

CO 9 SOUTH SUMMIT ACCESS STUDY

**SUMMIT COUNTY LINE (MP 77.49)
TO BOREAS PASS RD (MP 86.26)**



DEC 2020



COLORADO
Department of
Transportation



**SOUTH SUMMIT
COLORADO STATE HIGHWAY 9
ACCESS AND CONCEPTUAL TRAIL DESIGN STUDY**

**CO-9: M.P. 77.49 (Carroll Lane) to
M.P. 86.26 (Broken Lance Drive/Boreas Pass Road)**

CDOT Project Code 22621

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TABLE OF CONTENTS

Executive Summary	i
1.0 Introduction.....	1
1.1 Study Background.....	1
1.2 Study Coordination	3
1.3 Public Involvement.....	3
2.0 Access Management – Benefits, Principles & Techniques	6
2.1 Access Management Benefits.....	6
2.2 Guiding Principles	7
2.3 Techniques	8
3.0 Existing Conditions.....	10
3.1 Land Use Characteristics	10
3.2 Roadway Characteristics	11
3.3 Right-of-Way	13
3.4 Access Category	13
3.5 Existing Access Inventory	14
3.6 Crash History	15
4.0 Existing Traffic Conditions	18
4.1 Existing Traffic Volumes	18
4.2 LOS Criteria	18
4.3 Existing Conditions	20
5.0 Future Traffic Conditions.....	23
5.1 Traffic Growth	23
5.2 Future Traffic - 2040 No Build Scenario	23
5.3 Future Traffic - 2040 ACP Scenario	25
5.3.1 Auxiliary Lanes	25

5.3.2	Traffic Operations - 2040 ACP Scenario	26
5.3.3	Roundabouts	28
5.3.4	Passing Lanes	28
6.0	Access Plan Development and Application	30
6.1	Process	30
6.1.1	Step One – Methodology & Compatibility Index.....	30
6.1.2	Step Two – Development of the Access Plan	30
6.1.3	Step Three – Refine the Access Plan	30
6.1.4	Step Four – Evaluation	31
6.2	Evaluation Results	31
7.0	Access Plan Recommendations	32
7.1	Access Plan	32
8.0	Access Plan Implementation	52
9.0	Conceptual Design	54
9.1	Conceptual Trail Design.....	54
9.1.1	Design Elements for Conceptual Trail Design	54
9.1.2	Trail Typical Sections.....	54
9.1.3	Horizontal and Vertical Alignment.....	56
9.1.4	Opinion of Probable Cost – Conceptual Trail Design.....	57
9.2	Conceptual Roundabout Design	58
9.3	Conceptual Wildlife Crossing Design	61
10.0	Transit Planning	62
11.0	List of Acronyms	64
12.0	Glossary	66

LIST OF FIGURES

Figure 1-1. Vicinity Map	2
Figure 2-1. Functional Intersection Area.....	7
Figure 2-2. Consolidate Access	8
Figure 2-3. Define Driveways	8
Figure 2-4. Provide Cross Street Access.....	9
Figure 3-1. Driveway Crash Heatmap for CO-9.....	17
Figure 4-1. LOS Criteria	19
Figure 5-1. Slow Vehicle Turnout – US 50 Monarch Pass Eastbound	29
Figure 5-2. Advanced Regulatory Signs – Slow Vehicle Turnout.....	29
Figure 7-1A. CO-9 Access Exhibit 1 of 15.....	34
Figure 7-1B. CO-9 Access Exhibit 2 of 15.....	35
Figure 7-1C. CO-9 Access Exhibit 3 of 15.....	36
Figure 7-1D. CO-9 Access Exhibit 4 of 15.....	37
Figure 7-1E. CO-9 Access Exhibit 5 of 15.....	38
Figure 7-1F. CO-9 Access Exhibit 6 of 15	39
Figure 7-1G. CO-9 Access Exhibit 7 of 15.....	40
Figure 7-1H. CO-9 Access Exhibit 8 of 15.....	41
Figure 7-1I. CO-9 Access Exhibit 9 of 15	42
Figure 7-1J. CO-9 Access Exhibit 10 of 15.....	43
Figure 7-1K. CO-9 Access Exhibit 11 of 15	44
Figure 7-1L. CO-9 Access Exhibit 12 of 15	45
Figure 7-1M. CO-9 Access Exhibit 13 of 15	46
Figure 7-1N. CO-9 Access Exhibit 14 of 15.....	47
Figure 7-1O. CO-9 Access Exhibit 15 of 15.....	48
Figure 7-2. Lodge by the Blue Conditional Accesses	50
Figure 9-1. Sidewalk Typical Section	55

Figure 9-2. Shared Use Trail Typical Section	55
Figure 9-3. Shared Use Sidepath Typical Section	56
Figure 9-4. Highway – Widened Shoulders Typical Section	56
Figure 9-5. Conceptual Roundabout Design – CO-9 and Southside Drive/River Park Drive.....	59
Figure 9-6. Conceptual Roundabout Design – CO-9 and Blue River Road.....	60
Figure 9-7. Conceptual Intersection Design – CO-9 and Blue River Road.....	61

LIST OF TABLES

Table 3-1. CO-9 Jurisdictions	10
Table 3-2. Posted Speed Limits – CO-9 Northbound.....	11
Table 3-3. Posted Speed Limits – CO-9 Southbound.....	12
Table 3-4. Existing Vehicle Pull-Off Locations	13
Table 4-3. LOS Criteria	19
Table 4-4. Intersection LOS	20
Table 4-5. Existing Signalized Intersection Delay & LOS	21
Table 4-6. Segment Boundaries.....	21
Table 4-7. Existing Segment Operations.....	21
Table 5-1. 2040 traffic growth rates.....	23
Table 5-2. 2040 No Build Stop-Controlled Intersection Delay & LOS	23
Table 5-3. 2040 No Build Signalized Intersection Delay & LOS.....	24
Table 5-4. 2040 No-Build segment Operations.....	25
Table 5-5. POTENTIAL Auxiliary Lanes	26
Table 5-6. 2040 ACP Stop-Controlled Intersection Delay & LOS	27
Table 5-7. 2040 ACP Signalized Intersection Delay and LOS	27
Table 5-8. Roundabout Operations	28
Table 5-9. Passing Lane Results	28
Table 6-1. Access Plan Compatibility Evaluation Summary.....	31
Table 9-1. OPC Breakdown	57
Table 10-1. Transit Stop Evaluation	62

TECHNICAL APPENDIX (Bound Separately)

APPENDIX A - PUBLIC OUTREACH

APPENDIX B - EXISTING ACCESS INVENTORY

APPENDIX C - CRASH HISTORY

APPENDIX D - TRAFFIC METHODOLOGY, DATA & ANALYSIS

APPENDIX E - ACCESS PLAN METHODOLOGY & EVALUATION PROCESS

APPENDIX F - INTERGOVERNMENTAL AGREEMENT

APPENDIX G - ACCESS CONTROL PLAN TABLES

APPENDIX H - CONCEPTUAL TRAIL DESIGN PLANS AND OPINION OF PROBABLE COST

APPENDIX I - CONCEPTUAL WILDLIFE CROSSING AND OPINION OF PROBABLE COST

EXECUTIVE SUMMARY

Study Background

The Town of Blue River, the Town of Breckenridge, Summit County, and the Colorado Department of Transportation identified a need to develop an Access Plan for Colorado State Highway 9 (CO-9). The route includes a segment through the Town of Blue River and a small segment at the south end of Breckenridge within the southern section of Summit County. CO-9 provides connectivity for local and commuter traffic and is a critical route with few continuous alternative routes in the area. The differing uses on the highway can create conflict and interrupted traffic flow, which can be expected to worsen over time with growth and increased traffic. The Access Plan will give CDOT and the local agencies a long-range planning document to identify access points along the state highway. The goals for the study are as follows:

- Provide effective and efficient through travel for traffic on CO-9.
- Provide safe, effective, and efficient access to and from CO-9 for businesses, residents, and guests.
- Maintain compatibility with existing and proposed off-system connections that provide local circulation to support the transportation system.
- Provide a plan that is adoptable by all entities and can be implemented in phases.
- Support the economic viability of the study area.
- Maintain compatibility with previous local planning efforts, including wildlife planning.
- Support the development of alternative modes, including transit, pedestrian, and bicycle routes.

