RIFLE GATEWAY
CONCEPTUAL ALTERNATIVES REPORT

October 23, 2010

Prepared for:

202 Railroad Avenue
Rifle, CO 81650

Prepared by:

4601 DTC Boulevard
Suite 700
Denver, CO 80237

Table of Contents

E.0 EXECUTIVE SUMMARY ... 1
1.0 INTRODUCTION ... 7
2.0 STUDY AREA ... 8
3.0 PROJECT GOALS AND OBJECTIVES ... 9
4.0 DATA COLLECTION ... 10
4.1 SURVEY AND OWNERSHIP MAPPING ... 10
4.2 ENVIRONMENTAL SCAN AND SITE ASSESSMENT ... 13
4.2.1 Special Status Species ... 13
4.2.2 Wetlands and Floodplains ... 15
4.2.3 Historic and Cultural Resources ... 15
4.2.4 Hazardous Materials ... 16
4.2.5 Parklands and Recreation ... 18
4.3 GEOTECHNICAL INVESTIGATION ... 21
4.4 TRAFFIC COUNTS ... 21
4.5 UTILITY INVESTIGATION ... 21
4.6 EXISTING LIGHTING CONDITIONS ... 21
4.6.1 I-70 Interchange ... 22
4.6.2 Intersection Area (Gateway/2nd Street) ... 22
4.6.3 Historic Downtown Core ... 22
4.7 DOWNTOWN STREET SITE ANALYSIS ... 24
4.7.1 2nd Street ... 24
4.7.2 3rd Street ... 26
4.7.3 4th Street ... 28
4.7.4 5th Street ... 30
4.7.5 West Avenue ... 32
4.7.6 Railroad Avenue ... 34
4.7.7 East Avenue ... 36
4.7.8 Whiteriver Avenue ... 38
5.0 PRELIMINARY TRAFFIC ENGINEERING ... 40
5.1 APPLICABLE GUIDANCE AND ANALYSIS TOOLS ... 42
5.1.1 Highway Capacity Manual 2000 ... 42
5.1.2 Synchro Software ... 44
5.1.3 RODEL Software ... 44
5.2 EXISTING (2009) CONDITIONS ... 44
5.2.1 Roadway Characteristics ... 44
5.2.2 Traffic Volumes and Travel Patterns ... 46
5.2.3 Operating Conditions ... 48
5.2.4 Safety Conditions ... 50
5.3 NO-ACTION (2035) CONDITIONS ... 51
5.3.1 Roadway Characteristics ... 51
5.3.2 Traffic Volumes and Travel Patterns ... 52
5.3.3 Operating Conditions ... 54
5.3.4 Safety Conditions ... 56
6.0 CONCEPTUAL ALTERNATIVES DEVELOPMENT ... 57
6.1 SH 13/US 6/RAILROAD AVENUE INTERSECTION ALTERNATIVES ... 57
6.1.1 Design Criteria ... 58

6.1.2 Conceptual Corridor Alternatives 60
6.1.3 Preliminary Screening of Conceptual Corridor Alternatives 69
6.1.4 Refining of Preliminary Alternatives 86
6.1.5 Detailed Screening of Alternatives 89
6.1.6 Detailed Screening Objectives 90
6.1.7 3D Model Exhibits of Refined Alternatives 110
6.2 DOWNTOWN STREETS ALTERNATIVES 110
6.2.1 Streetscape Enhancement Zones 110
6.2.2 Recommended Streetscape Enhancements and 3D Imagery 113
6.2.3 Cost Estimates for Streetscape Enhancements 118
6.3 GATEWAY ALTERNATIVES 121
6.3.1 Gateway Concept Alternatives 121
6.3.2 Refined Gateway Concept Alternatives 123
6.3.3 Cost Estimate for Refined Gateway Concept Alternative 127
6.4 PARK AVENUE EXTENSION AND 2ND STREET EXTENSION ALTERNATIVES 127
6.4.1 Design Criteria 127
6.4.2 Feasible Concept Alternatives 129
6.4.3 Screening Criteria 138
6.4.4 Recommended Concept Alternative 138
6.5 I-70 ENTRANCE/EXIT RAMPS ALTERNATIVES 140
6.5.1 Concept A: Colorado River 140
6.5.2 Concept B: Farmland Grid 142
6.5.3 Concept C: Talus Slopes 143
6.5.4 Refined I-70 Entrance/Exit Alternatives 144
6.6 LIGHTING 146
6.6.1 Layout and Placement 148
6.6.2 SH 13/US6 Intersection Area 148
6.6.3 Historic Downtown Core 155
6.6.4 Gateway 155
7.0 PUBLIC INVOLVEMENT 156
7.1 KICK-OFF MEETING 156
7.2 SMALL GROUP AND CITY COUNCIL MEETINGS 156
7.3 CONCEPTUAL DESIGN CHARRETTE 156
7.4 PRELIMINARY SCREENING OPEN HOUSE 156
7.5 WEBSITE 156
8.0 IMPLEMENTATION PLAN 158
8.1 CONCEPT IMPLEMENTATION 158
8.1.1 Park Avenue Extension 158
8.1.2 I-70 Entrance/Exit Ramps 158
8.1.3 Downtown Streetscape Zones 159
8.1.4 SH 13/US 6 Alternative C2 159
9.0 REFERENCES 163

List of Figures

Figure 1 Overall Project Map 8
Figure 2 Project Control Diagram 11
Figure 3 Ownership Map 12
Figure 4 Environmental Conditions 19
Figure 5 2nd Street Site Analysis 25
Figure 6 3rd Street Site Analysis 27
Figure 7 4th Street Site Analysis 29
Figure 8 5th Street Site Analysis 31
Figure 9 West Avenue Site Analysis 33
Figure 10 Railroad Avenue Site Analysis 35
Figure 11 East Avenue Site Analysis 37
Figure 12 Whiteriver Avenue Site Analysis 39
Figure 13 Traffic Operational Analyses Study Area 41
Figure 14 Existing Roadway Characteristics 45
Figure 15 Existing Daily and Hourly Traffic Volumes 48
Figure 16 No-Action (2035) Alternative Roadway Configuration 52
Figure 17 No-Action (2035) Daily and Hourly Traffic Volumes 54
Figure 18 Conceptual Corridor Alternative A 61
Figure 19 Conceptual Corridor Alternative B1 62
Figure 20 Conceptual Corridor Alternative B2 63
Figure 21 Conceptual Corridor Alternative C 64
Figure 22 Conceptual Corridor Alternative D 65
Figure 23 Conceptual Corridor Alternative E 66
Figure 24 Conceptual Corridor Alternative F 67
Figure 25 Conceptual Corridor Alternative G 68
Figure 26 Conceptual Corridor Alternative H 69
Figure 27 Refined Alternative C1 87
Figure 28 Refined Alternative C2 88
Figure 29 Recommended Conceptual Corridor Alternative 106
Figure 30 Detailed Layout of the Recommended Conceptual Corridor Alternative 107
Figure 31 Recommended Alternative 3D Models 110
Figure 32 Streetscape Zones 112
Figure 33 Zone A 113
Figure 34 Zone A-1 114
Figure 35 Zone B 114
Figure 36 Zone R 115
Figure 37 Zone L 116
Figure 38 East Avenue Neighborhood Entry 117
Figure 39 Preliminary Gateway Concepts 122
Figure 40 Refined Gateway Concept Alternative 123
Figure 41 Gateway 3D Model 124
Figure 42 Park Avenue Extension, Alternative A 130
Figure 43 Park Avenue Extension, Alternative B 131
Figure 44 Park Avenue Extension, Alternative C 132
Figure 45 Park Avenue Extension, Alternative D 133
Figure 46 Park Avenue Extension, Alternative E 134
Figure 47 Park Avenue Extension, Alternative F 135
Figure 48 Park Avenue Extension, Alternative G 136
Figure 49 Park Avenue Extension, Alternative H 137
Figure 50 Recommended Park Avenue Extension, Alternative B1 139

Figure 51 Concept A: Colorado River 141
Figure 52 Concept B: Farmland Grid 142
Figure 53 Concept C: Talus Slopes 143
Figure 54 Refined I-70 Entrance and Exit Alternative 144
Figure 55 I-70 Underpass Alternative Treatment 145
Figure 56 Partial Lighting Scheme 151
Figure 57 Continuous Lighting Scheme 152
Figure 58 Two-Layer Lighting Scheme 153
Figure 59 Recommended Conceptual Corridor Alternative – Construction Phase 2 Option 161

List of Tables

Table 1 Endangered, Threatened, Proposed, and Candidate Species Potentially Occurring in the Study Area 14
Table 2 Basic Level of Service Descriptions 43
Table 3 Level of Service for Intersections 44
Table 4 Results of PM Peak Hour Model Calibration 50
Table 5 LOS Results of Existing Conditions Analysis 50
Table 6 Comparison of Overall Intersection LOS for Existing Conditions and 2035 No-Action Alternative 55
Table 7 Comparison of Worst Approach LOS for Existing Conditions and 2035 No-Action Alternative 56
Table 8 Design Criteria for Highways in the Study Area 58
Table 9 Preliminary Screening Goals, Objectives, and Evaluation Criteria 70
Table 10 Results for Preliminary Traffic Operations 74
Table 11 Results for Preliminary Screening of Mobility 76
Table 12 Results for Preliminary Screening of Aesthetics/Urban Environment 78
Table 13 Results for Preliminary Screening of Safety 78
Table 14 Results for Preliminary Screening of Environmental Resources 79
Table 15 Results for Preliminary Screening of Ease of Implementation 82
Table 16 Preliminary Screening Recommendations 85
Table 17 Detailed Screening Goals, Objectives, and Evaluation Criteria 89
Table 18 Results for Traffic Operations for Refined Alternatives 91
Table 19 Mobility Evaluation Thresholds 92
Table 20 Summary of Evaluation Thresholds for Mobility 94
Table 21 Aesthetics and Urban Environment Evaluation Thresholds 96
Table 22 Summary of Evaluation Thresholds for Aesthetics and Urban Environment 97
Table 23 Safety Evaluation Thresholds 98
Table 24 Summary of Evaluation Thresholds for Safety 99
Table 25 Environmental Evaluation Thresholds 100
Table 26 Summary of Evaluation Thresholds for Environmental 101
Table 27 Implementation Evaluation Thresholds 102
Table 28 Summary of Evaluation Thresholds for Ease of Implementation 103
Table 29 Summary of Evaluation Thresholds for Recommended Conceptual Corridor Alternative 104
Table 30 Estimate of Probable Cost – Recommended Conceptual Corridor Alternative 109
Table 31 Estimate of Probable Cost – Zone “A” Intersection (Railroad Avenue) 118
Table 32 Estimate of Probable Cost – Zone “A-1” Centennial Parkway (1/2 Block) 119
Table 33 Estimate of Probable Cost – Zone “B” (1/2 Block) 119
Table 34 Estimate of Probable Cost – Zone “R” Intersection 120

Table 35 Estimate of Probable Cost – East Avenue Neighborhood Gateway 121
Table 36 Estimate of Probable Cost – Gateway Roundabout 127
Table 37 Design Criteria for Park Avenue and 2nd Street Extension 128
Table 38 Park Avenue Preliminary Screening Criteria and Scoring 138
Table 39 Estimate of Probable Cost – Recommended Park Avenue Alternative B1 139
Table 40 Estimate of Probable Cost – Refined "Talus Slope" I-70 Entrance/Exit Alternative ... 146
Table 41 Estimate of Probable Cost – Lighting Scheme 155
Table 42 Estimate of Probable Cost – Construction Phase 2 Option 162

List of Appendices (on CD)

Appendix A – Existing Conditions Survey and Ownership Mapping Plots
Appendix B – Modified Environmental Site Assessment (MESA), dated August 12, 2009 and Addendum to the MESA, dated October 2009
Appendix C – Geotechnical Investigation and Pavement Design
Appendix D – Feasibility Safety Assessment Report
Appendix E – Request to Allow a One-Way Couplet Memorandum
Appendix F – Conceptual Evaluation of Park Avenue Extension over Rifle Creek Memorandum
Appendix G – Public Involvement
Appendix H – 3D Rendering Video and Snap Shots
Appendix I – Lighting Equipment Product Information Sheet Examples

This page intentionally left blank

E.0 EXECUTIVE SUMMARY

The City of Rifle (City), in cooperation with the Colorado Department of Transportation (CDOT), Region 3, has developed alternatives and intends to proceed with preliminary design for improvements to pedestrian paths, streets, and highways and streetscapes that form the principal gateways to downtown. The City also will develop plans for exceptional gateways to the Rifle Central Business District. The intent of this project is to identify potential roadway and pathway alternatives for the City, leading north from Interstate 70 (I-70) and east to west along United States Highway 6 (US 6), and to assess the potential effects of the proposed alternatives.

In addition, the City wishes to extend Park Avenue south from 3rd Street to intersect with State Highway 13 (SH 13) west of West Avenue to improve circulation options for vehicles attempting to travel north or south through the city. This roadway extension would also increase the access to and from the downtown area. With this extension, the City would then be able to extend 2nd Street to intersect with Park Avenue to the north of SH 13. These extensions would provide more access and better circulation to and from the downtown area by providing drivers with more options within the existing street network.

Goals and Objectives

An implementation plan was developed for improvements that met the project goals and objectives. The goal for the project is:

> To develop a positive and unique identity for the Rifle Central Business District which promotes economic vitality, and to evaluate ways to incorporate this image into improvements on US 6 and SH 13, which projects this local identity onto the regional highways.

In order to achieve the project goal, the project team developed a list of objectives that would help in the evaluation of the developed alternatives. The list of objectives was refined based on input from stakeholders and the public.

Data Collection

To complete the analysis and development of alternatives, data collection efforts were completed during the early stages of the study. The data collection efforts for this project included: topographic survey, ownership mapping and right of way (ROW), environmental scan and site assessment, geotechnical investigation, traffic data, utility investigation and downtown street assessment.

Preliminary Traffic Engineering

Improvements to the SH 13/US 6/Railroad Avenue intersection would result in changes to the surrounding roadway system. In order to identify those changes, data on existing traffic operations were collected, an existing operations analysis was completed, and an analysis of future traffic operations for the study area was completed for a series of alternatives, including a no-action alternative. The analysis includes an assessment of how well each alternative can handle projected future traffic volumes.

The traffic analysis for this study included: an evaluation of the existing (2009) traffic conditions, evaluation of the future (2035) traffic conditions under a no-action alternative, preliminary screening of conceptual corridor alternatives to develop refined concept alternatives for further analysis, and evaluation of the refined concept alternatives under future traffic conditions compared to the No-Action Alternative.

Alternative Development: SH 13/US 6 Corridor and Park Avenue Alternatives

Conceptual alternatives were developed to address City goals such as promoting new downtown development toward the Colorado River, creating an extension of 1st Street to the west (Centennial Parkway) that has an urban street design and feel, and for future sustainability by addressing future traffic volumes for the year 2035.

Nine SH 13/US 6 conceptual corridor alternatives were developed. Based on results of the preliminary screening, four alternatives were carried forward for additional analysis. Alternative C was not recommended to be carried forward based on screening; however, it was viewed as a concept that addressed many of the City's goals and objectives. The alternatives carried forward were further refined and Alternative C was refined into two separate alternatives: Alternatives C1 and C2. A detailed screening was performed on Alternatives B1, B2, C1, C2, E, and H. Based on the results of the detailed screening, Alternative C2 was identified as the alternative that best achieved the project goals and objectives. The estimated probable cost to implement Alternative C2 is approximately $11,200,000.

Recommended Corridor Conceptual Alternative: Alternative C2

Alternatives for the extensions of Park Avenue and 2nd Street were developed by reviewing previous studies completed in the project area and gathering information from the technical team. Eight alternatives were reviewed during the study. Four alternatives (Alternatives B, D, E and F) were carried forward for further consideration. Based on further analysis, Alternative B is recommended due to its ability to minimize structure size, facilitate surrounding development, and compatibility with existing surrounding concepts for the downtown environment. The estimated probable cost to implement the Park Avenue Extension is approximately $1,330,000.

Recommended Park Avenue Alternative: Alternative B1

Because larger funding amounts are more difficult to secure, phased packaging options are important to consider. Phased options should be coordinated with CDOT and the design engineer to ensure viability. Estimated probable costs, based on 2010 unit pricing, shown below include construction items, percentages, and design and construction engineering. Packaging options and a potential sequence of construction projects for the SH 13/US 6 recommended alternative could include:

- *Phase 1.* Implement minimal safety improvements.
  - Reduce SH 13 to one-lane southbound, south of US 6, to allow a dedicated acceleration lane from southbound Whiteriver Avenue to southbound SH 13. The estimated probable cost of Phase 1 is $150,000.
- *Phase 2.* Construct the eastern portion of the alternative from and including Railroad Avenue as shown in Figure 59.
  - This option would begin to implement the one-way couplet concept between Railroad Avenue and the roundabout. SH 13/Centennial Parkway west of Railroad Avenue would remain in a similar configuration as existing, one-lane in each direction.
  - The gateway features at the roundabout could also be in this option.
  - Phase 2, based on the conceptual costs developed for the entire alternative, is anticipated to cost approximately $5,800,000. A detailed cost estimate is shown in Table 42.
  - Additional options for Phase 2 that construct the roundabout and plan for ultimate conditions can be considered.
- *Phase 3.* Construct West Avenue south to the relocated SH 13 eastbound one-way. The estimated probable cost for Phase 3 is $1,300,000.
- *Phase 4.* Construct Park Avenue south to existing SH 13. The estimated probable cost of Phase 4 is $1,327,500 (from Table 39).
- *Phase 5.* Construct Park Avenue south to relocated SH 13 eastbound one-way and complete the one-way couplet. The estimated probable cost for Phase 5 is $4,300,000.

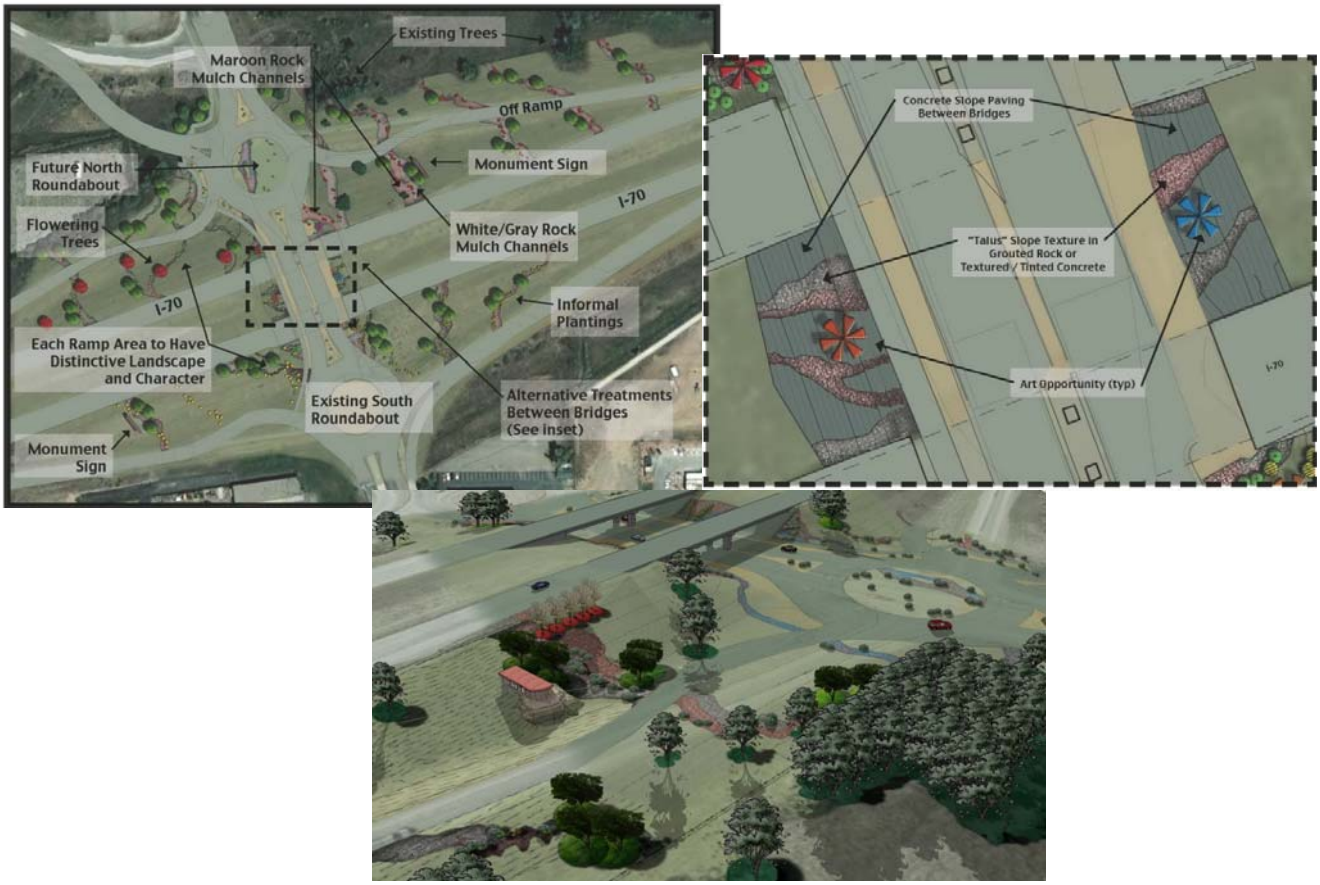
In the future, it may be beneficial for the City to implement Alternative G (north-south one-way pairs). Implementation of Alternative G will likely require a comprehensive public outreach campaign to convert existing north-south streets to one-ways. The City should anticipate performing a traffic study to determine the most optimal streets to convert to pairs. It is anticipated that north-south one-way pairs may be necessary in or around year 2033 based on current traffic modeling. If no improvements are made, as discussed previously, Alternative G would need to be implemented sooner. The estimated probable cost of Alternative G is approximately $2,500,000 to $3,500,000. This estimated cost includes traffic signals, roadway improvements, signing, striping, and design and construction engineering costs. An in-depth traffic analysis would be needed to determine the appropriate one-way roadway pair combination and required lane configurations. The implementation of Alternative G is highly dependent on traffic growth and alternative regional routes that may be constructed.

Alternative Development: Gateways, I-70 Entrance/Exit Ramps, and Downtown Streetscapes

One of the key areas of focus for the Rifle Gateway design process is to create a strong landscape statement at the principal intersection for the reconfigured SH 13/US 6. The gateway at the primary intersection will welcome visitors to Rifle and establish a landscape character for the new roadway system. Three concepts were established using public input for the theme and character. The concept that gathered the most public support features a stone outcrop entry monument with naturalized plantings. The estimated probable cost to implement the gateway concept is approximately $600,000, and is included in the Alternative C2 costs.

Recommended Gateway Alternative

Three alternatives were developed for the landscape surrounding Rifle's I-70 entrance and exit ramps. Each alternative includes an entry monument, which would be seen from I-70 and the entrance/exit ramps, and landscape enhancements that create a sense of entry for Rifle.



Recommended I-70 Entrance and Exit Ramp Landscaping

During the public input process, stakeholders and residents were asked to identify the landscape character for the gateway that was most consistent with their vision of Rifle. The clear consensus was to keep the gateway and I-70 entrance/exit ramp landscape character simple, with low water use plants and grasses. All concepts developed for the I-70 entrance/exit ramps followed this directive and were inspired by Rifle's varied but prominent landscapes. The "Talus Slope" concept was selected as the preferred concept. The estimated probable cost to implement the I-70 entrance and exit ramp landscaping concept is approximately $1,570,000.

The scope and scale of the downtown streetscape improvements were primarily established during the public involvement process. This included focus groups with downtown stakeholders, comments received during the open houses, and staff comments from the design charrette. Potential street improvements were then established and divided into six categories, or zones, each with a different level of finish. The estimated probable costs to implement the zones are approximately:

- Zone A – $361,000 (each intersection)
- Zone A-1 – $161,000 (each half block)
- Zone B – $480,000 (each half block)
- Zone R – $68,000 (each intersection)
- Zone CE – see gateway alternative

The next steps after completion of this study are to begin advanced planning and design of these areas. Funding programming should begin to secure internal City and external sources.

Recommended Streetscape Zones and Level of Finish

1.0 INTRODUCTION

The City of Rifle (City), in cooperation with the Colorado Department of Transportation (CDOT), Region 3, has developed alternatives and intends to proceed with preliminary design for improvements to pedestrian paths, streets, and highways and streetscapes that form the principal gateways to downtown. The City also will develop plans for exceptional gateways to the Rifle Central Business District. The intent of this project is to identify potential roadway and pathway alternatives for the City, leading north from Interstate 70 (I-70) and east to west along United States Highway 6 (US 6), and to assess the potential effects of the proposed alternatives.

In addition, the City wishes to extend Park Avenue south from 3rd Street to intersect with State Highway 13 (SH 13) west of West Avenue to improve circulation options for vehicles attempting to travel north or south through the city. This roadway extension would also increase the access to and from the downtown area. With this extension, the City would then be able to extend 2nd Street from its current terminus at West Avenue, to intersect with Park Avenue to the north of SH 13. These extensions would provide more access and better circulation to and from the downtown area by providing drivers with more options within the existing street network.

The overall project has been phased into two steps: (Step 1) conceptual corridor alternatives development and (Step 2) preliminary design (60 percent) of the recommended corridor alternative. This study is Step 1 of the overall project with the intent of identifying a recommended alternative(s) for the different project elements.

This report discusses the following procedures and results of the conceptual corridor alternatives development:

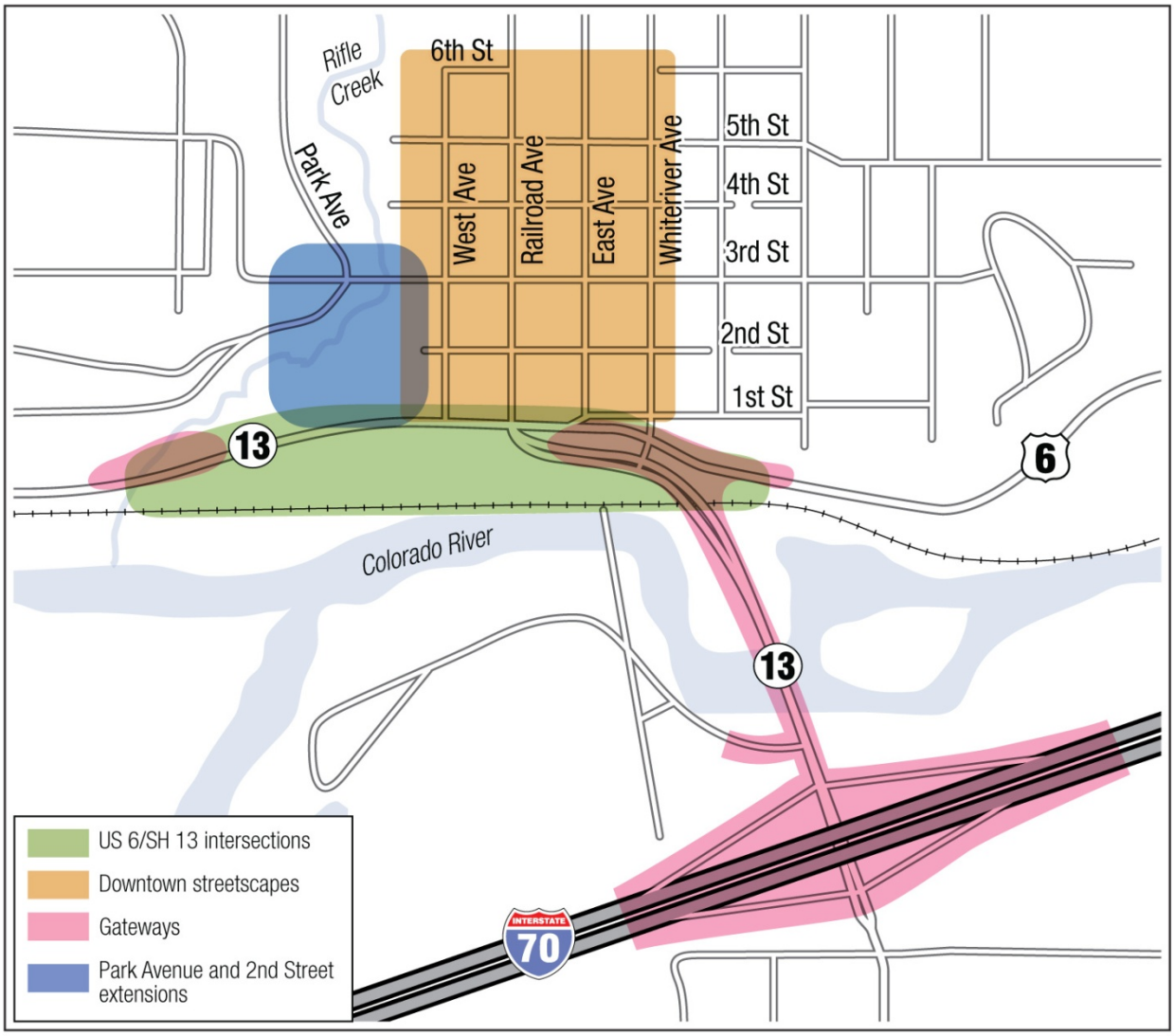
- Study area
- Project goals and objectives
- Data collection
- Preliminary traffic engineering
- Conceptual alternative development and preliminary screening
- Conceptual alternative refinement and detailed screening
- Downtown streetscape alternative development and screening
- Gateway alternative development and screening
- Cost estimates for construction
- Park Avenue extension alternative development and analysis
- Public involvement
- Implementation plan, including construction phasing options
- Next steps (including preliminary design)

2.0 STUDY AREA

The study area is separated into four core areas within the project boundaries for alternatives development, as shown in Figure 1:

- Intersections of SH 13, US 6 (Centennial Parkway), Railroad Avenue, 1st Street, West Avenue, East Avenue, and Whiteriver Avenue
- Downtown streetscapes from 1st Street to 6th Street and from Whiteriver Avenue to West Avenue
- Gateways from the south (SH 13), east (US 6), west (SH 13), and I-70 ramps
- Park Avenue extension over Rifle Creek to SH 13 and 2nd Street extension to Park Avenue

Figure 1
Overall Project Map



3.0 PROJECT GOALS AND OBJECTIVES

Ultimately, the project will develop an implementation plan for improvements that meet the project goals and objectives. The goal for the project is:

> To develop a positive and unique identity for the Rifle Central Business District which promotes economic vitality, and to evaluate ways to incorporate this image into improvements on US 6, SH 13, and the gateways into the City in order to project this local identity onto the regional highways.

In order to achieve the project goal, the project team (consultant and stakeholders) developed a list of objectives that would help in the evaluation of the developed alternatives. The list of objectives was refined based on input from stakeholders and the public. The following objectives were identified for the Rifle Gateway project:

- Create a distinctive gateway design welcoming residents and visitors to the city and Central Business District
- Accommodate future traffic volumes and mobility needs for 2035
- Incorporate well-conceived urban design principles
- Encourage pedestrian use through safe and convenient facilities
- Create an urban character for the US 6 and SH 13 (Centennial Parkway) corridor
- Develop traffic circulation patterns that complement the downtown environment
- Encourage regional truck traffic to use SH 13 in west Rifle
- Extend Park Avenue to Centennial Parkway (SH 13)
- Evaluate the extension of 2nd Street to Park Avenue
- Improve the safety and traffic operations of the SH 13/US 6 intersection
- Retain the functionality of the park and ride near Centennial Parkway and West Avenue
- Evaluate Centennial Parkway corridor concepts that promote development/redevelopment
- Incorporate context sensitive solutions guidelines and principles
- Minimize and avoid impacts to the social, physical, and natural environment
- Develop an affordable and effective implementation plan

4.0 DATA COLLECTION

To complete the analysis and development of alternatives, data collection efforts were completed during the early stages of the study. Because the project included possible improvements to state and federal highways, it was necessary to approach the project assuming the project may lead to the need to complete a National Environmental Policy Act (NEPA) of 1969 environmental document such as an environmental impact statement or an environmental assessment. The data collection efforts were approached in such a way that data from this study would be sufficient to carry over into a possible NEPA process that may result from the ultimate selection of a recommended alternative.

The data collection efforts for this project were:

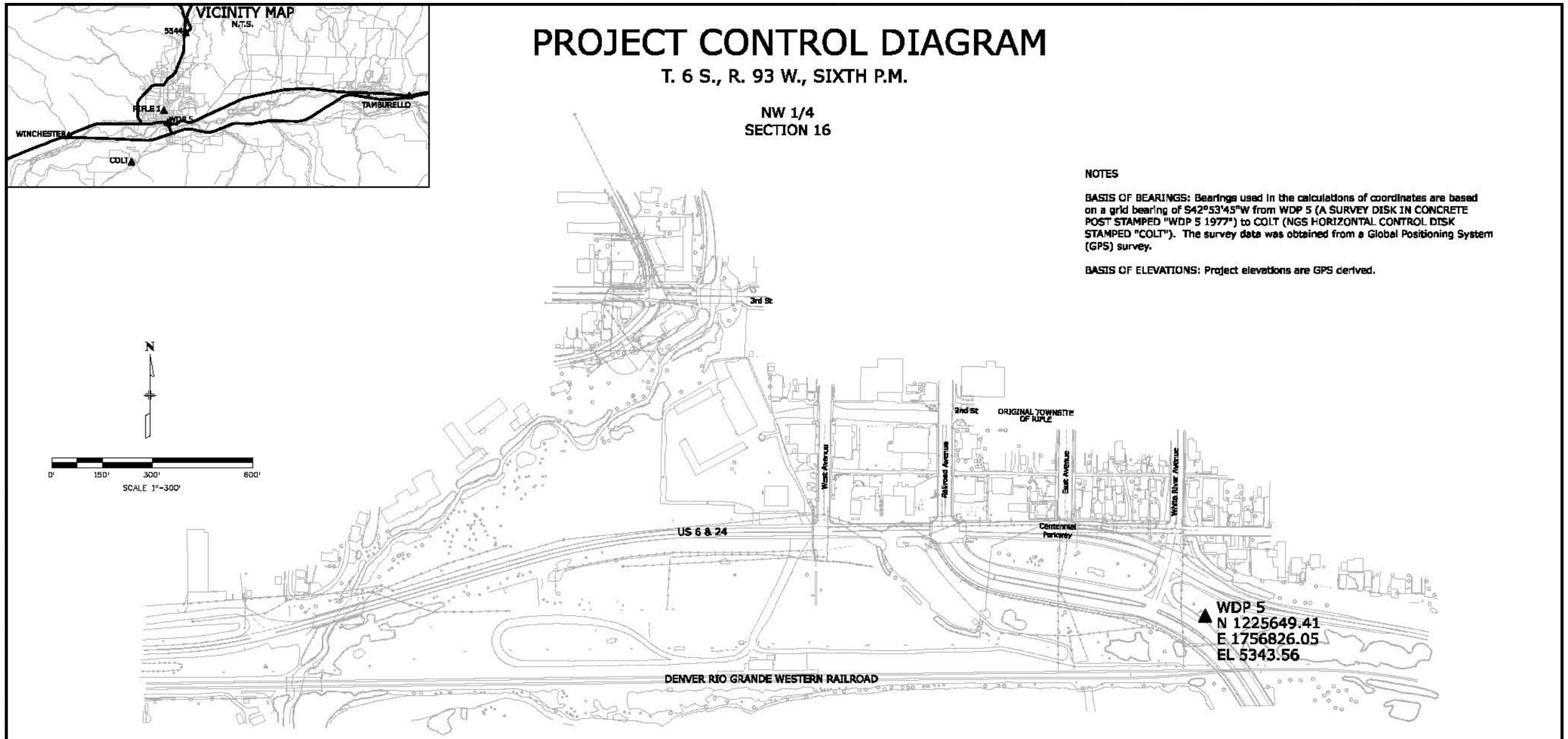
- Topographic survey
- Ownership mapping and right of way (ROW)
- Environmental scan and site assessment
- Geotechnical investigation
- Traffic data
- Utility investigation
- Downtown street assessment

4.1 SURVEY AND OWNERSHIP MAPPING

The project area was surveyed using aerial mapping/photography and was supplemented with field survey. The base map's features included existing roadways, curb and gutter, sidewalks, signs, grade breaks, drainage features, creeks, utilities, structures, property pins, and monumentations, as shown in Figure 2. The aerial imagery along with the base mapping was used to develop the conceptual alternatives. The aerial images were also an asset for the public involvement requirements of the project.

Figure 3 is an ownership map was developed for the project area. Assessor maps, deeds, and recorded plats from the City were referenced to produce the ownership map. The ownership information was used to determine ROW impacts for each alternative. A larger plot of the existing conditions survey and ownership mapping is included in Appendix A.

Figure 2
Project Control Diagram



NOTES

BASIS OF BEARINGS: Bearings used in the calculations of coordinates are based on a grid bearing of S42°53'45"W from WDP 5 (A SURVEY DISK IN CONCRETE POST STAMPED "WDP 5 1977") to COLT (NGS HORIZONTAL CONTROL DISK STAMPED "COLT"). The survey data was obtained from a Global Positioning System (GPS) survey.

BASIS OF ELEVATIONS: Project elevations are GPS derived.

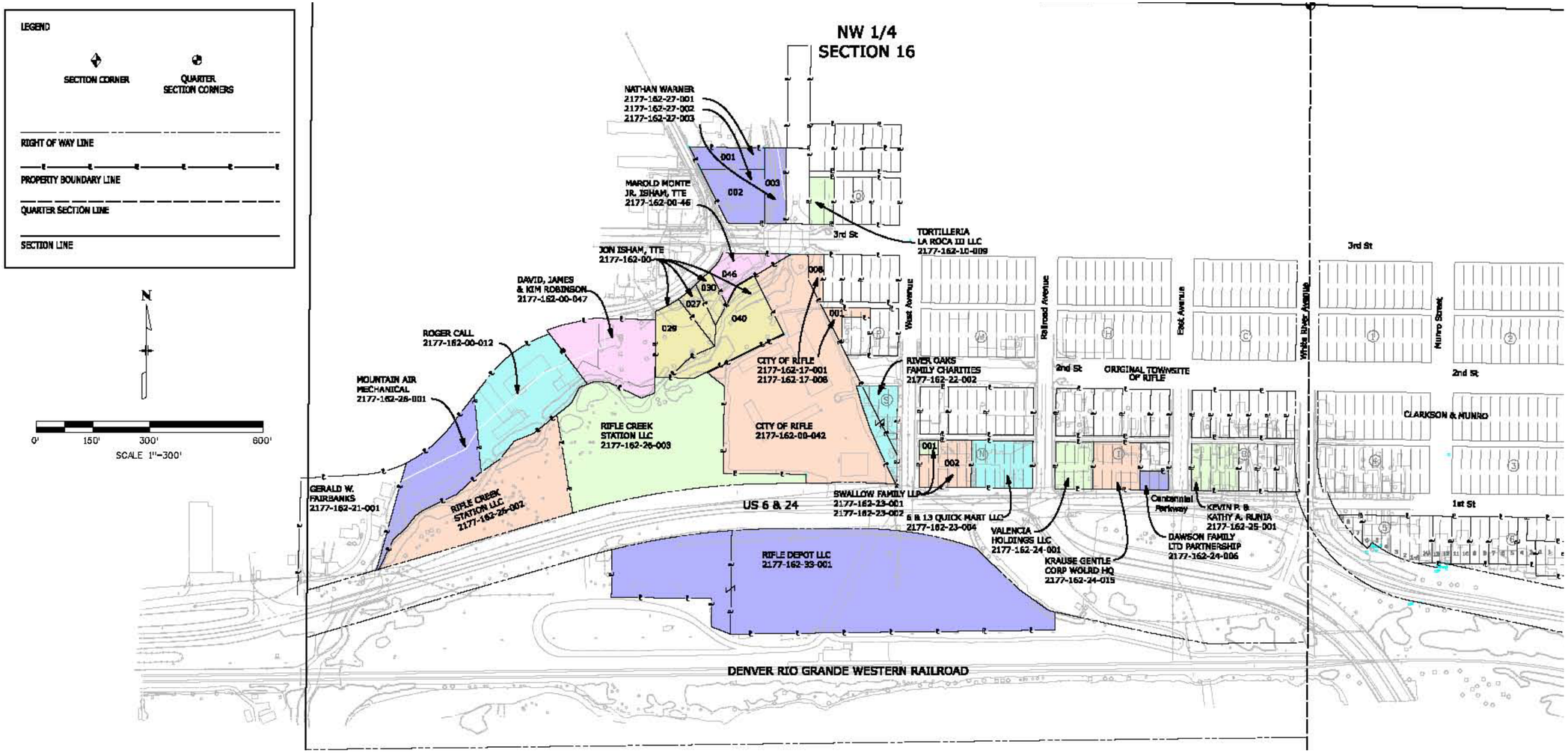
POINT	MODIFIED PROJECT CONTROL NORTHING (GROUND)	EASTING (GROUND)	ELEVATION	LATITUDE	LONGITUDE	ELLIPSOID HEIGHT	CODE
5544	1241735.66'	1760018.56'	5546.22'	39°34'24.34501"N	107°46'14.12140"W	5496.34'	USGS BENCH MARK DISK STAMPED "5544"
TAMBURELLO	1230468.65'	1800095.65'	5452.66'	39°32'42.63794"N	107°37'39.21871"W	5403.36'	NGS HORIZONTAL CONTROL DISK STAMPED "TAMBURELLO 1996"
RIFLE 1	1227780.35'	1756106.33'	5348.80'	39°32'05.53312"N	107°46'59.57646"W	5298.51'	BENCH MARK DISK STAMPED "RIFLE NO 1 1934"
WDP 5	1225649.41'	1756826.05'	5343.56'	39°31'44.66330"N	107°46'49.71306"W	5293.25'	SURVEY DISK IN CONCRETE POST STAMPED "WDP 5 1977"
COLT	1218592.97'	1750269.72'	5650.91'	39°30'33.32895"N	107°48'11.05739"W	5600.52'	NGS HORIZONTAL CONTROL DISK STAMPED "COLT 1996"
WINCHESTER	1223282.37'	1739059.04'	5305.53'	39°31'16.81594"N	107°50'35.55157"W	5255.15'	NGS STAINLESS STEEL ROD IN SLEEVE STAMPED "WINCHESTER 1996"

SURVEYOR STATEMENT (PROJECT CONTROL DIAGRAM)

I,_Christopher R. Raml___, a professional land surveyor licensed in the State of Colorado, do hereby state to the Colorado Department of Transportation this Project Control Diagram was prepared and the field survey it represents was performed under my responsible charge and, based upon my knowledge, information and belief is in accordance with applicable standards of practice defined by Colorado Department of Transportation publications. This statement is not a guaranty or warranty, either expressed or implied.

PLS No. Date

Figure 3
Ownership Map



4.2 ENVIRONMENTAL SCAN AND SITE ASSESSMENT

An environmental overview was conducted to provide a summary of existing environmental conditions in the Rifle Gateway study area. The overview was developed through a site visit, existing resource data, and consultation with resource agencies. Resource agencies consulted were the City, Colorado Division of Wildlife (CDOW), the U.S. Fish and Wildlife Service (FWS), the U.S. Census, and the Colorado National Heritage Program (CNHP).

The analysis conducted to complete this environmental overview may not be sufficient in meeting NEPA clearance requirements, nor does it provide a detailed account of all resources present in the study area or impacts that may occur. The overview is provided to show the critical resources and locations where impacts should be avoided and minimized. Critical resources in the project area are special status species, wetlands and floodplains, historic sites, and hazardous materials. Additional information on each of these resources is included in the following subsections. The resource information was also used during the screening analysis to help identify a recommended alternative. Additional resource analysis may be required as part of any necessary environmental clearances and permits when this project moves forward into preliminary and final design.

