	$ 990,293	$ 3,961,173	$ 8,945,493	$ 894,549	$ 3,584,015	$ 13,824,058	$ 3,456,014	$ 1,267,200	$ 18,547,272
Countyline Rd	CR-17 to CR-29	3	120	60	950400	1	1	$ 400,000	$ 1,246,080	$ 3,738,240	$ 990,293	$ 2,970,880	$ 6,709,120	$ 670,912	$ 2,723,011	$ 10,503,043	$ 2,625,761	$ 950,400	$ 14,079,204
Countyline Rd	CR-29 to CR-53	5.75	120	60	1821600	0	1	$ 400,000	$ 1,246,080	$ 7,164,960	$ 990,293	$ 5,694,187	$ 12,859,147	$ 1,285,915	$ 5,090,771	$ 19,635,833	$ 4,908,958	$ 1,821,600	$ 26,366,391
Countyline Rd	CR-53 to CR-65	3	120	60	950400	0	2	$ 800,000	$ 1,246,080	$ 3,738,240	$ 990,293	$ 2,970,880	$ 6,709,120	$ 670,912	$ 2,863,011	$ 11,043,043	$ 2,760,761	$ 950,400	$ 14,754,204
Countyline Rd	CR-65 to CR-105	10	120	60	3168000	0	4	$ 1,600,000	$ 1,246,080	$ 12,460,800	$ 990,293	$ 9,902,933	$ 22,363,733	$ 2,236,373	$ 9,170,037	$ 35,370,144	$ 8,842,536	$ 3,168,000	$ 47,380,680
																			$ -
CR-8	CR1 to CR-17	4	90	30	1900800	1	1	$ 400,000	$ 596,640	$ 2,386,560	$ 713,387	$ 2,853,547	$ 5,240,107	$ 524,011	$ 2,157,441	$ 8,321,558	$ 2,080,390	$ 1,900,800	$ 12,302,748
CR-8	CR-17 to CR-29	3	90	30	1425600	0	1	$ 400,000	$ 596,640	$ 1,789,920	$ 713,387	$ 2,140,160	$ 3,930,080	$ 393,008	$ 1,653,081	$ 6,376,169	$ 1,594,042	$ 1,425,600	$ 9,395,811
																			$ -
CR-174	CR-29 to CR-49	5	90	30	792000	1	1	$ 400,000	$ 596,640	$ 2,983,200	$ 713,387	$ 3,566,933	$ 6,550,133	$ 655,013	$ 2,661,801	$ 10,266,948	$ 2,566,737	$ 792,000	$ 13,625,685
CR-174	CR-53 to CR-65	3	90	30	1425600	0	1	$ 400,000	$ 596,640	$ 1,789,920	$ 713,387	$ 2,140,160	$ 3,930,080	$ 393,008	$ 1,653,081	$ 6,376,169	$ 1,594,042	$ 1,425,600	$ 9,395,811
																			$ -
CR-166	CR-1 to CR-17	4	120	60	1267200	0	1	$ 400,000	$ 1,246,080	$ 4,984,320	$ 990,293	$ 3,961,173	$ 8,945,493	$ 894,549	$ 3,584,015	$ 13,824,058	$ 3,456,014	$ 1,267,200	$ 18,547,272
CR-166	CR-17 to CR-29	3	120	60	950400	1	2	$ 800,000	$ 1,246,080	$ 3,738,240	$ 990,293	$ 2,970,880	$ 6,709,120	$ 670,912	$ 2,863,011	$ 11,043,043	$ 2,760,761	$ 950,400	$ 14,754,204
CR-166	CR-29 to CR-49	5	120	60	3168000	1	1	$ 400,000	$ 1,246,080	$ 6,230,400	$ 990,293	$ 4,951,467	$ 11,181,867	$ 1,118,187	$ 4,445,019	$ 17,145,072	$ 4,286,268	$ 3,168,000	$ 24,599,340
CR-166	CR-49 to CR-69	5	90	30	2376000	0	2	$ 800,000	$ 596,640	$ 2,983,200	$ 713,387	$ 3,566,933	$ 6,550,133	$ 655,013	$ 2,801,801	$ 10,806,948	$ 2,701,737	$ 2,376,000	$ 15,884,685
