



Environmental Assessment and Draft Section 4(f) Evaluation



July 2007

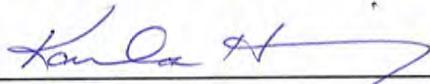


CDOT STA 402A-003
SH 402
US 287 to I-25 Interchange
ENVIRONMENTAL ASSESSMENT
and
DRAFT SECTION 4(F) EVALUATION
Larimer County, Colorado

Submitted Pursuant to
42 USC 4332(2)(c), 49 USC 303

by the
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
and
THE COLORADO DEPARTMENT OF TRANSPORTATION

Submitted By:

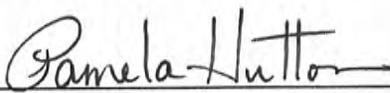


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FHWA Guidance on 23 USC 139(1)

A Federal agency may publish a notice in the Federal Register, pursuant to 23 USC 139(1), indicating that one or more federal agencies have taken final actions on permits, license, or approvals for a transportation project. If such notice is published, claims seeking judicial review of those Federal agency action will be barred unless such claims are filed within 180 days after the date of the notice, or within such shorter time period as is specified in the Federal laws pursuant to which judicial review of the Federal agency action is allowed. If no notice is published, then the periods of time that otherwise are provided by the federal laws governing such claims will apply.

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Glossary



Glossary

AASHTO

American Association of State Highway and Transportation Officials

Alternatives Analysis

The process by which alternatives identified in the scoping process are screened to determine how well each meets the project purpose and need. Alternatives that qualify after screening are included in the environmental assessment for further analysis and ultimately in the identification of the preferred alternative.

AMI

area median income

APCD

Air Pollution Control Division (of the Colorado Department of Public Health and Environment)

Average Daily Traffic (ADT)

The average two-way traffic (number of vehicles) on a given highway over a 24-hour period.

Best Management Practice (BMP)

Any program, technology, process, siting criteria, operating method measure, or device that controls, prevents, removes, or reduces effects from a project or activity on the surrounding area.

Capacity

The maximum rate of traffic flow at which vehicles can traverse a point of highway in 1 hour.

CDOW

Colorado Division of Wildlife

CDOT

Colorado Department of Transportation

CDPHE

Colorado Department of Public Health and Environment

CE

categorical exclusion

Clean Water Act (CWA)

The Federal Water Pollution Control Act enacted in 1972 by Public Law 92-500 and amended by the Water Quality Act of 1987. The CWA prohibits discharge of pollutants to waters of the United States without a National Pollutant Discharge and Elimination System permit. Section 404 of the CWA addresses protection of wetlands and aquatic habitats from dredge and fill activities.

CNHP

Colorado Natural Heritage Program

Corridor

In this document, a highway and associated right-of-way only.

Council on Environmental Quality (CEQ)

The US Congress established the CEQ within the Executive Office of the President as part of the National Environmental Policy Act of 1969. Additional responsibilities were provided by the Environmental Quality Improvement Act of 1970.

CR

county road

dB

decibel

dB(A)

A-weighted decibel

DOLA

Department of Local Affairs

DOT

Department of Transportation

Early Action Compact (EAC)

Agreements between Environmental Protection Agency and communities to reduce ground-level ozone pollution. EACs require communities to develop and implement air pollution control strategies; account for emissions growth, and achieve and maintain the national 8-hour ozone standard.

EB

eastbound

Endangered Species Act (ESA)

Legislation passed by Congress in 1973 to protect listed plant and animal species and their habitats from harm.

Environmental Assessment (EA)

A document prepared by a federal agency under National Environmental Policy Act regulations to provide sufficient evidence and analysis of a proposed project or action to determine whether to prepare an environmental impact statement or a finding of no significant impact.

Environmental Protection Agency (EPA)

The US agency responsible for controlling air pollution, water pollution, noise, radiation hazards, pesticide hazards, solid waste disposal, and other potential risks to the natural environment.

EO

Executive Order

Expressway

A multilane, divided highway designed to move large volumes of traffic at high speeds under free-flow conditions with full control of access.

Farmland Protection Policy Act (FPPA)

Enacted in 1981 to minimize the extent to which federally funded projects contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses.

FEMA

Federal Emergency Management Agency

FHWA

Federal Highway Administration

Finding of No Significant Impact (FONSI)

A decision rendered as the result of an environmental assessment indicating that a proposed action has no significant environmental impacts that cannot be appropriately mitigated.

FIS

Flood Insurance Study

Floodplain

An area adjacent to a stream or lake that is inundated periodically by high flows.

GIS

geographic information system

Grade-Separated Intersection

An intersection of highway roads, railroad tracks, or dedicated transit rail tracks that run either parallel or across at different surface elevations.

Growth Management Area (GMA)

The result of the 1980s' Intergovernmental Agreement between Larimer County and the city of Loveland. The primary purpose of the Loveland GMA is to focus urban development adjacent to cities and towns in areas that could be annexed.

Habitat

The environment in which an organism lives; the arrangement of food, water, cover, climate, and space suitable to meet the needs of an animal or a plant.

HASP

Health and Safety Plan

Hazardous Materials

Materials that pose a risk to human health or the environment.

HCS

Highway Capacity Software

HHS

Health and Human Services
(US Department of)

HOV

High Occupancy Vehicle

HUD

Housing and Urban Development
(US Department of)

IGA

intergovernmental agreement

LEDPA

least environmentally damaging
practicable alternative per
CFR 40 Part 230 Section 404(b)(1)

LESA

Land Evaluation and Site Assessment

Level of Service (LOS)

A qualitative measure of the operational characteristics of a traffic stream, ranked from A (best) to F (worst). LOS is described in terms of speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.



Level of Service A: Free-flow operations; vehicles are able to move freely within the traffic stream. Average spacing between vehicles is 528 feet or 26 car lengths, giving motorists a high comfort level. Effects of minor traffic incidents are easily absorbed, with traffic quickly returning to free-flow operation.

Level of Service B: Reasonably free-flow; speeds are generally maintained. Lowest average spacing between vehicles is 330 feet or 18 car lengths. Ability to maneuver within the traffic stream is only slightly restricted; the motorist has a generally high comfort level. Incidents are still quickly absorbed.





Level of Service C: Speeds are still at or near free-flow speeds, but freedom to maneuver is noticeably restricted; lane changes require vigilance. Minimum average spacing between vehicles is in the range of 220 feet or 11 car lengths. Queues may form behind any significant lane blockage. Drivers experience an increase in tension because of additional vigilance required for safe operation.

Level of Service D: Speeds begin to decline slightly with increasing flows. Vehicles are spaced at about 165 feet or 9 car lengths. In this range, density begins to increase more quickly with increasing flow. Freedom to maneuver is more limited; drivers experience reduced physical and psychological comfort levels. Even minor disturbances create queuing.



Level of Service E: Operations are volatile, because there are virtually no usable gaps in the traffic stream. Vehicles are spaced at approximately 6 car lengths, with little room to maneuver at more than 50 mph. Any disruption (vehicles entering from an entrance ramp or changing lanes) causes a disruption wave to move throughout the traffic flow. The lower boundary of LOS E (between LOS E and LOS F) is considered to be operating at capacity, at which point the traffic stream has no ability to dissipate any disruptions. Maneuverability is extremely limited, and driver comfort level is extremely poor.

Level of Service F: This LOS signifies a breakdown in vehicular flow. Queues form behind breakdown points that occur because of traffic incidents and recurring points of congestion (merging or weaving where the number of vehicles arriving is greater than the number of vehicles discharged). Breakdown occurs when the ratio of arrival flow rate to actual capacity or the forecast flow rate to estimated capacity exceeds 1.00. Whenever LOS F conditions exist, there is a potential for breakdown in traffic flow to extend upstream for significant distances.



LUST	leaking underground storage tank	on Environmental Quality regulations for implementing NEPA are found in 43 CFR 1500–1508.
M-ESA	Modified Environmental Site Assessment	
MMP	Materials Management Plan	
Mobility	The ability of traffic to move unimpeded through a highway or highway corridor.	
MP	milepost	
MPO	Metropolitan Planning Organization	
MS4	Colorado Department of Transportation's municipal separate storm sewer system	
MSA	Metropolitan Statistical Area	
MVMT	million vehicle miles traveled	
NAAQS	National Ambient Air Quality Standards	
NAC	Noise Abatement Criteria	
National Environmental Policy Act (NEPA)	The National Environmental Policy Act of 1969 establishes policy, sets goals, and provides a means for protection of the environment in federal decision-making. Under NEPA, all federal agencies must consider the environmental impacts of any proposed action that includes federal money or affects federal land and public input in relevant decisions. The Council	
		NAWMA North American Weed Management Association
		NB northbound
		NCEDC Northern Colorado Economic Development Corporation
		NFRT & AQPC North Front Range Transportation and Air Quality Planning Council
		NHPA National Historic Preservation Act of 1966
		No Action Alternative The project alternative that represents projected conditions in a study area without improvement; serves as a baseline for comparing action alternatives.
		NPDES National Pollutant Discharge and Elimination System
		NRCS Natural Resources Conservation Service
		NRHP National Register of Historic Places
		OAHP Office of Archaeology and Historic Preservation
		PCB polychlorinated biphenyl

PEM
Palustrine Persistent Emergent

PFO
Palustrine Persistent Forested

PIP
Public Involvement Program

PM_{2.5}
particulate matter of 2.5 microns or less

PM₁₀
particulate matter of 10 microns or less

Preferred Alternative
The alternative identified by means of the environmental assessment process as the action recommended to meet the purpose and need of a project.

Prime Farmland
Soil units with the best combination of physical and chemical characteristics to produce feed, food, forage, fiber, and oilseed crops as identified in the Farmland Protection Policy Act of 1981.

Purpose and Need
The underlying reason for conducting environmental studies and analysis; the purpose and need to which the agency is responding by proposing alternative solutions.

REA
Rural Electric Association

Receptor
A term used in noise analysis to refer to a site or location potentially subject to noise impacts.

Right-of-Way
A general term denoting land, property, or interest same; usually a strip acquired

for or devoted to transportation purposes.

RTP
Regional Transportation Plan

Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)

Legislation that replaces the Transportation Equity Act for the Twenty-First Century (TEA-21); signed into law on August 10, 2005, as Public Law 109-59. SAFETEA-LU represents the largest surface transportation investment in US history. SAFETEA-LU builds on the foundation of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and TEA-21, supplying the funds and refining the programmatic framework for investments needed to maintain and grow the nation's vital transportation infrastructure. SAFETEA-LU continues an emphasis on a strong fundamental core formula program, coupled with targeted investment, featuring safety, equity, innovative finance, congestion relief, mobility and productivity, efficiency, environmental stewardship, and environmental streamlining.

SB
southbound

Scoping
An open public process initiated at the beginning of an environmental assessment to help identify the relevant agencies' and public's concerns and recommended solutions.

Screening (alternatives analysis)
A systematic process in which a broad range of alternatives is narrowed down to those that best meet the goals of a project based on the project's purpose

and need, and on key issues and concerns related to the study area. Alternatives that pass through the screening process are taken into environmental assessment to identify a preferred alternative.

Section 4(f)

Properties that are defined under Section 4(f) of the Department of Transportation Act of 1966 (49 USC 303). DOT regulations explicitly state that the Secretary of Transportation cannot approve the acquisition of publicly owned land from a park, recreation area, or wildlife refuge, or land from a national, state, or local historic site unless no feasible and prudent alternative exists. These properties are commonly referred to as 4(f) properties.

Section 6(f)

Properties that are defined under Section 6(f)(3) of the Land and Water Conservation Fund Act signed into law on September 3, 1964. These properties consist of publicly owned land, including parks and recreation areas purchased or improved with monies from the Land and Water Conservation Fund, and are intended to remain in use for public recreation in perpetuity.

SH

state highway

SHPO

State Historic Preservation Officer

SIMTRAFFIC

A type of traffic analysis software.

SMARTTrips™

A regional public program designed to reduce automobile dependency and promote the use of alternative transportation in northern Colorado.