The Town of Blue River, the Town of Breckenridge, Summit County and the Colorado Department of Transportation (CDOT) recognize that good mobility and safe access along CO-9 are essential to the on-going vitality of South Summit area. In addition to the Access Plan, the study team has developed a conceptual (15%) trail design within the study limits to expand on the Hoosier Pass Recreational Pathway Feasibility Study that was completed in 2013. The conceptual trail design will give local agencies a starting point to obtain future funding opportunities for design and construction.

Study Area

The study area consists of approximately 9 miles of CO-9. The highway is an undivided, 2-lane, rural highway through mountainous terrain. The study limits stretch from Carroll Lane (MP 77.49) to Broken Lance Drive/Boreas Pass Road (MP 86.26). The access category for this segment of CO-9 is Regional Highway (R-A). There are currently 147 full movement access points on CO-9 within the study area. The access points are classified as follows:

- 2 Public Road Signalized
- 33 Public Road Unsignalized
- 5 Private Road Unsignalized
- 1 Business Access
- 77 Residential Accesses
- 29 Field Accesses

Some of the existing access points listed above are combined business, residential, and/or field accesses.

Coordination and Public Involvement

The study is a joint partnership between the Town of Blue River, the Town of Breckenridge, Summit County and CDOT Region 3. Input from corridor stakeholders, including property owners, tenants, transit agencies, United States Forest Service and the general public, was a critical element of the study. Multiple techniques were used to engage stakeholders including: two advertised public open houses; one-on-one in-person meetings and phone calls with interested stakeholders; public presentations with local elected officials; an online study comment tool; and study information posted on Blue River and Summit County websites. Exhibits presenting access management principles, the study process, recommended Access Plan, and Conceptual Trail Design elements were displayed at open houses, on Blue River and Summit County websites, and via a web-based interactive map and public comment tool. Representatives from the Towns, County, CDOT, and consultant team were available for questions at public outreach events. Comments were accepted at all outreach events, via the public comment tool, Survey Monkey, and e-mail or mail throughout the study.

Development of the Access Plan

In preparation for this study, the existing physical and operational characteristics of CO-9 were defined. The study team also developed goals for the study. A compatibility index for the Access Plan was developed to evaluate how the plan met the goals for the study. Next, future physical and operational characteristics were projected for a 20-year planning period based on anticipated growth in the area. Using this information, a draft Access Plan was developed and evaluated. Based on input from the study team, agency representatives, and the public, the draft plans were refined and evaluated using criteria identified in the compatibility index. Overall, the Access Plan rates favorably and is compatible with study's goals. Plan adoption by the Town of Blue River, the Town of Breckenridge, Summit County and CDOT is recommended.

Access Plan Recommendations

Figures 7-1A through 7-1O found in Section 7 of this report graphically illustrate the recommended Access Plan. Technical Appendix G contains the specific recommendations for each individual access point. In general, key full movement intersections with the potential for auxiliary lanes and the long-term potential for signalization have been identified. In considering locations of major intersections, out of direction travel was generally limited to a maximum distance of one mile ($\frac{1}{2}$ mile each way). Minor intersections were located in areas where spacing between major intersections was greater than $\frac{1}{2}$ mile, and an additional intersection with the potential for auxiliary lanes reduced the out of direction travel. These minor intersections would not have the potential for signalization. In addition, highway access is reduced to one location per ownership and where feasible, shared between adjacent properties. Access is located outside the functional intersection area of the nearest key full movement intersections, where possible. Closely spaced access points on opposite sides of the highway are realigned or relocated to eliminate overlapping vehicle conflicts. Where reasonable access can be provided to an alternate route/cross street, access points are relocated to the local street system. Limited movement access points were not considered along CO-9 due to the two-lane highway configuration. Access points between major intersections are identified as unsignalized full movement intersections.

The Access Plan will reduce the number of access points from 147 to 125. This change in access includes the following:

- 24 access closures
- 10 accesses relocated
- 11 shared access points
- 4 public road access points realigned to improved locations

Major and minor intersections that are identified as full movement intersections with potential auxiliary lanes and signalization, if warranted, (or other traffic control measure) in the future are as follows (minor intersections marked with an asterisk):

- | | |
|---|--|
| ➤ Carroll Lane (CR 860) | ➤ Rock Springs Road* |
| ➤ CR 670 with Hamilton Lane (CR 805) | ➤ Spruce Creek Road (CR 800) |
| ➤ Tordal Way (CR 656)* | ➤ Lakeshore Loop (CR 571) with Crown Drive (CR 574) |
| ➤ Blue Lakes Road (CR 850) | ➤ Green Mountain Drive (CR 790) with Horizon Lane (CR 550) |
| ➤ Mark Court (CR 650) with Susan Court (CR 847) | ➤ Wagon Road (CR 11)* |
| ➤ Quandary Road (CR 626) | ➤ River Park Drive with Southside Drive* |
| ➤ Whispering Pines Circle | ➤ Broken Lance Drive with Boreas Pass Road (CR 10) |
| ➤ Calle de Plata (CR 589)* | |
| ➤ Blue River Road | |
| ➤ Blue Rock Drive (CR 579)* | |

Access Plan Implementation

The improvements recommended in the Access Plan represent a long-range plan that will be implemented over time as traffic and safety needs arise and as funding becomes available. Construction of the recommended improvements may be completed using public and/or private funding. The following cases, or any combination, will trigger construction for the Access Plan:

1. A property redevelops or changes use, resulting in an increase in traffic to and from the site of 20% or more. In this case, limited improvements at the specific access point may be required by CDOT. As part of the Town of Blue River, the Town of Breckenridge, and/or Summit County's development review process, additional improvements compatible with the Access Plan may also be necessary to address traffic-related impacts created by the development. (Private Funding)
2. The Town of Blue River, the Town of Breckenridge, and/or Summit County obtains funding to complete improvements to a segment of the CO-9 corridor or a local route. (Public Funding)
3. State and/or Federal Funds are obtained to complete improvements to a segment of the CO-9 corridor. Typically, a project will be identified in the Statewide Transportation Improvement Program (STIP) to obtain funding. (Public Funding)
4. A safety or operational issue develops that can be mitigated through the implementation of access management techniques consistent with the Access Plan. Public funding from any combination of agencies may be obtained to construct improvements. (Public Funding)

The Access Plan identifies access improvements that can be implemented with the anticipated highway improvement project on CO-9 through the process described in the triggers above. To provide for continued commitment to the access modifications recommended by this study, it is

recommended that the Town of Blue River, the Town of Breckenridge, Summit County and CDOT execute an IGA to adopt the Access Plan as an Access Plan for the segment of CO-9 between Carroll Lane (MP 77.49) and Broken Lance Drive/Boreas Pass Road (MP 86.26).

