US85 CORRIDOR STUDY

SPEARFISH TO DEADWOOD

FINAL REPORT

June 2024

SD DEPARTMENT OF TRANSPORTATION

Prepared by:

JEO CONSULTING GROUP

US85 Corridor Study
Spearfish to Deadwood

Final Report

City of Spearfish, City of Deadwood, and Lawrence County, South Dakota

Prepared for:

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LIST OF ACRONYMS AND ABBREVIATIONS

AASHTO	American Association of State Highway Transportation Officials
AADT	Annual Average Daily Traffic
ADT	Average Daily Traffic
APE	Area of Potential Effect
ARC	Archaeological Research Center
AWSC	All-way Stop-Control (or Controlled)
BCC	Birds of Conservation Concern
BFE	Base Flood Elevations
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BMP	Best Management Practices
CAA	Clean Air Act
CAD	Computer-Aided Design
CGT	Continuous Green T (Intersection)
CMF	Crash Modification Factor
CPM	Crash Prediction Module
CWA	Clean Water Act
DDI	Diverging Diamond Interchange
DOT	Department of Transportation
EB	eastbound or Empirical Bayes
EIS	Environmental Impact Statement
EJ	Environmental Justice
ERT	Environmental Review Tool
ESA	Endangered Species Act
ETT	Experienced Travel Time
FEMA	Federal Emergency Management Agency
FFS	Free Flow Speed
FHWA	Federal Highway Administration
FPPA	Farmland Protection Policy Act
F+I (FI)	Fatal and Injury (crashes)
GIS	Geographic Information System
GPA	Game Production Area
HCM	Highway Capacity Manual
HCS	Highway Capacity Software
hr	hour
HSM	Highway Safety Manual
I-90	Interstate 90
IHSDM	Interactive Highway Safety Design Model
IMJR	Interchange Modification Justification Report
IPaC	Information for Planning and Conservation
ITE	Institute of Transportation Engineers
LIDAR	Light Detection and Ranging
LIRO	Left-In/Right-Out
LOS	Level of Service

LWCF	Land and Water Conservation Fund
M&A	Methods and Assumptions
MBTA	Migratory Bird Treaty Act
mi	mile
min	minute
MOE	Measure of effectiveness
mph	miles per hour
MRM	Mileage Reference Marker
MUT	Median U-Turn
MUTCD	Manual on Uniform Traffic Control Devices
MS4	Municipal Separate Storm Sewer System
n/a	not applicable
NAAQS	National Ambient Air Quality Standards
NB	northbound
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
NHD	National Hydrography Dataset
NHPA	National Historical Preservation Act
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
pc/mi/ln	passenger cars per mile per lane
PDO	Property Damage Only (crash)
PHF	Peak Hour Factor
RCI	Reduced Conflict Intersection
RIRO	Right-In/Right-Out
ROW	Right-of-Way
SAT	Study Advisory Team
SB	southbound
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SD	South Dakota
SDDANR	South Dakota Department of Agriculture and Natural Resources
SDDOT	South Dakota Department of Transportation
SDGFP	South Dakota Game Fish and Parks
sec	second
SHPO	State Historic Preservation Officer
SPF	Safety Performance Function
SPUI	Single-Point Urban Interchange
SSD	Stopping Sight Distance
STIP	Statewide Transportation Improvement Program
TCP	Traditional Cultural Property

THPO	Tribal Historic Preservation Office
TIA	Traffic Impact Analysis
TIS	Traffic Impact Study
TMDL	Total Maximum Daily Loads
TWSC	Two-way Stop-Control (or Controlled)
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
US14A	U.S. Highway 14A
US85	U.S. Highway 85
UST	Underground Storage Tank
veh	vehicle
vpd	vehicles per day
WB	westbound
WCSC	Worst-Case Stop Control
WOTUS	Waters of the U.S.
WSS	Web Soil Survey

EXECUTIVE SUMMARY

In 2022, the South Dakota Department of Transportation (SDDOT), in partnership with the Federal Highway Administration, City of Spearfish, City of Deadwood, and Lawrence County commenced a study to identify needed improvements to a nearly 7.5-mile corridor of U.S. Highway 85. **Figure ES-1** illustrates the study corridor beginning at Duke Parkway, located just north of the Interstate 90 (I-90; Exit 17) interchange, in Spearfish and continuing south to the junction with U.S. Highway 14A (US14A) in Deadwood. The ten study intersections are also illustrated in this figure.

The purpose of this corridor study was to evaluate existing and anticipated future conditions to identify potential improvements to the study corridor and associated intersections.

The study used a detailed process to fulfill its identified objectives. A study advisory team (SAT) was assembled to guide the development of the corridor study and was comprised of representatives of the agencies identified above. Additionally, public and stakeholder involvement was instrumental to the study process. In summary, the overall corridor study process consisted of the following milestones:

- Documentation of deficiencies and needs
- Development of alternative solutions
- Identification of consultant study team recommendations

In addition to the referenced technical memorandums developed throughout the study process, this report provides documentation of the corridor study process and the recommendations formulated by the consultant study team based on technical analyses and public input.

Summarized in **Tables ES-1, ES-2 and ES-3**, recommendations of the consultant study team are provided for multiple locations throughout the study corridor. Project planning timelines for implementation of projects are also included in the tables and are defined as follows:

- Near-term: 2024–2030
- Mid-term: 2031–2040
- Long-term: 2041–2050

The timeline for implementation for some improvements is largely dependent on the pace of development activity and therefore, could occur in either the mid- or long-term planning horizons. As such, these situational improvements are included in the table for long-term recommendations (**Table ES-3**) with the title of the table noting as such. Details of these recommendations as well as additional recommendations resulting from this corridor study are documented in section 6.0 of this report.

Finally, information contained herein regarding The Ridge Development is based on anticipated development activity and associated assumptions during the time that relevant corridor study tasks were being executed. In late Spring 2024, it became known to the Study Advisory Team that this development project was put on hold. Whether this hold is temporary or permanent is not yet determined. Associated land uses, access locations, future traffic volumes, and corresponding US85 improvements should be revisited should development activity resume.

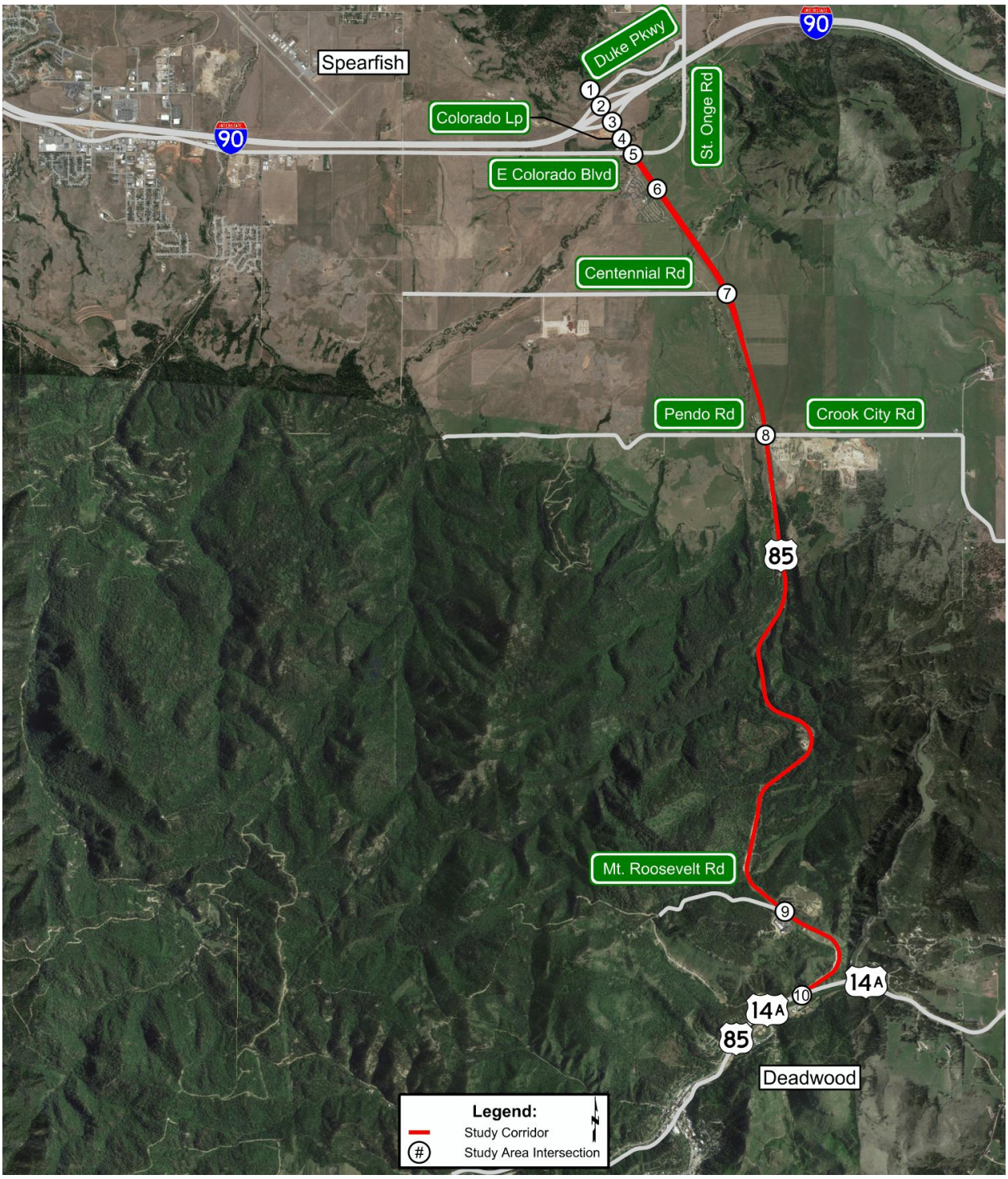


Figure ES-1: Study Corridor & Intersections

Table ES-1: Consultant Study Team Recommendations – Near-term (2024–2030)

Location	Recommendation	Discussion
Duke Parkway (intersection)	None	n/a
Exit 17 Interchange	Conduct Interchange Modification Justification Study.	This study is needed to determine mid-/long-term improvements including at the Duke Parkway intersection.
Exit 17 Interchange	Install traffic signal and turn lanes at either, or both, ramp terminal intersections, when warranted.	Existing volumes satisfy right-turn lane warrant criteria for the northbound approach at the eastbound ramp terminal intersection. Anticipated 2027 volumes satisfy right-turn lane warrant criteria for the southbound approach at the westbound ramp terminal intersection and signal warrant criteria at both intersections.
Cenex driveway (Colorado Loop) (intersection)	None	n/a
E. Colorado Boulevard / St. Onge Road (intersection)	Design and construct roundabout.	Existing volumes satisfy signal warrant criteria. This project is presently programmed for 2028. Roundabout should be constructed with the ability to be expanded to a "2x2" roundabout but initially operated as a "2x1" roundabout.
Elkhorn Ridge RV Resort Driveway (intersection)	Design and construct southbound right-turn lane.	Existing volumes satisfy turn lane warrant criteria.
Centennial Road (intersection)	None	n/a

Table ES-1 (continued): Consultant Study Team Recommendations – Near-term (2024–2030)

Location	Recommendation	Discussion
Crook City Road / Pendo Road (intersection)	Complete design and construct northbound and southbound left-turn lanes. Design and construct northbound and southbound offset right-turn lanes.	This project is presently programmed for 2026. Anticipated 2027 volumes satisfy turn lane warrant criteria. However, it may be more efficient to construct right-turn lanes with a mid-term solution involving more significant intersection modifications.
Preacher Smith Drive (intersection; The Ridge Development)[1]	Design and construct northbound right-turn lane.	Anticipated 2027 volumes satisfy turn lane warrant criteria. Consider constructing concurrently with the southbound left-turn lane which is a developer responsibility.
Mt. Roosevelt (intersection)	Improve pavement markings in the northbound lanes approaching and through the intersection.	Pavement markings are difficult to see at different times of the day.
US14A (intersection)	As warranted, operate intersection under full signal control during additional months of the year.	Presently, full signal operation is limited to the months of May through October.
US85, Exit 17 to Centennial Road (segment)	Revise access classification from "Rural" to "Urban Fringe."	"Urban Fringe" classification should be extended further south as development continues.
US85, Exit 17 to Crook City Road / Pendo Road (segment)	Enhance posted speed limit signing to better inform motorists of regulatory speed. Conduct speed study to determine if posted speed limit changes are necessary.	Throughout the course of this study, project stakeholders commented on their concern for high vehicle speeds, particularly along segments north of Centennial Road. Also, comments were made about uncertainty of regulatory speeds due to lack of signing.

[1] The Ridge Development was placed on hold in Spring 2024. The information provided herein is based on anticipated development activity and associated assumptions during the time that relevant corridor study tasks were being executed.

Table ES-1 (continued): Consultant Study Team Recommendations – Near-term (2024–2030)

Location	Recommendation	Discussion
US85, Crook City Road / Pendo Road to US14A (segment)	None	n/a
Pedestrian Connection to the Lodge at Deadwood	Construction pedestrian connection.	Solution to be developed in coordination with City of Deadwood and Lawrence County.

Table ES-2: Consultant Study Team Recommendations – Mid-term (2031–2040)

Location	Recommendation	Discussion
Duke Parkway (intersection)	Design and construct roundabout.	Implementation of roundabout is in conjunction with the development-driven implementation of a connecting roadway to the proposed Centennial Mountain development and relocation of the park & ride facility. Operations of roundabout must be shown to be compatible with the recommended interchange solution resulting from the proposed Exit 17 Interchange Modification Justification Study.
Exit 17 Interchange	Reconstruct interchange (if necessary) as recommended by Interchange Modification Justification Study.	This could be determined to be a long-term project.
Cenex driveway (Colorado Loop) (intersection)	None	n/a
E. Colorado Boulevard / St. Onge Road (intersection)	If constructed initially as a "2x1" roundabout, monitor the need to expand to "2x2" operation.	It is intended that the roundabout will be initially constructed to be expanded, when necessary.
Elkhorn Ridge RV Resort Driveway (intersection)	None	n/a
Centennial Road (intersection)	Design and construct northbound left-turn lane. If future development occurs, additional turn lanes also to be installed, when warranted, to serve a roadway connection to the east.	Anticipated 2040 volumes satisfy turn lane warrant criteria.

Table ES-2 (continued): Consultant Study Team Recommendations – Mid-term (2031–2040)

Location	Recommendation	Discussion
Crook City Road / Pendo Road (intersection)	Design and construct intersection improvements. (RCI)	Implementation of a RCI was recommended over a roundabout due to the volume of heavy vehicles turning onto and off of US85 at this location generated, in part, by the adjacent quarry.
Gold Spike Drive (intersection; The Ridge Development)[1]	Design and construct northbound right-turn lane.	Anticipated 2040 volumes satisfy turn lane warrant criteria.
Mt. Roosevelt Road (intersection)	Design and construct traffic signal and northbound right-turn lane.	Anticipated 2040 volumes satisfy signal and turn lane warrant criteria. Installation of signal control sooner than 2031 may be necessary to accommodate traffic entering or crossing the highway from the Mt. Roosevelt Road approaches. Traffic volumes/conditions should be monitored.
US14A (intersection)	None	n/a
US85, Exit 17 to Crook City Road / Pendo Road (segment)	None	n/a
US85, Crook City Road / Pendo Road to US14A (segment)	None	n/a

[1] The Ridge Development was placed on hold in Spring 2024. The information provided herein is based on anticipated development activity and associated assumptions during the time that relevant corridor study tasks were being executed.

Table ES-3: Consultant Study Team Recommendations – Mid-/long-term (2031–2050)

Location	Recommendation	Discussion
Duke Parkway (intersection)	None	n/a
Exit 17 Interchange	None	n/a
Cenex driveway (Colorado Loop) (intersection)	None	n/a
E. Colorado Boulevard / St. Onge Road (intersection)	None	n/a
Elkhorn Ridge RV Resort Driveway (intersection)	Design and construct Reduced Conflict Intersection (RCI). or Close driveway and relocate entrance of RV resort to a new roadway along the south edge of existing resort property.	The timeline for implementation is based on growth of US85 traffic volumes and the need to enhance intersection safety. Relocation of entrance will require partnership with RV resort owner. The recommendation of an RCI could change if a new roadway and US85 intersection were to be constructed at the existing median break near the existing south edge of the RV resort and access were moved to that location.
Centennial Road (intersection)	Design and construct intersection improvements to accommodate the expansion of the City of Spearfish's transportation network including the potential addition of an east leg to the intersection.	Presently, a RCI is recommended in combination with a southbound right-turn lane and correction of the existing intersection skew. Alternatives should be reevaluated once more specific development activity and associated resulting traffic volumes are better known.
Crook City Road / Pendo Road (intersection)	None	n/a

Table ES-3 (continued): Consultant Study Team Recommendations – Mid-/long-term (2031–2050)

Location	Recommendation	Discussion
Ridge Drive (intersection; The Ridge Development)[1]	Design and construct northbound right-turn lane.	Anticipated 2050 volumes satisfy turn lane warrant criteria.
Mt. Roosevelt Road (intersection)	None	n/a
US14A (intersection)	None	n/a
US85, Exit 17 to Crook City Road / Pendo Road (segment)	Design and construct an urbanized, four-lane divided section with intersection turn lanes, sidewalk and shared use path.	Continued coordination between SDDOT, the City of Spearfish and Lawrence County is needed to determine the timing for the implementation of this alternative which is dependent on continued development activity.
US85, Crook City Road / Pendo Road to US14A (segment)	None	n/a

[1] The Ridge Development was placed on hold in Spring 2024. The information provided herein is based on anticipated development activity and associated assumptions during the time that relevant corridor study tasks were being executed.

1.0 INTRODUCTION

1.1 BACKGROUND

As a result of on-going development activity and documented in prior development-related traffic impact studies, the South Dakota Department of Transportation's (SDDOT) has specifically identified the intersection of U.S. Highway 85 (US85) & E. Colorado Boulevard/St. Onge Road as requiring modifications to provide for acceptable traffic safety and operations. This on-going development activity is being experienced throughout the length of the study corridor and so, modifications may also be needed elsewhere to accommodate future traffic conditions.

The purpose of this corridor study was to evaluate existing and anticipated future conditions to identify potential improvements to the study corridor. With the large fluctuation in traffic volumes between normal conditions and conditions during various local and regional events, as well as annual tourism-related traffic, it is prudent to ensure that the correct typical section(s) and intersection enhancements are provided to accommodate these conditions. However, specific analyses of event-related conditions were not performed as part of this corridor study.

The study identified future improvements through the year 2050 and fulfilled the following objectives:

- Determine an ultimate reconstruction recommendation for the intersection of US85 & E. Colorado Boulevard/St. Onge Road.
- Determine potential intersection configurations for study area intersections.
- Determine the need for additional through and turning lanes along the corridor.
- Develop an access management strategy for the corridor.
- Determine project limits, prioritization, and timing for construction within shortened construction seasons.
- Create environmental scan documentation.
- Create final products for use by the SDDOT, City of Spearfish, City of Deadwood, and Lawrence County which will guide implementation of recommended improvements.

1.2 STUDY AREA

Figure 1 illustrates the study corridor beginning at Duke Parkway, located just north of the Interstate 90 (I-90; Exit 17) interchange, in Spearfish and continuing south to the junction with U.S. Highway 14A (US14A) in Deadwood. The study corridor includes the following 10 study intersections:

1. Duke Parkway/park & ride driveway
2. Exit 17 – westbound ramp terminal
3. Exit 17 – eastbound ramp terminal
4. Cenex driveway (Colorado Loop)
5. E. Colorado Boulevard/St. Onge Road
6. Elkhorn Ridge RV Resort driveway
7. Centennial Road
8. Crook City Road/Pendo Road
9. Mt. Roosevelt Road
10. US14A

A comprehensive evaluation of the ramp terminal intersections at the Exit 17 interchange (intersection #s 2 and 3) is excluded from this corridor study's scope of services. A currently unplanned, future interchange modification justification study will need to be conducted to identify the preferred interchange configuration.

Furthermore, two additional intersections were included in the project's original scope of services. Identified as Polo Loop (north and south), further evaluation of these intersections was not performed due to minimal traffic volume.

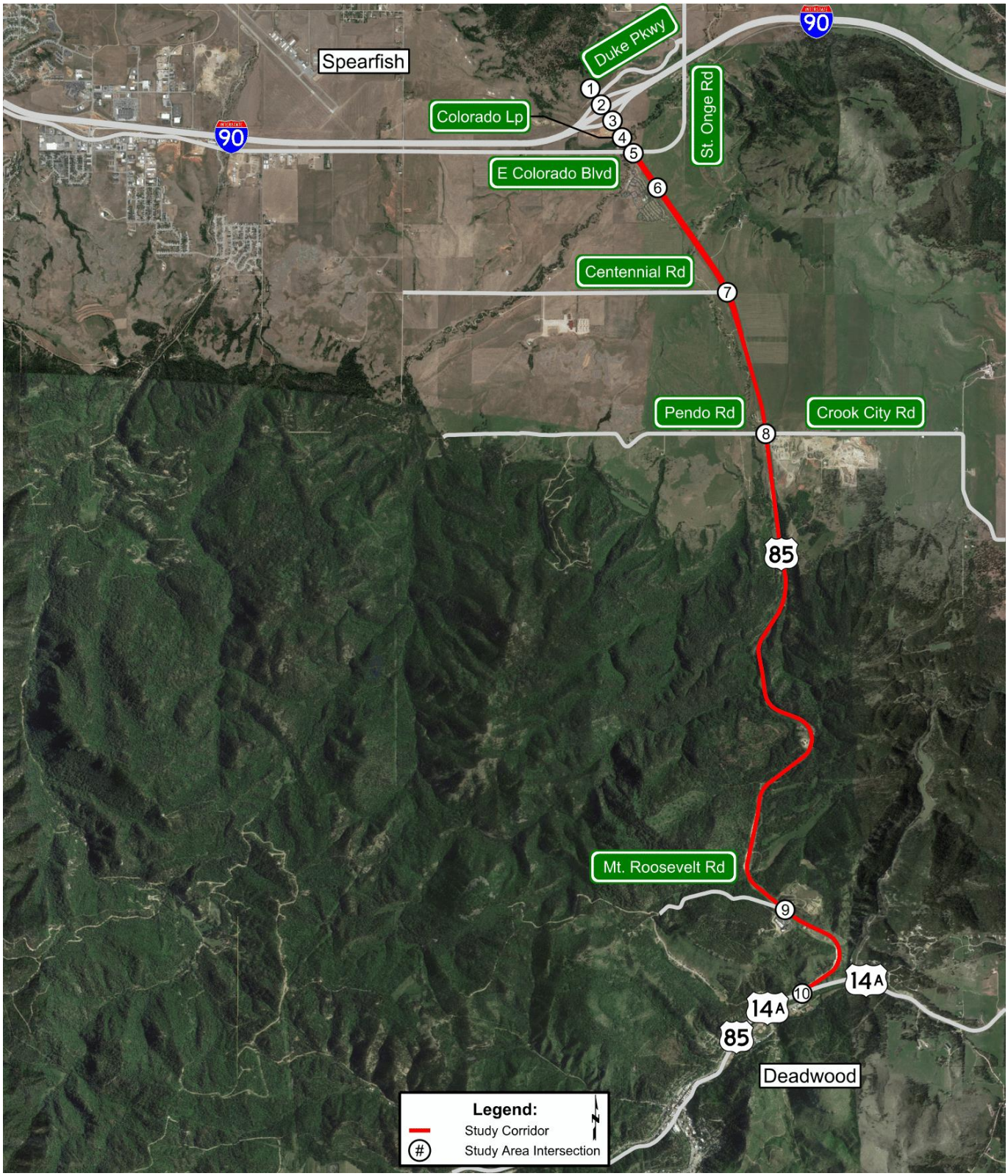


Figure 1: Study Corridor & Intersections

1.3 STUDY PROCESS

This study incorporated a detailed process to fulfill its identified objectives. A study advisory team (SAT) was assembled and comprised of representatives from SDDOT, City of Spearfish, City of Deadwood, Lawrence County, and Federal Highway Administration (FHWA). The SAT guided the development of the corridor study with a total of seven meetings held with the consultant study team. Additionally, public and stakeholder involvement was instrumental in the study process. Two public meetings and two rounds of group stakeholder meetings were conducted with property/business owners along the study corridor and elected officials. Furthermore, a project-specific website was maintained throughout the duration of the corridor study providing interested parties a mechanism to obtain project information and updates, including project team contact information, and an online comment portal during the public comment period associated with each of the two public meetings.

1.4 METHODS AND ASSUMPTIONS

A *Methods and Assumptions* document was prepared at the onset of this study to serve as a historical record of the traffic operations analysis methods and assumptions incorporated into the corridor study. The most recent, amended version is provided as **Appendix A**.

1.5 PROJECT COORDINATION & PREVIOUS STUDIES

During the course of this corridor study, two additional studies were in process, under the guidance of SDDOT, that required coordination between the corresponding study teams. These include:

- *Colorado Boulevard Corridor Study* – studying the needs of Colorado Boulevard from N 27th Street to US85
- *I-90/US 85 Spearfish Rest Area/Welcome Center Corridor Study* – an evaluation of locations for a modern rest area and welcome center in the Spearfish area

Additional previous plans and studies that contain information relevant to the US85 Corridor Study include:

- *South Dakota Statewide Intercity Bus Study*, ongoing
- *Traffic Impact Study, Spearfish I-90 Exit 17 Development Colorado Boulevard*, January 25, 2021
- *Traffic Study for Peaceful Pines Development in Spearfish, SD*, January 8, 2021
- *2020 South Dakota Decennial Interstate Corridor Study*, September 2021
- *Intersection Control Evaluation, US-85 & Colorado Boulevard*, July 2019
- *2019 South Dakota Strategic Highway Safety Plan*
- *Traffic Impact Analysis, Vieland Property/Elkhorn Development*, July 2016
- *envision Spearfish, The Comprehensive Plan of the City of Spearfish*, July 15, 2013
- *Spearfish Area Master Transportation Plan*, July 2011
- *Traffic Impact Study, Elkhorn Ridge Development*, December 2007
- *Lawrence County 2030 Comprehensive Plan*
- *City of Spearfish Parks and Recreation Master Plan 2022-2032*

2.0 EXISTING CONDITIONS

An *Existing Conditions Assessment* technical memorandum was prepared at the beginning of the study process. This assessment summarized existing characteristics of the study corridor and the broader study area. Outlined below is an overview of these characteristics. More detailed information may be found in the memo, provided as **Appendix B**.

2.1 REGIONAL TRANSPORTATION NETWORK

I-90 is an east-west transcontinental freeway and at 3,020 miles, the longest interstate highway in the United States. From west to east, I-90 connects Seattle, Washington to Boston, Massachusetts. Within South Dakota, I-90 begins west of Spearfish and continues to east of Sioux Falls. Throughout South Dakota, I-90 is primarily a four-lane freeway. Within Spearfish, I-90 is concurrent with US14 throughout and with US85 from Exit 10 to Exit 17.

US85 serves as the main connection between I-90, at Spearfish, and the cities of Deadwood and Lead. US85 is concurrent with US14A from the junction of US85 & US14A in Deadwood, through Deadwood and Central City to Lead, then from Lead to Cheyenne Crossing, then north to Spearfish through Spearfish Canyon. US85 is also a portion of the CanAm Highway, which stretches 1,479 miles from central Saskatchewan in Canada to the United States border with Mexico in El Paso, Texas. While US85 is a four-lane highway between Deadwood and Belle Fourche, it is a two-lane highway elsewhere within South Dakota. Within the study area, US85 is a "Principal Arterial" (SDDOT State Highway Functional Classification Map) and part of the Preferential Truck Network (SDDOT Freight Plan).

Figure 2 illustrates the geographic context of US85 within the regional transportation network.

2.2 LOCAL TRANSPORTATION NETWORK

North of the I-90 (Exit 17) junction, the project corridor is referenced as Duke Parkway. The northern end of the study corridor provides connections to I-90 at Exit 17, E. Colorado Boulevard, St. Onge Road, and the city of Spearfish. The southern end of the study corridor provides connections to Mt. Roosevelt Road, US14A, and the city of Deadwood. Within the central portion of the project corridor, US85 connects to the following county roads: Centennial Road, Pendo Road, and Crook City Road. Additionally, a connection to the city of Whitewood is provided via Crook City Road. The local transportation network is illustrated in **Figure 3**.

2.3 INTERSECTION SPACING AND ACCESS

According to SDDOT's Highway Access Classifications, the US85 study corridor is categorized as "Rural," which is defined as "low volume, high-speed facility" with access points spaced for safety and operations efficiency. Access location criteria for "rural" highways, as per the SDDOT Road Design Manual, are summarized in **Table 1**. This information was used during the corridor study to identify opportunities for improved safety and mobility. For reference and comparative purposes, the "Urban Fringe" category is also included. Its definition is "rural highway serving developing area immediately adjacent to a city or town" with "access regulated to provide future through-traffic priority."