SMARTTrips is a division of the North Front Range Transportation and Air Quality Planning Council. The program includes marketing bus transit service to northern Colorado communities. SMARTTrips encourages residents to leave their cars at home at least one day a week to help preserve air quality, decrease traffic congestion, conserve fuel, and promote better health.

Statewide Transportation Improvement Program (STIP)

Identifies necessary transportation improvements throughout Colorado that currently have funding available.

Study Area

In this document, an area larger than the corridor width and associated with a particular resource. The study area varies with the resource being analyzed.

SWMP

stormwater management plan

SYNCHRO HCM

A type of traffic analysis software that uses the average delay to define level of service for signalized and unsignalized intersections.

Threatened and Endangered Species (TES Species)

A classification of plant and animal species listed in the Endangered Species Act. Endangered species are in danger of becoming extinct; threatened species are in danger of being listed as endangered.

Transportation Improvement Program (TIP)

A prioritized program of transportation projects to be implemented in appropriate stages over 3 to 5 years as set forth in Department of

Transportation's joint regulations for transportation programming. The projects are recommended from those in the transportation systems management element and the long-range element of the planning process. Participation in this program is required as a condition for a locality to receive federal transit and highway grants.

UPRR

Union Pacific Railroad

USCOE

United States Army Corps of Engineers

USFWS

United States Fish and Wildlife Service

VMT

vehicle miles traveled

WB

westbound

Weighted Hazard Index (WHI)

Compares the frequency and severity of crashes to the statewide average. WHI values greater than zero exceed the statewide average, and values less than zero are below the statewide average.

WET

wetland evaluation technique

Wetland

An area sufficiently inundated by surface water or groundwater to support a predominance of vegetation adapted for life in saturated soil conditions (bogs, ponds, estuaries, marshes).

Chapter 1

Purpose and Need



Chapter 1. Purpose and Need

1.1 Introduction

State Highway 402 (SH 402) is a heavily used two-lane, east-west arterial connecting United States Highway 287 (US 287, also known as Lincoln Avenue) and Interstate 25 (I-25).¹ This 4-mile highway is located south of the city of Loveland in Larimer County, Colorado. SH 402 serves local residents and businesses and is used as a commuter route to I-25. The project location is shown in Figure 1-1.

Access to a carpool lot (approximately 88 spaces) located at the southwest quadrant of the SH 402 and I-25 interchange was included as a part of this study. Potential improvements at the I-25 interchange are being addressed under the current *North I-25 Environmental Impact Statement*.

SH 402 begins at US 287 and ends at I-25. An existing four-lane highway extends west of US 287 and is known as 14th Street in the city of Loveland. East of I-25, a rural two-lane county highway segment extends east through the edge of Johnstown and into the town of Evans, where it ends.

This Environmental Assessment (EA) encompasses the 4-mile length of SH 402 although improvements are not needed for the area between US 287 and CR 13C (St. Louis Avenue), which was widened by developers in coordination with the city of Loveland and the Colorado Department of Transportation (CDOT) under a Categorical Exclusion (CE) dated

¹ An urban cross section has been developed and partially built from US 287 east to CR 13C; the interim condition will remain until the development on the south side of SH 402 is constructed. This section was constructed by developers in coordination with the city of Loveland and CDOT under a Categorical Exclusion, dated September 18, 2003. Impacts related to widening between US 287 and CR 13C are not included in this analysis, and the existence of this developed portion of SH 402 did not restrict consideration of alternatives.

September 18, 2003. The EA was undertaken to investigate mobility and safety improvements along the SH 402 corridor. Analysis included assessment of both current travel conditions and projections for 2030 to identify and address both current and future travel demand needs.

The **purpose** of this project is to improve mobility and safety along the existing SH 402 from the US 287 intersection east to the I-25 interchange.

The **need** for this project is established by identifying and analyzing the 2030 travel demand and expected growth and development. The existing two-lane highway's substandard design from CR 13C to I-25 includes no turn lanes, narrow shoulders, and poor sight distances (how far ahead a driver can see from the road), resulting in mobility and safety concerns.

Mobility and safety concerns will worsen as traffic increases between now and 2030. Currently, traffic congestion and slowing are observed during peak periods. Public experiences of safety problems are common. Failure to address these problems will result in a highway with heavy congestion, significant delays, and exacerbated safety problems before 2030.

The eastbound morning peak traffic and westbound afternoon peak traffic indicate that SH 402 is used heavily by commuters for access to I-25.

The following terms are used throughout this document. *Corridor* refers to a highway and associated right-of-way only. *Study area* refers to an area larger than the corridor width and associated with a particular resource. The study area varies with the resource being analyzed.

This EA was conducted in accordance with the National Environmental Policy Act. The Federal Highway Administration (FHWA) is the lead agency, and CDOT is the applicant. FHWA requires completion of this study before initiation

of any improvements using federal money. Should improvements be warranted, FHWA will make the final decision on the appropriate action to be taken.

The project is included in the *Statewide Transportation Improvement Program (STIP)*. The STIP identifies necessary transportation improvements throughout Colorado that currently have funding available.

The North Front Range Transportation and Air Quality Planning Council (NFRT & AQPC) *2030 Regional Transportation Plan (RTP)* also shows improvement of SH 402 between US 287 and the I-25 interchange on its list of priorities within the *corridor vision #13 US 34 urban* category. The primary investment need for this corridor is mobility, which is consistent with this EA.

The 2005 update to the *Loveland 1994 Comprehensive Master Plan* cites the highway as a "significant arterial corridor." This formal recognition of the importance of SH 402 and its future mobility and safety indicate that improvements to SH 402 are part of the local and regional goals. SH 402 will be inconsistent with local plans and policies if improvements are not implemented.

The following sections support the project purpose and need.

- Project Purpose: Mobility and Safety
 - Existing SH 402 cross section
 - Level of service (LOS)
 - Crash analysis
- Project Need: Travel Demand and Growth
 - Travel demand
 - Land use and growth
- Photographic Essay

1.2 Project Purpose: Mobility and Safety

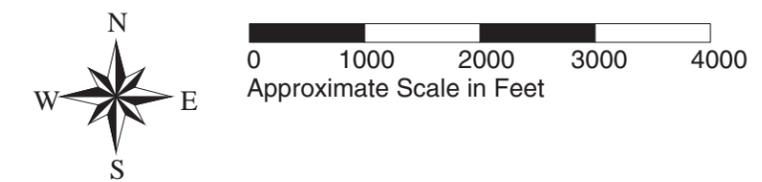
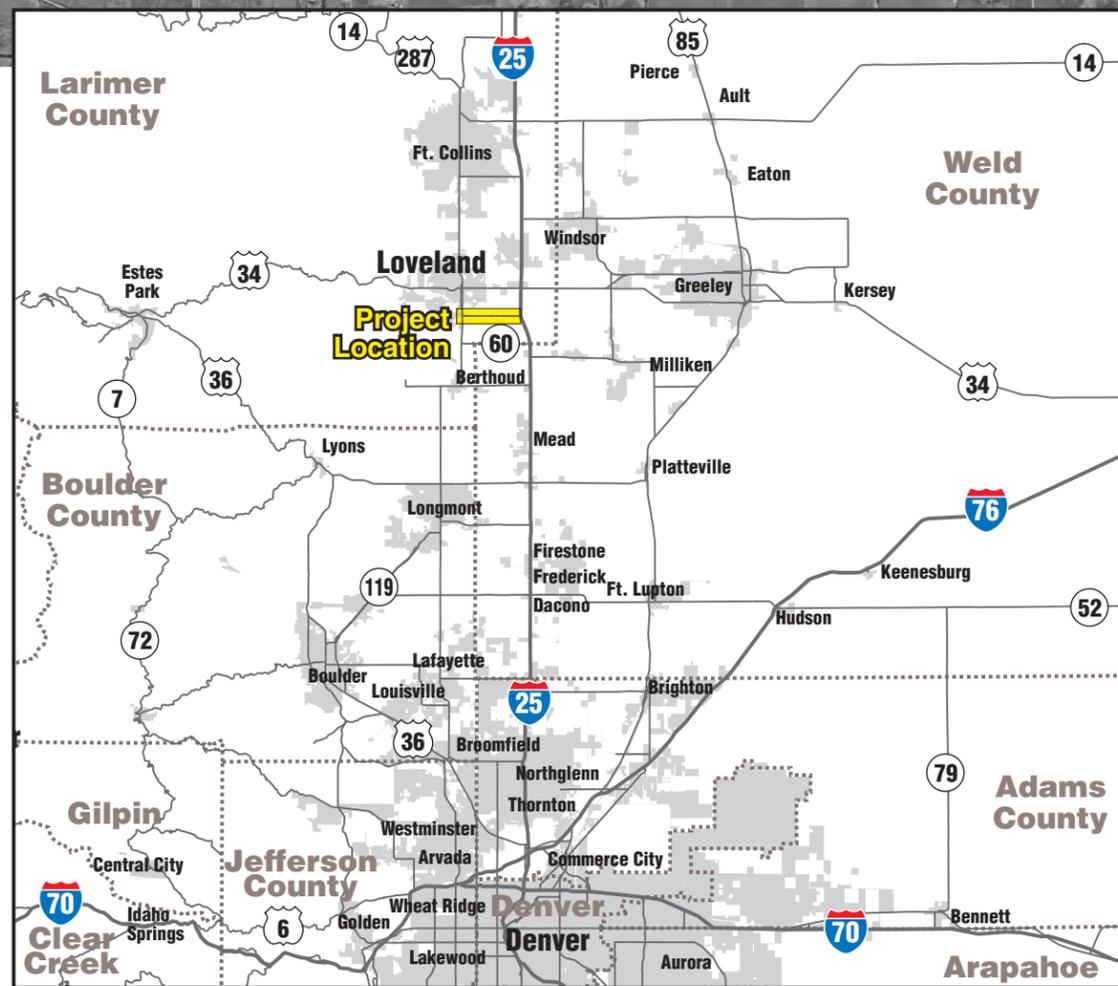
Mobility involves connecting more people and vehicles in less time with their work, school, community services, marketplaces, and each other. Congestion has a significant effect on mobility. Congestion is directly related to the ability of the highway to carry traffic efficiently. Key elements for identifying congestion are the cross section of the highway and the level of service (LOS). The cross section identifies the number and width of lanes and shoulders, as well as other typical highway features such as turn lanes and medians. LOS is a qualitative measure of the operational characteristics of the traffic stream. This section provides information on the existing cross section and the appropriate LOS for SH 402.

Mobility and safety are closely tied together. As congestion builds, crash rates increase, and as crashes increase, there is more congestion. This section also summarizes crash information and related corridor characteristics for SH 402.

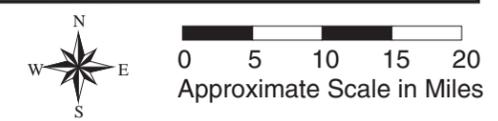
1.2.1 Existing SH 402 Cross Section

The existing SH 402 between US 287 and CR 13C is a four-lane highway with two signalized intersections and a raised median allowing limited access and associated turn lanes. Between CR 13C and the I-25 interchange, it is a two-lane highway with seven unsignalized intersections (see Figure 1-1). SH 402 is classified as a minor urban arterial for its entire length.

Substandard narrow shoulders extend for most of the length of the existing highway, with numerous direct residential and business accesses. Figure 1-2 illustrates the cross section of the existing SH 402 east of CR 13C. Although right-of-way width varies along SH 402, it is generally 60 feet to the east of CR 13C.