CR-166	CR-69 to CR-85	4	90	30	633600	0	1	$ 400,000	$ 596,640	$ 2,386,560	$ 713,387	$ 2,853,547	$ 5,240,107	$ 524,011	$ 2,157,441	$ 8,321,558	$ 2,080,390	$ 633,600	$ 11,035,548
																			$ -
Hilltop Rd	CR-1 to CR-13	3	120	60	950400	0	1	$ 400,000	$ 1,246,080	$ 3,738,240	$ 990,293	$ 2,970,880	$ 6,709,120	$ 670,912	$ 2,723,011	$ 10,503,043	$ 2,625,761	$ 950,400	$ 14,079,204
																			$ -
CR-154	CR-13 to CR-29	4	90	30	1267200	1	1	$ 400,000	$ 596,640	$ 2,386,560	$ 713,387	$ 2,853,547	$ 5,240,107	$ 524,011	$ 2,157,441	$ 8,321,558	$ 2,080,390	$ 1,267,200	$ 11,669,148
CR-154	CR-29 to Kiowa Bennette	4	90	30	1900800	1	2	$ 800,000	$ 596,640	$ 2,386,560	$ 713,387	$ 2,853,547	$ 5,240,107	$ 524,011	$ 2,297,441	$ 8,861,558	$ 2,215,390	$ 1,900,800	$ 12,977,748
CR-154	Kiowa bennet to CR-69	6	90	30	1742400	0	2	$ 800,000	$ 596,640	$ 3,579,840	$ 713,387	$ 4,280,320	$ 7,860,160	$ 786,016	$ 3,306,162	$ 12,752,338	$ 3,188,084	$ 1,742,400	$ 17,682,822
																			$ -
CR-150	CR-61 to CR-85	4.75	90	30	752400	0	1	$ 400,000	$ 596,640	$ 2,834,040	$ 713,387	$ 3,388,587	$ 6,222,627	$ 622,263	$ 2,535,711	$ 9,780,601	$ 2,445,150	$ 752,400	$ 12,978,151
CR-150	CR-85 to Rodge Rd	4.75	90	30	752400	0		$ -	$ 596,640	$ 2,834,040	$ 713,387	$ 3,388,587	$ 6,222,627	$ 622,263	$ 2,395,711	$ 9,240,601	$ 2,310,150	$ 752,400	$ 12,303,151
																			$ -
CR- 146	CR-13 to CR-33	5	90	30	1267200	1	1	$ 400,000	$ 596,640	$ 2,983,200	$ 713,387	$ 3,566,933	$ 6,550,133	$ 655,013	$ 2,661,801	$ 10,266,948	$ 2,566,737	$ 1,267,200	$ 14,100,885
CR- 146	CR-33 to Kiowa Benette	2.75	90	30	1306800	0	2	$ 800,000	$ 596,640	$ 1,640,760	$ 713,387	$ 1,961,813	$ 3,602,573	$ 360,257	$ 1,666,991	$ 6,429,821	$ 1,607,455	$ 1,306,800	$ 9,344,077
																			$ -
CR-134	CR-45 to CR-61	4.5	90	30	1425600	1	1	$ 400,000	$ 596,640	$ 2,684,880	$ 713,387	$ 3,210,240	$ 5,895,120	$ 589,512	$ 2,409,621	$ 9,294,253	$ 2,323,563	$ 1,425,600	$ 13,043,417
CR-134	CR-61 to CR-85	5.5	90	30	2613600	0	2	$ 800,000	$ 596,640	$ 3,281,520	$ 713,387	$ 3,923,627	$ 7,205,147	$ 720,515	$ 3,053,981	$ 11,779,643	$ 2,944,911	$ 2,613,600	$ 17,338,154
CR-134	CR-85 to CR-99	3	90	30	1425600	0	1	$ 400,000	$ 596,640	$ 1,789,920	$ 713,387	$ 2,140,160	$ 3,930,080	$ 393,008	$ 1,653,081	$ 6,376,169	$ 1,594,042	$ 1,425,600	$ 9,395,811