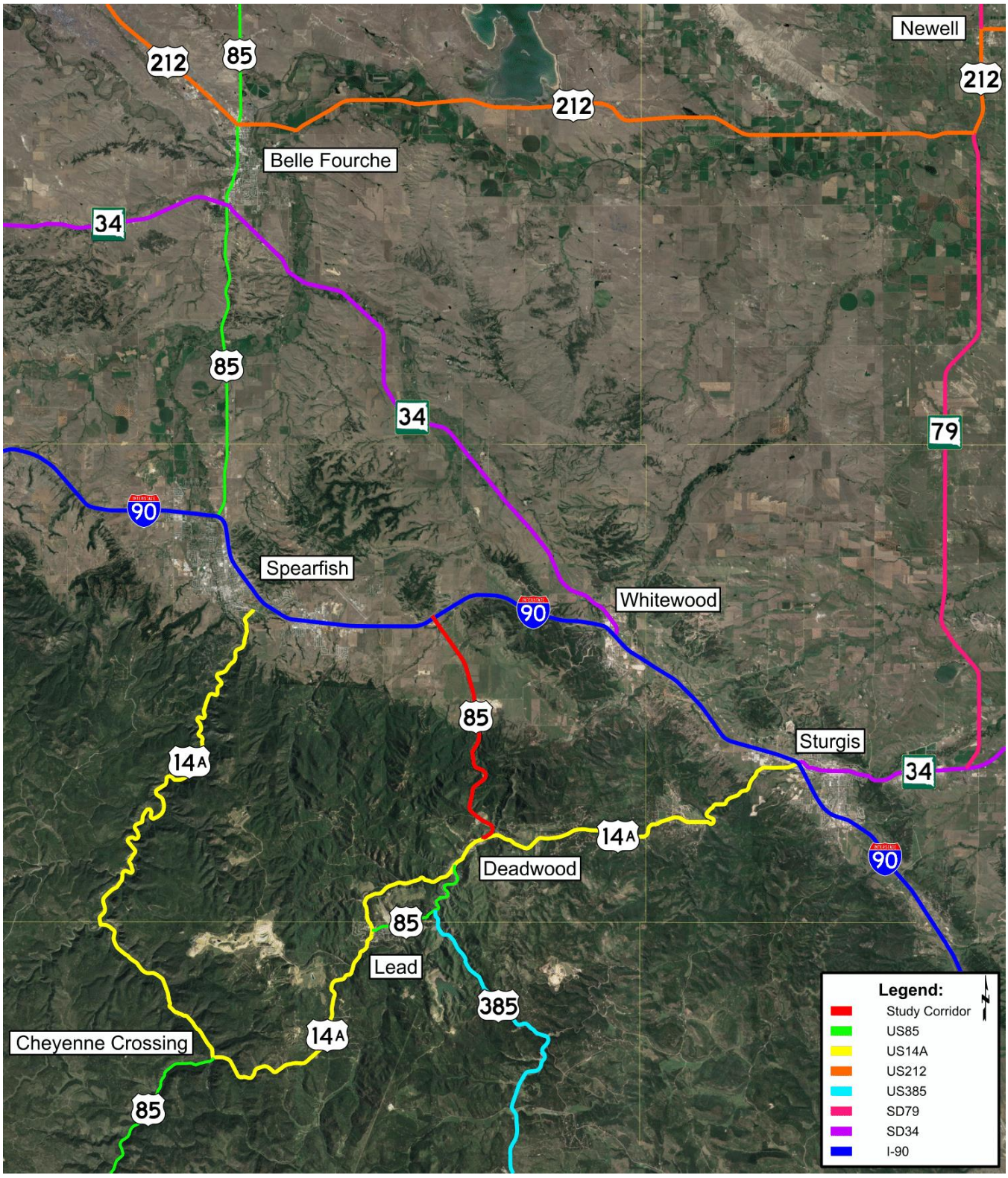


Figure 2: Regional Transportation Network

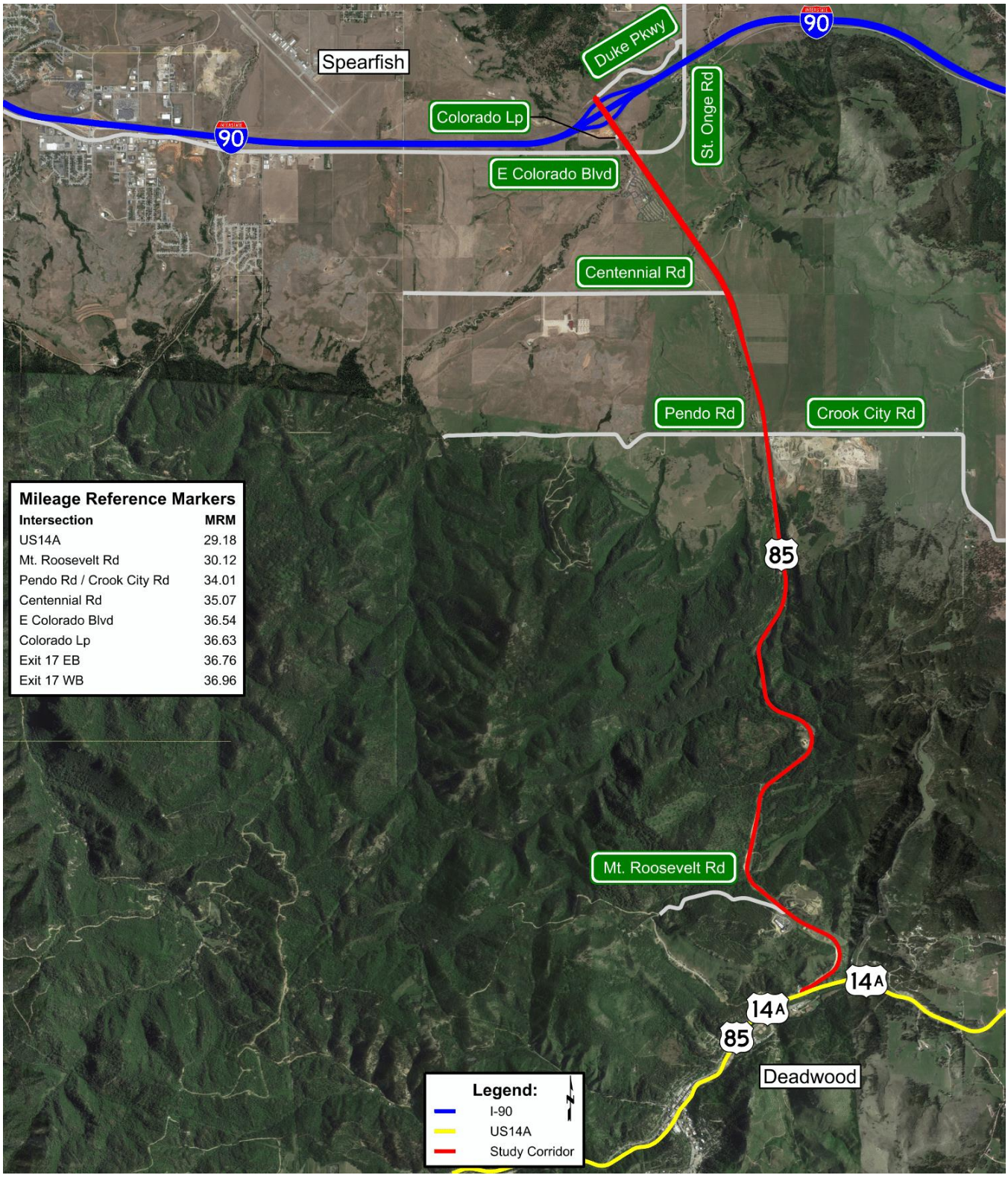


Figure 3: Local Transportation Network

Table 1: SDDOT Access Location Criteria

Access Classification	Signal Spacing Distance (mile)	Median Opening Spacing (mile)	Minimum Unsignalized Access Spacing (feet)	Access Density
Urban Fringe	¼	½ F ¼ D	1,000	5 accesses per side per mile
Rural	n/a	n/a	1,000	5 accesses per side per mile

Notes:

1. Access to the Interstate system is governed by SDDOT interchange policy. No new access shall be provided on non-interstate routes within 1/8-mile of interstate ramp terminals.
2. N/A = not applicable, F = Full Movement – all turns and through movements provided, D = Directional Only – certain turning and through movements not provided.
3. SDDOT may defer to stricter local standards.
4. SDDOT will seek opportunities to reduce access density wherever possible.
5. Rural class minimum unsignalized access spacing may be reduced to 660' by the Area Engineer, based on results of an engineering study as described in §70:09:02:01.

Two study intersections do not satisfy intersection spacing criteria. The US85 & Cenex driveway (Colorado Loop) intersection is located 0.13 miles from the Exit 17 eastbound ramp terminal intersection and 0.15 miles from the E. Colorado Boulevard/St. Onge Road intersection, both of which are less than the minimum spacing of 0.50 miles for full movement median openings and 0.25 miles for directional only median openings. Additionally, the intersection along Duke Parkway formed by the park & ride driveway does not satisfy median opening requirements with a distance of approximately 0.03 miles. However, it should be noted that this portion of the study corridor is not a designated U.S. highway but rather, a local street. For the entire corridor, only one segment does not satisfy SDDOT access density criteria, which is the southbound segment of US85 beginning just north of Crook City Road/Pendo Road and continuing approximately 0.85 miles south of the intersection. **Figure 4** identifies the non-intersection access points along the corridor and how the resulting access density compares to SDDOT criteria.

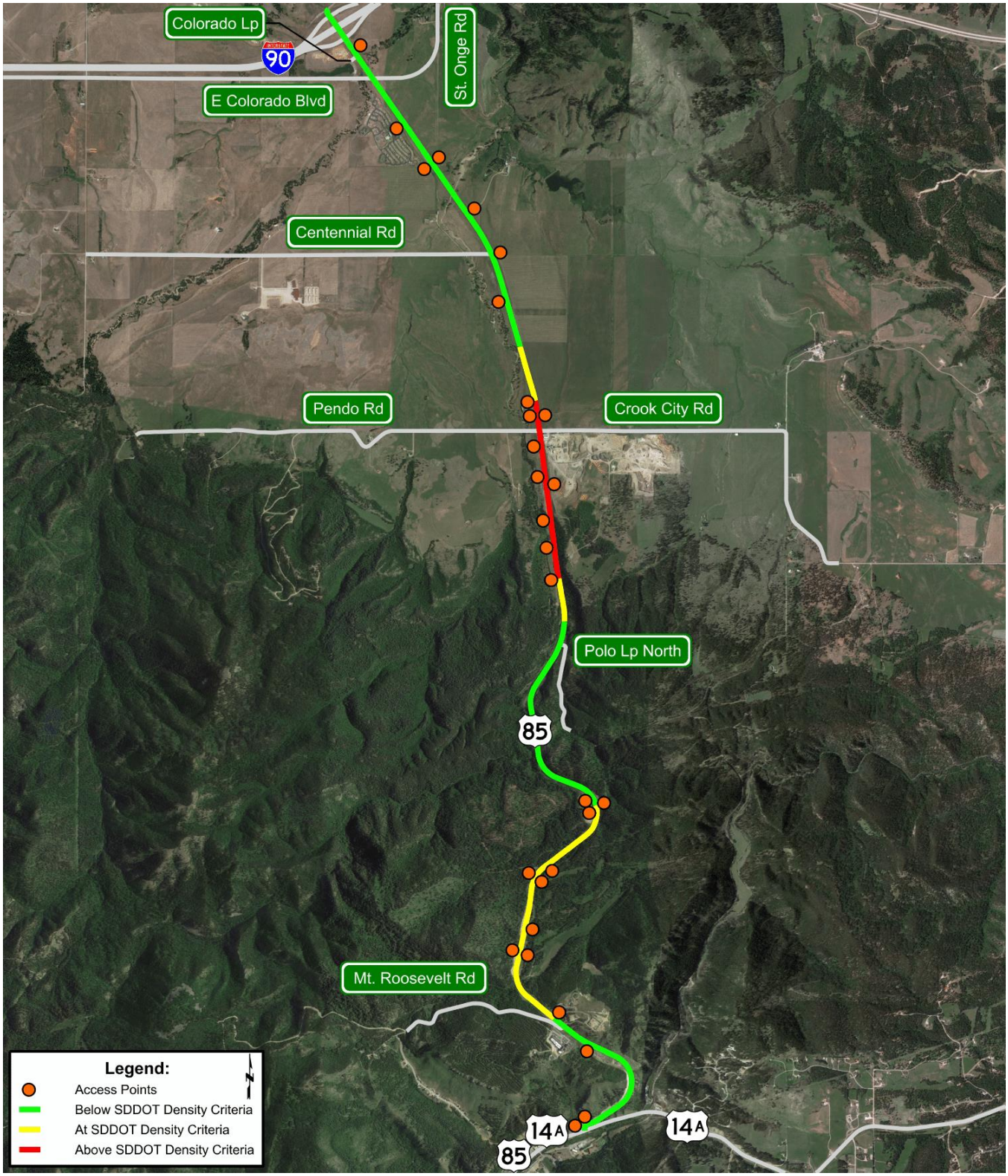


Figure 4: Access Density

2.4 TRAFFIC VOLUMES

2.4.1 Historical Traffic Volumes

SDDOT collects and maintains an assortment of traffic-related data, including daily traffic volumes, on highways statewide. **Figure 5** illustrates daily volumes dating back to 2012 for various segments of the project corridor. As illustrated, the two segments of US85 are characterized by volumes of minimal change from 2012 to 2019 before a gradual increase to year 2022.

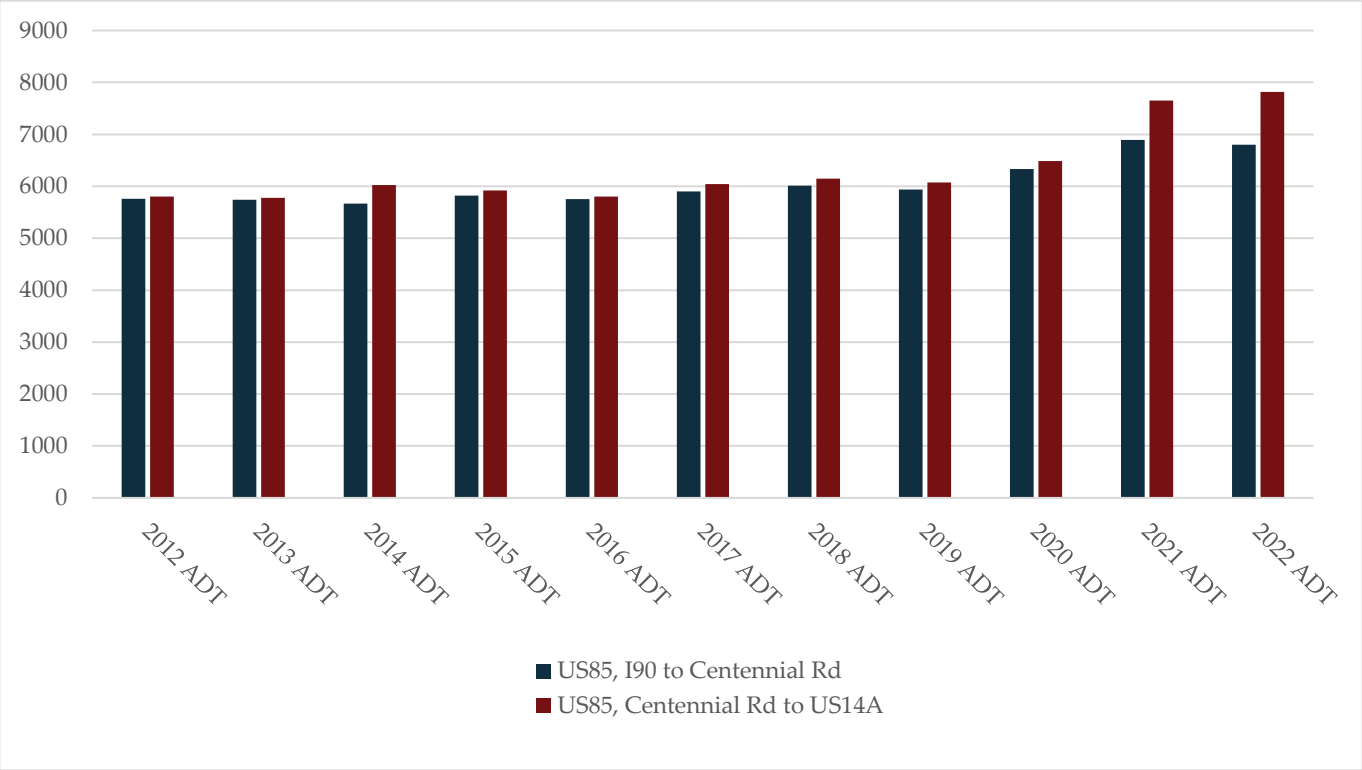


Figure 5: Historical Traffic Volumes

2.4.2 Existing Traffic Volumes

Existing (2022) traffic volumes were collected as part of the corridor study process. Volumes were collected in the form of 15-minute turning movement volumes at the 10 study area intersections in November 2022. Because traffic volumes at the Elkhorn Ridge RV Resort driveway experience minimal traffic volumes during the time when data was collected, additional volumes were collected in July 2023. The resulting AM and PM peak hour turning movement volumes and existing daily volumes are illustrated in **Figure 6**. Details of these volumes are provided in **Appendix B**.

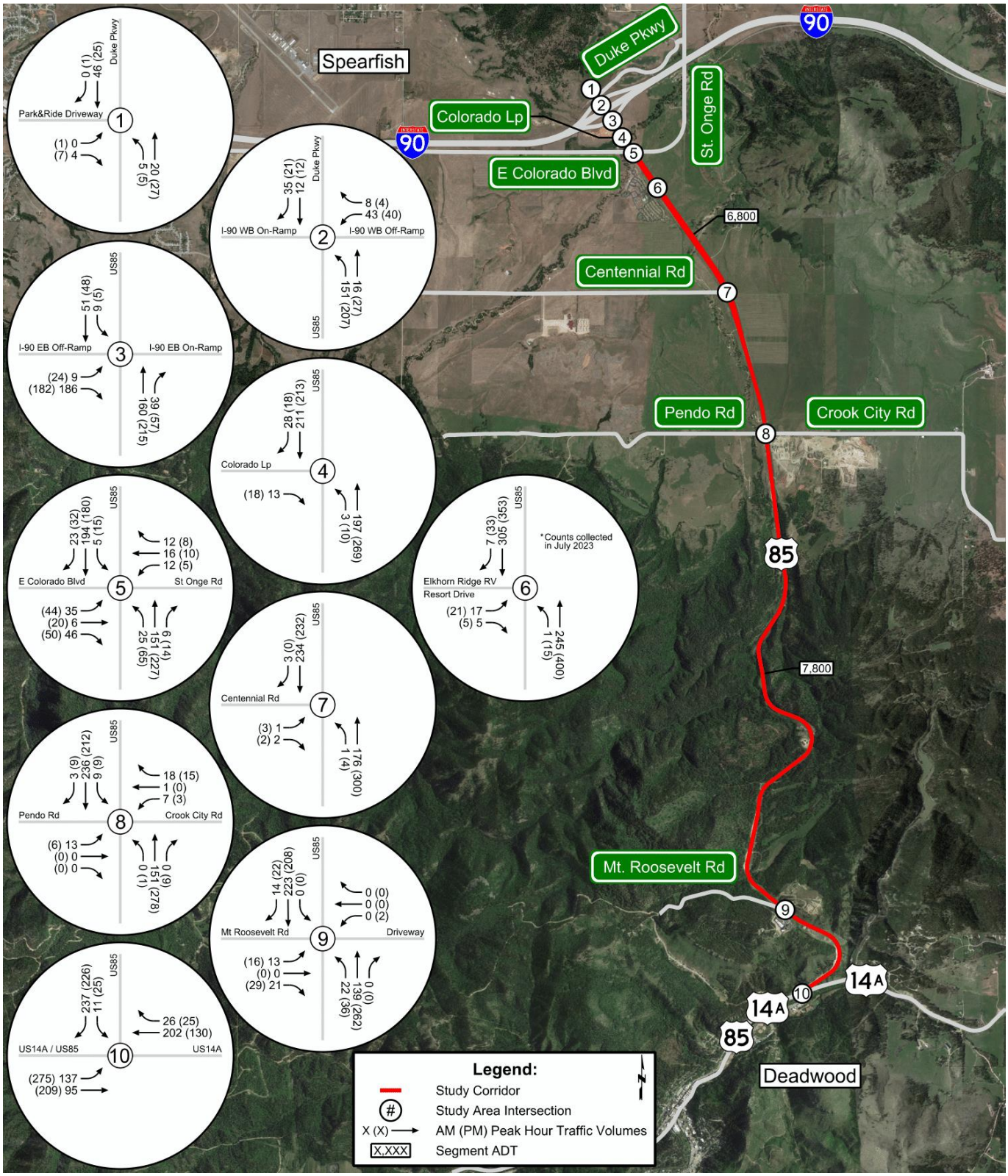


Figure 6: Existing Traffic Volumes

2.5 NETWORK CHARACTERISTICS

Various other elements of the study corridor were inventoried to provide an assessment of existing conditions.

2.5.1 Existing Roadway Sections

The existing project corridor consists of four-lane divided and undivided typical sections. Beginning at US14A, at mileage reference marker (MRM) 29.18, the study corridor consists of four 12-ft lanes. At MRM 34.70, and to the north end of US85 at the westbound ramps of Exit 17 (MRM 36.96), the roadway section transitions to a four-lane, divided section with 12-ft lanes and a 32-ft depressed median. The short section of Duke Parkway, north of Exit 17, consists of one lane in each direction separated by an approximate 38-ft raised median.

2.5.2 Intersection Lane Configurations and Traffic Control

Of the 10 study intersections, the intersection at US14A is signalized (operating as red/yellow flash during the months of November through April); the E. Colorado Boulevard/St. Onge Road intersection is all-way stop-controlled (AWSC); and the remaining are two-way stop-controlled (TWSC) or "tee" intersections with stop sign control of the single, minor street approaching the project corridor. Further details of intersection lane configurations and traffic control are illustrated in **Figure 7**.

Information regarding the following additional network characteristics is provided in **Appendix B**.

- Right-of-way widths
- Existing roadway surfacing and pavement condition
- Horizontal curves and superelevation rates
- Vertical curves
- Intersection sight distance

2.6 MULTI-MODAL FACILITIES

Various multi-modal facilities within the study corridor were inventoried to provide an assessment of existing conditions. These facilities include:

2.6.1 Pedestrian/Bicycle Facilities

Throughout the project corridor, the only pedestrian/bike facility is a sidewalk located along Colorado Loop, and under E. Colorado Boulevard, connecting the Cenex gas station to the Elkhorn Ridge RV Resort.

2.6.2 Pedestrian Crossings

Other than the sidewalk undercrossing referenced in the preceding section, presently, there are no designated, at-grade or grade-separated pedestrian/bicycle crossings along or adjacent to the project corridor.

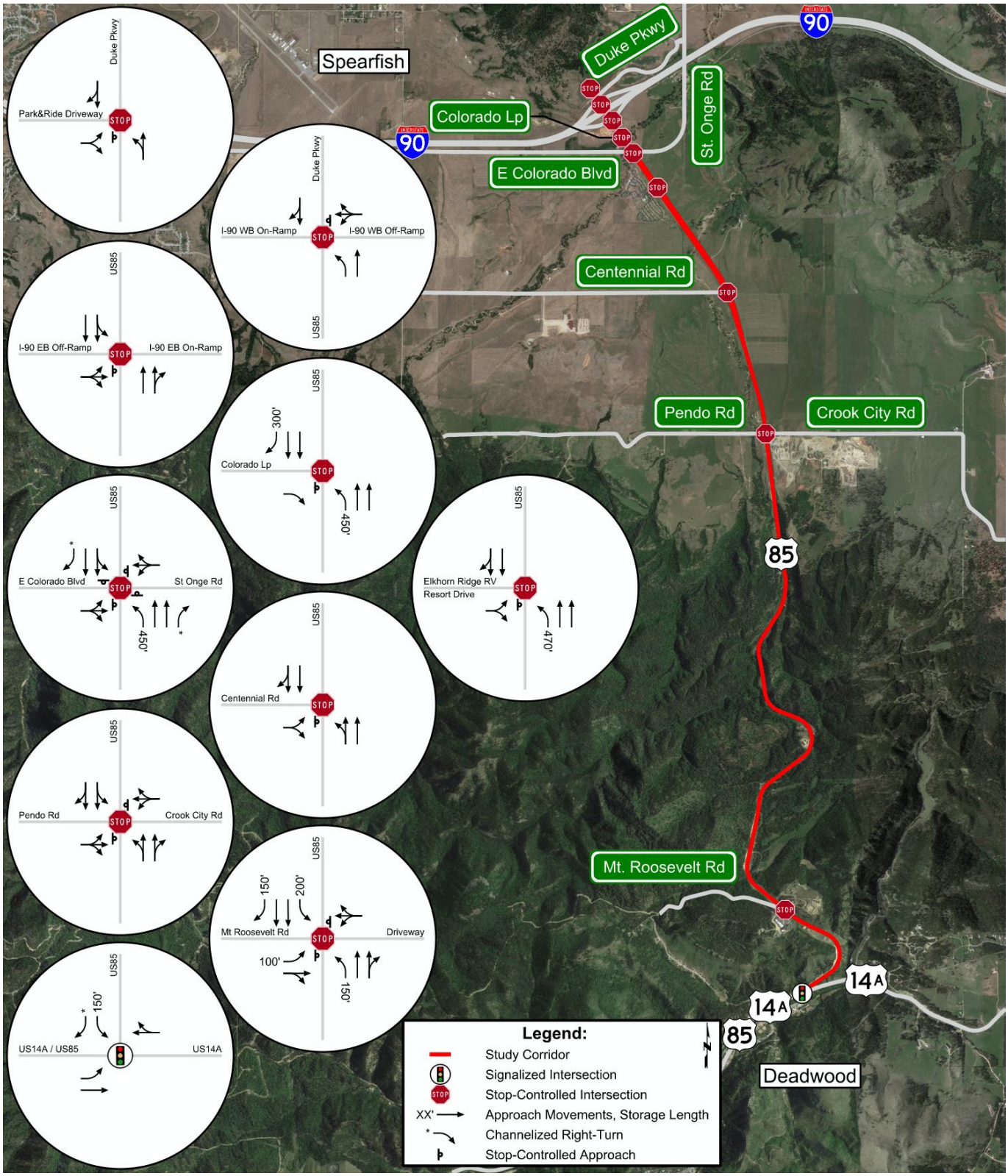


Figure 7: Existing Intersection Lane Configurations & Traffic Control

2.6.3 Transit

Currently, Prairie Hills Transit, a non-profit corporation, provides pre-scheduled public transportation for a six-county region including Lawrence County. Hours of service within the city of Spearfish are from 7am-7pm Monday-Friday, 9am-4pm on Saturdays, and 8am-12pm on Sundays. Transit to and from Walmart and its surrounding stores are from 10am-12pm Monday-Friday, and 11:30am-1:30pm on Saturday. Prairie Hills Transit also provides transit from Lead and Whitewood to Spearfish on Thursdays with varying service times. Out-of-town appointment times can also be scheduled 24 hours in advance for the hours between 10am-2pm.

2.6.4 Railroad

Presently, no railroads cross or parallel the project corridor.

2.6.5 Duke Parkway Park & Ride Lot

An existing park & ride lot is located opposite of Duke Parkway at the north end of the study corridor. This facility provides approximately 30 paved parking spaces for commuters wishing to carpool with others or perhaps to serve simply as a rest area for those traveling along I-90. In October 2023, SDDOT collected video data that was evaluated to assess the quantity and duration of park & ride lot use. Results of this evaluation are summarized in **Table 2**.

Duke Parkway Park & Ride Lot

2.7 TRAFFIC OPERATIONS & SAFETY ANALYSIS

2.7.1 Intersection and Corridor Operations

Traffic operations analyses for project area intersections and corridor segments were performed in accordance with methodologies defined in the project's *Methods and Assumptions* document provided as **Appendix A**. The measure of effectiveness (MOE) used for this analysis was Level of Service (LOS). LOS is a qualitative assessment of the highway's operating conditions and relates to a measurement reflecting the relative ease of traffic flow on a scale of A through F.

The results of this exercise indicate that for existing (2022) conditions, all intersections and highway segments operate at LOS A during both the AM and PM peak hours, except for the US85 & E. Colorado Boulevard intersection which operates at LOS B during the PM peak hour. Traffic operations analysis indicates that there are no existing operational deficiencies along the corridor.

A summary of this evaluation is provided in the *Existing Conditions Assessment* report, provided as **Appendix B**.

Table 2: Duke Parkway Park & Ride Lot Usage

Start Time	End Time	Monday 10/2/23		Tuesday 10/3/23		Wednesday 10/4/23		Thursday 10/5/23		Friday 10/6/23		Saturday 10/7/23		Sunday 10/8/23	
		Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit
0:00	1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00	2:00	0	0	0	0	1	0	0	0	0	0	0	0	0	0
2:00	3:00	0	0	0	0	0	1	0	0	0	0	0	0	0	0
3:00	4:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00	5:00	0	0	2	1	2	1	0	0	0	0	2	1	3	2
5:00	6:00	0	0	0	0	1	1	0	0	1	1	2	1	2	1
6:00	7:00	0	0	0	0	3	3	0	0	0	0	2	1	1	1
7:00	8:00	0	0	6	3	4	4	3	1	4	3	1	2	0	0
8:00	9:00	0	0	2	4	0	0	0	1	3	2	2	2	2	2
9:00	10:00	0	0	2	2	1	1	1	1	0	0	2	1	2	3
10:00	11:00	0	0	7	4	0	0	4	3	7	4	5	6	0	0
11:00	12:00	0	0	2	3	0	0	2	1	2	5	3	2	6	4
12-hour (a.m.) Total		-	-	21	17	11	10	7	6	17	15	19	16	16	13

Note: Gray cells indicate time periods without full video data; time periods are excluded from daily enter and exit totals.

Table 2 (continued): Duke Parkway Park & Ride Lot Usage

Start Time	End Time	Monday 10/2/23		Tuesday 10/3/23		Wednesday 10/4/23		Thursday 10/5/23		Friday 10/6/23		Saturday 10/7/23		Sunday 10/8/23	
		Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit
12:00	13:00	0	0	5	4	0	0	6	7	2	2	4	3	4	4
13:00	14:00	3	2	4	5	0	0	1	1	2	2	1	1	5	2
14:00	15:00	1	2	1	2	0	0	2	2	6	6	2	1	3	5
15:00	16:00	1	1	4	3	0	0	10	10	5	6	1	1	6	5
16:00	17:00	2	1	1	2	0	0	2	3	6	6	3	3	5	6
17:00	18:00	7	7	0	0	0	0	5	5	11	9	4	3	0	0
18:00	19:00	2	3	3	5	0	0	7	1	2	1	10	14	6	7
19:00	20:00	2	2	1	1	0	0	6	7	3	5	2	4	2	4
20:00	21:00	3	4	0	0	0	0	6	6	1	2	0	0	0	0
21:00	22:00	0	0	0	0	0	0	3	10	0	0	0	0	0	0
22:00	23:00	0	0	1	2	0	0	1	0	2	3	0	0	0	0
23:00	24:00	0	0	0	0	0	0	0	1	0	0	0	0	0	0
12-hour (p.m.) Total		18	20	20	24	-	-	49	53	40	42	27	30	31	33
24-hour Total		18	20	41	41	11	10	56	59	57	57	46	46	47	46
Min. Duration of Stay[1]		0:00:29		0:00:09		0:01:18		0:00:22		0:00:28		0:00:44		0:00:10	
Max Duration of Stay		3:04:45		14:10:59		0:57:59		8:29:57		7:50:38		13:36:58		10:28:27	
Average Duration of Stay		0:18:36		1:05:52		0:13:03		0:42:54		0:37:01		1:03:25		0:46:38	

Note: Gray cells indicate time periods without full video data; time periods are excluded from daily enter and exit totals.
[1]hr:min:sec

2.7.2 Turn Lane Warrants

To determine the need for left-turn and right-turn lanes at intersections along the project corridor, both SDDOT guidelines (for signalized and unsignalized intersections) and the National Cooperative Highway Research Program (NCHRP) Report 457: *Evaluating Intersection Improvements: An Engineering Study Guide* were evaluated. A summary of this evaluation is provided in **Table 3**.

Table 3: Turn Lane Warrant Evaluation (Existing Conditions)

	US85 – Northbound		US85 – Southbound	
Intersection	Left-turn	Right-turn	Left-turn	Right-turn
Duke Pkwy/ park & ride driveway	Not Warranted	-	-	Not Warranted
I-90 (Exit 17) westbound ramp terminal	Existing[1]	-	-	Not Warranted
I-90 (Exit 17) eastbound ramp terminal	-	Warranted (NCHRP)	Not Warranted	-
Cenex driveway (Colorado Loop)	Existing	-	-	Existing
E. Colorado Boulevard / St. Onge Road	Existing	Not Warranted[2]	Not Warranted	Not Warranted[2]
Elkhorn Ridge RV Resort	Existing	-	-	Warranted (NCHRP)
Centennial Road	Not Warranted	-	-	Not Warranted
Crook City Road / Pendo Road	Not Warranted[3]	Not Warranted	Not Warranted[3]	Not Warranted
Mt. Roosevelt Road	Existing	Not Warranted	Existing	Existing
US14A	-	-	Existing[4]	Existing[5]

[1]Lane drop
[2]Existing short, yield-controlled, channelized right-turn lane
[3]Left-turn lane planned for construction 2026
[4]Forced left-turn movement as US85 forms a tee-intersection with US14A
[5]Right-turn lane transitions into an added westbound lane on US14A into Deadwood

2.7.3 Crash History

A review of reported crashes for the years 2017-2021 was performed to assess the level of safety along the project corridor. From this review, a total of 203 crashes were reported along the project corridor, 53 of which were at, or influenced by, one of the 10 study area intersections. The remaining 150 crashes occurred along highway segments within the study corridor, but between intersections.