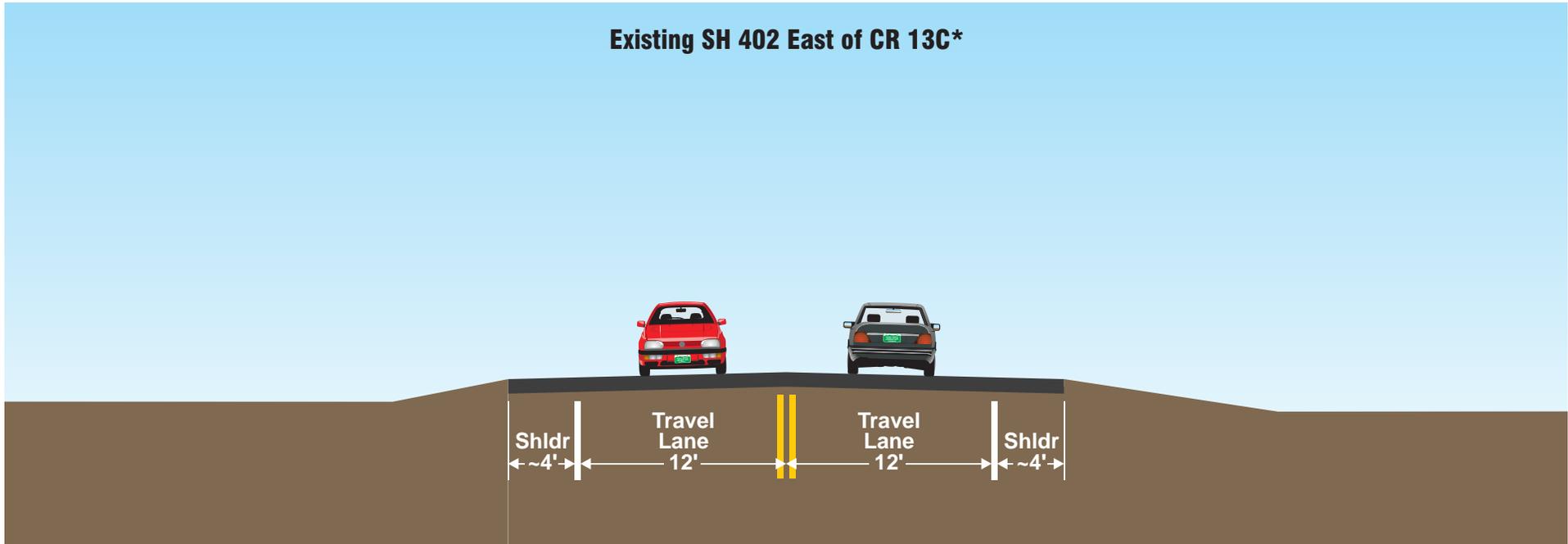


Note: SH 402 project does not include I-25 interchange improvements at the east terminus. SH 402 project does include intersection improvements at US 287, the west terminus. These improvements extend west of the intersection to tie into existing 14th Street.



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Existing SH 402 East of CR 13C*



*Existing right of way is approximately 60'

1.2.2 Level of Service

LOS is a qualitative measure of the operational characteristics of a traffic stream, ranked from A (best) to F (worst). LOS is described in terms of speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Highway LOS ratings are as follows:

LOS A	free-flow operations
LOS B	reasonably free-flow operations
LOS C	noticeable traffic
LOS D	declining speeds and congestion beginning to form
LOS E	maximum service flow (full capacity)
LOS F	heavy congestion, significant delays, stop-and-go-traffic

The factors used to determine LOS differ with the type of highway and intersection:

- ❑ Highway segment LOS is generally based on the ratio of volume over capacity.
- ❑ Intersection LOS is based on vehicle seconds of delay.

For two-lane highways, the percentage of no-passing zones is also taken into consideration when determining LOS. The LOS shown in this document is for the peak morning and evening hours.

The Rural and Urban Arterials category from the American Association of State Highway and Transportation Officials (AASHTO) design guide applies to SH 402. According to AASHTO (*AASHTO Green Book*, 2004, fifth edition), rural and urban arterials and their auxiliary facilities (turning lanes, intersections, interchanges) should generally be designed for LOS C. However, LOS D is more appropriate in heavily developed areas. Therefore, the design goal for SH 402 for the US 287 intersection to CR 13C is LOS D, with LOS C for the remainder of SH 402 east of CR 13C. This also complies with city of Loveland transportation plan requirements.

1.2.3 Crash Analysis

Data collected by CDOT between January 1, 1998, and December 31, 2002, were used to perform a crash analysis. CDOT crash rates calculated for SH 402 cover the entire length of the highway between US 287 and I-25 but do not include I-25 crashes. During the five years analyzed, 194 crashes occurred: 112 involved property damage only, 81 involved injuries, and 1 involved a fatality. The most common crash types were rear-end (48 percent), collisions with fixed objects (21 percent), and broadsides (14 percent). Rear-end and broadside crashes typify the design deficiencies of the existing SH 402, including poor sight distance and inadequate turn lanes and shoulders.

The highest percentage of crashes (83 percent or 143) involved travel along SH 402. Most of the overall crashes on SH 402 (52 percent) were at intersections or intersection-related, and 20 percent were driveway-related. The remainder (17 percent) occurred in driveways and at intersections (mainly US 287, CR 13C, and CR 9E).

Analysis of crash data, together with a preliminary field safety inspection, reveals the following SH 402 corridor characteristics:

- ❑ The shoulders along SH 402 are typically about 4 feet wide, although this varies. The standard width for a highway of this type is 10 feet.
- ❑ Numerous residential and business driveways are located along the highway in the study area. Some of these driveways are very close to intersections.
- ❑ Turning onto side roads and driveways requires slowing that can catch drivers by surprise. Because speeds are fast, a sudden drop in speed by a vehicle turning left or right creates a high-speed differential, increasing the risk of rear-end accidents.

- ❑ Sight distance problems were observed at several locations. Some unsignalized intersections (for example, SH 402 and CR 9E) require vehicles to stop well beyond a stop sign in order to see traffic on SH 402. In the eastern section of the study area with its rolling terrain, Sauk Road, Heron Drive/ Olsen Drive, and CR 7 access SH 402 with inadequate stopping sight distance due to the terrain.
- ❑ Restricted sight problems exist for some driveways, including one at the northeast end of the intersection of SH 402 and CR 13C. The line of westbound vehicles at the intersection blocks sight of vehicles traveling east on SH 402.
- ❑ Traffic volumes are high and are expected to increase in the future. Increased traffic, combined with high speeds, unexpected stops, inadequate shoulders, and restricted or inadequate sight distances, makes this section of SH 402 a candidate for safety improvements.

Table 1-1 provides safety information for the SH 402 corridor. Note that the Weighted Hazard Index (WHI) is -2.56 for the entire project length, which is less than the statewide average. However, WHI for the rural section (CR 13C to I-25) is 1.98, which is worse than the statewide average for this type of highway.

Table 1-1. 1998–2002 Safety Records: SH 402 Averages per MVMT and WHI

Safety Criteria	SH 402
Property Damage Only per MVMT	5.32
Injury Crashes per MVMT	3.85
Fatalities per 100 MVMT	0.05
Total Crashes per MVMT	9.22
Weighted Hazard Index	-2.56

MVMT = million vehicle miles traveled

WHI compares the frequency and severity of crashes to the statewide average. WHI values greater than zero exceed the statewide average, and values less than zero are below the statewide average.

1.3 Project Need: Travel Demand and Growth

Travel demand is calculated by identifying trip generation (sources of trips such as commute to work, shopping, home), distribution (where trips go), mode choice (automobile, bus), and traffic assignment (uses this information to generate trips on various highway networks). For this project, travel demand was forecast for 2030. Because travel demand is forecast based on assumptions about land use and growth, additional information is provided in this section on land use and growth.

1.3.1 Travel Demand

Volumes for current average daily traffic (two-way traffic in number of vehicles per day, or ADT) were based on traffic counts taken in November 2001. ADT volumes in 2001 were 16,100 between US 287 and CR 13C, and ranged from 13,400 to 14,000 between CR 13C and the I-25 interchange. Existing conditions are represented in this study using 2001 traffic counts.

To investigate 2030 travel conditions, a “best fit” linear regression line for a data set that included past, present, and future (2025) ADT was applied. Additional information on 2030 traffic can be found in the *Traffic Report: State Highway 402 Environmental Assessment from US 287 (MP 0.00) to I-25 (MP 4.00)* prepared by J.F. Sato and Associates in July 2004.

The 2030 traffic projections identify ADT volumes ranging from 36,700 between US 287 and CR 13C to 37,150 between CR 13C and the I-25 interchange on a typical weekday during a school year. These calculations indicate a 128 percent increase in traffic volumes in the western portion of the project area near the intersection with

US 287, and a 170 percent increase in the eastern portion of the project area near the I-25 interchange.

Increases in 2030 traffic result from local and regional population growth and travel demands along SH 402. Travel projections for SH 402 are increasing at a higher rate than the area population as one new person generates more than one new trip. In addition to population projections, traffic forecasts for SH 402 include NFRT & AQPC, Larimer County, and city of Loveland planning assumptions, area employment opportunities, retail development patterns, and through traffic movements.

Traffic volumes are expected to increase 128 percent in the western portion of the project area near the intersection with US 287, and 170 percent in the eastern portion of the project area near the I-25 interchange.

Table 1-2 and Table 1-3 show LOS values for intersections and through traffic for the existing highway (No Action Alternative). LOS values were determined as follows. Future turning movement counts were calculated using the SIMTRAFFIC model and calibrated from traffic counts taken in November 2001. Average delay values for intersections were also obtained from the SIMTRAFFIC model of the traffic analysis software. The SYNCHRO HCM (Highway Capacity Manual) model then uses the average delay to define LOS for signalized and unsignalized intersections. Thus, the delay limits in HCM were used to determine LOS at the intersections and carpool lot.

The traffic composition on SH 402 includes 6 percent trucks. Of that 6 percent, two-thirds are single-unit trucks and one-third are semitrailer trucks. The percentage of truck traffic indicates that this highway is used to transport goods, as well as people. Peak travel times are 7:00 AM to 8:00 AM and 4:00 PM to 5:00 PM. The morning peak hour direction is eastbound, and the afternoon peak direction is westbound. Figure 1-3 illustrates 2001 and 2030 through

traffic (ADT), through traffic LOS, and intersection LOS.