4.2.1 Special Status Species

Special status species are those listed or are candidates for listing by FWS as threatened or endangered under the Endangered Species Act of 1973. The types of special status species under consideration in the project area are:

- Federal Endangered Species – any species that is in danger of extinction throughout all or significant portions of its range (16 United States Code [USC] §1531-1543).
- Federal Threatened Species – any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (16 USC §1531-1543).
- Federal Candidate for Listing – species for which FWS has sufficient information on their biological status and threats to propose them as endangered or threatened under Endangered Species Act, but for which development of a proposed listing regulation is precluded by other higher priority listing activities (16 USC §1531-1543).

Species that are known to occur or have potential to occur in the study area are listed in Table 1. The Colorado River, floodplain, and riparian areas adjacent to the Colorado River and Rifle Creek provide potential habitat for six species of the 11 species listed for Garfield County. The habitat requirements, obtained from CDOW, CNHP, or the Natural Diversity Information Source (NDIS), for these six species with potential to occur in the study area are summarized following Table 1.

Table 1
Endangered, Threatened, Proposed, and Candidate Species
Potentially Occurring in the Study Area

Common Name	Scientific Name	Status	Is Habitat Present?
Bonytail	*Gila elegans*	E	Yes
Canada lynx	*Lynx canadensis*	T	No
Colorado pikeminnow©	*Ptychocheilus lucius*	E	Yes
DeBeque phacelia	*Phacelia submutica*	C	No
Humpback chub	*Gila cypha*	E	Yes
Mexican spotted owl	*Strix occidentalis lucida*	T	No
Parachute beardtongue	*Penstemon debilis*	C	No
Razorback sucker©	*Xyrauchen texanus*	E	Yes
Unita Basin hookless cactus	*Sclerocactus glaucus*	T	No
Ute ladies'-tresses orchid	*Spiranthes diluvialis*	T	Yes
Yellow-billed cuckoo	*Coccyzus americanus*	C	Yes

Source: FWS, 2008
Notes: © = There is designated critical habitat for the species in Garfield County
E = Endangered
T = Threatened
C = Candidate

Bonytail (fish) – The bonytail is listed as endangered in Garfield County. Bonytails prefer pools and eddies, not swift currents.

Canada lynx (mammal) – The Canada lynx is listed as threatened in Garfield County. Habitat for the Canada lynx is not present in the study area.

Colorado pikeminnow (fish) – The Colorado pikeminnow is listed as endangered in Garfield County. Colorado pikeminnows prefer swift flowing muddy rivers with quiet, warm backwaters.

DeBeque phacelia (plant) – The DeBeque phacelia is a candidate for listing in Garfield County. Habitat for DeBeque phacelia is not present in the study area.

Humpback chub (fish) – The Humpback chub is listed as endangered in Garfield County. Humback chubs prefer eddies and pools, not swift currents.

Mexican spotted owl (bird) – The Mexican spotted owl is listed as threatened in Garfield County. Habitat for the Mexican spotted owl is not present in the study area.

Parachute beardtongue (plant) – The Parachute beardtongue is a candidate for listing in Garfield County. Habitat for the Parachute beardtongue is not present in the study area.

Razorback sucker (fish) – The Razorback sucker is listed as endangered in Garfield County. Razorback suckers prefer water depths of 4 to 10 feet, swift currents, and backwaters.

Unita Basin hookless cactus (plant) – The Unita Basin hookless cactus is listed as threatened in Garfield County. Habitat for Unita Basin hookless cactus is not present in the study area.

Ute ladies'-tresses orchid (plant) – The Ute ladies'-tresses orchid is listed as threatened in Garfield County. Ute ladies'-tresses orchids occur on sub-irrigated alluvial soils along streams and in open meadows in floodplains.

Yellow-billed cuckoo (bird) – The yellow-billed cuckoo is listed as a candidate species in Garfield County. Yellow-billed cuckoos prefer lowland riparian forests and urban areas with tall trees.

4.2.2 Wetlands and Floodplains

Section 404 of the Federal Water Pollution Control Act amendments of 1972 as amended by the Clean Water Act of 1977 is the primary vehicle for wetland protection and regulation in the United States. The Clean Water Act of 1977 set the basic structure for regulating discharge of pollutants to waters of the United States. Section 404 of the Clean Water Act established a program to regulate the discharge of dredged and fill material into waters of the United States, including wetlands. Anyone dredging or filling waters of the United States must request a permit from the U.S. Army Corps of Engineers (USACE).

Wetlands are specifically defined as areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetland boundaries are delineated by the presence of hydrophytic vegetation and soil in addition to the presence of hydrological indicators (USACE, 1999).

Floodplains are determined by applying both of the sciences of hydrology and hydraulics. The floodplain determines what areas are inundated for various storm events, and in the study area consist of Federal Emergency Management Agency (FEMA) regulated floodplains and non-FEMA regulated floodplains. FEMA regulates floodplains and the cost of damage that occurs from them through the National Flood Insurance Program. This program was created through the National Flood Insurance Act of 1968 and further strengthened by the Flood Disaster Protection Act of 1973. The storm event that FEMA regulates to is the 100-year storm event. There are specific conditions that must be applied, specific models that must be used, and paperwork that must be completed to enact changes to FEMA regulated floodplains. Minimum floodplain management requirements for participation in the National Flood Insurance Program are in 44 Code of Federal Regulations §60.3. The non-FEMA regulated floodplains, such as the urban flooding areas in downtown Denver, have fewer restrictions on them; however, they are no less important. Design for these flooding areas should reduce the risk of flood loss; minimize the effect of floods on human safety, health, and welfare; and should restore and preserve any natural and beneficial values served by the floodplain.

Within the study area, the Rifle Creek floodplain may be affected by the alternatives.

4.2.3 Historic and Cultural Resources

Historic resources are standing architectural and engineering features such as buildings, dams, canals, bridges, roads, railroads, and other structures of historic or aesthetic significance. Architectural resources generally must be more than 50 years old to be considered for protection under existing historic resource laws. However, more recent structures may warrant protection if

they have the potential to gain significance in the future. National Register of Historic Places (NRHP) listed or eligible historic properties are protected under Section 106 of the National Historic Preservation Act of 1966. Only significant historic resources warrant consideration with regard to adverse effects resulting from a preferred alternative. Significant historic resources are either eligible for, or listed on, the NRHP.

Based on preliminary analysis, 240 potentially historic sites are in the Rifle Gateway project area and surrounding areas. The report was generated for Township 6S, Range 93W, 6th PM and Sections 8 to 9 and 16 to 17. As the project alternatives were further refined, the project area lies entirely within Section 16. A formal consultation with the Colorado State Historic Preservation Office is required to confirm specific properties that are eligible for listing on the NRHP. Twelve potential sites are in the immediate project area and will need to be reviewed during preliminary and final design.

Historic properties are also protected under the U.S. Department of Transportation Act of 1966, commonly known as Section 4(f). This Act mandates that a use of land from such properties cannot be approved for transportation improvements, unless it can be demonstrated that there is no other prudent and feasible alternatives to using that land and the action includes all planning to minimize harm to the property.

4.2.4 Hazardous Materials

Implementation of a transportation project may result in effects on hazardous materials due to past land uses and documented and undocumented releases. Identified known releases are primarily from leaking underground storage tanks (LUSTs) that contain gasoline, diesel, waste oil, or other fuel products. Other identified known releases are from hazardous substances associated with past land uses, and the use and storage of hazardous waste. Resulting soil and groundwater contaminants commonly include petroleum products such as fuels and oils, chlorinated solvents, and metals. The investigation and cleanup of hazardous materials sites are subject to several state and federal environmental laws:

- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980.
- Superfund Amendments and Reauthorization Act of 1986.
- Resource Conservation and Recovery Act (RCRA) of 1976.
- Federal Hazardous and Solid Waste Amendments.
- Colorado Voluntary Clean-up and Redevelopment Act of 1994.
- Section 5.5.1 (A) of the Colorado Solid Waste Regulations pertaining to asbestos in soil.

A modified environmental site assessment (MESA) was performed for the study area in August 2009, with an addendum was issued in October 2009. The purpose of the MESA is to identify recognized environmental conditions, based on readily available data, that might impact proposed roadway improvements. The MESA is included as Appendix B. For the purpose of the study, “environmental conditions” was defined as “the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater or surface water of the property” (American Society for Testing and Materials, 2005).

As part of the compilation of this report, the following items were completed:

- Review of readily available historic land use documentation
- Analysis of relevant published geologic, hydrogeologic, and soil information
- Review of the Environmental Data Resources, Inc. (EDR) report that documents their database search of available government records within the identified search area
- Review of existing site conditions

The records review identified the following sites:

- Three sites identified in the federal Resource Conservation and Recovery Act (RCRA) database as conditionally exempt small quantity generators
- Three sites identified as RCRA Non-Generators in the RCRAInfo database
- Five sites reported in the Federal Emergency Response Notification System, Hazardous Materials Incident Report System, and Colorado Emergency Response Notification System databases
- Fourteen LUST sites
- Six State Trust Fund (LUST TRUST) database sites
- Nineteen underground storage tank sites
- Five above-ground storage tank sites
- One site on the Federal Insecticide, Fungicide and Rodenticide Act/Toxic Substances Control Act Tracking System (FTTS) list and Federal Insecticide, Fungicide and Rodenticide Act/Toxic Substances Control Act Administrative Case Listing (HIST FTTS) list
- Seventeen sites listed under the facility index system database
- Two dry cleaner sites
- Six asbestos sites

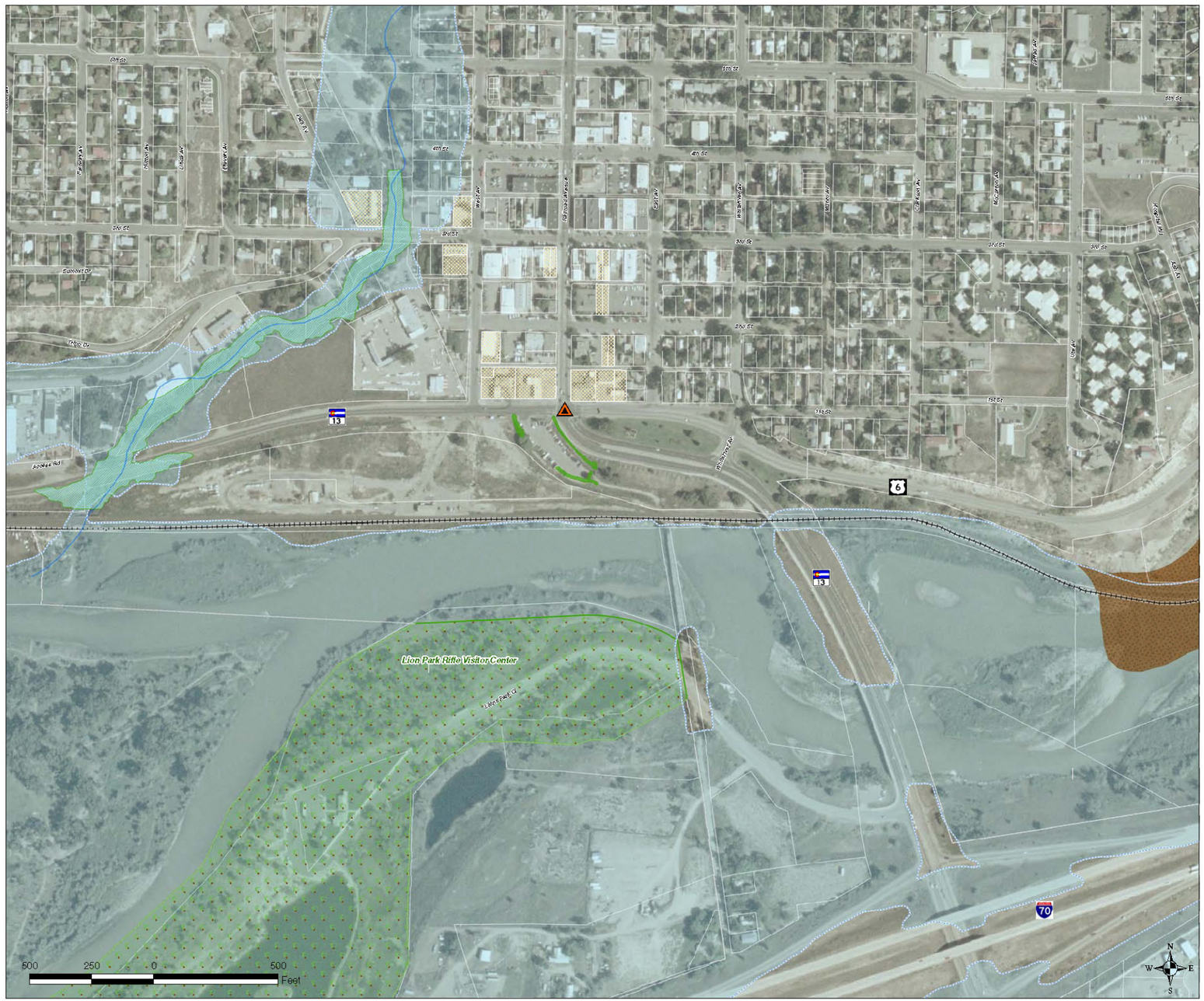
The addendum to the MESA revealed a new LUST incident and 14 additional sites to be added to the orphan listing (list of facilities that cannot be mapped due to poor or inadequate address information). The most notable additions were a Uranium Mill Tailings Remedial Action site related to the uranium and vanadium tailing repositories that were identified in the MESA and three sites located on Union Pacific Railroad (UPRR) property. The UPRR property was researched through the Colorado Department of Public Health and Environment (CDPHE). A "No Action Determination Approval" letter was issued by CDPHE in October 1999 for the property and is included in Appendix D of the MESA addendum.

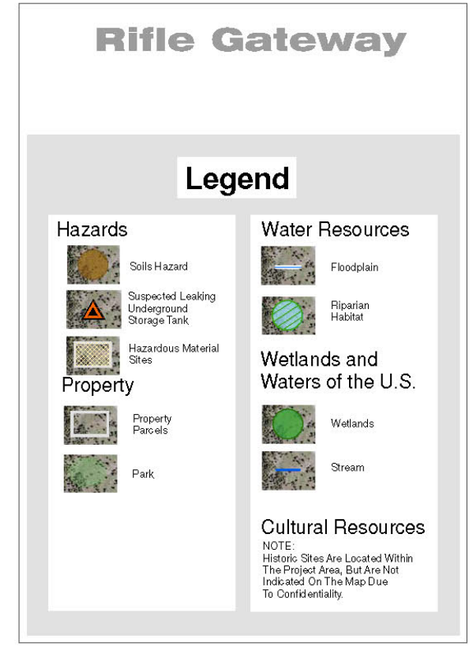
Based on the findings, no recognized hazardous material sites were identified that impact or may impact the proposed project, with the exception of the UPRR property. There may be residual radioactive contamination on the UPRR property because no documentation was found of the removal of the remaining radioactive contamination following July 1999. It is recommended that a radiological survey of the UPRR property be performed before proceeding with the next phase of this project, unless documentation of the removal can be obtained from UPRR.

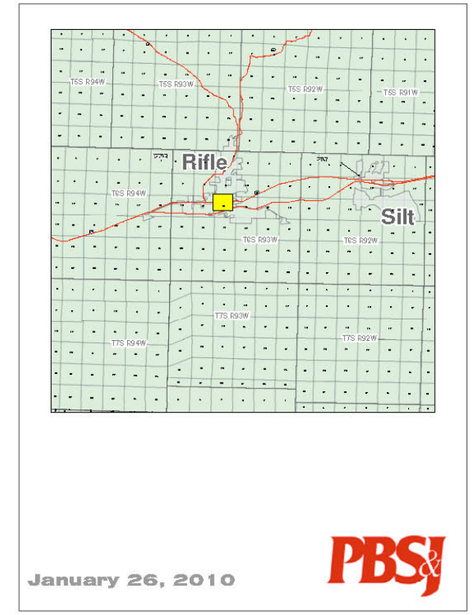
4.2.5 Parklands and Recreation

Existing and proposed parks and recreation facilities include regional bicycle/pedestrian trails, open space corridors, and neighborhood/community parks and recreation centers. These existing and planned facilities are important resources, highly valued by local governments and community members. Existing parks and recreation facilities are shown in Figure 4.

Figure 4
Environmental Conditions







This page intentionally left blank.

4.3 GEOTECHNICAL INVESTIGATION

A geotechnical investigation was performed for the project area in August 2009. The field investigation consisted of drilling two exploratory borings to investigate foundation conditions for the proposed Park Avenue bridge over Rifle Creek and nine exploratory borings to investigate pavement subgrade materials along the existing SH 13/US 6 roadway.

Results of the field and laboratory tests were used to develop recommendations for bridge foundations and pavement design. Both hot mix asphalt and concrete pavement options were evaluated. A separate document was prepared to discuss the recommendations in detail, which is in Appendix C.

4.4 TRAFFIC COUNTS

Traffic data, such as daily traffic volumes, heavy vehicle percentages, and peak hour turning movement counts, necessary to complete all analyses were collected in January 2009. CDOT performed a traffic crash and safety analysis for the study area in 2009 and provided the results to the project team. Details about the traffic data collection efforts are provided in Chapter 5.0, Preliminary Traffic Engineering.

4.5 UTILITY INVESTIGATION

Utilities were mapped in conjunction with survey mapping; the boundary of the utility investigation was limited to the existing SH 13/US 6 ROW. Existing subsurface gas, telephone, fiber optic, water, and electric lines were located. Storm and sanitary lines were also located including above-ground features such as manholes and inlets. Aerial electric lines were located as well.

The investigation did not include potholing or determining inverts of the storm and sanitary lines. Further analysis will be required in the preliminary design phase.

4.6 EXISTING LIGHTING CONDITIONS

A field survey was completed to assess the existing lighting conditions for the proposed project area; however, electrical service equipment was not inventoried. Electrical design and engineering of the street lights is to be furnished by Xcel Energy under the terms of the existing franchise agreement.

4.6.1 I-70 Interchange

Cobra Head Style Luminaire

The lighting assemblies most commonly used to illuminate the intersections and ramps associated with the interchange are utilitarian in character and provide good general illumination for safe driving. The luminaire and pole assembly is affordable and has many features that simplify maintenance.

The “cobra head” style luminaire is equipped with an integral unitized ballast, tool-less entry, Type III distribution, and a hydro-formed reflector. The luminaire is classified as full cutoff and is furnished with a flat glass lens. The lamp source is 250-Watt (W) high-pressure sodium mounted on a dark bronze 40-foot tall tapered steel pole.

4.6.2 Intersection Area (Gateway/2nd Street)

Hockey Puck Style Luminaire

The curvilinear “hockey puck” luminaire assembly is currently in use in the city and will provide illumination to the Gateway/2nd Street area. This luminaire has a more neutral aesthetic appearance, which makes it ideal as a parking or roadway luminaire in an urban context. The internal reflector assembly is much more efficient than the often used utilitarian luminaires, allowing greater spacing and reducing equipment. The round housing easily integrates with contemporary architecture.

The hockey puck style luminaire is equipped with integral unitized ballast, tool-less entry, Type III distribution, and a segmented reflector. The luminaire is classified as full cutoff and is furnished with a flat glass lens. The lamp source is 250-W high pressure sodium mounted on a dark bronze 40-foot tall tapered steel pole.

4.6.3 Historic Downtown Core

The historic downtown core uses two types of luminaire assemblies: “acorn” style pedestrian and “teardrop” style intersection.

Acorn Style Pedestrian Assembly

The pedestrian post top luminaire that is located in this area is well suited in any historic neighborhood or along main street. This luminaire is currently used along Railroad Avenue, 3rd Street, and other locations throughout the city. Many traditional style luminaires are now equipped with modern conveniences and advanced technologies including light emitting diode

(LED) sources. This blend of historic aesthetic and modern performance helps municipalities resolve a variety of seemingly opposing concerns and priorities.

The acorn style luminaire is equipped with integral unitized ballast, tool-less entry, Type III or symmetrical distribution with ultraviolet stabilized acrylic prismatic refractor globe. The current lamp source is 100-W high pressure sodium, though some of the luminaires have been retrofitted with 50-W LEDs at a color temperature of 3000 Kelvin (K) (by comparison, high pressure sodium lamps have a color temperature of 2700 K). The luminaire is mounted on a black 12-foot tall straight, aluminum pole with a decorative base cover.

Acorn Style Luminaire

Teardrop Style Intersection Assembly

Teardrop Style Luminaire

The lighting assembly used at intersections throughout downtown is well-suited for this application with one important exception. While the "teardrop" lens is suggestive of historic lamps, the luminaire is not compliant with Colorado's Dark-Sky Statute. This luminaire, however, can be modified in various ways (such as a flat glass lens) that would bring it into compliance. This luminaire is currently used along Railroad Avenue, 3rd Street, and locations throughout the city. Many traditional style luminaires are now equipped with modern conveniences and advanced technologies including LED sources. This blend of historic aesthetic and modern performance helps municipalities resolve a variety of seemingly opposing concerns and priorities.

The teardrop style luminaire is equipped with integral unitized ballast, tool-less entry, Type III or symmetrical distribution with ultraviolet stabilized acrylic prismatic refractor globe. The current lamp source is 250-W high pressure sodium. High pressure sodium lamps have a color temperature of 2700 K. The luminaire is mounted on a 5-foot arm that is attached to a 30-foot round tapered steel.

4.7 DOWNTOWN STREET SITE ANALYSIS

The existing conditions and function of the streets in the downtown portion of the project area were analyzed. This analysis of Rifle's downtown blocks focused on identifying the physical characteristics of each street and existing improvements that would need to be accounted for in a streetscape improvement plan. This analysis was used to determine where and how streetscape enhancements could be incorporated into downtown Rifle without adversely impacting residential uses, existing trees, vehicular circulation patterns, and parking.

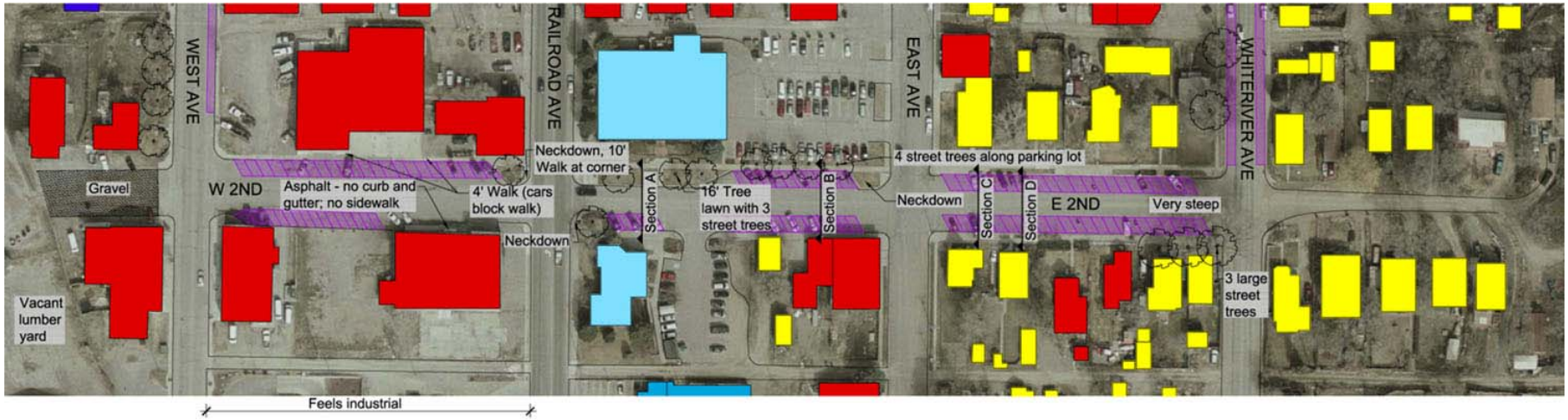
The findings of these site analyses are discussed in the following subsections.

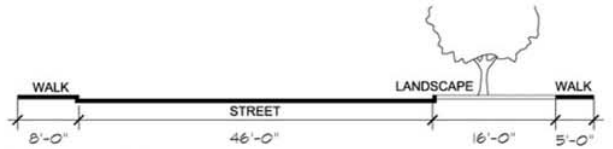
4.7.1 2nd Street

The following are the findings from the site analysis of 2nd Street, as shown in Figure 5:

- Primarily residential uses in two western blocks. There is a mix of pubic and commercial uses in the three blocks west of East Avenue.
- No overhead utility lines (located in alleys).
- No decorative street lights.
- Diagonal parking.
- Sidewalk condition ranges from no sidewalks (west end), to 4-feet wide, but obstructed by cars, to unobstructed and having a width between 3 and 10 feet.
- Existing neckdowns near the City Hall/Library block with 10-foot sidewalks.
- Some large street trees near City Hall and at the east end.
- Road is very steep on east end, east of Whiteriver Avenue.
- Decorative street lights found only at Railroad Avenue.
- In early 2010, the City plans to abandon the portion of 2nd Street between Whiteriver Avenue and East Avenue to allow the construction of a central plaza providing access to a parking garage, City Hall, and a new library.
- Handicap ramps do exist at street corners.
- During this study and subsequent to the data collection phase, the City undertook improvements to the downtown area including the addition of a parking structure, new library, and an expansion of City Hall. This has resulted in the portion of 2nd Street between Railroad Avenue and East Avenue being abandoned to allow for the improvements to take place.

Figure 5
2nd Street Site Analysis





Section A (NTS)

Section C (NTS)

Section B (NTS)

Section D (NTS)

GENERAL NOTES:
- Very little traffic
- No overhead powerlines
- No decorative street lights

Key:
- Single family housing
- Multi-family housing
- Commercial
- Office
- Public
- Service
- Church
- Angled Parking
- Parallel Parking

0' 100'
SCALE 1"=100'
NORTH

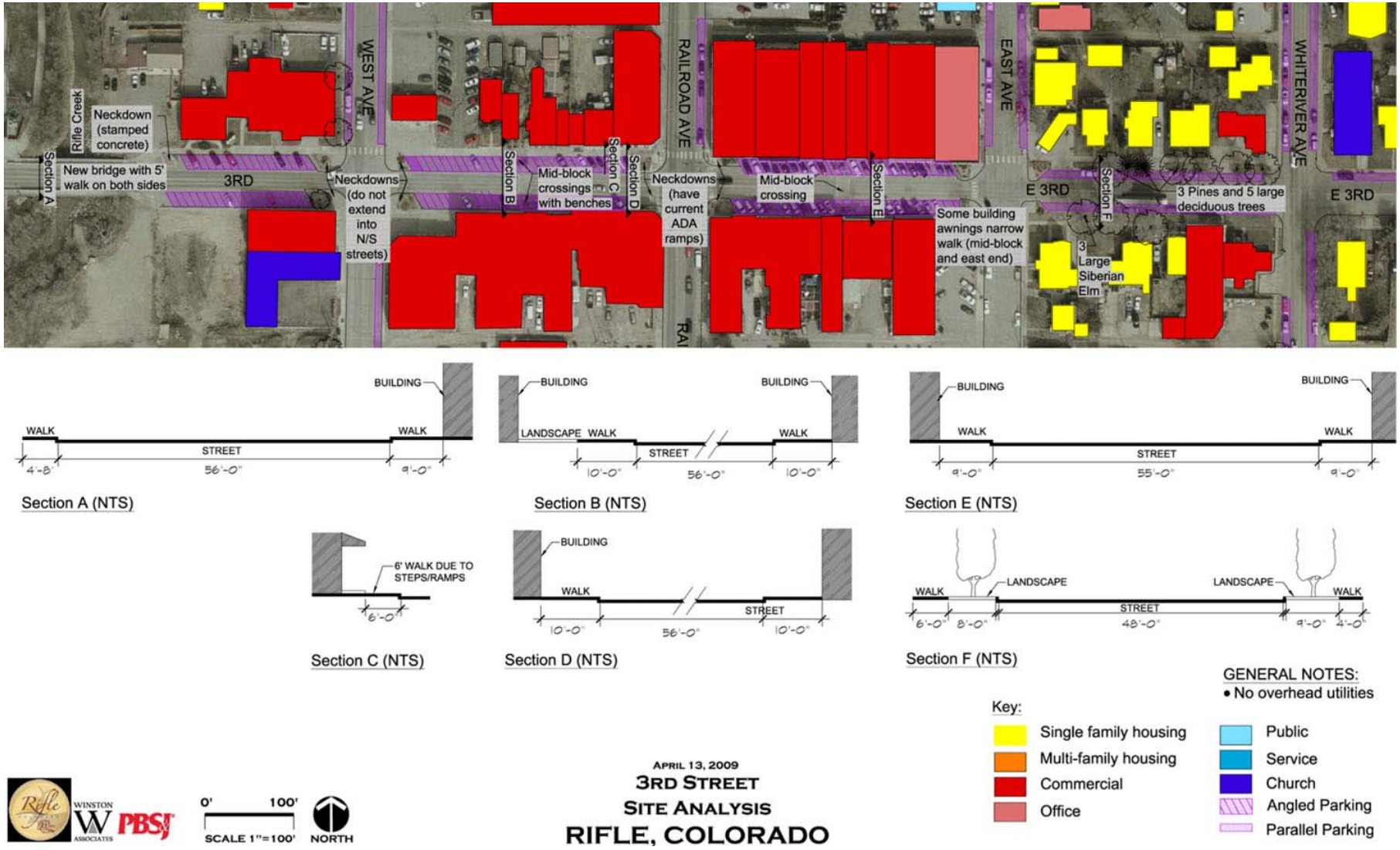
APRIL 13, 2009
2ND STREET
SITE ANALYSIS
RIFLE, COLORADO

4.7.2 3rd Street

The following are the findings from the site analysis of 3rd Street, as shown in Figure 6:

- Commercial uses in three western blocks and primarily residential in the eastern block.
- Highest level of streetscape character with shrub beds and unit pavers in neckdowns, site furnishings, and art.
- No overhead utility lines.
- Widened bridge with 5-foot walk on both sides and decorative street lights at both ends.
- Diagonal parking in three western blocks/parallel parking in the eastern block.
- Neckdowns at most corners.
- Two mid-block crossings in two central blocks.
- Nine healthy, mature trees between East Avenue and Whiteriver Avenue.
- Sidewalks are sometimes attached, sometimes detached, and range between widths of 4 (east block) and 10 feet (central two blocks).
- Some building awnings extend into sidewalk, narrowing usable sidewalk width (between Railroad Avenue and East Avenue).
- Decorative street lights for two blocks (between East and West avenues).

Figure 6
3rd Street Site Analysis

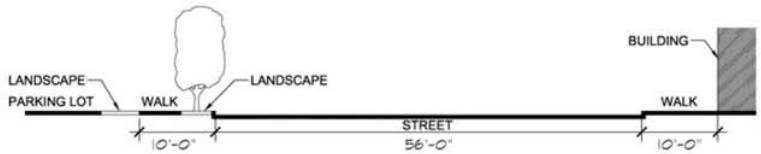


4.7.3 4th Street

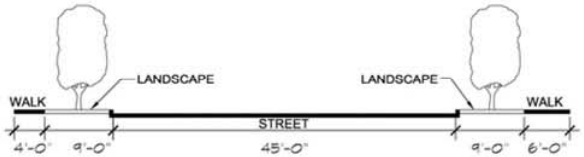
The following are the findings from the site analysis of 4th Street, as shown in Figure 7:

- A mix of commercial, office, public, church, and residential along the length of the street. Commercial/public focused in two central blocks.
- No overhead utility lines.
- Diagonal parking in two central blocks/parallel parking in the eastern block.
- Neckdown condition is 15-feet wide on north side of street and 6-feet wide on south side of street.
- Substantial number of trees: street trees in grates in two central blocks and five large Siberian elms, five small to medium honey locusts, and ornamental trees in the eastern block.
- Mid-block crossing with stamped concrete between Railroad and East avenues.
- Gravel roadway for westernmost block (west of West Avenue) with no sidewalks.
- Road is steep between East and Whiteriver avenues.
- Sidewalk width ranges between 4 and 9 feet.
- Decorative street lights for two blocks (between East and West avenues).

Figure 7
4th Street Site Analysis



Section A (NTS)



Section C (NTS)

Section B (NTS)

GENERAL NOTES:
- Decorative street lights between East and West Streets (2 blocks)
- No overhead powerlines
- Center lane stripe
- Neckdowns: 15' width north side of street/One 6' width south side of street

Key:
- Single family housing
- Multi-family housing
- Commercial
- Office
- Public
- Service
- Church
- Angled Parking
- Parallel Parking

0' 100'
SCALE 1"=100'
NORTH

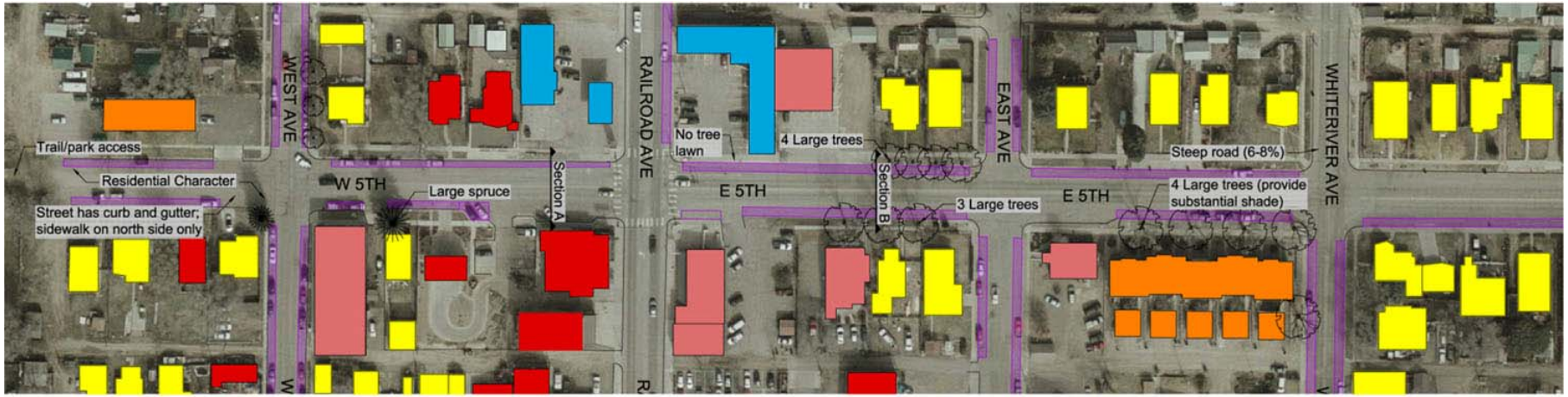
APRIL 13, 2009
4TH STREET
SITE ANALYSIS
RIFLE, COLORADO

4.7.4 5th Street

The following are the findings from the site analysis of 5th Street, as shown in Figure 8:

- A mix of commercial, office, service, multi-family, and residential uses along the length of the street.
- No overhead utility lines.
- Parallel parking.
- No neckdowns or mid-block crossings.
- Has the character of a downtown transition zone because of the parallel parking and wide mix of uses.
- Westernmost block has trail/park access and residential character.
- At least nine large, healthy trees on two eastern blocks. There is a mix of ornamental trees, large evergreen trees, and large shade trees in tree lawns west of Railroad Avenue.
- Sidewalk width ranges from 4 to 6 feet.
- No decorative street lights.

Figure 8
5th Street Site Analysis



Section A (NTS)

Section B (NTS)

GENERAL NOTES:
- Feels like a downtown transition zone with a mix of uses
- No overhead powerlines

Key:
- Single family housing
- Multi-family housing
- Commercial
- Office
- Public
- Service
- Church
- Angled Parking
- Parallel Parking

0' 100'
SCALE 1"=100'
NORTH

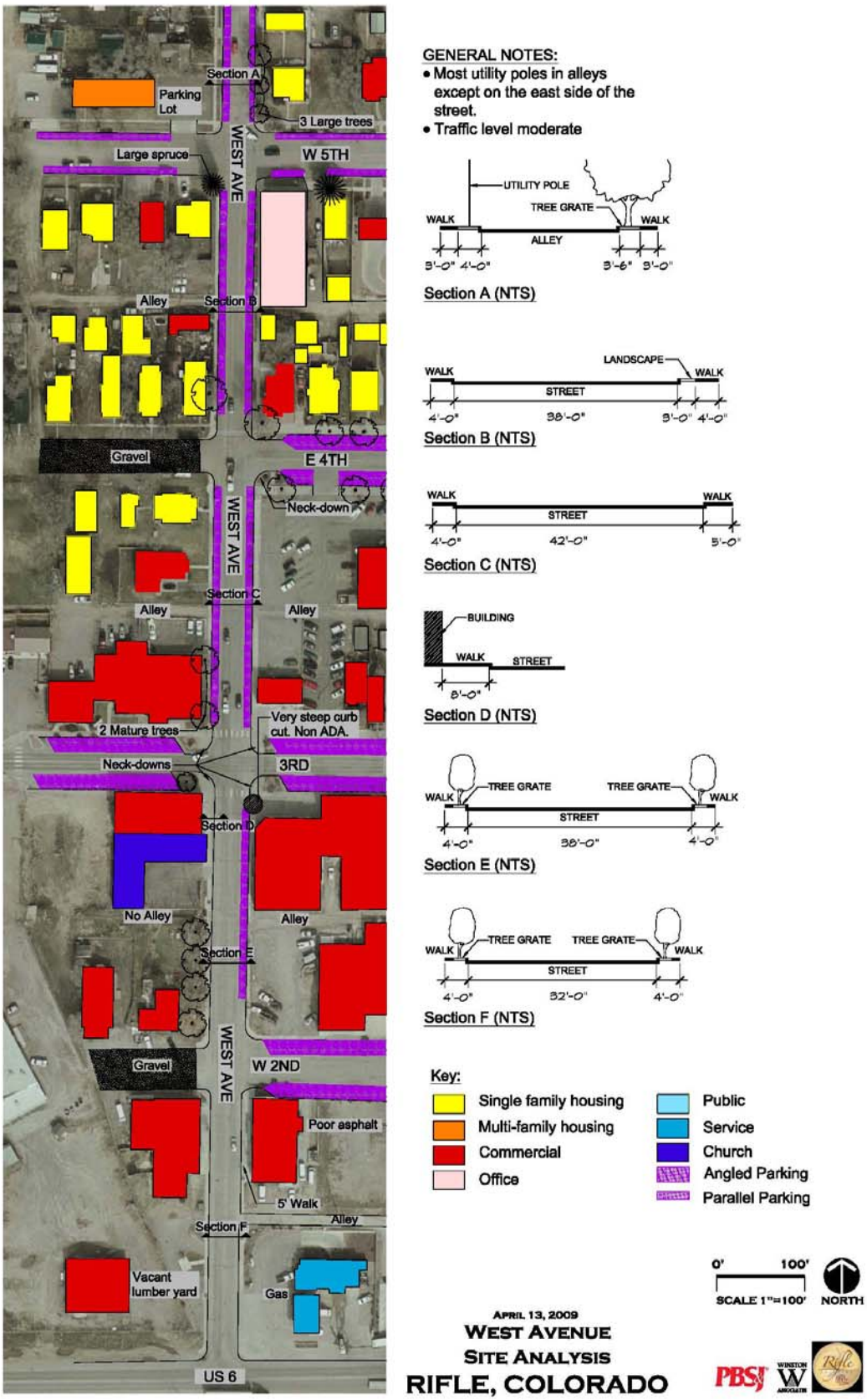
APRIL 13, 2009
5TH STREET
SITE ANALYSIS
RIFLE, COLORADO

4.7.5 West Avenue

The following are the findings from the site analysis of West Avenue, as shown in Figure 9:

- Commercial, church, and service uses in south half; a mix of commercial, residential, and office uses in north half.
- Overhead utility lines are in the mid-block, east-west alleys.
- Parallel parking on some parts of this street.
- Neckdowns occur at the 3rd Street intersection.
- Moderate number of mature trees, mostly on the north end; smaller street trees in grates on southern two blocks.
- Sidewalk width ranges from 3 to 5 feet.
- Decorative street lights between 3rd Street and SH 13/US 6.

Figure 9
West Avenue Site Analysis

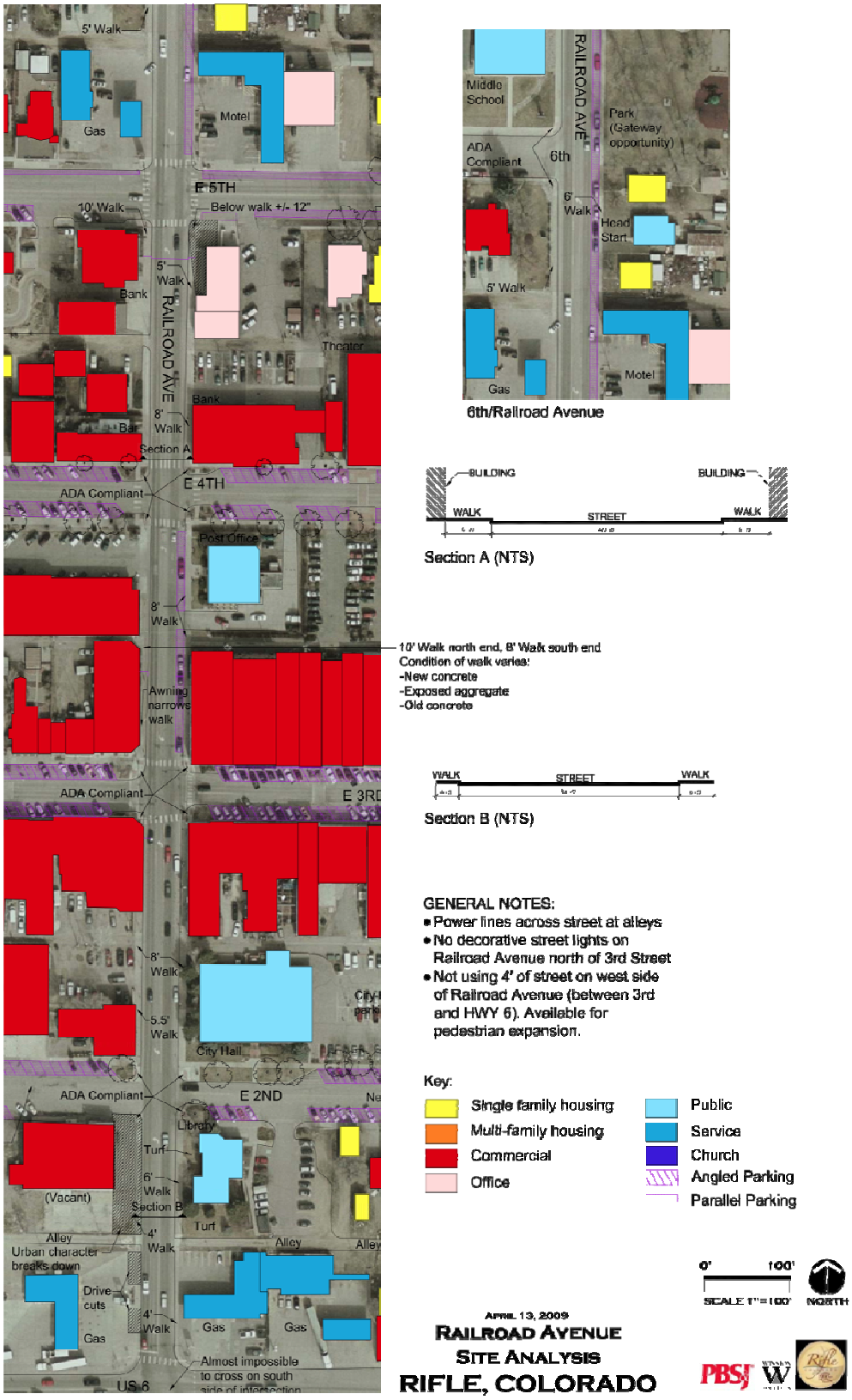


4.7.6 Railroad Avenue

The following are the findings from the site analysis of Railroad Avenue, as shown in Figure 10:

- Predominately commercial in three mid blocks. Public, service, and office uses on north and south ends.
- Overhead utility lines are in the mid-block, east-west alleys.
- Pedestrian crossing difficult at non-signalized intersections.
- Parallel parking, but generally limited to the east side of the two middle blocks.
- Not using 4 feet of street on the west side of Railroad Avenue (between 3rd and US 6); available for increasing sidewalk width.
- Neckdowns occur at 2nd, 3rd, and 4th Street intersections, all with handicap ramps.
- No street trees on Railroad Avenue; the trees in lawn area of the library will be removed as part of the library and parking garage construction.
- Sidewalk width ranges from 4 to 8 feet, but building awnings reduce sidewalk width between East 4th and East 3rd streets.
- Decorative street lights between 3rd Street and SH 13/US 6.