Conceptual Trail Design

The study team is developing a conceptual (15%) trail design within the study limits to expand on the Hoosier Pass Recreational Pathway Feasibility Study that was completed in 2013. The conceptual trail design will give local agencies a starting point to obtain future funding opportunities. The trail design consists of four typical sections including sidewalk, shared use trail, shared use sidepath, highway-widened shoulders. Using existing data, Summit County Lidar data, aerial mapping, recommendations from the traffic operations analyses, industry design standards, the Access Plan, and input from CDOT, local agencies and the public, a conceptual design for the study corridor was developed.

The typical sections were developed that considered elements such as existing terrain, right-of-way impacts, wildlife, local planning efforts, and multi-modal accommodations. Conceptual trail design plans can be found in Technical Appendix H. The conceptual design defines baseline conditions and establishes a foundation for project improvements including an overall level of impact along the corridor and potential right-of-way needs. The total anticipated cost of the project is \$19.3 million in 2019 dollars. Continuing design efforts will consider unique circumstances and will adapt the project elements to fit specific conditions by selecting distinct design treatments customized for each location, circumstance, or condition.

1.0 INTRODUCTION

1.1 Study Background

Colorado State Highway 9 (CO-9) is a critical route through south Summit County and Park County providing connectivity between US 285 and I-70 for local, regional, commuter, and tourist traffic. CO-9 not only provides access for outdoor recreation and tourism economies within Summit County, but also provides residential access for local communities along the highway. With few continuous alternative routes in the area, communities like Blue River and Breckenridge rely heavily on CO-9 for access and mobility. In addition, the need for multi-modal options along our state highway corridors continues to rise and the desire for improved transit, bicycle and pedestrian options along CO-9 has been specifically identified by the local agencies within south Summit County through previous planning efforts. The rugged terrain and critical environmental resources in the area, including the Blue River and the variety of wildlife that inhabit the area, also impact corridor operations and opportunities for transportation improvements. The differing uses on the highway can create conflict and interrupted traffic flow, which can be expected to worsen over time with growth and increased traffic.

The Town of Blue River, the Town of Breckenridge, Summit County and the Colorado Department of Transportation (CDOT) recognize that good mobility and safe access along CO-9 are essential to the on-going vitality of the South Summit County area. In recognition of the growth that Summit County and Park County are experiencing, as well as the conflicts and needs along the CO-9 corridor, these four agencies have identified a need to develop an Access Plan for CO-9 between Carroll Lane (MP 77.49) and Broken Lance Drive/Boreas Pass Road (MP 86.26). The limits of the access study span approximately 8.77 miles of CO-9 as illustrated on the Vicinity Map in Figure 1.1.

In conjunction with the Access Plan, the agencies have also partnered together to advance the Hoosier Pass Recreational Pathway Feasibility Study that was completed in 2013. As part of this study effort, the alternatives identified in the 2013 study were furthered investigated and refined to provide the agencies with a conceptual (15%) trail design within the study limits that is compatible with the Access Plan, topography, property ownership and operations on CO-9. The conceptual trail design is meant to provide the local agencies with a plan that will support future efforts in obtaining funding and pursuing environmental clearances.

The purpose of this study effort is to coordinate development and growth anticipated in the area with the transportation needs for the local community and the traveling public. Establishing a long-term access and conceptual trail design plan will improve safety, local access efficiency, and mobility to promote the current and future economic viability of the corridor, while improving the functionality of the highway for all users. The goals for the study are as follows:

- Provide effective and efficient through travel for traffic on CO-9.
- Provide safe, effective, and efficient access to and from CO-9 for businesses, residents, and guests.
- Maintain compatibility with existing and proposed off-system connections that provide local circulation to support the transportation system.
- Provide a plan that is adoptable by all entities and can be implemented in phases.
- Support the economic viability of the project area.
- Maintain compatibility with previous local planning efforts, including wildlife planning.
- Support the development of alternative modes, including transit, pedestrian, and bicycle routes.

Figure 1-1. Vicinity Map



1.2 Study Coordination

The study area falls within the southern portion of Summit County, including a 3.84-mile segment through the Town of Blue River and a short 0.26-mile segment at the south end of Breckenridge. All participating local agencies have jurisdiction over land use within their respective boundaries. Operations of CO-9 are managed by CDOT – Region 3 with the Mountain Residency responsible for engineering and construction. Maintenance of CO-9 is split between CDOT Region 2 and 3. Within the study area, CDOT Region 2 maintains CO-9 from the summit of Hoosier Pass to MP 80. The study is a joint partnership between the Town of Blue River, the Town of Breckenridge, Summit County and CDOT.

The primary study team for development of the study consisted of representatives from Blue River staff and Board of Trustees, Breckenridge staff, Summit County staff, and CDOT – Region 3 Traffic and Safety Unit. Input from other departments and specialties within the Towns, County and CDOT, including environmental, design, planning, maintenance, open space and trails, and Summit Stage transit was collected by study team representatives at specific study progress meetings and at staff previews held prior to the public open houses. Coordination with local elected officials and study stakeholders, including property owners, tenants and the general public is described in the Section 1.3.

1.3 Public Involvement

Input from corridor stakeholders, including property owners, United States Forest Service (USFS), Colorado Parks and Wildlife (CPW) and the general public, was a critical element of the study. Multiple techniques were used to engage stakeholders including advertised public open houses; one-on-one meetings/phone calls with interested stakeholders; public presentations with local elected officials; an online study comment tool; and study information posted on the Summit County website.

Two advertised study-specific public open houses were held to present and discuss the recommended Draft Access Plan and the conceptual trail design for the CO-9 corridor, review access management principles and techniques, and gather public input on the draft plans and designs. The first meeting was held on May 15, 2019 at the Breckenridge Recreation Center, and the second meeting was held on September 25, 2019 at the Town of Blue River Town Hall. Corridor property owners, local government representatives, and other interested individuals who contacted the team prior to the open houses were invited to the open house by first class mail and e-mail, when provided. 140 postcards were mailed to property owners in advance of the open houses. An invitation was included on the Town of Blue River and Summit County websites and in the Town of Blue River email newsletter. Legal public notices were posted in two issues of the Colorado Mountain News Media, and advertisements were posted in the Summit Daily News to inform the general public of the open houses. Exhibits presented at both open houses included:

- Study goals
- Access management benefits
- Access management principles and techniques
- Study limits overview
- Comparison of existing process and Access Plan process
- Recommended draft and revised Access Plans
- Access Plan implementation
- Trail typical sections
- Conceptual trail design
- Trail implementation process
- Study schedule

The same exhibits were also available for review on Town of Blue River and Summit County websites. Representatives from the Town of Blue River, the Town of Breckenridge, Summit County, CDOT, and consultant team were available for questions and discussion at both open houses. At the May open house, 55 people signed in and 38 people signed-in at the September open house.

Following the May public open house, the study team held a series of one-on-one meetings with corridor property owners. Face-to-face meetings were held at the Blue River Town Hall on June 25, 2019. Opportunities for participation in the one-on-one meetings was advertised in the Town of Blue River email newsletter and some participants were contacted directly by phone requesting participation in the process. Eight one-on-one meetings were held. Six of the meetings were held in-person and two of the meetings were held over the phone. Interested parties that participated in the one-on-one meetings included property owners, developers, HOA's, CDOT Maintenance, USFS, and CPW. Town, County, CDOT, and consultant team representatives participated in each of these meetings. In addition, the study was discussed with several interested parties via telephone at various times during Access Plan development.