Table 1-2. Intersection LOS, No Action Alternative

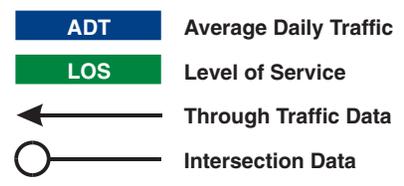
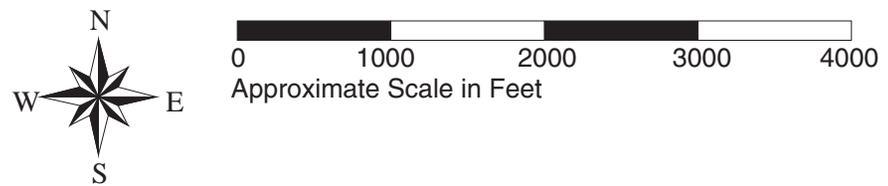
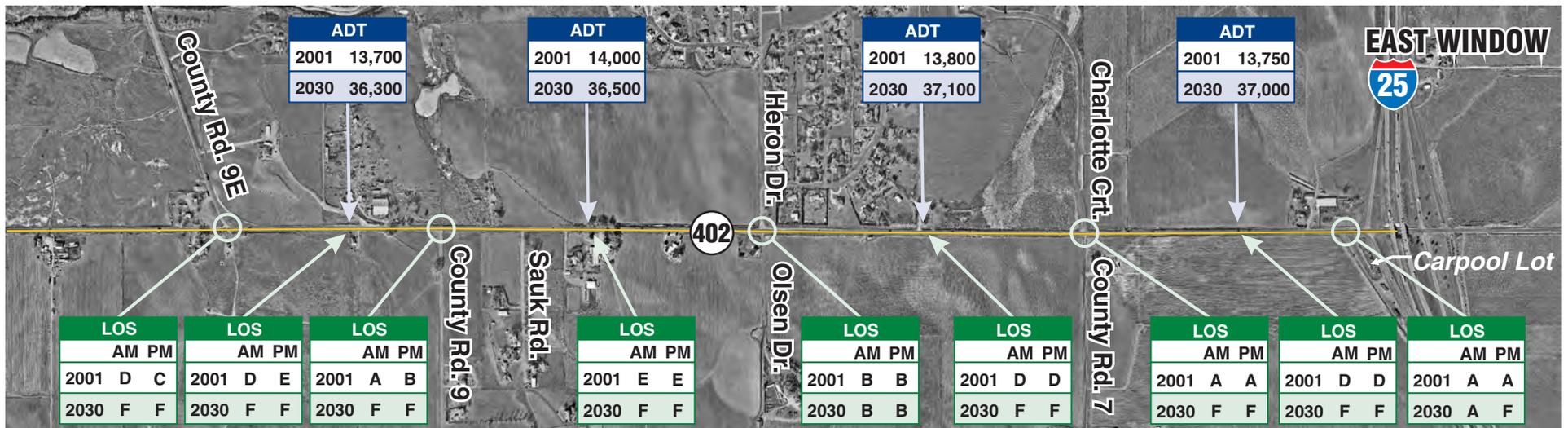
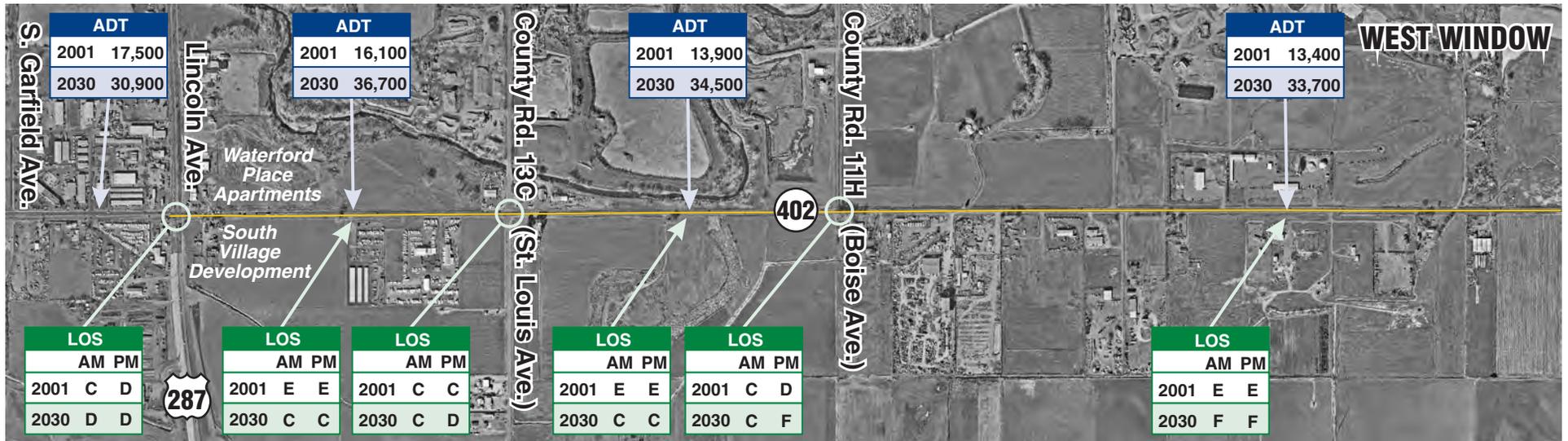
Intersection	Existing 2001		2030	
	AM	PM	AM	PM
US 287 (Lincoln Avenue)	C	D	D	D
CR 13C (St. Louis Avenue)	C	C	C	D
CR 11H (Boise Avenue)	C	D	C	F
CR 9E	D	C	F	F
CR 9	A	B	F	F
Heron Drive/Olsen Drive	B	B	B	B
CR 7 (Charlotte Court)	A	A	F	F
Carpool Lot Access Road	A	A	A	F

Table 1-3. Through Traffic LOS, No Action Alternative

Highway Segment	Existing 2001		2030	
	AM	PM	AM	PM
US 287 to CR 13C	E	E	C	C
CR 13C to CR 11H	E	E	C	C
CR 11H to CR 9E	E	E	F	F
CR 9E to CR 9	D	E	F	F
CR 9 to Heron Drive	E	E	F	F
Heron Drive to CR 7	D	D	F	F
CR 7 to Carpool Lot Access Road	D	D	F	F

As illustrated in Table 1-2, the intersections with the worst performance for 2001 (LOS C or D) were US 287, CR 13C, CR 11H, and CR 9E. As illustrated in Table 1-3, through traffic operated between LOS D and E along the entire length of SH 402 for year 2001.

Without improvements to SH 402 east of CR 13C, by 2030, most intersections and through traffic east of CR 11H would experience LOS F during both morning and afternoon peak periods.



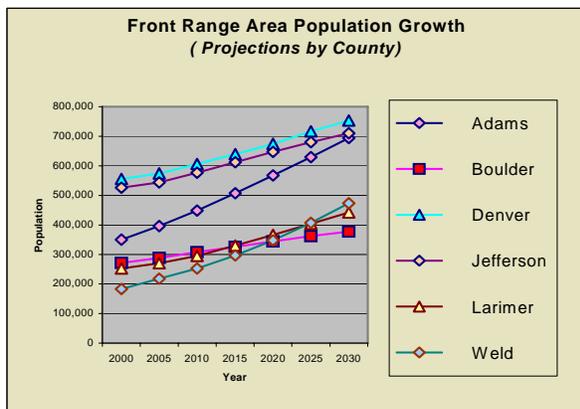
2001 & 2030 Average Daily Traffic (ADT), Through Traffic Level of Service (LOS), and Intersection LOS
FIGURE I-3

1.3.2 Land Use and Growth

Population Growth Rates

Land use patterns influence the travel demand on transportation corridors, and future land use plans shape how each corridor will be maintained and potentially improved. Projected land use for a corridor is taken into account when examining the need for transportation improvements. The following discussion addresses growth and development expected in the SH 402 project area regardless of improvements to SH 402 between US 287 and the I-25 interchange.

As with other Colorado Front Range counties, Larimer County has experienced substantial growth since the 1970s. County population grew 66 percent between 1970 and 1980, then slowed to 25 percent growth rate between 1980 and 1990, and rose again to 35 percent between 1990 and 2000. While state forecasts for Larimer County population (Colorado Department of Local Affairs [DOLA], Demography Section, 2003) show a conservative 75 percent growth between 2000 and 2030 (25 percent every 10 years), actual growth could be as much as 100 percent (closer to the current trend of 35 percent every 10 years). See Figure 1-4.



Source: DOLA 2003

Figure 1-4. Front Range Area Population Growth

The city of Loveland has also experienced tremendous growth since the 1970s. Population grew 86 percent between 1970 and 1980, 24 percent between 1980 and 1990, and 35 percent between 1990 and 2000. City of Loveland population trends are estimated to follow or exceed county trends between 2000 and 2030.

For additional information on population and related topics, see *Section 3.1*. A detailed discussion of land use can be found in *Section 3.4*.

Land Use Plans and Policies

Local planners anticipate population and employment growth in this area. In the 1980s an Intergovernmental Agreement (IGA) between Larimer County and the city of Loveland resulted in development of the Loveland Growth Management Area (GMA). The primary purpose of the GMA is to focus urban development adjacent to cities and towns in areas that could be annexed. The IGA was updated in January 2004.

In 1997 the SH 402 study area was categorized as rural land in the *Larimer County Master Plan and Partnership Land-Use System* (November 1997), and had not yet been incorporated into the GMA. However, the *Loveland, Colorado 1994 Comprehensive Master Plan* identified SH 402 as part of the GMA and as an important arterial associated with potential plans for a neighborhood activity center. The *IGA for Growth Management* between the city of Loveland and Larimer County (January 12, 2004) also includes SH 402 in the GMA boundaries. Additional information on specific land uses in the SH 402 study area is located in *Section 3.4*.

Transportation Plans

SH 402 is included in the STIP and is listed as a priority project in the 2030 RTP.

The 2030 RTP also shows SH 402 as a four-lane arterial with signalized intersections at CR 11H (Boise Avenue), CR 9, and CR 7 (Charlotte Court). This plan also shows SH 402 with on-street bikeways and as a proposed transit route. SH 402 is an integral part of the area's transportation network, providing linkage between I-25 and the city of Loveland to the north, and to businesses and residences between and to the west of I-25 and US 287.

A carpool lot with approximately 88 parking spaces, including 4 handicap spaces, is located on the southwest corner of the SH 402 and I-25 interchange. This lot is not currently serviced by public transportation but is used by private carpools and vanpools. Vehicle counts taken in October 2001 indicated approximately 40 to 60 vehicles per day at the carpool lot during the week.

The *City of Loveland 2020 Transportation Plan* includes the SH 402 and I-25 interchange as a transit center that is "an important feeder point for south Loveland residents using regional transit in the I-25 corridor and seeking access to planned commercial and employment facilities to be developed in the vicinity of the interchange."

CDOT is currently investigating improvements to US 34, a parallel highway approximately 2 miles to the north. The two parallel corridors provide a different means of connectivity in the area and serve different markets. US 34 serves city of Loveland and adjacent commercial-business development, as well as provides a direct route to Rocky Mountain National Park to the west, while SH 402 is a primary east-west route for residents and businesses located along the highway and further to the west. High morning and evening peak traffic on SH 402 indicates that this highway is also used heavily by commuters for access to I-25. Continued development in the area around SH 402 will only increase the need for improvements to the highway, regardless of whether improvements to US 34 are pursued.

1.4 Photographic Essay

Figure 1-5 provides a descriptive photographic essay of the SH 402 study area.



View east along SH 402 at US 287



View east just west of CR 13C (St. Louis Avenue)



Cattail marsh and agricultural land along SH 402



Big Thompson River east of CR 13C (St. Louis Avenue)



View north at CR 9E



Irrigation ditch A, north of SH 402



**SH 402 to the I-25 Interchange:
Photographic Essay (from west to east)**

FIGURE 1-5 (cont.)



View east toward the I-25 interchange



Carpool lot in the SW quad of I-25 and SH 402

Chapter 2

Alternatives



Chapter 2. Alternatives

This chapter describes the alternatives considered and the analysis conducted for State Highway 402 (SH 402) between United States Highway 287 (US 287) and the Interstate 25 (I-25) interchange. Principal concepts include:

- ❑ alternatives identification
- ❑ alternative modes of transportation
- ❑ alternatives development
- ❑ screening process
- ❑ screening results
- ❑ alternatives retained for study

2.1 Alternatives Identification

Scoping was initiated at the start of the Environmental Assessment (EA) process to identify issues and concerns related to SH 402 and its potential improvement. These issues and concerns were used to:

- ❑ develop project purpose and need
- ❑ develop alternatives to examine
- ❑ identify screening criteria to apply
- ❑ identify alternatives to retain for further study

A detailed agency and public involvement process was initiated during project scoping. *Chapter 6 – Public Involvement* provides specific information about this process, which included:

- ❑ agency meetings
- ❑ public workshops
- ❑ project website
- ❑ factsheets and postcards
- ❑ comment sheets
- ❑ mailings to an extensive list

2.2 Alternative Modes of Transportation

Alternative modes of transportation were considered during the scoping process. Across the country and in Colorado, transportation planning entities have added emphasis to examining ways to increase transit use and

reduce reliance on the automobile. The North Front Range Transportation and Air Quality Planning Council (NFRT & AQPC) has included the goal of transferring some single-occupancy vehicle trips made in the area to a different mode of transportation (pedestrian, bicycle, carpool, transit, or vanpool) in its Regional Transportation Plan. For the SH 402 corridor, the alternative mode of transportation known as SMARTTrips™ carpooling and vanpooling is currently used. Planned alternative modes of transportation include extension of local bus service into the SH 402 corridor and provision for bicycle lanes as a part of the 10-foot shoulder of widening alternatives (described below). Implementation of all of these alternative modes depends on mobility and safety improvements and on meeting 2030 travel demand on SH 402.

2.2.1 Bus

Although no local bus routes currently travel east of US 287 on SH 402, the *City of Loveland 2020 Transportation Plan* (July 18, 2000) calls for extension of local bus service (City of Loveland Transit, COLT) into this corridor with a transit center. COLT is managed by the city, and as such is considered a constant among the alternatives.

SMARTTrips is a regional public program designed to reduce automobile dependency and promote the use of alternative transportation in northern Colorado. SMARTTrips is a division of the NFRT & AQPC. The program includes marketing bus transit service to northern Colorado communities. SMARTTrips encourages residents to leave their cars at home at least one day a week to help preserve air quality, decrease traffic congestion, conserve fuel, and promote better health. The program's regional office is located at the NFRT & AQPC headquarters in the city of Fort Collins. The cities of Loveland, Fort Collins, and Greeley are the major participants in the SMARTTrips program. The impact of this program on SH 402 travel demand has not been calculated.