Figure 10
Railroad Avenue Site Analysis

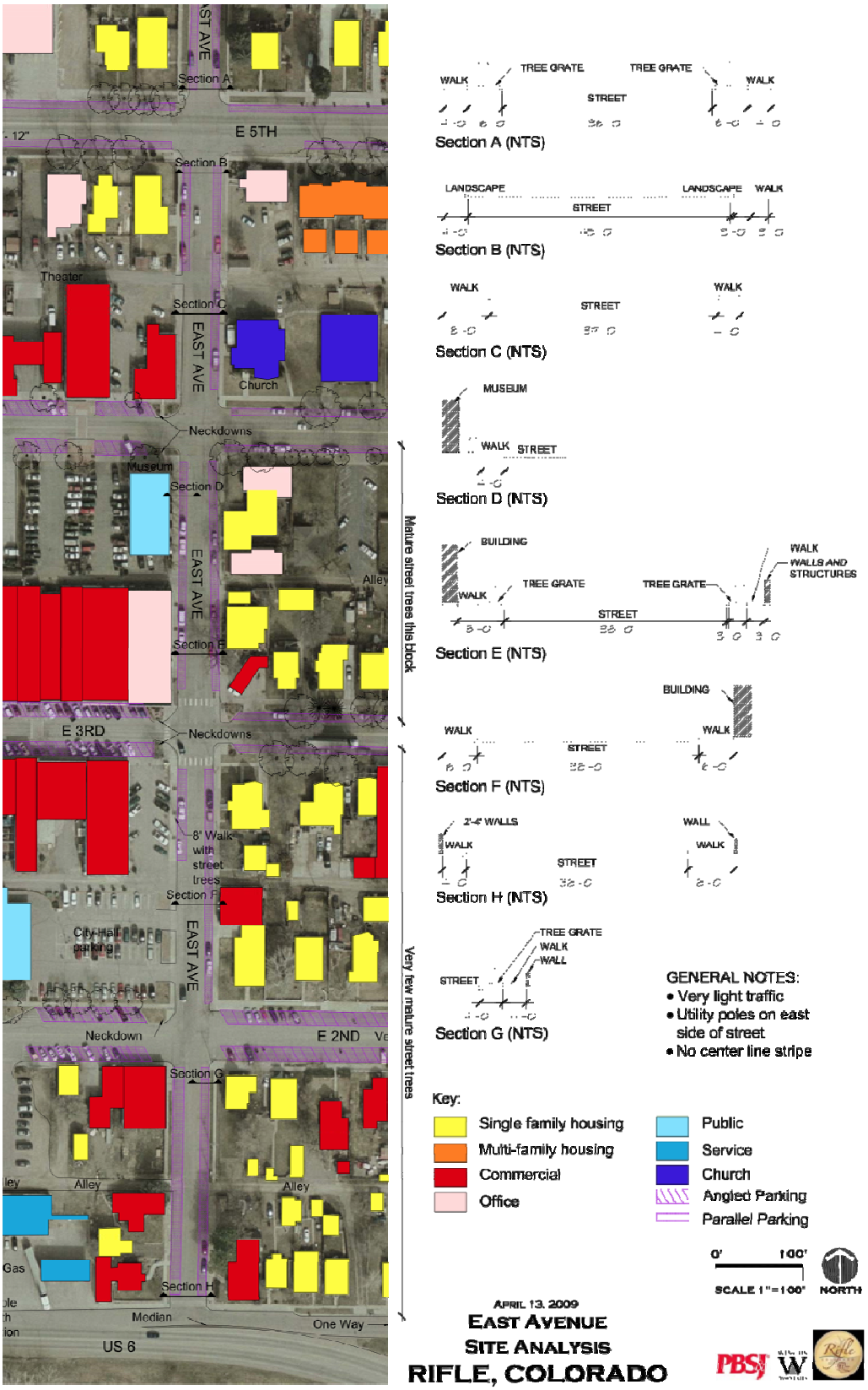


4.7.7 East Avenue

The following are the findings from the site analysis of East Avenue, as shown in Figure 11:

- Southern three blocks are primarily residential uses on the east side and commercial fronting the west side of street. A mix of commercial, public, office, and church uses in northernmost block.
- Overhead utility poles/lines on east side of street.
- Sidewalk width ranges from 3 to 8 feet.
- Parallel parking along length of street.
- Retaining walls adjacent to back of walk in southernmost block.
- Trees in grates between 2nd and 3rd streets, large street trees on the east side between 3rd and 4th streets (some pruned for power lines), line of honey locust adjacent to museum (south of 4th Street), and no street trees between 4th and 5th streets.
- Decorative street lights in neckdowns at the intersections of 3rd and 4th streets.

Figure 11
East Avenue Site Analysis

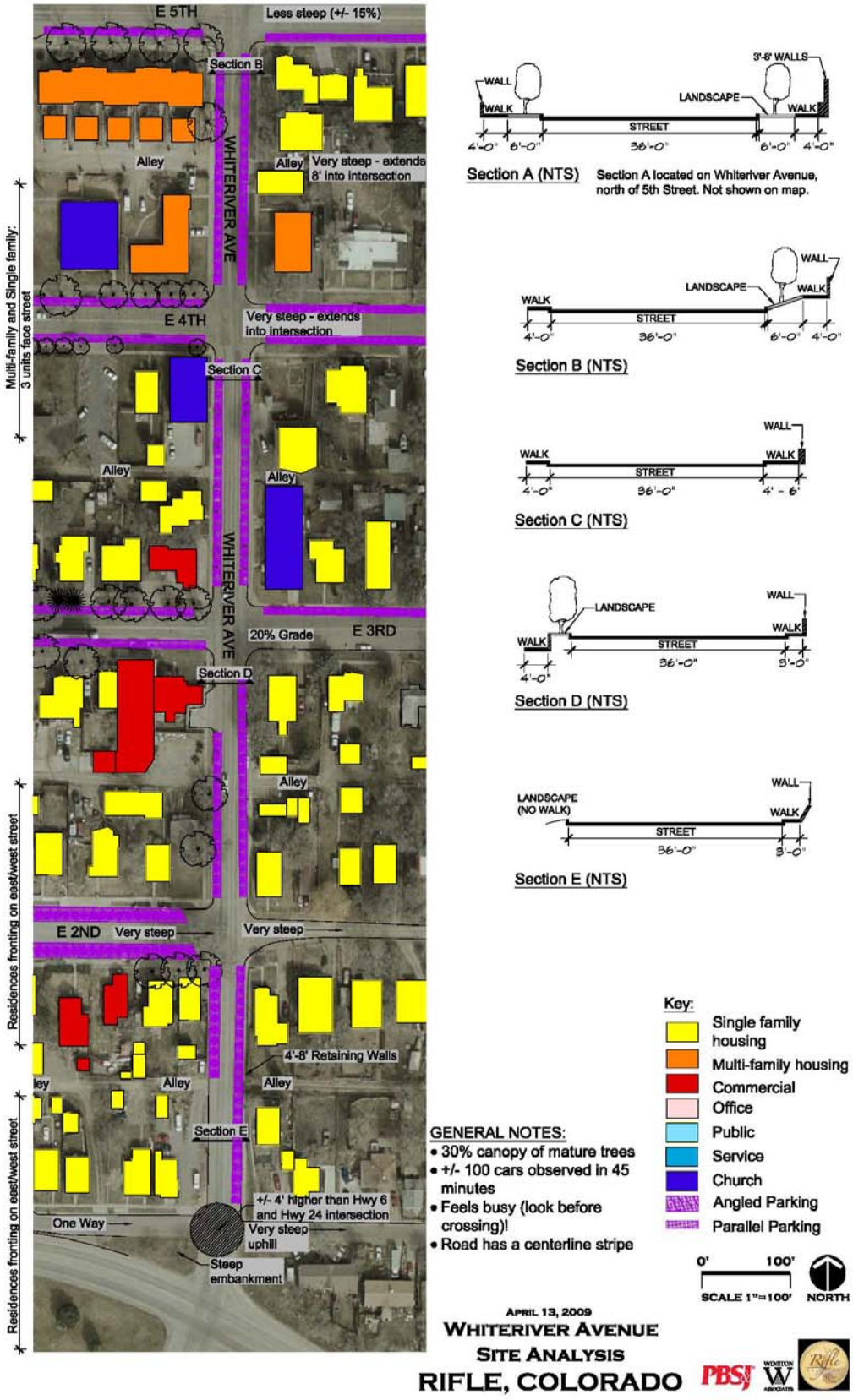


4.7.8 Whiteriver Avenue

The following are the findings from the site analysis of Whiteriver Avenue, shown in Figure 12:

- Predominantly residential along length of street (single and multi family) with three commercial/church uses at 3rd Street.
- There is a 30 percent canopy of mature trees along length of street.
- Overhead utility lines are in the mid-block, east-west alleys.
- Steep section of roadway just north of US 6 and at intersections of all east-west streets and Whiteriver Avenue (generally on the east side of street).
- Parallel parking along length of street.
- Retaining walls (3 to 8 feet high) adjacent to back of walk along east side of street.
- No decorative street lights; cobra head lights at intersections.

Figure 12
Whiteriver Avenue Site Analysis



5.0 PRELIMINARY TRAFFIC ENGINEERING

Improvements to the SH 13/US 6/Railroad Avenue intersection would result in changes to the surrounding roadway system. In order to identify those changes, data on existing traffic operations were collected, an existing operations analysis was completed, and an analysis of future traffic operations for the study area was completed for a series of alternatives, including a no-action alternative. The analysis includes an assessment of how well each alternative can handle projected future traffic volumes.

The traffic analysis for this study included the following steps:

- Step 1 evaluated the existing (2009) traffic conditions.
- Step 2 evaluated the future (2035) traffic conditions under a no-action alternative.
- Step 3 involved the preliminary screening of a series of conceptual corridor alternatives to develop a list of refined concept alternatives for further analysis.
- Step 4 involved evaluating the refined concept alternatives under future (2035) traffic conditions and comparing the results to the No-Action Alternative.

Step 1 analysis included identification of current traffic operations at the critical intersections in the vicinity of the SH 13/US 6/Railroad Avenue intersection. The analysis also included a review of accident data and level of service (LOS) during the AM/PM peak periods.

In Step 2, the traffic operations of the critical intersections were evaluated under projected 2035 traffic volumes assuming no changes to the roadway system (no-action). The results of the evaluation provide the benchmark to compare the refined concept alternatives in Step 4.

Step 3 conducted a preliminary evaluation of a series of conceptual alternatives for roadway and intersection improvements. The preliminary analysis, which was more qualitative than quantitative, focused on identification of how well each alternative could accommodate future traffic volumes before the alternative would begin to experience operational failures and would need further mitigation. The goal of Step 3 was to screen out as many of the conceptual alternatives as possible and identify a list of alternatives to complete more detailed traffic analyses.

Step 4 completed a more in-depth traffic operations analysis on the list of refined concept alternatives identified in Step 3. The results of the more in-depth analysis, which were more quantitative than qualitative, were compared to the No-Action Alternative and to the other alternatives to determine impacts and benefits. The goal of Step 4 was to identify a recommended alternative(s) for improving traffic operations in the study area.

While the overall project area is large and stretches from I-70 in the south to 6th Street in the north, the study limits for the traffic operations analysis are narrower in nature. The study limits for the traffic analysis focus primarily on the intersection of SH 13/US 6/Railroad Avenue and the immediate intersection to the east and west of this location. Generally, the study area limits are the bridge on SH 13 that passes over the Colorado River (southern limit), 3rd Street (northern limit), Whiteriver Avenue (eastern limit), and the bridge over Rifle Creek (western limit). Figure 13 shows the study limits considered for the traffic operational analyses.

The critical intersections in the study area are:

- US 6/Whiteriver Avenue
- US 6/East Avenue
- SH 13/US 6/Railroad Avenue
- SH 13/West Avenue
- SH 13/Whiteriver Avenue
- 1st Street/Whiteriver Avenue

Figure 13
Traffic Operational Analyses Study Area

5.1 APPLICABLE GUIDANCE AND ANALYSIS TOOLS

Several analysis tools were used in analyzing existing and future traffic conditions in the study area.

5.1.1 Highway Capacity Manual 2000

The *Highway Capacity Manual* (Transportation Research Board, 2000) served as the basis for traffic operations analysis. The manual was developed by the Transportation Research Board with the intent of providing a consistent, systematic, and simple method for evaluating the capacity and LOS of the various components of a roadway network. The *Highway Capacity Manual* does not establish policy for acceptable capacity or LOS, but focuses on providing up-to-date methodologies and results from ongoing research.

Traffic engineers most commonly use LOS to measure traffic operations of freeway segments, freeway ramps and ramp junctions, surface streets, and intersections. LOS is an operational analysis rating system, with service levels affected by several variables including speed, delay, travel time, and freedom to maneuver. There are six levels of LOS ranging from “A” to “F” (see Table 2 for descriptions of each LOS). LOS A is defined as being ideal flow conditions with little or no delays. LOS F is defined as conditions where extreme delays are encountered.

LOS at signalized intersections is based on the overall seconds of average stop delay per vehicle (sec/veh) at the intersection. Each approach to the intersection experiences delay based on the amount of green time provided for that approach. The delay per vehicle for each approach is averaged to provide an overall average delay. As delay increases, the LOS decreases (from A to F). Individual movements may experience a worse LOS than the overall LOS.

Unsignalized intersections are broken into two categories: all-way stop controlled and two-way stop controlled. All-way stop controlled intersections use the average total delay of the intersection to determine LOS. Two-way stop controlled intersection LOS analysis does not report an overall delay, rather it reports the delay for each approach separately with the intersection LOS determined by the approach with the highest delay. The reason the LOS analysis of two-way stop controlled intersections does not report overall delay is that the uncontrolled movements experience very little delay and an average of uncontrolled delays with controlled delays does not provide an accurate depiction of intersection operations. Table 3 shows the LOS thresholds for signalized and unsignalized intersections.

Table 2
Basic Level of Service Descriptions

	LOS A. Represents the best operating conditions and is considered free flow. Individual users are virtually unaffected by the presence of others in the traffic stream.
	LOS B. Represents reasonably free flowing conditions with some influence by others.
	LOS C. Represents a constrained constant flow below speed limits, with additional attention required by drivers to maintain safe operations. Comfort level of the driver noticeably declines.
	LOS D. Represents traffic operations approaching unstable flow with high passing demand and limited passing capacity. Maneuverability of the driver is restricted. LOS D is an acceptable condition for urban arterial and collector roadways.
	LOS E. Represents unstable flow near capacity. LOS E often quickly changes to LOS F because of disturbances (road conditions, crashes, etc.) in traffic flow.
	LOS F. Represents the worst conditions with heavily congested flow and traffic demand exceeding capacity. LOS F is characterized by stop-and-go traffic, poor travel time, low comfort and convenience, and increased crash exposure.

Source: Highway Capacity Manual (Transportation Research Board, 2000)

Table 3
Level of Service for Intersections

LOS	Intersection Control Delay (sec/veh)		
	Signalized	Unsignalized	
		TWSC	AWSC
A	0 - 10	0 - 10	0 - 10
B	> 10 - 20	> 10 - 15	> 10 - 15
C	> 20 - 35	> 15 - 25	> 15 - 25
D	> 35 - 55	> 25 - 35	> 25 - 35
E	> 55 - 80	> 35 - 50	> 35 - 50
F	> 80	> 50	> 50

Source: Highway Capacity Manual (Transportation Research Board, 2000)
TWSC – Two-way stopped controlled intersection.
AWSC – All-way stopped controlled intersection.

5.1.2 Synchro Software

In order to analyze the existing conditions and future scenarios, Synchro software was used to analyze the capacity and performance of the roadways and intersections in the study area. In particular, Synchro was used to determine existing LOS for the unsignalized and signalized intersections in the study area. SimTraffic software, which is part of the Synchro traffic analysis package, was used to analyze additional measures of effectiveness when necessary.

5.1.3 RODEL Software

In order to analyze alternatives with roundabout intersection control in the future scenarios, RODEL software was used to determine LOS for the roundabouts and to determine basic design features of the roundabouts such as entry flare, deflection angle, and number of circulating lanes.

5.2 EXISTING (2009) CONDITIONS

An existing conditions operational analysis was performed to provide an understanding of the current study area conditions. This provided a comprehensive look at how the intersecting local streets operate and served as the baseline for analysis of the No-Action Alternative.

5.2.1 Roadway Characteristics

Existing roadway geometry was collected at the study intersections and along the roadways within the project limits to correctly set up the traffic analysis model. Roadway geometrics along with traffic volumes are essential for the determination of LOS. Figure 14 shows the existing type of laneage and traffic control in the study area.

Figure 14
Existing Roadway Characteristics

SH 13 is a four-lane divided highway that carries north-south traffic to and from the I-70 interchange south of the city. The intersection of SH 13/US 6/Railroad Avenue is signalized. South of the intersection with US 6/Railroad Avenue, SH 13 is consistent with a rural highway. At the intersection with US 6/Railroad Avenue, SH 13 turns to the west and travels approximately 1 mile to the west before turning to the north and passing around the northwest side of the city (also known as the SH 13 Bypass). SH 13 has a posted speed limit of 40 miles per hour (mph) on the portion that is south of Whiteriver Avenue, which changes to 25 mph between Whiteriver Avenue and US 6, and has a posted speed limit of 35 mph while traveling east-west through the study area between Railroad Avenue and the bridge over Rifle Creek.

US 6 is a regional highway that travels east-west in the project area between the SH 13/Railroad Avenue intersection and the eastern study limits of Whiteriver Avenue. US 6 continues to the east and west and provides connectivity with other communities such as the Town of Silt. US 6 is a two-lane undivided road in the project area with a posted speed limit of 35 mph.

The primary north-south local streets in Rifle that are included within the traffic analysis limits are West Avenue, Railroad Avenue, East Avenue, and Whiteriver Avenue. The only east-west local street in the study area is 1st Street between Whiteriver Avenue and US 6. First Street intersects with Whiteriver Avenue approximately 40 feet north of US 6, and has a posted speed limit of 25 mph. East of Whiteriver Avenue the roadway has one lane of travel in each direction, but to the west of the intersection, 1st Street is a one-way street, allowing westbound travel only.

West Avenue intersects with SH 13/US 6 as the north leg of a "T" intersection. SH 13/US 6 traffic is uncontrolled and traffic on West Avenue is controlled by a stop sign. The road has one lane of travel in each direction (north-south) with a posted speed limit of 25 mph, and provides access to multiple commercial and residential driveways.

Railroad Avenue is the north leg of the SH 13/US 6/Railroad Avenue intersection and is the primary north-south roadway through the city. The roadway has one travel lane in each direction, a shared left-turn lane, and a posted speed limit of 25 mph.

East Avenue intersects with 1st Street as the north leg of a "T" intersection. First Street traffic is uncontrolled and traffic on East Avenue is controlled by a stop sign. East Avenue has one lane of travel in each direction (north-south) with a posted speed of 25 mph, and provides access to multiple commercial and residential driveways. First Street is a one-way street allowing only westbound travel on both sides of the intersection with East Avenue.

Whiteriver Avenue intersects with US 6 approximately 40 feet south of the intersection with 1st Street. This intersection is stop controlled on the Whiteriver approaches and traffic on US 6 is uncontrolled. Whiteriver Avenue has one lane of travel in each direction (north-south) with a posted speed limit of 25 mph, and provides access to some commercial and many residential driveways. Located approximately 50 feet to the south of this intersection is the intersection of Whiteriver Avenue with SH 13. The intersection of Whiteriver Avenue and SH 13 is a "T" intersection, with Whiteriver Avenue being stop controlled. Whiteriver Avenue traffic can turn left or right onto SH 13, but only northbound right turns from SH 13 onto Whiteriver Avenue are allowed. The three intersections of SH 13/Whiteriver Avenue, US 6/Whiteriver Avenue, and Whiteriver Avenue/1st Street are located within a 100-foot distance along Whiteriver Avenue and have limited storage capability and other geometric challenges, such as limited site distance, both horizontal and vertical curves, and grades on most approaches.

First Street intersects with US 6 approximately 50 feet west of East Avenue, which is the terminus of 1st Street. The only movement allowed at this intersection is westbound 1st Street to westbound US 6. The intersection is basically a slip ramp entrance with traffic on US 6 being uncontrolled and traffic on westbound 1st Street being controlled by a yield sign. The geometry of this intersection is such that 1st Street intersects with the north side of US 6 and is parallel to US 6 at the point of the intersection.

The only signalized intersections within the study limits are SH 13/US 6/Railroad Avenue and Railroad Avenue/3rd Street. These signals are coordinated with other signals on Railroad Avenue, with the City having control of the signal at 3rd Street, but CDOT maintains control of the signal at SH 13/US 6/Railroad Avenue. Signal timing data for the intersections was provided by CDOT and the City. All other intersections in the study area are stop controlled.

5.2.2 Traffic Volumes and Travel Patterns

Traffic volume data was collected along the study area corridor and the local street system. The volume data included daily traffic volume counts, vehicle classification counts, and peak hour turning movement volumes at key intersections.

Average Daily Traffic

Average daily traffic volumes were collected in January 2009 at the following locations:

- SH 13 west of West Avenue
- SH 13 south of US 6
- Railroad Avenue north of SH 13/US 6
- US 6 east of Whiteriver Avenue

Based on these traffic counts, the average daily traffic volumes on SH 13 west of West Avenue are approximately 5,000 vehicles per day (vpd) combined eastbound and westbound. SH 13 south of US 6 has daily volumes of approximately 19,950 vpd. The daily traffic volume on Railroad Avenue north of US 6 is approximately 12,600 vpd. On US 6 east of Whiteriver Avenue, the average daily traffic is approximately 7,300 vpd.

Peak Period Travel Patterns

During the morning peak, traffic along SH 13/Railroad Avenue is slightly higher in the southbound direction both north and south of the intersection with US 6. Traffic during the morning peak hours on US 6 and SH 13 are evenly split between eastbound and westbound travel on either side of the Railroad Avenue intersection. During the evening peak, traffic along SH 13/Railroad Avenue is slightly higher in the northbound direction both north and south of the intersection with US 6. Traffic during the evening peak hours on US 6 and SH 13 is fairly evenly distributed in both directions on either side of the intersection with Railroad Avenue.

Peak Hour Turning Movement Volumes

Peak hour turning movement counts were collected in January 2009 as well. The counts were conducted during the morning peak period (7:00 a.m. to 9:00 a.m.) and the evening peak period (4:00 p.m. to 6:00 p.m.) of a typical weekday (Tuesday, Wednesday, or Thursday). Although the counts were completed in January, this time period was identified by City staff as being a typical month of the year (not the peak) that was felt to represent a typical day of the year. The counts were conducted at the following intersections in the study area:

- SH 13 and West Avenue
- SH 13/US 6 and Railroad Avenue
- 1st Street and East Avenue
- 1st Street and Whiteriver Avenue
- US 6 and Whiteriver Avenue
- SH 13 and Whiteriver Avenue

The traffic patterns observed during the peak hour turning movement counts were consistent with the observed patterns from the daily traffic counts previously described.

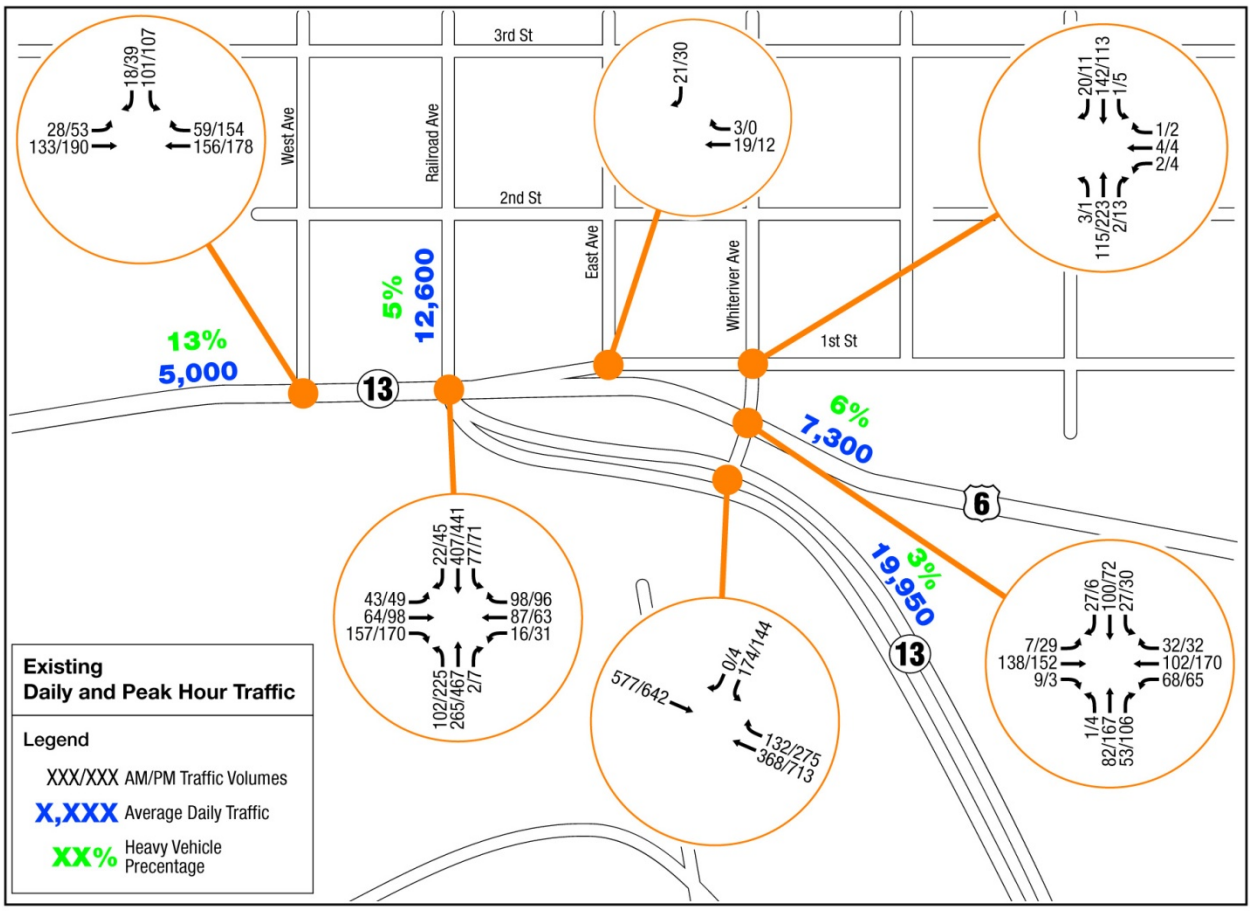
Heavy Vehicle Percentages

The percentage of heavy vehicles that travel along a roadway affects traffic operations along the corridor. Heavy vehicles typically travel at slower speeds than passenger vehicles and require longer acceleration and deceleration distances. As the percentage of heavy vehicles in the traffic stream increases, passenger vehicle movement becomes restricted and traffic operations deteriorate.

Vehicle classification counts were collected for the Rifle Gateway project in January 2009. Heavy vehicles on SH 13 averaged 3 percent of the daily volumes south of US 6 and averaged 13 percent of the daily volumes west of West Avenue. Heavy vehicles averaged 5 percent of the traffic volumes on Railroad Avenue north of SH 13/US 6. East of Whiteriver Avenue on US 6, heavy vehicles averaged approximately 6 percent of the daily volumes.

Figure 15 shows the bi-directional daily volumes (24-hour period), peak hour turning movements (highest morning and evening hour of the day), and heavy vehicle percentages (percentage of the daily traffic volumes) within the study area for existing (2009) conditions.

Figure 15
Existing Daily and Hourly Traffic Volumes



5.2.3 Operating Conditions

As part of the existing condition analysis, the LOS for the signalized and unsignalized intersections in the study area was determined for both the morning and evening peak hour. The analysis was completed using the Synchro traffic analysis software.

Before completing the existing conditions analysis, the Synchro traffic model was calibrated based on field observed conditions. Field data were collected in April 2009 during the morning and evening peak periods. Queue length data were observed and recorded for use in calibrating the model. Queues were collected for all approaches at the SH 13/US 6/Railroad Avenue

intersection at the start of each green phase for several signal cycle lengths during the peak hours. Southbound queues were measured at 1st Street, US 6, and SH 13 along Whiteriver Avenue. In addition, field measurements of prevailing travel speeds on the major roadway links were collected by driving along the roadways during the peak periods of a typical day and recording travel speeds. Most links were observed to travel at less than posted speed limits, primarily due to location of access driveways, pedestrian activities, and parked vehicles.

Observations during the morning peak showed very few queued vehicles, typically less than five for almost all of the movements at all intersections. Evening queue lengths were typically much longer and more consistent throughout the duration of the peak period. Thus, the evening traffic model was calibrated by changing parameters such as saturation flow rates (typically reduced below the default 1900 vehicles per hour value) and link travel speeds (reduced below the posted speed limits based on observed conditions and measured values). The saturation flow rates were reduced due to friction caused by a high number of driveways and turning vehicles in the area, pedestrian crosswalks at unsignalized locations, grades, and geometric conditions at intersections (such as odd turning angles or sight distance issues).

The model was calibrated with an effort to get modeled traffic queues to be within 20 percent of the field observed values. Because most queues were observed to be less than 10 vehicles, a 20 percent error range reflects a +/- 2 vehicle difference between observed and modeled conditions. Table 4 shows the results of the calibration efforts in terms of queued vehicles. Once the evening model was calibrated, similar changes in the traffic parameters were made to the morning model because most of the changes in parameters dealt with geometric conditions and not driver behaviors. After calibration of the model, existing peak period traffic volumes were analyzed to determine LOS at the critical intersections. Table 5 shows the results of the existing condition LOS analysis along with the average vehicle delay for the overall intersection and for the worst movement at each location.

Under existing conditions, the signalized intersections operate at LOS C or better during the peak periods. Although the overall intersection LOS is good, individual movements do operate at LOS D or worse during the peaks, indicating the intersections are experiencing a poor operation level under existing conditions. Most of the unsignalized intersections operate at LOS B or better during the peaks, with the exception of the closely spaced intersections of US 6 and SH 13 with Whiteriver Avenue. These intersections operate at LOS D or F during the peak hours. The combination of short storage areas and the large number of turning movements occurring within a small area create confusion for drivers at these unsignalized locations. In addition, vehicles attempting to turn left from southbound Whiteriver Avenue onto SH 13 must cross two lanes of traffic and merge directly into traffic on SH 13 without the benefit of an acceleration lane. These factors contribute to the large delay values shown at this intersection.

Table 4
Results of PM Peak Hour Model Calibration

Intersection	Movement	Queue Length (feet)		
		Observed*	Modeled	Difference
SH 13/US 6/Railroad Avenue	Southbound Through/Right	197	193	-2%
	Southbound Left Turn	40	39	-3%
	Northbound Through/Right	195	186	-4%
	Northbound Left Turn	101	89	-12%
	Eastbound Through/Left	98	110	+12%
	Eastbound Right Turn	55	59	+6%
	Westbound Through/Left	67	72	+7%
	Westbound Right Turn	30	36	+18%
1st Street/Whiteriver Avenue	Southbound (All)	273	271	-1%
US 6/Whiteriver Avenue	Southbound (All)	29	24	-17%
SH 13/Whiteriver Avenue	Southbound Left Turn	58	63	+10%

** Assumes 25 feet per vehicle for an average queue distance based on field measurements of average observed queues.*

Table 5
LOS Results of Existing Conditions Analysis

Intersection	Peak Period (AM/PM)				
	Overall Intersection		Worst Approach		
	Delay (sec/veh)	LOS	Movement	Delay (sec/veh)	LOS
SH 13/West Avenue	13.6/14.8	B/B	Southbound/Southbound	13.6/14.8	B/B
SH 13/US 6/Railroad Avenue*	17.8/31.5	B/C	Eastbound Through-Left/ Westbound Through-Left	31.9/58.2	C/**E**
Railroad Avenue/3rd Street*	8.4/24.3	A/B	Eastbound/Eastbound	30.9/42.8	C/D
1st Street/East Avenue	8.5/8.6	A/A	Southbound/Southbound	8.5/8.6	A/A
1st Street/Whiteriver Avenue	10.9/11.3	B/B	Westbound/Westbound	10.9/11.3	B/B
US 6/Whiteriver Avenue	25.3/26.7	D/D	Southbound/Southbound	25.3/26.7	D/D
SH 13/Whiteriver Avenue	25.6/84.2	D/**F**	Southbound Left/ Southbound Left	25.6/84.6	D/**F**

**Denotes signalized intersection.*

5.2.4 Safety Conditions

As part of the project, CDOT staff completed a Feasibility Safety Assessment Report (2009) for the state facilities in the study area, which is in Appendix D. The report considered accident data for the time period of January 1, 2001 through December 31, 2005. The following is a brief discussion on the findings of the CDOT report.

A total of 104 accidents were reported during the five-year study period, with one fatality. The fatality was the result of a single vehicle running off the road, which occurred west of the study area on SH 13. Overall, the highways through Rifle are performing well in terms of safety when compared to other similar facilities statewide. Most of the accidents occurred at intersections and involved either rear-end or approach-turn incidents. The top three intersections for accidents were SH 13/US 6/Railroad Avenue, US 6/Whiteriver Avenue, and SH 13/Whiteriver Avenue. The report made the following suggestions in an effort to reduce the number of accidents:

- Installation of a roundabout at one or more of the top three accident intersections.
- Realignment of the SH 13/US 6/Railroad Avenue intersection to eliminate or reduce the skew angle.
- Improved pavement markings at the SH 13/US 6/Railroad Avenue intersection to better assist travelers with proper lane assignments.
- Improved signal equipment and pedestrian facilities at the SH 13/US 6/Railroad Avenue intersection.
- Improved pavement markings at the US 6/Whiteriver Avenue intersections to better assist travelers with proper lane assignments.
- Trimming of foliage on the westbound approach to the US 6/Whiteriver Avenue intersections.
- Improved pavement markings at the SH 13/Whiteriver Avenue intersections to better assist travelers with proper lane assignments.

In general, the CDOT safety report does not indicate a safety issue requiring an immediate solution. City staff provided information related to accidents on City-managed streets. The data from the City indicated no significant accident history for the non-state owned roadways in the study area.

5.3 NO-ACTION (2035) CONDITIONS

The anticipated traffic operating conditions under a no-action alternative were developed for the year 2035. This analysis provides a basis to compare operational benefits of the build alternatives for the Rifle Gateway project area. This section includes a brief description of how the growth rate was developed for the study area, a summary of forecasted year 2035 traffic volumes, and resulting operating conditions.

5.3.1 Roadway Characteristics

For the purposes of completing the analysis of the No-Action Alternative, the roadway network was kept identical to that of the existing conditions. The only change to the network involved optimization of the signal timing at the signalized intersections. The analysis assumed all other intersections would remain unchanged including the number of lanes and the type of traffic control. Figure 16 shows the laneage and traffic control assumed for the No-Action Alternative.

Figure 16
No-Action (2035) Alternative Roadway Configuration

5.3.2 Traffic Volumes and Travel Patterns

Before completing the analysis of future conditions, projected traffic volumes for the year 2035 were developed. Projection of future traffic volumes required the development of an annual growth rate to be applied to the 2009 traffic volumes in order to factor the volumes up to expected 2035 levels. Multiple studies have been completed recently in the city that looked at existing and future populations in the area. A review was completed of the projected (future) volumes from the following sources:

- *SH 13 and US 6 Access Control Plan* (ACP), Stolfus and Associates, ongoing.
- CDOT website projected growth factors.
- *Northwest Colorado Socioeconomic Analysis and Forecasts*, BBC Research and Consulting, 2008.
- *City of Rifle Transportation Master Plan*, LSC Transportation Consultants, Inc., 2005.

Upon review of the sources, several variances were found for growth rates. The SH 13 and US 6 ACP (not within the study area of this project) determined that a background growth rate of 3.0 percent would be used in the project area for the ACP. When developed traffic was added to the background traffic, the growth of traffic was more than 3.0 percent annually. A review of CDOT growth rate data shows an annual growth rate of 1.5 to 2.7 percent along US 6 and SH 13 within the Rifle Gateway project limits. The *Northwest Colorado Socioeconomic Analysis and Forecasts* study does not provide estimated traffic growth, but it does provide an estimate of the population growth from 2005 to 2035. The estimated annual population growth in Rifle is 4.4

percent. Typically, traffic volumes show similar growth rates as population; thus, based on this study, it is reasonable to expect traffic volumes to increase at a 4.4 percent annual rate between 2005 and 2035. The *City of Rifle Transportation Master Plan* developed a low-growth (2.6 percent annual) and a high-growth (3.3 percent annual) scenario for the year 2025.

The future traffic projections vary in the area of the Rifle Gateway project based on other studies that have been performed. According to most of the data, an annual growth rate in excess of 3 percent is possible and is consistent with all of the studies performed in the area. Only the CDOT historic growth rates for the area show a lower trend. In order to evaluate one possible scenario, it was determined to remain consistent with the high-growth scenario from the *City of Rifle Transportation Master Plan* and use an overall growth rate of 3.3 percent per year to project 2035 traffic volumes from the recently collected 2009 levels. This rate is also similar to the rate used in the SH 13 and US 6 ACP and is in line with the projected population growth expected to occur in the area.

Average Daily Traffic

Traffic volume data for the year 2035 were projected for the study area assuming a 3.3-percent annual growth rate, which is equivalent to a 2.33 growth factor. Based on this factor, the average daily traffic (combined eastbound and westbound) volumes on SH 13, west of West Avenue, would increase to approximately 11,600 vpd. SH 13 south of US 6 would have daily volumes of approximately 46,500 vpd and the daily traffic volume on Railroad Avenue north of US 6 would increase to approximately 29,350 vpd. On US 6, east of Whiteriver Avenue, the average daily traffic would be approximately 17,000 vpd.

Peak Period Travel Patterns

The peak period travel patterns were assumed to remain similar to that of existing conditions. It should be noted that major development or future construction of additional access to I-70 may result in changes to the travel patterns of vehicles in the area, but there is not sufficient evidence at the current time to warrant a change in the travel patterns being analyzed.

Peak Hour Turning Movement Volumes

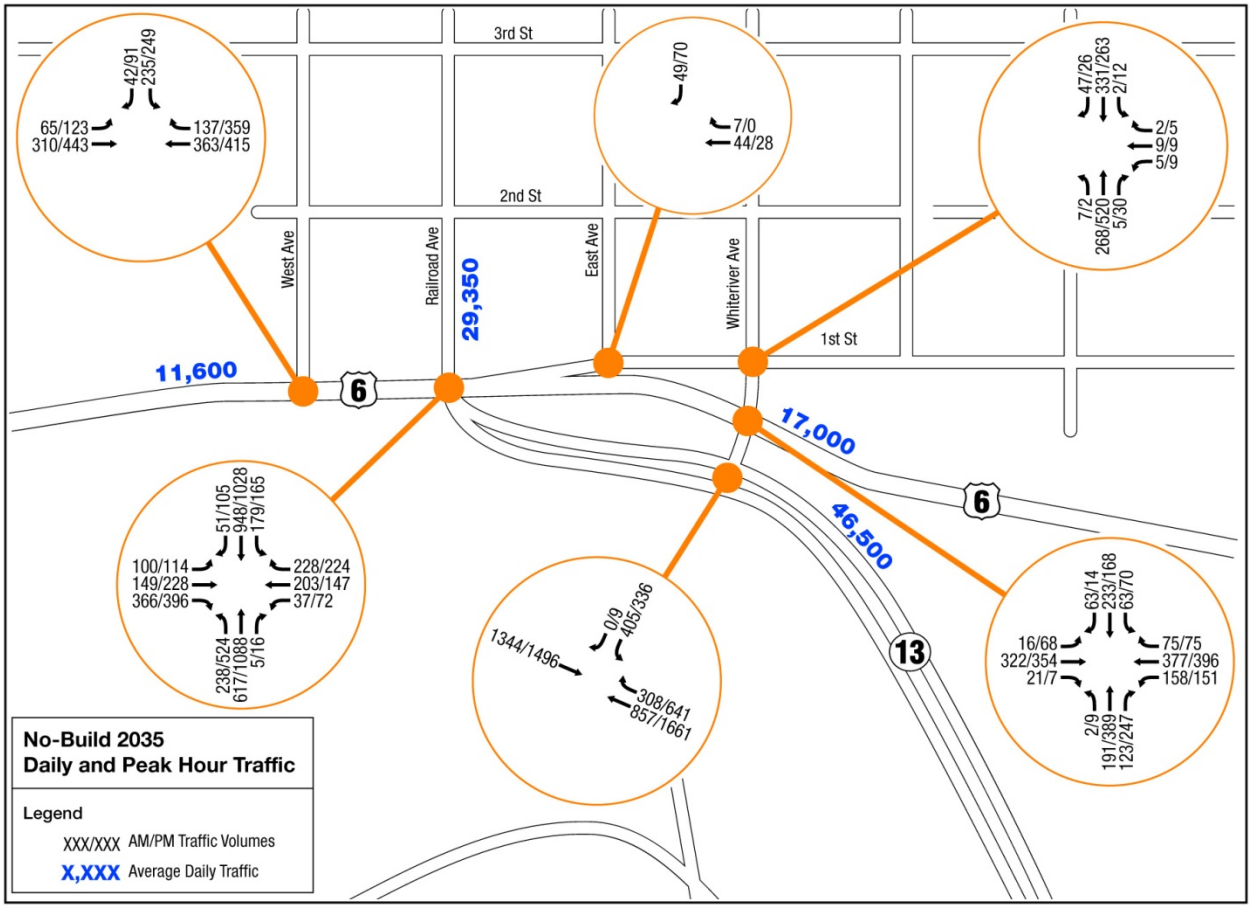
The future turning movement counts were developed by applying the 2.33 growth factor (3 percent annual growth for 26 years) to all movements at all intersections. Although some movements may not experience this level of growth, there is insufficient data available at this time to determine which movements will or will not experience such growth.