The intersection of US85 & E. Colorado Boulevard/St. Onge Road experienced 34 reported crashes; the only study intersection to experience an average of one or more crashes per year. However, it should be noted that these crashes all occurred prior to the implementation of AWSC on June 29, 2022. From then through the end of 2022, only one crash was reported. All of the study intersections experienced a crash rate under 0.5 crashes per million entering vehicles except for the intersection of US85 & E. Colorado Boulevard/St. Onge Road which experienced a rate of 1.94 crashes per million entering vehicles. A summary of this evaluation is provided in the *Existing Conditions Assessment* report, provided as **Appendix B**.

US85 & E. Colorado Boulevard/St. Onge Road Intersection (looking northwest)

3.0 TRAFFIC FORECASTS

The methodology to develop future traffic volumes is documented in the project's *Methods and Assumptions* document, provided as **Appendix A**, and the technical memorandum titled *Future Traffic Volume Forecasts*, provided as **Appendix C**. As noted, future traffic volumes were developed for the following year scenarios:

- Year 2027 – anticipated first year of transportation improvements implementation
- Year 2040
- Year 2050

In addition to increased traffic volumes based on general population growth and historic traffic volume changes, future traffic forecasts developed for this corridor study also take into consideration anticipated traffic generated by multiple proposed and active developments along, or in proximity to the study corridor. The proposed developments impacting the US85 corridor are illustrated in **Figure 8** and summarized in **Tables 4-6**.

The resulting future AM and PM peak hour traffic volumes for horizon years 2027, 2040, and 2050 are illustrated in **Figures 9, 10** and **11**.

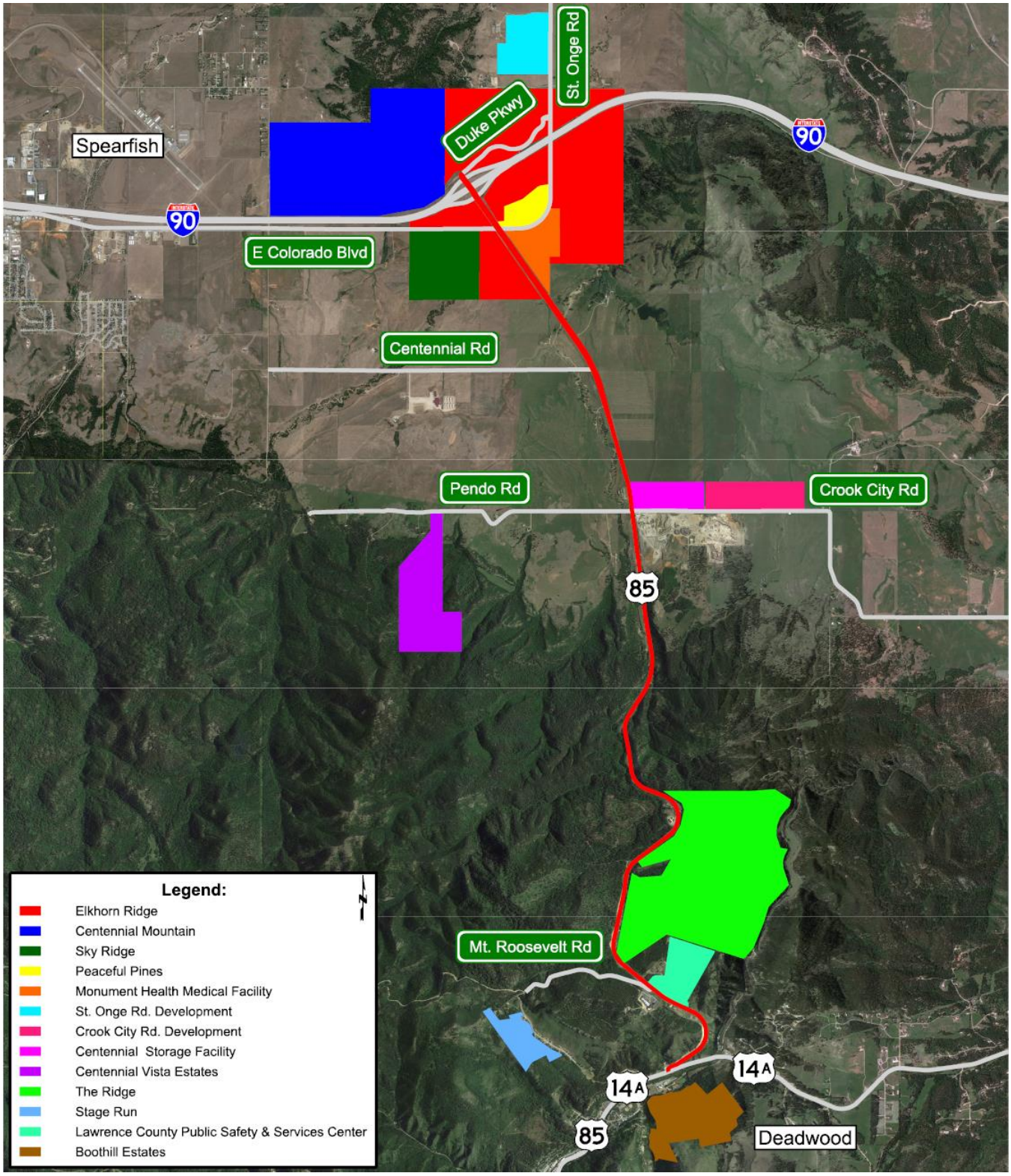


Figure 8: Proposed Land Development Areas

Table 4: Proposed Developments (City of Spearfish)

Development	Completed TIA Report	LAND USE AND ACCESS ASSUMPTIONS		
		2027	2040	2050
Centennial Mountain	2021 Interstate Engineering	Land Use ▪ 49 single-family res. units ▪ 1 middle/junior high school Access ▪ Driveways on Rainbow Rd.	Land Use, in addition to 2027: ▪ 40 single-family res. units ▪ 115 multi-family res. units ▪ 1 building materials & lumber store ▪ 1 free-standing discount superstore ▪ 1 shopping center ▪ 1 apparel store ▪ 1 fast casual restaurant ▪ 1 high-turnover (sit-down) restaurant ▪ 1 fast-food restaurant w/ drive-through window ▪ 1 coffee/donut shop w/ drive-through window ▪ 1 winery ▪ 1 quality restaurant Access, in addition to 2027: New roadway connection at Duke Parkway	Land Use, in addition to 2040: ▪ 1 small office building ▪ 1 gasoline/service station Access, in addition to 2040: ▪ No access changes
Sky Ridge	2021 HDR	Land Use ▪ 320 single-family res. units ▪ 11 recreational fields. Access Driveways on E. Colorado Blvd.	Land Use, in addition to 2027: ▪ No additional uses Access, in addition to 2027: No access changes	Land Use, in addition to 2040: ▪ No additional uses Access, in addition to 2040: No access changes

Table 4 (continued): Proposed Developments (City of Spearfish)

Development	Completed TIA Report	LAND USE AND ACCESS ASSUMPTIONS		
		2027	2040	2050
Elkhorn Ridge	2007 Kirkham Michael	Land Use ▪ 1 gasoline/service station ▪ 1 high-turnover restaurant ▪ 2 specialty retail centers ▪ 460 campground/RV Park sites ▪ 366 single-family res. units ▪ 265 multifamily res. units ▪ 1 general office building ▪ 1 golf course (18 holes)	Land Use, in addition to 2027: ▪ No additional uses	Land Use, in addition to 2040: ▪ No additional uses
		Access Multiple driveways on existing road network	Access, in addition to 2027: No access changes	Access, in addition to 2040: No access changes
Peaceful Pines	2021 Wenck	Land Use ▪ 43 senior adult housing multi-family units ▪ 1 nursing home ▪ 6 multi-family res. units	Land Use, in addition to 2027: ▪ No additional uses	Land Use, in addition to 2040: ▪ No additional uses
		Access Driveways on St. Onge Rd.	Access, in addition to 2027: No access changes	Access, in addition to 2040: No access changes
Monument Health Medical Facility	n/a	Land Use ▪ 1 clinic (36,850 SF)	Land Use, in addition to 2027: ▪ 1 clinic (32,000 SF)	Land Use, in addition to 2040: ▪ 1 hospital (50,000)
		Access Driveway on St. Onge Rd.	Access, in addition to 2027: No access changes	Access, in addition to 2040: Driveway connection at US85

Table 5: Proposed Developments (Lawrence County)

Development	Completed TIA Report	LAND USE AND ACCESS ASSUMPTIONS		
		2027	2040	2050
Centennial Storage Facility	n/a	Land Use ▪ 150 mini-warehouse units Access ▪ Driveway on Crook City Rd.	Land Use, in addition to 2027: ▪ 450 mini-warehouse units Access, in addition to 2027: ▪ No access changes	Land Use, in addition to 2040: ▪ No additional uses Access, in addition to 2040: ▪ No access changes
Centennial Vista Estates	n/a	Land Use ▪ 25 single-family res. units Access ▪ Driveways on Pendo Rd.	Land Use, in addition to 2027: ▪ 50 single-family res. units Access, in addition to 2027: ▪ No access changes	Land Use, in addition to 2040: ▪ No additional uses Access, in addition to 2040: ▪ No access changes
Crook City Road Development	n/a	Land Use ▪ 25 single-family res. units Access ▪ Driveways on Crook City Rd.	Land Use, in addition to 2027: ▪ 50 single-family res. units Access, in addition to 2027: ▪ No access changes	Land Use, in addition to 2040: ▪ No additional uses Access, in addition to 2040: ▪ No access changes
St. Onge Road Development	n/a	Land Use ▪ 20 single-family res. units Access ▪ Driveways on St. Onge Rd.	Land Use, in addition to 2027: ▪ 20 single-family res. units Access, in addition to 2027: ▪ No access changes	Land Use, in addition to 2040: ▪ No additional uses Access, in addition to 2040: ▪ No access changes

Table 6: Proposed Developments (City of Deadwood)

Development	Completed TIA Report	LAND USE AND ACCESS ASSUMPTIONS		
		2027	2040	2050
Boothill Estates[1]	n/a	Land Use ▪ 24 single-family res. units ▪ 50 multi-family res. units Access ▪ Connection to US14A via Stage Pile Rd.	Land Use, in addition to 2027: ▪ 70 single-family res. units ▪ 148 multi-family res. units Access, in addition to 2027: ▪ No access changes	Land Use, in addition to 2040: ▪ No additional uses Access, in addition to 2040: ▪ No access changes
Stage Run[1]	n/a	Land Use ▪ 75 single-family res. units ▪ 32 multi-family res. units Access ▪ Connection to US85 via Mt. Roosevelt Rd.	Land Use, in addition to 2027: ▪ 80 multi-family res. units Access, in addition to 2027: ▪ New roadway connection into Deadwood at Burnham Ave.	Land Use, in addition to 2040: ▪ No additional uses Access, in addition to 2040: ▪ No access changes
Lawrence County Public Safety & Services Center	n/a	Land Use ▪ 1 sheriff's office Access ▪ Driveway across from Mt. Roosevelt Rd.	Land Use, in addition to 2027: ▪ 1 county administrative building Access, in addition to 2027: ▪ No access changes	Land Use, in addition to 2040: ▪ No additional uses Access, in addition to 2040: ▪ No access changes
The Ridge[1, 2]	n/a	Land Use ▪ 25 single-family res. units ▪ 114 multi-family res. units ▪ 1 convenience store ▪ 80 RV park sites Access ▪ Connections at US85	Land Use, in addition to 2027: ▪ 73 single-family res. units ▪ 126 multi-family res. units ▪ 1 convenience store ▪ 88 RV park sites Access, in addition to 2027: ▪ No access changes	Land Use, in addition to 2040: ▪ 125 single-family res. units Access, in addition to 2040: ▪ No access changes

[1] Trips generated by residential uses within this development were reduced by 15% assuming many are rental/vacation properties and not all completely occupied at any given time.

[2] The Ridge Development was placed on hold in Spring 2024. The information provided herein is based on anticipated development activity and associated assumptions during the time that relevant corridor study tasks were being executed.

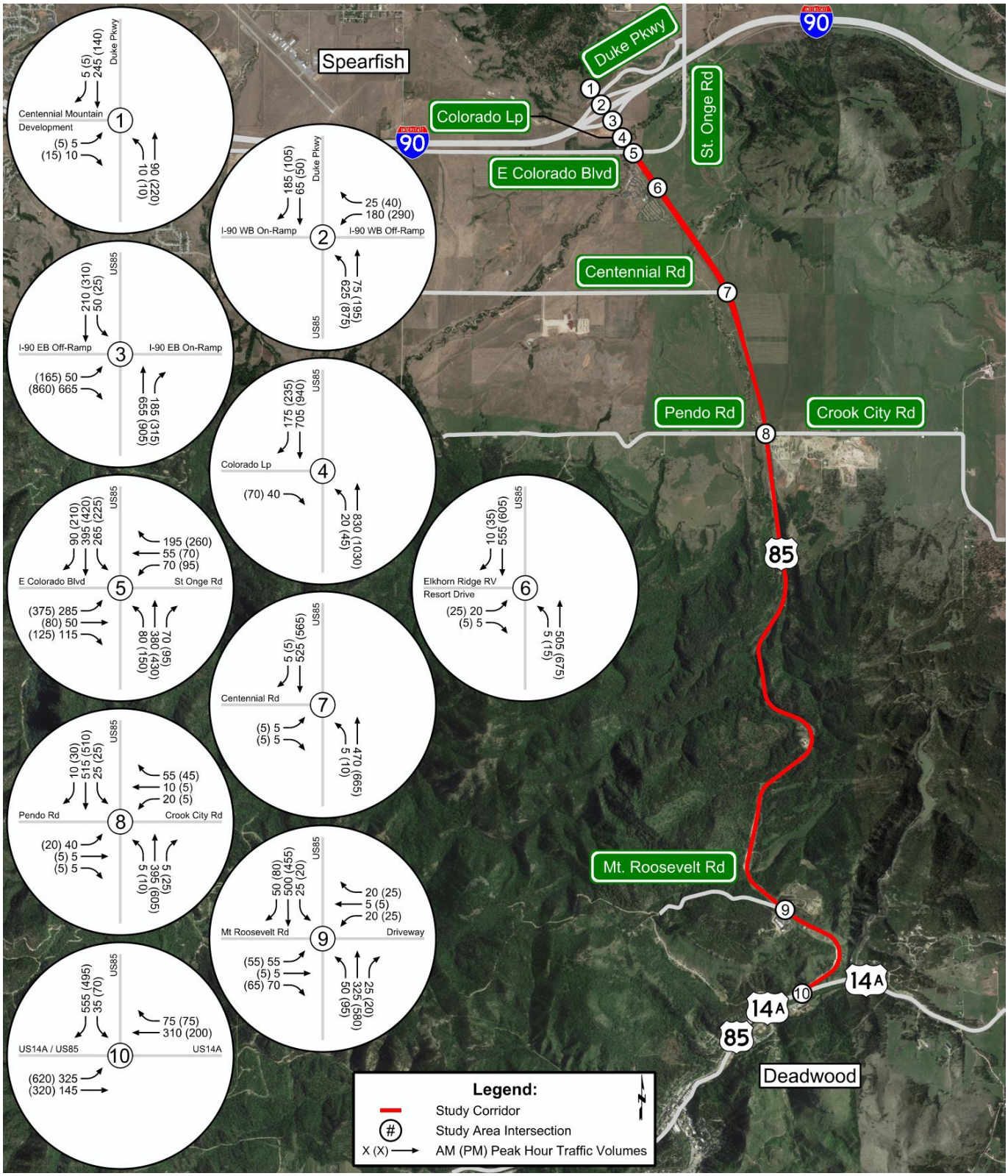


Figure 9: Future (2027) No-build Traffic Volumes

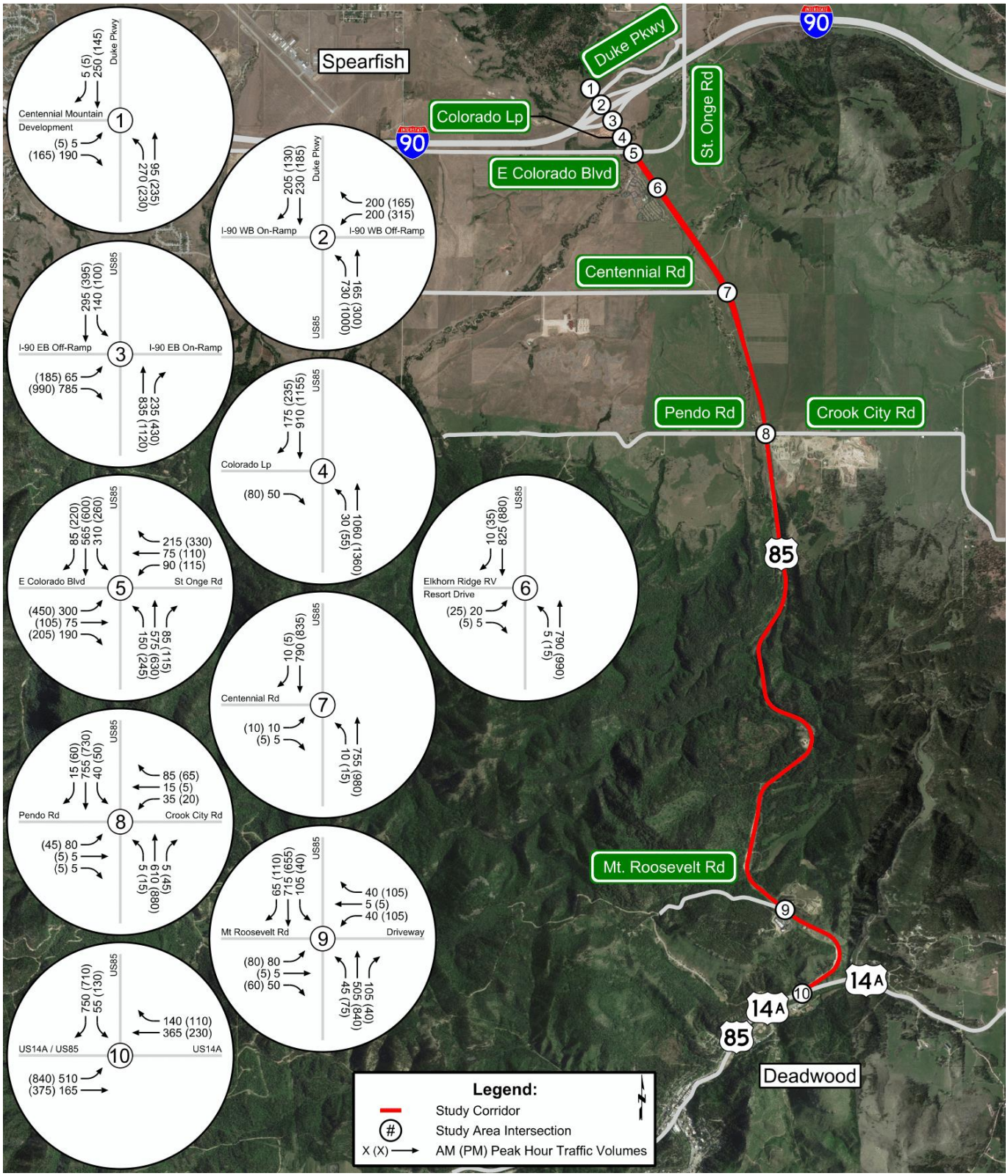


Figure 10: Future (2040) No-build Traffic Volumes

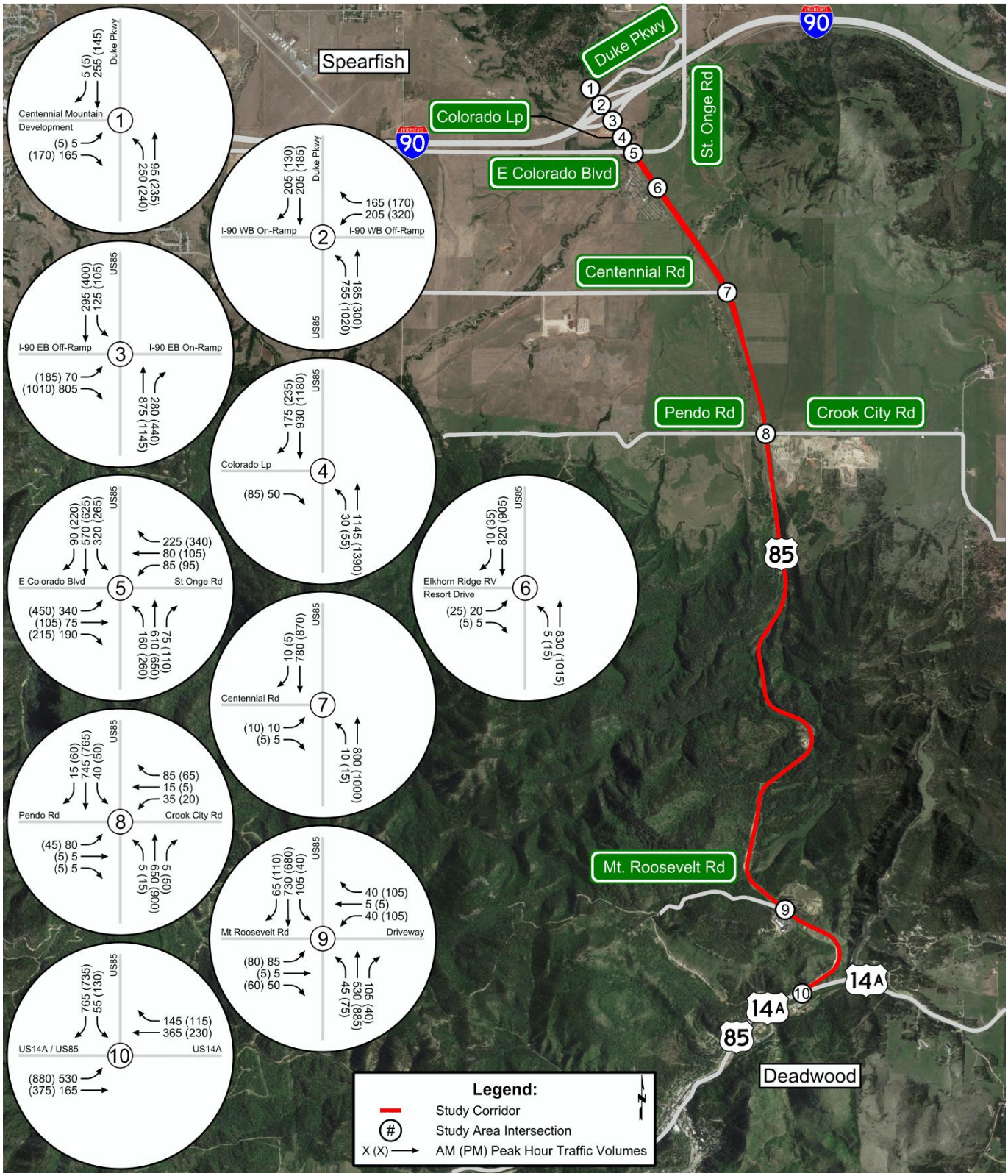


Figure 11: Future (2050) No-build Traffic Volumes

4.0 FUTURE NO-BUILD ANALYSIS

For this corridor study, "no-build" represents a scenario of the transportation system in place at the time, or horizon year, for which the analysis is being performed. This transportation system is not inclusive of any improvements implemented for the sole purpose of addressing needs identified as part of this corridor study. The horizon years for which analyses are being performed are 2027, 2040, and 2050. Detailed information regarding the "no-build" analysis was incorporated into the *Future No-build Traffic Operations Analysis* technical memo provided as **Appendix D** and the *Predictive Safety Analysis of Existing and Future No-build Conditions* technical memo, provided as **Appendix E**.

4.1 INTERSECTION AND CORRIDOR LEVEL-OF-SERVICE

Traffic operations analyses for project area intersections and corridor segments were performed in accordance with methodologies defined in the project's *Methods and Assumptions* document provided as **Appendix A**. The measure of effectiveness (MOE) used for this analysis is Level of Service (LOS), which is a qualitative assessment of a highway's operating conditions and relates to a measurement reflecting the relative ease of traffic flow on a scale of A through F.

4.1.1 2027 Traffic Operations Analysis

All but four intersections are anticipated to operate at LOS A during both peak time periods. The US85 intersections at the Exit 17 westbound ramp terminal and E. Colorado Boulevard/St. Onge Road are expected to operate at LOS F during both peak time periods. The US85 intersection at the Exit 17 eastbound ramp terminal is anticipated to operate at LOS B during the AM peak time period but LOS F during the PM peak time period. When operating as TWSC, the intersection of US85 & US14A is anticipated to operate at LOS C during the AM peak time period and LOS F during the PM peak time period. However, the intersection is expected to operate at LOS A during both peak time periods when it operates under signal control. All corridor segments are expected to operate at LOS B, or better, during both peak time periods.

4.1.2 2040 Traffic Operations Analysis

LOS operations at several intersections are anticipated to worsen beyond the deficiencies previously described in the horizon year 2027 traffic operations analysis. The US85 intersection at the Exit 17 eastbound ramp terminal worsens to LOS F during both peak time periods. The intersection of US85 & Mt. Roosevelt Road is expected to operate at LOS C and LOS F during the AM and PM peak time periods, respectively. Additionally, the intersection of US85 & US14A can be expected to operate LOS F during both peak time periods under TWSC operations. While signal controlled, the same intersection worsens to LOS B and LOS C during the AM and PM peak time periods, respectively. All but two segments are anticipated to operate at LOS B, or better, during both the AM and PM peak time periods. The US85 segment from the Exit 17 eastbound ramp terminal to the Cenex driveway (Colorado Loop) is anticipated to operate at LOS C in both directions during the PM peak time period. The segment from the Cenex driveway to E. Colorado Boulevard/St. Onge Road is expected to operate at LOS C in the northbound direction during the PM peak time period.

4.1.3 2050 Traffic Operations Analysis

All study intersections are anticipated to operate similar as conditions for horizon year 2040. Additionally, all segments along the project corridor are expected to operate similarly as the year 2040.

4.2 TRAFFIC SIGNAL WARRANTS

To determine the need for traffic signals at intersections along the project corridor, signal warrant criteria outlined in the *Manual on Uniform Traffic Control Devices (MUTCD)* were evaluated. Intersections with minor approach traffic volumes below the MUTCD thresholds were not evaluated. A summary of the results of this evaluation is provided in **Table 7** noting the study horizon year that first satisfies signal warrant criteria. As appropriate, minor approach right-turn volumes were discounted using methodology from NCHRP Report 457.

Table 7: Planning Level Traffic Signal Warrant Evaluation (Future No-build Conditions)

Intersection	Initial Year Warranted	Warrants Satisfied	Warrants Satisfied with Discounted Right-Turns
Exit 17 - WB ramp terminal	2027	Warrant 1A Warrant 2	Warrant 1A Warrant 2
Exit 17 - EB ramp terminal	2027	Warrant 1A Warrant 2	Warrant 1A Warrant 2
E. Colorado Boulevard / St. Onge Road	2022	Warrant 1A	-
Crook City Road / Pendo Road	2040	Warrant 1B Warrant 2	Warrant 3B[1]
Mt. Roosevelt Road	2027	Warrant 1B Warrant 2	-

[1]Note that Warrant 3 (Peak Hour) is intended for unusual cases (i.e., land use types) that attract or discharge large numbers of vehicles over a short period of time. As such, it should not be the only warrant that concludes implementation of traffic signal control. However, for planning-level studies, this warrant can serve as an indication for the potential future need for signalization.

4.3 TURN LANE WARRANTS

To determine needs for left-turn and right-turn lanes at intersections along the project corridor, both SDDOT guidelines (for signalized and unsignalized intersections) and NCHRP Report 457 were evaluated. A summary of this evaluation is provided in **Table 8** noting the earliest study horizon year that satisfies SDDOT or NCHRP turn-lane warrant criteria. The streets accessing the proposed The Ridge development (Gold Spike Drive, Preacher Smith Drive, and Ridge Drive) are included to provide guidance on if/when turn lanes are warranted for these potential future access drives.

Table 8: Turn Lane Warrant Evaluation (Future No-build Conditions)

	US85 - Northbound		US85 – Southbound	
Intersection	Left-turn	Right-turn	Left-turn	Right-turn
Duke Pkwy/ park & ride driveway	NCHRP/ SDDOT 2040[1]	-	-	Not Warranted
Exit 17 – westbound ramp terminal	Existing[2]	-	-	SDDOT 2027
Exit 17 – eastbound ramp terminal	-	NCHRP 2022 SDDOT 2027	NCHRP/ SDDOT 2027	-
Cenex driveway (Colorado Loop)	Existing	-	-	Existing
E. Colorado Boulevard / St. Onge Road	Existing	NCHRP/ SDDOT 2027[3]	NCHRP/ SDDOT 2027	NCHRP/ SDDOT 2027[3]
Elkhorn Ridge RV Resort	Existing	-	-	NCHRP 2023 SDDOT 2027
Centennial Road	SDDOT 2040	-	-	Not Warranted
Crook City Road / Pendo Road	SDDOT 2040[4]	NCHRP 2027 SDDOT 2040	NCHRP/ SDDOT 2027[4]	NCHRP 2027 SDDOT 2040
Gold Spike Drive[7]	-	NCHRP/ SDDOT 2040	SDDOT 2027 NCHRP 2040	-
Preacher Smith Drive[7]	-	SDDOT/ NCHRP 2027	SDDOT/ NCHRP 2027	-
Ridge Drive[7]	-	NCHRP/ SDDOT 2050	SDDOT 2040 NCHRP 2050	-
Mt. Roosevelt Road	Existing	NCHRP/ SDDOT 2040	Existing	Existing
US14A	-	-	Existing[5]	Existing[6]

[1]Future northbound access to Centennial Mountain development
[2]Lane drop
[3]Existing short, yield-controlled, channelized right-turn lane
[4]Left-turn lane planned for construction in year 2026
[5]Forced left-turn movement as US85 forms a tee-intersection with US14A
[6]Right-turn lane transitions into an added westbound lane on US14A into Deadwood
[7]The Ridge Development was placed on hold in Spring 2024. The information provided herein is based on anticipated development activity and associated assumptions during the time that relevant corridor study tasks were being executed.

Detailed information on intersection LOS, queuing, and turn lane evaluation results is provided in the *Future No-build Traffic Operations Analysis* technical memo provided as **Appendix D**.

4.4 SAFETY ANALYSIS

A predictive crash analysis was completed based on methods of the Highway Safety Manual (HSM). The purpose of the HSM is to measure different alternatives in quantitative terms of expected crash frequency to allow for a level comparison of safety with respect to the no-build scenario. The Interactive Highway Safety Design Model (IHSDM) software was the tool used to evaluate safety of the "no build" and "build" scenarios. Detailed information on the predictive crash analysis results for the no-build condition is available in the *Predictive Safety Analysis of Existing and Future No-build Conditions* technical memo, provided as **Appendix E**.

5.0 CORRIDOR STUDY ALTERNATIVES

The process for developing alternatives began through the recognition that each intersection or segment possessed unique deficiencies and needs. As a result, unique solutions and subsequent project alternatives were identified for each. The following information is presented within this section of the report for each of these alternatives.