As part of the public outreach process, CDOT led efforts to develop a public comment tool. This public comment tool was a web-based interactive mapping tool that referenced GIS data available from the County and duplicated the study boards presented at the open houses. The comment tool was available via web link which was shared with attendees at the open houses, as well as on the Town Blue River and Summit County websites. Users could geographically place comments on the maps presented and could request a phone call or meeting with the study team. One comment was received through this tool.

For the May open house, comment forms were collected in-person at the meeting, through email, through CDOT's public comment tool, and through Survey Monkey. Comments were also collected in the form of sticky notes on the display boards. A total of eleven comment forms were filled out. Seven were submitted using the paper form, and four were collected via Survey Monkey. The comments received are summarized below.

- 55% of respondents support the consolidation of access throughout the corridor
- 100% of respondents support the Conceptual Trail Plan
- The three most important priorities included:
 - Pedestrian/Bicycle Trail Access (91% of respondents)
 - Safety (72% of respondents)
 - Driveway Access (55% of respondents)
- Concerns about the plan included:
 - Sharing access with neighbor (45% of respondents)
 - Relocation of access on property (18% of respondents)
 - Potential for traffic signals (9% of respondents)

For the September open house comment forms were collected in-person and through email. Survey Monkey was available, but no comments were received through Survey Monkey. A total of two comment forms were filled out using the paper form. The comments received are summarized below.

- 50% of respondents support the consolidation of access throughout the corridor
- 50% of respondents support the Conceptual Trail Plan
- Concerns:
 - Private property encroachment
 - Converting portions of private roads to public roads for access improvements

Open house sign-in sheets and comment sheets, as well as a list of one-on-one meeting participants can be found in Technical Appendix A.

The study team updated and engaged local elected officials on study progress and development on multiple occasions. All meetings were open to the public. Updates were provided at the following meetings:

- Blue River Board of Trustees: April 9, 2019 and August 20, 2019
- Breckenridge Town Council: April 9, 2019 and via staff memo in August, 2019
- Summit County Board of County Commissioners: May 7, 2019 and August 20, 2019

Final presentations to each of the agency's elected officials will be held at regularly scheduled meetings in April, 2020 to adopt the plan.

2.0 ACCESS MANAGEMENT – BENEFITS, PRINCIPLES & TECHNIQUES

As defined by the *Access Management Manual, TRB, Second Edition 2014*, “Access management is the coordinated planning, regulation, and design of access between roadways and land development. It involves the systematic control of the location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to a roadway.” Access management along Colorado State Highways is generally administered by CDOT on a case-by-case basis, as prescribed by the *State of Colorado State Highway Access Code, latest edition*. Per Section 2.12 of the Access Code, CDOT or a local authority may develop an Access Control Plan (ACP) for a segment of highway that defines access locations, level of access and traffic control for future conditions. Developing an Access Plan provides CDOT and the local authorities with the opportunity to develop a single transportation plan that considers multiple access points along a segment of highway as a network rather than as individual access points. Corridor specific issues such as intersection spacing, traffic movements, circulation, land use, topography, alternative access opportunities, and other local planning documents may be considered in developing an Access Plan. The Plan does not define capacity improvements, off-network improvements, or funding sources for access improvements, although local governments often consider off-network improvements for their communities in conjunction with an Access Plan. The Plan is a long-range planning document that identifies access conditions that will be implemented as highway and land-use characteristics change. Access Plans for State Highways are adopted by CDOT and the local authorities through an intergovernmental agreement (IGA).

2.1 Access Management Benefits

Access management provides the means to balance good mobility along the highway with local access needs of businesses and residents. Implementation of access management principles and techniques on State and local transportation networks can provide the following long-term benefits for highway users, communities, and businesses:

- Safety
 - Fewer decision points and potential for conflicts for motorists, cyclists, and pedestrians results in a reduced number of crashes.
 - Safe access to businesses and residences is provided.
- Increased ability to accommodate traffic demands
 - Fewer locations where vehicles are entering and exiting the corridor results in smoother traffic flow and decreased travel times.
 - Reduced congestion and travel times on the highway increases opportunities to reduce delay on the local street system.
 - Improved operations on the highway results in less air pollution.
- Preserves property values and the economic viability of adjacent businesses
 - A more efficient roadway system captures a broader market area.
 - A more predictable and consistent development environment is created.
 - Well-defined driveways with suitable spacing make it easier for customers to enter and exit businesses safely, thereby encouraging customers to patronize corridor businesses.
- Encourages use and development of local streets
 - Alternative local routes allow traffic to access local amenities conveniently without using the highway, thereby providing both convenient local access and circulation and reduced volumes on the highway.

2.2 Guiding Principles

Access management centers around limiting and consolidating access along major roadways and focusing access for development on a supporting local street network and circulation system. The following guiding principles to access management were applied in the development of the Access Plan for CO-9:

- Limit the number of direct access points to major roadways
- Locate major intersections (potential future signals) to favor through movements and to accommodate infrastructure for turning movements
- Remove turning vehicles from through traffic lanes
- Provide a supporting local street network and circulation system

In addition, functional intersection area was considered in evaluating the spacing between major intersections. *American Association of State Highway and Transportation Officials (AASHTO) A Policy on Geometric Design of Highways and Streets, 2018* and *Access Management Manual, TRB, Second Edition 2014* indicate that separation of access points should not be less than the functional area of the intersection. The functional intersection area extends upstream and downstream from the physical intersection as shown in Figure 2-1.

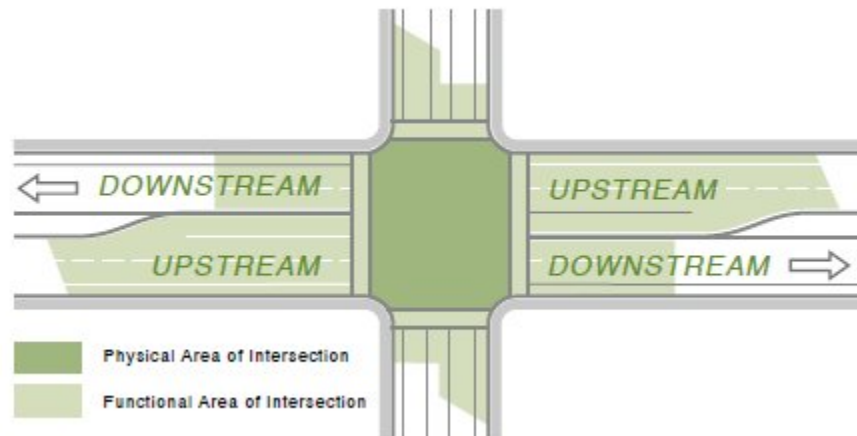


Figure 2-1. Functional Intersection Area

Source: Federal Highway Administration (FHWA) *Access Management in the Vicinity of Intersections Technical Summary*

The upstream distance is a combination of the storage length, deceleration and taper length, and the perception-reaction distance required for the speed of the segment. The downstream distance is measured as either acceleration length or decision sight distance. Providing acceleration length allows vehicles to accelerate to normal speed without conflict. Providing decision sight distance allows drivers to pass through an intersection before considering potential conflicts at the next intersection. Decision sight distance was identified as the controlling downstream functional intersection distance for this corridor since, based on traffic volumes and the topography along the CO-9 corridor, the need for acceleration lanes and the ability to provide acceleration lanes is low. The functional intersection area depends on the speed of the segment and the number of projected turning vehicles.