Heavy-Vehicle Percentages

The heavy-vehicle percentages were assumed to remain similar to that of existing conditions. It should be noted that a change in economic conditions, such as a revitalization of the energy sector, could result in significant changes to the heavy-vehicle percentages in the area. City staff has indicated a noticeable reduction in heavy-vehicle traffic in the area over the past year during the same time as a down turn in the economy and a slowdown in the energy sector. Based on the information available at the current time, a decision was made to keep the heavy-vehicle percentages at levels equal to the existing conditions. Future truck volumes are 2.33 times higher than existing volumes, but the overall percentage of heavy vehicles remains the same.

Figure 17 shows the bi-directional daily volumes (24 hour period), peak hour turning movements (highest morning and evening hour of the day), and heavy vehicle percentages (percentage of the daily traffic volumes) in the study area for the no-action (2035) alternative.

Figure 17
No-Action (2035) Daily and Hourly Traffic Volumes



5.3.3 Operating Conditions

As part of the no-action condition analysis, the LOS for the signalized and unsignalized intersections in the study area was determined for both the morning and evening peak hour.

Table 6 shows the intersection LOS results for the analysis of the 2035 no-action alternative compared to the results from the existing conditions. Under no-action traffic volumes, the majority of the intersections operate at a LOS F during both the morning and evening peak periods, with the exceptions of the intersections of 1st Street/East Avenue (LOS A/A) and Railroad Avenue/3rd Street (LOS C in the morning peak). Many of the unsignalized intersections experience so much delay that the analysis indicates the delay is incalculable. This is indicative of intersections that are extremely over capacity and cannot process the vehicles attempting to be processed through them.

Table 6
Comparison of Overall Intersection LOS for
Existing Conditions and 2035 No-Action Alternative

Intersection	Peak Period (AM/PM)			
	Existing Conditions		2035 No-Action Alternative	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
SH 13/West Avenue	13.6/14.8	B/B	286.4/890.7	**F/F**
SH 13/US 6/Railroad Avenue*	17.8/31.5	B/C	147.2/461.4	**F/F**
Railroad Avenue/3rd Street*	8.4/24.3	A/B	33.3/302.5	C/**F**
1st Street/East Avenue	8.5/8.6	A/A	8.9/9.0	A/A
1st Street/Whiteriver Avenue	10.9/11.3	B/B	>>100/>>100	**F/F**
US 6/Whiteriver Avenue	25.3/26.7	D/D	>>100/>>100	**F/F**
SH 13/Whiteriver Avenue	25.6/84.2	D/**F**	>>100/>>100	**F/F**

**Denotes signalized intersection.*

Table 7 presents the worst approach LOS results for the 2035 No-Action Alternative compared to the existing conditions. In general, the worst approach at most intersections for the 2035 No-Action Alternative is the same as the existing conditions. At SH 13/US 6/Railroad Avenue the northbound left-turn movement is the worst approach during the evening peak for the 2035 No-Action Alternative compared to the eastbound through-left movement under existing conditions. This is primarily because the left-turn volumes at this location become high enough to warrant a second left-turn lane. The lack of a second left-turn lane results in queues that are unable to clear during the peak hour.

The worst approach at the intersection of Railroad Avenue/3rd Street switches from the eastbound movement (existing conditions) to the northbound through movement (2035 No-Action Alternative). A review of the 2035 projected traffic volumes on Railroad Avenue show more than 1,300 northbound vehicles in the PM peak hour. This value is in excess of the capacity of the roadway (one northbound lane) and results in excessive queues that spill back into the upstream intersections and do not clear during the peak hour.

Most of the intersections under the no-action traffic volumes experience excessive queue lengths that spill back into the upstream intersections and do not clear during the peak periods. A prime example occurs at the intersection of SH 13/Whiteriver Avenue. At this intersection the southbound left turn vehicles rarely find sufficient gaps in traffic on SH 13 to make the left turn. This results in traffic filling the space between SH 13 and US 6 on Whiteriver Avenue, then filling the space between US 6 and 1st Street, and continuing to build north on Whiteriver Avenue for several hundred feet.

Table 7
Comparison of Worst Approach LOS for
Existing Conditions and 2035 No-Action Alternative

Intersection	Peak Period (AM/PM)					
	Existing Conditions			2035 No-Action Alternative		
	Movement	Delay (sec/veh)	LOS	Movement	Delay (sec/veh)	LOS
SH 13/West Avenue	Southbound/ Southbound	13.6/14.8	B/B	Southbound/ Southbound	286.4/890.7	**F/F**
SH 13/US 6/Railroad Avenue*	Eastbound Through-Left/ Eastbound Through-Left	31.9/58.2	C/**E**	Eastbound Through-Left/ Northbound Left	258.6/679.8	**F/F**
Railroad Avenue/ 3rd Street*	Eastbound/ Eastbound	30.9/42.8	C/D	Eastbound/ Northbound Through	54.4/443.3	D/**F**
1st Street/East Avenue	Southbound/ Southbound	8.5/8.6	A/A	Southbound/ Southbound	8.9/9.0	A/A
1st Street/ Whiteriver Avenue	Westbound/ Westbound	10.9/11.3	B/B	Westbound/ Westbound	>>100/>>100	**F/F**
US 6/Whiteriver Avenue	Southbound/ Southbound	25.3/26.7	D/D	Southbound/ Southbound	>>100/>>100	**F/F**
SH 13/Whiteriver Avenue	Southbound Left/ Southbound Left	25.6/84.2	D/**F**	Southbound Left/ Southbound Left	>>100/>>100	**F/F**

**Denotes signalized intersection.*
>>100 seconds of delay indicates an intersection or movement that experiences incalculable delay and indicates need for mitigation.

5.3.4 Safety Conditions

As discussed previously, traffic in the area is projected to grow at a rate of approximately 3.3 percent annually in the future. This will result in a significant increase in traffic on the local roadway network between 2009 and 2035 (a 233 percent increase in traffic volumes). The results of the No-Action Alternative analysis show that most intersections will operate very poorly with extensive queuing and very long delays for the minor street approaches. These factors are expected to have a negative impact on the overall safety for all of the road users (motor vehicle, pedestrian, transit, and bicyclist).

As traffic volumes increase, the potential for conflicts will increase, resulting in more accidents on the roadways. As delay begins to become excessive on the minor street approaches to intersections, the vehicle operators will begin to take bigger risks to enter the intersection, which will result in more accidents. Many of these accidents will be broadside, left turning, or head on in nature and will most likely result in higher injury and possibly higher fatality rates in the study area.

6.0 CONCEPTUAL ALTERNATIVES DEVELOPMENT

As previously discussed, the project area is divided into four core areas within the project boundaries:

- Intersections of SH 13, US 6, Railroad Avenue, 1st Street, West Avenue, East Avenue, and Whiteriver Avenue
- Downtown streetscapes from 1st Street to 6th Street and from Whiteriver Avenue to West Avenue
- Gateways from the south (SH 13), east (US 6), and west (SH 13)
- Park Avenue extension over Rifle Creek to SH 13 and 2nd Street extension to Park Avenue

During the study, the I-70 interchange ramps at SH 13 were added for concept alternative development. Each area has unique issues and goals that can be addressed separate from each other. Although some of the areas overlap with each other, for the most part the approach to developing alternatives to resolve each area's issues is independent of each other. The following sections describe the steps used in developing and analyzing alternatives for each of the areas.

6.1 SH 13/US 6/RAILROAD AVENUE INTERSECTION ALTERNATIVES

The intersection of SH 13/US 6/Railroad Avenue and the other intersections in the near vicinity currently act as the gateway to the core downtown area of Rifle. The intersections serve multiple purposes by providing access between I-70 and downtown Rifle via SH 13; providing east-west connectivity for vehicles on US 6; providing access between I-70 and the SH 13 Bypass for commercial vehicles and other pass through traffic; and dispersing traffic onto north-south city streets.

The close spacing of intersections along Whiteriver Avenue at 1st Street, US 6, and SH 13 create safety and operations issues under existing conditions. These intersections are already difficult for vehicles to maneuver through the area. The lack of adequate storage space, limited number of lanes, sight distance issues, and the high number of turning movements in a condensed area contribute to the formation of long queues, long delays, poor operations, and an increase in the number of accidents.

In an effort to improve operations and safety and to create an opportunity for a gateway into Rifle, conceptual alternatives for roadway and intersection improvements were developed for the following areas:

- SH 13 between Railroad Avenue and Rifle Creek just to the west of downtown
- US 6 between Railroad Avenue and Whiteriver Avenue
- The intersections of 1st Street/Whiteriver Avenue, US 6/Whiteriver Avenue, SH 13/Whiteriver Avenue, 1st Street/East Avenue, SH 13/US 6/Railroad Avenue, and SH 13/West Avenue

The conceptual alternatives were developed with the intent of addressing other City goals such as promoting new development of downtown toward the Colorado River, create an extension of 1st Street to the west (Centennial Parkway) that has an urban street design and feel, and to be sustainable for the future by addressing future traffic volumes for the year 2035.

The evaluation process involved developing conceptual corridor alternatives, identifying screening criteria, performing a preliminary screening, identifying a smaller set of alternatives to carry forward for additional analysis, refining the alternatives, developing detailed screening criteria, performing a detailed screening analysis, and making recommendations for alternative(s). The following subsections describe the process used to develop the conceptual alternatives and the evaluation process.

6.1.1 Design Criteria

Specific design criteria were used as a guideline for developing alternatives. The basis for the design criteria came from the American Association of State Highway and Transportation Officials (AASHTO) *A Policy on the Geometric Design of Highways and Streets* (2004), the *CDOT Roadway Design Guide* (2005), the *Colorado State Highway Access Code* (Access Code) (2002), and the *Rifle Public Works Manual* (2007). The criteria were developed based on the roadway classification, design speed, and terrain. Specific aspects of the criteria are discussed in detail; Table 8 lists the design criteria that were used for SH 13, US 6, and Railroad Avenue.

Table 8
Design Criteria for Highways in the Study Area

Highway Segment	SH 13 from I-70 to Railroad Ave.	SH 13 west from Railroad Ave. to SH 13 Bypass	US 6 from Railroad Ave. to Whiteriver Ave.	US 6 from Whiteriver Ave. to east of Whiteriver Ave.
Design Criteria	**Criteria Values**			
Roadway Classification	Expressway; major bypass	Non-rural regional highway	Non-rural arterial	Rural regional highway
Width of travel lanes	12 feet	12 feet	12 feet	12 feet
Shoulder width (left-turn/median)	4 feet	4 feet	4 feet	N/A
Shoulder width (right-turn/outside)	10 feet	10 feet	10 feet	8 or 10 feet
Median width	10	N/A	N/A	N/A
Side slope dist. ("z")	12 feet at 6:1 slope	12 feet at 6:1 slope	12 feet at 6:1 slope	8 feet at 6:1 slope
Posted speed	40 & 25 mph	35 mph	35 mph	35 mph
Design speed	50 mph	40 mph	40 mph	40 mph
Maximum superelevation	6%	6%	6%	6%
Minimum radius	833 feet	485 feet	485 feet	485 feet
Minimum stopping sight distance	425 feet	305 feet	305 feet	305 feet
Maximum grade	5%	8%	8%	6%

Roadway Classification

Roadways are classified as certain types based on the function they provide. As defined by the Access Code, SH 13 is classified as an expressway or a major bypass from I-70 to Railroad Avenue and as a non-rural regional highway from Railroad Avenue to US 6. US 6 is classified as a non-rural arterial from Railroad Avenue to Whiteriver Avenue and as a rural regional highway from east of Whiteriver Avenue.

Design Speed

Design speed is the maximum safe speed that can be maintained under ideal conditions for a given section of roadway. A desired design speed is typically set to determine particular design criteria for roadway geometry. For the roadways with expressway classifications, the design speed was 50 mph. Regional highways and arterial roadways used a 40 mph design speed. Design speeds were varied depending on alternative characteristics.

Maximum Vertical Grade (Vertical Alignment)

Vertical alignment is measured in terms of grade. The maximum vertical grade, or rate of change in slope either ascending or descending along the roadway, is between 5 and 8 percent for the highways on this project.

Horizontal Curve Radius

The radius of horizontal curve determines the sight distance for a particular stretch of roadway and the ability for a vehicle to negotiate the alignment at a particular speed. A function of horizontal curvature is superelevation or the "banking" of a curve to keep a vehicle from sliding off the curve. The desired radius of horizontal curves is defined according to the design speed of the roadway. For the roadways with expressway classifications, a minimum horizontal curve radius of 833 feet was used. Regional highways and arterial roadways used a minimum horizontal radius of 485 feet. All roadway segments were assumed to be limited to a maximum superelevation of six percent.

Vertical Curves

The radius of vertical curves also impacts the sight distance for that particular stretch of roadway. The desired vertical curves are defined according to the design speed. Crest curves must be designed so that drivers can see and avoid objects or stopped vehicles on the roadway. On hills, or "crests," drivers must be able to see over the top of the crest far enough to allow enough time to stop if needed. Likewise, in valleys, or "sags," drivers must be able to adequately see the end of their headlight beams on the road to avoid obstructions in the roadway. For the roadways with expressway classifications, the minimum vertical stopping sight distance (SSD) used was 425 feet. The minimum vertical SSD for regional highways and arterial roadways was 305 feet.

Cross Section Features

Roadway cross section features include lane widths, shoulder widths, turn lane widths, and bike lane and shoulder widths. Typical roadway dimensions used for developing alternatives consisted of 12-foot travel lanes, 4-foot median, and curb and gutter. In addition, other assumptions were considered for overall roadway laneage. For example, during the development and analysis of alternatives, efforts were made to keep roadways such as Railroad Avenue to a maximum of three travel lanes (some alternatives required four lanes on Railroad Avenue in order to reach LOS C or better operations). Whiteriver Avenue was assumed to be no more than four travel lanes wide. Currently, Whiteriver Avenue has two travel lanes with curb side parking on both sides of the roadway. For future conditions, it was assumed that the parking lanes could be removed to allow for three lanes of travel. The SH 13 bridge across the Colorado River was assumed to remain at its existing width with a maximum of five travel lanes. Improvements to the east-west portions of US 6 and SH 13 were assumed to include no more than two through

lanes in each direction with appropriate turn lanes, ideally remaining less than six lanes for a cross section.

6.1.2 Conceptual Corridor Alternatives

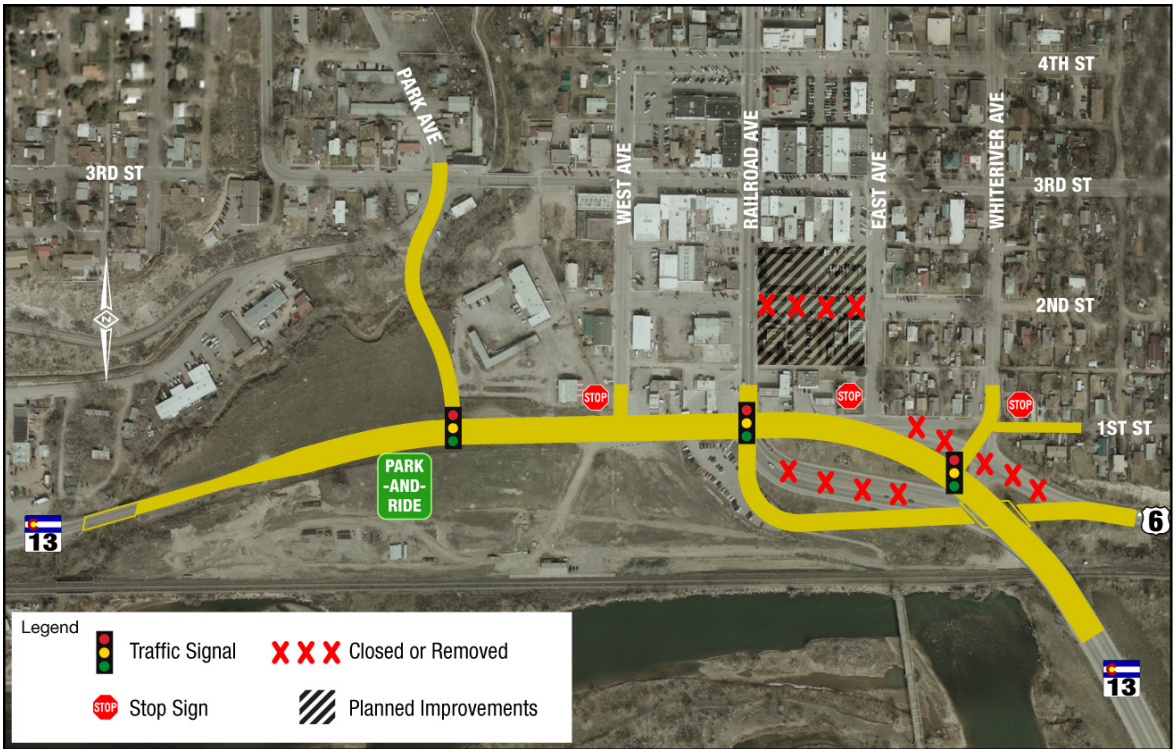
The conceptual corridor alternatives for the SH 13/US 6/Railroad Avenue intersection area were developed by reviewing previous studies completed in the project area and gathering information from the project team. Conceptual corridor alternative suggestions were also received during the initial phase of the public involvement process. Nine alternatives were identified for analysis and are described in the following subsections.

The depictions of traffic signals in these figures were based upon projected traffic volumes on the area roadways and were not based upon warrant analyses. Installation of any traffic signal would be evaluated based on actual conditions at the time and would only occur should the traffic signal be warranted. In addition, appropriate traffic analysis would need to be completed to show acceptable traffic operations based on CDOT criteria and other relevant factors such as the highway classification according to the *State Highway Access Code*. The City and CDOT would have to work together to identify necessary signal placement or other traffic control changes to ensure safe and efficient movement of all modes of transportation.

Alternative A: SH 13/US 6 Grade Separation

Alternative A, shown in Figure 18, creates an interchange concept between SH 13 and US 6 with the main intersection remaining at Railroad Avenue. In this alternative, US 6 and SH 13 switch alignments and would enter the main intersection on each other's existing alignments. US 6 would be grade separated below SH 13 and would then turn to the north and form the south leg of the intersection with Railroad Avenue, similar to SH 13 under existing conditions. SH 13 would be realigned to the north onto the existing US 6 alignment and form the east leg of the main intersection, similar to how US 6 does in existing conditions. To help operations, additional ramp type connections between northbound SH 13 to eastbound US 6, and westbound US 6 to northbound SH 13 could be considered to reduce the volume of traffic moving through the main intersection. The intersections of SH 13/US 6/Railroad Avenue, SH 13/Whiteriver Avenue, and SH 13/Park Avenue would be signalized in this alternative. The intersections of SH 13/West Avenue and SH 13/East Avenue would be stop controlled for the non-SH 13 legs in this option. The park-n-Ride facility would be moved to the west near the SH 13/Park Avenue intersection.

Figure 18
Conceptual Corridor Alternative A



Alternative B1: Signalized Intersection at SH 13/US 6/Whiteriver Avenue

Alternative B1 would relocate the intersection between SH 13/US 6 from its existing location at Railroad Avenue to a location that is closer to the existing SH 13/Whiteriver Avenue intersection. The north leg of this intersection would be Centennial Parkway and would have urban characteristics. SH 13 would be realigned to the south closer to the railroad ROW. This would allow the business district to expand south toward the realigned highway alignment and the extension of West Avenue, Railroad Avenue, and the future Park Avenue. This alternative would have as many as five signalized intersections including two on Centennial Parkway at Railroad Avenue and Park Avenue and three on SH 13 at US 6, Railroad Avenue, and Park Avenue.

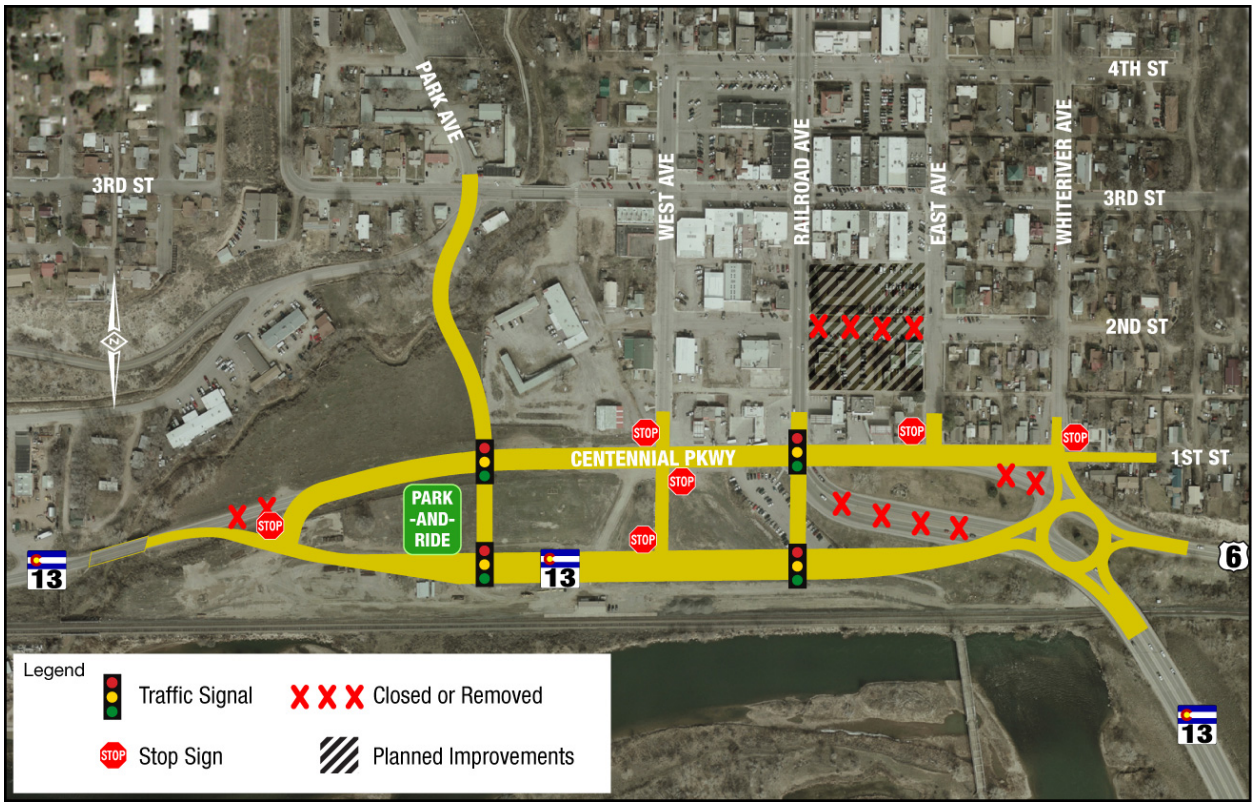
Access to Whiteriver Avenue at SH 13 would be limited to right-in, right-out access. The intersections of SH 13/West Avenue, Centennial Parkway/West Avenue, Centennial Parkway/East Avenue, and Centennial Parkway/Whiteriver Avenue would be stop controlled for the non-SH 13 approach legs. Similar to Alternative A the park-n-ride would be moved west of the new Park Avenue extension and SH 13 intersection. This alternative is shown in Figure 19.

Figure 19
Conceptual Corridor Alternative B1

Alternative B2: Roundabout at SH 13/US 6/Whiteriver Avenue

Alternative B2 is nearly identical to B1. The most significant difference between the alternatives is the traffic control at the intersection of SH 13/US 6/Whiteriver Avenue, which in this alternative would be a roundabout instead of a traffic signal. The intersection of Centennial Parkway/Whiteriver Avenue/ Avenue would be stop controlled and would have restricted access to right-in, right-out due to the proximity of the roundabout. The alternative would have four signalized intersections at Centennial Parkway/Railroad Avenue, Centennial Parkway/Park Avenue, SH 13/Railroad Avenue, and SH 13/Park Avenue. The remaining intersections would be stop controlled. Alternative B2 is shown in Figure 20.

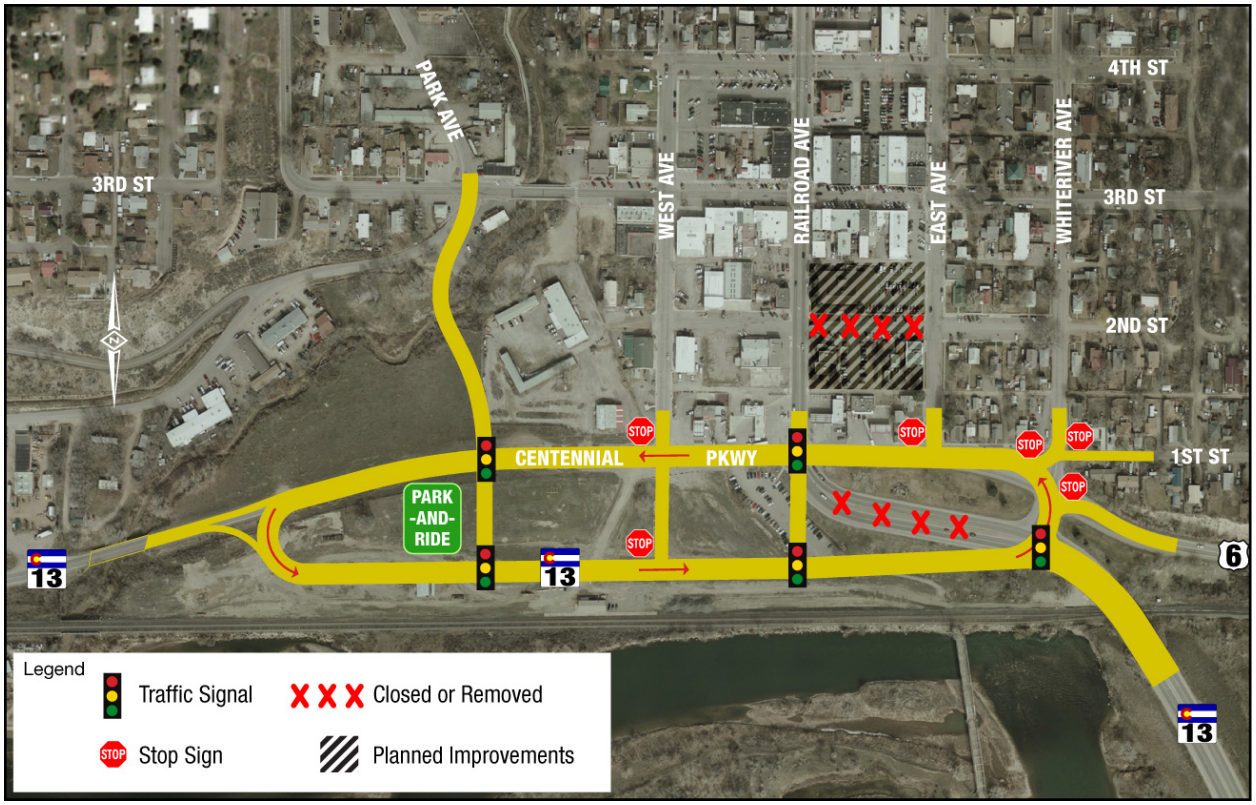
Figure 20
Conceptual Corridor Alternative B2



Alternative C: One-way Loop

Alternative C creates a one-way loop for all east-west traffic through the study area. Basically, opposing directions of traffic on SH 13 between Whiteriver Avenue and the Rifle Creek bridge would be split into two separate roadways that create a large loop system. Westbound traffic would remain on the existing alignment of US 6 and SH 13 while eastbound traffic would be placed onto a new roadway that would parallel the railroad ROW between the Rifle Creek bridge east through the study area. Again, this concept would allow for the business district to be extended south from the current downtown area. Existing roadways (Railroad Avenue, West Avenue, and Park Avenue) could be extended to the south to provide sufficient circulation in and through the city. The eastbound and westbound roads that make up the loop would both be state facilities. Optional design features in this alternative could have the one-way loop only extend as far west as West Avenue, Park Avenue, or all the way to near the Rifle Creek Bridge as shown in Figure 21.

Figure 21
Conceptual Corridor Alternative C

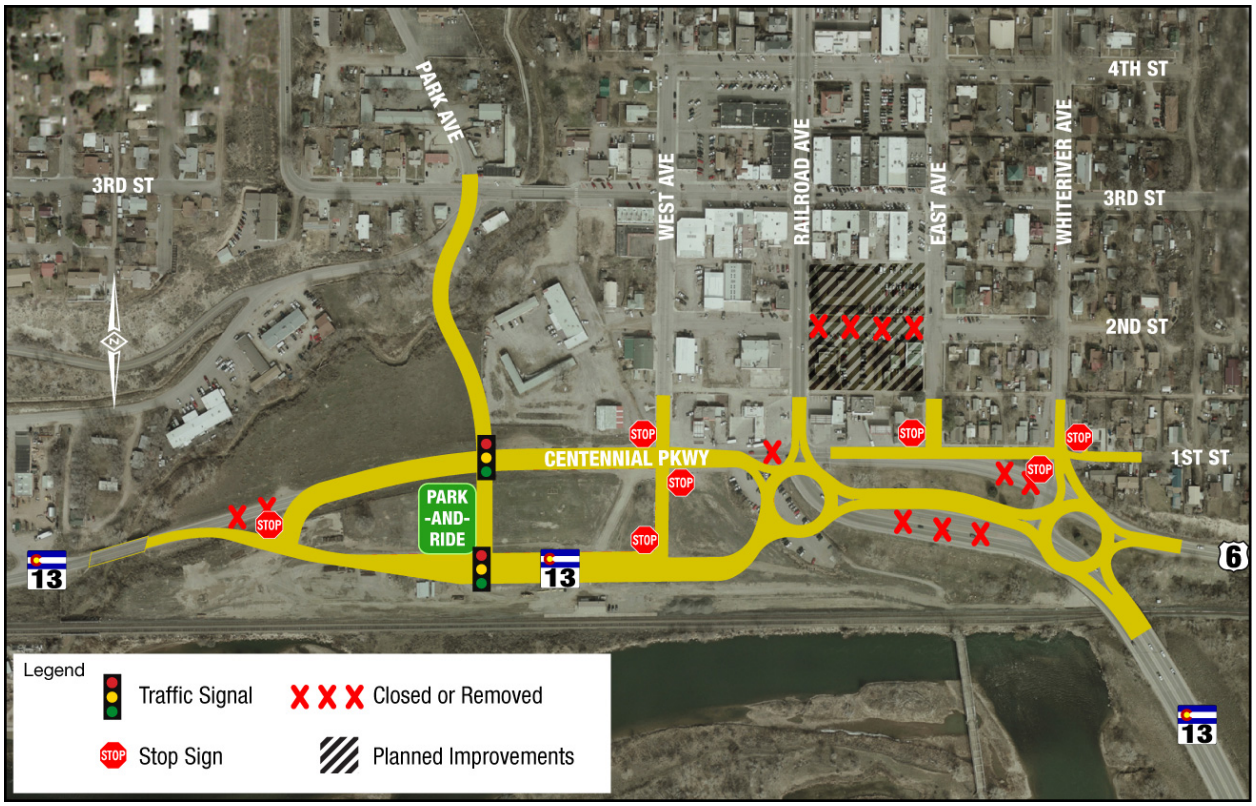


Alternative D: Two Roundabouts

Alternative D features two roundabouts. One roundabout receives all traffic from SH 13 and US 6 and is located south of the Whiteriver Avenue/ Street intersection. The second roundabout is located near the existing park-n-Ride, south of the existing SH 13/US 13/Railroad Avenue intersection. To the west of the second roundabout, Centennial Parkway would continue along the existing SH 13 alignment. SH 13 would be realigned south toward the railroad property. This alternative may have traffic signals at the future Park Avenue/Centennial Parkway and Park Avenue/SH 13 intersections. Roundabout entries would be limited to two lane entries and the roundabouts would be limited to two circulating lanes.

In this alternative Centennial Parkway would be split in two sections, one west of Railroad Avenue and one east of Railroad Avenue. The east section would not connect to Railroad Avenue and would be limited to right-in, right-out access at Whiteriver Avenue. East Avenue would intersect with Centennial Parkway at a T-intersection. The intersections of Park Avenue/Centennial Parkway and Park Avenue/SH 13 may require signalization in this alternative. All other intersections would be stop-controlled or yield controlled at the roundabouts. The park-n-Ride would be west of the Park Avenue extension and between Centennial Parkway and SH 13. Alternative D is shown in Figure 22.

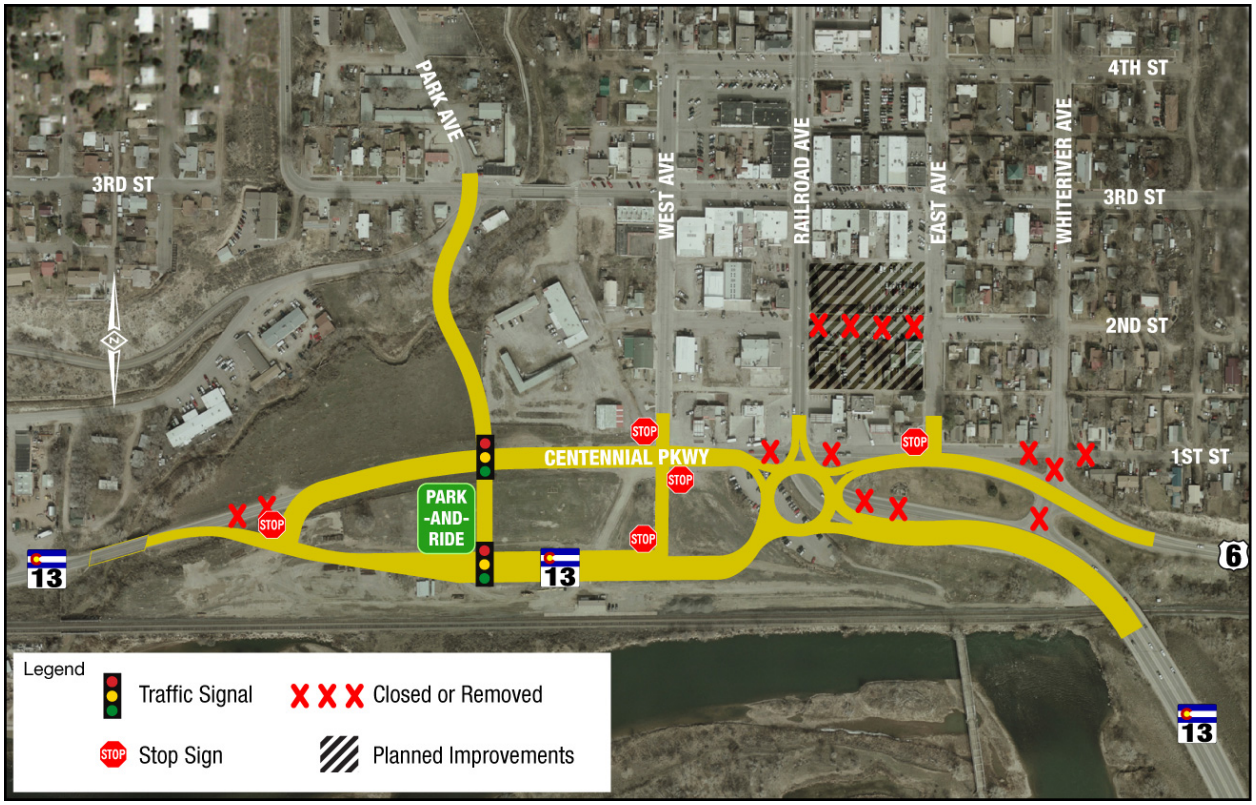
Figure 22
Conceptual Corridor Alternative D



Alternative E: Central Roundabout

The main feature of Alternative E is a centrally located roundabout that receives the traffic from SH 13, US 6, and Railroad Avenue. SH 13 and US 6 would be realigned to accommodate proper entry and exit angles for the roundabout. To the west, half of this alternative would be very similar to that of Alternative D. All movements at the intersection of Whiteriver Avenue/SH 13 would be eliminated except for right turns from northbound SH 13 to eastbound US 6. This alternative would require the portion of Railroad Avenue between SH 13 and 3rd Street to be improved to allow for four travel lanes. Traffic signals may be at SH 13/Park Avenue and Centennial Parkway/Park Avenue. Alternative E is shown in Figure 23.

Figure 23
Conceptual Corridor Alternative E

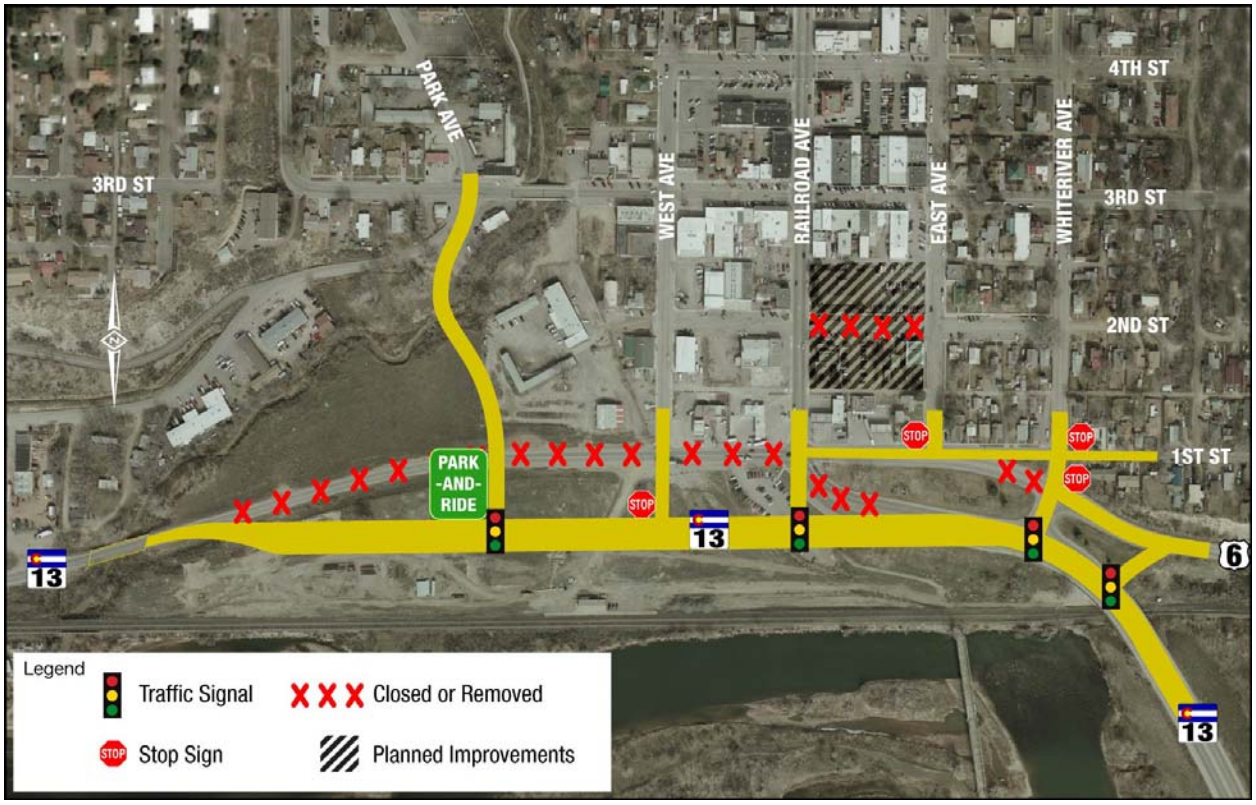


Alternative F: Middle Boulevard

Alternative F realigns SH 13 so that it is located half way between the existing SH 13/US 6 alignment and the railroad ROW. All existing north-south roadways and Park Avenue would be extended to intersect with the new roadway except East Avenue. The intersections of Park Avenue, Railroad Avenue, and Whiteriver Avenue would be signalized.

Centennial Parkway would extend between Whiteriver Avenue and Railroad Avenue with both intersections likely to be restricted to right-in, right-out access. This alternative would most likely have four signalized intersections along SH 13 (US 6, Whiteriver Avenue, Railroad Avenue, and Park Avenue). The remaining intersections would be stop controlled. Alternative F is shown in Figure 24.

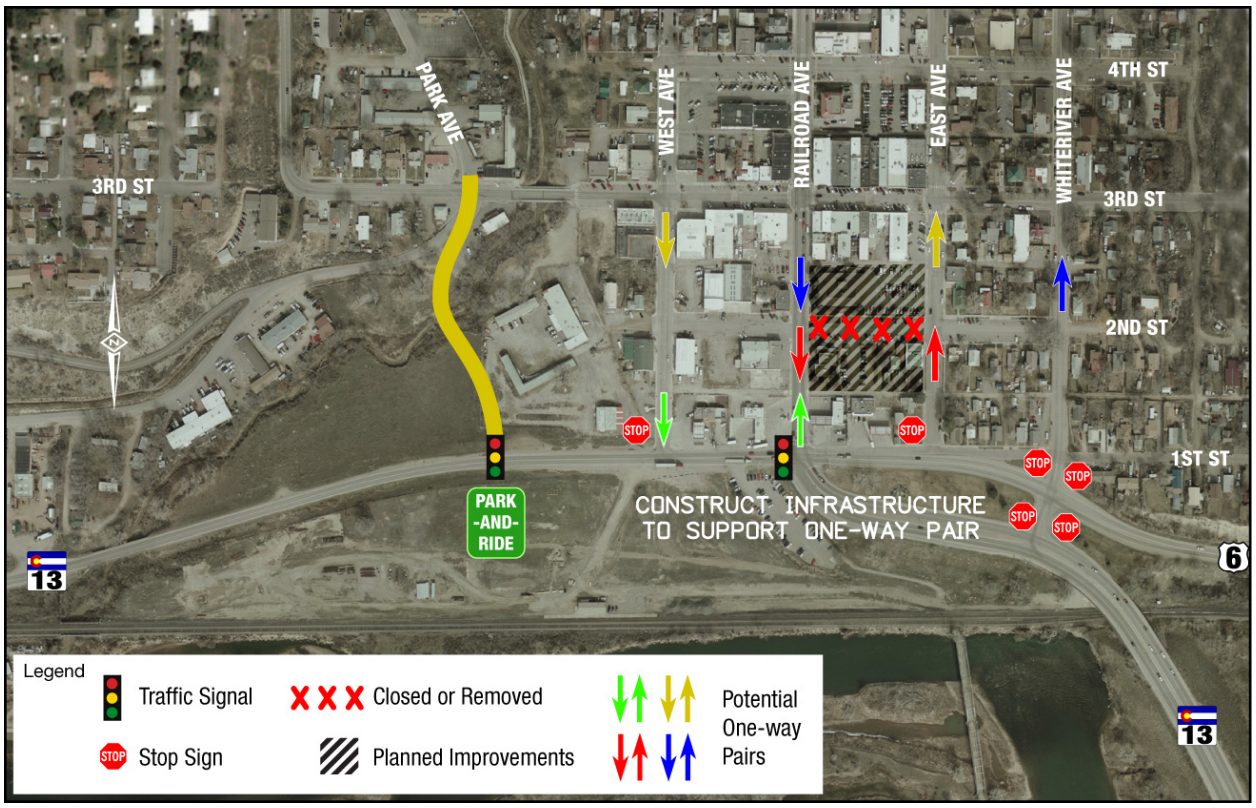
Figure 24
Conceptual Corridor Alternative F



Alternative G: One-way North-South Pairs

For Alternative G, the majority of the road network would remain the same as existing conditions, but a pair of north-south streets would be converted to one-way operations. Examples of the possible north-south pairs are West Avenue (southbound)/Railroad Avenue (northbound), Railroad Avenue (southbound)/Whiteriver Avenue (northbound), or West Avenue (southbound)/East Avenue (northbound). Other pairs could be created with one serving southbound traffic and the other serving northbound traffic. For the purposes of this study, it was assumed that Railroad Avenue would serve southbound traffic and Whiteriver Avenue would serve northbound traffic. The one-way streets could be put into effect completely through the city from the SH 13 Bypass to SH 13 or they could be implemented for only part of the distance through the city such as between 9th Street and SH 13. Traffic signals would be implemented as needed per one-way pair. This alternative could be the final configuration of the roadway or act as an interim phase for other improvements or alternatives. Alternative G is shown in Figure 25.