																			$ -
																			$ -
SH-86 Corridor																			
SH-86	CR-1 to CR-9	2.5	120	60	792000	0	0	$ -	$ 1,246,080	$ 3,115,200	$ 990,293	$ 2,475,733	$ 5,590,933	$ 559,093	$ 2,152,509	$ 8,302,536	$ 2,075,634	$ 792,000	$ 11,170,170
SH-86	CR-9 to CR-21	2.5	120	60	792000	1	2	$ 800,000	$ 1,246,080	$ 3,115,200	$ 990,293	$ 2,475,733	$ 5,590,933	$ 559,093	$ 2,432,509	$ 9,382,536	$ 2,345,634	$ 792,000	$ 12,520,170
SH-86	CR-21 to CR-33	3.25	120	60	1029600	0	2	$ 800,000	$ 1,246,080	$ 4,049,760	$ 990,293	$ 3,218,453	$ 7,268,213	$ 726,821	$ 3,078,262	$ 11,873,297	$ 2,968,324	$ 1,029,600	$ 15,871,221
SH-86	CR-33 to Kiowa bennett	3	120	60	950400	1	1	$ 400,000	$ 1,246,080	$ 3,738,240	$ 990,293	$ 2,970,880	$ 6,709,120	$ 670,912	$ 2,723,011	$ 10,503,043	$ 2,625,761	$ 950,400	$ 14,079,204
SH-86	Kiowa Bennette to CR-61	4.5	90	30	712800	0	1	$ 400,000	$ 596,640	$ 2,684,880	$ 713,387	$ 3,210,240	$ 5,895,120	$ 589,512	$ 2,409,621	$ 9,294,253	$ 2,323,563	$ 712,800	$ 12,330,617
SH-86	CR-61 to CR-77	4.5	90	30	712800	0	1	$ 400,000	$ 596,640	$ 2,684,880	$ 713,387	$ 3,210,240	$ 5,895,120	$ 589,512	$ 2,409,621	$ 9,294,253	$ 2,323,563	$ 712,800	$ 12,330,617
SH-86	CR-77 to CR-105	7	90	30	1108800	0	2	$ 800,000	$ 596,640	$ 4,176,480	$ 713,387	$ 4,993,707	$ 9,170,187	$ 917,019	$ 3,810,522	$ 14,697,727	$ 3,674,432	$ 1,108,800	$ 19,480,959
																			$ -
CR-118	CR-1 to CR-17	4.5	90	30	1425600	1	1	$ 400,000	$ 596,640	$ 2,684,880	$ 713,387	$ 3,210,240	$ 5,895,120	$ 589,512	$ 2,409,621	$ 9,294,253	$ 2,323,563	$ 1,425,600	$ 13,043,417
CR-118	CR-17 to CR-25	4.75	90	30	2257200	1	3	$ 1,200,000	$ 596,640	$ 2,834,040	$ 713,387	$ 3,388,587	$ 6,222,627	$ 622,263	$ 2,815,711	$ 10,860,601	$ 2,715,150	$ 2,257,200	$ 15,832,951
CR-118	CR-25 to CR-61	6	90	30	1900800	0	1	$ 400,000	$ 596,640	$ 3,579,840	$ 713,387	$ 4,280,320	$ 7,860,160	$ 786,016	$ 3,166,162	$ 12,212,338	$ 3,053,084	$ 1,900,800	$ 17,166,222
																			$ -
CR-98	CR-1 to CR-21	5	90	30	792000	0	1	$ 400,000	$ 596,640	$ 2,983,200	$ 713,387	$ 3,566,933	$ 6,550,133	$ 655,013	$ 2,661,801	$ 10,266,948	$ 2,566,737	$ 792,000	$ 13,625,685
CR-98	CR-21 to CR-33	3.25	90	30	514800	1	1	$ 400,000	$ 596,640	$ 1,939,080	$ 713,387	$ 2,318,507	$ 4,257,587	$ 425,759	$ 1,779,171	$ 6,862,516	$ 1,715,629	$ 514,800	$ 9,092,945