2.2.2 Bicycle/Pedestrian

Currently no bicycle or pedestrian trails parallel SH 402 between US 287 and the I-25 interchange. The roadway's narrow shoulders are inconsistent and not conducive to either use. Ten-foot shoulders are included in the rural cross section for the action alternatives to encourage bicycle/pedestrian use. In addition, a sidewalk is included for the urban section of the project. The sidewalk will be attached in areas where the right-of-way reduction avoids direct impact on a structure (such as a home or business). SMARTTrips promotes bicycling programs that could be applicable for future use in the SH 402 corridor.

2.2.3 Carpool/Vanpool

The NFRT & AQPC and northern Colorado Front Range communities support carpooling and vanpooling through SMARTTrips. The carpool lot at the southwest quadrant of the SH 402 and I-25 interchange has been used as a meeting place for program participants. Other groups and individuals use the lot independently of SMARTTrips.

2.2.4 High Occupancy Vehicle Lanes/Rapid Transit/Commuter Rail

High occupancy vehicle (HOV) lanes were examined for potential inclusion in the range of alternatives for SH 402 improvements. However, these lanes are generally better suited to freeway or expressway facilities with controlled access than they are to arterial roads and streets with numerous access points. Rapid transit and commuter rail systems work well in areas with a large, high-density population base. Because SH 402 between US 287 and the I-25 interchange is not a freeway or expressway and does not have a large, high-density population base, HOV lanes, fixed guideway rapid transit, or commuter rail do not meet the needs of the traveling public on this highway.

The Colorado Department of Transportation (CDOT) does not have plans for HOV lanes, rapid transit, or commuter rail in this corridor, nor does 2030 travel demand justify this level of improvement.

2.2.5 Conclusion

After examination of existing and planned carpooling and vanpooling programs, bus transit service, and bike/pedestrian systems in the vicinity of SH 402, it was concluded that as stand-alone solutions, none of these alternative transportation modes would measurably contribute to a reduction in highway traffic along SH 402 by the 2030 design year. Therefore, no alternative modes of transportation as stand-alone solutions were examined further. However, alternative transportation modes were retained to enhance an action alternative that would support the project purpose and need.

2.3 Alternatives Development

The purpose and need for this project are to improve mobility and safety while addressing requirements for 2030 travel demand and growth on the existing SH 402 between US 287 and the I-25 interchange. Five alternatives were identified initially: a No Action Alternative and four action alternatives. As required by the Council on Environmental Quality (CEQ), the No Action Alternative was considered throughout the EA as a viable alternative.

All action alternatives include widening to four through lanes with associated auxiliary and turn lanes, plus a bike lane. A 25-foot utility corridor easement along the south side of the highway is also included for all action alternatives. Proposed COLT service will operate along SH 402 regardless of the alternative selected. Detailed discussions of alternative cross sections and alignments follow.

- ❑ Alternative #1: hold the centerline and widen on both the north and south sides
- ❑ Alternative #2: hold the north edge of the right-of-way and widen on the south side
- ❑ Alternative #3: hold the south edge of the pavement and widen on the north side
- ❑ Alternative #4: Meander Alternative

2.3.1 Action Alternative Highway Cross Sections

The Rural and Urban Arterials category from the American Association of State Highway and Transportation Officials (AASHTO) Design Guide applies to SH 402. According to AASHTO (*AASHTO Green Book*, 2004, fifth edition), rural and urban arterials and their auxiliary facilities (turning lanes, intersections, and interchanges) should generally be designed for level of service (LOS) C. However, LOS D is more appropriate in heavily developed sections of metropolitan areas. The section of SH 402 between US 287 and CR 13C (St. Louis Avenue) has already been partially constructed and will meet AASHTO requirements. The design goal for SH 402 from US 287 to CR 13C is LOS D, with LOS C for the rest of the corridor. This also complies with city of Loveland transportation plan requirements.

Urban Cross Section

An urban cross section has been developed and partially built from US 287 east to CR 13C; the interim condition will remain until development on the south side of SH 402 is constructed. Developers constructed this section in coordination with the city of Loveland and CDOT. The 175-foot right-of-way includes:

- ❑ 18 to 26 feet set aside for a raised median and left turn lane in the center of the highway
- ❑ four 12-foot general-purpose travel lanes (two in each direction)
- ❑ two 7-foot bike lanes (one in each direction)
- ❑ two 12-foot auxiliary lanes (one in each direction)
- ❑ two 6-foot sidewalks separated from the highway by approximately 10 feet (where space permits)

- ❑ curb and gutter
- ❑ 25-foot utility corridor easement along the south side of the highway¹

This cross section is the standard for four-lane arterial highways in the city of Loveland. Design speed for the urban section of SH 402 (US 287 to CR 13C) is 45 miles per hour (mph), with a posted speed of 40 mph. (CDOT has directed that posted speeds be 5 mph lower than the design speed.) Figure 2-1 illustrates the proposed urban cross section associated with all action alternatives.

Rural Cross Section

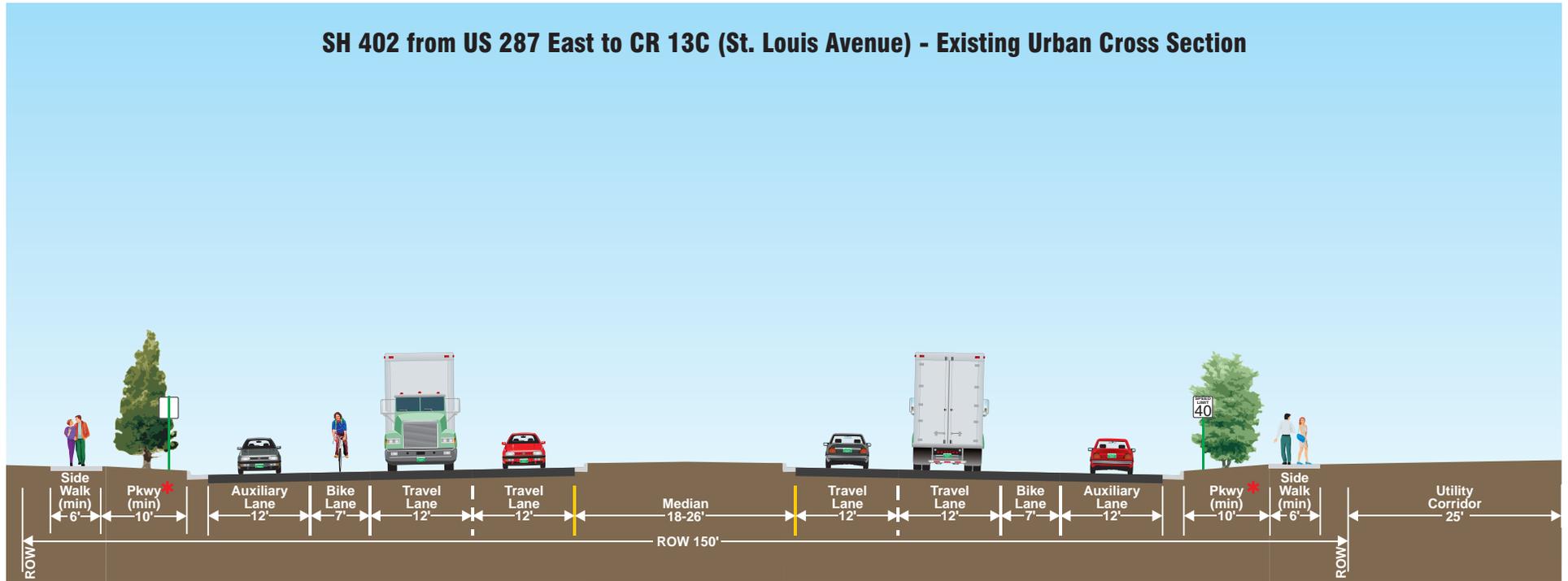
The rural cross section is from CR 13C east to the I-25 interchange. The 160- to 175-foot right-of-way includes:

- ❑ four 12-foot general-purpose travel lanes (two in each direction)
- ❑ 16-foot painted median that serves as a continuous left turn lane
- ❑ two 10-foot shoulders that include a 7-foot bike lane separated from the highway by 3 feet
- ❑ 25-foot utility corridor easement on the south side of the highway¹

Right-of-way for the rural cross section of the action alternatives is sufficient to allow for a future change in classification from rural to urban, should this be warranted. Projected 2030 traffic volumes do not indicate the need for an urban cross section. Design speed for the rural section of SH 402 would be 55 mph, with a posted speed of 50 mph. Figure 2-2 illustrates the proposed rural cross section associated with all action alternatives.

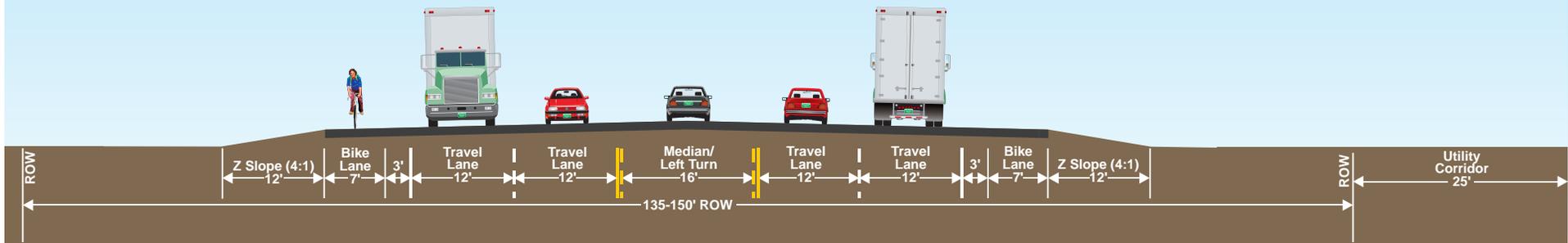
¹The 25-foot utility corridor easement on the south side is proposed to accommodate existing south side utilities and new utilities. Utilities currently on the north side of SH 402 will not be moved into the 25-foot utility corridor easement along the south side. These utilities will be relocated further north and will remain within the SH 402 footprint defined by the 160-foot to 175-foot cross section.

SH 402 from US 287 East to CR 13C (St. Louis Avenue) - Existing Urban Cross Section



* Where space permits

SH 402 from CR 13C (St. Louis Avenue) East to the I-25 Interchange - Rural Cross Section for Action Alternatives



Cross Section Development

The right-of-way originally considered was 225 feet (200-foot right-of-way and a 25-foot utility corridor). During alternatives development and screening, the cross section was narrowed to respond to public and agency comments, while maintaining desired design characteristics.

Conceptual design for all action alternatives was based on achieving LOS D at urban intersections, LOS C at rural intersections, and LOS C for through traffic for 2030. LOS would meet these goals in 2030 if any of the action alternatives were implemented. During the morning peak hour, only the intersection at US 287 will experience LOS D. The US 287 and CR 13C intersections will both reach this LOS during the afternoon peak hour. All other intersections would operate at LOS C or better, and through sections would operate at LOS C. Note that in the urban section the bicycle lane is shown between the auxiliary lane and the travel lanes. The auxiliary lane drops off the rural section for a smooth transition of the bicycle lane to a position outside the travel lanes. The location of the bicycle lane might shift in final design.

Access

If an action alternative is selected, CDOT will work with affected property owners to maintain or bring access onto SH 402 into compliance with the State Highway Access Code. *Chapter 3 – Impacts and Mitigation Measures, Section 3.2* includes additional access-related discussions.

2.3.2 Action Alternative Descriptions

Alternative #1 – hold the centerline and widen on the north and south sides

The Alternative #1 design widened SH 402 evenly on both sides of the existing centerline.

Alternative #2 – hold the north edge of the right-of-way and widen on the south side

Alternative #2 proposed to hold the north edge of right-of-way constant, meaning that this design required property acquisitions only from the south side of the road. To analyze impacts from an

alternative that widens only the south side of the roadway, Alternative #2 held the right-of-way constant and shifted all new right-of-way requirements to south of the existing highway.