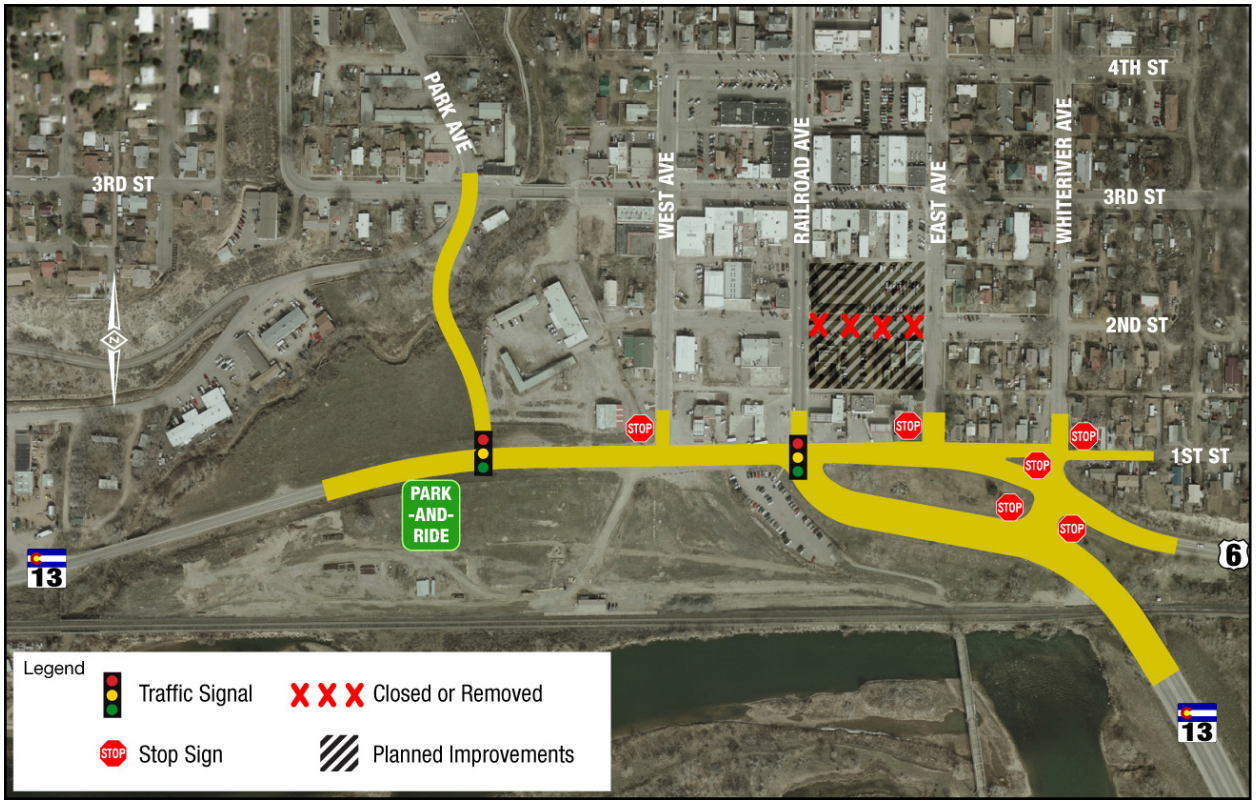
Figure 25
Conceptual Corridor Alternative G



Alternative H: Intersection and Lane Improvements

Alternative H is similar to a no-action (2035) alternative. All roadways would remain on their existing alignments except for some turn restrictions at the Whiteriver Avenue/SH 13 intersection that would only allow northbound to eastbound right turns. All other intersections would be improved by adding additional through lanes and turn lanes in order to accommodate future traffic volumes. Alternative H is shown in Figure 26.

Figure 26
Conceptual Corridor Alternative H



6.1.3 Preliminary Screening of Conceptual Corridor Alternatives

After developing the nine conceptual corridor alternatives, the next step was to perform a preliminary screening analysis in an effort to reduce the number of alternatives that would be carried forward through a more detailed operational, environmental, and design analysis. In order to complete the preliminary screening, a set of goals, objectives, and evaluation criteria were developed and used to complete the screening process. The preliminary screening process was intended to be more qualitative and less quantitative with more analysis to be completed during the detailed screening phase of the project.

Preliminary Screening Goals

The first step in the preliminary screening process involved developing a list of goals that each of the alternatives could be evaluated against and compared to each other. The evaluation goals identified for this project include mobility, aesthetics/urban environment, safety, environmental resources, and ease of implementation. These goals are typical for a project of this nature and

cover a broad range of issues that address the City's concerns as well as other stakeholders like CDOT. The preliminary screening goals are shown in the far left column of Table 9.

Preliminary Screening Objectives

Next, within each of the goals a series of project objectives was identified as being important to the overall Rifle Gateway project and were developed to ensure the project would focus more specifically on meeting the City's and stakeholders' overall goals for the project. The list of objectives that were identified for the preliminary screening analysis is in the second column of Table 9.

Table 9
Preliminary Screening Goals, Objectives, and Evaluation Criteria

Goal	Objective	Evaluation Criteria/Measures of Effectiveness (MOEs)
Mobility	Meet the future mobility and traffic operations needs along the SH 13/US 6 corridor	Ability to accommodate 2035 traffic volumes.
	Encourage truck traffic to use West Rifle and SH 13 Bypass	Ease of movement for trucks through the recommended alternative.
	Facilitate improved circulation in and through the downtown street network	Does alternative promote better use of north-south streets other than Railroad Avenue?
	Account for the needs of different modes of transportation	Are alternatives designed to accommodate the movement of vehicles, pedestrians, and bicyclists through the area?
Aesthetics/ Urban Environment	Develop a corridor concept that projects the City's vision of its desired image to users	Are the roadway improvements compatible with the City's goals for the gateway design?
	Create a corridor vision that is compatible with the city's goals and adopted concepts for the Downtown	Promote the City's goal of extending the downtown grid to the south toward the Colorado River.
	Facilitate future development/ redevelopment adjacent to the roadways	Amount of developable land.
Safety	Provide safe travel conditions within the area for all users	Number of conflict points and uncontrolled crossing locations.
Environmental Resources	Minimize impacts to the social, physical and natural environment	Anticipated impacts to floodplains, cultural/historic properties, water quality, ROW, etc.
Ease of Implementation	Level of anticipated effort to implement (e.g., to study, design, and construct)	Overall effort to take alternative from study to construction.
	Construction impacts and delay to traffic	Ability to maintain traffic operations during construction.
	Ability to fund recommended alternative	Overall estimated costs of alternative.
	Ability to implement through phased construction	Overall ease to phase the construction of the alternative.
	Maintenance of alternative and other issues	Anticipated costs associated with yearly maintenance.
	Impacts to railroad	Amount of land necessary to obtain from railroad.

Mobility

For the mobility goal, objectives were developed that not only focused on moving automobile traffic through the study area, but looked at other benefits the alternative may provide to all modes of transportation. The alternative should accommodate future traffic demands that will exist on SH 13 and US 6. The City does not want to construct improvements to the area that will result in the need to do something again in the future. The alternative selected in this study should be sustainable well into the future in terms of traffic volumes. The alternative should also encourage commercial vehicles that are not making local deliveries to use the SH 13 Bypass, and if possible, encourage commercial vehicles to use the West Rifle interchange on I-70 instead of traveling through the downtown area. Reduction of commercial vehicle traffic on the existing city streets would improve mobility for automobile traffic and safety for all users of the roadway.

Another mobility objective is to develop a roadway system that improves circulation in the downtown area by providing vehicles the opportunity to use more north-south streets instead of focusing traffic onto Railroad Avenue. If traffic volumes were spread out over several north-south streets (Whiteriver Avenue, East Avenue, Railroad Avenue, West Avenue, and Park Avenue), which are currently operating under capacity, then traffic would flow more freely, operations would be improved, and the need for further improvements in the area would be delayed. Finally, the alternatives should consider the needs of all modes of transportation (vehicle, pedestrian, bicycle, and transit) and should be designed in a manner to facilitate movement of all modes in and through the study area.

Aesthetics/Urban Environment

The aesthetics/urban environment objective focuses more on meeting the City's desire of creating a gateway into the downtown area and creating opportunities to encourage new development south toward the Colorado River. The alternative should allow the City to project its desired image to the users of the facility. The recommended alternative should not discourage such development by creating a wide boulevard-type roadway that would split the existing and expanded downtown areas. Finally, the alternatives will result in new lanes to accommodate future traffic volumes, but should minimize ROW acquisition. In order to encourage new development toward the Colorado River, the alternative should provide adequate sized parcels of land to accommodate new development.

Safety

The goal of safety is important to the City and the stakeholders. The design of the alternative should be one that adheres to national and regional design criteria, which were developed in an effort to create safe roadways. The alternative should also take into account pedestrian/bicycle movements and provide opportunities for these movements to be completed safely, directly, and easily.

Environmental Resources

Potential environmental impacts are always a critical issue on roadway improvement projects and the Rifle Gateway is no different. As part of the preliminary screening process, the environmental objective was to scan each alternative being evaluated based upon estimated impacts to the social, physical, and natural resources of the area. Each alternative will have some impact on the environmental resources of the area, but the recommended alternative should minimize such impacts.

Ease of Implementation

The final goal of the preliminary screening phase was to evaluate each alternative and evaluate the overall feasibility of implementing the improvements. Depending on alternative impacts, there may be a need to conduct a more lengthy study (such as a NEPA environmental study), undertake a larger design effort involving structures or other complicated design elements, and the alternative may be difficult to construct. Ideally, the recommended alternative would not require any significant additional study, would not require a large design effort, and would not be difficult to construct. Along these same lines, an objective of the project is to identify an alternative that would not have significant impact to traffic operations during construction, which could be accomplished by having an alternative that can be easily constructed in phases. Another important objective is to evaluate each of the alternatives to determine relative costs. The project should not be cost prohibitive relative to the funding amount the City could reasonably secure through the use of local, state, and/or federal funds. In addition, some alternatives may require more intensive maintenance efforts that would increase life-cycle costs to not only the City, but to other stakeholders like CDOT. An example would be any alternative that results in significant structural elements, which are costly to maintain over the life of the roadway. Finally, because many of the conceptual corridor alternatives involve moving roadways to the south directly adjacent to the existing railroad property, one objective is to determine how much of an impact the alternative may have on the railroad property that may require acquisition of railroad property.

Preliminary Screening Evaluation Criteria

In an effort to keep the preliminary screening analysis to a minimum, but to ensure adequate data was available to grade each alternative, a list of evaluation criteria for each of the objectives was developed that could be qualitatively discussed with the project team, quantified as needed, and compared. The list of evaluation criteria for each of the objectives that were used for the preliminary screening analysis is in the third column of Table 9.

Mobility

The mobility goal required the most significant analysis effort. In order to determine how well the alternatives would accommodate future traffic volumes, each of the alternatives was modeled and evaluated to determine future operational conditions. The modeling efforts were confined to the evening peak period, as this period has the highest existing volumes and is the peak period that is already experiencing operation issues for existing conditions. Traffic in the evening peak period tends to follow a pattern that is heavy from the south to north on the roadways in the study area.

The alternatives were modeled in Synchro traffic analysis software, and modeled in Rodel analysis software in the cases involving roundabouts, making assumptions about reasonable number of lanes and traffic control devices with 2035 traffic volumes as developed in the no-action analysis. Engineering judgment was used to reassign traffic to better use of north-south streets in an effort to prevent any single roadway from operating over capacity. Traffic was not split evenly between the north-south roadways, as most traffic was assumed to use the first available option from the east to the west; thus, if Whiteriver Avenue was an option for traffic this roadway was assigned a high traffic load, typically around 600 vehicles in the peak direction. A similar approach was used for each road in an east to west direction. For all alternatives, it was assumed that heavier traffic loads would be carried by Whiteriver Avenue,

Railroad Avenue, and any future Park Avenue extension. West Avenue and East Avenue were treated as secondary options with lower traffic volumes assigned to these roads.

The remaining objectives for this goal were evaluated using engineering judgment and a more qualitative approach.

Aesthetics/Urban Environment

The evaluation criteria for this objective are all qualitative in nature. The criteria include evaluating each alternative to determine how well each one provides opportunities for the City to create a gateway into the downtown area. Alternatives with roundabout intersections provide very good opportunities to create landscaped and architectural features that create a gateway and project the City's desired image to the road users. Other alternatives create roadway networks that would provide development and expansion of the downtown area to the south toward the Colorado River. Other alternatives use much more land and limit the amount of development that can occur. Each alternative was reviewed based on the conceptual layouts and intersections to determine how each one would achieve the City's objectives for this goal.

Safety

The evaluation criteria for safety focused on identifying the number of conflict points throughout the study area for both vehicles and pedestrians. Depending on the type of intersection and type of control that is included in the alternative, the number of conflict points would change for both vehicles and pedestrians. For vehicles, the number of conflicts points is lower at roundabout intersections or on one-way roadways compared to two-way roads or signalized intersections. For pedestrians, roundabouts create safety concerns due to the fact that vehicles are free to enter the intersection at all times without stopping, but reduce the speeds of the vehicles. Signalized intersections provide the pedestrians a safer way to cross the roadway under the protection of the signal, but do not necessarily reduce the number of potential conflicts with cars. One-way streets reduce the number of conflict points for pedestrians with vehicles, but the speed of vehicles may be higher. Each of the alternatives was scored based on a qualitative review of the roadway system and the number and type of expected conflict points.

Environmental Resources

The potential environmental impact of the different alternatives was another area primarily evaluated from a qualitative approach. The evaluation took into account social resources (anticipated noise levels to adjacent properties, access to business, etc.), physical resources (ROW, number of property acquisitions, historic/cultural properties, etc.), and natural resources (floodplains, water quality, wildlife habitat, etc.) that were identified during the data collection phase of the project to estimate the total level of impact each alternative would have if constructed. The goal is to minimize the impacts.

Ease of Implementation

This evaluation was also based on a qualitative approach with a moderate amount of quantitative analysis for preliminary screening. The recommended alternative is one that would be easy to construct, would have minimal impact to traffic operations during construction, would not be cost prohibitive, would be readily constructable, and would have reasonable yearly/life-cycle maintenance costs.

Results of the Preliminary Screening

After the goals, objectives, and evaluation criteria were developed, each of the nine preliminary alternatives were reviewed based on a good, neutral, and poor scoring system based on the previously discussed approaches. The following subsections describe the results of the preliminary screening analysis on a goal by goal approach.

Mobility

Each of the conceptual corridor alternatives was modeled with either the Synchro or Rodel traffic analysis software for future 2035 traffic volumes. The analysis focused on the primary intersections within each conceptual design, which is generally the eastern most intersection of SH13/US 6 or the eastern most roundabout. The analysis found that only one alternative (Alternative G: One-Way North-South Pairs) would accommodate all of 2035 traffic volumes without resulting in significant operations issues in the study area. The remaining alternatives would experience operations issues and breakdowns prior to reaching the year 2035 traffic volumes. The results of the analysis are shown in Table 10.

Table 10
Results for Preliminary Traffic Operations

Year	Alternative								
	A	B1	B2	C	D	E	F	G	H
2010									
2011									
2012									
2013									
2014									
2015									
2016									
2017									
2018									
2019									
2020									
2021									
2022									
2023									
2024									
2025									
2026									
2027									
2028									
2029									
2030									
2031									
2032									
2033									
2034									
2035									

White indicates good operations, gray indicates the onset of operational issues is expected to occur during this time period, and black indicates operational failures are expected to exist under the projected traffic volumes for these years.

The analysis was then repeated with the traffic volumes decreased by 3.3 percent annually (growth rate for the project) until operational issues were reduced to acceptable levels of operations (typically LOS D or better for most intersections and queues at the critical intersections were below 500 feet on all approaches). Table 10 shows how each of the alternatives would accommodate different levels of traffic volumes before experiencing a breakdown in operations. In general, the alternatives that included some type of roundabout as the main intersection were able to accommodate higher traffic volumes than the alternatives that had the main intersection controlled by a traffic signal.

Based on these results and other qualitative evaluations, the following scoring criteria were developed for the objectives of the mobility goal.

Meet Future Mobility and Traffic Operations Needs Along the SH 13/US 6 Corridor

The scoring criteria for this objective are:

- Good – Acceptable operations beyond 2030
- Neutral – Acceptable operations beyond 2020
- Poor – Acceptable operations end before 2020

Encourage Truck Traffic to Use West Rifle or SH 13 Bypass

Depending on the design of the alternative, the City would like to see pass-through traffic, especially commercial vehicles, not use city streets such as Railroad Avenue, but instead use the highways in the area to use the SH 13 Bypass, which could include existing I-70 at the West Rifle interchange. Currently, SH 13 travels north from I-70 and intersects with US 6 directly in-line with Railroad Avenue. Under this condition, commercial traffic is directed directly onto city streets in order to travel through the area. The alternatives that re-route the highways to the south toward the railroad would require commercial vehicles to make a series of turns to gain access to the city streets, which would be a disadvantage if they were passing through the area without making a local stop. Other alternatives would involve one or more roundabouts, which commercial vehicles would tend to avoid if they were passing through without stopping. Alternative G and H would still point commercial vehicles directly onto city streets and would do very little to discourage pass through traffic. The scoring criteria for this objective are:

- Good – Pass through commercial vehicle traffic would be less likely to use city streets
- Neutral – The alternative would not have much of an change to commercial vehicle using city streets
- Poor – Alternative could increase commercial vehicle traffic on city streets

Facilitate Improved Circulation In and Through the Downtown Street Network

Another objective of the City is to develop improvements that would improve circulation in the downtown area for the vehicles that have destinations within the city and for local residents. Under existing conditions, traffic from SH 13 and US 6 that wants to circulate in and through the downtown area primarily uses Railroad Avenue or Whiteriver Avenue. By making changes to the roadway network, traffic entering the city can be exposed to more north-south roadways providing the drivers with more options to circulate into and through the downtown area. The addition of Park Avenue would increase the number of options for north-south travel, but this roadway would be a part of all options so does not really figure into the evaluation. Other

alternatives would actually reduce the number of north-south roadways that drivers have access to and would not improve the situation. The scoring criteria for this objective are:

- Good – Improves north-south access into the downtown area
- Neutral – The alternative does not have a significant impact to north-south street access
- Poor – Access to north-south streets is reduced compared to existing conditions

Account for the Needs of Different Modes of Transportation

The City would like to implement improvements that would take into account the need of all modes of transportation (vehicles, pedestrians, transit users, and bicyclists). Because the project would be designing the improvements from the ground up, the design would incorporate features that ensure the needs of all transportation modes are met. This would include involving the City in the design process to ensure the different needs of its citizens are accounted for in the design. The scoring criteria for this objective are:

- Good – Alternative design would provide for the needs of all modes of transportation
- Neutral – Alternative design would not completely provide for the needs of all modes of transportation
- Poor – Alternative design would be deficient in providing for the needs of all modes of transportation

The results of the preliminary screening analysis for the mobility goal are presented in Table 11.

Table 11
Results for Preliminary Screening of Mobility

Project Objective	Alternative								
	A	B1	B2	C	D	E	F	G	H
Meet the future mobility and traffic operations needs along the SH 13/US 6 corridor	○	●	◑	●	◑	○	◑	○	●
Encourage truck traffic to use West Rifle and SH 13 Bypass	◑	○	◑	○	○	◑	○	●	●
Facilitate improved circulation in and through the downtown street network	◑	○	◑	○	◑	◑	○	◑	●
Account for the needs of different modes of transportation	○	○	○	○	○	○	○	○	○

● = *Alternative scores poorly in this criteria*
◑ = *Alternative is relatively neutral for this criteria*
○ = *Alternative scores good for this criteria*

Aesthetics/Urban Environment

The following objectives were identified for the aesthetics/urban environment goal.

Develop a Corridor Concept that Projects the City's Vision of Its Desired Image to Users

A key objective of the City is to improve the roadway network to improve operations, while still creating a design that allows the opportunity to create a gateway feature to the downtown area. Alternatives that create spaces where landscaping features and artwork can be added to the corridor allow the City to project their desired image onto the traveling public. Alternatives that include roundabouts or loop concepts would provide very good opportunities for gateway features. Other alternatives do not create as much space to create gateway features. The scoring criteria for this objective are:

- Good – Alternative provides an excellent opportunity to create gateway features
- Neutral – Alternative has some opportunity for smaller gateway features
- Poor – Alternative does not provide good opportunity to create gateway features

Create a Corridor Vision that is Compatible with the City's Goals and Adopted Concepts for the Downtown

Developing a roadway system that allows the City to expand its downtown to the south toward the Colorado River would meet another objective of the City. This objective is best achieved by creating a road system that does not create wide roadways (shorter crossing distances for pedestrians). Narrower roadways would be consistent with existing downtown area streets and would be similar conditions for pedestrian traffic. In addition, the recommended alternative should not use too much of the available land south of the existing highway alignment to ensure ample opportunity for development. The scoring criteria for this objective are:

- Good – Alternative creates an excellent opportunity to expand downtown to the south
- Neutral – Alternative creates a good opportunity to expand downtown to the south
- Poor – Alternative does not create much opportunity to expand the downtown

Facilitate Future Development/Redevelopment Adjacent to the Roadways

As the City expands its downtown to the south toward the Colorado River, the City would like to have a roadway system that promotes urban development and creates a pedestrian/visitor friendly environment to encourage people to walk around, shop, or visit new development. In addition, if the roadway system is designed so that development will have good visibility, easy access, adequate parking, and sufficient land to build adequately sized buildings, then business and development will be attracted to the area. A poor roadway design will not create a downtown area that will be attractive to new development, meaning the City's plans to expand may result in open lots and a lack of development. The scoring criteria for this objective are:

- Good – Alternative creates a roadway system that will be attractive to new development
- Neutral – Alternative may or may not be attractive to new development
- Poor – Alternative does not create a roadway system that will be attractive to new development

The results of the preliminary screening analysis for the aesthetics/urban environment goal are presented in Table 12.

Table 12
Results for Preliminary Screening of Aesthetics/Urban Environment

Project Objective	Alternative								
	A	B1	B2	C	D	E	F	G	H
Develop a corridor concept that projects the City's vision of its desired image to users	◑	○	○	○	○	○	●	●	●
Create a corridor vision that is compatible with the city's goals and adopted concepts for the Downtown	◑	○	○	○	◑	◑	○	◑	◑
Facilitate future development/redevelopment adjacent to the roadways	○	○	○	○	◑	◑	○	○	○

● = *Alternative scores poorly in this objective*
◑ = *Alternative is relatively neutral for this objective*
○ = *Alternative scores good for this objective*

Safety

The following objectives were identified for the safety goal.

Provide Safe Travel Conditions within the Area for All Users

Providing for a safe travel experience for all modes of transportation is an important goal for both the City and other stakeholders. A roadway system that minimizes the number of conflict points (i.e., locations where the paths of vehicles and/or pedestrians cross each other) enhances safety. There are many ways to achieve this, including the use of roundabouts that eliminate conflict points for vehicle to vehicle conflicts; however, roundabouts do create separate safety issues for pedestrians attempting to cross the roadway. Another option is to install traffic signals at intersections, which will improve the safety for crossing pedestrians, but could result in more vehicle to vehicle crashes. Yet another way to address safety is to implement one-way roadways, which reduce the number of vehicle-to-vehicle and vehicle-to-pedestrian conflicts, but may increase traffic speeds. The scoring criteria for this objective are:

- Good – Alternative design improves safety over no-action alternative
- Neutral – Alternative about as safe as no-action alternative
- Poor – Alternative not as safe as no-action alternative

The results of the preliminary screening analysis for the safety goal are presented in Table 13.

Table 13
Results for Preliminary Screening of Safety

Project Objective	Alternative								
	A	B1	B2	C	D	E	F	G	H
Provide safe travel conditions within the area for all users	○	○	◑	○	◑	◑	○	○	◑

● = *Alternative scores poorly in this objective*
◑ = *Alternative is relatively neutral for this objective*
○ = *Alternative scores good for this objective*

Environmental Resources

The following objectives were identified for the environmental resources goal.

Minimize Impacts to the Social, Physical, and Natural Environment

When improvements are being made to a roadway network, the project runs the risk of impacting the environmental resources in the area. Alternatives that keep the roadway improvements within the existing ROW, keep the improvements on existing alignments, or involve minimal amounts of re-routing of the roadway will typically have very little impact to environmental resources. Other alternatives involving re-routing of roads or significant expansion of the roadways tend to increase the potential to impact environmental resources in the area. The data collection phase of this study identified minimal resources in the areas where improvements are being studied. The scoring criteria for this objective are:

- Good – Low level of anticipated impacts to environmental resources
- Neutral – Moderate level of anticipated impacts to environmental resources
- Poor – High level of anticipated impacts to environmental resources

The results of the preliminary screening analysis for the environmental resources goal are presented in Table 14.

Table 14
Results for Preliminary Screening of Environmental Resources

Project Objective	Alternative								
	A	B1	B2	C	D	E	F	G	H
Minimize impacts to the social, physical and natural environment	○	○	◑	◑	●	◑	◑	◑	○

● = *Alternative scores poorly in this objective*
◑ = *Alternative is relatively neutral for this objective*
○ = *Alternative scores good for this objective*

Ease of Implementation

The ability to physically implement the recommended alternative is crucial to the success of the project. Because the preliminary screening was completed based on conceptual level designs, the exercise of evaluating the goal was mainly a qualitative one for the objectives.

Level of Anticipated Effort to Implement

Each of the alternatives will require additional study and design efforts prior to construction activity beginning. A project objective was to develop an alternative that would not require a large environmental study (NEPA) in order to clear the project for construction. Based on the data collection results and information gathered through the study process, it is believed that all of the alternatives would not require significant environmental study to obtain environmental clearance for construction, with Alternative G and H requiring the least work because these alternatives use the existing roadway configuration and widens mostly within existing ROW. These alternatives would also be the easiest to design and construct. The remaining alternatives

would all require a moderate amount of effort to complete the design work and construct the project. The scoring criteria for this objective are:

- Good – Likely would require a categorical exclusion and design would be relatively simple.
- Neutral – May involve the need to do more detailed environmental resource studies and the design may be more complicated
- Poor – Most likely will require a significant environmental study effort and the design may require significant effort to complete

Construction Impacts and Delay to Traffic

Each alternative was put through a conceptual level construction phasing analysis to identify the anticipated impacts to traffic during construction. Alternatives G and H would have minimal impact to operations because most of the improvements are within existing ROW and the improvements would not require major road closures or detours. On the other end of the spectrum, Alternative A would require the construction of an underpass in order to realign US 6 under SH 13. Due to grades and other issues to the east of the underpass location, it is likely that US 6 and/or SH 13 would be closed to traffic for an extended period of time while this portion of the improvements was being completed. This would result in significant detours, as the next exit from I-70 that would provide access to US 6 is approximately 4 miles to the west at West Rifle or seven miles to the east in the Town of Silt. Out of direction travel would be significant for vehicles and the impacts to residents and businesses just east of the city would be significant. The remaining alternatives would have some impacts to traffic operations (such as turn restrictions and temporary minor road closures), but could be phased in a manner as to limit the time duration and overall magnitude of the impacts. The scoring criteria for this objective are:

- Good – Alternative would have minimal impact to traffic during construction
- Neutral – Alternative would have moderate level of anticipated impacts traffic during construction and may result in some access impacts to the local businesses
- Poor – Alternative would have a high level of anticipated impacts to traffic during construction, including significant access impact to businesses and the likely need to close roadways for extended periods of time in order to construct the improvements

The Ability to Fund the Recommended Alternative

The ability to construct the recommended alternative will heavily depend on the ability of the City to fund the project due to the current and projected budgetary issues CDOT is facing. By looking at the magnitude of proposed improvements to the roadway system, each alternative was evaluated to determine the order of magnitude. Depending on the ability to phase the project into multiple phases also is a consideration for this objective. If the project can be phased from existing conditions to ultimate design, then the City could fund the project in multiple phases instead of having to fund the entire project at one time. Alternatives E, F, G, and H all involve use of much of the existing infrastructure, require addition of minor new roadways, or in the case of Alternative F, much of the improvements could be constructed without impacting existing roadways. These alternatives would be cheaper to construct or could be phased in a manner to allow the City to fund the project more easily. The scoring criteria for this objective are:

- Good – Project costs are anticipated to be low
- Neutral – Project costs are anticipated to be moderate
- Poor – Project costs are anticipated to be high

Ability to Implement Through Phased Construction

This objective is very closely tied to the previous objectives with much of the analysis already discussed. The ability to phase the construction of the project allows the City flexibility in funding the project as well as spreading out the impacts to traffic during construction. Some of the alternatives have a new road alignment along the railroad ROW. This road could be constructed first, without any impact to traffic, and then traffic could be routed onto this road while other improvements further to the north are being completed. With Alternative D, one of the two roundabouts could be constructed first and then at a later time the second one could be added. Other alternatives do not provide much flexibility and would require the construction to be completed in fewer steps with more impacts to traffic. Because of the structure work on Alternative A, this alternative has very little phasing flexibility and would require the project to be constructed all at once. The scoring criteria for this objective are:

- Good – Project would be easy to phase and would provide the City with options to construct and fund
- Neutral – Project would not provide as much flexibility to the City for phasing and funding options
- Poor – Project would be very difficult of phase and provide little funding flexibility for the City

Maintenance of Alternative and Other Issues

Because most of the roadways being improved are state owned and maintained facilities, CDOT is a crucial stakeholder in this project. The addition of lanes, ROW, traffic control devices, and possibly structures to the network would result in the possible increase in annual maintenance costs to CDOT. For example, Alternative C would create an east-west one-way couplet road network. This creates two highways where there is only one today. Each roadway would have its own drainage system, pavement, ROW, and traffic control devices that would all need to be maintained. Two roadways where there currently is only one could have a noticeable impact to annual maintenance costs to CDOT for this portion of their facilities. Other alternatives would add several traffic signals to the system which again would add costs to maintain, power the signals, and related equipment. Other alternatives like Alternatives F, G, and H either use existing roadways or the final design would be very similar to existing conditions, which would have minimal impact to the annual maintenance costs in the area for CDOT. The scoring criteria for this objective are:

- Good – Maintenance costs would be similar to no-action alternative
- Neutral – Maintenance costs would be moderately higher than no-action alternative
- Poor – Maintenance costs would be much higher than no-action alternative

Impacts to the Railroad

The UPRR currently has a line in operation that is just north of the Colorado River. The railroad currently owns the property that is adjacent to the river between SH 13 and Rifle Creek. Discussions with the railroad have indicated the ability to purchase or lease land from them if the land is used to construct a roadway and not for development reasons. The railroad would not allow the project to create any type of at-grade vehicle or pedestrian crossings as this would have a negative impact to operations and safety. None of the alternatives involve creating an at-grade crossing with the railroad, and thus would not have an impact to safety or operations. A handful of the alternatives do not require obtaining any railroad property in order to construct the

improvements. Alternatives B1, B2, C, D, and E would all require some property to be obtained in order to construct a roadway that is just north of the railroad. The scoring criteria for this objective are:

- Good – Very little or no anticipated impact to the railroad in terms of property or operations
- Neutral – Alternative would require obtaining railroad property but would not have an impact on operations
- Poor – Alternative would have significant impact to railroad including significant property acquisition and possible impacts to railroad operations

The results of the preliminary screening analysis for the ease of implementation goal are presented in Table 15.

Table 15
Results for Preliminary Screening of Ease of Implementation

Project Objective	Alternative								
	A	B1	B2	C	D	E	F	G	H
Level of anticipated effort to implement (e.g., to study, design, and construct)	◑	◑	◑	◑	◑	◑	◑	○	○
Construction impacts and delay to traffic	●	◑	◑	◑	◑	◑	◑	○	○
Ability to fund recommended alternative	●	◑	◑	◑	◑	◑	○	○	○
Ability to implement through phased construction	●	◑	◑	◑	◑	○	◑	○	○
Maintenance of alternative and other issues	●	◑	◑	●	◑	◑	○	○	○
Impacts to railroad	○	◑	◑	◑	◑	◑	○	○	○

● = *Alternative scores poorly in this objective*
◑ = *Alternative is relatively neutral for this objective*
○ = *Alternative scores good for this objective*

Preliminary Screening Recommendations

Based on the results of the preliminary screening, the project team identified the alternatives that best achieved the project goals and objectives for the City and stakeholders. The following is brief discussion on the recommendations for each of the alternatives. Each alternative was rated with either a ✗ if it was not recommended for further consideration or a ✓ if it was recommended for further consideration. A summary of the goals and objectives scoring is shown in Table 16, after the alternative recommendation discussion.

Alternative A ✗

Although this alternative did well with some of the goals such as mobility and safety, the overall difficulty to phase and construct the project, lack of ability to create the desired gateways and urban environment, and the overall expected high cost of the project were seen as being difficult to overcome. For these reasons, Alternative A was eliminated from further consideration.

Alternative B1 ✓

This alternative scored fairly well in most of the objectives and met most of the City goals for the project. The alternative did not score as well in the ease of implementation objective, but was viewed as an alternative that should be evaluated further. For these reasons, Alternative B1 was recommended for additional study.

Alternative B2 ✓

Like Alternative B1, this alternative scored fairly well in most of the objectives and met most of the City goals for the project. The alternative did not score as well in the ease of implementation objective, but was viewed as an alternative that should be evaluated further. For these reasons, Alternative B2 was recommended for additional study.

Alternative C ✗

This alternative scored fairly well in most of the objectives and met most of the City goals for the project. However, this alternative could not accommodate future traffic volumes beyond 2015 and creates two state owned facilities. For these reasons, Alternative C was eliminated from further consideration.

Alternative D ✗

This alternative scored relatively neutral on most of the objectives and was identified as having the potential to have the largest impact on the environmental resources in the area. The largest impact this alternative would create would be the need to eliminate access to several properties to the north of the existing highway, which would result in the City needing to purchase or relocate these properties. For these reasons Alternative D, was eliminated from further consideration.

Alternative E ✓

This alternative scored fairly well in most of the objectives and met most of the City goals for the project. The alternative would create some access issues similar to, but not to the extent of, Alternative D. Alternative E was recommended for additional study.

Alternative F ✗

Although this alternative scored relatively well in most of the objectives, this alternative did not meet some of the City's goals for the downtown area. Primarily, placing the highway directly through the center of the undeveloped land south of the existing roadway would have significant impacts to the ability to develop the downtown to the south toward the Colorado River. This would also create a large boulevard type roadway that creates a barrier between the existing downtown and the desire to get development to the Colorado River. For these reasons, Alternative F was eliminated from further consideration.

Alternative G ✗ (✓- could be implemented in combination with other alternatives)

Although this alternative scored very well in most of the objectives, this alternative was felt to not meet some of the City's goals for the downtown area. Primarily, the creation of one-way north-south roadways would increase traffic flow on city streets, could increase traffic speeds in residential areas, and may be difficult to implement from a political standpoint. Furthermore, the one-way streets could have a negative impact on the existing downtown area by taking traffic away from the businesses. Also, the one-way roads would not direct traffic toward the new

development that the City wants south and west of the existing SH 13/US 6/Railroad Avenue intersection. For these reasons, Alternative G was eliminated from further consideration, but could be used in the future when perceptions change or to delay the need for major improvements.

Alternative H ✓

This alternative did not score well in the mobility or urban environment objectives and would not meet many of the City's goals for the project. However, because this alternative is leaving the roadways in place and making improvements to existing alignments and within ROW, this alternative scored very well in the ease of implementation objective. Alternative H was recommended for additional study.

Table 16
Preliminary Screening Recommendations

Goal	Objective	Alternative								
		A	B1	B2	C	D	E	F	G	H
Mobility	Meet the future mobility and traffic operations needs along the SH 13/US 6 corridor	○	●	◑	●	◑	○	◑	○	●
	Encourage truck traffic to use West Rifle and SH 13 Bypass	◑	○	◑	○	○	◑	○	●	●
	Facilitate improved circulation in and through the downtown street network	◑	○	◑	○	◑	◑	○	◑	●
	Account for the needs of different modes of transportation	○	○	○	○	○	○	○	○	○
Aesthetics/Urban Environment	Develop a corridor concept that projects the City's vision of its desired image to users	◑	○	○	○	○	○	●	●	●
	Create a corridor vision that is compatible with the city's goals and adopted concepts for the Downtown	◑	○	○	○	◑	◑	○	◑	◑
	Facilitate future development/ redevelopment adjacent to the roadways	○	○	○	○	◑	◑	○	○	○
Safety	Provide safe travel conditions within the area for all users	○	○	◑	○	◑	◑	○	○	◑
Environmental Resources	Minimize impacts to the social, physical, and natural environment	○	○	◑	◑	●	◑	◑	◑	○
Ease of Implementation	Level of anticipated effort to implement (e.g., to study, design, and construct)	◑	◑	◑	◑	◑	◑	◑	○	○
	Construction impacts and delay to traffic	●	◑	◑	◑	◑	◑	◑	○	○
	Ability to fund recommended alternative	●	◑	◑	◑	◑	◑	○	○	○
	Ability to implement through phased construction	●	◑	◑	◑	◑	○	◑	○	○
	Maintenance of alternative and other issues	●	◑	◑	●	◑	◑	○	○	○
	Impacts to railroad	○	◑	◑	◑	◑	◑	○	○	○
Recommendation to carry forward to detailed screening analysis		×	✓	✓	×	×	✓	×	×	✓

● = *Alternative scores poorly in this objective*
◑ = *Alternative is relatively neutral for this objective*
○ = *Alternative scores good for this objective*
× = *Not recommended for further consideration*
✓ = *Recommended for further consideration*

6.1.4 Refining of Preliminary Alternatives

After the preliminary screening analysis, Alternative C was eliminated from further analysis and four alternatives were recommended for further study. However, during the public involvement process and through discussion with stakeholders, including the City and CDOT, Alternative C was viewed as a concept that addressed many of the City goals and objectives for the project. The project team decided to refine the design of Alternative C, specifically the east end of the option where most of the mobility issues were being observed. The project team developed two concepts to change the design. Alternative C1 creates a signalized intersection between SH 13/US 6 that would meter the flow of traffic into the one-way loop. Alternative C2 creates a roundabout intersection between SH 13/US 6/Whiteriver Avenue that better facilitates the flow of traffic into the east end of the one-way couplet concept.

It should be noted that CDOT staff provided the project team with approval to move forward with pursuing the one-way couplet concept even though it would involve creating two separate state facilities. A technical memorandum was prepared for CDOT to discuss one-way alternatives and their benefits and challenges related to the Rifle Gateway project. This memorandum is included as Appendix E. The two refinements to Alternative C are described in the following sections.

Alternative C1: One-Way Loop with Traffic Signal at SH 13/US 6

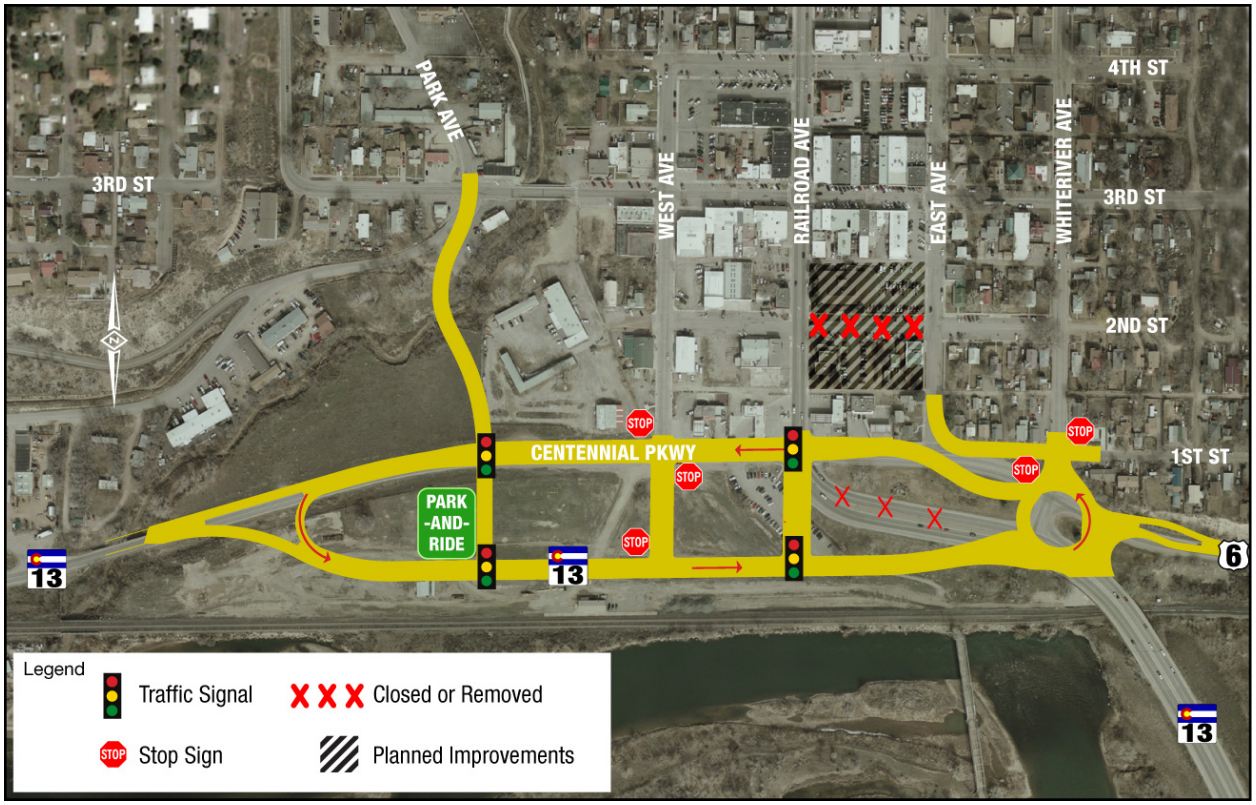
Alternative C1, shown in Figure 27, creates one-way roadways for all east-west traffic through the study area. Opposing directions of traffic on SH 13 between Whiteriver Avenue and the Rifle Creek bridge would be split into two separate roadways that create a large loop system. Westbound traffic would remain on the existing alignment of US 6 and SH 13 while eastbound traffic would be placed onto a new roadway that would parallel the railroad ROW between the Rifle Creek bridge east through the study area. This concept would allow for future development to be extended south from the current downtown area. Existing roadways could be extended to the south to provide sufficient circulation in and through the city. The eastbound and westbound roads that make up the loop would both be state facilities. The main intersection of SH 13/US 6 at the east end of the study area would be controlled by a traffic signal. This alternative would have traffic signals at both intersections for SH 13/Railroad Avenue and SH 13/Park Avenue.