																			$ -
CR-94	CR-33 to CR-61	7	90	30	1584000	1	1	$ 400,000	$ 596,640	$ 4,176,480	$ 713,387	$ 4,993,707	$ 9,170,187	$ 917,019	$ 3,670,522	$ 14,157,727	$ 3,539,432	$ 1,584,000	$ 19,281,159
CR-94	CR-61 to CR-81	6	90	30	950400	0	2	$ 800,000	$ 596,640	$ 3,579,840	$ 713,387	$ 4,280,320	$ 7,860,160	$ 786,016	$ 3,306,162	$ 12,752,338	$ 3,188,084	$ 950,400	$ 16,890,822
																			$ -
CR-86	CR-1 to CR-17	4	90	30	633600	0	1	$ 400,000	$ 596,640	$ 2,386,560	$ 713,387	$ 2,853,547	$ 5,240,107	$ 524,011	$ 2,157,441	$ 8,321,558	$ 2,080,390	$ 633,600	$ 11,035,548
CR-86 Diagonal / Kiowa Creek Rd	CR-17 to Elbert Rd	3.75	90	30	594000	0	0	$ -	$ 596,640	$ 2,237,400	$ 713,387	$ 2,675,200	$ 4,912,600	$ 491,260	$ 1,891,351	$ 7,295,211	$ 1,823,803	$ 594,000	$ 9,713,014

E-W Sub-Total $ 619,046,141

Roadway Plan Cost Estimate

North South Segments

Corridor	Roadway Segment	Total Segment DISTANCE (In Miles)	Improvement ROW	Extra ROW Needed	Extra ROW Needed for Entire Segment (in SF)	Number of Intersections	Number of Bridges	Bridges Cost	Overlay Cost Per Mile	Overlay Cost	Sub Surface Cost Per Mile	Sub Surface Cost	Paving and Subbase Subtotal (X)	Drainage	Other Unlisted items (Mob, Util, Misc, Signing, Traf Control...)	Total of Construction Bid Items	Prelliminary and Construction Engineering (10% + 15%)	Right-of-way Cost	Grand Total Cost
	Logical Segments												=SUB+OVERLAY	=10% of Subtotal	35% of Br, subtotal, sig and Drainage		=25% of subtotal of items		(Const + PE + CE + ROW)
CR-1	County Line Rd to CR-8	3	120	60	950400	0	0	$ -	$ 1,246,080	$ 3,738,240	$ 990,293	$ 2,970,880	$ 6,709,120	$ 670,912	$ 2,583,011	$ 9,963,043	$ 2,490,761	$ 950,400	$ 13,404,204
CR-1	CR-8 to Hilltop Rd	6	120	60	1900800	0	1	$ 400,000	$ 1,246,080	$ 7,476,480	$ 990,293	$ 5,941,760	$ 13,418,240	$ 1,341,824	$ 5,306,022	$ 20,466,086	$ 5,116,522	$ 1,900,800	$ 27,483,408
CR-1	SH-86 to CR-118	4	90	30	633600	0	0	$ -	$ 596,640	$ 2,386,560	$ 713,387	$ 2,853,547	$ 5,240,107	$ 524,011	$ 2,017,441	$ 7,781,558	$ 1,945,390	$ 633,600	$ 10,360,548
																			$ -
CR-5	CR-118 to CR-98	6	90	30	950400	0	0	$ -	$ 596,640	$ 3,579,840	$ 713,387	$ 4,280,320	$ 7,860,160	$ 786,016	$ 3,026,162	$ 11,672,338	$ 2,918,084	$ 950,400	$ 15,540,822
																			$ -