2.3 Techniques

Several access management techniques, illustrated on the following pages, may be used to achieve the principles outlined above and to realize the benefits of access management along CO-9.

Principle: Limit the number of direct access points to major roadways

Technique: Consolidate Access

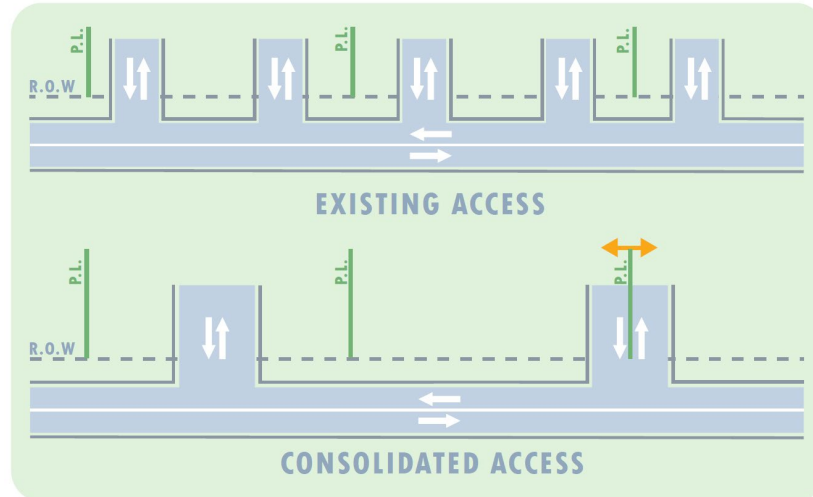


Figure 2-2. Consolidate Access

Consolidate access points by:

- Reducing the number of access points that serve a single property
- Providing joint access for multiple properties at or near a property line

Principle: Minimize the number of locations where vehicles merge, split, or cross

Technique: Define Driveways

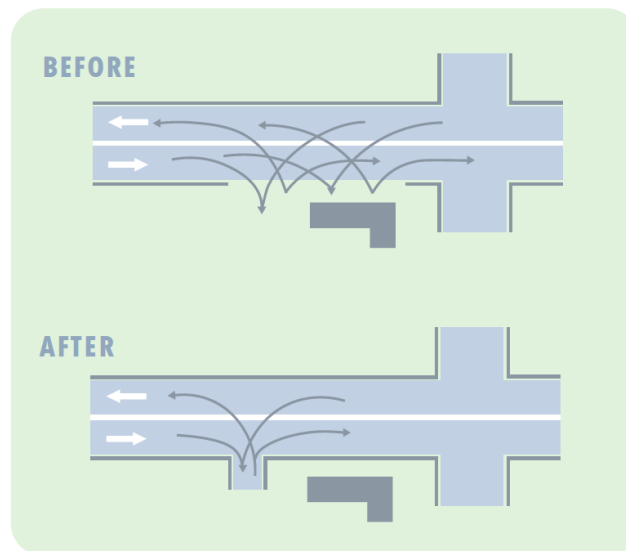


Figure 2-3. Define Driveways

Define driveways to provide clear identification of entrance and exit locations.

Principle: Provide a supporting local street network and circulation system

Technique: Provide Cross Street Access

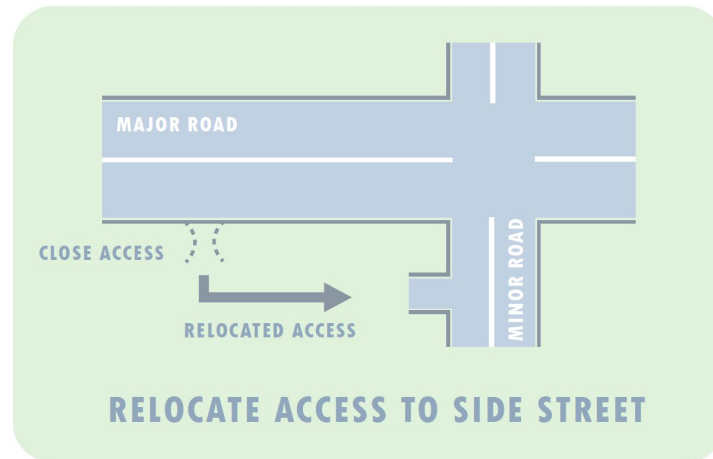


Figure 2-4. Provide Cross Street Access

Relocate access to a side street to:

- *Reduce the number of direct access points to the major roadway.*
- *Provide safe and easy access to a minor roadway intersection with the major roadway.*
- *Provide opportunities to use an alternate local route, thereby avoiding use of the major roadway completely.*

3.0 EXISTING CONDITIONS

3.1 Land Use Characteristics

The study area covers 8.77 miles of CO-9 from Carroll Lane (MP 77.49) to Broken Lance Drive/Boreas Pass Road (MP 86.26) in Summit County, Colorado. CO-9 is an undivided, 2-lane, rural highway through mountainous terrain. This stretch of CO-9 passes through multiple jurisdictions, shown in Table 4-1.

TABLE 3-1. CO-9 JURISDICTIONS

Mile Post	Approximate Location	Jurisdiction
MP 77.49 to MP 80.77	Park County Line to Rio Azul	Summit County
MP 80.77 to MP 84.72	Rio Azul to Rivershore Drive	Town of Blue River
MP 84.72 to MP 86.00	Rivershore Drive to Riverpark Drive	Summit County
MP 86.00 to MP 86.26	Riverpark Drive to Broken Lance Drive	Town of Breckenridge

In general, land use within the study area is single-family residential. The area is home to full-time and part-time seasonal residents, with short-term rental properties available. The study area has some commercial properties closer to the Town of Breckenridge, but is primarily residential in the segment near the Town of Blue River. There are plans to expand the size and number of new housing units in Blue River along Spruce Creek Road with the potential to accommodate a live-work component where residential units are directly connected to workspace for home occupations. At the southern end of Blue River, Town Hall is located off of CO-9 with the future plan of further developing the area for various municipal and public facilities. The Goose Pasture Tarn is a private lake within the Town of Blue River that provides fishing and boating opportunities to Town residents only. County land use outside of the Town of Blue River is generally zoned single-family residential and natural resources. The study area falls within the United States Forest Service (USFS) White River National Forest jurisdiction. Several properties along the route are owned and maintained by the USFS. A segment of CO-9 between Mark Court and Quandary Road is owned by the USFS, and CDOT has a permanent easement for the highway.

The South Summit area is a mountainous region that is accessible to many Colorado residents. The area is recognized as a national destination for world-class recreational opportunities such as road and mountain biking, hiking, cross-country and downhill skiing, and other year-round outdoor activities. The beginning of the study starts near the Hoosier Pass Summit. The Summit is a destination that has a designated parking area for visitors to stop for a scenic overlook. Multiple trailheads are accessed off CO-9, including the Quandary Peak trailhead.