Figure 27
Refined Alternative C1

Alternative C2: One-Way Loop with Roundabout at SH 13/US 6/Whiteriver Avenue

Alternative C2, shown in Figure 28, creates a one-way loop for all east-west traffic through the study area. Opposing directions of traffic on SH 13 between Whiteriver Avenue and the Rifle Creek bridge would be divided into two separate roadways that create a large loop system. Westbound traffic would remain on the existing alignment of US 6 and SH 13 while eastbound traffic would be placed onto a new roadway that would parallel the railroad ROW between the Rifle Creek bridge east through the study area. This concept would allow for future development to be extended south from the current downtown area. Existing roadways could be extended to the south to provide sufficient circulation in and through the city. The eastbound and westbound roads that make up the loop would both be state facilities. The main intersection of SH 13/US 6/Whiteriver Avenue at the east end of the study area would be controlled by a roundabout. This alternative would have signals at both intersections for SH 13/Railroad Avenue and SH 13/Park Avenue.

Figure 28
Refined Alternative C2



6.1.5 Detailed Screening of Alternatives

Alternative B1, Alternative B2, Alternative E, and Alternative H were recommended for further study through the preliminary screening process. Subsequent to the preliminary analysis, two refined alternatives (Alternative C1 and Alternative C2) were also added to the list of alternatives that were carried forward into the detailed screening analysis. The next step was to perform a more in depth analysis in an effort to identify a recommended alternative(s). In order to complete the detailed screening, the goals, objectives, and evaluation criteria from the preliminary screening process were refined to provide more in depth scoring of the alternatives. The detailed screening process was intended to be more quantitative compared to the preliminary screening phase of the project.

Detailed Screening Goals

The goals identified as part of the preliminary screening phase of this project were maintained for the detailed screening phase. The goals include mobility, aesthetics/urban environment, safety, environmental resources, and ease of implementation. The goals are shown down the far left column of Table 17.

Table 17
Detailed Screening Goals, Objectives, and Evaluation Criteria

Goal	Project Objective	Evaluation Criteria/Measures of Effectiveness (MOEs)
Mobility	Meet the future mobility and traffic operations needs along the SH 13/US 6 corridor	Intersection LOS
		Intersection queues
	Encourage truck traffic to use West Rifle and SH 13 Bypass	Ease of movement for trucks through the recommended alternative
	Facilitate improved circulation in and through the downtown street network	Effectiveness of the Park Avenue Extension design
		Effectiveness of the 2nd Street Extension design
		Effectiveness of the existing north/south street network
	Account for the needs of different modes of transportation	Impact to transit vehicle operations
		Impact to transit riders
		Impact to bicycle riders
		Impact to pedestrians
		Impact to rideshare users
Aesthetics/ Urban Environment	Develop a corridor concept that projects the City's vision of its desired image to users	Are the roadway improvements compatible with the City's goals for the gateway design?
	Create a corridor vision that is compatible with the city's goals and adopted concepts for the Downtown	Impacts to parking
		Impacts to roadway concepts
		Is the alternative compatible with the developed concepts for the downtown environment?
		Promote the City's goal of extending the downtown grid to the UPRR tracks
	Identify future ROW needs to facilitate future development/redevelopment adjacent to the roadways	Amount of developable land

Table 17
Detailed Screening Goals, Objectives, and Evaluation Criteria

Goal	Project Objective	Evaluation Criteria/Measures of Effectiveness (MOEs)
Safety	Provide safe travel conditions within the area for all users	Impacts to pedestrian/bicycle safety
		Impacts to transit rider safety
		Impacts to vehicle safety
Environmental Resources	Minimize impacts to the social, physical and natural environment	Number of property impacts (partial takes)
		Number of property impacts (full takes)
		Number of impacts to business operations (access and parking)
		Number of cultural and historic property impacts
		Impact to riparian habitat (acres)
		Impact to Threatened and Endangered Species
		Water quality effects (square yards of additional impervious surface)(potential treatment areas)
		Hazardous materials impacts
		Floodplain impacts (acres)
		Parks and recreational impacts
		Number of potential properties affected by noise impacts
		Impacts to residential neighborhood traffic
		Impacts to residential neighborhoods
Ease of Implementation	Level of anticipated effort to implement (e.g., to study, design, and construct)	Overall effort to take alternative from study to construction
	Construction impacts and delay to traffic	Ability to maintain traffic operations during construction
	Ability to fund recommended alternative	Overall estimated costs of alternative
	Ability to implement through phased construction	Overall ease to phase the construction of the alternative
	Maintenance of alternative and other issues	Anticipated costs associated with yearly maintenance
	Impacts to railroad	Amount of land necessary to obtain from railroad

6.1.6 Detailed Screening Objectives

The project objectives developed during the preliminary screening analysis were maintained for the detailed screening process. The project objectives are in the first column of Table 17.

Detailed Screening Evaluation Criteria

Evaluation criteria for detailed screening was further refined from the preliminary screening criteria to allow more quantitative definition of impacts and alternatives. The evaluation criteria are listed in Table 17.

Results of the Detailed Screening

Each of the five alternatives carried forward into the detailed screening were evaluated based on the detailed criteria shown in Table 17. The following subsections describe the results of the detailed screening on a goal-by-goal approach.

Mobility

A similar traffic operations analysis was completed for each of the refined Alternatives C1 and C2 to determine how much traffic each one could accommodate. The results of the analysis are shown in Table 18.

In general, Alternative C1 provides reasonable operations for approximately 20 years before the system would begin to break down and need of additional improvements. For Alternative C2, the implementation of a roundabout instead of the traffic signal at the critical intersection would result in acceptable operations extending an additional five to seven years into the future and, one less signal would be required.

Table 18
Results for Traffic Operations for Refined Alternatives

Year	Alternative	
	C1	C2
2010		
2011		
2012		
2013		
2014		
2015		
2016		
2017		
2018		
2019		
2020		
2021		
2022		
2023		
2024		
2025		
2026		
2027		
2028		
2029		
2030		
2031		
2032		
2033		
2034		
2035		

White indicates good operations, gray indicates the onset of operational issues is expected to occur during this time period, and black indicates operational failures are expected to exist under the projected traffic volumes for these years.

The mobility criteria and evaluation thresholds are shown in Table 19 and the evaluation thresholds with qualitative criteria are described following the table.

Table 19
Mobility Evaluation Thresholds

Objective	Evaluation Criteria	Evaluation Thresholds		
		○ (Good)	◑ (Neutral)	● (Poor)
Meet the future mobility and traffic operations needs along the SH 13/US 6 corridor.	Intersection LOS	High % operate ≥ LOS C	High % operate LOS D to E	High % operate ≤ LOS F
	Intersection queues	Worst queues are less than 300 feet in length	Worst queues are between 300 and 500 feet in length	Worst queues are greater than 500 feet in length
Encourage truck to use West Rifle and SH 13 Bypass	Ease of movement for trucks through the recommended alternative	Highly encourages selected alternative route	Does not encourage alternative route	Encourages traffic through downtown
Facilitate better circulation in and through the downtown street network	Effectiveness of the Park Avenue Extension design	Improves access and circulation compared to No-Action Alternative	Similar to No-Action Alternative	Does not improve access and circulation compared to No-Action Alternative
	Effectiveness of the 2nd Street Extension design	Improves access and circulation compared to No-Action Alternative	Similar to No-Action Alternative	Does not improve access and circulation compared to No-Action Alternative
	Effectiveness of the existing north/south street network	Provides more options for access to CBD	Similar to No-Action Alternative	Provides fewer options for access to CBD
Account for the needs of different modes of transportation	Impact to transit vehicle operations	Few operational issues	Moderate level of operations issues	High level of operations issues
	Impact to transit riders	Improved facilities	Minimal improvements to minor impacts to facilities	High level of impact to facilities
	Impact to bicycle riders	Improved facilities	Minimal improvements to minor impacts to facilities	High level of impact to facilities
	Impact to pedestrians	Improved facilities	Minimal improvements to minor impacts to facilities	High level of impact to facilities
	Impact to rideshare users	Improved facilities	Minimal improvements to minor impacts to facilities	High level of impact to facilities

CBD = Central Business District.

Two evaluation criterions were used to evaluate how well each alternative was able to process the expected traffic volumes for future conditions. The first mobility criterion is intersection LOS, which is intended to identify how well the intersections can process traffic demand levels. In other words, does the alternative have sufficient laneage and traffic control to allow the intersections to process vehicles in an efficient manner to reduce delays and queues? Intersection operations were evaluated using traffic simulation software to determine average vehicle delays, which can then be equated to a level of service based on definitions provided in the Highway Capacity Manual. The guidelines for determining the rating of this measure are:

- Good – A majority of the intersections in the study area operate at LOS C or better
- Neutral – The alternative has more intersections operating at LOS D or E
- Poor – The majority of intersections operate at LOS F

The second mobility criterion is intersection queues, which is intended to identify the level of queuing that is anticipated to occur at the critical intersections in the network (primarily the intersections along US 6 and SH 13). Based on modeling of the alternative under future traffic volumes—what are the projected queues on the approaches? Intersection queues were evaluated using traffic simulation software to determine average queue lengths. The guidelines for determining the rating of this measure are:

- Good – A majority of queues were projected to be less than 300 feet (less than one typical block length in Rifle) in length and not spill back into adjacent intersections
- Neutral – Queues were projected to be up to 500 feet in length and could start to impact operations at adjacent intersections
- Poor – Project queues were often longer than 500 feet in length and did result in operational impacts at adjacent intersections

The ease of movement for trucks through the recommended alternative is intended to identify if the alternative would encourage truck traffic to use West Rifle and the SH 13 Bypass. This is a qualitative assessment based on the design layout. The guidelines for determining the rating of this measure are:

- Good – Highly encourages an alternate route; design elements such as roundabouts and turning radii do not encourage the turning movements of truck traffic into the Central Business District
- Neutral – Does not encourage an alternate route; alternate routes are provided for truck traffic; however, no geometric controls were used to discourage traffic through the Central Business District
- Poor – Encourages truck traffic through downtown; the main alignment and roadway geometrics funnel truck traffic into the Central Business District

Although the Park Avenue and 2nd Street extensions will be put through a separate screening process, the general layout and connection to the SH 13/US 6 alternative is analyzed. The effectiveness of the Park Avenue extension design and 2nd Street extension design were evaluated qualitatively using the following measures:

- Good – Improves access and circulation compared to the No-Action Alternative
- Neutral – Access and circulation are similar to the No-Action Alternative
- Poor – Does not improves access and circulation compared to the No-Action Alternative

Facilitating improved circulation in and through the downtown street network is essential to compliment the City's goals for the downtown environment. The SH 13/US 6 design and existing north/south street network were evaluated using the following measures for thresholds:

- Good – Provides additional access options to the Central Business District
- Neutral – Access options to the Central Business District are similar to the No-Action Alternative
- Poor – Reduces access options to the Central Business District

Impacts to transit vehicles were evaluated operationally. The impacts were qualitative in nature; threshold guidelines are:

- Good – Few operational issues
- Neutral – Moderate level of operational issues
- Poor – High level of operational issues

Several modes of transportation were evaluated for each alternative. Impacts to transit operations, transit users, and pedestrians were evaluated qualitatively. The threshold determinations are:

- Good – Improved facilities for transit riders, bicyclists, pedestrians, and rideshare users
- Neutral – Minimal improvements to facilities to minor impacts for transit riders, bicyclists, pedestrians and rideshare users
- Poor – High level of impact to facilities for transit riders, bicyclists, pedestrians, and rideshare users

A summary of the scoring of the evaluation thresholds for each alternative is shown in Table 20.

Table 20
Summary of Evaluation Thresholds for Mobility

Evaluation Criteria	Alternative					
	B1	B2	C1	C2	E	H
Intersection LOS	◑	◑	◑	◑	◑	●
Intersection queues	◑	◑	◑	◑	◑	●
Ease of movement for trucks through the recommended alternative	○	○	○	○	◑	●
Effectiveness of the Park Avenue Extension design	○	○	○	○	○	○
Effectiveness of the 2nd Street Extension design	○	○	○	○	○	○
Effectiveness of the existing north/south street network	○	○	○	○	●	●
Impact to transit vehicle operations	●	◑	○	○	◑	●
Impact to transit riders	○	○	○	○	○	○
Impact to bicycle riders	○	○	○	○	○	○
Impact to pedestrians	○	○	○	○	○	○
Impact to rideshare users	○	○	○	○	○	●

● = *Alternative scores poorly in this objective*
◑ = *Alternative is relatively neutral for this objective*
○ = *Alternative scores good for this objective*

Aesthetics/Urban Environment

Aesthetics and urban environment development are vital in developing a positive and unique identity for the City of Rifle. The goal is to incorporate the Central Business District's theme into improvements of the regional highways. Evaluation criteria and thresholds are shown in Table 21.

Each alternative's roadway improvements were evaluated to determine if they were compatible with the City's goals for the gateway design and downtown environment. The qualitative evaluation threshold criteria are:

- Good – Highly compatible
- Neutral – Neither compatible nor incompatible
- Poor – Is not compatible

Aesthetics are also incorporated into roadway concepts, wayfinding, and streetscaping; the streetscaping can impact parking. Impacts to parking and roadway concepts were qualitatively evaluated using the following threshold criteria:

- Good – No impacts to roadway design, increases parking
- Neutral – Minimal impacts to roadway design, available parking is approximately equal to no-action alternative
- Poor – Significant impacts to roadway design, decreases available parking

The City's goal of extending the downtown grid to the UPRR tracks was evaluated using the following threshold criteria:

- Good – Achieves the goal
- Neutral – Portions of alternative achieve the goal
- Poor – Does not achieve the goal

Finally, each alternative was evaluated to determine how well the final configuration of the roadways left parcels of adequate size so that development could occur. The following threshold criteria were used to evaluate this goal:

- Good – Provides a high level of easily developable land units
- Neutral – Provides a moderate level of developable land units
- Poor – Provides a low level of developable land units

Table 21
Aesthetics and Urban Environment Evaluation Thresholds

Objective	Evaluation Criteria	Evaluation Thresholds		
		○ (Good)	◑ (Neutral)	● (Poor)
Develop a corridor concept that projects the City's vision of its desired image to users	Are the roadway improvements compatible with the City's goals for the gateway design?	Highly compatible	Same as	Is not compatible
Create a corridor vision that is compatible with the City's goals and adopted concepts for the Downtown	Impacts to parking	No impacts	Minimal impacts	Significant impacts
	Impacts to roadway concepts	No impacts	Minimal impacts	Significant impacts
	Is the alternative compatible with the developed concepts for the downtown environment?	Highly compatible	Same as	Is not compatible
	Promote the City's goal of extending the downtown grid to the UPRR tracks	Achieves goal	Similar to No-Action Alternative	Does not achieve goal
Facilitate future development/redevelopment adjacent to the roadways	Amount of developable land	High level of developable land units (6 or more acres)	Moderate level of developable land units (5 to 6 acres)	Low level of developable land units (less than 5 acres)

A summary of the scoring of the evaluation thresholds for each alternative is shown in Table 22.

Table 22
Summary of Evaluation Thresholds for Aesthetics and Urban Environment

Evaluation Criteria	Alternative					
	B1	B2	C1	C2	E	H
Are the roadway improvements compatible with the City's goals for the gateway design?	◑	○	◑	○	○	◑
Impacts to parking	○	○	○	○	○	●
Impacts to roadway concepts	●	◑	○	○	◑	●
Is the alternative compatible with the developed concepts for the downtown environment?	○	○	○	○	◑	◑
Promote the City's goal of extending the downtown grid to the UPRR tracks	○	○	○	○	◑	●
Amount of developable land	○	○	○	○	●	◑

● = *Alternative scores poorly in this objective*
◑ = *Alternative is relatively neutral for this objective*
○ = *Alternative scores good for this objective*

Safety

The project's objective for safety is to provide safe travel conditions within the area for all users. The three main user groups were classified as pedestrians/bicyclists, transit riders, and vehicles or motorists. The safety evaluation criteria and measures are shown in Table 23.

Safety of pedestrians and bicyclists was evaluated qualitatively based on proposed uncontrolled crossings. The evaluation thresholds are:

- Good – Reduces the number of uncontrolled crossings
- Neutral – Similar number of uncontrolled crossings as the No-Action Alternative
- Poor – Increases the amount of uncontrolled crossings

The safety of transit users was evaluated qualitatively based on accessibility of current and proposed route stops. The evaluation thresholds are:

- Good – Access to stops is improved
- Neutral – Assess to stops remains the same
- Poor – There is a degradation in access to stops

Vehicular and motorist safety was evaluated qualitatively based on conflict points such as intersections and accesses. The evaluation thresholds are:

- Good – Fewer conflict points than the existing condition or No-Action Alternative
- Neutral – Conflict points are equivalent to the No-Action Alternative
- Poor – More conflict points than the No-Action Alternative

Table 23
Safety Evaluation Thresholds

Objective	Evaluation Criteria	Evaluation Thresholds		
		○ **(Good)**	◑ **(Neutral)**	● **(Poor)**
Provide safe travel conditions within the area for all users	Impacts to pedestrian/bicycle safety	Fewer uncontrolled crossings	Similar number of uncontrolled crossing as No-Action Alternative	More uncontrolled crossings
	Impacts to transit rider safety	Improved access to stops	Access same as No-Action Alternative	Degradation in access to stops
	Impacts to vehicle safety	Fewer conflict points	No change	More conflict points

A summary of the scoring of the evaluation thresholds for each alternative is shown in Table 24.

Table 24
Summary of Evaluation Thresholds for Safety

Evaluation Criteria	Alternative					
	B1	B2	C1	C2	E	H
Impacts to pedestrian/bicycle safety	○	◑	◑	◑	●	◑
Impacts to transit rider safety	○	○	○	○	○	○
Impacts to vehicle safety	◑	○	○	○	○	●

● = *Alternative scores poorly in this objective*
◑ = *Alternative is relatively neutral for this objective*
○ = *Alternative scores good for this objective*

Environmental

This group of evaluation criteria centers on the importance of avoiding and/or minimizing impacts to the social, physical, and natural environment. Evaluation criteria and thresholds are shown in Table 25.

The severity of property impacts for full takes and partial takes are quantitative. Impacts to riparian habitat, water quality, hazardous material sites, floodplains, parks and recreational sites, and noise were also calculated and evaluated quantitatively.

The impacts to business operations are measured by impacts to access and parking. The guidelines for determining the value of the measure are:

- Good – Low; accesses remain in their current location, no change in parking
- Neutral – Medium; changes the function of the access (i.e., full movement to right-in/right-out); minor parking impacts
- Poor – High; moves or eliminates an access, major parking impacts

Impacts to cultural and historic properties were evaluated at a qualitative level for this study. The guidelines for determining the value of the measure are as follows:

- Good – No impacts; entire alternative avoids potential and listed sites
- Neutral – Potential to impact; the alternative is in the proximity of potential and listed sites
- Poor – Definite impacts; alternative is within the boundary of potential and listed sites

Impacts to threatened and endangered species were evaluated at a qualitative level for this study. As discussed in Subsection 4.2.1, Special Status Species, the species listed for the project area will most likely be found in rivers, streams, floodplains, and/or riparian areas. The guidelines for determining the value of the measure are:

- Good – No impacts; alternative avoids improvements near rivers, floodplains, and riparian areas.
- Neutral – Potential to impact; the alternative is in proximity of rivers, floodplains, and riparian areas
- Poor – Definite impacts; alternative has significant changes near the Rifle Creek including the surrounding floodplain and associated riparian areas

Table 25
Environmental Evaluation Thresholds

Objective	Evaluation Criteria	Evaluation Thresholds		
		○ (Good)	◑ (Neutral)	● (Poor)
Minimize impacts to the social, physical, and natural environment	Number of property impacts (partial takes)	4 or fewer	5 to 9	10 or more
	Number of property impacts (full takes)	1 or fewer	2 to 3	4 or more
	Number of impacts to business operations (access and parking)	Low	Medium	High
	Cultural and historic property impacts	No impacts	Potential to impact	Definite impacts
	Impact to riparian habitat (acres)	.1 or fewer	.11 to .99	1.0 or more
	Impact to Threatened and Endangered Species	No impacts	Potential to impact	Definite impacts
	Water quality effects (acres of additional impervious surface)(potential treatment areas)	2.0 or fewer	2.1 to 4.0	4.1 or more
	Hazardous materials impacts (sites)	2 or fewer	3 to 4	5 or more
	Floodplain impacts (acres)	.015 or fewer	.016 to .050	.051 or more
	Parks and recreational impacts (sites)	1 or fewer	2 to 3	4 or more
	Number of potential properties affected by noise impacts	1 or fewer	2 to 4	5 or more
	Impacts to residential neighborhood traffic	Decrease in travel time	Similar to No-Action Alternative	Increase in travel time
	Impacts to residential neighborhoods	Decrease in neighborhood traffic volumes	Similar to No-Action Alternative	Increase in neighborhood traffic volumes

Impacts to surrounding residential neighborhoods were measured by travel times and traffic volumes. The evaluations were qualitative and used the following measures:

- Good – Travel times and traffic volumes were decreased
- Neutral – Travel times and traffic volumes were similar to the No-Action Alternative
- Poor – Travel times and traffic volumes were increased

A summary of the scoring of the evaluation thresholds for each alternative is shown in Table 26.

Table 26
Summary of Evaluation Thresholds for Environmental

Evaluation Criteria	Alternative					
	B1	B2	C1	C2	E	H
Number of property impacts (partial takes)	◑	◑	◑	◑	◑	●
Number of property impacts (full takes)	○	○	○	○	○	○
Number of impacts to business operations (access and parking)	○	○	◑	◑	●	●
Cultural and historic property impacts	◑	◑	◑	◑	◑	◑
Impact to riparian habitat (acres)	◑	◑	◑	◑	◑	○
Impact to Threatened and Endangered Species	◑	◑	◑	◑	◑	○
Water quality effects (acres of additional impervious surface)(potential treatment areas)	◑	◑	◑	◑	●	◑
Hazardous materials impacts (sites)	◑	◑	◑	◑	○	◑
Floodplain impacts (acres)	○	◑	◑	◑	○	●
Parks and recreational impacts (sites)	○	○	○	○	○	○
Number of potential properties affected by noise impacts	○	◑	◑	◑	○	○
Impacts to residential neighborhood traffic	◑	◑	○	○	○	●
Impacts to residential neighborhoods	○	○	○	○	○	●

● = *Alternative scores poorly in this objective*
◑ = *Alternative is relatively neutral for this objective*
○ = *Alternative scores good for this objective*

Ease of Implementation

The ease of implementation goal focuses on the ability to turn each alternative from a concept into a design that can be funded and constructed. All of the criteria were qualitative with the exception of required funding. Evaluation criteria and thresholds are shown in Table 27.

The anticipated effort to implement was evaluated based on the complexity of an environmental clearance, alternative design, and construction effort. Guidelines used for this measure are:

- Good – Low level of effort; the environmental clearance would be a categorical exclusion, the design and construction are straightforward
- Neutral – Medium level of effort; the environmental clearance may involve a categorical exclusion or environmental assessment, portions of the design and construction would require additional analysis
- Poor – High level of effort; the environmental process may require an environmental assessment or an environmental impact statement, the design and construction would require additional analysis

Table 27
Implementation Evaluation Thresholds

Objective	Evaluation Criteria	Evaluation Thresholds		
		○ (Good)	◑ (Neutral)	● (Poor)
Level of anticipated effort to implement (e.g., to study, design, and construct)	Overall effort to take alternative from study to construction	Low	Medium	High
Construction impacts and delay to traffic	Ability to maintain traffic operations during construction	Low	Medium	High
Ability to fund recommended alternative	Overall estimated costs of alternative	$0-$5 million	$5-$10 million	+ $10 million
Ability to implement through phased construction	Overall ease to phase the construction of the alternative	High	Medium	Low
Maintenance of alternative	Anticipated costs associated with yearly maintenance	Lower than existing	Same as	Higher than existing
Impacts to railroad	Amount of land necessary to obtain from railroad	No impacts	Minimal impacts	High level of impacts

The construction impacts are measured by a qualitative impact on traffic. Guidelines used for this measure are:

- Good – Low impact to traffic
- Neutral – Medium impact to traffic
- Poor – High impact to traffic

Construction phasing is based on the geometric alignment of each alternative. Guidelines used for this measure are:

- Good – High; likely that construction can be phased
- Neutral – Medium; segments of the project can be phased
- Poor – Low; not able to phase major elements of the project

Maintenance of each alternative was evaluated using the following measures:

- Good – Lower effort and cost of maintenance than existing conditions
- Neutral – Effort and cost of maintenance equivalent to existing conditions
- Poor – Increased effort and cost of maintenance than existing conditions

The impacts to the railroad for each alternative were evaluated using the following measures:

- Good – Very little or no anticipated impact to the railroad in terms of property or operations
- Neutral – Alternative would require obtaining railroad property but would not have an impact on operations
- Poor – Alternative would have significant impact to railroad including significant property acquisition and possible impacts to railroad operations

A summary of the scoring of the evaluation thresholds for each alternative is shown in Table 28.

Table 28
Summary of Evaluation Thresholds for Ease of Implementation

Evaluation Criteria	Alternative					
	B1	B2	C1	C2	E	H
Overall effort to take alternative from study to construction	◑	◑	◑	◑	◑	○
Ability to maintain traffic operations during construction	◑	◑	◑	◑	●	○
Overall estimated costs of alternative	●	●	●	●	●	○
Overall ease to phase the construction of the alternative	◑	◑	◑	◑	●	○
Anticipated costs associated with yearly maintenance	●	●	●	●	●	○
Amount of land necessary to obtain from railroad	◑	◑	◑	◑	●	○

● = *Alternative scores poorly in this objective*
◑ = *Alternative is relatively neutral for this objective*
○ = *Alternative scores good for this objective*

Selection of Recommended Conceptual Corridor Alternative

Based on the results of the detailed screening, the project team identified alternative C2 as the alternative that best achieved the project goals and objectives. The key features of this alternative that lead to the recommendation included:

- Long-term mobility potential
- Potential expansion to combine north-south one-way pairs (Alternative G)
- Narrower street crossings for pedestrians
- Amount of developable land remaining
- Compatibility with existing developed concepts for the downtown environment
- Gateway feature potential
- Fewer potential traffic signals

Table 29 summarizes the detailed screening scoring for each goal and objective.

Table 29
Summary of Evaluation Thresholds for Recommended Conceptual Corridor Alternative

Goal	Evaluation Criteria	Alternative					
		B1	B2	C1	C2	E	H
Mobility	Intersection LOS	◑	◑	◑	◑	◑	●
	Intersection queues	◑	◑	◑	◑	◑	●
	Ease of movement for trucks through the recommended alternative	○	○	○	○	◑	●
	Effectiveness of the Park Avenue Extension design	○	○	○	○	○	○
	Effectiveness of the 2nd Street Extension design	○	○	○	○	○	○
	Effectiveness of the existing north/south street network	○	○	○	○	●	●
	Impact to transit vehicle operations	●	◑	○	○	◑	●
	Impact to transit riders	○	○	○	○	○	○
	Impact to bicycle riders	○	○	○	○	○	○
	Impact to pedestrians	○	○	○	○	○	○
	Impact to rideshare users	○	○	○	○	○	●
Aesthetics/Urban Environment	Are the roadway improvements compatible with the City's goals for the gateway design?	◑	○	◑	○	○	◑
	Impacts to parking	○	○	○	○	○	●
	Impacts to roadway concepts	●	◑	○	○	◑	●
	Is the alternative compatible with the developed concepts for the downtown environment?	○	○	○	○	◑	◑
	Promote the City's goal of extending the downtown grid to the UPRR tracks	○	○	○	○	◑	●
	Amount of developable land	○	○	○	○	●	◑

Table 29
Summary of Evaluation Thresholds for Recommended Conceptual Corridor Alternative

Goal	Evaluation Criteria	Alternative					
		B1	B2	C1	C2	E	H
Safety	Impacts to pedestrian/bicycle safety	○	◑	◑	◑	●	◑
	Impacts to transit rider safety	○	○	○	○	○	○
	Impacts to vehicle safety	◑	○	○	○	○	●
Environmental	Number of property impacts (partial takes)	◑	◑	◑	◑	◑	●
	Number of property impacts (full takes)	○	○	○	○	○	○
	Number of impacts to business operations (access and parking)	○	○	◑	◑	●	●
	Cultural and historic property impacts	◑	◑	◑	◑	◑	◑
	Impact to riparian habitat (acres)	◑	◑	◑	◑	◑	○
	Impact to Threatened and Endangered Species	◑	◑	◑	◑	◑	○
	Water quality effects (acres of additional impervious surface)(potential treatment areas)	◑	◑	◑	◑	●	◑
	Hazardous materials impacts (sites)	◑	◑	◑	◑	○	◑
	Floodplain impacts (acres)	○	◑	◑	◑	○	●
	Parks and recreational impacts (sites)	○	○	○	○	○	○
	Number of potential properties affected by noise impacts	○	◑	◑	◑	○	○
	Impacts to residential neighborhood traffic	◑	◑	○	○	○	●
	Impacts to residential neighborhoods	○	○	○	○	○	●
Ease of Implementation	Overall effort to take alternative from study to construction	◑	◑	◑	◑	◑	○
	Ability to maintain traffic operations during construction	◑	◑	◑	◑	●	○
	Overall estimated costs of alternative	●	●	●	●	●	○
	Overall ease to phase the construction of the alternative	◑	◑	◑	◑	●	○
	Anticipated costs associated with yearly maintenance	◑	◑	●	●	●	○
	Amount of land necessary to obtain from railroad	◑	◑	◑	◑	●	○
Recommendation to carry forward as recommended conceptual corridor alternative		×	×	×	✓	×	×

● = *Alternative scores poorly in this objective*
◑ = *Alternative is relatively neutral for this objective*
○ = *Alternative scores good for this objective*
× = *Not recommended for further consideration*
✓ = *Recommended for further consideration*

Figure 29
Recommended Conceptual Corridor Alternative

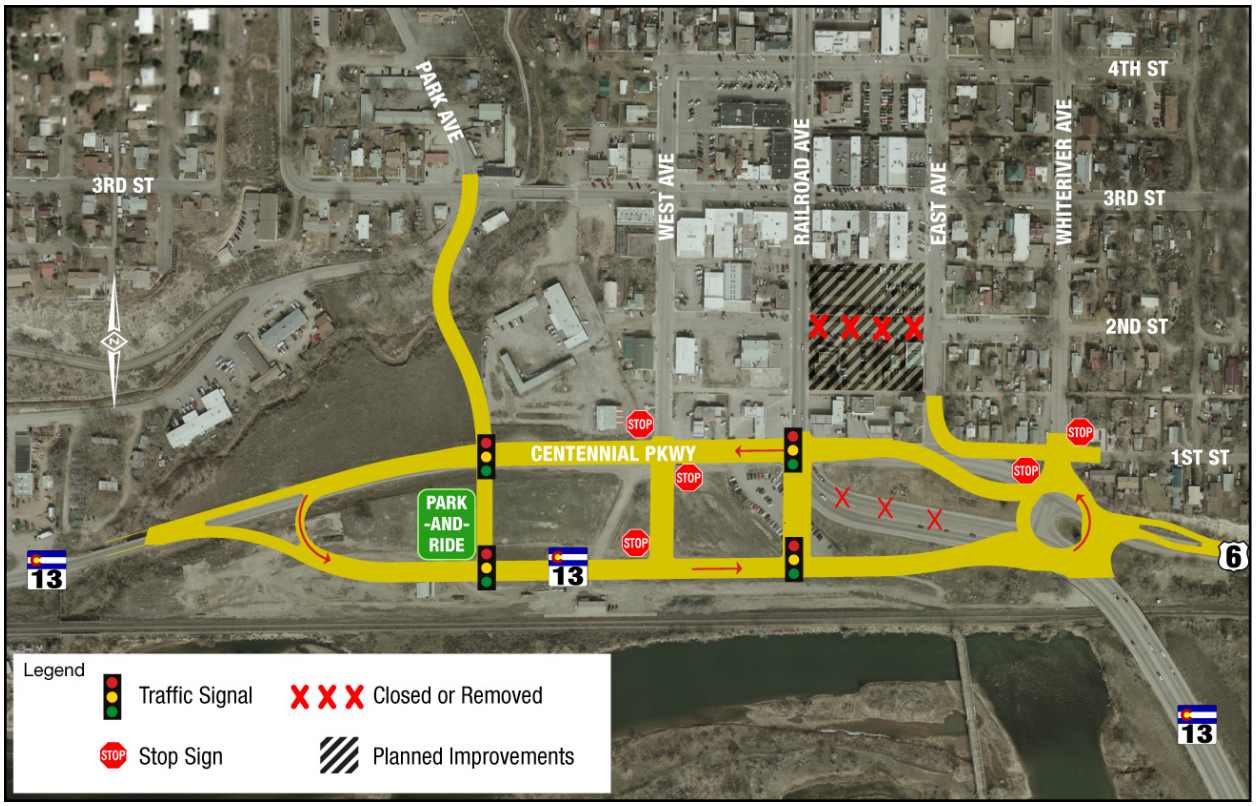
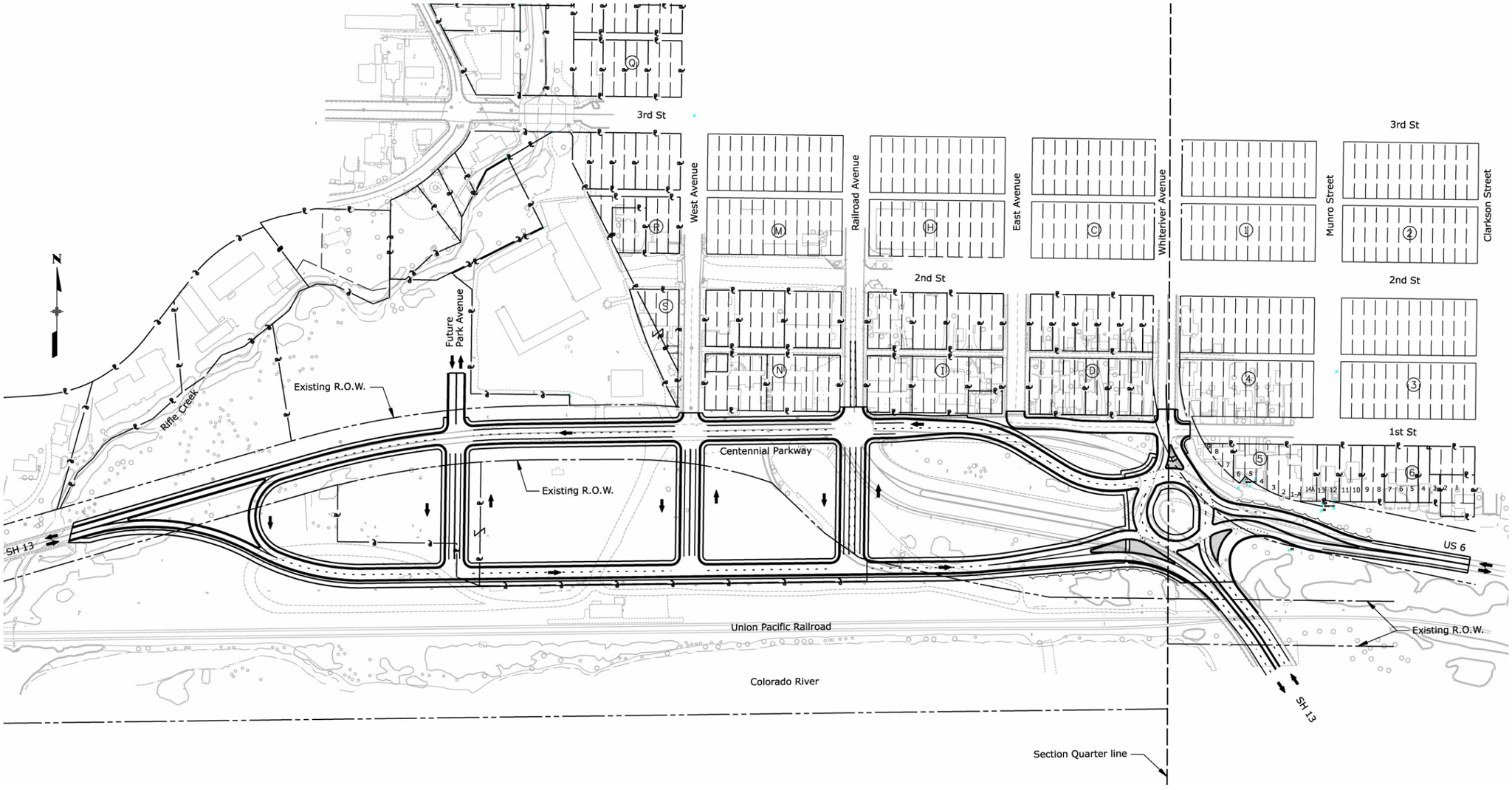


Figure 30
Detailed Layout of the Recommended Conceptual Corridor Alternative



Recommended Conceptual Corridor Alternative notes:

1. Horizontal alignments are approximate and subject to revision during preliminary design.
2. Typical section widths and features are intended to show general conceptual corridor layout and are subject to revision during preliminary design. These widths and features include, but are not limited to, lane widths and number of lanes, shoulder widths, auxiliary lane location and widths, bike lanes, parking lanes, sidewalks, and right-of-way width.

This page intentionally left blank.

A conceptual cost estimate was developed for the recommended conceptual corridor alternative as shown in Table 30. The cost estimate is based on 2010 unit prices. Right of way costs are not included.

Table 30
Estimate of Probable Cost – Recommended Conceptual Corridor Alternative

Item No.	Item	Unit	Unit Cost	Quantity	Cost
201	Clearing and grubbing	LS	$50,000	1	$50,000
202	Removal of asphalt mat	SY	$8	26,200	$209,600
202	Removal of curb and gutter	LF	$7	3,400	$23,800
203	Unclassified excavation	CY	$15	20,000	$300,000
304/403/412	Pavement structure (asphalt or concrete)	SY	$50	25,010	$1,250,500
601	Retaining walls	SF	$70	4,000	$280,000
608	Concrete sidewalk	SY	$45	9,700	$436,500
609	Curb and gutter type 2 (section IB)	LF	$15	3,100	$46,500
609	Curb and gutter type 2 (section IIB)	LF	$18	12,400	$223,200
610	Median cover material	SF	$12	9,000	$108,000
613	Lighting	LS	$190,000	1	$190,000
614	Traffic signals	EA	$250,000	4	$1,000,000
	Subtotal construction items				**$4,118,100**
202	Removals (2%)	LS	$82,000	1	$82,000
207/212/213	Topsoil/native seeding/mulching (1%)	LS	$41,000	1	$41,000
208	Erosion control (3%)	LS	$124,000	1	$124,000
603	Drainage (20%)	LS	$824,000	1	$824,000
614/627	Signing and striping (2%)	LS	$82,000	1	$82,000
625	Construction surveying (2%)	LS	$82,000	1	$82,000
626	Mobilization (10%)	LS	$412,000	1	$412,000
630	Construction traffic control (12%)	LS	$494,000	1	$494,000
	Contingency (bonds, profit, unknowns) (30%)	LS	$1,235,000	1	$1,235,000
	Utility relocations	LS	$350,000	1	$350,000
	Gateway landscaping and monument	LS	$594,016	1	$594,016
	Centennial Parkway streetscape (6 half-blocks)	EA	$134,620	6	$807,720
	Subtotal percentages				**$5,127,736**
	Subtotal construction items and percentages				**$9,245,836**
	Environmental clearance (documented Categorical Exclusion) (3%)	LS	$277,000	1	$277,000
	Design engineering (8%)	LS	$740,000	1	$740,000
	Construction engineering (10%)	LS	$925,000	1	$925,000
	Totals				**$11,187,836**

6.1.7 3D Model Exhibits of Refined Alternatives

For a better understating of the proposed conditions, 3D model exhibits of the recommended alternative were created. The 3D models are shown in Figure 31.

Figure 31
Recommended Alternative 3D Models

6.2 DOWNTOWN STREETS ALTERNATIVES

6.2.1 Streetscape Enhancement Zones

After completing the downtown street assessment, a hierarchy of streetscape improvements for Rifle's downtown was developed. Because street conditions, character, and uses in the downtown vary, it was important that the scope of the proposed streetscape enhancements be scaled appropriately.

Existing Streetscape

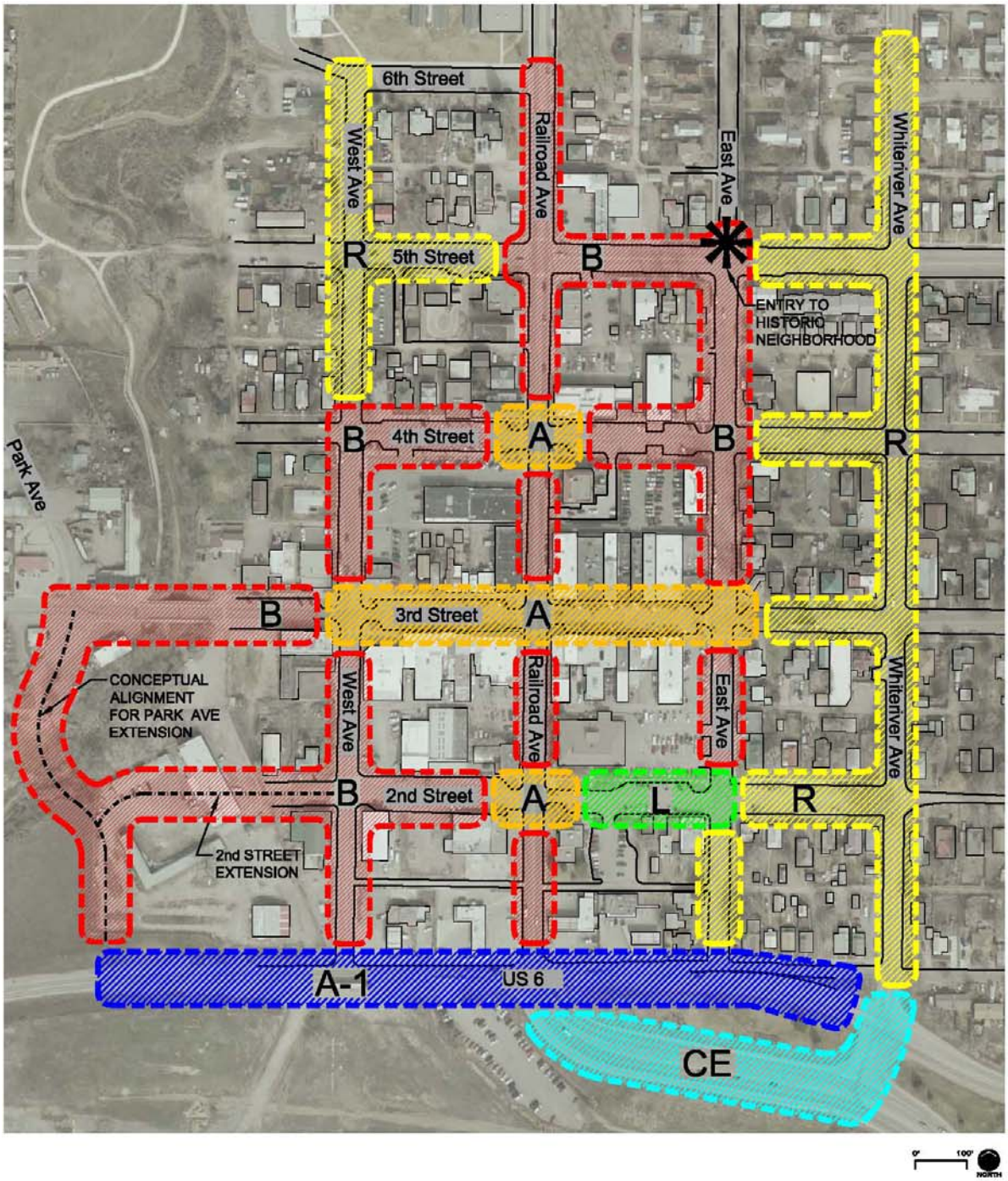
The scope and scale of the streetscape improvements were primarily established during the public involvement process. This included focus groups with downtown stakeholders, comments received during the open houses, and staff comments from the design charrette. Potential

street improvements were then established and divided into six categories, or zones, each with a different level of finish. The following is an explanation of each level of finish (beginning with highest intensity/cost and ending with lowest intensity/cost).