CR-9	SH-86 to CR-118	4.25	90	30	1481040	0	1	$ 400,000	$ 596,640	$ 2,535,720	$ 713,387	$ 3,031,893	$ 5,567,613	$ 556,761	$ 2,283,531	$ 8,807,906	$ 2,201,976	$ 1,481,040	$ 12,490,922
																			$ -
CR-13	CR-166 to CR-154	3	120	60	950400	0	1	$ 400,000	$ 1,246,080	$ 3,738,240	$ 990,293	$ 2,970,880	$ 6,709,120	$ 670,912	$ 2,723,011	$ 10,503,043	$ 2,625,761	$ 950,400	$ 14,079,204
CR-13	CR-154 to SH-86	4	120	60	1267200	0	1	$ 400,000	$ 1,246,080	$ 4,984,320	$ 990,293	$ 3,961,173	$ 8,945,493	$ 894,549	$ 3,584,015	$ 13,824,058	$ 3,456,014	$ 1,267,200	$ 18,547,272
																			$ -
CR-17	County Line Rd to CR-8	3	90	30	475200	0	0	$ -	$ 596,640	$ 1,789,920	$ 713,387	$ 2,140,160	$ 3,930,080	$ 393,008	$ 1,513,081	$ 5,836,169	$ 1,459,042	$ 475,200	$ 7,770,411
CR-17	CR-8 to CR-166	4	90	30	1267200	0	0	$ -	$ 596,640	$ 2,386,560	$ 713,387	$ 2,853,547	$ 5,240,107	$ 524,011	$ 2,017,441	$ 7,781,558	$ 1,945,390	$ 1,267,200	$ 10,994,148
																			$ -
CR-17/21	SH-86 to CR-118	4.5	90	30	712800	0	0	$ -	$ 596,640	$ 2,684,880	$ 713,387	$ 3,210,240	$ 5,895,120	$ 589,512	$ 2,269,621	$ 8,754,253	$ 2,188,563	$ 712,800	$ 11,655,617
CR-17/21	CR-118 to CR-98	6.5	90	30	1029600	0	0	$ -	$ 596,640	$ 3,878,160	$ 713,387	$ 4,637,013	$ 8,515,173	$ 851,517	$ 3,278,342	$ 12,645,032	$ 3,161,258	$ 1,029,600	$ 16,835,891
																			$ -
CR-21	CR-166 to CR-154	3	90	30	475200	0	0	$ -	$ 596,640	$ 1,789,920	$ 713,387	$ 2,140,160	$ 3,930,080	$ 393,008	$ 1,513,081	$ 5,836,169	$ 1,459,042	$ 475,200	$ 7,770,411
CR-21	CR-154 to SH-86	4	90	30	633600	0	0	$ -	$ 596,640	$ 2,386,560	$ 713,387	$ 2,853,547	$ 5,240,107	$ 524,011	$ 2,017,441	$ 7,781,558	$ 1,945,390	$ 633,600	$ 10,360,548
																			$ -
CR-29	Countyline Rd to CR-8	3	90	30	831600	0	0	$ -	$ 596,640	$ 1,789,920	$ 713,387	$ 2,140,160	$ 3,930,080	$ 393,008	$ 1,513,081	$ 5,836,169	$ 1,459,042	$ 831,600	$ 8,126,811
CR-29	CR-8 to CR-166	4	90	30	633600	0	0	$ -	$ 596,640	$ 2,386,560	$ 713,387	$ 2,853,547	$ 5,240,107	$ 524,011	$ 2,017,441	$ 7,781,558	$ 1,945,390	$ 633,600	$ 10,360,548
CR-29	CR-166 to CR-154	3	90	30	475200	0	0	$ -	$ 596,640	$ 1,789,920	$ 713,387	$ 2,140,160	$ 3,930,080	$ 393,008	$ 1,513,081	$ 5,836,169	$ 1,459,042	$ 475,200	$ 7,770,411
CR-29/33	CR-154 to midpoint kink	2.5	90	30	396000	0	0	$ -	$ 596,640	$ 1,491,600	$ 713,387	$ 1,783,467	$ 3,275,067	$ 327,507	$ 1,260,901	$ 4,863,474	$ 1,215,869	$ 396,000	$ 6,475,343