- Needs identification – a summary of the issues and deficiencies, as determined by an evaluation of existing and future no-build conditions. Details of these needs, by location, were documented in the *Identification of Needs* technical memorandum, provided as **Appendix F**. The identified deficiencies were grouped into the following categories:
  - Traffic operations
  - Roadway/intersection geometry
  - Access
  - Safety
  - Roadway typical section

- Intersection alternatives – to address these deficiencies, and in collaboration with the SAT, a range of alternatives were identified for further evaluation. These alternatives are more thoroughly documented and illustrated in the *Summary of Feasible Alternatives* technical memorandum, provided as **Appendix G**, which includes the following information for each location:
  - Description of the deficiency or need being addressed
  - Anticipated timing for implementation (additional information can be found in the *Future Traffic Volume Forecasts* and *Future No-build Traffic Operations Analysis* memos)
  - Description and concept-level illustration(s) of the alternatives/options developed to address the deficiencies
  - Preliminary project costs (inflated to an assumed 2027 year of construction) estimate for each alternative/option
  - Preliminary and partial list of alternative considerations, as compared to no-build conditions

- Alternatives analysis – the project alternatives for each location were analyzed through multiple technical evaluations. In addition to the information provided in the *Summary of Feasible Alternatives* technical memorandum, technical evaluations are documented in the *Traffic Operations Analysis of Feasible Alternatives* (**Appendix H**) and *Predictive Safety Analysis of Feasible Alternatives* (**Appendix I**) technical memorandums. Additional consideration was also given to public input of the alternatives collected at the February 27, 2024 public meeting. Detailed information of the community engagement activities and comments gathered are included in the *Public and Stakeholder Meetings Summaries*, provided as **Appendix J**. Additional information regarding these alternatives is provided in the *Environmental Screening Report* (**Appendix K**) and the *Project Implementation Plan* technical memorandum (**Appendix L**).

5.1 DUKE PARKWAY INTERSECTION

This location is presently an unsignalized, "T" intersection, providing access to a park & ride lot along the west side of the study corridor. The northbound left-turn movement into the park & ride lot is stop controlled. While the park & ride lot driveway itself does not have a stop sign, as a driveway, it is intended to operate as stop-controlled. The northbound right-turn and westbound movements are uncontrolled.

5.2.1 Needs Identification

This intersection is being evaluated because future connectivity to a proposed development (Centennial Mountain) has been identified to be located through this intersection. As part of this corridor study, this connection was assumed to be necessary by year 2040. Maintaining the aforementioned park & ride lot, whether in its current form or with an alternative location and/or configuration, has also been identified as a desired outcome.

5.2.2 Intersection Alternatives

The following alternatives were evaluated for the Duke Parkway intersection at the north end of the project corridor.

It should be noted that the adjacent ramp terminal intersections at the Exit 17 interchange are excluded from this corridor study's scope of services. A currently unplanned, future interchange modification justification study will need to be conducted to identify the preferred interchange configuration. As such, the future configuration of the Duke Parkway intersection is dependent on this future interchange configuration. For purposes of this corridor study and alternatives analysis, this intersection was evaluated independent from the Exit 17 interchange, yet recognizing a great need to coordinate their function, design and operation with respect to one another.

A0: No-Build

This intersection would remain as an unsignalized intersection with the driveway serving the park & ride lot being stop controlled. The no-build alternative is only feasible if a connection to the proposed Centennial Mountain development is determined to be unnecessary. See Figure 12.

A1: Stop Control with Northbound Left-turn Lane

This intersection would be reconstructed in the configuration of a more traditional, "T" intersection. Changes would include the provision of a northbound left-turn lane and stop control of both the eastbound and westbound approaches. See Figure 13.

A2: Signalization with Northbound Left-turn Lane

Alternative A2 is identical to Alternative A1 except for how the intersection is controlled. Under Alternative A2, the intersection would be traffic signal controlled, subject to MUTCD warrant criteria being satisfied. See Figure 14.

A3: Roundabout

This alternative converts the subject intersection to a single-lane roundabout. See Figure 15.

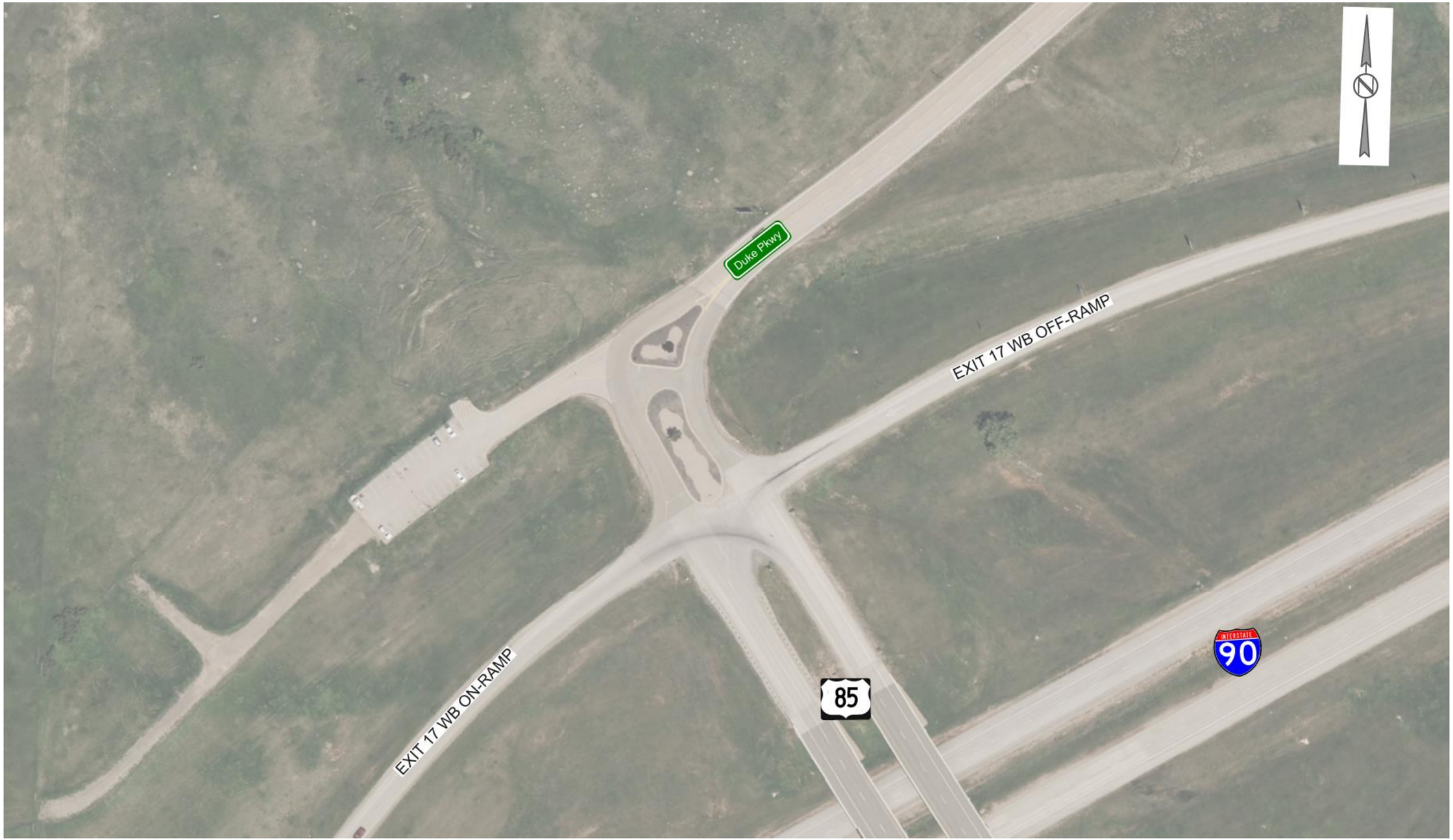


Figure 12: Alternative A0 – No-Build

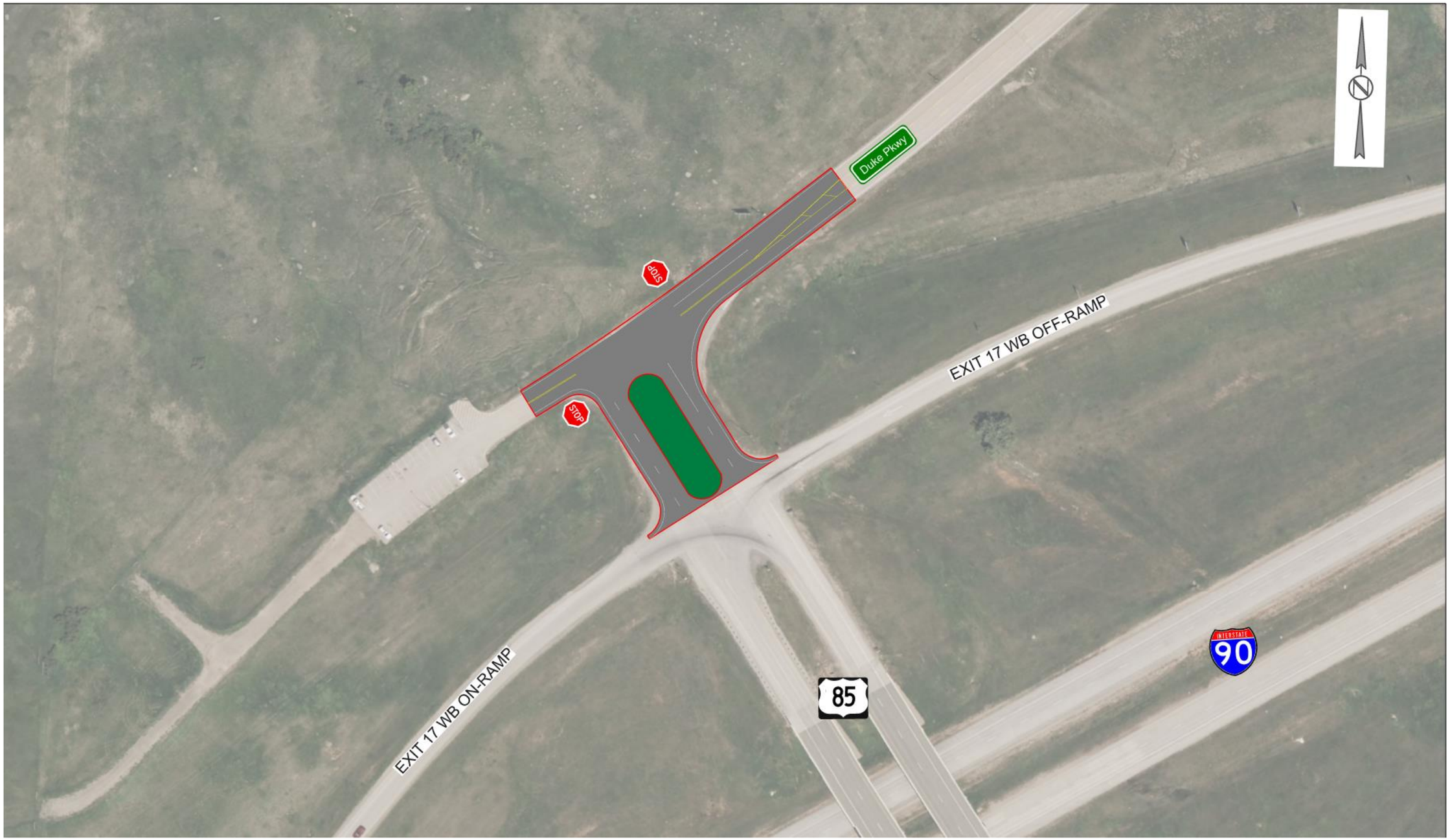


Figure 13: Alternative A1 – Stop Control with Northbound Left-turn Lane

Figure 14: Alternative A2 – Signalization with Northbound Left-turn Lane

Figure 15: Alternative A3 – Roundabout

5.2.3 Alternatives Analysis

Table 9 summarizes the evaluation of potential project alternatives for the Duke Parkway intersection.

Table 9: Duke Parkway Intersection Alternatives

Alternative	Project Implementation Cost[1]	Traffic Operations	Traffic Safety[2]	Other Considerations
A0: No-build	-	Worst-case Stop Control LOS (AM / PM) 2027: B / A 2040: B / B 2050: B / B	FI[3]: 13.38 PDO[4]: 12.15 Total: 25.51	-
A1: Stop Control with Northbound Left-turn Lane	$1,120,000	Worst-case Stop Control LOS (AM / PM) 2027: B / B 2040: B / B 2050: B / B	FI: 9.56 PDO: 8.69 Total: 18.23	(The considerations listed within this text box apply to both alternatives A1 and A2.) ▪ The turn-lane for left-turning traffic improves safety by removing left-turning vehicles from through-movement travel lanes. ▪ Capacity is increased by removing left-turning vehicles from through-movement travel lanes. ▪ The resulting typical section of the north-south roadway is similar to that through the Exit 17 interchange area. ▪ This alternative eliminates confusion associated with the unconventional layout of the existing intersection. ▪ The existing "free" flow of eastbound vehicles along Duke Parkway is removed. ▪ Compatibility would need to be verified with potential future changes at the Exit 17 interchange.
A2: Signalization with Northbound Left-turn Lane	$1,710,000	Intersection LOS (AM / PM) 2027: B / A 2040: B / A 2050: B / B	FI: 8.33 PDO: 17.06 Total: 25.35	
A3: Roundabout	$1,130,000	Intersection LOS (AM / PM) 2027: A / A 2040: A / A 2050: A / A	FI: 7.45 PDO: 12.09 Total: 19.51	▪ Roundabouts improve safety due to the reduced number of vehicle conflict points and the slower, consistent speeds at which vehicles enter and traverse the intersection. ▪ The operation of the intersection as a roundabout improves capacity and overall traffic operations. ▪ The existing "free" flow of eastbound vehicles along Duke Parkway is removed. ▪ Compatibility would need to be verified with potential future changes at the Exit 17 interchange.

[1]Year 2027 including preliminary engineering and 30% contingency
[2]Predicted crashes (2027-2050)
[3]FI – Fatal and Injury crash
[4]Property Damage Only crash

5.2 E. COLORADO BOULEVARD / ST. ONGE ROAD INTERSECTION

This location is presently an unsignalized, all-way stop-controlled intersection. It includes a left-turn lane on the northbound approach and channelized right-turn lanes on the northbound and southbound approaches.

5.2.1 Needs Identification

This intersection is being evaluated because of development-driven traffic volume growth and the associated intersection safety and operations implications. Additionally, the intersection is being evaluated because of its existing 55° skew angle. Improvements at this location are programmed by SDDOT for year 2028.

5.2.2 Intersection Alternatives

The following alternatives were evaluated for the E. Colorado Boulevard / St. Onge Road intersection.

B0: No-Build (All-way Stop Control)

This intersection would remain as an unsignalized intersection with stop control on all four approaches. See Figure 16.

B1: Signalization

The all-way stop control under no-build conditions would be replaced by traffic signal control. Additionally, auxiliary turn lanes would be provided on all approaches and the approaches would be realigned to mitigate the existing skew. Two options were developed to correct the intersection's skew angle. One modifies only US85 (north and south) legs of the intersection while the other option modifies all four legs of the intersection. See Figures 17 and 18.

B2: Reduced Conflict Intersection (RCI)

This alternative would incorporate a reduced conflict intersection (RCI) concept. Left-turn movements would be allowed from US85 to E. Colorado Boulevard and St. Onge Road however, movements from the east and west legs of the intersection would be restricted to right-turn movements only. Thus, left-turn and through movements from the minor approaches of the intersection are accomplished by making a right-turn from the minor roadway, traveling approximately 600-1,000 feet to a median u-turn location before proceeding back to the primary intersection and either continuing straight or turning right onto the opposite minor street leg of the intersection.

To accommodate future year traffic volumes, auxiliary left-turn and right-turn lanes would be required on US85 and dual right-turn lanes would be required on the approaches of both E. Colorado Boulevard and St. Onge Road. The primary intersection and the south median u-turn would require signalization for all horizon years while the north median u-turn location would be yield controlled in 2027 but signalized for the other two horizon years. See Figure 19.

B3: Roundabout

This alternative would reconstruct the intersection as a multi-lane (2x2) roundabout. Flexibility is available in the approach angles of roadways due to the inherent geometric characteristics and operating speeds associated with roundabouts. See Figure 20.

Figure 16: Alternative B0 – No-Build (All-way Stop Control)

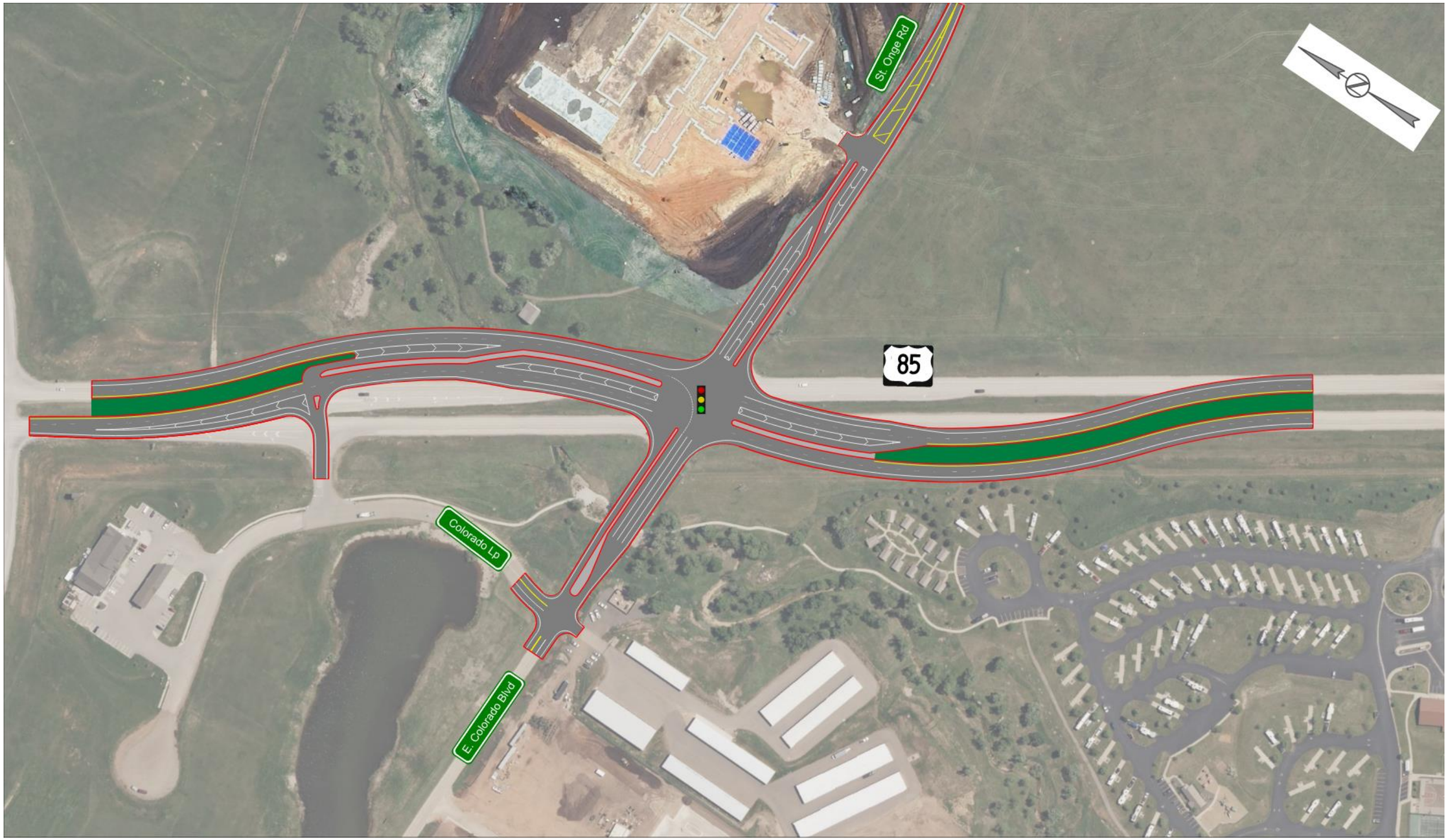


Figure 17: Alternative B1.1 – Signalization

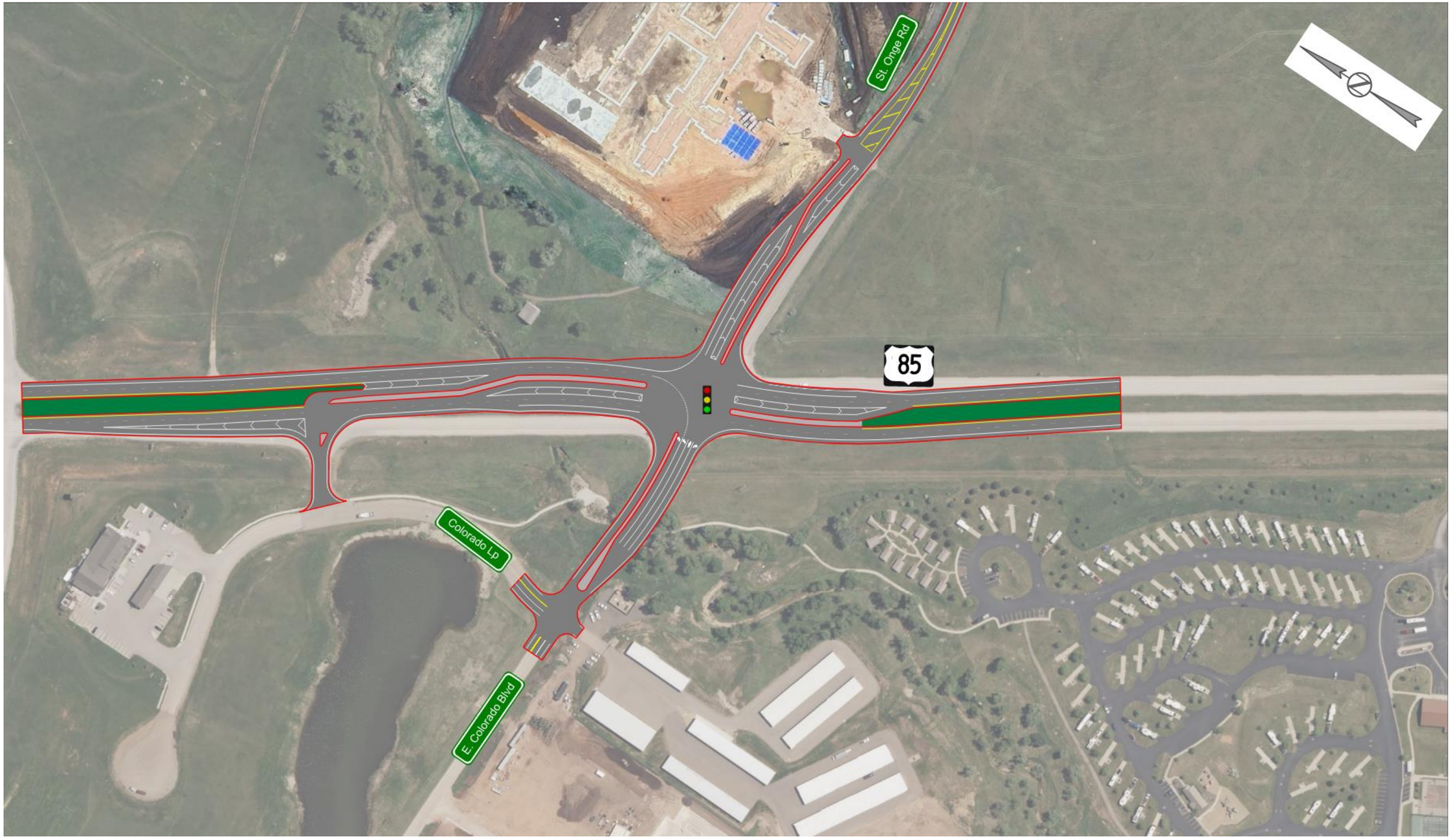


Figure 18: Alternative B1.2 – Signalization

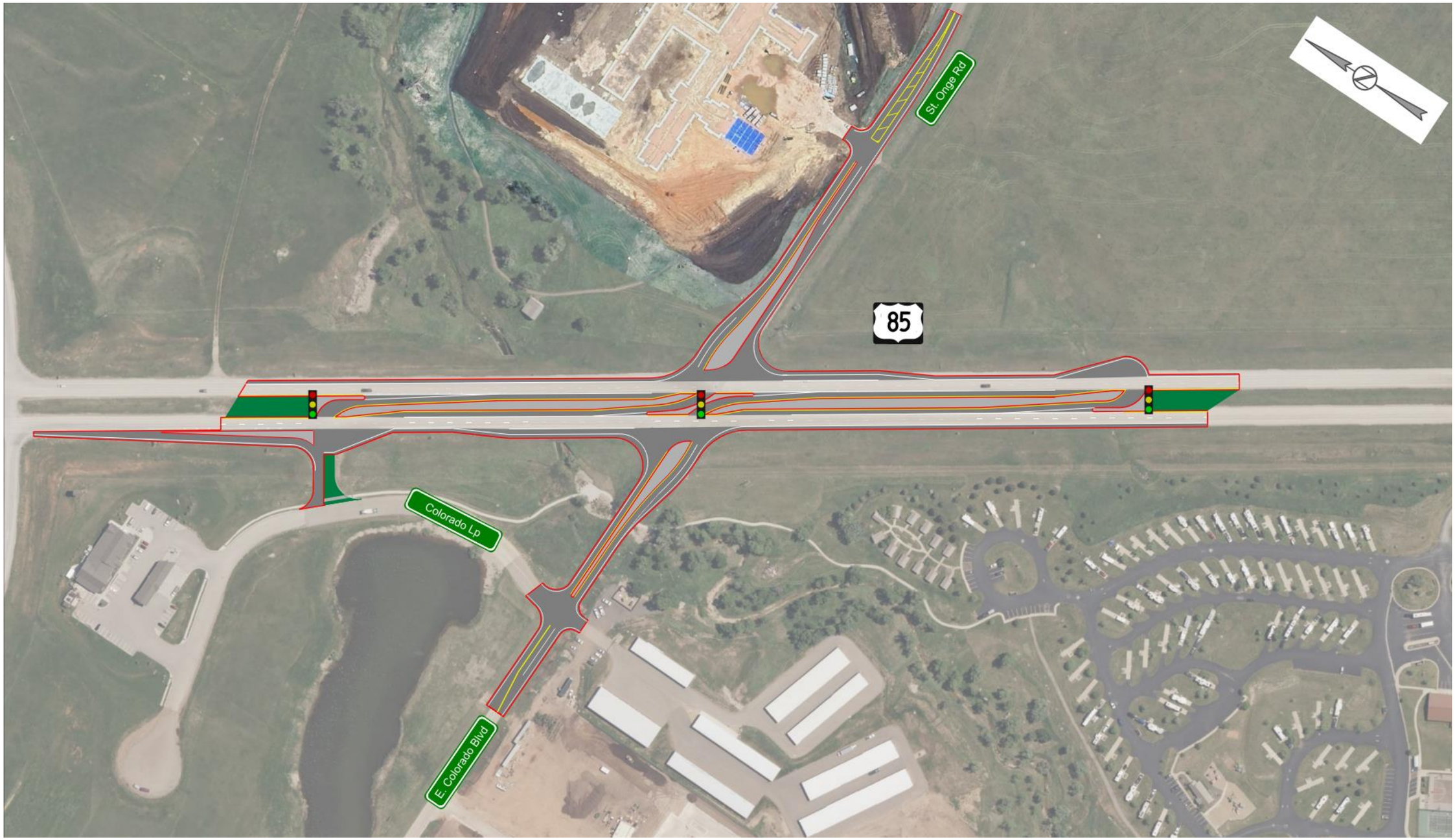


Figure 19: Alternative B2 – Reduced Conflict Intersection (RCI)

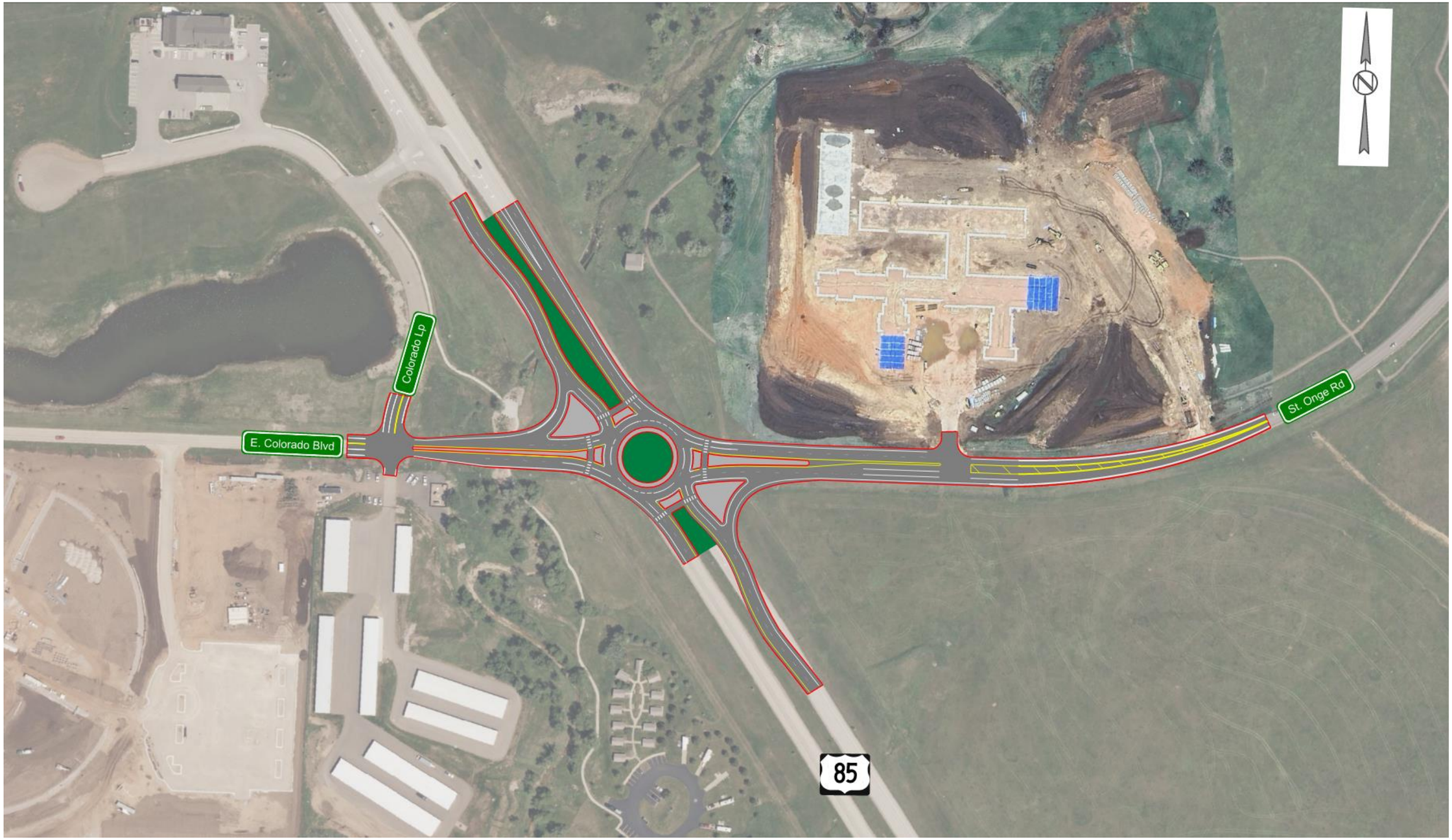


Figure 20: Alternative B3 – Roundabout

5.2.3 Alternatives Analysis

Table 10 summarizes the evaluation of potential project alternatives for the E. Colorado Boulevard / St. Onge Road intersection

Table 10: E. Colorado Boulevard / St. Onge Road Intersection Alternatives

Alternative	Year 2027 Project Implementation Cost[1]	Traffic Operations	Traffic Safety[2]	Other Considerations
B0: No-build (All-way Stop Control)	-	Intersection LOS (AM / PM) 2027: F / F 2040: F / F 2050: F / F	FI[3]: 134.69 PDO[4]: 53.52 Total: 188.18	-
B1: Signalization (w/ skew correction)	$13,390,000 – 14,320,000	Intersection LOS (AM / PM) 2027: B / C 2040: B / C 2050: C / C	FI: 122.88 PDO: 226.77 Total: 349.66	▪ The resulting traffic signal would provide controlled pedestrian crossings via pedestrian push buttons and signals. ▪ Signalization would result in increased intersection capacity. ▪ Intersection safety would be improved by correcting the skew angle which through the realignment of US85, will result in decreased vehicle operating speeds. ▪ Realignment of intersection approaches would result in impacts to adjacent properties. ▪ Traffic signal control on high-speed roadways, like US85, are oftentimes characterized by severe crashes (i.e., rear-end and right-angle crashes). ▪ Dual left-turn lanes would be necessary on the eastbound approach to accommodate anticipated future traffic volumes. However, when initially constructed, it may be appropriate for the intersection to function and operate with only a single eastbound left-turn lane. This can be evaluated in further detail during the final design of these improvements and is dependent on the forecast of development activity at that time.
B2: Reduced Conflict Intersection (RCI)	$7,770,000	**North MUT Intersection** Intersection LOS (AM / PM) 2027[5]: B / C 2040: A / A 2050: A / A **Main Intersection** Intersection LOS (AM / PM) 2027: B / B 2040: B / B 2050: B / B **South MUT Intersection** Intersection LOS (AM / PM) 2027: B / B 2040: B / B 2050: B / C	FI: 89.96 PDO: 118.92 Total: 208.90	▪ Safety is enhanced due to the reduced number of conflict points. ▪ The intersection configuration results in a greater amount of pavement to maintain. ▪ Increased travel times would be experienced due to the resulting out-of-direction travel. ▪ Construction phasing, while maintaining traffic, will be challenging. ▪ To accommodate future traffic volumes, it is anticipated that the eastbound and westbound approaches will require dual right-turn lanes. Additionally, it is estimated that the main intersection and both median u-turn intersections will require signalization by year 2040. However, when initially constructed, it may be appropriate for the main intersection to operate under stop sign control, the median u-turns to remain yield controlled, and that only single right-turn lanes are implemented on the eastbound and westbound approaches. This can be evaluated in further detail during the final design of these improvements and is dependent on the forecast of development activity at that time.