- **Enhanced Urban Streetscape (Zone A).** This zone targets the highest level of enhancement on the two central retail blocks of 3rd Street (between West and East avenues) and the intersections of Railroad Avenue and 4th Street and the west side of 2nd Street. The streetscape for central 3rd Street blocks includes neckdowns at the corners and the mid-block points, 10-foot sidewalks, street trees, shrub beds, concrete unit paving, and site furnishings. The downtown streetscape is over 20 years old and beginning to show its age with heaving unit pavers, overgrown shrubs, and a patch work of paving for the sidewalks. The two Railroad Avenue intersections north and south of 3rd Street are designated as Zone A in order to extend the core area streetscape to 4th and 2nd streets and to enhance the Railroad Avenue streetscape. The opportunity for streetscaping on Railroad Avenue is constrained by three lanes of traffic and parallel parking.
- **Centennial Parkway Streetscape (Zone A-1).** Centennial Parkway has been designated for a level of finish just below Zone A to reflect the City's intent to extend its downtown to the Colorado River and west to Rifle Creek. Once the level of development adjacent to the Park Avenue and 2nd Avenue extensions is better defined, it is conceivable that these streets could also be designated as A-1 Zones.
- **Enhanced Streetscape including Park Avenue and 2nd Street Extensions (Zone B).** Zone B is intended as an intermediate level of finish for streets with lower retail/commercial density. Zone B streets include the remainder of the downtown area with commercial uses outside of Zone A. The goal is to encourage additional retail development and a more comfortable pedestrian experience. Zone B areas could be converted to an "A" level of finish as commercial development grows.
- **Community Entry Landscape (Zone CE).** The Community Entry Zone covers the primary "Gateway" (see Section 6.3, Gateway Alternatives) that will be developed in conjunction with SH 13/US 6 conceptual alternatives.
- **Enhanced Residential Streetscape (Zone R).** Zone R covers the portions of the downtown with primarily residential uses such as Whiteriver Avenue, the eastern blocks for the east/west streets between East and Whiteriver avenues, and the northwest corner of the downtown. In keeping with the scale of the residential zones and the number of large existing trees, only intersection improvements are recommended.
- **New Library/City Hall Plaza (Zone L).** This area of the downtown on 2nd Street between Railroad and East Avenues has a unique designation in response to the development of the new library and the closure of 2nd Street and creation of a pedestrian plaza.
- **Entry to Historic East Avenue Neighborhood.** Residents from the historic East Avenue neighborhood (north of 5th Street) expressed strong concerns that changes in vehicular circulation patterns in the downtown would potentially increase traffic on their street -- creating an adverse impact. A neighborhood entry "gateway" is shown to mitigate this concern, which could also be combined with additional in-street traffic calming measures.

Figure 32 shows the locations and extent of the recommended streetscape zones.

Figure 32
Streetscape Zones



LEGEND AND LEVEL OF FINISH ZONES

Level of finish:

A: Enhanced Urban Streetscape (specialty paving, benches, planters, intersection improvements on Railroad Ave, etc.) $$$$$

A-1: Centennial Parkway Streetscape/Enhanced Urban Streetscape (Will respond to final street section). $$$$

Level of finish:

B: Enhanced Streetscape (planters, refurbished sidewalks, specialty paving at crosswalks) $$

R: Enhanced Residential Streetscape (additional trees, shrub beds, refurbished sidewalks) $

Level of Finish:

CE: Community Entry Landscape (shrub beds, perennials, possible entry feature) $$$

L: New Library / City Hall Plaza

Entry to Historic Neighborhood (signage/monument, traffic calming)

6.2.2 Recommended Streetscape Enhancements and 3D Imagery

Enhanced Urban Streetscape (Zone A)

This is the highest, most intensive, and likely the most expensive level of finish. It has been assigned to downtown areas having an urban feel and includes aesthetic elements such as decorative paving (tinted concrete with decorative bands) for sidewalks, enhanced intersection paving, raised planters, decorative pots, street trees in tree grates, site furnishings, along with intersection/crosswalk improvements to increase pedestrian functionality, comfort, and safety. Crosswalk improvements may include updating handicap ramps to current Americans with Disabilities Act (ADA) standards, adding mid-block crosswalks or signals, and employing traffic calming measures like textured paving and improved neckdowns (narrowed street to reduce the length of crosswalks). Figure 33 shows the proposed streetscape for 3rd Street and Railroad Avenue.

Figure 33
Zone A

Zone A

Level of finish example

Centennial Parkway Streetscape (Zone A-1)

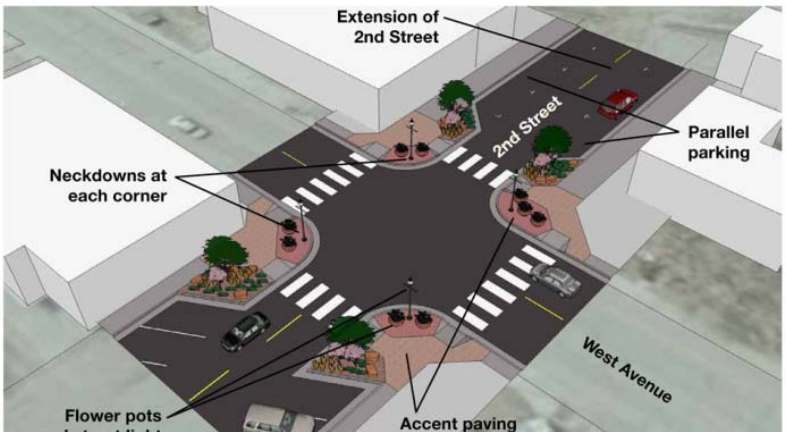
Zone A-1 will be similar to Zone A, but adapted to a new Centennial Parkway roadway section. It will be slightly less intensive than Zone A and will provide a transition between the Community Entry Landscape and the Enhanced Urban Streetscape. The images from the 3D model for Centennial Parkway in Figure 34 illustrate the proposed streetscape for Centennial Parkway. The proposed streetscape improvements would include street trees in large, 12-foot by 4-foot tree grates set at regular intervals (30-foot to 40-foot spacing), wide sidewalks (8 feet to 15 feet), and decorative street lights that are consistent with those used in the historic downtown. At the intersections, 30-foot tall light fixtures are shown. The decorative paving consists of accent paving (unit pavers or stamped and tinted concrete) in the site furnishings/street tree zone and standard concrete paving with decorative bands in the pedestrian zone. The intersections feature decorative paving at the corners and the crosswalks with enhanced paving for the intersections.

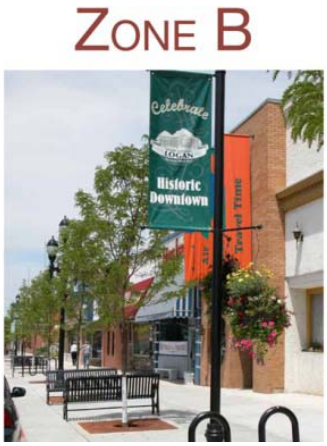
Figure 34
Zone A-1

Enhanced Streetscape (Zone B)

In Zone B, the majority of the streetscape improvements are focused at the intersections. This includes neckdowns at the corners with accent paving (tinted concrete or unit pavers), at-grade planters, and refurbished sidewalks. Street trees will be planted along the street, either in tree grates or large (+/- 8 foot by 4 foot) at-grade tree wells. Refurbishing sidewalks could consist of general repairs to damaged pavement, providing a consistent sidewalk width within a given block, and/or widening. The objective is to improve pedestrian comfort and safety and the aesthetic quality of the street, as well as provide a transition zone to the residential portions of downtown. Figure 35 shows the proposed streetscape for 2nd Street and West Avenue.

Figure 35
Zone B





Level of finish example

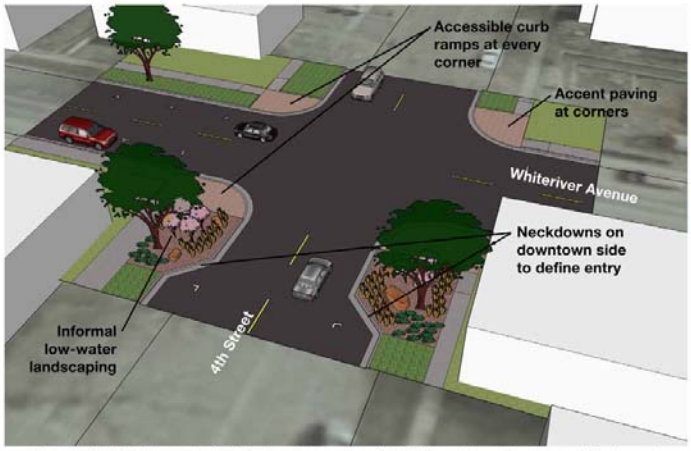
Community Entry Landscape (Zone CE)

The Community Entry Landscape ("Gateway") will create a gateway to Rifle's downtown. It will likely include a major monument sign, extensive landscaping, and decorative hardscape paving. The intent is to have the gateway reflect the character established in the I-70 off ramp "Talus Slope" concept. See Section 6.3, Gateway Alternatives for Zone CE concepts.

Enhanced Residential Streetscape (Zone R)

The Zone R streetscape enhancements are focused entirely at the intersections. They include neckdowns on the side of the intersection closest to the downtown and at grade planters with naturalized landscaping, landscape boulders, and street trees. Handicap ramps and enhanced paving is shown at each corner of the intersection. Budget allowing, decorative streetlights should be installed at each intersection. Figure 36 shows the proposed streetscape for Whiteriver Avenue and 4th Street.

Figure 36
Zone R



Level of Finish Zone R - Whiteriver Avenue and 4th Street Looking East - Northeast

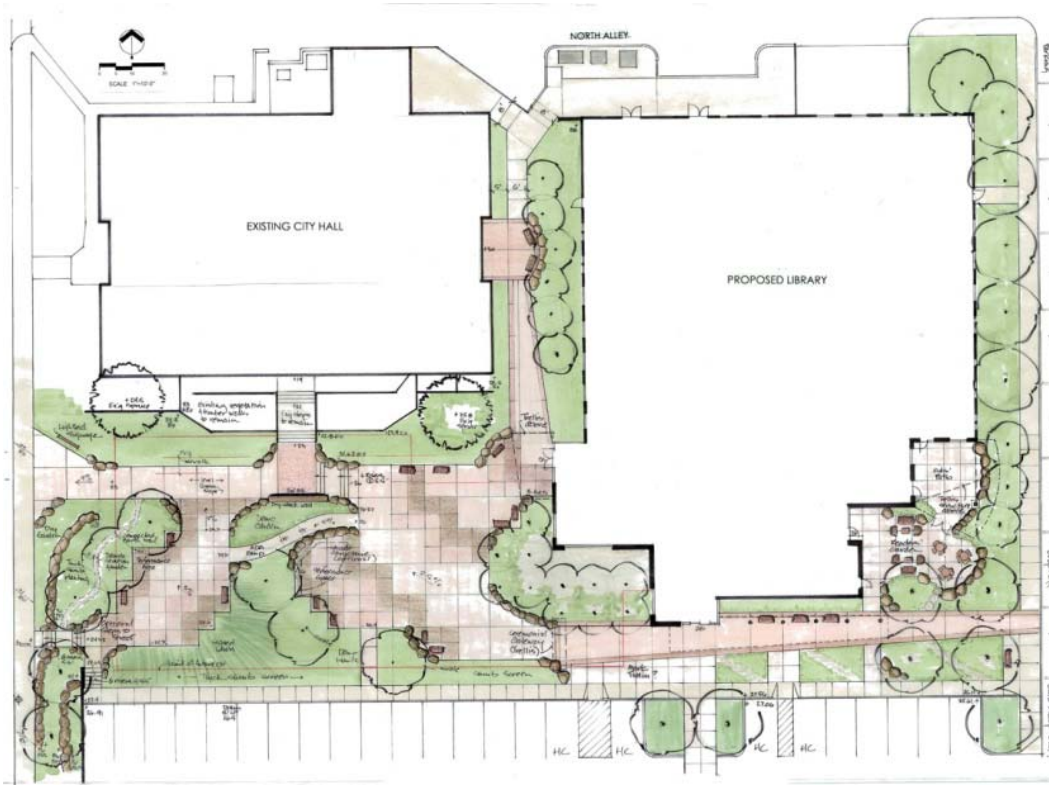
ZONE R

Level of finish example

New Library/City Hall Plaza (Zone L)

The City is in the process of designing a new library that will be constructed on the existing parking lot east of City Hall, as shown in Figure 37. To accommodate this important civic facility, 2nd Street between Railroad Avenue and East Avenue will be closed and converted to a pedestrian plaza. This will create a new pedestrian-only space and connect City Hall and the new library to Railroad Avenue.

Figure 37
Zone L



Entry to Historic Neighborhood

Enhancements in this area, shown in Figure 38, include signage, an entry monument, or art within a small median at the intersection of 5th Street and East Avenue to both celebrate this neighborhood entry and inhibit vehicular traffic. Additional in-street traffic calming measures further north on East Avenue such as speed tables, neckdowns, or chicanes could be added to further discourage pass through traffic.

Figure 38
East Avenue Neighborhood Entry

6.2.3 Cost Estimates for Streetscape Enhancements

While the 3D model images shown previously indicate a high level of detail regarding materials and finishes, it is important to understand that the designs for the streetscape enhancements are very conceptual at this time. Cost estimates for streetscape improvements developed with this level of detail are, by necessity, very general in nature as detailed engineered plans have not been completed and existing conditions vary from block to block. For example, 2nd Street, starting at Railroad Avenue and traveling west, begins with curb and gutter and concrete sidewalks, transitions to asphalt paving without curb and gutter or sidewalks, and ends as a gravel street and parking area – all in the distance of two blocks. Therefore, the cost for the streetscape enhancements should be considered in order of magnitude costs that will change as the plans evolve. The cost estimates are based on 2010 unit prices.

Enhanced Urban Streetscape (Zone A)

The cost estimate for Zone A (Table 31) is focused on enhancements to the intersections at the Railroad Avenue and the east/west cross streets (2nd, 3rd, and 4th streets) including approximately 50 feet north and south on Railroad Avenue. Costs for upgrading the streetscape improvements in the remaining blocks of 3rd Street will require more detailed analysis and design on the existing improvements that should be preserved or renovated.

Table 31
Estimate of Probable Cost – Zone "A" Intersection (Railroad Avenue)

Cost Element	Estimated Cost
Demolition	$68,230.00
Utility Improvements	$12,250.00
Hardscape Improvements	$83,642.00
Landscape Improvements	$24,700.00
Subtotal construction items	**$188,822.00**
Erosion Control (2%)	$3,800.00
Construction Surveying (5%)	$9,400.00
Mobilization (15%)	$28,300.00
Construction Traffic Control (10%)	$18,900.00
Contingency (30%)	$56,600.00
Subtotal percentages	**$117,000.00**
Subtotal construction items and percentages	**$305,822.00**
Design Engineering (8%)	$24,500.00
Construction Services (10%)	$30,600.00
Total estimated project cost	**$360,922.00**

Centennial Parkway Streetscape (Zone A-1)

The costs for the Centennial Parkway streetscape improvements shown in the following cost estimate (Table 32) cover a half-block segment (both sides of the street) and half of the crosswalk/intersection enhancements. It is assumed that all costs for roadway construction including demolition, curb and gutter, utilities (including lighting), and roadway paving are included in the estimates for the recommended conceptual corridor alternative.

Table 32
Estimate of Probable Cost – Zone "A-1" Centennial Parkway (1/2 Block)

Cost Element	Estimated Cost
Demolition	$0.00
Utility Improvements	$0.00
Hardscape Improvements	$43,420.00
Landscape Improvements	$34,400.00
Subtotal construction items	**$77,820.00**
Erosion Control (5%)	$3,900.00
Construction Surveying (10%)	$7,800.00
Mobilization (15%)	$11,700.00
Construction Traffic Control (15%)	$11,700.00
Contingency (30%)	$23,300.00
Subtotal percentages	**$58,400.00**
Subtotal construction items and percentages	**$136,220.00**
Design Engineering (8%)	$10,900.00
Construction Services (10%)	$13,600.00
Total estimated project cost	**$160,720.00**

Enhanced Streetscape (Zone B)

The following cost estimate (Table 33) for the prototypical Zone B segment includes a half-block segment (both sides of the street) as well as two neckdowns.

Table 33
Estimate of Probable Cost – Zone "B" (1/2 Block)

Cost Element	Estimated Cost
Demolition	$33,260.00
Utility Improvements	$9,050.00
Hardscape Improvements	$178,876.00
Landscape Improvements	$30,135.00
Subtotal construction items	**$251,321.00**
Erosion Control (2%)	$5,000.00
Construction Surveying (5%)	$12,600.00
Mobilization (15%)	$37,700.00
Construction Traffic Control (10%)	$25,100.00
Contingency (30%)	$75,400.00
Subtotal percentages	**$155,800.00**
Subtotal construction items and percentages	**$407,121.00**
Design Engineering (8%)	$32,600.00
Construction Services (10%)	$40,700.00
Total estimated project cost	**$480,421.00**

Enhanced Residential Streetscape (Zone R)

The following cost estimate (Table 34) for a prototypical Zone R intersection includes the four corners of the intersection.

Table 34
Estimate of Probable Cost – Zone "R" Intersection

Cost Element	Estimated Cost
Demolition	$11,561.00
Utility Improvements	$2,925.00
Hardscape Improvements	$11,706.00
Landscape Improvements	$7,100.00
Subtotal construction items	**$33,292.00**
Erosion Control (3%)	$1,000.00
Construction Surveying (8%)	$2,700.00
Mobilization (15%)	$5,000.00
Construction Traffic Control (15%)	$5,000.00
Contingency (30%)	$10,000.00
Subtotal percentages	**$23,700.00**
Subtotal construction items and percentages	**$56,992.00**
Design Engineering (8%)	$4,600.00
Construction Services (10%)	$5,700.00
Total estimated project cost	**$67,292.00**

Entry to Historic East Avenue Neighborhood

The following cost estimate (Table 35) for the East Avenue neighborhood includes a center median and two neckdowns. Traffic calming measures further north on East Avenue are not included in this estimate.

Table 35
Estimate of Probable Cost – East Avenue Neighborhood Gateway

Cost Element	Estimated Cost
Demolition	$7,534.00
Utility Improvements	$5,040.00
Hardscape Improvements	$8,672.00
Landscape Improvements	$12,600.00
Subtotal construction items	**$33,846.00**
Erosion Control (5%)	$1,700.00
Construction Surveying (8%)	$2,700.00
Mobilization (15%)	$5,100.00
Construction Traffic Control (15%)	$5,100.00
Contingency (50%)	$16,900.00
Subtotal percentages	**$31,500.00**
Subtotal construction items and percentages	**$65,346.00**
Design Engineering (8%)	$5,200.00
Construction Services (10%)	$6,500.00
Total estimated project cost	**$77,046.00**

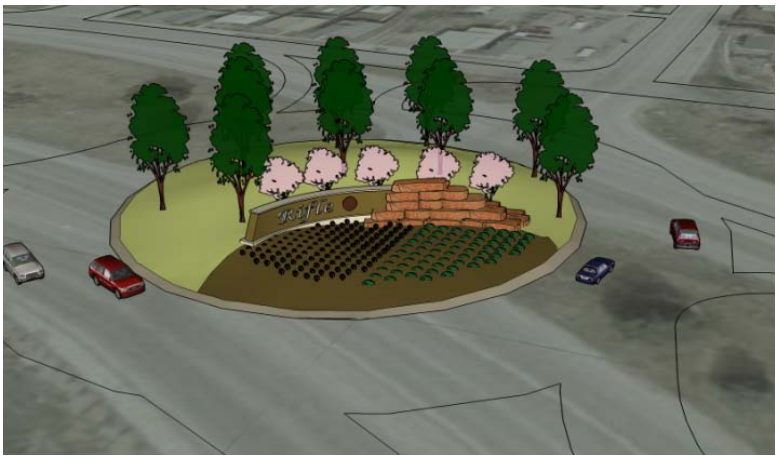
6.3 GATEWAY ALTERNATIVES

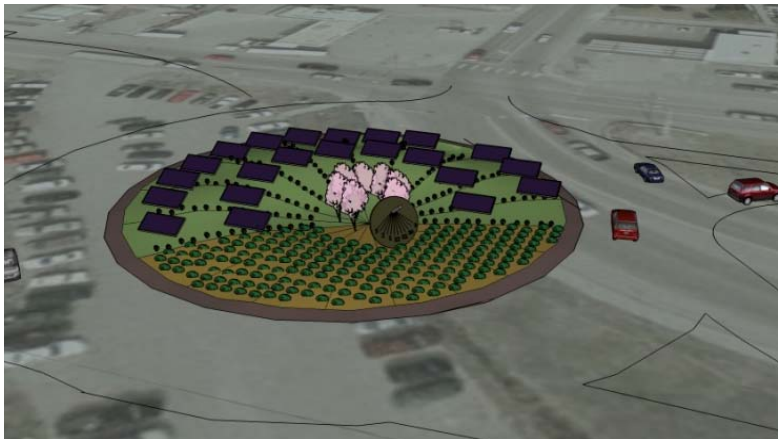
One key area of focus for the Rifle Gateway design process is to create a strong landscape statement at the principal intersection for the reconfigured SH 13/US 6. The final design for these roads will create new southern, eastern, and western access points for the downtown. The gateway at the primary intersection will welcome visitors to Rifle and establish a landscape character for the new roadway system. As with the other elements of the Rifle Gateway, the theme and character was established using the public input process.

6.3.1 Gateway Concept Alternatives

During the May design charrette, three preliminary concepts for the gateway were developed, as shown in Figure 39. The themes examined included a “city-corporate” concept for a roundabout with a natural stone Rifle entry monument. A second concept for a roundabout featured an “energy” theme with a solar panel array, a sundial, and formal plantings. A third theme was produced for a signalized intersection that featured a natural stone outcropping for the Rifle monument and naturalized plantings.

Figure 39
Preliminary Gateway Concepts





6.3.2 Refined Gateway Concept Alternatives

When the three concept alternatives were presented to the public and stakeholders, the concept featuring a stone outcrop entry monument and naturalized planting garnered the most support. As the design for the roundabout gateway at SH 13/US 6 was finalized, the consensus was to adapt the rock outcrop monument sign and naturalized landscape to that configuration. The Refined Gateway Concept Alternative is shown in Figure 40.

Figure 40
Refined Gateway Concept Alternative

The Refined Gateway Concept Alternative features a large entry monument in the center of the roundabout. The monument shown includes the word "Rifle", which ideally would be constructed of backlight, raised steel letters. The city logo or a welcome message would also be appropriate. The monument has been oriented to the southeast so it would be visible to travelers entering Rifle from both major entry points. The exterior finish could be either a carefully crafted artificial stone or a natural stone veneer. The stone treatment should replicate the stone color and textures found in exposed outcroppings in the Rifle area. Deep red or terracotta color aprons are shown at the edges of the roundabout. These could be constructed of tinted and stamped concrete or a heavy-duty unit paver.

Example of artificial stone exterior finish

Native and adapted, low-water use (xeric) plants should be used throughout the gateway area. The plants should be grouped in layers and large groupings to maximize the impact of each individual plant variety. The trees and shrubs used for the gateway area should be specified to provide spring and summer flowers, fall color, and distinctive leaf color and texture. The

landscape will also need to be designed so that the plants' maximum heights do not conflict with the sight distance requirements for the roundabout.

Example of xeric plants

The images from the 3D model for the gateway area shown in Figure 41 shows what visitors and residents traveling through the SH 13/US 6 gateway would experience. Overviews of the gateway area are on pages 121 and 122. The Refined Gateway Concept Alternative is consistent with what residents said they would like to convey as Rifle's identity. In addition, the proposed improvements take their cue from the natural environment and reflect to the community's goal for a sustainable design.

Figure 41
Gateway 3D Model

Approaching roundabout on US 6 looking west

Approaching roundabout on SH 13 – bird's eye view looking northwest

Figure 41 continued

Combined Recommended Conceptual Corridor Alternative, Gateway concept, and streetscape examples – bird's eye view

Figure 41 continued

Recommended Conceptual Corridor Alternative, Gateway concept, and streetscape examples – bird's eye view looking southeast

6.3.3 Cost Estimate for Refined Gateway Concept Alternative

The following cost estimate (Table 36) for the Refined Gateway Concept Alternative includes the landscape enhancements for the roundabout area. Costs for roads, curb and gutter, retaining walls, and paved aprons are included in the recommended conceptual corridor alternative cost estimates. The cost estimate is based on 2010 unit prices. One major variable to the gateway cost estimate is the amount of landscaping that will be needed at the edges of the roundabout. The extent of landscaping for the roads approaching the roundabout and cost for restoration of cut slopes and fill required to construct the roundabout can only be determined once detailed design has been completed.

Table 36
Estimate of Probable Cost – Gateway Roundabout

Cost Element	Estimated Cost
Demolition	$0.00
Utility Improvements	$0.00
Hardscape Improvements	$0.00
Entry Monument Sign	$161,917.00
Landscape Improvements	$198,100.00
Subtotal construction items	**$360,017.00**
Erosion Control (5%)	$18,000.00
Construction Surveying (5%)	$18,000.00
Mobilization (15%)	$54,000.00
Construction Traffic Control (10%)	$36,000.00
Contingency (30%)	$108,000.00
Subtotal percentages	**$234,000.00**
Subtotal construction items and percentages	**$594,017.00**
Design Engineering (8%)	$47,500.00
Construction Services (10%)	$59,400.00
Total estimated project cost	**$700,917.00**

6.4 PARK AVENUE EXTENSION AND 2ND STREET EXTENSION ALTERNATIVES

6.4.1 Design Criteria

Specific design criteria were used as a guideline for developing alternatives. The basis for the design criteria came from the AASHTO *A Policy on the Geometric Design of Highways and Streets* (2004) and the *Rifle Public Works Manual* (2007). The criteria were developed based on the roadway classification, design speed, and terrain. Table 37 lists the design criteria that were used for the Park Avenue extension and the 2nd Street extension.

Table 37
Design Criteria for Park Avenue and 2nd Street Extension

Design Criteria	Park Avenue Extension Criteria Values	2nd Avenue Extension Criteria Values
Roadway Classification	Urban Collector	Urban Local
Width of travel lanes	12 feet	10 feet
Shoulder width (left-turn/median)	6 feet	6 feet
Shoulder width (right-turn/outside)	6 feet	6 feet
Design speed	35 mph	30 mph
Minimum radius	175 feet	100 feet
Minimum tangent between reverse curves	150 feet	50 feet
Minimum stopping sight distance	250 feet	200 feet
Maximum grade	8%	10%

Roadway Classification. Roadways are classified based on the function they provide. The Rifle *Public Works Manual* determines the classification for city streets based primarily on average daily traffic. The Park Avenue extension will serve as an urban collector and the 2nd Street extension will be classified as an urban local street.

Design Speed. Design speed is the maximum safe speed that can be maintained under ideal conditions for a given section of roadway. A desired design speed is typically set to determine particular design criteria for roadway geometry. Design speeds of 35 and 30 mph were used for the Park Avenue extension and 2nd Street extension, respectively.

Maximum Vertical Grade (Vertical Alignment). Vertical alignment is measured in terms of grade. The maximum vertical grade, or rate of change in slope either ascending or descending along the roadway, is eight percent for Park Avenue and ten percent for 2nd Street; however, the grade along the centerline shall not exceed five percent through intersections.

Horizontal Curve Radius. The radius of horizontal curve determines the sight distance for a particular stretch of roadway and the ability for a vehicle to negotiate the alignment at a particular speed. The desired radius of horizontal curves is defined according to the design speed of the roadway. For this study, a minimum horizontal curve radius of 175 feet was used for Park Avenue and a minimum radius of 100 feet was used for 2nd Street.

Vertical Curves. The radius of vertical curves also impacts the sight distance for that particular stretch of roadway. The desired vertical curves are defined according to the design speed. Crest curves must be designed so that drivers can see and avoid objects or stopped vehicles on the roadway. On hills, or “crests,” drivers must be able to see over the top of the crest far enough to allow enough time to stop if needed. Likewise, in valleys, or “sags,” drivers must be able to adequately see the end of their headlight beams on the road to avoid obstructions in the roadway. The minimum vertical stopping sight distance used was 250 feet for Park Avenue and 200 feet for 2nd Street.

Cross Section Features. Roadway cross section features include lane widths and shoulder widths. Typical roadway dimensions used for Park Avenue's alternatives consisted of 12-foot travel lanes, a 6-foot shoulder, curb and gutter, and sidewalk. Similarly, 2nd Street's alternatives consisted of 10-foot travel lanes, a 6-foot shoulder, curb and gutter, and sidewalk.

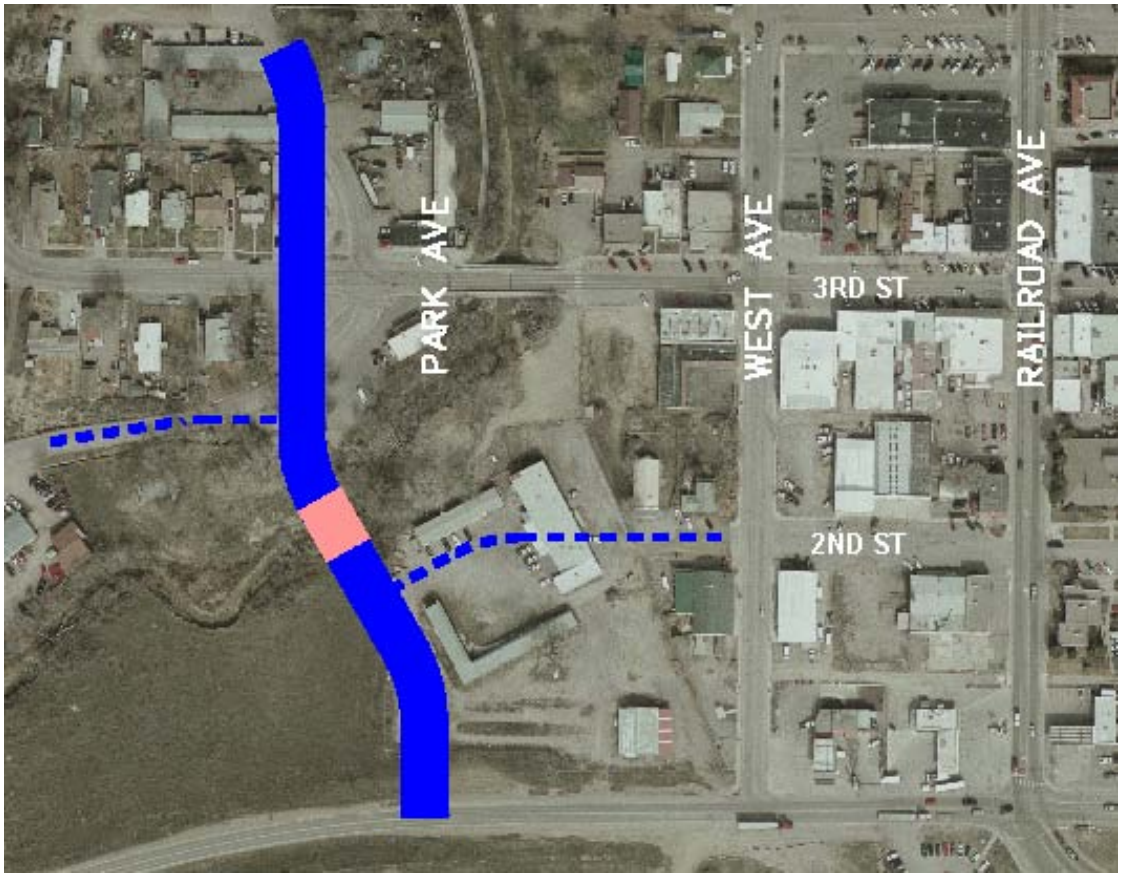
6.4.2 Feasible Concept Alternatives

Alternatives for the extensions of Park Avenue and 2nd Street were developed by reviewing previous studies completed in the project area and gathering information from the technical team. Eight alternatives were reviewed during the study. Figure 42 through Figure 49 show the range of alternatives considered for this study.

Alternative A

Alternative A realigns Park Avenue between 3rd and 4th streets and continues south. A structure spans Rifle Creek; the alignment of Park Avenue at this location is perpendicular to the creek in order to minimize the skew of the structure. Park Avenue ties perpendicularly into SH 13 just east of Rifle's property line. The 2nd Street alignment is extended to the west from West Avenue and ties into the proposed Park Avenue south of the new bridge structure spanning Rifle Creek (see Figure 42). 2nd Street to the west of Park Avenue is realigned to intersect perpendicularly with Park Avenue north of the new bridge structure spanning Rifle Creek.

Figure 42
Park Avenue Extension, Alternative A



Alternative B

Alternative B realigns Park Avenue at the intersection of 3rd Street. A structure spans Rifle Creek; the alignment of Park Avenue at this location is perpendicular to the creek to minimize the skew of the structure. Park Avenue ties perpendicularly into SH 13 just east of the Rifle's property line. The 2nd Street alignment is extended to the west from West Avenue and ties into the proposed Park Avenue south of the new bridge structure spanning Rifle Creek (see Figure 43). 2nd Street to the west of Park Avenue is realigned to intersect perpendicularly with Park Avenue north of the new bridge structure spanning Rifle Creek.

Figure 43
Park Avenue Extension, Alternative B

Alternative C

Alternative C realigns Park Avenue between 3rd and 4th streets and extends south to SH 13. This alignment is one tangent section with curves to tie into the existing Park Avenue north of 3rd Street and SH 13. Because the roadway is not perpendicular to the creek, the structure is skewed. Park Avenue ties perpendicularly into SH 13 west of Rifle's property line. The 2nd Street alignment is extended to the west from West Avenue and ties into the proposed Park Avenue south of the new bridge structure spanning Rifle Creek (see Figure 44). 2nd Street to the west of Park Avenue is realigned to intersect perpendicularly with Park Avenue north of the new bridge structure spanning Rifle Creek.

Figure 44
Park Avenue Extension, Alternative C

Alternative D

Alternative D realigns Park Avenue at the intersection of 3rd Street, similar to Alternative B. Because the roadway is not perpendicular to the creek, the structure is skewed. Park Avenue ties perpendicularly into SH 13 west of Rifle's property line. The 2nd Street alignment is extended to the west from West Avenue and ties into the proposed Park Avenue south of the new bridge structure spanning Rifle Creek (see Figure 45). 2nd Street to the west of Park Avenue is realigned to intersect perpendicularly with Park Avenue north of the new bridge structure spanning Rifle Creek.

Figure 45
Park Avenue Extension, Alternative D

Alternative E

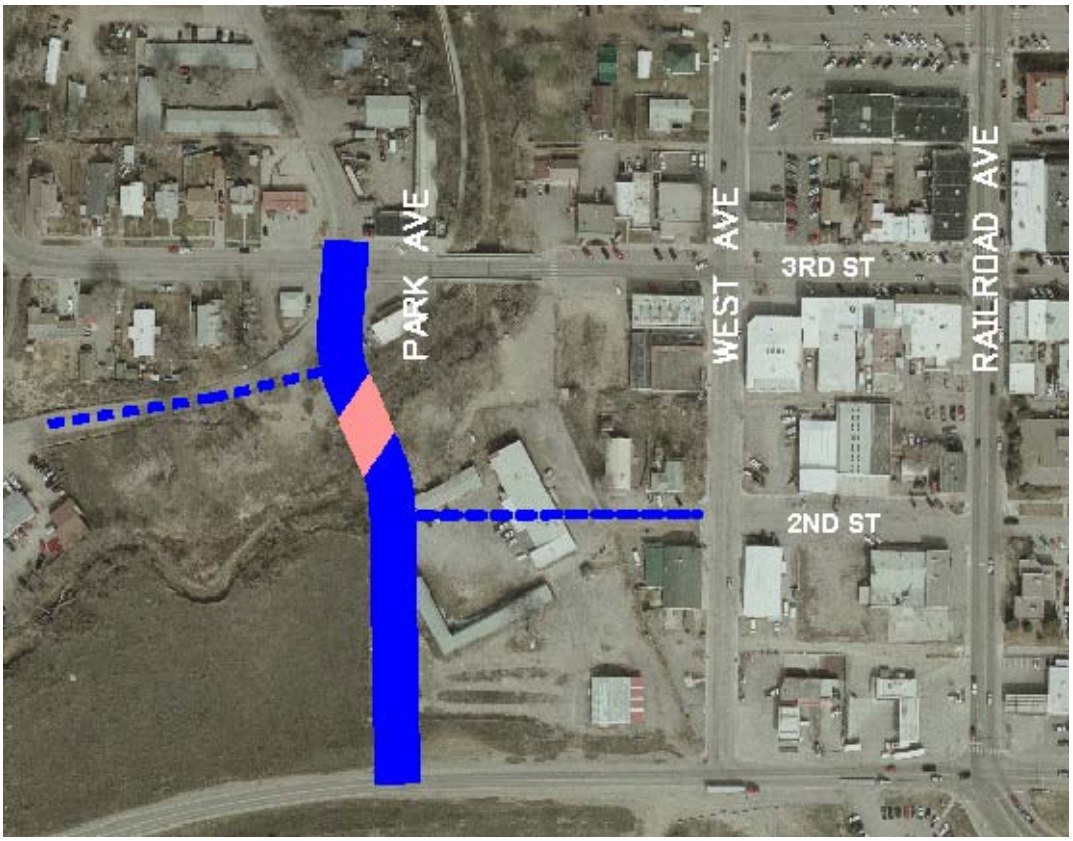
Alternative E extends Park Avenue south from 3rd Street to SH 13; impacts north of 3rd Street are minimized. This alignment is one tangent section with a slight curve to tie into SH 13. Because the roadway is not perpendicular to the creek, the structure is skewed. Park Avenue ties perpendicularly into SH 13 just east of Rifle's property line. The 2nd Street alignment is extended to the west from West Avenue and ties into the proposed Park Avenue south of the new bridge structure spanning Rifle Creek (see Figure 46). 2nd Street to the west of Park Avenue could be realigned to intersect perpendicularly with Park Avenue north of the new bridge structure spanning Rifle Creek. A second option for 2nd Street west of Park Avenue would include realigning to intersect with Park Avenue south of the new bridge structure, which would result in the need for a second bridge structure spanning Rifle Creek.

Figure 46
Park Avenue Extension, Alternative E

Alternative F

Alternative F extends Park Avenue south from 3rd Street; impacts north of 3rd Street are minimized. Because roadway is at an angle to the Rifle Creek, the structure is skewed. Park Avenue then extends perpendicularly to SH 13 just east of Rifle's property line. 2nd Street is extended from West Avenue to tie into the proposed Park Avenue south of the new bridge structure spanning Rifle Creek (see Figure 47). 2nd Street to the west of Park Avenue is realigned to intersect perpendicularly with Park Avenue north of the new bridge structure spanning Rifle Creek.

Figure 47
Park Avenue Extension, Alternative F



Alternative G

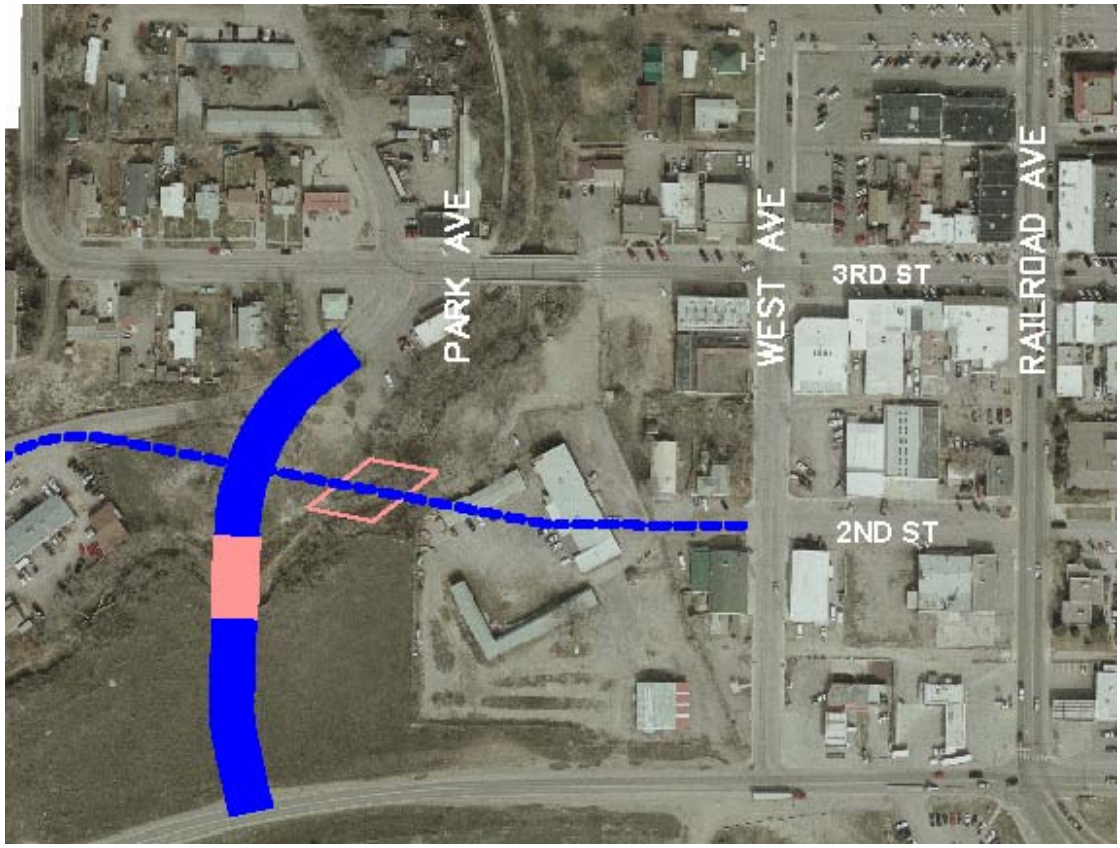
Alternative G extends Park Avenue south to SH 13, although it is not a direct connection. Park Avenue is extended to connect with a 2nd Street extension from 3rd Street. Park Avenue would also extend from SH 13 north to the 2nd Street extension. The alignment of 2nd Street requires that the structure is skewed. The segment between 2nd Street and SH 13 is located east of Rifle's property line (see Figure 48).

Figure 48
Park Avenue Extension, Alternative G

Alternative H

Alternative H extends Park Avenue south to SH 13. Improvements are made south of 3rd Street; thus, impacts to private property are minimized at the intersection. The roadway is perpendicular to the Rifle Creek, minimizing the skew of the structure. The proposed 2nd Street extension intersects north of the new bridge structure spanning Rifle Creek and 2nd Street requires a second structure (skewed) to span Rifle Creek (see Figure 49).

Figure 49
Park Avenue Extension, Alternative H



6.4.3 Screening Criteria

The Park Avenue and 2nd Street extension alternatives were scored by the project team. The evaluation criteria and scoring are shown in Table 38. All measures of the screening for Park Avenue were qualitative; thresholds for each criterion were evaluated as good, neutral, or poor.