CR-29/33	midpoint kink to CR-146	1	107	47	248160	0	0	$ -	$ 839,520	$ 839,520	$ 713,387	$ 713,387	$ 1,552,907	$ 155,291	$ 597,869	$ 2,306,066	$ 576,517	$ 248,160	$ 3,130,743
CR-33	CR-146 to SH-86	2.5	107	47	620400	0	0	$ -	$ 839,520	$ 2,098,800	$ 713,387	$ 1,783,467	$ 3,882,267	$ 388,227	$ 1,494,673	$ 5,765,166	$ 1,441,292	$ 620,400	$ 7,826,858
																			$ -
Kiowa Bennette Corridor																			$ -
CR-53	Countyline Rd to CR-174	5	107	47	1557600	0	0	$ -	$ 839,520	$ 4,197,600	$ 713,387	$ 3,566,933	$ 7,764,533	$ 776,453	$ 2,989,345	$ 11,530,332	$ 2,882,583	$ 1,557,600	$ 15,970,515
CR-174	CR-53 to CR-49	1	107	47	248160	0	0	$ -	$ 839,520	$ 839,520	$ 713,387	$ 713,387	$ 1,552,907	$ 155,291	$ 597,869	$ 2,306,066	$ 576,517	$ 248,160	$ 3,130,743
CR-49	CR-174 to CR-166	2	107	47	496320	0	0	$ -	$ 839,520	$ 1,679,040	$ 713,387	$ 1,426,773	$ 3,105,813	$ 310,581	$ 1,195,738	$ 4,612,133	$ 1,153,033	$ 496,320	$ 6,261,486
CR-49	CR-166 to CR-154	3.5	107	47	868560	0	0	$ -	$ 839,520	$ 2,938,320	$ 713,387	$ 2,496,853	$ 5,435,173	$ 543,517	$ 2,092,542	$ 8,071,232	$ 2,017,808	$ 868,560	$ 10,957,601
CR-49	CR-154 to SH-86	3.25	107	47	806520	0	0	$ -	$ 839,520	$ 2,728,440	$ 713,387	$ 2,318,507	$ 5,046,947	$ 504,695	$ 1,943,074	$ 7,494,716	$ 1,873,679	$ 806,520	$ 10,174,915
CR-25	SH-86 to CR-118	3.5	107	47	868560	0	0	$ -	$ 839,520	$ 2,938,320	$ 713,387	$ 2,496,853	$ 5,435,173	$ 543,517	$ 2,092,542	$ 8,071,232	$ 2,017,808	$ 868,560	$ 10,957,601
CR-41	CR-118 to CR-98	6.5	107	47	1613040	0	0	$ -	$ 839,520	$ 5,456,880	$ 713,387	$ 4,637,013	$ 10,093,893	$ 1,009,389	$ 3,886,149	$ 14,989,432	$ 3,747,358	$ 1,613,040	$ 20,349,830
Elbert Rd	CR-98 to CR-74 (countyline south)	7.5	107	47	1861200	0	0	$ -	$ 839,520	$ 6,296,400	$ 713,387	$ 5,350,400	$ 11,646,800	$ 1,164,680	$ 4,484,018	$ 17,295,498	$ 4,323,875	$ 1,861,200	$ 23,480,573
																			$ -
CR-45	SH-86 to CR-118	4	90	30	633600	0	0	$ -	$ 596,640	$ 2,386,560	$ 713,387	$ 2,853,547	$ 5,240,107	$ 524,011	$ 2,017,441	$ 7,781,558	$ 1,945,390	$ 633,600	$ 10,360,548
CR-45	CR-118 to CR-110	3	90	30	1267200	0	1	$ 400,000	$ 596,640	$ 1,789,920	$ 713,387	$ 2,140,160	$ 3,930,080	$ 393,008	$ 1,653,081	$ 6,376,169	$ 1,594,042	$ 1,267,200	$ 9,237,411
																			$ -