The area has been involved in previous planning study efforts. The Hoosier Pass Recreational Pathway Feasibility Study was completed in 2013 and explored a 17-mile multi-modal recreational link along CO-9 that would connect the Town of Breckenridge, Town of Blue River, and the Upper Blue River Basin. In addition to its recreational opportunities, the study area is also known for its wildlife. CO-9 is a busy wildlife corridor and travelers on the highway often stop and pull off the road when wildlife is spotted. The Summit County Safe Passages: A County-wide Connectivity Plan for Wildlife Study was completed in 2017 to investigate appropriate wildlife crossings in the study area.

3.2 Roadway Characteristics

The alignment of CO-9 is curvilinear with tight turns at the beginning of the study area. The highway straightens out through the middle section of the study area and then has gradual curves toward the end. At the beginning of the study near MP 78.6, there is a large, sharp curve due to the wetland area on the east side of the highway. Further along between MP 79 and 80 there are two switchbacks due to the steep grade of the terrain.

The road descends from Hoosier Pass at the beginning of the study limits. The profile grade of the road decreases steadily from Hoosier Pass to the end, where it levels out closer to Breckenridge. In general, the natural cross-sectional slope rises dramatically on the west side of CO-9; several locations with steep cut slopes are located adjacent to the highway. In some parts, the land on the east side of the highway tends to be significantly lower than CO-9 where guardrail protects several of these fill slopes. In the limits of the Town of Blue River, the land on either side of the highway flattens out with residences on both sides.

The posted speed limit on CO-9 ranges from 30 mph to 50 mph with the majority of the study area posted at 50 mph. Lower speeds are posted as the highway ascends/descends Hoosier Pass and approaching the Town of Breckenridge. There are several speed advisory signs in the segment ascending/descending Hoosier Pass due to curvature and steep grades. Speed limits currently posted within the study area are summarized in Table 3-1 and Table 3-2. The posted speeds were used to evaluate intersection functional area and proposed access configurations.

TABLE 3-2. POSTED SPEED LIMITS – CO-9 NORTHBOUND

Approximate Milepost	Approximate Location	Northbound Posted Speed Limit (mph)	Approximate Milepost	Northbound Advisory Speed (mph)
77.49 - 79.90	Carroll Ln to north of Mark Ct	30	78.20	25
			78.63	15
			78.80	25
			79.22	25
			79.35	10
79.90 - 80.09	North of Mark Ct to south of Quandary Rd	40	N/A	N/A
80.09 - 85.82	South of Quandary Rd to south of River Park Dr	50	80.26	45
			80.62	35
85.82 -86.26	South of River Park Dr to Broken Lance Dr/Boreas Pass Rd	35	N/A	N/A

TABLE 3-3. POSTED SPEED LIMITS – CO-9 SOUTHBOUND

Approximate Milepost	Approximate Location	Southbound Posted Speed Limit (mph)	Approximate Milepost	Southbound Advisory Speed (mph)
86.26 - 85.95	Broken Lance Dr/Boreas Pass Rd to south of River Park Dr	35	N/A	N/A
85.95 - 80.05	South of River Park Dr to south of Quandary Rd	50	83.05	45
			81.90	35
80.05 - 79.87	South of Quandary Rd to north of Mark Ct	40	N/A	N/A
79.87 - 77.49	North of Mark Ct to Carroll Ln	30	79.71	10
			78.83	15
			78.53	25
			77.68	10

CO-9 generally consists of a 2-lane rural asphalt cross-section. Sections of the corridor include 2-10' asphalt shoulders, while other sections have gravel shoulders. At Broken Lance Drive/Boreas Pass Road, there are right and left-turn deceleration lanes. There is a northbound left turn deceleration lane and southbound right turn acceleration lane at River Park Dr. A summary of the existing cross-sections on CO-9 is listed below by milepost.

MP 77.49 to MP 79.00:

- 2-lane rural section with asphalt shoulders

MP 79.00 to MP 85.94:

- 2-lane rural section with a mix of asphalt and gravel shoulders

MP 85.94 to MP 86.00 (River Park Drive intersection south leg):

- 2-lane rural section with gravel shoulders and a northbound deceleration lane and a southbound acceleration lane

MP 86.00 to MP 86.10 (River Park Drive intersection north leg):

- 2-lane rural section with asphalt shoulders and northbound acceleration lane and a southbound deceleration lane

MP 86.10 to MP 86.26 (Broken Lance Drive/Boreas Pass Road intersection south leg):

- 2-lane rural section with guardrail in both directions and a northbound right and left turn lane and a southbound acceleration lane.

The following access points have geometric configurations that create access challenges:

- Access No. 8.5 (skewed intersection at County Road (CR) 805)
- Access No. 18a (poor sight distance at horizontal curves near Tordal Way)
- Access No. 20 (steep grade from Susan Court to CO-9)
- Access No. 38a (skewed intersection at 97 Circle)
- Access No. 109 (skewed intersection at Spruce Creek Road)
- Access No. 122 (skewed intersection at Alpenview Road)

Vehicle pull-off areas along CO-9 also create access challenges. Some of the pull-offs are used by CDOT Maintenance as an area to turn around during plowing and other maintenance activities. Others are located on private property. Some pull-offs are also used as transit stops. Many are used by the public as an area to pull

over or park. Parking is not permitted, but difficult to enforce. Pull-offs also present safety and operational challenges due to inadequate sight distance and position at some of the locations. There are 22 pull-off areas along CO-9 in the study area:

TABLE 3-4. EXISTING VEHICLE PULL-OFF LOCATIONS

Access Number	Approximate Location	Direction of Travel
1b	Between Carroll Lane and CR 865	Northbound
3	Across CR 856	Northbound
7	Between CR 865 and CR 670	Northbound
11	Between CR 670 and Blue Lakes Road	Northbound
14b	Near Blue Lakes Road	Northbound
14.5	North of CR 871	Northbound
19	Between Tordal Way and Lance Lane	Northbound
22	North of Lance Lane	Southbound
24b	Quandary Drive	Northbound
32	Between Lodge by the Blue and Whispering Pines Circle	Northbound
35	Across Fredona Gulch Road	Southbound
38.5	South of 97 Circle	Southbound
83b	Blue River Road	Northbound
84.5	North of Blue River Road	Northbound
97b	North of Rustic Terrace	Northbound
107.5	North of Rock Springs Road	Northbound
108	North of Rock Springs Road	Southbound
108.5	Between Spruce Creek Road and Conifer Drive	Southbound
112	North of the Goose Pasture Tarn	Northbound
112.5	Between Goose Pasture Tarn and Crown Drive	Southbound
120	North of Wagon Road	Northbound
121	North of Wagon Road	Southbound

3.3 Right-of-Way

The right-of-way (ROW) width within the study area varies between approximately 75' and 225'. Starting at Carroll Lane, there is a permanent easement from the USFS. This permanent easement continues to CR 586. Highway ROW picks up at CR 586 to Susan Court/Mark Court at an approximate width of 100'. The segment between Mark Court and Quandary Road is owned by the USFS, and CDOT has a permanent easement of approximately 300' for the highway and surrounding land. After Quandary Road, the highway ROW begins again and is approximately 75' wide through the rest of the study limits. There are utility and service road easements in various locations along the corridor.

3.4 Access Category

Section Three of the *State of Colorado State Highway Access Code, latest edition*, establishes a system of eight highway categories for the purpose of defining the level of access for a highway segment based on the intended function of that segment. The Colorado Transportation Commission assigns a category to each state highway segment throughout Colorado. The entire length of the study area along CO-9 from Carroll Lane to Broken Lance Drive/Boreas Pass Road in Breckenridge (MP 77.49 to MP 86.26) is categorized as Regional Highway (R-A).