Alternative #3 – hold the south edge of the pavement and widen on the north side

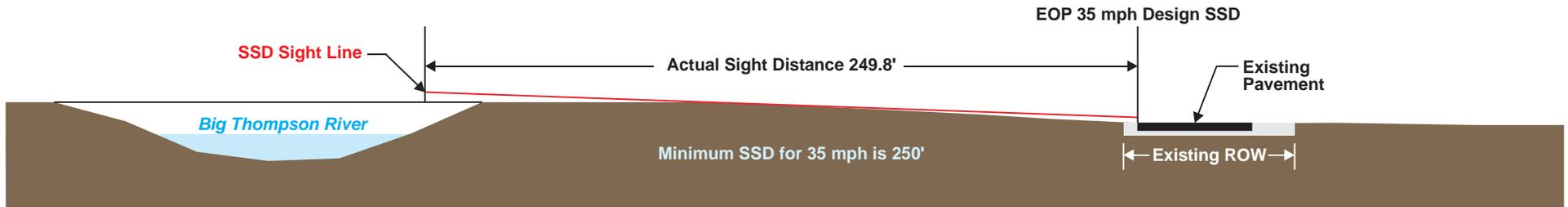
Holding the south edge of the pavement would widen the highway to the north and move the signalized intersection at SH 402 and CR 13C farther to the north where a bridge crosses the Big Thompson River. This would interfere with driver ability when headed south on CR 13C to see the intersection, including traffic stopped at a red light. When the south edge of the pavement was held, the sight distance (how far ahead a driver can see from the road) at the intersection with CR 13C was reduced to 167 feet, and the minimum sight distance required by AASHTO is 250 feet. See Figure 2-3. The bridge currently meets safety requirements for sight distance on southbound CR 13C for the 35 mph posted speed limit.

The elevation of the bridge is 12 feet, which must be maintained because of the freeboard needed to meet floodplain requirements. To maintain the current sight distance, the road could not be aligned any further to the north.

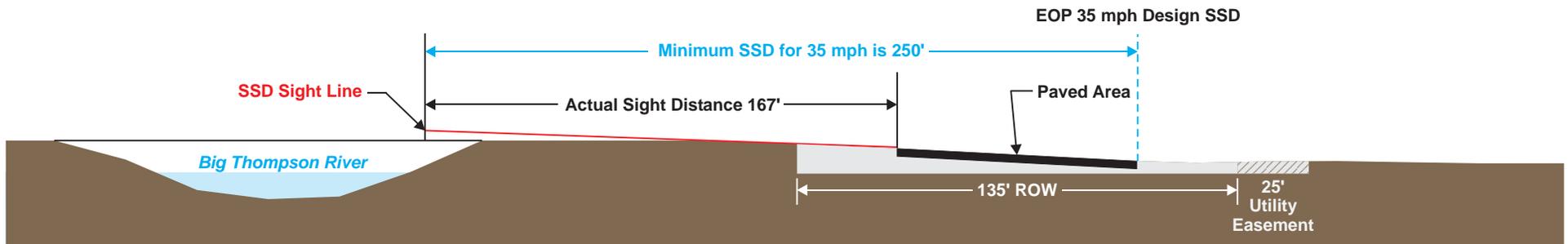
Alternative #4 – Meander Alternative (alignment that shifts between the north and south sides of the current highway alignment)

Alternative #4, the Meander Alternative, shifts between the north and south sides of the current highway alignment, minimizing impacts on the human and natural environments while meeting design criteria for a four-lane highway in this corridor.

Individual constraints in the study area that guided the development of the Meander Alternative were identified during project scoping, then mapped, and used to develop the meander alignment. Versions of the Meander Alternative were analyzed to identify the best-fit alignment that minimized impacts while meeting design criteria.



Existing Cross Section



Alternative #3 Cross Section



EOP = Edge of Pavement
SSD = Stopping Sight Distance



**SH 402 from US 287 East to CR 13C (St. Louis Avenue)
St. Louis Ave. Stopping Sight Distance Cross Sections**

FIGURE 2-3

2.4 Screening Process

2.4.1 Agency and Public Involvement

The following agency and public involvement activities were part of the screening process. *Chapter 6 – Public Involvement* provides additional details on the public involvement program and participants.

- ❑ Screening criteria and initial screening results were reviewed and agreed upon by local, state, and federal agencies at Agency Status Meetings in October 2001 and August 2002. Initial screening results were presented to the public in September 2002.
- ❑ The four initial alignments with a 225-foot right-of-way were evaluated and the results presented to the public and agencies.
- ❑ To respond to agency and public comment in August and September 2002 and reduce potential impacts on the surrounding environment and property owners, the project team refined the action alternatives to a narrower 160- to 175-foot right-of-way.
- ❑ Screening results were presented to the agencies in February 2003 and to the public in April 2003 for feedback.

2.4.2 Screening

Screening criteria were developed based on purpose and need elements, potential human and community resource impacts, natural environment impacts, and public and agency comments.

The action alternative alignments were evaluated at widths of 160 to 175 feet. Screening was conducted for the action alternatives extending from US 287 to I-25. In 2006, after screening was completed, area developers constructed the portion of SH 402 between US 287 and CR 13C. The constructed design is consistent with future potential improvements.

Screening for Purpose and Need

Screening criteria were developed to determine whether each alternative met the purpose and

need for the project. Detailed discussion of purpose and need is found in *Chapter 1 – Purpose and Need*.

As a result of screening for purpose and need elements, Alternative #3 was eliminated during screening because of sight distance safety issues in the vicinity of CR 13C (see discussion on page 2-6).

Three action alternatives (#1, #2, and #4) met the project purpose and need, and along with the No Action Alternative, were carried forward for additional analysis.

Screening for Human Resources and Natural Environment

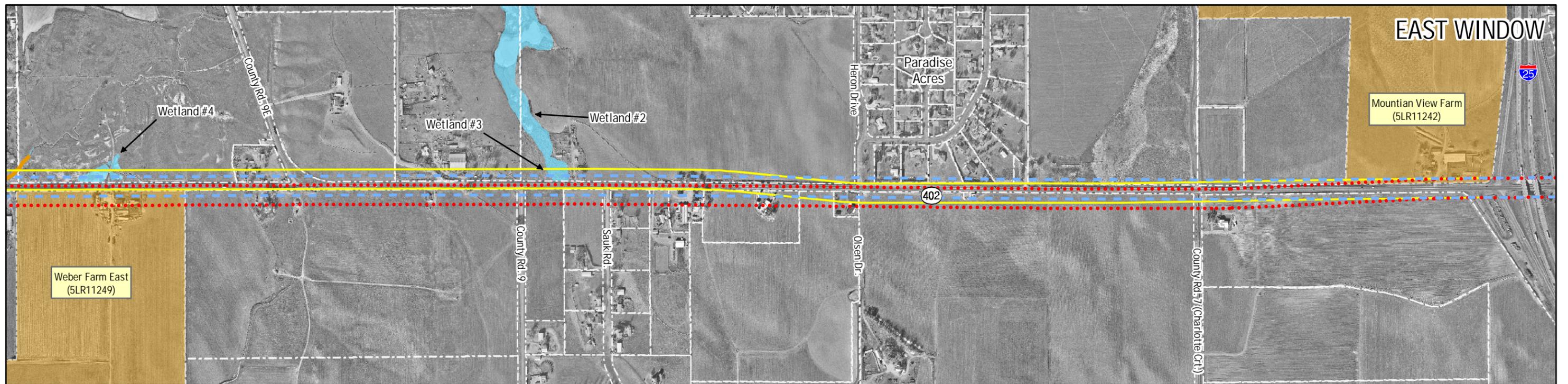
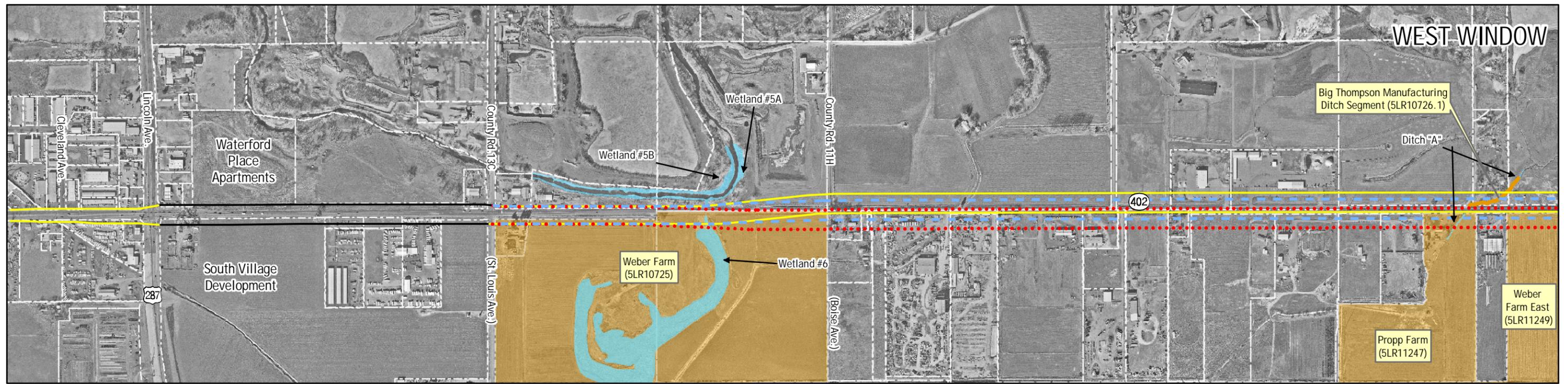
Initially, a set of resources was identified for screening; however, for some resources, there was a lack of presence in the corridor or a lack of differentiation of impacts due to the similarities of Alternatives #1, #2, and #4. The following resources were not used to screen the remaining alternatives for the reasons mentioned above:

- ❑ Threatened and Endangered Species and/or Potential Habitat
- ❑ Vegetation and Wildlife Impacts
- ❑ Potential Hazardous Materials Sites
- ❑ Floodplain
- ❑ Construction Related: traffic issues and estimated construction costs

Resources retained for screening were:

- ❑ Wetlands
- ❑ Right-of-Way and Relocations
- ❑ Historic Properties

Figure 2-4, an aerial photo with parcel boundaries, illustrates the alignments of the three alternatives discussed below, including identification of wetlands and historic properties within the corridor.



LEGEND

- | | | | |
|--|---|---|---------------------|
|  | Existing Right-of-Way |  | Historic Properties |
|  | Property Parcel Boundaries |  | Historic Ditches |
|  | Alternative #1 (Hold Centerline) Right-of-Way |  | Wetlands |
|  | Alternative #2 (Hold North Edge) Right-of-Way | | |
|  | Alternative #4 (Meander) Right-of-Way (Preferred) | | |



SCALE - 1:9,000 or 1" = 750'



SOURCE: 2001 1/2-foot resolution aerial photography and parcel information provided by the City of Loveland. Wetland information obtained through field observation and aerial photo interpretation by JFSA. Historic information provided by WCRM. Map produced May 25, 2007 by JFSA.



Alternatives #1, #2, and #4 with Wetlands, Historic Properties and Parcel Boundaries.

FIGURE 2-4

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Wetlands. Direct impacts on both jurisdictional and nonjurisdictional wetlands were initially assessed on the basis of aerial photography and site visits. Alternative #4 – Meander Alternative had the highest number of wetlands impacts at just under 0.9 acres.

Table 2-1 shows estimated total acres of wetlands affected by the alternatives.

Table 2-1. Wetland Impact Estimates

Alternative	Wetland Acreage
#1 – Hold Centerline	0.41
#2 – Hold North Edge	0.01
#4 – Meander	0.89

See *Chapter 3, Section 3.19*, for a detailed discussion of wetlands and mitigation opportunities.

Right-of-Way and Relocations. The right-of-way needed from property owners for each alternative was determined from conceptual design. The potential number of residential and commercial acquisitions within 10 feet of the right-of-way was also included in the estimate of potential relocations. For additional discussion, see *Chapter 3, Section 3.2*.