[1]Year 2027 including preliminary engineering and 30% contingency [2]Predicted crashes (2027-2050) [3]FI – Fatal and Injury crash [4]Property Damage Only crash
[5]North MUT for RCI alternative in 2027 is yield controlled and resulting LOS is for the U-turn movement only

Table 10 (continued): E. Colorado Boulevard / St. Onge Road Intersection Alternatives

Alternative	Year 2027 Project Implementation Cost[1]	Traffic Operations	Traffic Safety[2]	Other Considerations
B3: Roundabout	$7,190,000	Intersection LOS (AM / PM) 2027: A / B 2040: B / D 2050: C / D	FI: 50.14 PDO: 321.92 Total: 372.07	▪ Due to the low speed in which vehicles traverse the intersection and the fewer number of conflict points as compared to a traditional intersection, roundabouts are a proven safe intersection treatment, for both vehicles and pedestrians. ▪ Favorable operations and reduced delays would be anticipated during most all periods of the day. ▪ Roundabout would accommodate large variations in traffic such as during special events or unplanned events (detours) without traffic management requirements (signal timing adjustments etc.) ▪ Construction phasing, while maintaining traffic, will be challenging. ▪ To accommodate future traffic volumes, it is anticipated that the roundabout will require two circulating lanes, two approach lanes, and two departure lanes on all legs of the intersection. However, when initially constructed, it may be appropriate for either or both of the east and west legs of the intersection to operate with single approach and/or departure lanes. This can be evaluated in further detail during the final design of these improvements and is dependent on the forecast of development activity at that time. ▪ Conditions characterized by LOS D in 2040 and 2050 are likely to be experienced for no more than one (1) hour (and likely less) during the highest peak period, which is the PM peak hour.

[1]Year 2027 including preliminary engineering and 30% contingency
[2]Predicted crashes (2027-2050)
[3]FI – Fatal and Injury crash
[4]Property Damage Only crash

5.3 ELKHORN RIDGE RV RESORT DRIVEWAY INTERSECTION

This intersection is formed by the driveway that serves the Elkhorn Ridge RV Resort. The driveway approach is stop controlled and a left-turn lane is provided on the northbound approach.

5.3.1 Needs Identification

Existing (2023) traffic volumes satisfy criteria for a southbound right-turn lane. Additionally, future US85 volumes may make it difficult and/or unsafe for long vehicles (i.e., those pulling trailers) to turn left from the RV resort driveway onto northbound US85. Traffic conditions should be monitored to determine when additional intersection improvements are needed.

5.3.2 Intersection Alternatives

The following alternatives were evaluated for the Elkhorn Ridge RV Resort driveway intersection.

C0: No-Build

The no-build alternative would retain the existing intersection lane configurations without a southbound right-turn lane. See Figure 21.

C1: Southbound Right-turn Lane

This alternative consists of adding a southbound offset right-turn lane, as warranted by NCHRP and SDDOT criteria. All other features of the existing intersection would be retained. See Figure 22.

C2: Reduced Conflict Intersection (RCI)

This alternative would incorporate a reduced conflict intersection (RCI) concept. Left-turn movements would be allowed from US85 into Elkhorn Ridge RV Resort however, movements from the west leg of the intersection would be restricted to a right-turn movement only. Thus, left-turn movements from the driveway would be accomplished by making a right-turn, traveling 600-1,000 feet to a median u-turn location before proceeding back to the primary intersection and continuing straight. The primary intersection would be stop controlled and the median u-turn intersection would be yield controlled. See Figure 23.

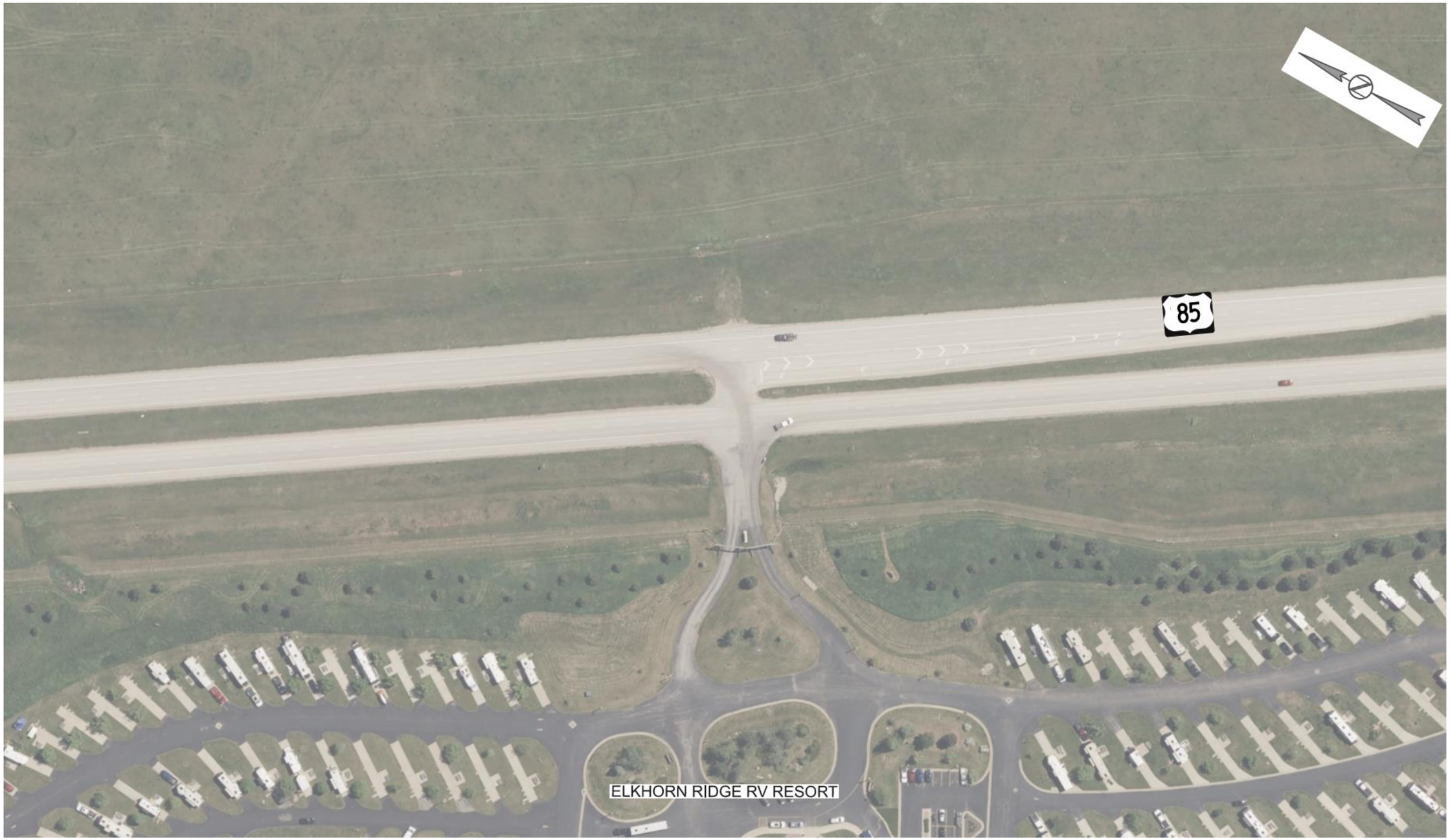


Figure 21: Alternative C0 – No-Build

Figure 22: Alternative C1 – Southbound Right-turn Lane

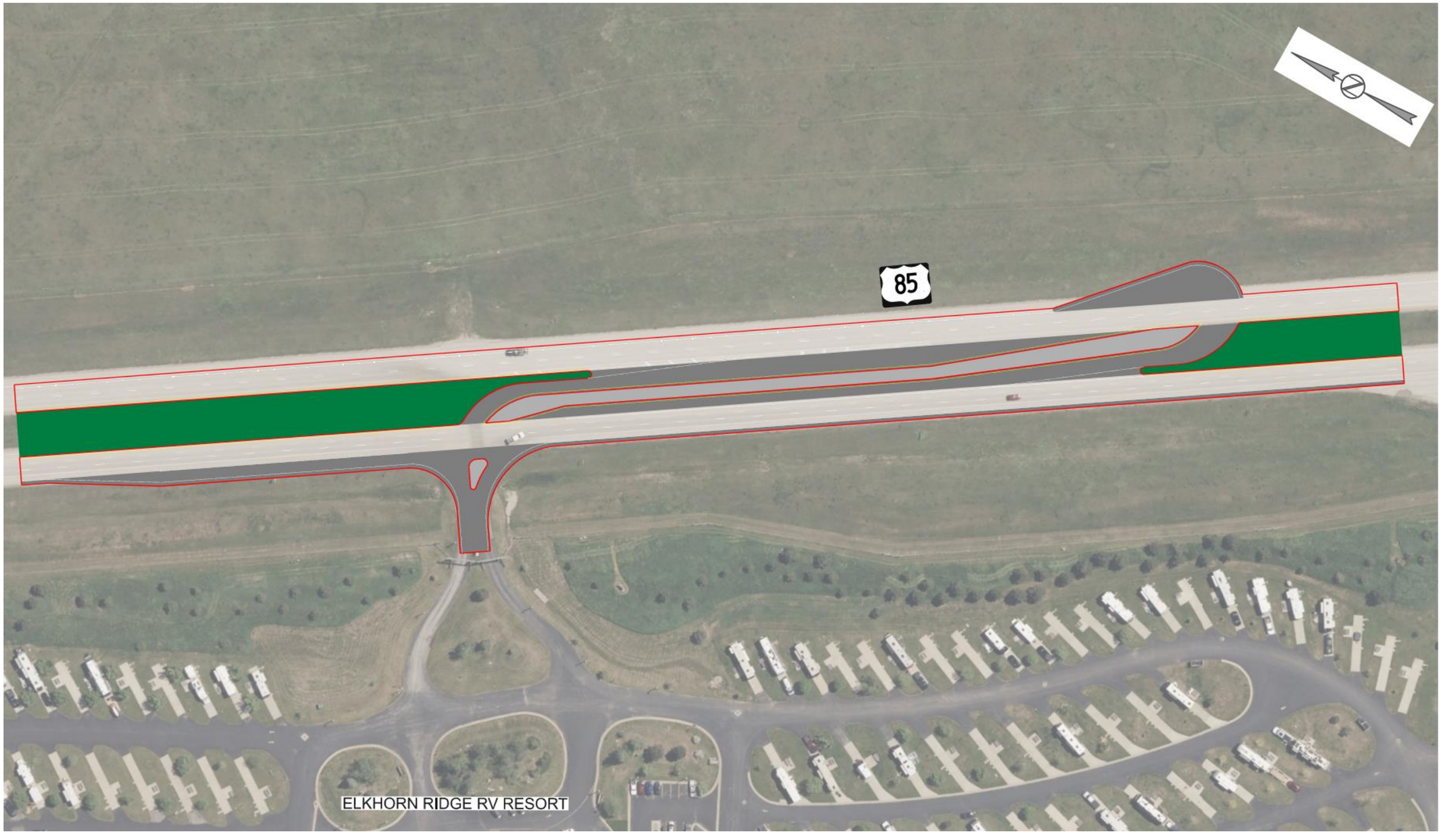


Figure 23: Alternative C2 – Reduced Conflict Intersection (RCI)

5.3.3 Alternatives Analysis

Table 11 summarizes the evaluation of potential project alternatives for the Elkhorn Ridge RV Resort driveway intersection.

Table 11: Elkhorn Ridge RV Resort Driveway Intersection Alternatives

Alternative	Year 2027 Project Implementation Cost[1]	Traffic Operations	Traffic Safety[2]	Other Considerations
C0: No-build	-	Worst-case Stop Control LOS (AM / PM) 2027: C / C 2040: C / C 2050: D / C	FI[3]: 11.15 PDO[4]: 15.02 Total: 26.17	-
C1: Southbound Right-turn Lane	$720,000	Worst-case Stop Control LOS (AM / PM) 2027: C / B 2040: C / C 2050: C / C	FI: 9.61 PDO: 12.89 Total: 22.51	▪ The turn-lane for right-turning traffic improves safety by removing right-turning vehicles from through-movement travel lanes. ▪ The right-turn lane adds to the amount of pavement to maintain.
C2: Reduced Conflict Intersection (RCI)	$1,650,000	**Main Intersection** Worst-case Stop Control LOS (AM / PM) 2027: B / B 2040: B / B 2050: B / B **South MUT Intersection** U-turn LOS (AM / PM) 2027: B / B 2040: B / B 2050: B / B	FI: 7.19 PDO: 17.73 Total: 24.93	▪ Safety is enhanced due to the reduced number of conflict points. ▪ The intersection configuration results in a greater amount of pavement to maintain. ▪ Increased travel times would be experienced due to the resulting out-of-direction travel.

[1]Year 2027 including preliminary engineering and 30% contingency
[2]Predicted crashes (2027-2050)
[3]FI – Fatal and Injury crash
[4]Property Damage Only crash

5.4 CENTENNIAL ROAD INTERSECTION

This intersection is presently a stop-controlled, "T" intersection. Though not represented in the exhibits depicting each alternative, the future expansion of the City of Spearfish's transportation network could result in an east leg of this intersection.

5.4.1 Needs Identification

Future (2040) traffic volumes satisfy criteria for a northbound left-turn lane. Additionally, the intersection is being evaluated because of its existing 66° skew angle. The timing for this turn lane along with a southbound right-turn lane and additional turn lanes associated with the extension of Centennial Road east of US85 is dependent on development activity and the buildout of the City of Spearfish's transportation network.

5.4.2 Intersection Alternatives

The following alternatives were evaluated for the Centennial Road intersection.

D0: No-Build

The no-build alternative would retain the existing intersection lane configurations with neither a northbound left-turn lane nor a southbound right-turn lane. See Figure 24.

D1: Southbound Right-turn Lane

This alternative consists of adding a southbound offset right-turn lane, if warranted by future volumes. All other features of the existing intersection would be retained. See Figure 25.

D2: Northbound Left-turn Lane

This alternative consists of adding a northbound left-turn lane, as warranted by SDDOT criteria. All other features of the existing intersection would be retained. See Figure 26.

D3: Skew Correction

This alternative consists of realigning the east leg of the intersection to mitigate the intersection's existing skew. See Figure 27.

D4: Reduced Conflict Intersection (RCI)

With this alternative, left-turn movements would be allowed from US85 however, movements from the west and potential future east legs of the intersection would be restricted to only right-turns. Thus, left-turn and through movements from the minor intersection approaches are accomplished by making a right-turn from the minor roadway, traveling approximately 600-1,000 feet to a median u-turn location before proceeding back to the primary intersection and either continuing straight or turning right onto the opposite minor street leg of the intersection.

To accommodate future traffic volumes, auxiliary left- and right-turn lanes would be required on US85 and single, approach lanes, restricted to right-turning movements, would be provided on both the minor road approaches. The primary intersection would be stop controlled and both the median u-turn intersections would be yield controlled. See Figure 28.

Figure 24: Alternative D0 – No-Build

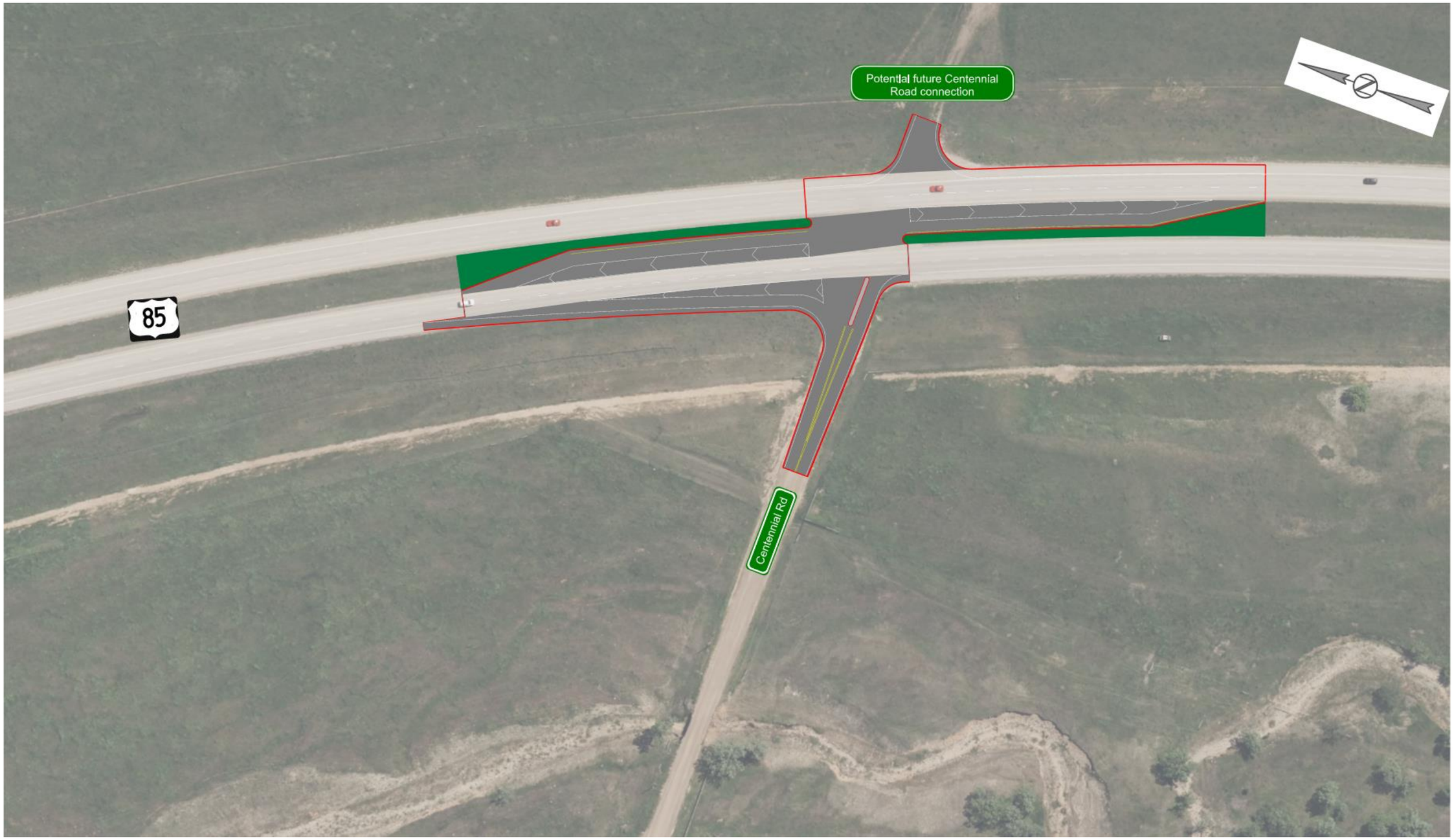


Figure 25: Alternative D1 – Southbound Right-turn Lane

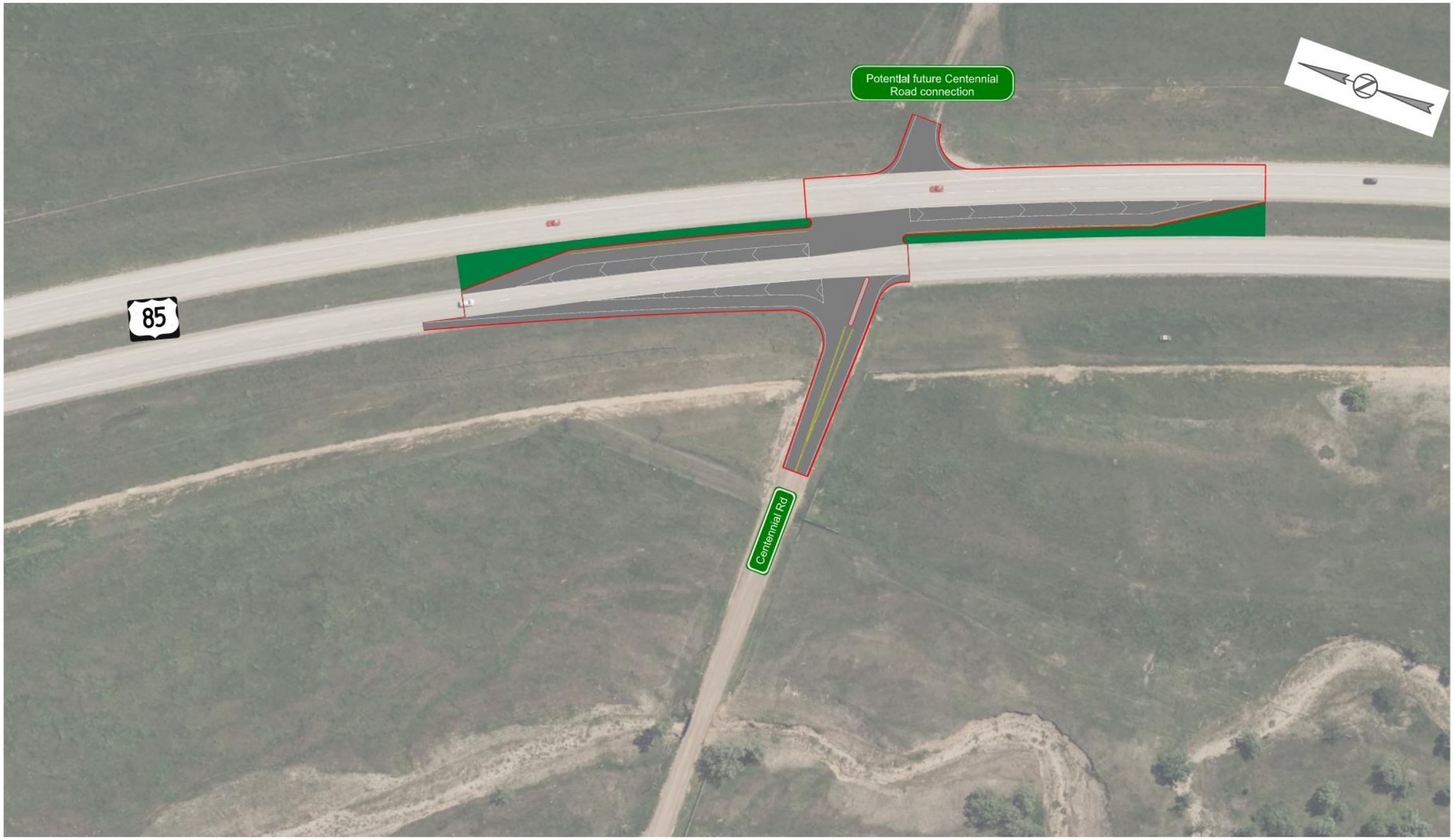


Figure 26: Alternative D2 – Northbound Left-turn Lane

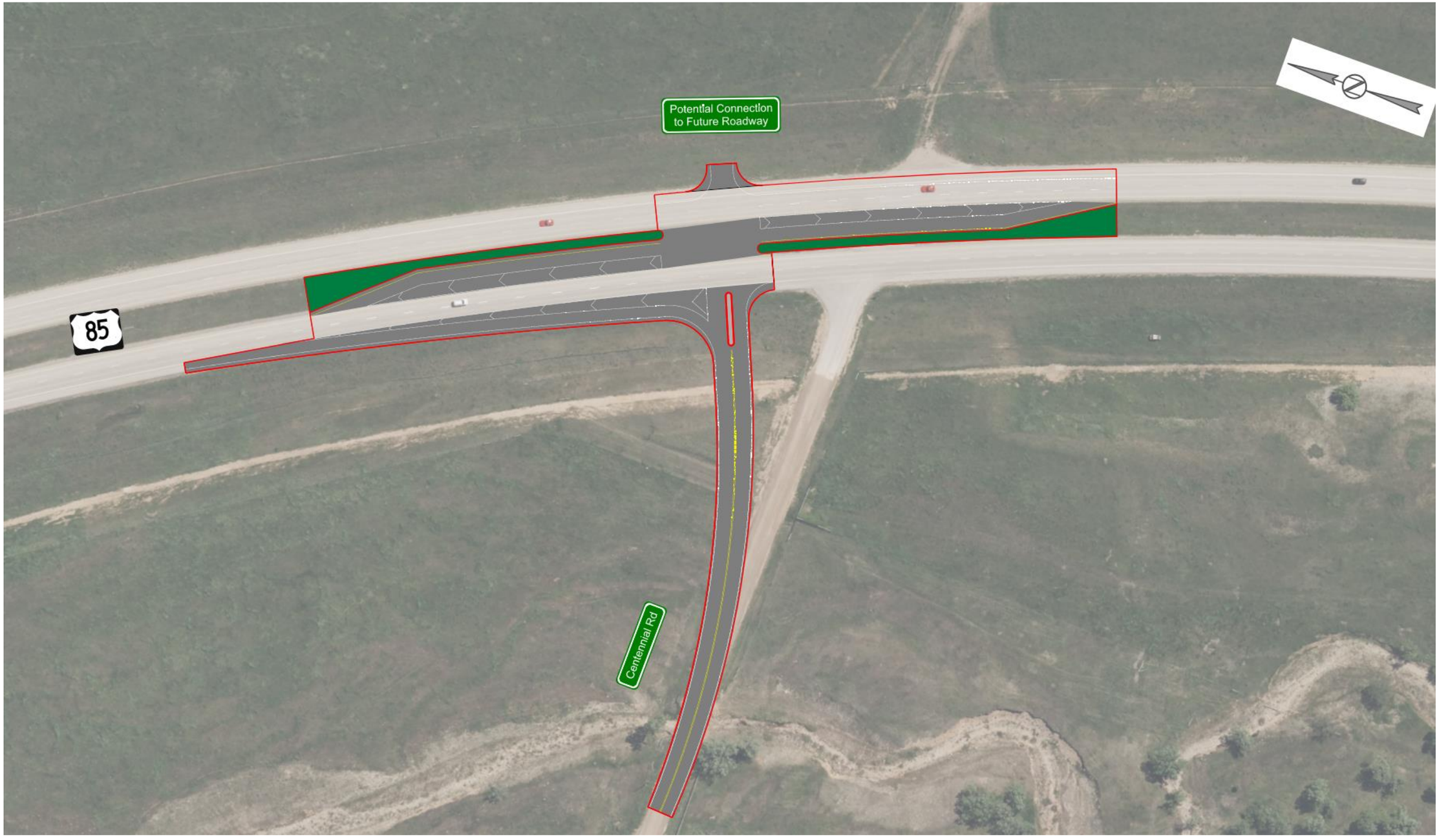


Figure 27: Alternative D3 – Skew Correction

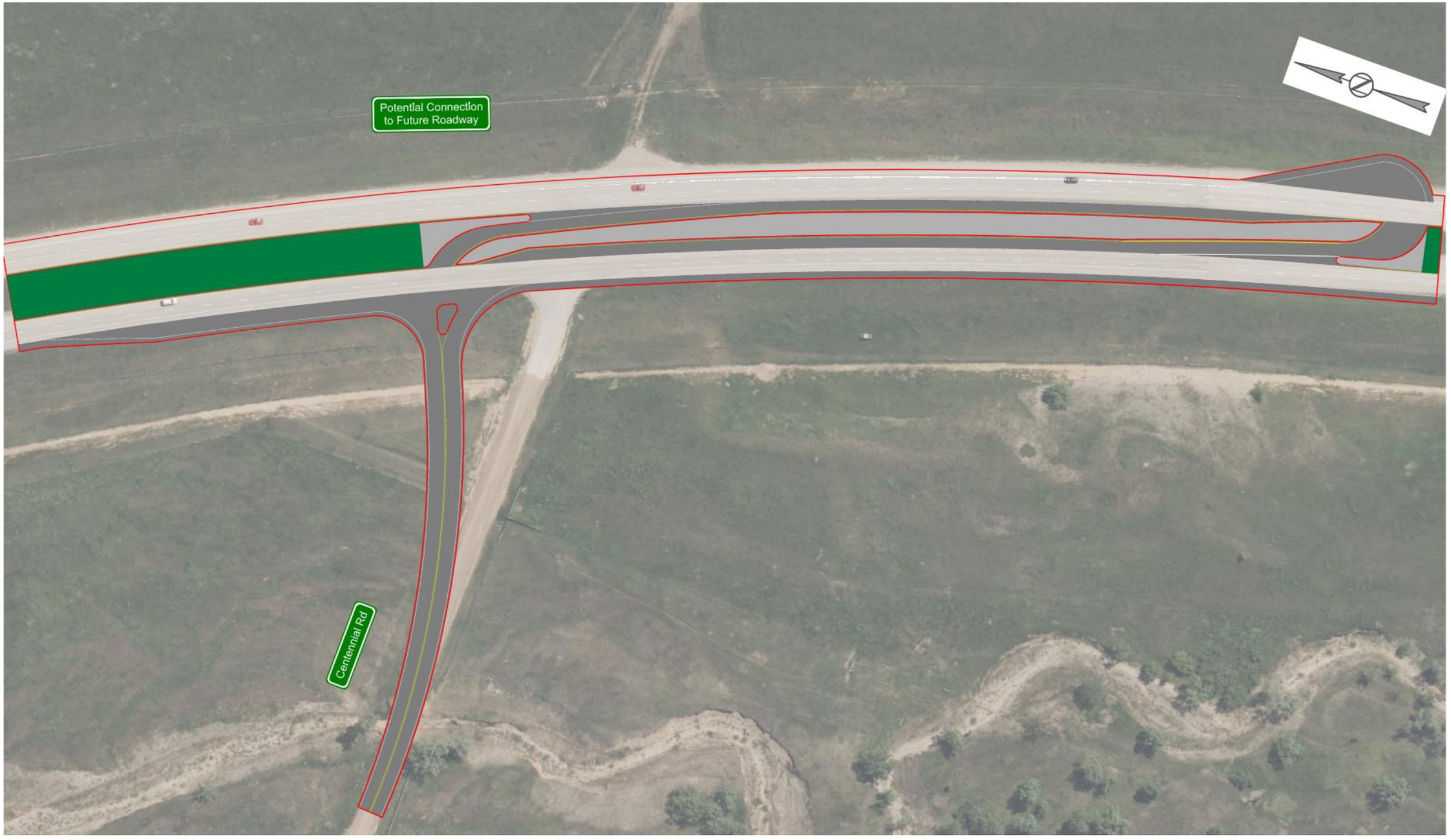


Figure 28: Alternative D4 – Reduced Conflict Intersection (RCI)

5.4.3 Alternatives Analysis

Table 12 summarizes the evaluation of potential project alternatives for the Centennial Road intersection.