According to Section 3.8 of the Access Code, the major access control characteristics of a highway segment under Category R-A are as follows:

- Through traffic movements take precedence over direct access needs;
- Capacity for medium to high speed and medium to high traffic volumes within rural areas;
- “One access shall be granted per parcel of land if reasonable access cannot be obtained from the local street or road system;”
- One-half mile spacing for full movement intersections or minimum 35% efficiency for signal progression.
- The auxiliary lane warrants for R-A highway are as follows:
 - Left turn deceleration lane – 10 vehicles per hour (vph)
 - Right turn deceleration lane – 25 vph
 - Right turn acceleration lane – 50 vph

3.5 Existing Access Inventory

There are currently 147 existing access points on CO-9 within the study area. Most existing access points are full movement, unsignalized accesses, with the exception of the signalized intersection at Broken Lance Drive/Boreas Pass Road. The majority of access points, nearly 53%, provide residential access. Approximately 23% of access points provide public road access, and 3% provide private road access. The remaining access points provide either direct business access or field access, approximately less than 1% and 20%, respectively. Some access points are multi-purpose.

For the purposes of identifying the location of access points for this plan, all access points are defined by the approximate CDOT milepost (MP) along CO-9 based on CDOT Highway Segment Description Milepost for Carroll Lane, MP 77.49. All access points are located at the approximate centerline of the access (+/- 50 feet). A complete inventory of existing access points is provided in Technical Appendix B.

The following provides a description of the accesses by type:

Public Road Signalized (PRS) – Full movement, signal-controlled intersection. There are 2 PRS access points on CO-9 at the intersection of Broken Lance Dr/Boreas Pass Road.

Public Road Unsignalized (PRU) – Full movement, stop-controlled intersections providing direct access to a publicly owned roadway. The PRU access points in the study area include:

- | | |
|----------------------------------|---------------------------------|
| • Carroll Lane CR (860) | • Fredonia Gulch Road (CR 600) |
| • CR 856 | • Calle De Plata (CR 589) |
| • CR 670 | • 97 Circle (CR 804) |
| • Hamilton Lane (CR 805) | • Sherwood Lane (CR 613) |
| • CR 855 | • Blue Grouse Trail |
| • Blue Lakes Road (CR 850) | • Blue River Road (CR 680) |
| • Mountain Kingdom Road (CR 871) | • Rustic Terrace (CR 603) |
| • Odins Circle (CR 849) | • Blue Rock Drive (CR 579) |
| • Ellen Circle (CR 848) | • Leap Year Trail (CR 578) |
| • Tordal Way (CR 656) | • Rock Springs Road (CR 577) |
| • Susan Court (CR 847) | • Spruce Creek Road (CR 800) |
| • Mark Court (CR 650) | • Lakeshore Loop (CR 571) |
| • Quandary Road (CR 626) | • Crown Drive (CR 574) |
| • Whispering Pines Circle | • Green Mountain Drive (CR 790) |
| • Silverheels Road (CR 590) | • Horizon Lane (CR 550) |

- Wagon Road (CR 11)
- River Park Drive (CR 765)
- Alpenview Road (CR 789)

Private Road Unsignalized (PVRU) – Full movement, stop-controlled intersections providing direct access to a privately-owned roadway. The PVRU access points in the study area include:

- Rio Azul
- Red Mountain Trail
- Conifer Drive
- Rivershore Drive
- Southside Drive

Business Access (BA) – Full movement highway access points serving businesses within the study area. These types of access points are typically used multiple times daily by a variety of traffic types. There is a total of one BA at Lodge by the Blue

Residential Access (R) – Full movement private highway access points used on a regular basis by limited traffic. These types of access points include single-family private driveways. There are 77 R points on CO-9.

Field Access (FA) – Full movement access points that provide direct access from the highway to agricultural land, vehicle pull-offs, and trailheads. These types of access points are typically not well-defined and are used infrequently. There are 29 FA points on CO-9.

According to these classifications, the access points are distributed as follows:

- 2 Public Road Signalized
- 33 Public Road Unsignalized
- 5 Private Road Unsignalized
- 1 Business Access
- 77 Residential Accesses
- 29 Field Accesses

Some of the existing access points listed above are combined business, residential, and/or field accesses.

3.6 Crash History

A Safety Assessment was conducted for the study area in November 2018 based on crash data for the period of January 1, 2012 to December 31, 2016. Crash data from January 1, 2017 to December 31, 2017 was made available after the completion of the safety assessment. This data was examined and it was concluded that the inclusion of this data would not significantly change crash patterns, levels of service of safety, or overall recommendations. Within the study period, 175 crashes were reported along CO-9 between MP 77.49 and MP 86.26. Of these, there were 34 injury collisions and 1 fatal collision; 50 persons injured and 1 killed. Crashes with fixed objects were the type most commonly reported, accounting for 36% of crashes along the segment. Other common crash types along this corridor include overturning crashes, accounting for 14% of total crashes, as well as rear end, accounting for 13% of the total crashes.

Nearly the entire study segment has a higher than expected crash rate. The roadway segment between MP 81.4 and 83.5 (approximately between Silverheels Road and north of Rock Springs Road) has the highest crash frequency and severity. This segment contains 61 non-intersection crashes, eight of which resulted in

injuries and one resulted in a fatality. Seventeen (17) of the crashes occurred on curves and 14 crashes were reported as overturning.

Several crash patterns were identified along CO-9, including sideswipe same direction, embankment, dawn/dusk, off-road, snow/icy road, overturning, injury, property damage only (PDO) and dark-unlighted crashes. Embankment crashes are above the expected norms from MP 79.4 to MP 80.2 and from MP 81.6 to MP 84.55. These locations often lack guardrail, have several horizontal curves, and can be visually obstructed by trees. The safety assessment recommended that the Region could conduct further geometric analysis to determine if guardrail is warranted in these subsegments along CO-9. A pattern of dark-unlighted crashes was observed between MP 83.25 and MP 84.20. Among the 38 crashes occurring in dark-unlighted condition, 24 of them took place in a snowy/icy/wet roadway condition. The safety assessment recommended that the Region could consider improving the visibility of existing pavement markings and providing additional pavement markings on curves to reduce dark-unlighted crashes in this subsegment.

A pattern of PDO crashes were observed between MP 82.4 and MP 83.2. The existing shoulders within this segment are narrow. The safety assessment recommended that the Region could consider widening the existing shoulders and implementing shoulder rumble strips on this subsegment to reduce fixed object PDO crashes.

Snowy road crashes followed a pattern between MP 81.6 to MP 83.7, MP 84.4 to MP 84.6, MP 84.8 to MP 85.2 and MP 85.4 to MP 85.55. Most of the crashes took place during dark-unlighted condition. Most of the icy road crashes involved a citation for driving too fast for conditions. A pattern was observed for icy road crashes between MP 81.5 and MP 83.5. The posted speed limit is 50 mph within this subsegment. Therefore, installation of an icy curve/road warning system and reviewing the existing speed limit was recommended by the safety assessment.

A pattern of off-road right crashes was observed between MP 81.75 and MP 84.75. Among the 47 off-road crashes within this subsegment, 34 of them took place during dawn, dusk, or dark conditions. There are a very limited number of street lights present within this subsegment. The safety assessment recommended that the Region could review the adequacy of existing lighting and delineators and implement shoulder rumble strips to reduce off-road crashes in this subsegment.