Table 2-2 shows the estimated number of relocations.

Table 2-2. Relocation Estimates

Alternative	Homes	Businesses
#1 – Hold Centerline	9	1
#2 – Hold North Edge	10	2
#4 – Meander	6	0

Historic Properties. Structures listed or eligible for listing on the NRHP are protected under Section 106 of the National Historic Preservation Act of 1966 as amended, and Section 4(f) of the Department of Transportation Act of 1966. Sites of local, state, or national significance must be identified and avoided where there is a prudent and feasible alternative. Section 4(f) regulations allow for use of publicly owned land in a public park, recreation area, or wildlife/waterfowl refuge,

or land of a historic site of national, state, or local significance (as determined by the officials having jurisdiction over the park, recreation area, refuge, or site) only if (1) there is no feasible and prudent alternative to such use, and (2) the project includes all possible planning to minimize harm. For additional discussion, see *Chapter 3, Section 3.11*, and *Chapter 4*.

Five NRHP eligible historic properties were identified in the corridor, as follows:

- Weber Farm
- Weber Farm East
- Big Thompson Manufacturing Ditch
- Propp Farm
- Mountain View Farm

Due to the potential for all three action alternatives to affect all five of these properties, each alternative was re-examined under Section 106 and Section 4(f). General impacts on the Weber Farm, Big Thompson Manufacturing Ditch, and Mountain View Farm are expected to be the same order of magnitude for Alternatives #1, #2, and #4.

Impacts (in acres) on the Weber Farm East and Propp Farm vary as noted in Table 2-3.

Table 2-3. Impacts on Weber and Propp Farms (acres)

Alternative	Weber Farm East	Propp Farm
#1 – Hold Centerline	1.2	0.4
#2 – Hold North Edge	3.4	1.0
#4 – Meander	None	None

2.5 Screening Results

The information presented in the previous section was used to determine which alternatives should progress to the next stage of the EA for in-depth investigation and ultimate selection of a preferred alternative. Input from local, state, and federal agencies and the public, was considered in the decision.

Although Alternatives #1 and #2 resulted in less impact on wetlands than Alternative #4, both

resulted in higher numbers of relocations and more NRHP eligible historic properties affected. As a result, Alternatives #1 and #2 were eliminated from detailed study in the EA. Alternative #4 – the Meander Alternative and the No Action Alternative were advanced for detailed analyses.

2.6 Alternatives Retained for Study in the EA

2.6.1 Alternative #4 – Meander Alternative (alignment that shifts between the north and south sides of the current highway alignment)

The Meander Alternative consists of a 175-foot urban section between US 287 and CR 13C that is being constructed as development occurs in this area (Figure 2-1), a 160-foot section in the vicinity of the Big Thompson River, and a 175-foot rural section east of the Big Thompson River to the I-25 interchange (Figure 2-2). Cross-section variation is an effort to reduce encroachment into the Big Thompson River floodplain. This is in direct response to agency comment.

During the public involvement activities, the majority of commenters preferred this alternative, recognizing that the design minimized right-of-way impacts. While this alternative did not have the least impact on wetlands, it had the fewest relocations and least number of impacts on historic properties, minimizing effects on two of the three historic properties along the south side of SH 402. This alternative was retained for further analysis.

Meander Alternative Alignment Description

Figure 2-5 illustrates the alignment of the Meander Alternative, described below.

1. Starting at the western terminus of SH 402 at US 287, the Meander Alternative would be designed to include necessary intersection improvements such as turn lanes to accommodate 2030 traffic. The section

between US 287 and CR 13C has already been partially constructed and will be completed as development on the south side of SH 402 is completed. These improvements do not preclude future improvements to the remainder of SH 402.

2. East of CR 13C the alignment would shift to the south side, away from the Big Thompson River.
3. West of CR 11H (Boise Avenue) the alignment would shift back to the north side and remain there until the highway reaches Heron Drive/Olsen Drive.
4. At CR 9E, the intersection would be straightened to improve sight distance.
5. The alignment would shift slightly south again, then gradually return to the existing alignment where it ends at the I-25 interchange.

In addition to horizontal alignment shifts, the Meander Alternative would also be designed to smooth the vertical profile of the roadway near the Heron Drive/Olsen Drive, Sauk Road, CR 9, and CR 9E intersections to maintain the required sight distance along the corridor. Side slopes would also be cut back to account for the increased distance from stop signs to the highway at unsignalized intersections.

The alignment shifts are the result of an extensive design effort that focused on improving roadway mobility and safety while minimizing potential negative impacts on the surrounding human and natural environments. The Meander Alternative's limited alignment shifts were developed to meet speed and safety criteria for posted speed limits (40 to 50 mph) while taking into account driver expectations. By limiting the number of alignment shifts and maintaining the right-of-way width of 160 to 175 feet, the Meander Alternative minimized impacts on the number of relocations and historic properties while meeting the purpose and need. Additional refinements to the Meander Alternative would occur during final design.

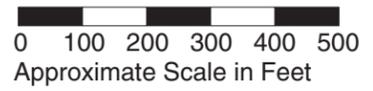
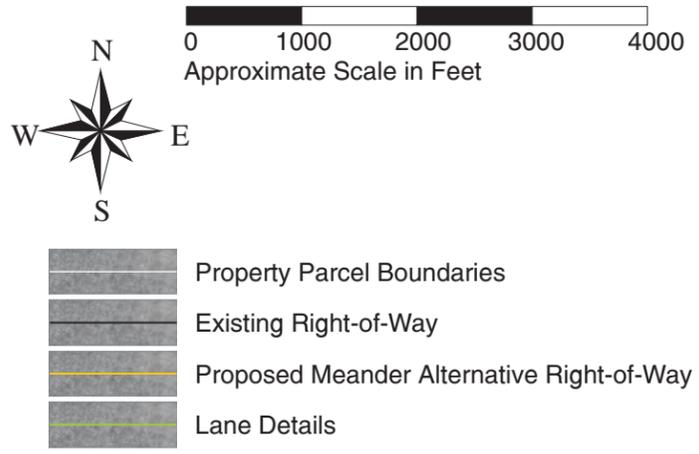
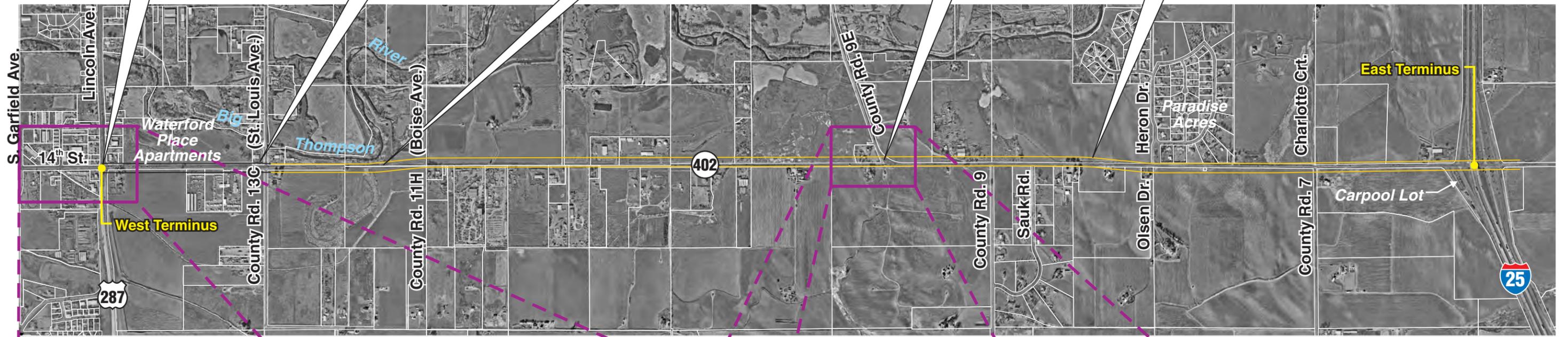
1 Starting at the western terminus of SH 402 and US 287, the Meander Alternative was designed to include necessary intersection improvements, such as turn lanes, to accommodate 2030 traffic.

2 East of CR 13C, the alignment shifts to the south side, away from the Big Thompson River.

3 West of CR 11H (Boise Avenue) the alignment shifts back to the north side and remains along the north side until Heron Dr./Olsen Dr.

4 At CR 9E, the intersection will be straightened to improve sight distances.

5 The Meander Alternative shifts slightly south again and then gradually returns to the existing alignment where it ends at the I-25 interchange.



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Meander Alternative Level of Service

The Meander Alternative would improve travel conditions by providing more capacity, a left turn lane in the median, and consistent shoulders. These features address mobility and safety issues, especially those associated with the difficulty of making a left turn onto or off the highway, and allowing cars to pull off to the side of the facility on the shoulders without blocking traffic.

Intersection LOS varies by intersection in the urban section. US 287 and CR 13C operate at LOS D during peak hours. All other intersections are in the rural section and would operate at LOS C or better during peak hours. Table 2-4 details LOS at intersections for the Meander Alternative.

Table 2-4. Intersection LOS, Meander Alternative

Intersection	2001		2030	
	AM	PM	AM	PM
US 287 (Lincoln Avenue)	C	D	D	D
CR 13C (St. Louis Avenue)	C	C	C	D
CR 11H (Boise Avenue)	C	C	A	C
CR 9E	C	C	C	B
CR 9	A	B	A	A
Heron Drive/Olsen Drive	B	B	A	A
CR 7 (Charlotte Court)	A	A	C	B
Carpool Lot Access Road	A	A	A	A

Table 2-5 illustrates through traffic LOS for the Meander Alternative for morning and evening peak traffic directions. LOS C would be achieved along the entire route.

Table 2-5. Through Traffic LOS, Meander Alternative

Highway Segment	2001		2030	
	AM	PM	AM	PM
US 287 to CR 13C	E	E	C	C
CR 13C to CR 11H	E	E	C	C
CR 11H to CR 9E	E	E	C	C
CR 9E to CR 9	D	E	C	C
CR 9 to Heron Drive	E	E	C	C
Heron Drive to CR 7	D	D	C	C
CR 7 to Carpool Lot Access Road	D	D	C	C

Meander Alternative Design Features

Design features needed to achieve LOS C for through traffic on SH 402 in 2030 are shown for each intersection in Figure 2-6 through Figure 2-8. These figures show the 2001 condition and the proposed 2030 intersection designs.

2.6.2 No Action Alternative

As required by the CEQ, the No Action Alternative was considered throughout the EA as a viable alternative. This alternative would result in no physical changes to the existing highway; however, standard operation (including proposed COLT bus service and SMARTTrips) and maintenance practices would continue. The existing human and natural environments bordering the highway would remain as they are, except for any development that might occur independently of improvements to the highway.

The No Action Alternative includes developer improvements between US 287 and CR 13C, which result in improved 2030 LOS for the US 287 and CR 13C intersections and through traffic LOS between US 287 and CR 11H.