Table 12: Centennial Road Intersection Alternatives

Alternative	Year 2027 Project Implementation Cost[1]	Traffic Operations	Traffic Safety[2]	Other Considerations
D0: No-build	-	Worst-case Stop Control LOS (AM / PM) 2027: B / B 2040: C / C 2050: C / C	FI[3]: 24.70 PDO[4]: 27.98 Total: 52.67	-
D1: Southbound Right-turn Lane	$770,000	Worst-case Stop Control LOS (AM / PM) 2027: B / B 2040: C / C 2050: C / C	FI: 21.24 PDO: 24.07 Total: 45.30	▪ The turn-lane for right-turning traffic improves safety by removing right-turning vehicles from through-movement travel lanes. ▪ The right-turn lane adds to the amount of pavement to maintain.
D2: Northbound Left-turn Lane	$300,000	Worst-case Stop Control LOS (AM / PM) 2027: B / B 2040: C / C 2050: C / C	FI: 19.01 PDO: 21.46 Total: 40.47	▪ The turn-lane for left-turning traffic improves safety by removing left-turning vehicles from through-movement travel lanes. ▪ The left-turn lane adds to the amount of pavement to maintain.
D3: Skew Correction	$2,630,000	Worst-case Stop Control LOS (AM / PM) 2027: B / B 2040: C / C 2050: C / C	FI: 19.26 PDO: 21.84 Total: 41.09	▪ Intersection safety is improved by correcting skew angle. ▪ Realignment of intersection approaches results in impacts to adjacent properties.
D4: Reduced Conflict Intersection (RCI)	$2,910,000	**Main Intersection** Worst-case Stop Control LOS (AM / PM) 2027: B / B 2040: B / B 2050: B / B **South MUT Intersection** U-turn LOS (AM / PM) 2027: A / B 2040: B / B 2050: B / B	FI: 15.49 PDO: 27.35 Total: 42.84	▪ Safety is enhanced due to the reduced number of conflict points. ▪ The intersection configuration results in a greater amount of pavement to maintain. ▪ Increased travel times would be experienced due to the resulting out-of-direction travel.

[1]Year 2027 including preliminary engineering and 30% contingency
[2]Predicted crashes (2027-2050)
[3]FI – Fatal and Injury crash
[4]Property Damage Only crash

5.5 CROOK CITY ROAD / PENDO ROAD INTERSECTION

This location of the project corridor is presently an unsignalized intersection with the eastbound and westbound approaches of Pendo Road and Crook City Road being stop controlled. Although no turn lanes are presently provided at the intersection, a 2026 project is presently programmed by SDDOT to construct northbound and southbound left-turn lanes. These left-turn lanes are assumed as part of the no-build alternative.

5.5.1 Needs Identification

This intersection is being evaluated because of future traffic volume growth and a high percentage of truck traffic turning to and from US85 from/to Crook City Road.

The northbound and southbound left-turn lanes at the Crook City Road/ Pendo Road intersection are programmed for implementation in year 2026. The northbound and southbound right-turn lanes are anticipated by year 2027 according to NCHRP turn lane warrant criteria and by year 2040 based on SDDOT warrant criteria. Based on documented future traffic volume forecasts, intersection control type modifications are anticipated by year 2040.

5.5.2 Intersection Alternatives

The following alternatives were evaluated for the Crook City Road / Pendo Road intersection.

E0: No-Build

This intersection would remain as an unsignalized intersection with stop control on the eastbound and westbound approaches. The no-build alternative includes the northbound and southbound left-turn lanes the SDDOT has programmed for construction in 2026. See Figure 29.

E1: Northbound and Southbound Right-turn Lanes

This alternative consists of adding northbound and southbound offset right-turn lanes, as warranted by NCHRP and SDDOT criteria. As an unsignalized intersection, these turn lanes would be offset from their respective, adjacent through lane such that sight distance of minor road traffic would not be inhibited. If this intersection were also to be signalized, and if benefit/cost analysis warranted right-turn lanes to be implemented, they would be parallel and adjacent to the outside travel lane. All other features of the existing intersection would be retained. See Figure 30.

E2: Signalization

This alternative replaces the stop-controlled conditions with the operation of the intersection under signal control. Though the right-turn lanes included with Alternative E1 would be retained, they would not be offset, but rather, immediately adjacent to their corresponding through lane. As noted with Alternative E1, benefit/cost analysis should be performed to illustrate the benefit of the right-turn lanes with this alternative. See Figure 31.

E3: Reduced Conflict Intersection (RCI)

This alternative would incorporate a reduced conflict intersection (RCI) concept. Left-turn movements would be allowed from US85 to Crook City Road and Pendo Road however, movements from the east and west legs of the intersection would be restricted to right-turn movements only. Thus, left-turn and through movements from the minor approaches of the intersection are accomplished by making a right-turn from the minor roadway, traveling

approximately 600-1,000 feet to a median u-turn location before proceeding back to the primary intersection and either continuing straight or turning right onto the opposite minor street leg of the intersection.

To accommodate future year traffic volumes, auxiliary left-turn and right-turn lanes would be required on US85 and single, approach lanes, restricted to right-turning movements, would be provided on both the Crook City Road and Pendo Road approaches. The primary intersection would be stop controlled and both the median u-turn intersections would be yield controlled. See Figure 32.

E4: Roundabout

This alternative would reconstruct the intersection as a multi-lane (2x1) roundabout. See Figure 33.

Figure 29: Alternative E0 – No-Build

Figure 30: Alternative E1 – Northbound and Southbound Right-turn Lanes

Figure 31: Alternative E2 – Signalization

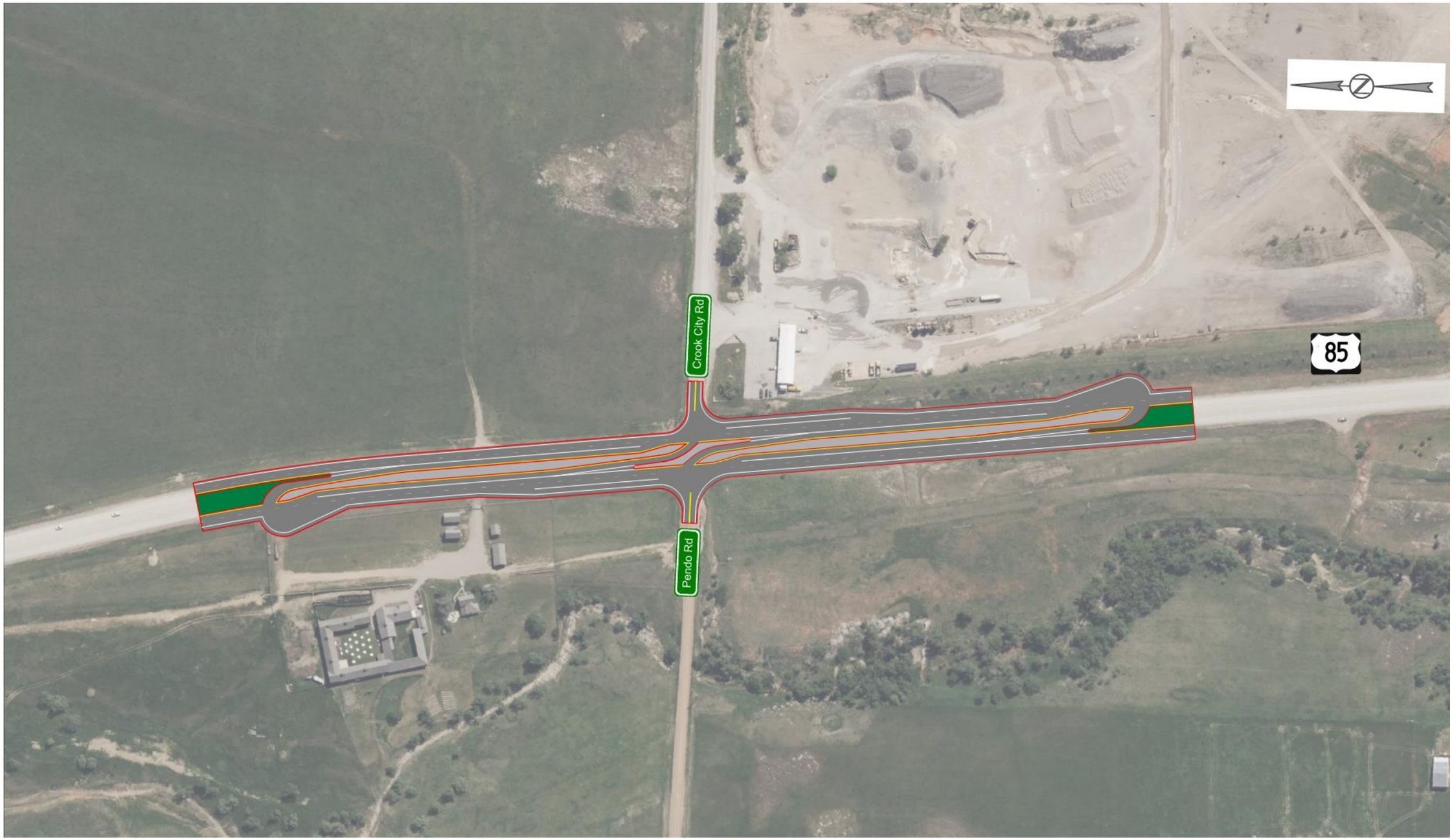


Figure 32: Alternative E3 – Reduced Conflict Intersection (RCI)

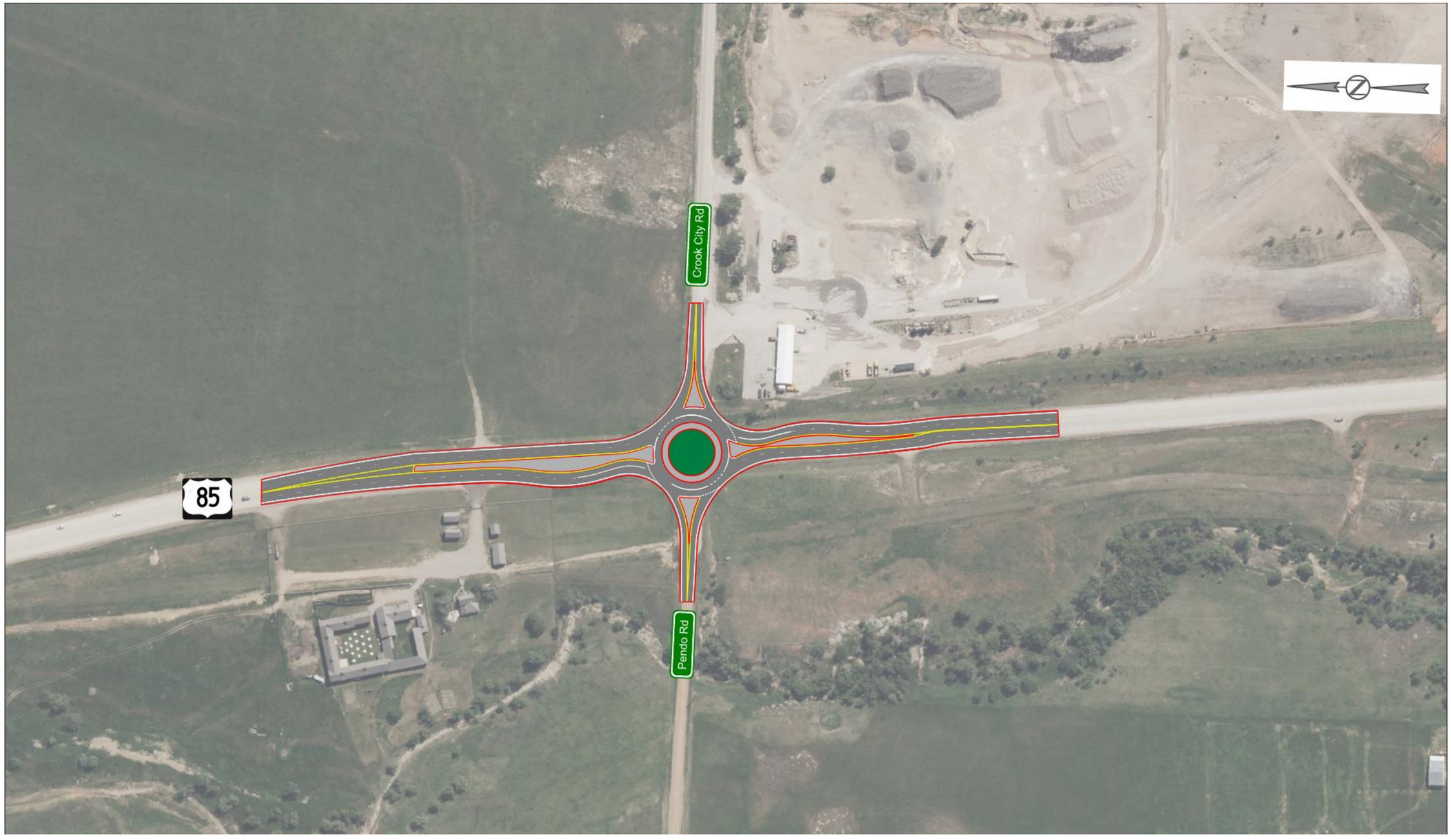


Figure 33: Alternative E4 – Roundabout

5.5.3 Alternatives Analysis

Table 13 summarizes the evaluation of potential project alternatives for the Crook City Road / Pendo Road intersection.

Table 13: Crook City Road / Pendo Road Intersection Alternatives

Alternative	Year 2027 Project Implementation Cost[1]	Traffic Operations	Traffic Safety[2]	Other Considerations
E0: No-build	-	Worst-case Stop Control LOS (AM / PM) 2027: C / D 2040: F / F 2050: F / F	FI[3]: 42.40 PDO[4]: 27.32 Total: 69.70	-
E1: Northbound and Southbound Right-turn Lanes	$1,710,000	Worst-case Stop Control LOS (AM / PM) 2027: C / D 2040: F / F 2050: F / F	FI: 31.37 PDO: 20.20 Total: 51.58	▪ The turn-lane for right-turning traffic improves safety by removing right-turning vehicles from through-movement travel lanes. ▪ The right-turn lane adds to the amount of pavement to maintain.
E2: Signalization	$2,870,000	Intersection LOS (AM / PM) 2027: A / A 2040: A / A 2050: A / A	FI: 48.37 PDO: 53.17 Total: 101.54	▪ Signalization results in increased intersection capacity but can negatively impact northbound and southbound through movement operations along US85. ▪ Traffic signal control on high-speed roadways, like US85, are oftentimes characterized by severe crashes (i.e., rear-end and right-angle crashes).
E3: Reduced Conflict Intersection (RCI)	$7,550,000	**North MUT Intersection** U-turn LOS (AM / PM) 2027: B / A 2040: B / B 2050: B / B **Main Intersection** Worst-case Stop Control LOS (AM / PM) 2027: B / B 2040: B / B 2050: B / B **South MUT Intersection** U-turn LOS (AM / PM) 2027: A / B 2040: B / B 2050: B / B	FI: 23.83 PDO: 29.08 Total: 52.92	▪ Safety is enhanced due to the reduced number of conflict points. ▪ The intersection configuration results in a greater amount of pavement to maintain. ▪ Increased travel times would be experienced due to the resulting out-of-direction travel.

E4: Roundabout	$5,590,000	Intersection LOS (AM / PM) 2027: A / A 2040: A / A 2050: A / A	FI: 26.79 PDO: 79.09 Total: 105.85	▪ Due to the low speed in which vehicles traverse the intersection and the fewer number of conflict points as compared to a traditional intersection, roundabouts are a proven safe intersection treatment, for both vehicles and pedestrians. ▪ Construction phasing, while maintaining traffic, will be challenging.

[1]Year 2027 including preliminary engineering and 30% contingency
[2]Predicted crashes (2027-2050)
[3]FI – Fatal and Injury crash
[4]Property Damage Only crash

5.6 THE RIDGE DEVELOPMENT INTERSECTIONS

The information contained herein regarding The Ridge Development is based on anticipated development activity and associated assumptions during the time that relevant corridor study tasks were being executed. In late Spring 2024, it became known to the Study Advisory Team that this development project was put on hold. Whether this hold is temporary or permanent is not yet determined. Associated land uses, access locations, future traffic volumes, and corresponding US85 improvements should be revisited should development activity resume.

As illustrated in **Figure 34**, three streets are proposed to access the proposed development, The Ridge. From north to south, these streets are Gold Spike Drive, Preacher Smith Drive, and Ridge Drive. Each of these side streets will be stop controlled on their approach to US85 and at each location, the developer is responsible for constructing southbound left-turn lanes prior to receiving an access permit from SDDOT and the City of Deadwood. These left-turn lanes are assumed as part of the no-build alternative.

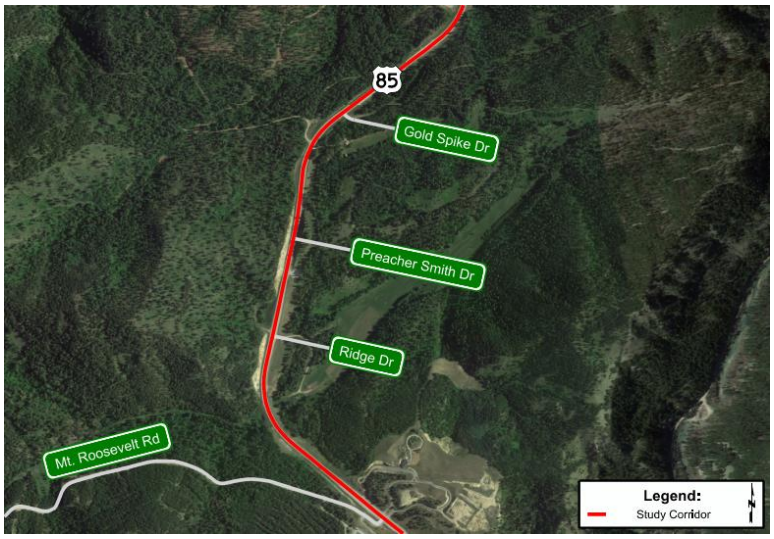


Figure 34 - The Ridge Development Access Locations

5.6.1 Needs Identification

As part of The Ridge Development implementation, southbound left-turn lanes at each of the three development access locations are required to be in place prior to the access permit being granted to the developer by SDDOT. Based on the assumed buildout of this development, the anticipated timing for northbound right-turn volumes satisfying turn lane warrant criteria at each of the development streets is as follows:

- Gold Spike Drive – by year 2040
- Preacher Smith Drive – by year 2027
- Ridge Drive – by year 2050

5.6.2 Intersection Alternatives

The following alternatives were evaluated for the three development access locations.

F0: No-Build

The no-build alternative would consist of the proposed, stop-controlled, development street approach plus a southbound left-turn lane.

F1: Northbound Right-turn Lanes

This alternative consists of adding a northbound offset right-turn lane, as warranted by NCHRP and SDDOT criteria. All other features of the processed access locations, as described under the no-build alternative, would be retained.

5.6.3 Alternatives Analysis

Table 14 summarizes the evaluation of potential project alternatives for The Ridge development intersections should the development activity resume.

Table 14: The Ridge Development Intersection Alternatives

Alternative	Year 2027 Project Implementation Cost[1]	Traffic Operations	Traffic Safety[2]	Other Considerations
F0: No-build	-	**Gold Spike Drive** Worst-case Stop Control LOS (AM / PM) 2027: B / C 2040: C / E 2050: C / E **Preacher Smith Drive** Worst-case Stop Control LOS (AM / PM) 2027: C / C 2040: F / F 2050: F / F **Ridge Drive** Worst-case Stop Control LOS (AM / PM) 2027: B / C 2040: C / D 2050: D / E	FI[3]: 48.49 PDO[4]: 39.23 Total: 87.76	-
F1: Northbound Right-turn Lanes	$580,000 (per location)	**Gold Spike Drive** Worst-case Stop Control LOS (AM / PM) 2027: B / C 2040: C / E 2050: C / E **Preacher Smith Drive** Worst-case Stop Control LOS (AM / PM) 2027: C / C 2040: F / F 2050: F / F **Ridge Drive** Worst-case Stop Control LOS (AM / PM) 2027: B / C 2040: C / D 2050: D / E	FI: 44.52 PDO: 35.86 Total: 80.41	▪ The turn-lane for right-turning traffic improves safety by removing right-turning vehicles from through-movement travel lanes. ▪ The right-turn lane adds to the amount of pavement to maintain.

[1]Year 2027 including preliminary engineering and 30% contingency
[2]Predicted crashes (2027-2050)
[3]FI – Fatal and Injury crash
[4]Property Damage Only crash

5.7 MT. ROOSEVELT ROAD INTERSECTION

This location is presently an unsignalized intersection with the minor road approaches of Mt. Roosevelt Road being stop controlled. Presently, a left-turn lane is provided on both approaches of US85, and a right-turn lane is provided on the southbound approach to Mt. Roosevelt Road.

5.7.1 Needs Identification

This intersection is being evaluated because of future traffic volume growth resulting, in part, from additional phases of the Stage Run residential development south/west of US85 and the development of a new Lawrence County public safety and services facility on the north/east side of US85.

The northbound right-turn volume is anticipated to satisfy turn lane warrant criteria by year 2040. Intersection control type modifications are anticipated by year 2040 but should also be considered for implementation at the time the Lawrence County public safety and services facility is operational or as conditions warrant.

5.7.2 Intersection Alternatives

The following alternatives were evaluated for the Mt. Roosevelt Road intersection.

G0: No-Build

This intersection would remain as an unsignalized intersection with stop control on the minor road approaches. See Figure 35.

G1: Northbound Right-turn Lane

This alternative consists of adding a northbound right-turn lane, as warranted by NCHRP and SDDOT criteria. As an unsignalized intersection, this turn lane would be offset from the adjacent through lane such that sight distance of minor road traffic would not be inhibited. All other features of the existing intersection would be retained. See Figure 36.

G2: Signalization (with northbound right-turn lane)

This alternative replaces the stop-controlled conditions with the operation of the intersection under signal control. Though the right-turn lane included with Alternative G1 would be retained, it would not be offset, but rather, immediately adjacent to the through lane. A benefit/cost analysis should be performed to illustrate the benefit of the northbound right-turn lane with this alternative. See Figures 37.

G3: Roundabout

This alternative would reconstruct the intersection as a multi-lane (2x1) roundabout. See Figure 38.

Figure 35: Alternative G0 – No-Build

Figure 36: Alternative G1 – Northbound Right-turn Lane

Figure 37: Alternative G2 – Signalization (with northbound right-turn lane)

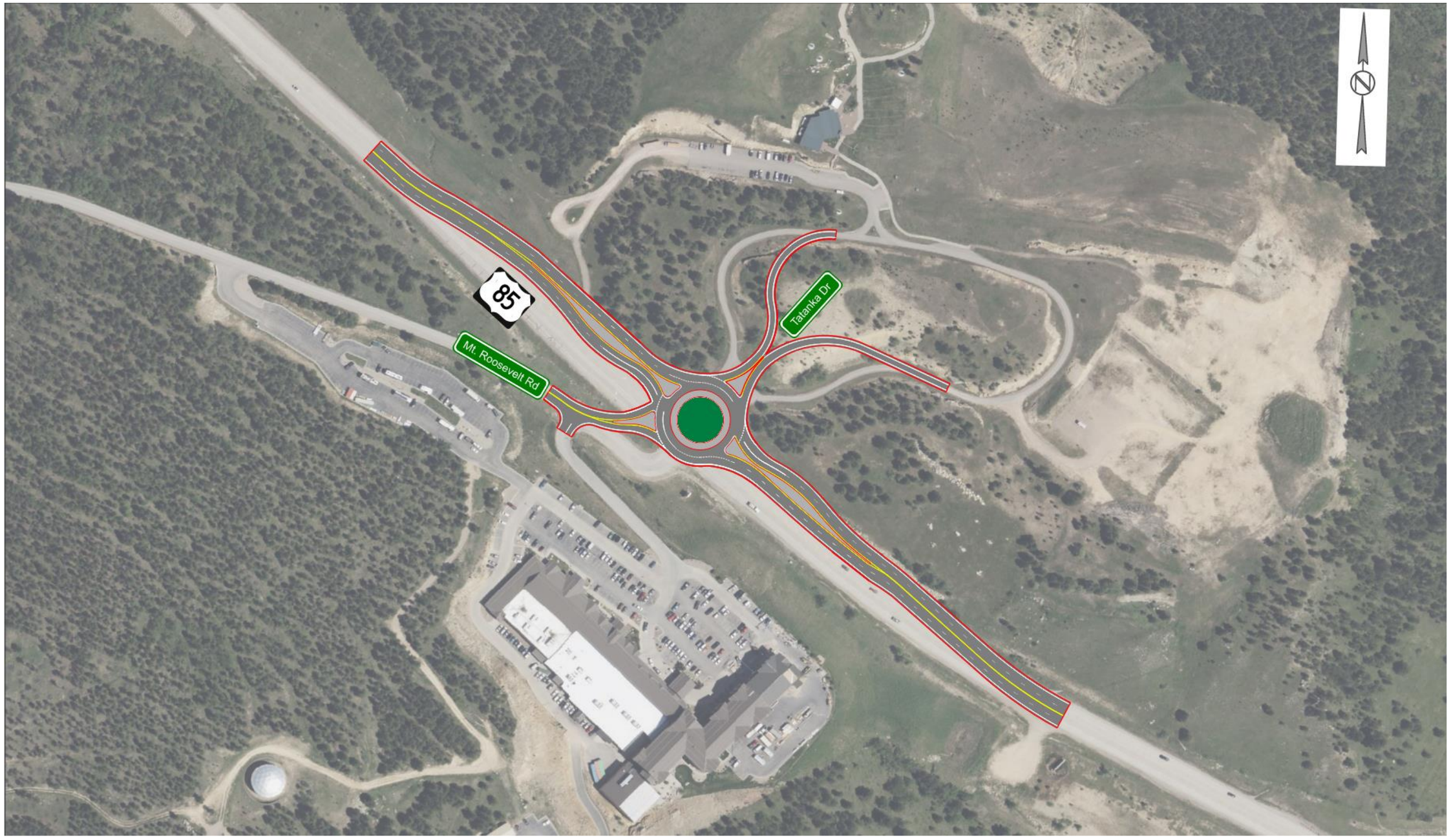


Figure 38: Alternative G3 – Roundabout

5.7.3 Alternatives Analysis

Table 15 summarizes the evaluation of potential project alternatives for the Mt. Roosevelt Road intersection.

Table 15: Mt. Roosevelt Road Intersection Alternatives

Alternative	Year 2027 Project Implementation Cost[1]	Traffic Operations	Traffic Safety[2]	Other Considerations
G0: No-build	-	Worst-case Stop Control LOS (AM / PM) 2027: C / D 2040: F / F 2050: F / F	FI[3]: 46.17 PDO[4]: 28.57 Total: 74.77	-
G1: Northbound Right-turn Lane	$230,000	Worst-case Stop Control LOS (AM / PM) 2027: C / D 2040: F / F 2050: F / F	FI: 42.89 PDO: 26.56 Total: 69.47	▪ The turn-lane for right-turning traffic improves safety by removing right-turning vehicles from through-movement travel lanes. ▪ The right-turn lane adds to the amount of pavement to maintain.
G2: Signalization (with northbound right-turn lane)	$1,020,000	Intersection LOS (AM / PM) 2027: A / A 2040: A / B 2050: A / B	FI: 78.17 PDO: 108.08 Total: 186.24	▪ The resulting traffic signal would provide for controlled pedestrian crossings via pedestrian push buttons and signals if sidewalks are constructed at the intersection. ▪ Signalization results in increased intersection capacity but can negatively impact northbound and southbound through movement operations along US85. ▪ Traffic signal control on high-speed roadways, like US85, are oftentimes characterized by severe crashes (i.e., rear-end and right-angle crashes).
G3: Roundabout	$5,390,000	Intersection LOS (AM / PM) 2027: A / A 2040: A / A 2050: A / A	FI: 27.14 PDO: 155.72 Total: 182.87	▪ Due to the low speed in which vehicles traverse the intersection and the fewer number of conflict points as compared to a traditional intersection, roundabouts are a proven safe intersection treatment, for both vehicles and pedestrians. ▪ Construction phasing, while maintaining traffic, will be challenging. ▪ The resulting grade between the revised centerline of US85 to the tie-in to existing Mt. Roosevelt Road is 8.8%. ▪ Because of grade differential referenced in the previous consideration and the acute angle at which the north (US85) and west (Mt. Roosevelt Road) legs connect to the roundabout with respect to one another, making a southbound right-turn movement from US85 to Mt. Roosevelt Road is not physically possible. In order to perform this maneuver, a motorist would have to use the inside (left) lane of US85 approaching the intersection and travel all the way around the roundabout to continue west along Mt. Roosevelt Road. Recognizing this exercise was only performed at a concept design level, solutions to address this shortcoming could be evaluated in greater detail with more detailed topographic survey information and more detailed design.

[1]Year 2027 including preliminary engineering and 30% contingency
[2]Predicted crashes (2027-2050)
[3]FI – Fatal and Injury crash
[4]Property Damage Only crash

5.8 US14A INTERSECTION

This southernmost intersection along the corridor is presently a "T" intersection. The intersection is operated under traffic signal control during the peak season of tourism (generally May through October). For the remainder of the year, the intersection operates as a stop-controlled intersection with east/west traffic on US14A presented with a flashing yellow display and traffic on the southbound approach of US85 presented with a flashing red display.

5.8.1 Needs Identification

This intersection is being evaluated because of future traffic volume growth and resulting traffic operations and safety deficiencies. The need for intersection control type modifications is primarily dependent on the timing, or pace, of area development activity. Based on the assumptions used within this corridor study, these modifications are anticipated as early as year 2027. It is noted that these modifications could be as simple as operating the intersection under full signal control for a longer portion of the calendar year as compared to May through October as is the case presently.