Table 38
Park Avenue Preliminary Screening Criteria and Scoring

Threshold Criteria	Alternatives							
	A	B	C	D	E	F	G	H
Residential/Commercial Building Purchase	●	○	●	○	◑	◑	○	○
Property Acquisition	●	◑	●	●	○	○	○	◑
Bridge Development	○	○	○	○	◑	○	◑	●
Environmental Impact	◑	◑	◑	◑	●	●	●	●
Cost	●	○	◑	○	◑	●	●	●
Accommodates North/South Traffic	○	○	○	○	○	○	●	●
Accommodates East/West Traffic	◑	◑	◑	◑	○	◑	●	○
Ability to Phase	◑	◑	◑	◑	○	◑	○	○
Alternative Disposition	✗	✓	✗	✓	✓	✓	✗	✗

● = *Alternative scores poorly in this objective*
◑ = *Alternative is relatively neutral for this objective*
○ = *Alternative scores good for this objective*
✗ = *Alternative is not recommended for further consideration*
✓ = *Alternative is recommended for further consideration*

The preliminary screening matrix determined that Alternatives B, D, E, and F would be carried forward as potential alternatives.

6.4.4 Recommended Concept Alternative

Alternative B was revised to create Alternative B1 which minimizes impacts at the 3rd Street intersection. Alternative B1 is recommended due to its ability to minimize structure size, facilitate surrounding development, and compatibility with existing surrounding concepts for the downtown environment. Alternative B1 is shown in Figure 50.

Figure 50
Recommended Park Avenue Extension, Alternative B1

A conceptual cost estimate was developed for Alternative B1, as shown in Table 39. ROW costs are not included. The cost estimate is based on 2010 unit prices.

Table 39
Estimate of Probable Cost – Recommended Park Avenue Alternative B1

Cost Element	Estimated Cost
Bridge structure	$475,000
Pavement structure	$160,000
Curb, gutter, sidewalk, and median cover material	$115,000
Subtotal	**$750,000**
Contingency (50%)	$375,000
Subtotal	**$1,125,000**
Design engineering (8%)	$90,000
Construction engineering (10%)	$112,500
Total project cost	**$1,327,500**

Park Avenue Bridge over Rifle Creek Summary

A conceptual evaluation of the critical issues related to the Park Avenue Bridge was performed. The following critical issues must be resolved before determining the recommended structure type as determined by the evaluation:

- **Hydraulic analysis.** The hydraulic analysis will determine the required geometry of the crossing structure, both for current conditions as well as future conditions. The FEMA Flood Insurance Rate Maps indicate a potentially wide floodway that will need to be spanned. If the floodway is not spanned, a Conditional Letter of Map Revision would need to be submitted to the USACE for approval to build within waters of the U.S.
- **Vertical profile.** Due to the difference in terrain between the north and south sides of Rifle Creek at the approximate recommended crossing location, the vertical profile of the structure will need to be reviewed thoroughly. The profile must coordinate with the hydraulic requirements and sight distance requirements for the intersection of 2nd Avenue on the north and south side of the bridge.

Two preliminary geotechnical borings were drilled near the recommended crossing location. A detailed memorandum regarding the conceptual evaluation is in Appendix F.

6.5 I-70 ENTRANCE/EXIT RAMPS ALTERNATIVES

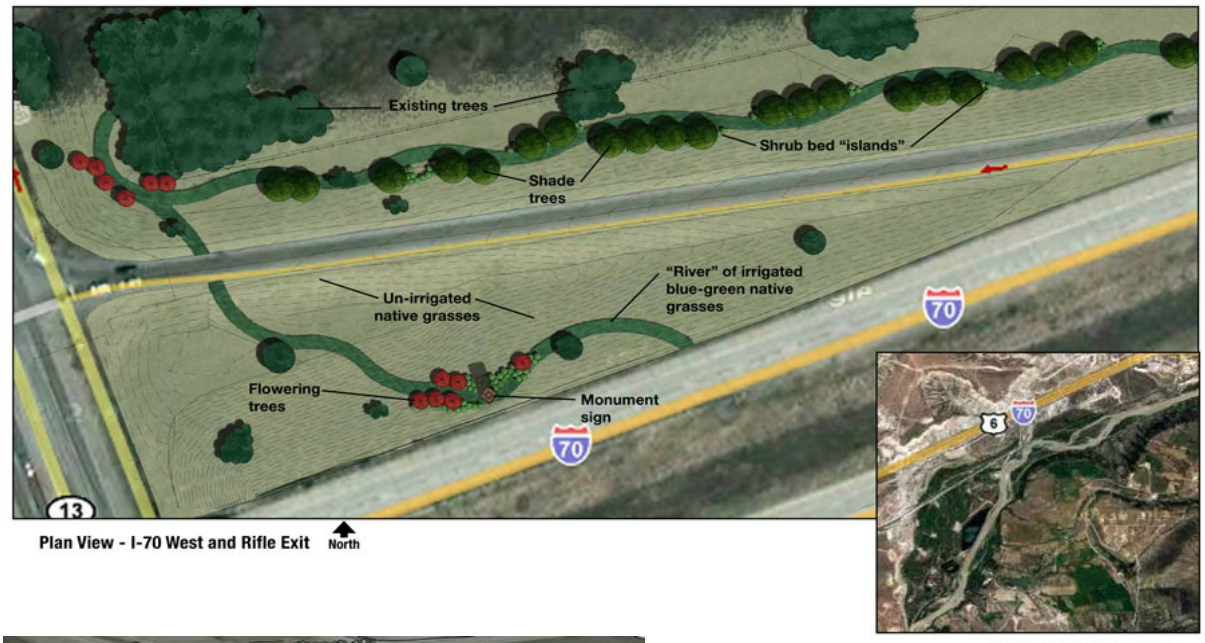
Three alternatives were developed for the landscape surrounding Rifle's I-70 entrance and exit ramps. Each alternative includes an entry monument, which would be seen from both I-70 and the entrance/exit ramps, and landscape enhancements that create a sense of entry for Rifle.

During the public input process, the stakeholders and residents were asked to identify the landscape character for the gateway that was most consistent with their vision of Rifle. After reviewing images of landscapes ranging from formal to naturalized, the clear consensus was to keep the gateway and I-70 entrance/exit ramp landscape character simple, with low water use plants and grasses. All concepts developed for the I-70 entrance/exit ramps followed this directive and were inspired by Rifle's varied but prominent landscapes.

6.5.1 Concept A: Colorado River

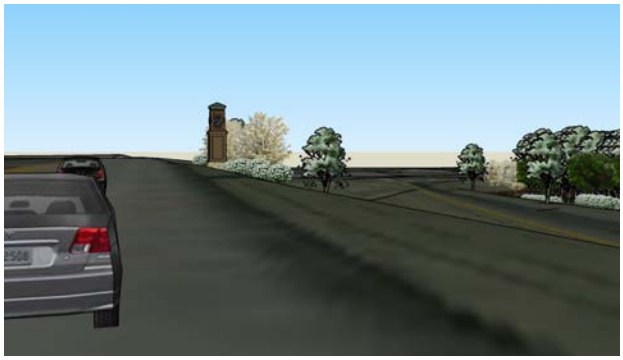
Concept A, shown in Figure 51, features an irrigated, meandering band of blue/green native grasses which flow through groups of new and existing trees in the ramp areas. The form of this band of blue-green grass band mimics the Colorado River. Since these grasses would be irrigated, the blue/green native grass mix would remain a prominent landscape feature even as the native grasses turn tan in mid-summer. Shrub beds are aligned with the band of blue-green grasses and represent the islands found in the Colorado River. The entry monument is a traditional brick tower that brings the brick detailing of historic buildings in the downtown to the I-70 interchange.

Figure 51
Concept A: Colorado River



Plan View - I-70 West and Rifle Exit North

Design Inspiration Image - Colorado River Air Photo



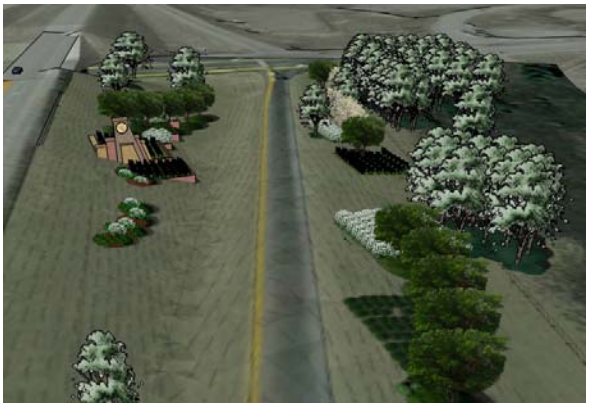
6.5.2 Concept B: Farmland Grid

Concept B, shown in Figure 52, uses grid-squares of trees and shrubs that are inspired by the pattern created by the farmland along the Colorado River Corridor. These geometric groups of trees and shrubs are placed in a random pattern along the ramp area, but carefully sited to preserve views to the Colorado River. The massing of the tinted concrete entry monument reflects landforms surrounding Rifle and steps down the hillside along with a series of retaining walls.

Figure 52
Concept B: Farmland Grid

Plan View - I-70 West and Rifle Exit North

Design Inspiration Image - Farmland Grid



View from I-70 West Bound

6.5.3 Concept C: Talus Slopes

Concept C, shown in Figure 53, is inspired by Rifle's talus slopes, which are found at the tops of the foothills surrounding the town. The landscape treatment consists of spillways of large rock mulch bands in contrasting colors flowing downhill. Planting occurs in a random pattern but connects with existing trees beyond the highway ROW and strategically protects views to the river. The entry monument is shown with a veneer of irregular rocks and stone slabs with a stone cap and reflects the natural rock outcroppings found in the Rifle area.

Figure 53
Concept C: Talus Slopes

Plan View - I-70 West and Rifle Exit

Design Inspiration Image - Talus Slope

6.5.4 Refined I-70 Entrance/Exit Alternatives

The "Talus Slope" concept emerged as the favorite during the stakeholders' and residents' review of the entrance/exit ramp concepts. The alternative was refined and extended to the I-70 underpass area as well as all four entrance and exit ramps, as shown in Figure 54.

The approach for the refined I-70 entrance/exit landscape features cascading bands of "talus" rock mulch winding down the hillsides of highway embankments. The concept shows rock with contrasting colors such as light grey and tan river cobble next to the deep burgundy rock found in the Colorado River Valley. To reduce maintenance, the bands of rock mulch should be separated from the surrounding native grasses with an edger treatment such as 6-inch concrete curb. Naturalized groupings of shrub beds made up of xeric plant materials frame the mulch bands. As with the gateway roundabout, these shrubs should be selected for strong flowering characteristics and fall color. Deciduous shade and flowering ornamental trees are informally grouped among the talus bands and shrub beds. The flowering ornamental trees are also used to frame the entry monuments.

Figure 54
Refined I-70 Entrance and Exit Alternative

The entry monument sign is derived from the natural stone outcropping gateway monument described in Section 6.3.1, Concept Alternatives. A monument sign is proposed at each off ramp, welcoming travelers to Rifle. The monument sign would be placed high enough on the overpass embankment so that it would also be visible to vehicles passing through along I-70. The exterior finish could be either a carefully crafted artificial stone or a natural stone veneer. The stone treatment should represent the stone colors and textures found in outcroppings near Rifle. The monument sign would prominently feature the word "Rifle," which ideally would be constructed of backlight, raised steel letters. The city logo or a welcome message would also be appropriate.

During the review of the entrance/exit ramp concepts, the best approach for the landscape areas beneath the I-70 bridges was discussed. While there was agreement that the talus landscape would be appropriate for the underpass areas, there was concern shade from the bridges and the salt and sand thrown off the highway would degrade the landscape and create an ongoing maintenance problem. Therefore, an alternate treatment, shown in Figure 55, for this area is shown on the entrance/exit ramp illustrative plan. In this concept, concrete slope paving is suggested along with talus slope rock bands represented by natural stone grouted in place or by sandblasted and tinted concrete.

Figure 55
I-70 Underpass Alternative Treatment

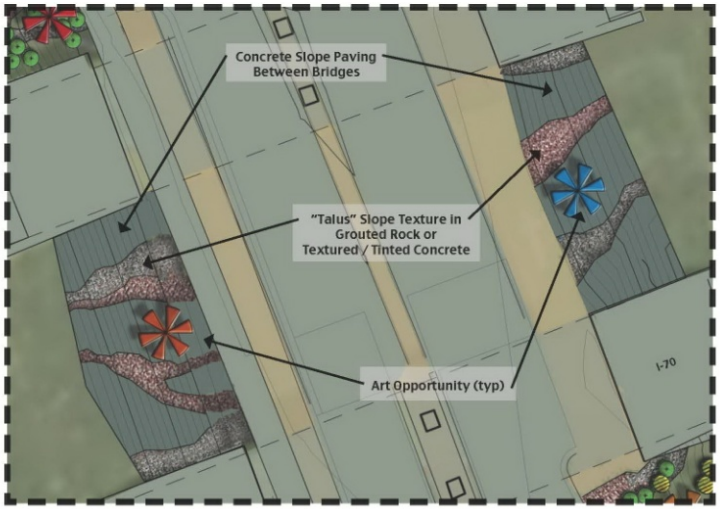


Table 40 presents estimated costs for the I-70 Entrance/Exit Alternative, including the underpass areas between the I-70 bridges. The cost estimate is based on 2010 unit prices.

Table 40
Estimate of Probable Cost – Refined "Talus Slope" I-70 Entrance/Exit Alternative

Cost Element	Estimated Cost
Demolition	$12,000.00
Utility Improvements	$25,000.00
Hardscape Improvements	$30,000.00
Landscape Improvements	$474,600.00
Monument Signs	$323,700.00
Subtotal construction items	**$865,300.00**
Erosion Control (2%)	$17,300.00
Construction Surveying (2%)	$17,300.00
Mobilization (15%)	$129,800.00
Construction Traffic control (5%)	$43,300.00
Contingency (30%)	$259,600.00
Subtotal percentages	**$467,300.00**
Subtotal construction items and percentages	**$1,332,600.00**
Design Engineering (8%)	$106,600.00
Construction Services (10%)	$133,300.00
Total estimated project cost	**$1,572,500.00**

6.6 LIGHTING

A successful exterior lighting approach develops layers of light; this type of approach begins with the street lighting system. Lighting should provide uniform lighting on the street and strong vertical light at crosswalks and intersections. Lighting differentiation gives both the motorist and pedestrian the necessary information for detection and identification, satisfying the issues related to safety. The lighting of sidewalks, trees and building facades can then be used to provide a soft backdrop of light. Surface brightness will help define exterior surroundings, adding depth to the environment and addressing security issues. Dark areas and dark shadows are minimized. The intensity of this type of lighting is often not as important as the uniformity or evenness of light.

The exterior lighting alternatives for City of Rifle will provide light for safety and comfort while preserving the natural resources and support its unique appeal, charm, and desire to become a new Energy Village. The lighting alternatives throughout the community will provide improved visibility for pedestrians and motorists, preserve a level of darkness for adjacent landowners and natural open spaces, save energy and reduce waste to help preserve the natural environment. Lighting will be minimized to provide light only where safety and visibility are critical. Specific lighting control measures and technologies will ensure that lighting is not used when it is not needed.

There are three keys to achieve a successful urban lighting design for the City of Rifle:

- **Environmentally sensitive lighting.** This lighting system must be thoughtfully designed to minimize its impact on nearby properties, wildlife, and the night sky. By using shielded lamps and luminaires, the lighting design will have minimal impact on its surrounding environment. Minimal light pollution and light trespass will result from a thoughtful and well designed lighting system.
- **Light Pollution.** Light that is emitted directly into the sky or is reflected off the ground to other surfaces contributes to light pollution and sky glow, diminishing our view of the stars at night. The City of Rifle is located in a natural, very dark environment which is sensitive to light pollution.
- **Light Trespass.** Light trespass refers to stray light that falls on a neighborhood property. Whether the nearby property is a block of apartments or a wildlife habitat, the lighting must be carefully designed to minimize the impacts on its surrounding environment. Consideration will be given to luminaires and sources which minimize or reduce stray light emitted from the luminaire. Care will be taken during the selection, placement and installation of the lighting equipment to ensure that light is provided where, and in the amount, that it is needed.

Nighttime Visibility and Function

The full moon illuminates the landscape with only one-hundredth of a footcandle. Yet, even in this very low light level, it is possible to read a newspaper. Our visual system can adjust to an amazingly wide range of light levels. In darker environments, our vision responds differently than in brighter environments. At night, we are more sensitive to glare and are able to see better with white light and uniform brightness. Glare from an unshielded light bulb can be uncomfortable or temporarily blind a pedestrian just as the headlights of an oncoming car can temporarily blind a driver.

Safety

Lighting to improve safety involves lighting hazards so that they can be seen with sufficient reaction time. Hazards may include vehicle intersections, crosswalks, urban trails, commercial alleyways, stairs and ramps and other site features that may be perceived as unsafe if not well identified at normal nighttime lighted conditions. The lighting system, along with other site design elements, provides visual information to assist users in avoiding such things as a collision or loss of bearings.

Image and Identity

The luminaire styles should be influenced by the architectural styles; however, many traditionally lighting fixtures create as much glare as they do useful light and are not designed to minimize light trespass and light pollution. With some minor modifications, many traditional styles can be made to better control the light and still stay true to the traditional forms.

As the architectural and streetscape design evolves, luminaire, arm, and pole selections should be coordinated with the urban design effort to integrate the aesthetic concerns and retain the desirable performance characteristics of good lighting outlined previously.

6.6.1 Layout and Placement

The placement of equipment on any road should provide the lighting necessary for safe vehicular navigation and pedestrian circulation. Additionally, the lighting equipment must provide information and visual cues as to the nature of the road and upcoming hazards. A lighting system can do this in several ways. For example:

- Emphasize the intersection by using a different luminaire or pole at the intersections than the luminaire or pole used in an open roadway.
- Provide optical guidance when a road curves, use medians for equipment placement and avoid staggered spacing of fixtures.
- Provide a visually organized, hierarchical and easily understandable lighting system.

Urban design issues must also be addressed by the lighting equipment. The integration of the lighting equipment into the urban environment will be important to the overall success of the streetscape. Implementation of the streetscape plan can be achieved by applying the following guidelines to future lighting projects:

- Reduce visual clutter as much as possible by integrating lighting, signals, and signage.
- Pedestrian poles should be spaced approximately 70-100 feet apart
- Integrate with building entries and curb cuts to maintain a consistent spacing pattern.
- Respond to parking and turn lanes where appropriate to maintain visual cues.
- Signal the beginning and end of the commercial districts with appropriate lighting equipment.
- Transition zones between commercial and residential districts should respond to pedestrian traffic needs.

Pole Mounted Curvilinear (Hockey Puck)

The pole mounted curvilinear (hockey puck) luminaire is mounted on a 20- to 40-foot round tapered steel pole. The light pole may have one or two heads, depending on location. The cylindrical shape is preferred because it has a neutral appearance and integrates well in a variety of urban contexts. This luminaire can be used at intersections, roadways, and parking areas in business or industrial parks.

Decorative Pedestrian Pole

The standard pedestrian light fixture is mounted on a 12- to 14-foot high pole and has a decorative globe head. The pole has a decorative base and is used in historic town areas or in districts where architectural character is important. Although the exact equipment layout depends on specific conditions, typical spacing for the pedestrian fixture is 70 to 100 feet on center.

6.6.2 SH 13/US6 Intersection Area

Three lighting concepts were developed for the SH 13/US 6 intersection area and are described in the following subsections. It should be noted that the lighting layout for the roundabout is defined by standard and does not vary between schemes. Appendix I includes lighting equipment product information sheet examples

Partial Lighting Scheme

A partial lighting scheme is described as one in which lighting occurs at conflict points such as intersections, alleys, drive entries, crosswalks, or other locations where there is a high probability of a traffic incident. This scheme provides the minimal lighting equipment necessary for safe travel and thereby reduces nighttime impacts to dark environments. Additional lighting may be installed as needed in areas identified as especially hazardous or potentially dangerous to motorists, cyclists, or pedestrians. The partial lighting scheme is shown in Figure 56.

Continuous Lighting Scheme

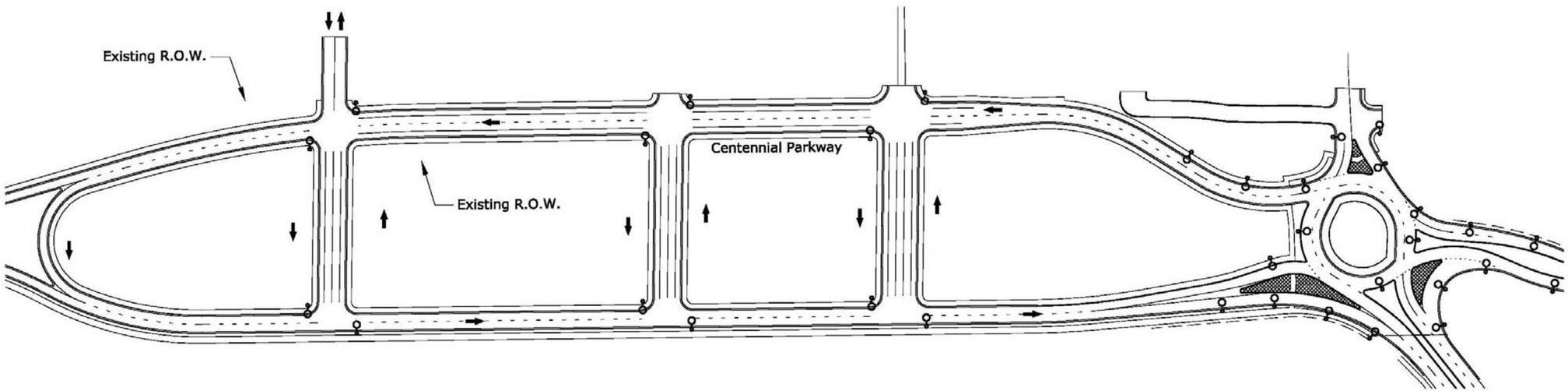
A continuous lighting scheme can be used where it is critical to meet lighting performance criteria or other defined target. This scheme places equipment continuously along the roadway at regular (or nearly regular) intervals in order to achieve the illuminance or luminance criteria target. This scheme requires more equipment and more coordination with underground utilities and other streetscape features (for example, trees and parking meters). The continuous lighting scheme is shown in Figure 57.

Two-Layer Lighting Scheme

The two-layer scheme uses both taller assemblies at intersections with the shorter decorative assemblies for pedestrians along the block. This is similar to the lighting that currently occurs through parts of Rifle. While this scheme requires the most equipment, it also does the best job of integrating the new development areas with the historic core. Equipment selection of the pedestrian assemblies should be integrated with the urban design effort in order to respond to the aesthetics of the area and retain the desirable performance characteristics of good exterior lighting outlined previously. The two-layer lighting scheme is shown in Figure 58.

This page intentionally left blank

Figure 56
Partial Lighting Scheme



LEGEND

Pole Mounted Curvilinear (Hockey Puck) Roadway Luminaire with Type III Distribution
Mounting Height = 35-40 Feet
Lamp Type = 250W HID or 165W Induction

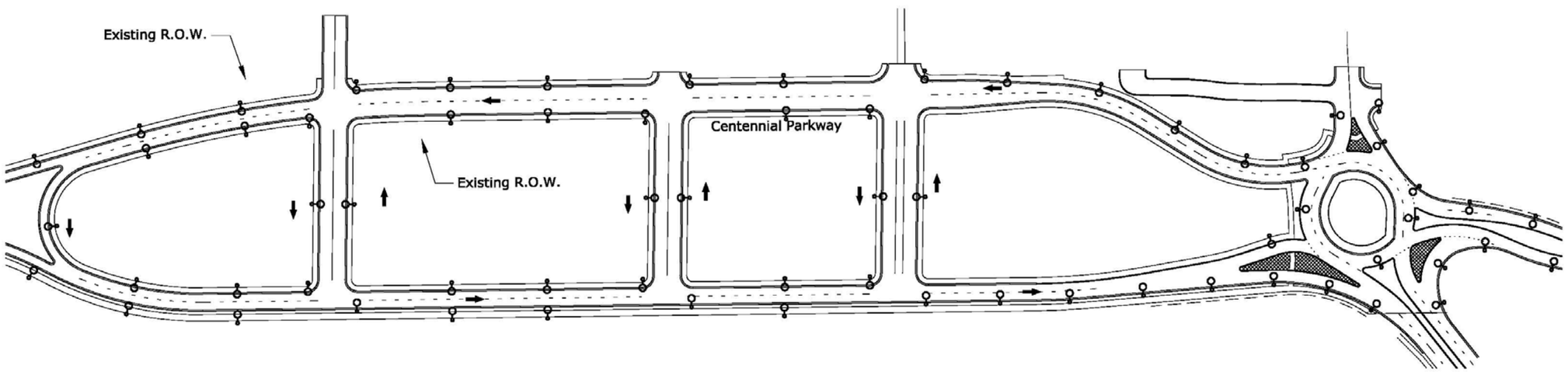
NOTE: Use of induction lamp type may alter layout

North

CLANTON & ASSOCIATES
LIGHTING DESIGN AND ENGINEERING
4699 NAUTILUS COURT SOUTH STE. 102
BOULDER, CO 80301
303-530-7229

Title: LIGHTING SCHEME I - PARTIAL
Date: 05-14-10 Rev 09-27-10
Scale: 1:150
Project: RIFLE GATEWAY
Drawn By: GA

Figure 57
Continuous Lighting Scheme



LEGEND

•o Pole Mounted Curvilinear (Hockey Puck) Roadway Luminaire with Type III Distribution
Mounting Height = 35-40 Feet
Lamp Type = 250W HID or 165W Induction

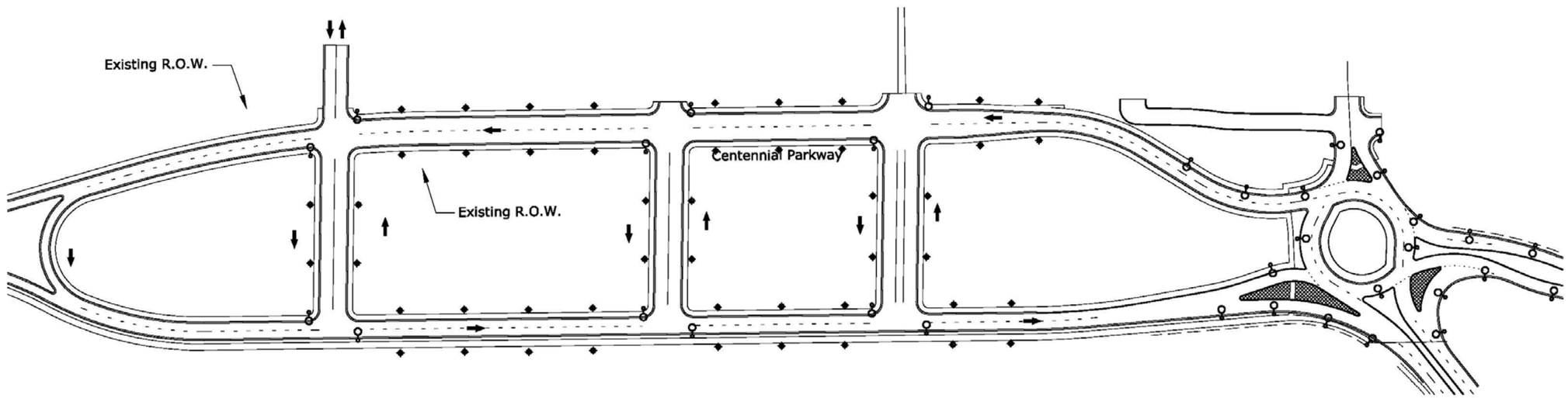
NOTE: Use of induction lamp type may alter layout

North

CLANTON & ASSOCIATES
LIGHTING DESIGN AND ENGINEERING
4699 NAUTILUS COURT SOUTH STE. 102
BOULDER, CO 80301
303-530-7229

Title: LIGHTING SCHEME 2 - CONTINUOUS
Date: 05-14-10 Rev 09-27-10
Scale: 1:150
Project: RIFLE GATEWAY
Drawn By: GA

Figure 58
Two-Layer Lighting Scheme



LEGEND

Pole Mounted Curvilinear (Hockey Puck) Roadway Luminaire with Type III Distribution
Mounting Height = 35-40 Feet
Lamp Type = 250W HID or 165W Induction

NOTE: Use of induction lamp type may alter layout

Post Top Decorative Pedestrian Luminaire
Refer to City Standard
Mounting Height = 12-14 feet
Lamp Type = 50W HID, 32W Compact Fluorescent, or 55W Induction

North

CLANTON & ASSOCIATES
LIGHTING DESIGN AND ENGINEERING
4899 NAUTILUS COURT SOUTH STE. 102
BOULDER, CO 80301
303-530-7229

Title: LIGHTING SCHEME 3 - TWO LAYER
Date: 05-14-10 Rev 09-27-10
Scale: 1:150
Project: RIFLE GATEWAY
Drawn By: GA

This page intentionally left blank.

Lighting Scheme Costs

Table 41 shows the approximate cost for lighting equipment and includes installation labor. These costs do not include associated design and engineering costs for lighting. Design and engineering costs for lighting for the recommended conceptual corridor alternative are included in the design engineering percentage in Table 30. The quantities shown for the roadway lighting assemblies in each scheme include the roundabout. The cost estimate is based on 2010 unit prices.

Table 41
Estimate of Probable Cost – Lighting Scheme

Type	Description	Partial		Continuous		Two-Layer	
		Qty	Total	Qty	Total	Qty	Total
Roadway	250-watt HID curvilinear "hockey-puck" luminaire with IESNA Type III full cutoff distribution on 35-foot round tapered steel pole.	33	$82,500	71	$177,500	33	$82,500
Pedestrian	55-watt LED acorn style luminaire with prismatic acrylic globe and symmetric (or asymmetric) distribution on cast aluminum 12-foot tall straight round 14-flute "Washington-style" pole.	0	--	0	--	48	$105,600
	TOTAL		**$82,500**		**$177,500**		**$188,100**

6.6.3 Historic Downtown Core

The lighting scheme for the historic downtown area should be unified by the continued installation of LED Acorn style luminaires along the blocks and the taller historic style luminaires at the intersections.

The recent conversions of the acorn luminaires along 3rd Street represent a good starting point. Going forward, the remainder of the downtown core can be converted in a similar fashion resulting in improved visibility and lower maintenance and operating costs for the City of Rifle.

6.6.4 Gateway

Accent lighting for the monuments at the Gateways should include luminaires which provide the appropriate amount of light and make use of accessory shields or louvers to prevent distracting glare to motorists, cyclists, and pedestrians. Low-wattage metal halide and LED sources are appropriate for this application.

7.0 PUBLIC INVOLVEMENT

The public involvement approach was developed to be compatible with the City's request for meetings with the public, City Council, and the Downtown Development Authority. The public involvement program engaged stakeholders, interested parties, regulatory agencies, and the general public to identify issues, seek input, and gain feedback on the study's process and findings.

7.1 KICK-OFF MEETING

The kick-off meeting was held Tuesday, January 13, 2009, at Rifle City Hall. Attendees represented the City, CDOT, PBS&J, and Winston Associates. Agenda items included a project overview, City goals, CDOT goals, a NEPA process overview, a project schedule, and development of alternatives for the four areas.

7.2 SMALL GROUP AND CITY COUNCIL MEETINGS

The following specific meetings were held to discuss goals, objectives, issues, and concerns:

- Lodging tax board and Rifle Depot – April 13, 2009
- Downtown Development Authority, RFTA, UPRR – April 14, 2009
- City Council one-way presentation – September 30, 2009

7.3 CONCEPTUAL DESIGN CHARRETTE

An on-site digital design charrette was held May 18 through May 20, 2009. The charrette was held in the Council Chambers of City Hall from 3 p.m. to 7 p.m. on Monday, 9 a.m. to 9 p.m. on Tuesday, and 9 a.m. to 2 p.m. on Wednesday. The space was arranged so that the display boards and plots could be viewed along with the 3D modeling, which was projected onto a presentation screen and shown on overhead television monitors. The schedule included a general public meeting on the evening of May 18, 2009, which gave a project description and summarized key issues, project history, and preliminary design options. A second public meeting was held on May 20, 2009, to present the alternatives developed in the design charrette. The remainder of the session was available for drop-ins. The digital design summary prepared by Winston Associates is included in the Appendix G.

7.4 PRELIMINARY SCREENING OPEN HOUSE

The preliminary screening open house held on July 22, 2009, presented the alternatives refined based on the design charrette. Alternatives for SH 13/US 6 were compared using criteria developed from the project goals and objectives. Alternatives for Park Avenue and 2nd Street were also presented and screened, though the screening criteria were not as refined as the highways' criteria.

Concepts were also presented for the downtown streetscaping and gateway monument and landscaping.

7.5 WEBSITE

The study website (www.riflegateway.com), launched in April 2009, was advertised on all correspondence with the public. The site was designed to provide access to study information, study schedule, frequently asked questions, meeting announcements, exhibits from open house

meetings, and other related information. Visitors to the website can submit questions or request information from the project team. Information from the public meetings was typically posted to the website two weeks after each meeting.

8.0 IMPLEMENTATION PLAN

The City has multiple options for implementation due to the distinct areas the study encompassed. While the areas do relate and are coordinated with each other, a logical sequence of advanced planning, design efforts, and implementation can be developed. This sequence will need to be prioritized by the City based on its economic development, funding availability, and community values.

8.1 CONCEPT IMPLEMENTATION

Each of the four areas identified can be constructed as distinct projects and require initial steps to begin the process. Portions of these projects can also be completed in coordination with other projects. The four areas identified are:

- Park Avenue extension
- I-70 entrance/exit ramps
- Individual downtown streetscape zones
- Recommended SH 13/US 6 corridor Alternative C2

8.1.1 Park Avenue Extension

The platting of the Park Avenue extension is currently ongoing in coordination with development activity. As part of the development process, the City may work with the developer(s) to construct portions of Park Avenue extension. To ensure a continuous coordinated design effort between all developers and the City, preliminary design should be initiated to determine the extent of the Rifle Creek floodplain impacts to the vertical alignment of the extension. Preliminary design should progress to the point of determining the optimal horizontal and vertical alignments, structure location, ROW impacts, and utility relocations—typically a 30 to 60 percent design effort. Coordination with CDOT will be required to connect the extension to SH 13.

Packaging the Park Avenue extension with the 2nd Street extension is reasonable due to similar work elements and proximity.

8.1.2 I-70 Entrance/Exit Ramps

The recommended concept for the ramps can be implemented as funding becomes available. Where the westbound ramps intersect with SH 13 on the north side, a roundabout is planned. This roundabout has been conceptually designed. Preliminary design should be initiated for the north side roundabout and westbound ramps in coordination to ensure a cohesive design. Each ramp can be constructed as a standalone project, or ramps can be packaged together. Potential packaging options include:

- Monument signs
- Exit ramps and monument signs
- Entrance and exit ramps and monument signs
- Eastbound entrance and exit ramps on the south side of I-70
- Westbound entrance and exit ramps on the north side of I-70
- North side roundabout and westbound entrance and exit ramps.

Coordination with CDOT will be required to ensure interstate roadside clear zone and safety measures are met.

8.1.3 Downtown Streetscape Zones

All streetscape zones can begin to be implemented as funding becomes available, except zones A-1 and CE, which depend on the SH 13/US 6 Alternative C2 implementation schedule. Streetscape implementation should coordinate with lighting upgrades. Packaging options for the downtown streetscape zones could include:

- All zone A areas
- All zone R areas
- Railroad Avenue
- Whiteriver Avenue
- 3rd Street
- Entrance to East Avenue neighborhood
- Selected deteriorated intersections

8.1.4 SH 13/US 6 Alternative C2

Due to the size and complexity of this alternative, there are many steps needed to implement this alternative. These steps vary depending on funding sources. The City should begin programming funding internally and begin securing outside funding sources to design and construct the recommended alternative. Since the alternative involves state and federal highways, CDOT design standards will need to be followed. It should also be anticipated that because the state highway will be divided into two separate roadways, a form of maintenance agreement that defines specific responsibilities, protocols, routine maintenance schedules, and budgets for long-term maintenance of the roadway will need to be coordinated with CDOT.

Preliminary design should be initiated for the recommended alternative and gateway features to further develop impacts and associated costs. Incremental design phases of 30 percent (preliminary), 60 percent (intermediate), and 90 percent (final) are recommended.

If no CDOT or Federal Highway Administration funding is included, the required environmental clearance for construction will include those shown on CDOT Form 128 and supporting documentation. ROW and utility clearances will also be required, but do not necessarily need to follow CDOT processes.

If CDOT or Federal Highway Administration funding is included, the environmental, ROW, and utility clearances will follow CDOT processes. Preliminary indications during the study process are that the recommended alternative can be cleared for construction through a categorical exclusion. This process includes completing CDOT Form 128 and supporting documentation. Supporting documentation for the categorical exclusion may include impacts and proposed mitigation to cultural resources, wetlands, and hazardous materials. Additional clearances include completing the ROW plans review and clearly defining the utility relocation responsibilities through utility agreements.

The City should consider working towards getting the recommended alternative included in the long-range transportation statewide plan from which it may be prioritized and partially or fully funded through the State Transportation Improvement Program (STIP).

It is also recommended that discussion and negotiations begin with the Union Pacific Railroad regarding use, lease, or purchase of a portion of the parcel in the southwest corner of the study area needed to implement the recommended alternative.

Because larger funding amounts are more difficult to secure, phased packaging options are important to consider. Phased options should be coordinated with CDOT and the design engineer to ensure viability. Estimated probable costs, based on 2010 unit pricing, shown below include construction items, percentages, and design and construction engineering. Packaging options and a potential sequence of construction projects for the SH 13/US 6 recommended alternative could include:

- *Phase 1.* Implement minimal safety improvements.
  - Reduce SH 13 to one-lane southbound, south of US 6, to allow a dedicated acceleration lane from southbound Whiteriver Avenue to southbound SH 13. The estimated probable cost of Phase 1 is $150,000.
- *Phase 2.* Construct the eastern portion of the alternative from and including Railroad Avenue as shown in Figure 59.
  - This option would begin to implement the one-way couplet concept between Railroad Avenue and the roundabout. SH 13/Centennial Parkway west of Railroad Avenue would remain in a similar configuration as existing, one-lane in each direction.
  - The gateway features at the roundabout could also be in this option.
  - Phase 2, based on the conceptual costs developed for the entire alternative, is anticipated to cost approximately $5,800,000. A detailed cost estimate is shown in Table 42.
  - Additional options for Phase 2 that construct the roundabout and plan for ultimate conditions can be considered.
- *Phase 3.* Construct West Avenue south to the relocated SH 13 eastbound one-way. The estimated probable cost for Phase 3 is $1,300,000.
- *Phase 4.* Construct Park Avenue south to existing SH 13. The estimated probable cost of Phase 4 is $1,327,500 (from Table 39).
- *Phase 5.* Construct Park Avenue south to relocated SH 13 eastbound one-way and complete the one-way couplet. The estimated probable cost for Phase 5 is $4,300,000.

In the future, it may be beneficial for the City to implement Alternative G (north-south one-way pairs). Implementation of Alternative G will likely require a comprehensive public outreach campaign to convert existing north-south streets to one-ways. The City should anticipate performing a traffic study to determine the most optimal streets to convert to pairs. It is anticipated that north-south one-way pairs may be necessary in or around year 2033 based on current traffic modeling. If no improvements are made, as discussed previously, Alternative G would need to be implemented sooner. The estimated probable cost of Alternative G is approximately $2,500,000 to $3,500,000. This estimated cost includes traffic signals, roadway improvements, signing, striping, and design and construction engineering costs. An in-depth traffic analysis would be needed to determine the appropriate one-way roadway pair combination and required lane configurations. The implementation of Alternative G is highly dependent on traffic growth and alternative regional routes that may be constructed.

Figure 59
Recommended Conceptual Corridor Alternative – Construction Phase 2 Option

Table 42
Estimate of Probable Cost – Construction Phase 2 Option

Item No.	Item	Unit	Unit Cost	Quantity	Cost
201	Clearing and grubbing	LS	$25,000	1	$25,000
202	Removal of asphalt mat	SY	$8	20,200	$161,600
202	Removal of curb and gutter	LF	$7	3,100	$21,700
203	Unclassified excavation	CY	$15	10,000	$150,000
304/403/412	Pavement structure (asphalt or concrete)	SY	$50	13,200	$660,000
601	Retaining walls	SF	$70	4,000	$280,000
608	Concrete sidewalk	SY	$45	3,300	$148,500
609	Curb and gutter type 2 (section IB)	LF	$15	3,100	$46,500
609	Curb and gutter type 2 (section IIB)	LF	$18	5,700	$102,600
610	Median cover material	SF	$12	9,000	$108,000
613	Lighting	LS	$87,000	1	$87,000
614	Traffic signals	EA	$250,000	1	$250,000
	Subtotal construction items				**$2,040,900**
202	Removals (2%)	LS	$41,000	1	$41,000
207/212/213	Topsoil/native seeding/mulching (1%)	LS	$20,000	1	$20,000
208	Erosion control (3%)	LS	$61,000	1	$61,000
603	Drainage (20%)	LS	$406,000	1	$406,000
614/627	Signing and striping (2%)	LS	$41,000	1	$41,000
625	Construction surveying (2%)	LS	$41,000	1	$41,000
626	Mobilization (10%)	LS	$203,000	1	$203,000
630	Construction traffic control (12%)	LS	$244,000	1	$244,000
	Contingency (bonds, profit, unknowns) (30%)	LS	$609,000	1	$609,000
	Utility relocations	LS	$150,000	1	$150,000
	Gateway landscaping and monument	LS	$594,017	1	$594,017
	Centennial Parkway streetscape (2 half-blocks)	EA	$134,620	2	$269,240
	Subtotal percentages				**$2,686,257**
	Subtotal construction items and percentages				**$4,727,157**
	Environmental clearance (documented categorical exclusion) (3%)	LS	$142,000	1	$142,000
	Design engineering (8%)	LS	$378,000	1	$378,000
	Construction engineering (10%)	LS	$473,000	1	$473,000
	Totals				**$5,720,157**

9.0 REFERENCES

American Society for Testing and Materials (ASTM). (2005). Standard practice for environmental site assessments: Phase I environmental site assessment process. Standard E 1527-05. West Conshohocken, PA: ASTM International.

BBC Research and Consulting. (2008). *Northwest Colorado socioeconomic analysis and forecast.* Denver: Author.

City of Rifle. (2007). *Public works manual*. Rifle, CO: Author.

LSC Transportation Consultants, Inc. (2005). *City of Rifle transportation master plan.* Colorado Springs: Author.

Transportation Research Board. (2000). *Highway capacity manual*. Washington, D.C.: National Academy of Sciences.

U.S. Army Corps of Engineers. (1999). Definition of Waters of the United States, §404(a) of the Clean Water Act, 33 USC §1344(a), 33 CFR § 328.

This page intentionally left blank.

Appendix A

Existing Conditions Survey and Ownership Mapping Plots

Appendix B

Modified Environmental Site Assessment (MESA) and Addendum to the MESA

Appendix C

Geotechnical Investigation and Pavement Design

Appendix D

Feasibility Safety Assessment Report

Appendix E

Request to Allow a One-Way Couplet Memorandum

Appendix F

Conceptual Evaluation of Park Avenue Extension over Rifle Creek Memorandum

Appendix G

Public Involvement

Appendix H

3D Rendering Video and Snap Shots

Appendix I

Lighting Equipment Product Information Sheet Examples