CR-65	Countyline Rd to CR-174	5	90	30	792000	0	0	$ -	$ 596,640	$ 2,983,200	$ 713,387	$ 3,566,933	$ 6,550,133	$ 655,013	$ 2,521,801	$ 9,726,948	$ 2,431,737	$ 792,000	$ 12,950,685
CR-65	CR-174 to CR-166	2	90	30	316800	0	0	$ -	$ 596,640	$ 1,193,280	$ 713,387	$ 1,426,773	$ 2,620,053	$ 262,005	$ 1,008,721	$ 3,890,779	$ 972,695	$ 316,800	$ 5,180,274
																			$ -
CR-69	CR-166 to CR-154	3	90	30	475200	0	0	$ -	$ 596,640	$ 1,789,920	$ 713,387	$ 2,140,160	$ 3,930,080	$ 393,008	$ 1,513,081	$ 5,836,169	$ 1,459,042	$ 475,200	$ 7,770,411
CR-61	CR-154 to CR-134	5.25	90	30	831600	0	1	$ 400,000	$ 596,640	$ 3,132,360	$ 713,387	$ 3,745,280	$ 6,877,640	$ 687,764	$ 2,787,891	$ 10,753,295	$ 2,688,324	$ 831,600	$ 14,273,219
CR-61	CR-134 to SH-86	2	90	30	316800	0	0	$ -	$ 596,640	$ 1,193,280	$ 713,387	$ 1,426,773	$ 2,620,053	$ 262,005	$ 1,008,721	$ 3,890,779	$ 972,695	$ 316,800	$ 5,180,274
CR-61	SH-86 to CR-118	2.5	90	30	1188000	0	1	$ 400,000	$ 596,640	$ 1,491,600	$ 713,387	$ 1,783,467	$ 3,275,067	$ 327,507	$ 1,400,901	$ 5,403,474	$ 1,350,869	$ 1,188,000	$ 7,942,343
CR-61	CR-118 to CR-94	6	90	30	1584000	0	0	$ -	$ 596,640	$ 3,579,840	$ 713,387	$ 4,280,320	$ 7,860,160	$ 786,016	$ 3,026,162	$ 11,672,338	$ 2,918,084	$ 1,584,000	$ 16,174,422
																			$ -
CR-77	SH-86 to CR-94	6.5	90	30	1029600	0	0	$ -	$ 596,640	$ 3,878,160	$ 713,387	$ 4,637,013	$ 8,515,173	$ 851,517	$ 3,278,342	$ 12,645,032	$ 3,161,258	$ 1,029,600	$ 16,835,891
																			$ -
CR-81	CR-94 to CR-74	5.5	90	30	871200	0	1	$ 400,000	$ 596,640	$ 3,281,520	$ 713,387	$ 3,923,627	$ 7,205,147	$ 720,515	$ 2,913,981	$ 11,239,643	$ 2,809,911	$ 871,200	$ 14,920,754
																			$ -
CR-85	CR-166 to CR-150	4	90	30	633600	0	0	$ -	$ 596,640	$ 2,386,560	$ 713,387	$ 2,853,547	$ 5,240,107	$ 524,011	$ 2,017,441	$ 7,781,558	$ 1,945,390	$ 633,600	$ 10,360,548
CR-85	CR-150 to Wedemyer Rd	4	90	30	1584000	0	0	$ -	$ 596,640	$ 2,386,560	$ 713,387	$ 2,853,547	$ 5,240,107	$ 524,011	$ 2,017,441	$ 7,781,558	$ 1,945,390	$ 1,584,000	$ 11,310,948
CR-85	Wedemyer Rd to SH-86	4.5	90	30	2138400	0	1	$ 400,000	$ 596,640	$ 2,684,880	$ 713,387	$ 3,210,240	$ 5,895,120	$ 589,512	$ 2,409,621	$ 9,294,253	$ 2,323,563	$ 2,138,400	$ 13,756,217

N-S Sub-Total	$ 478,521,323
Traffic Signalization Subtotal (Assume 10 signalized intersections)	$ 2,500,000
Grand Total	$ 1,100,067,464

NOTE: All existing roads are assumed at 60 feet ROW