5.8.2 Intersection Alternatives

The following alternatives were evaluated for the US14A intersection.

H0.1: No-Build (unsignalized)

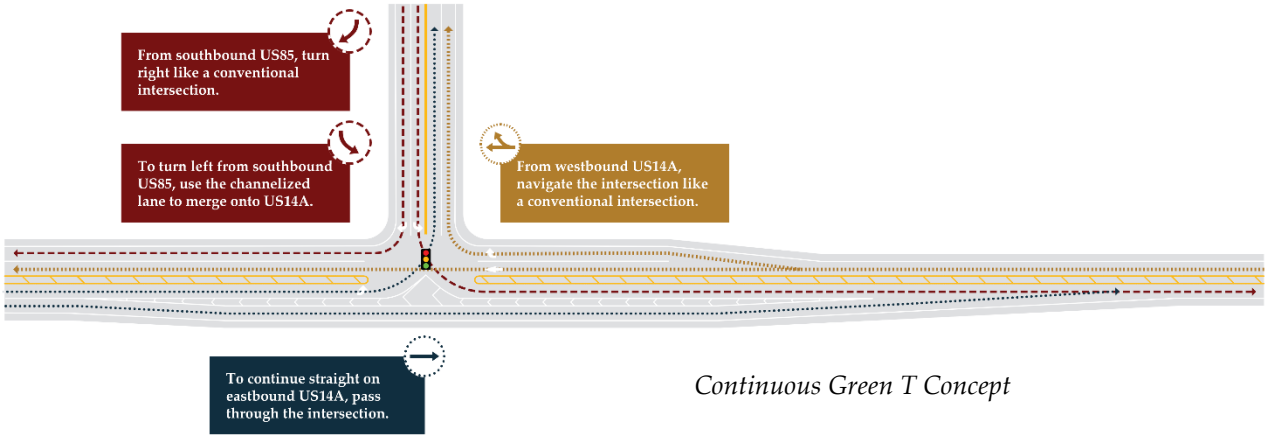
In the near term, and during the non-peak season of tourism, this intersection would operate as stop-controlled. See Figure 39.

H0.2: No-Build (signalized)

During the peak tourism season (generally, May into October) and likely longer portions of the year as development-driven traffic volumes grow, this intersection would operate under traffic signal control. See Figure 40.

H1: Continuous Green T

This signalized concept maintains the traditional T-intersection configuration but allows a continuous green signal indication for one direction of vehicles along the main roadway. In this case, that direction is eastbound US14A and with a continuous green signal indication, these eastbound through vehicles are not required to stop. Meanwhile, vehicles on the intersecting roadway (US85) face a red signal indication and after turning green, left-turning vehicles from US85 are required to merge with eastbound US14A vehicles. An illustration of a Continuous Greet T intersection is provided on the following page. See Figure 41.



Continuous Green T Concept

Figure 39: Alternative H0.1 – No-Build (unsignalized)

Figure 40: Alternative H0.2 – No-Build (signalized)

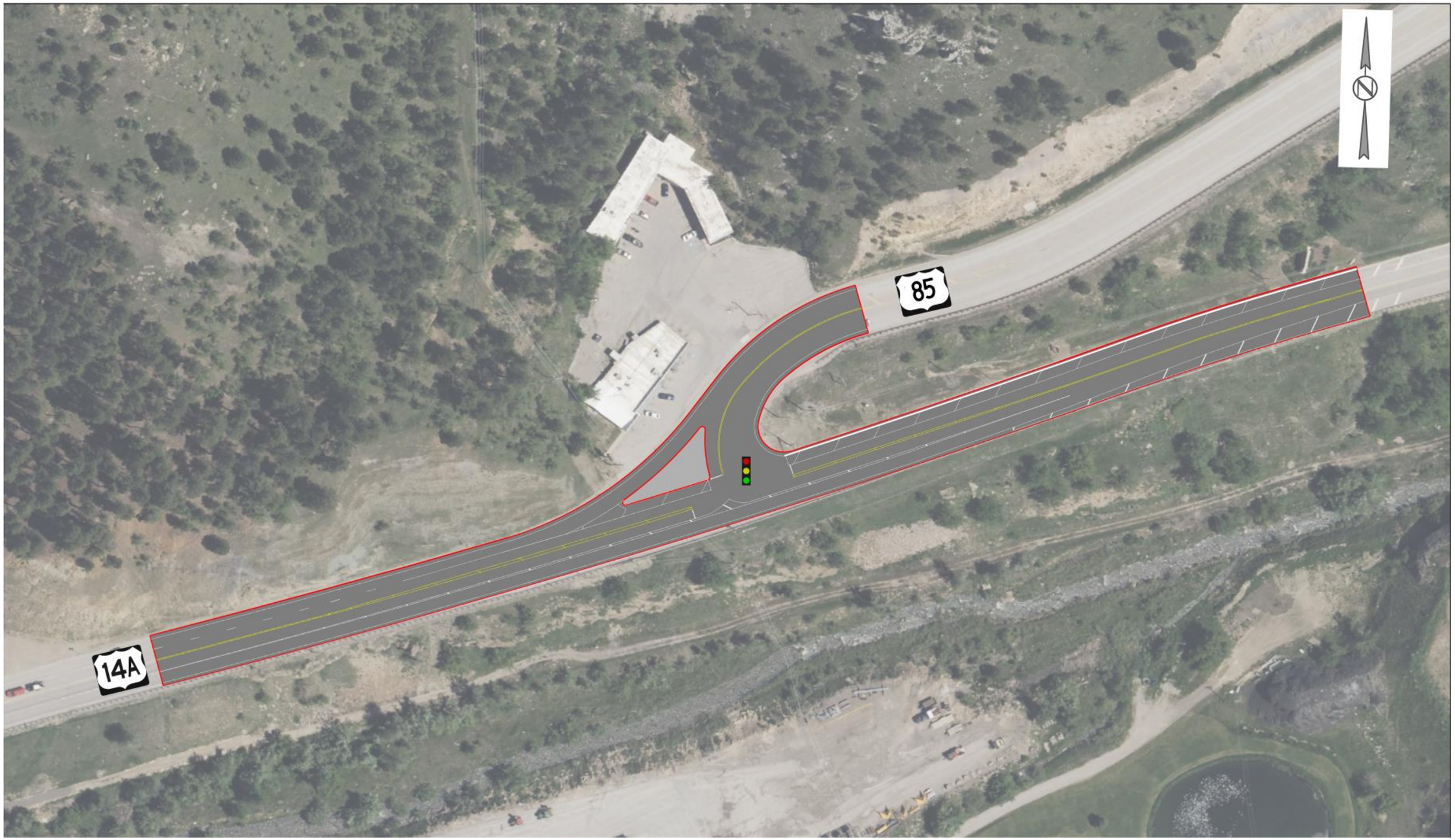


Figure 41: Alternative H1 – Continuous Green T

5.8.3 Alternatives Analysis

Table 16 summarizes the evaluation of potential project alternatives for the US14A intersection.

Table 16: US14A Intersection Alternatives

Alternative	Year 2027 Project Implementation Cost[1]	Traffic Operations	Traffic Safety[2]	Other Considerations
H0.1: No-build (Unsignalized)	-	Worst-case Stop Control LOS (AM / PM) 2027: E / F 2040: F / F 2050: F / F	FI[3]: 43.34 PDO[4]: 37.63 Total: 80.97	-
H0.2 No-build (Signalized)	-	Intersection LOS (AM / PM) 2027: A / B 2040: B / C 2050: B / C	FI: 30.14 PDO: 85.54 Total: 115.67	-
H1: Continuous Green T	$3,460,000	Intersection LOS (AM / PM) 2027: A / B 2040: B / C 2050: B / D	FI: 28.88 PDO: 81.90 Total: 110.81	▪ Limited available width for the implementation of a desired median separator between the minor approach (US85) left-turn movement and the mainline (US14A) through movement. ▪ A Continuous Green T intersection should not be considered if there is a future desire to allow pedestrians to cross US14A at this location.

[1]Year 2027 including preliminary engineering and 30% contingency
[2]Predicted crashes (2027-2050)
[3]FI – Fatal and Injury crash
[4]Property Damage Only crash

5.9 US85, DUKE PARKWAY TO CROOK CITY ROAD/PENDO ROAD

This segment of the project corridor, of which the majority is currently a depressed median-divided, four-lane highway, was identified for alternative evaluation by the Study Advisory Team (SAT).

5.9.1 Needs Identification

The reason for evaluating this segment as part of the corridor study relates to this area of the corridor becoming more urbanized in the coming years with anticipated development activity. The timing for needed improvements along this segment of the study corridor is largely dependent on the pace of this development activity.

5.9.2 Segment Alternatives

The following alternatives were evaluated for this segment.

I0: No-Build

This segment of US85 would remain as a four-lane, median-divided highway to a location approximately 1,500 feet south of Centennial Road. South of this location, this segment would remain a four-lane, undivided highway. See Figures 42 and 43.

I1: Extend Existing Typical Section to Crook City Road/Pendo Road

Under this alternative, the existing median-divided cross section of which the majority of the corridor is presently characterized would be extended south, through the intersection of Crook City Road/Pendo Road. At all intersections within this segment of the overall corridor, the median width would be sufficiently wide to allow for two-stage turning or crossing maneuvers from the minor road approaches. See Figures 44 and 45.

I2: Urbanized, 4-lane Divided with Turn Lanes

This alternative converts the typical section to better fit the anticipated future urbanized character of the corridor. This would consist of a raised median separating northbound and southbound vehicles, warranted turn lanes at intersections, a 5-feet sidewalk on one side of the highway and a 10-feet trail on the other. Roadway lighting is also proposed throughout this segment. See Figure 46.

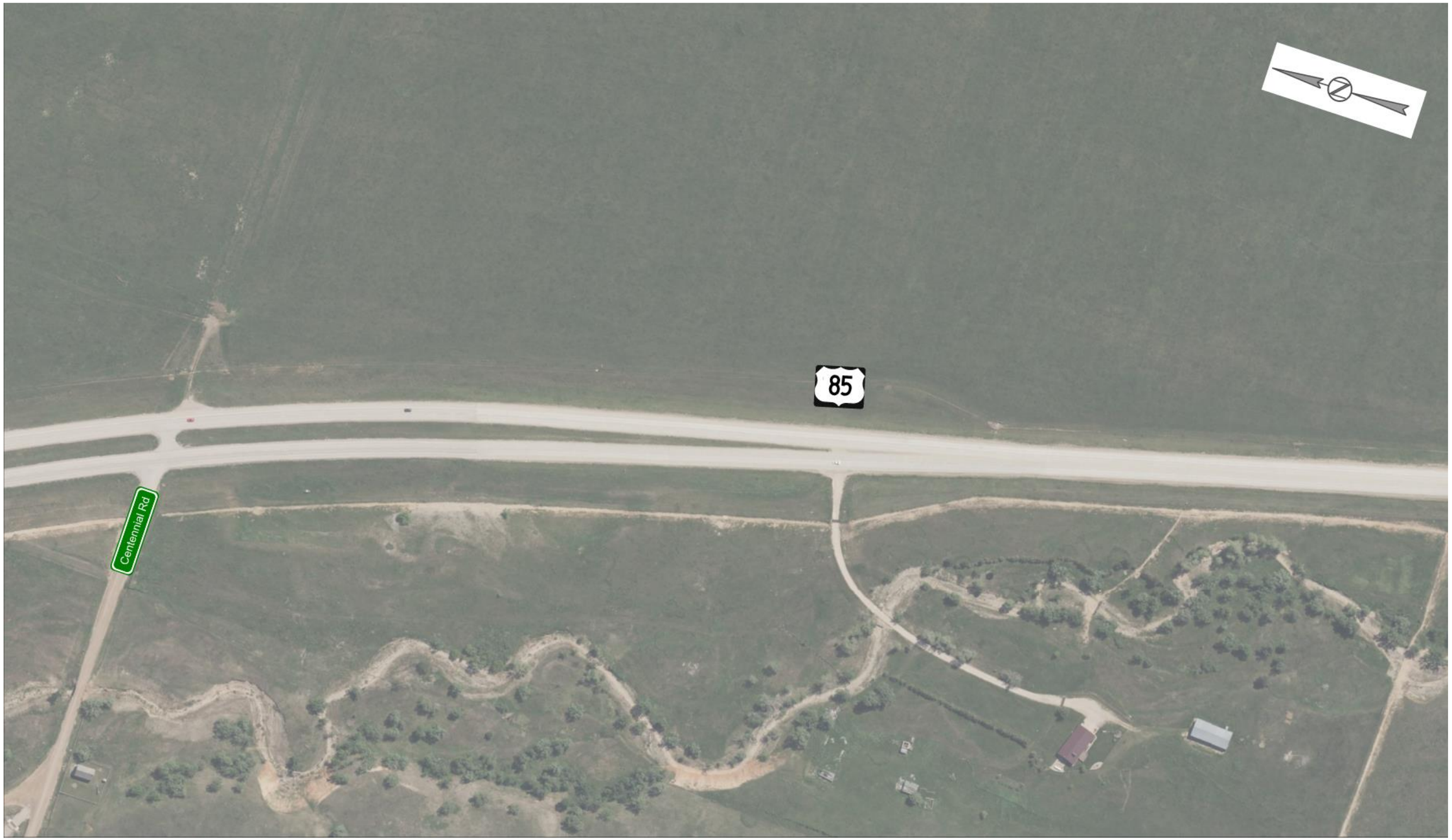
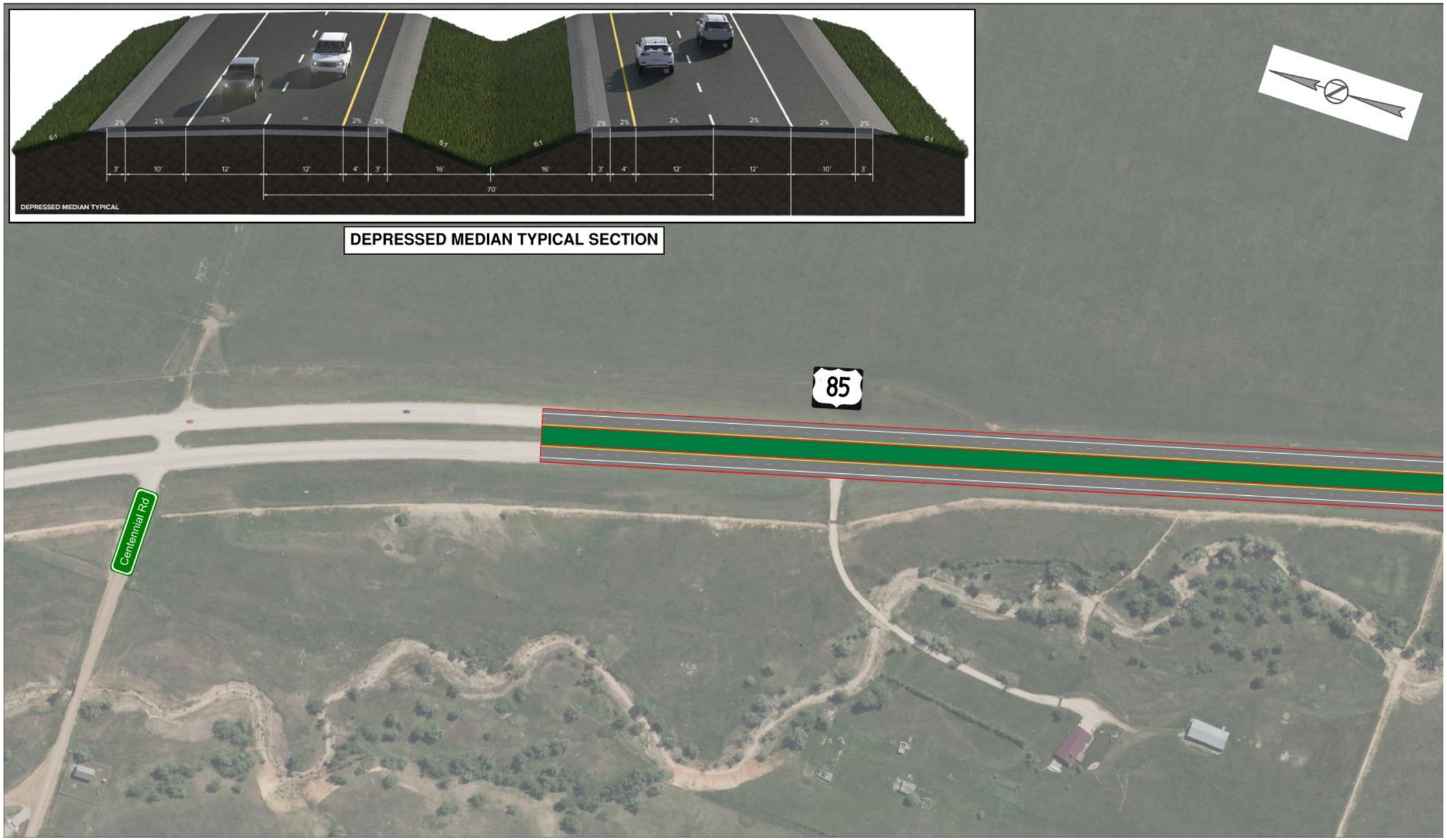


Figure 42: Alternative I0 – No-Build

Figure 43: Alternative I0 – No-Build



DEPRESSED MEDIAN TYPICAL SECTION

Figure 44: Alternative I1 – Extend Existing Typical Section to Crook City Road/Pendo Road

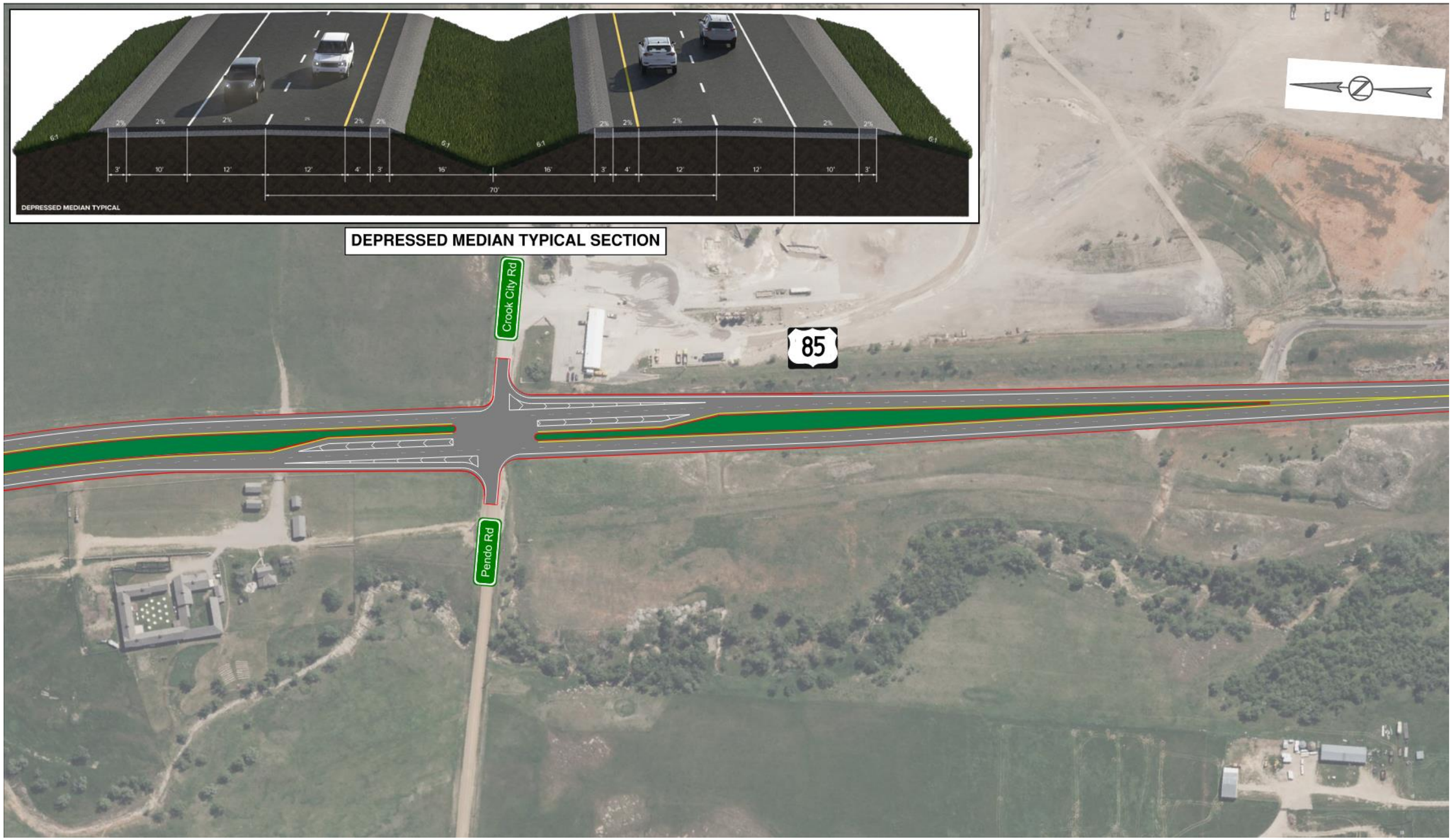


Figure 45: Alternative I1 – Extend Existing Typical Section to Crook City Road/Pendo Road

Figure 46: Alternative I2 – Urbanized, 4-lane Divided with Turn Lanes

5.9.3 Alternatives Analysis

Table 17 summarizes the evaluation of potential project alternatives for the segment of US85 between Duke Parkway and Crook City Road / Pendo Road.

Table 17: US85, Duke Parkway to Crook City Road/Pendo Road Segment Alternatives

Alternative	Year 2027 Project Implementation Cost[1]	Traffic Operations	Traffic Safety[2]	Other Considerations
I0: No-build	-	**Elkhorn Ridge RV Resort Driveway** Worst-case Stop Control LOS (AM / PM) 2027: C / C 2040: C / C 2050: D / C **Centennial Road** Worst-case Stop Control LOS (AM / PM) 2027: B / B 2040: C / C 2050: C / C **Crook City Road / Pendo Road** Worst-case Stop Control LOS (AM / PM) 2027: C / D 2040: F / F 2050: F / F	FI[3]: 249.20 PDO[4]: 222.61 Total: 471.83	-
I1: Extend Existing Typical Section to Crook City Road / Pendo Road	$17,360,000	**Crook City Road / Pendo Road** Worst-case Stop Control LOS (AM / PM) 2027: C / C 2040: E / E 2050: E / E	FI: 235.40 PDO: 213.45 Total: 448.84	▪ The current typical section allows for two-stage turning or crossing maneuvers by motorists from the minor road approaches. However, the median width is likely not sufficient for vehicles pulling trailers to stage within this median area. As a result, the single-stage turning or crossing distance for these vehicles could result in additional vehicle delay and/or vehicle crashes.
I2: Urbanized, 4-lane Divided with Turn Lanes	$34,030,000	**Elkhorn Ridge RV Resort Driveway** Worst-case Stop Control LOS (AM / PM) 2027: C / C 2040: F / F 2050: F / F **Centennial Road** Worst-case Stop Control LOS (AM / PM) 2027: B / C 2040: C / E 2050: C / E **Crook City Road / Pendo Road** Worst-case Stop Control LOS (AM / PM) 2027: C / D 2040: F / F 2050: F / F	FI: 231.75 PDO: 208.89 Total: 440.64	▪ Infrastructure (sidewalk and trail) for active transportation modes is included with this alternative. ▪ Raised median decreases the likelihood of vehicles colliding with vehicles traveling in the opposing direction. ▪ Improved safety resulting from roadway lighting. However, additional operation and maintenance costs are also attributed to this enhancement. ▪ Consistency of ROW and managing future access likely becomes easier. ▪ Intersection operations for this alternative degrade, as compared to alternatives I0 and I1 because, as two-way stop-controlled intersections, a two-stage crossing or left-turn movement from the side street operates better than a single-stage maneuver.

[1]Year 2027 including preliminary engineering and 30% contingency
[2]Predicted crashes (2027-2050)
[3]FI – Fatal and Injury crash
[4]Property Damage Only crash

5.10 US85, CROOK CITY ROAD/PENDO ROAD TO US14A

This segment of the project corridor, of which the majority is an undivided, four-lane highway, was identified for alternative evaluation by the Study Advisory Team (SAT).

5.10.1 Needs Identification

The reason for evaluating this segment as part of the corridor study relates to the inclusion of multi-modal elements to the segment's typical section.

5.10.2 Segment Alternatives

The following alternatives were evaluated for this segment.

J0: No-Build

This segment of US85 would remain as a four-lane, undivided highway with the exception of the intersection at Mt. Roosevelt Road which includes multiple auxiliary turn lanes. Once complete as part of the associated development turn-lane responsibilities, should development activity resume, the other exception would be at the intersections with the streets associated with The Ridge development. See Figure 47.

J1: Super 2 Highway

This alternative incorporates a "Super 2" concept for this segment of the overall study corridor. The Super 2 concept consists of one travel lane in each direction and a second travel lane in one of the two directions. In the case of this alternative, the second lane would correspond to segments of the corridor that are traveling uphill, with the downhill direction having only the single lane. North of Mt. Roosevelt Road, the second lane would be provided for the southbound direction of travel whereas south of Mt. Roosevelt Road, the second lane would be provided for the northbound direction of travel. Since this typical section utilizes only three of the existing four lanes of travel, the remaining section width would be dedicated to a two-way, buffered bike lane on one side of the highway. See Figures 48 and 49.

EXISTING MOUNTAINOUS REGION TYPICAL SECTION

Figure 47: Alternative J0 – No-Build

Figure 48: Alternative J1 – Super 2 Highway

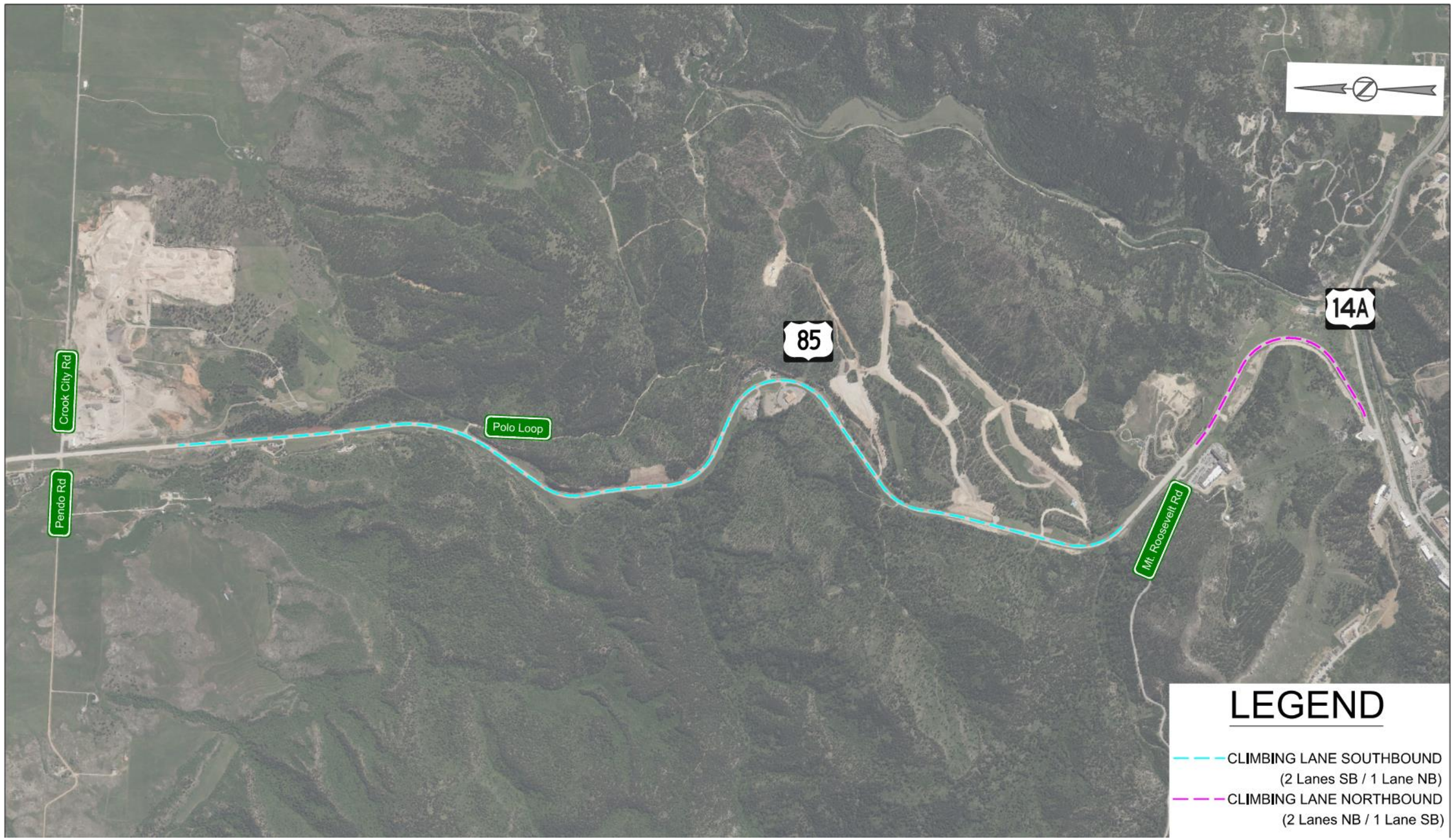


Figure 49: J1 – Super 2 Highway

5.10.3 Alternatives Analysis

Table 18 summarizes the evaluation of potential project alternatives for the segment of US85 between Crook City Road / Pendo Road and US14A.

Table 18: US85, Crook City Road/Pendo Road to US14A Segment Alternatives

Alternative	Year 2027 Project Implementation Cost[1]	Traffic Operations[5]	Traffic Safety[2]	Other Considerations
J0: No-build	-	**Crook City Road / Pendo Road to Mt. Roosevelt Road** Density LOS (AM / PM) 2027: A / A 2040: A / B 2050: A / B **Mt. Roosevelt Road to US14A** Density LOS (AM / PM) 2027: A / A 2040: B / B 2050: B / B	FI[3]: 350.55 PDO[4]: 179.46 Total: 605.79	-
J1: Super 2 Highway	$1,270,000	**Crook City Road / Pendo Road to Mt. Roosevelt Road** Follower Density LOS (AM / PM) 2027: C / E 2040: E / E 2050: E / E **Mt. Roosevelt Road to US14A** Follower Density LOS (AM / PM) 2027: D / C 2040: E / E 2050: E / E	FI: 134.87 PDO: 285.24 Total: 420.08	▪ The reduction of one travel lane and the associated loss of capacity could create longer travel times during higher volume time periods (i.e., those associated with special events in the area). ▪ The bike lane was shown as a two-way bike lane on one side of the street to minimize the amount of scarring to the roadway surfaces as part of the process for removing pavement markings. Excessive surface scarring would likely require overlaying the surface with a new coat of asphalt such that confusion between scarring and new pavement markings is minimized. ▪ The minimal (2-4 feet) buffer between the outside travel lane and the two-way bike lane could result in either reduced usage of the bike lanes or bicycle/vehicle collisions.

[1]Year 2027 including preliminary engineering and 30% contingency
[2]Predicted crashes (2027-2050)
[3]FI – Fatal and Injury crash
[4]Property Damage Only crash
[5]Reported LOS of highway segments is the worst-case LOS of either the NB or SB direction

5.11 PEDESTRIAN CONNECTION TO THE LODGE AT DEADWOOD

At present, there are no pedestrian accommodations between Deadwood and The Lodge at Deadwood, located at Mt. Roosevelt Road.