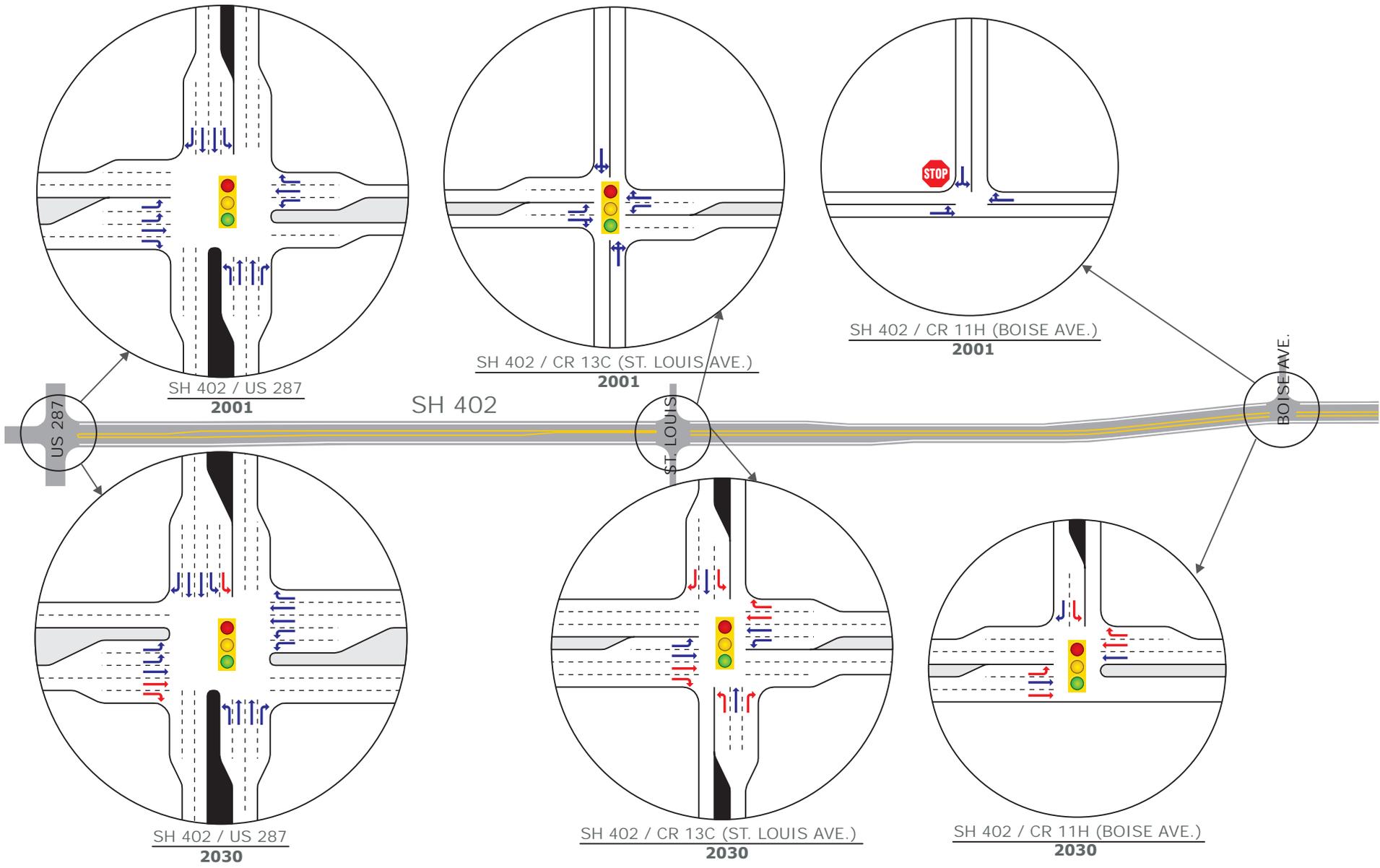
Mobility and safety concerns are expected to escalate as traffic volumes increase. As shown in Table 2-6, SH 402 traffic volumes in 2030 under the No Action Alternative will result in LOS F at most intersections east of CR 13C. The LOS for highway through segments between intersections is projected to decline to LOS F east of CR 11H in 2030 (Table 2-7). It is also expected that the difficulty of making a left turn onto or off the highway will increase with higher traffic volumes.

Table 2-6. Intersection LOS, No Action Alternative

Intersection	Existing 2001		2030	
	AM	PM	AM	PM
US 287 (Lincoln Avenue)	C	D	D	D
CR 13C (St. Louis Avenue)	C	C	C	D
CR 11H (Boise Avenue)	C	D	C	F
CR 9E	D	C	F	F
CR 9	A	B	F	F
Heron Drive/Olsen Drive	B	B	B	B
CR 7 (Charlotte Court)	A	A	F	F
Carpool Lot Access Road	A	A	A	F

Table 2-7. Through Traffic LOS, No Action Alternative

Highway Segment	Existing 2001		2030	
	AM	PM	AM	PM
US 287 to CR 13C	E	E	C	C
CR 13C to CR 11H	E	E	C	C
CR 11H to CR 9E	E	E	F	F
CR 9E to CR 9	D	E	F	F
CR 9 to Heron Drive	E	E	F	F
Heron Drive to CR 7	D	D	F	F
CR 7 to Carpool Lot Access Road	D	D	F	F

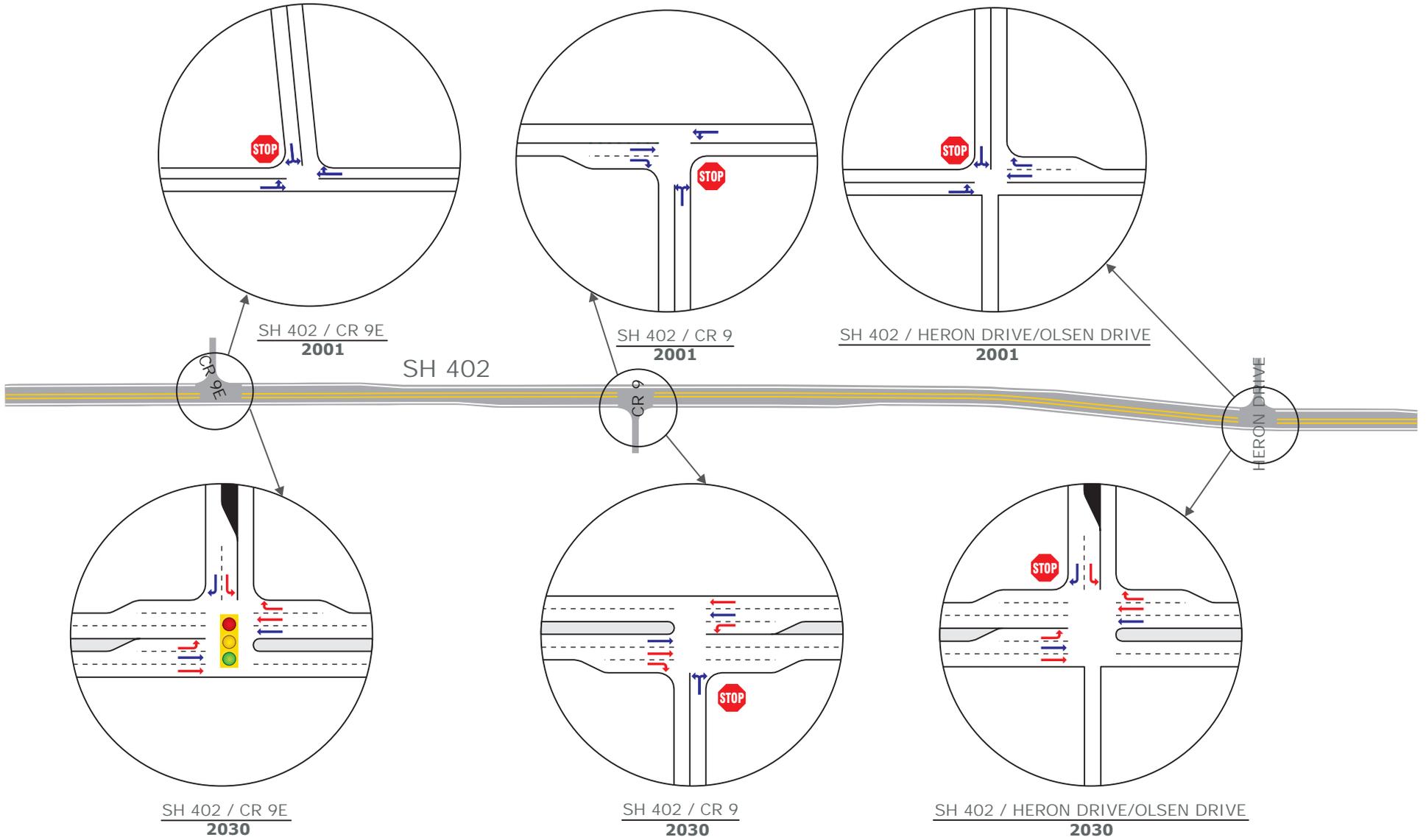


← Lane Additions
← Existing Lanes



**Existing and Meander Alternative Intersection Configuration
US 287 to CR 11H (Boise Avenue)**

FIGURE 2-6

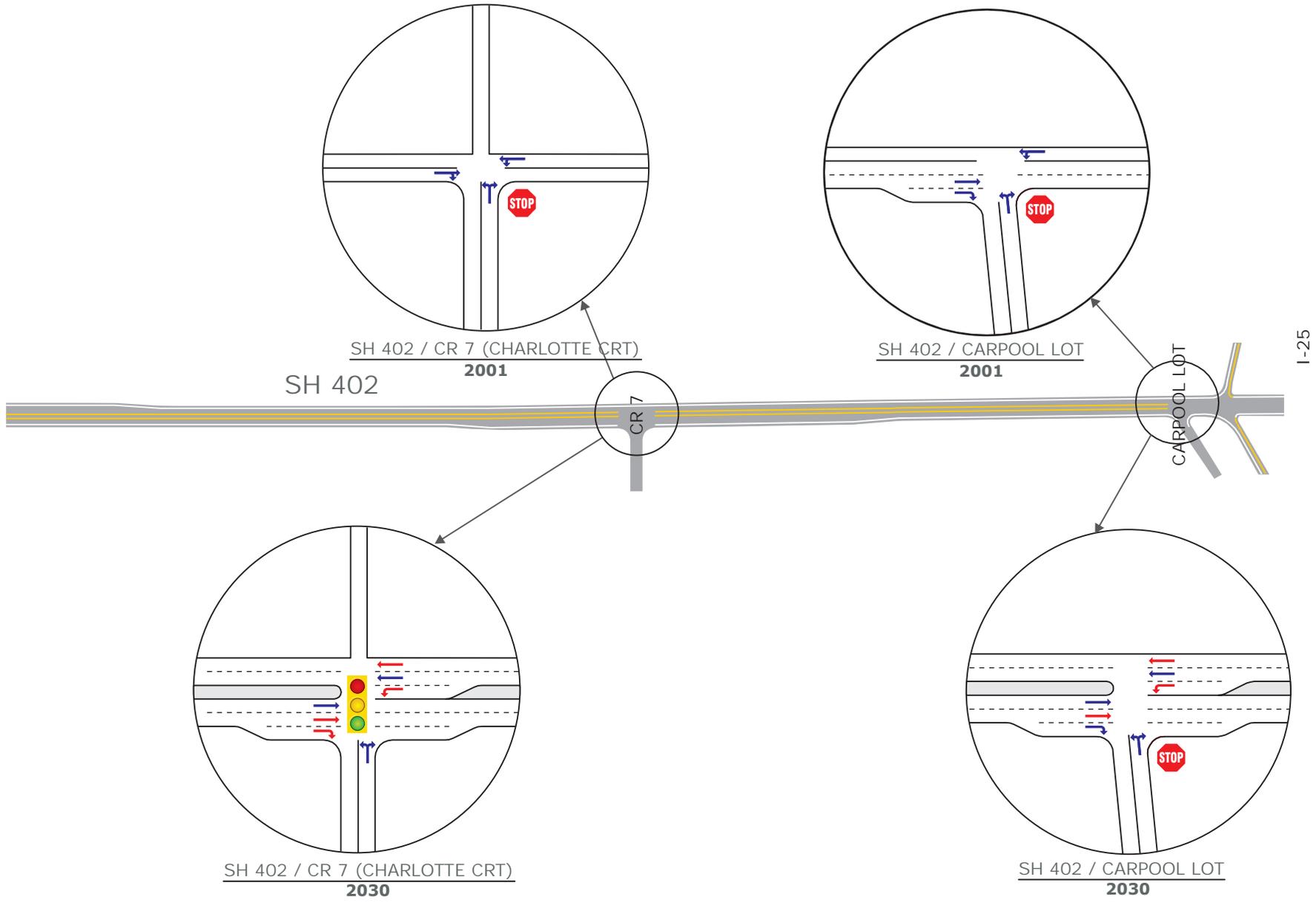


- ← Lane Additions
- ← Existing Lanes



**Existing and Meander Alternative Intersection Configuration
CR 9E to Heron Drive/Olsen Drive**

FIGURE 2-7



- ← Lane Additions
- ← Existing Lanes



**Existing and Meander Alternative Intersection Configuration
CR 7 (Charlotte Crt.) to Carpool Lot**

FIGURE 2-8

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