5.11.1 Needs Identification

Input from local residents and public agency officials indicate that pedestrians are oftentimes seen walking along the highway to get to/from The Lodge. As such, this has been identified as a current need. This set of alternatives identifies various ways of connecting Deadwood to The Lodge for use by those traveling by bicycle or on foot.

5.11.2 Pedestrian Connection Alternatives

The following alternatives were evaluated for this segment.

K0: No-Build

Presently, there are no sidewalks or trails connecting Deadwood to The Lodge at Deadwood (The Lodge). Under the no-build alternative, this condition would not change. Instead, pedestrians and bicyclists would continue to walk/ride in or along the side of US85.

K1: Off Highway Alignment (Option 1)

This alternative would construct a rock/dirt trail away from the US85 alignment, through an undeveloped and partially wooded area south of The Lodge. See Figure 50.

K2: Off Highway Alignment (Option 2)

This alternative would construct a paved walking path away from the US85 alignment, through an undeveloped and partially wooded area south of The Lodge. As compared to Alternative K1, this alternative would consist of a longer length including multiple switchbacks to decrease the average slope of the walking path. See Figure 50.

K3: Highway Alignment (Option 1)

This alternative would construct a five-foot, paved sidewalk along the west side of US85. See Figure 50.

K4: Highway Alignment (Option 2)

This alternative would construct a five-feet, paved sidewalk along the east side of US85. See Figure 50.

K5: Deadwood Connection

This alternative is that portion of sidewalk that would connect each of the other four alternatives to the contiguous pedestrian paths in Deadwood (near the First Gold Hotel). The existing desire path worn through the vegetation on the north side of the highway demonstrates the need for a pedestrian path in this location. See Figure 50.

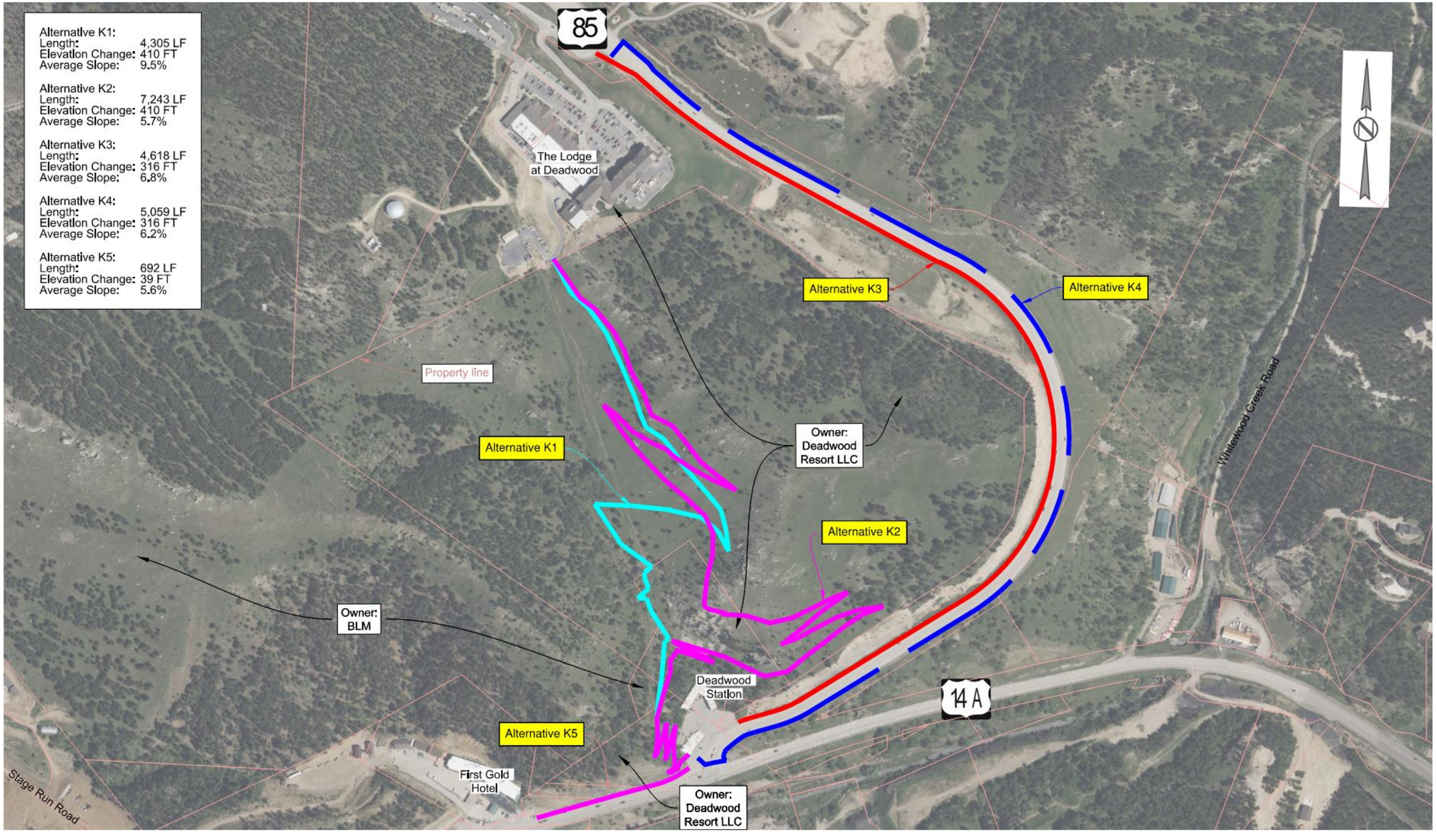


Figure 50: Alternatives K1-K5

5.11.3 Alternatives Analysis

Table 19 summarizes the evaluation of potential project alternatives for pedestrian connections to The Lodge at Deadwood.

Table 19: Pedestrian Connection to The Lodge at Deadwood Alternatives

Alternative	Year 2027 Project Implementation Cost[1]	Other Considerations
K0: No-build	-	-
K1: Off Highway Alignment (Option 1)	$210,000	▪ The trail would be surfaced with rock or dirt. ▪ The trail termini would be near Deadwood Station and near the maintenance building behind The Lodge. ▪ The trail would be approximately 4,300 feet in length and have an average slope of 9.5% with short portions approaching 25%. These grades would make it challenging for many potential users. ▪ A portion of the trail may cross property owned by the Bureau of Land Management (BLM). The remaining portions of the trail are on private property. Coordination with BLM and other property owners would be required. ▪ This alternative adds to the existing recreational trail network in and around Deadwood. ▪ During inclement weather, the trail may become impassable.
K2: Off Highway Alignment (Option 2)	$1,570,000	▪ The walking path would be paved. ▪ The trail termini would be near Deadwood Station and near the maintenance building behind The Lodge. ▪ The trail would be approximately 7,240 feet in length and have an average slope of 5.7% with a maximum slope of 8.3%, satisfying accessibility requirements. ▪ A portion of the trail may cross property owned by the BLM. The remaining portions of the trail are on private property. Coordination with BLM and other property owners would be required. ▪ This alternative adds to the existing recreational trail network in and around Deadwood. It could include amenities such as railings, benches, and widened passing areas. ▪ A trail under this alternative could be traversed with small maintenance vehicles for trash collection, snow removal, etc.

[1]Year 2027 including preliminary engineering and 30% contingency

Table 19 (continued): Pedestrian Connection to The Lodge at Deadwood Alternatives

Alternative	Year 2027 Project Implementation Cost[1]	Other Considerations
K3: Highway Alignment (Option 1)	$600,000	▪ The sidewalk would be paved. Final design activity would determine whether there is separation between the highway and the sidewalk. Pedestrian discomfort could be realized if the trail is located immediately adjacent to the highway. ▪ The sidewalk would be approximately 4,620 feet in length and match the profile grade of the highway with an average slope of 6.8%. ▪ Fallen or falling rocks could present dangerous conditions for pedestrians and likely make this alternative not feasible. ▪ Considerable noise associated with highway traffic. ▪ Construction may require slope stabilization, rockfall protection system or thickened paving section through cut sections of the vertical profile. ▪ The entire sidewalk alignment would be within SDDOT right-of-way.
K4: Highway Alignment (Option 2)	$660,000	▪ The sidewalk would be paved. ▪ For approximately 3,200 feet, the sidewalk could be protected from highway traffic by existing guardrail which could serve as a barrier for pedestrians. ▪ The sidewalk would be approximately 5,060 feet in length and an average slope of 6.2% which is less than the average highway profile grade due to the trail's slightly circuitous route. ▪ Due to insufficient width above the existing embankment and behind the existing guardrail, this alternative is likely not feasible. ▪ Considerable noise associated with highway traffic. ▪ Users would have to cross US85 twice; once at the Mt. Roosevelt intersection and once at the US14A intersection. ▪ The entire sidewalk alignment would be within SDDOT right-of-way.
K5: Deadwood Connection	$90,000	▪ The five-feet sidewalk would be paved. ▪ The sidewalk would be approximately 700 feet in length and follows the adjacent highway grade profile with an average slope of 5.6%. ▪ Construction may require slope stabilization or rockfall protection system to protect users from fallen/falling rocks. ▪ The entire sidewalk alignment would be within SDDOT right-of-way.

[1]Year 2027 including preliminary engineering and 30% contingency

6.0 RECOMMENDATIONS

6.1 STUDY INTERSECTIONS AND SEGMENTS

Recommendations of the consultant study team for improvements to the study corridor consider a combination of the technical evaluation of traffic, safety, access management, potential for adjacent property impacts, input received through public engagement, and interactions with the SAT. Considerations of each alternative for each location were documented in the *Summary of Feasible Alternatives* technical memo, provided as **Appendix G**.

Summarized in **Table 20**, recommendations of the consultant study team are provided for each of multiple study corridor locations. Project planning timelines are defined as follows:

- Near-term: 2024–2030
- Mid-term: 2031–2040
- Long-term: 2041–2050

6.2 OTHER CORRIDOR CONSIDERATIONS

Other elements of the study corridor that were evaluated but may not fall within a specific location or category of alternatives are presented in this section of this report.

6.2.1 Access and Roadway Connectivity

This section addresses the request for additional roadway connections that may be made in the future related to urban growth and private development activity.

Exit 17 to Colorado Boulevard/St. Onge Road

As illustrated in Figure 51, SDDOT control of access exists throughout the portion of US85 that is presently median divided. Control of access is the regulation of access, through the limitation of public access rights to and from properties abutting the highway facility. Typically, control of access is placed on highways to protect the integrity of their intended function.

SDDOT's access management criteria restricts any access along non-interstate routes within 1/8-mile of any interchange ramp terminal intersections. Furthermore, this criteria states that full-movement, median openings should be separated by one-half mile and that any unsignalized access spacing should be a minimum of 1,000 feet. Based on the approximate distance of 1,400 feet between the Exit 17 eastbound ramp terminal intersection and the Colorado Boulevard/St. Onge Road intersection, the presence of Miller Creek, and the criteria stated herein, additional access along US85 within this segment of the corridor should not be permitted unless approved by a SDDOT-authorized traffic study.

Table 20: Recommendations

Location	Alternatives	Alternative Comments	Planning Timeline	Study Team Recommended Alternative(s)	Recommendation Comments
Duke Parkway Intersection	A0: No-build A1: Stop Control with Northbound Left-turn Lane A2: Signalization with Northbound Left-turn Lane A3: Roundabout	All alternatives would include a new roadway connection to serve the proposed Centennial Mountain development as well as a new park & ride lot location.	Mid-term (The timing for implementing a solution for this intersection is primarily based on the need for a connection to proposed Centennial Mountain development.)	A3: Roundabout	A roundabout at this location provides the greatest safety benefit and assumedly, the greatest compatibility with a variety of future interchange configurations at Exit 17. This compatibility assumption, however, should be confirmed as part of a future Exit 17 Interchange Modification Justification Study. Connection to a reconfigured park & ride lot would be accessed via the new roadway connecting to the proposed Centennial Mountain development.
Exit 17 Interchange	Though a comprehensive evaluation of alternatives was not performed for the ramp terminal intersections at the Exit 17 interchange, an analysis of future no-build conditions identified operational deficiencies, including the satisfaction of signal warrant and turn lane warrant criteria as early as year 2027.		Near-term	Install traffic signal and turn lanes at either, or both, ramp terminal intersections, when warranted.	-
			Near-term	Conduct Interchange Modification Justification Study to identify the preferred interchange configuration.	-
			Mid-term	Reconstruct interchange (if necessary) as recommended by Interchange Modification Justification Study	This could be determined to be a “long-term” project.
Cenex Driveway (Colorado Loop) Intersection	Other than the close spacing with respect to the eastbound ramp terminal intersection at Exit 17, no deficiencies were identified for this location. If a Reduced Conflict Intersection were to be implemented at the E. Colorado Boulevard/St. Onge Road intersection, outbound (eastbound) movements onto US85 would be prohibited due to conflicts with the northbound u-turn movement.		n/a	n/a	n/a
E. Colorado Boulevard / St. Onge Road Intersection	B0: No-build B1: Signalization B2: Reduced Conflict Intersection (RCI) B3: Roundabout	All build alternatives would include the reconstruction of the Miller Creek box culvert under the west leg of E. Colorado Boulevard and transitioning to an improved, three-lane E. Colorado Boulevard west of Colorado Loop.	Near-term (SDDOT presently has the project programmed for 2028.)	B3: Roundabout	Alternative B3 provides maximized safety benefits, is largely supported by the public, and can be initially constructed as a 2x1 roundabout before being expanded to a 2x2 roundabout, when needed.

Table 20 (continued): Recommendations

Location	Alternatives	Alternative Comments	Planning Timeline	Study Team Recommended Alternative(s)	Recommendation Comments
Elkhorn Ridge RV Resort Driveway Intersection	C0: No-build C1: Southbound Right-turn Lane C2: Reduced Conflict Intersection (RCI)	Alternatives could change if a new roadway and US85 intersection were to be constructed at the existing median break near the existing south edge of the RV resort and access moved to that location. (see additional information on page 62)	Near-term Mid/long-term	C1: Southbound Right-turn Lane C2: Reduced Conflict Intersection	Existing (2023) southbound right-turn volumes satisfy warrant criteria. As such, a right-turn lane should be installed as soon as an agreement can be reached between SDDOT and the owner of Elkhorn Ridge RV Resort. Due to the difficulty of vehicles making left-turns from the driveway onto northbound US85, especially those large vehicles accustomed to using an RV park, an RCI should be implemented when traffic conditions warrant.
Centennial Road	D0: No-build D1: Southbound Right-turn Lane D2: Northbound Left-turn Lane D3: Skew Correction D4: Reduced Conflict Intersection (RCI)	All alternatives should consider the potential for a future east leg of the intersection. This intersection is spaced well with respect to other US85 intersections and would serve well future development on the east side of US85.	Mid-term The timing of additional improvements is dependent on development activity along the east side of US85 and/or the expansion of the City of Spearfish's transportation network.	D2: Northbound Left-turn Lane D4 (RCI) in combination with D1 (Southbound Right-turn Lane) and D3 (Skew Correction)	A roundabout was not included in the range of alternatives, but could be considered as a future option (at the request of the City of Spearfish and/or Lawrence County) pending development modifications and travel patterns.
Crook City Road / Pendo Road Intersection	E0: No-build E1: Northbound and Southbound Right-turn Lanes E2: Signalization E3: Reduced Conflict Intersection (RCI) E4: Roundabout	Northbound and southbound left-turn lanes are presently programmed by SDDOT for construction in year 2026.	Near-term Mid-term	E1: Northbound and Southbound Right-turn Lanes E3: RCI	The alternative selected for the segment of US85, between Duke Parkway and Crook City Road/ Pendo Road could play a role in determining which alternative is implemented.
The Ridge Development Driveway Intersections Note: The Ridge Development was placed on hold in Spring 2024. The information provided herein is based on anticipated development activity and associated assumptions during the time that relevant corridor study tasks were being executed.	F0: No-build F1: Northbound Right-turn Lanes	As a reminder, southbound left-turn lanes are to be implemented, as required in the current developer agreement.	Near-term Preacher Smith Drive Mid-term Gold Spike Drive Long-term Ridge Drive	F1: Northbound Right-turn Lane F1: Northbound Right-turn Lane F1: Northbound Right-turn Lane	At Preacher Smith Drive, consideration should be given to constructing the southbound left-turn lane (by developer) and the northbound right-turn lane concurrently.

Table 20 (continued): Recommendations

Location	Alternatives	Alternative Comments	Implementation Timeline	Study Team Recommended Alternative(s)	Recommendation Comments
Mt. Roosevelt Road Intersection	G0: No-build G1: Northbound Right-turn Lane G2: Signalization (with northbound right-turn lane) G3: Roundabout	As the Lawrence County Public Safety & Services Center becomes operational and as traffic volumes grow along US85, pedestrian movements across US85 should be monitored to determine if improvements are necessary to accommodate safe pedestrian crossing of US85.	Mid-term Traffic volumes and other traffic conditions should be monitored to determine if the recommended solution should be implemented sooner than the mid-term horizon.	G2: Signalization (with northbound right-turn lane)	Though a roundabout would operate well at this location, the grade differential between US85 and Mt. Roosevelt Road, to the west, presents significant challenges. Additionally, maintaining access to both sides of US85 would be challenging during the construction of a roundabout.
US14A Intersection	H0.1: No-build (unsignalized) H0.2: No-build (signalized) H1: Continuous Green T		Near-term, or when warranted	H0.2	The signal infrastructure is in place. This recommended alternative simply suggests that the full operation of the traffic signal should be extended beyond the current May through October timeframe.
US85, Duke Parkway to Crook City Road/Pendo Road	I0: No-build I1: Extend Existing Typical Section to Crook City Road/Pendo Road I2: Urbanized, 4-lane Divided with Turn Lanes	The alternative selected for the Crook City Road / Pendo Road intersection could play a role in determining which alternative is implemented.	Mid/long-term	I2	Alternative I2 would provide a more compatible typical section as the northern portion of the corridor urbanizes with continued development activity.
US85, Crook City Road/Pendo Road to US14A	J0: No-build J1: Super 2 Highway		n/a (since no-build alternative is recommended)	J0	According to the U.S. DOT's *Bikeway Selection Guide*, February 2019, only separated bike lanes or shared use paths should be considered along roadways with speeds above 35 mph and volumes above 7,000 vehicles per day.
Pedestrian Connection to The Lodge at Deadwood	K0: No-build K1: Off Highway Alignment (Option 1) K2: Off Highway Alignment (Option 2) K3: Highway Alignment (Option 1) K4: Highway Alignment (Option 2) K5: Deadwood Connection	The highway alignment alternatives (K3 and K4) are considered to be not feasible for reasons stated in Table 19.	Near-term	K2 & K5	Though alternative K2 is a more expensive alternative than K1, its resulting grades are more accommodating to users. K5 is also needed to make the full connection into Deadwood.

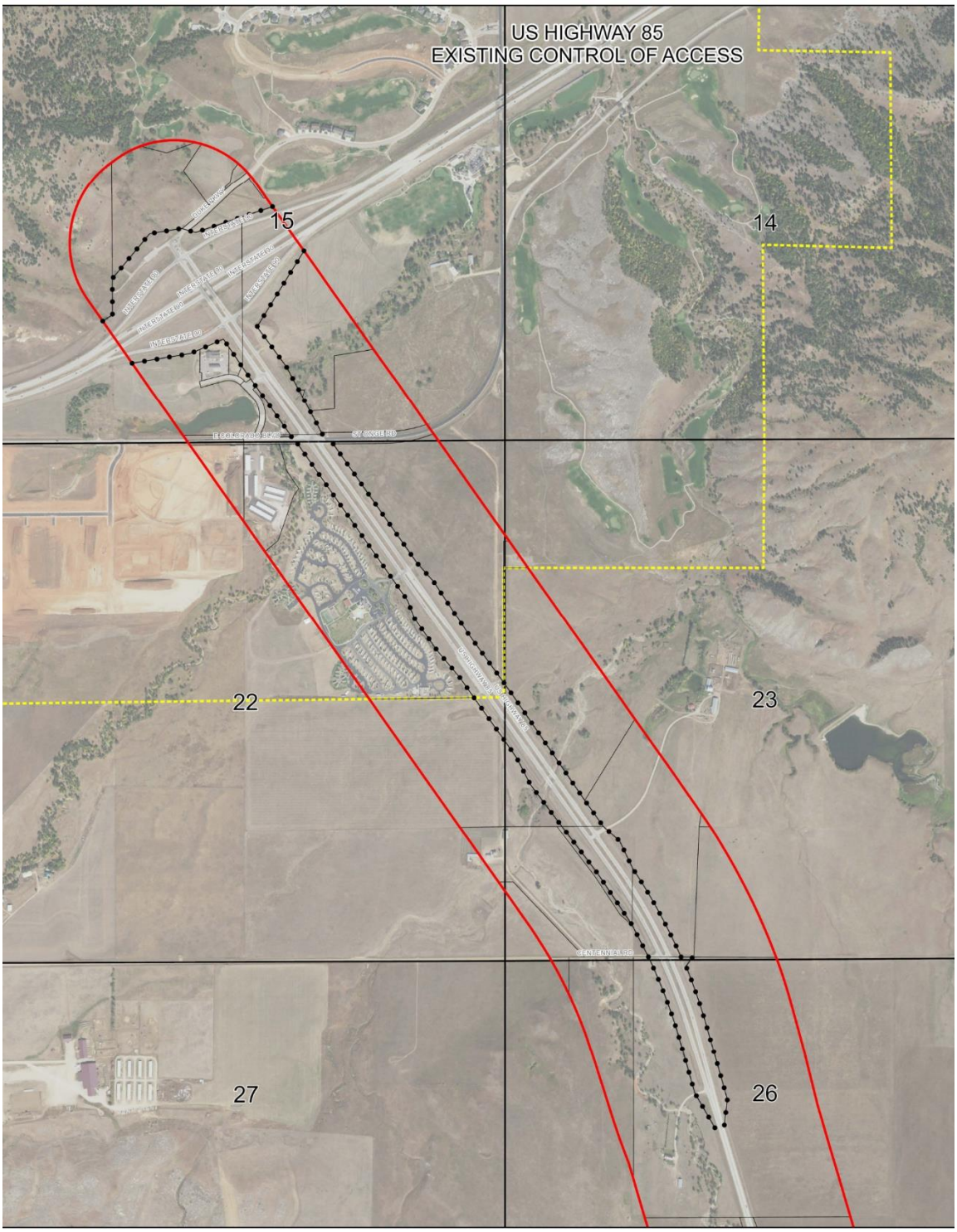


Figure 51: SDDOT Control of Access

South Border of Elkhorn Ridge RV Resort

Based on discussions as part of the City of Spearfish's update to their Comprehensive Plan and Long-Range Transportation Plan, future growth and development activity could lead to the expansion of the public roadway network. This includes but is not limited to a potential east-west roadway along, or near the south edge of the existing Elkhorn Ridge RV Resort, resulting in an intersection with US85 at the location of an existing median access opening. This intersection could also provide access and connectivity to undeveloped parcels east of US85. The resulting spacing between this intersection and the Colorado Boulevard/St. Onge Road intersection would be approximately one-half mile. The resulting spacing between this intersection and the median opening at the Elkhorn Ridge RV Resort driveway would be approximately one-quarter mile, thus requiring an exception to SDDOT's access management criteria. Additionally, a break in the control of access on both sides of the highway would have to be granted. For safety and operational reasons, this future intersection would be the most desirable location to provide full-movement access to undeveloped properties south of St. Onge Road.

An illustration of this resulting intersection and associated east and west roadway connections is illustrated in Figure 52.

Centennial Road

Similar to the previously referenced intersection and as mentioned in the alternatives summary for this location, Centennial Road could also play a larger role in Spearfish's transportation network. If so, this could result in a more prominent intersection at this location with the ability to provide connections to undeveloped property east of US85. The location of this intersection would result in good spacing with other existing or future intersections and median openings. An illustration of this resulting intersection and associated east roadway connection is illustrated in Figure 52.

6.2.2 Intersection Lighting

Based on an evaluation of SDDOT intersection lighting criteria, lighting is recommended at the following intersections. It is assumed that the cost for implementing lighting at these locations is included with other alternative cost estimates.

- Duke Parkway (for signalization and roundabout alternatives)
- Colorado Boulevard / St. Onge Road (all alternatives)
- Crook City Road / Pendo Road (for signalization and RCI alternatives)
- Mt. Roosevelt Road (all alternatives)
- US14A (intersection already lighted)

6.2.3 Multimodality

Throughout the course of this corridor study, both members of the study advisory team and project stakeholders expressed the importance of US85 providing multimodal accommodations. This includes not only the crossing of the highway but also facilities along, or generally parallel to the highway. Though, for safety reasons, the implementation of a bike facility within or immediately adjacent to the highway is not recommended, future opportunities off of the highway should continue to be evaluated. This includes, but is not limited to a shared use path as part of Alternative I2.

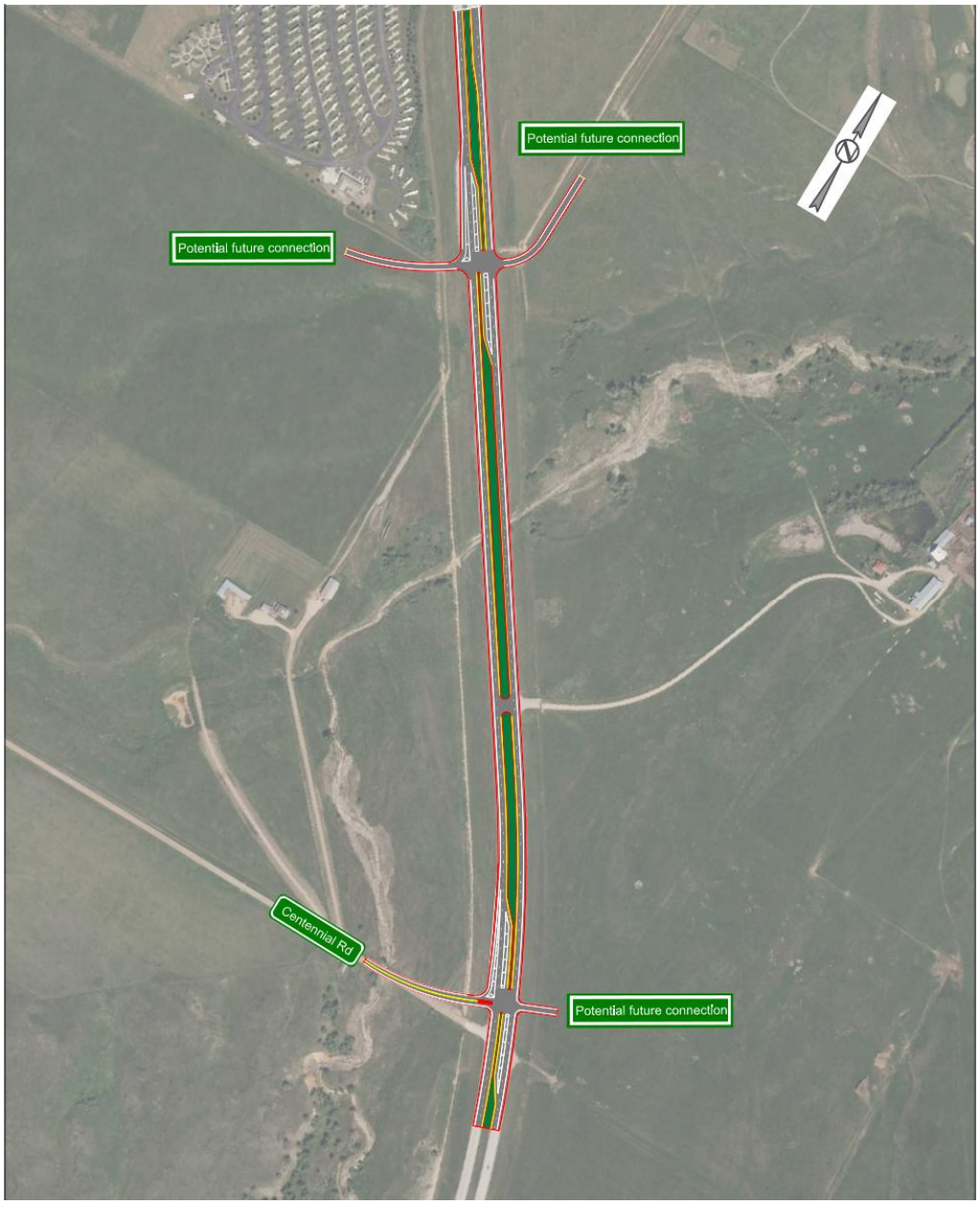


Figure 52: Future Intersections & Roadway Connectivity

6.2.4 Wild Animal Crashes

From 2017 to 2021, 90 animal-related crashes were reported within the limits of the study area. More than half of these crashes occurred between the Crook City Road/Pendo Road and US14A intersections with the vast majority of the crashes involving deer. While it is assumed that some of these crashes also involved big horn sheep, the exact number of those crashes is unknown. Furthermore, of the 90 crashes, only one resulted in injury to a vehicle occupant. For animal-related crashes with no injuries to vehicle occupants, the estimated monetary value of those crashes, according to SDDOT, is $19,000 per crash.

To date, SDDOT has only installed highway fencing, as a means to mitigate wild animal crashes, along I-90. As future projects along US85 are developed, mitigation strategies can be considered using SDDOT's recently developed decision guides. If fencing is ultimately recommended as a mitigation strategy, it should be recognized that the associated design at driveway access openings will need to minimize the occurrence of animals circumventing the fencing and positioning themselves on the highway side of the fencing.

APPENDICES

US85 CORRIDOR STUDY

SPEARFISH TO DEADWOOD

APPENDIX A

Methods and Assumptions Document

US85 CORRIDOR STUDY

SPEARFISH TO DEADWOOD

APPENDIX B

Existing Conditions Assessment Technical Memo

US85 CORRIDOR STUDY

SPEARFISH TO DEADWOOD

APPENDIX C

Future Traffic Volume Forecasts Technical Memo

US85 CORRIDOR STUDY

SPEARFISH TO DEADWOOD

APPENDIX D

Future No-build Traffic Operations Analysis Technical Memo

US85 CORRIDOR STUDY

SPEARFISH TO DEADWOOD

APPENDIX E

Predictive Safety Analysis of Existing and Future No-build Conditions Technical Memo

US85 CORRIDOR STUDY

SPEARFISH TO DEADWOOD

APPENDIX F

Identification of Needs Technical Memo

US85 CORRIDOR STUDY

SPEARFISH TO DEADWOOD

APPENDIX G

Summary of Feasible Alternatives Technical Memo

US85 CORRIDOR STUDY

SPEARFISH TO DEADWOOD

APPENDIX H

Traffic Operations Analysis of Feasible Alternatives Technical Memo

US85 CORRIDOR STUDY

SPEARFISH TO DEADWOOD

APPENDIX I

Predictive Safety Analysis of Feasible Alternatives Technical Memo

US85 CORRIDOR STUDY

SPEARFISH TO DEADWOOD

APPENDIX J

Public and Stakeholder Meetings Summaries

APPENDIX K

Environmental Screening Report

US85 CORRIDOR STUDY

SPEARFISH TO DEADWOOD

APPENDIX L

Project Implementation Plan Technical Memo

US85 CORRIDOR STUDY

SPEARFISH TO DEADWOOD


US85
CORRIDOR STUDY
SPEARFISH TO DEADWOOD