Figure 3-1 shows the driveway crash distribution within the study limit on CO-9. Crash data was obtained for each driveway using a 0.02-mile inclusive search radius. Crash distribution by driveways can be found in Technical Appendix C. Among these locations, driveways between MP 82.03 and MP 82.14 experienced a higher number of crashes compared to the rest of the study segment. This subsegment includes several frequent residential driveways as seen in Figure 3-1. The safety assessment recommended consolidation of driveways through implementing an Access Plan, which could reduce the number of access points on CO-9 within this location.

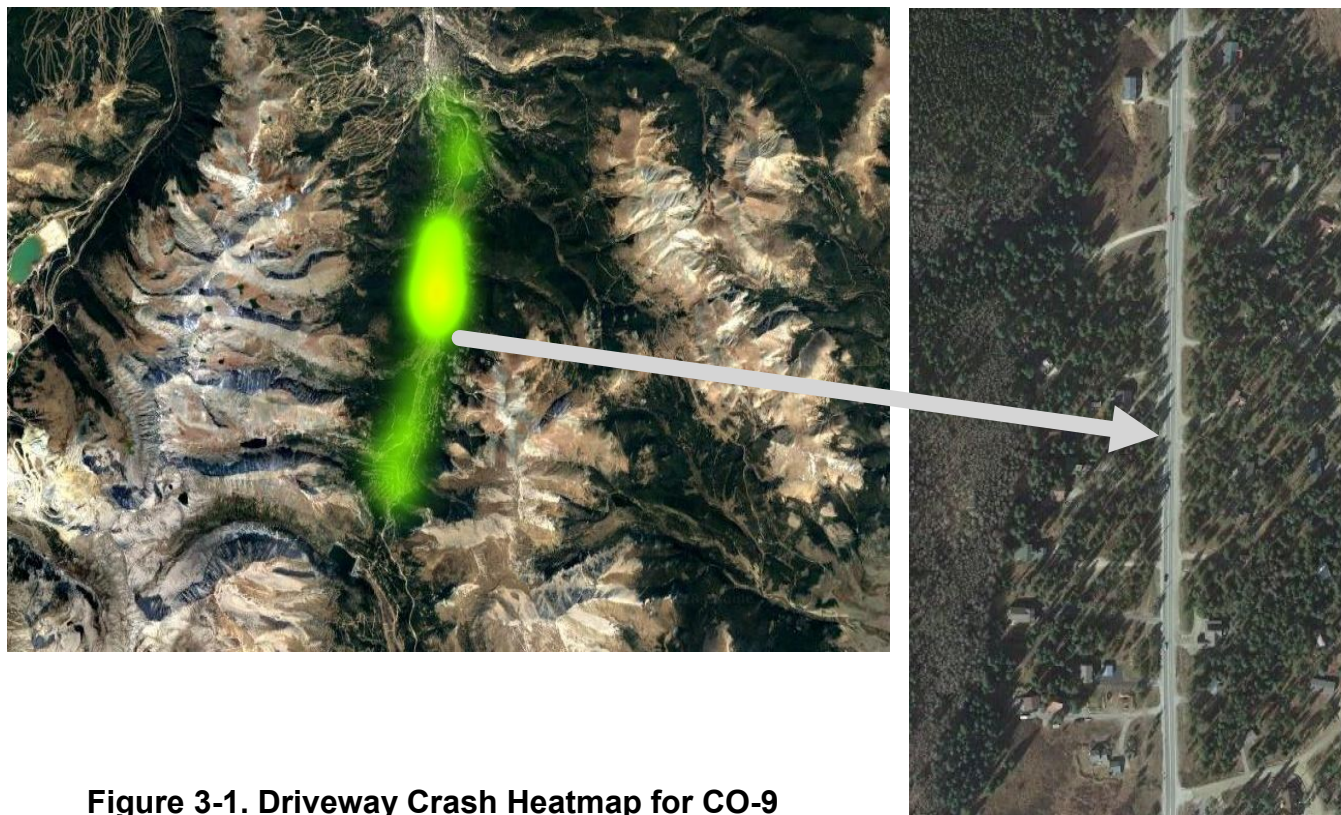


Figure 3-1. Driveway Crash Heatmap for CO-9

4.0 EXISTING TRAFFIC CONDITIONS

The traffic analysis for this Access Plan considered the 8.77-mile segment of CO-9 in Summit County, as well as 31 intersections within that segment of highway. The focus of the traffic analysis for the access study is identifying movements that will warrant auxiliary lanes by the year 2040, as well as increasing passing opportunities for drivers traveling along CO-9. The following three scenarios were analyzed for this Access Plan:

Existing: This scenario was evaluated using July/August 2018 count data and the existing roadway geometry.

2040 No Build: This scenario evaluated traffic conditions with the assumption that roadway geometry has remained the same. The 2040 No Build scenario also does not include any improvements to access based upon the recommended Access Plan. Traffic counts were inflated in accordance with future growth projections.

2040 ACP: This scenario evaluated traffic conditions assuming full implementation of the proposed Access Plan. Where warranted by the State Highway Access Code (SHAC) criteria, auxiliary lanes were assumed.

4.1 Existing Traffic Volumes

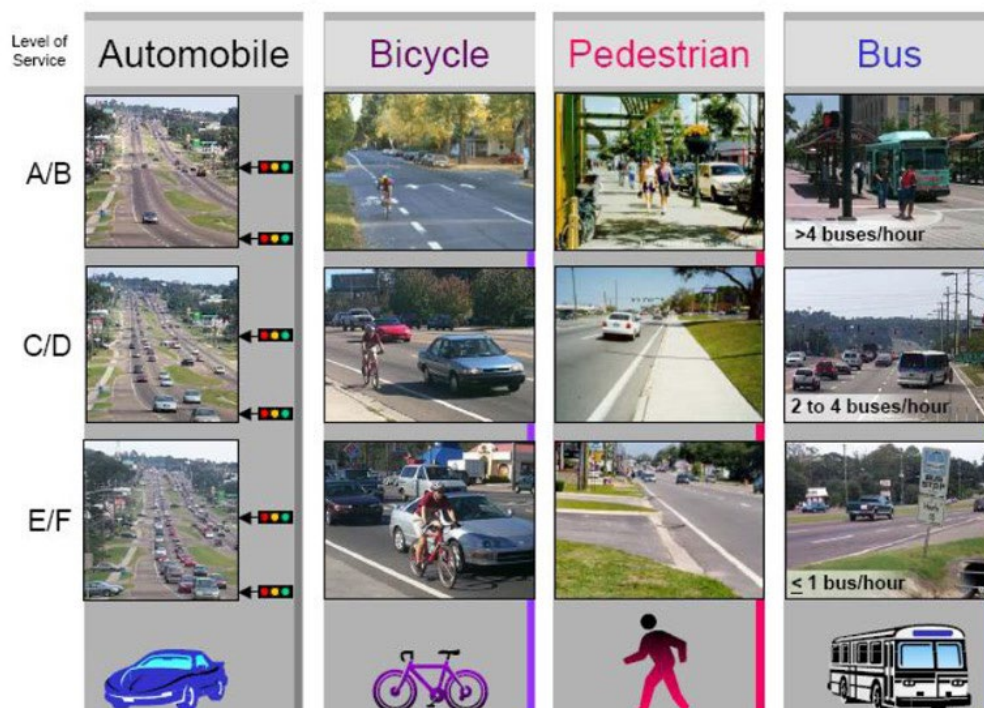
Hourly vehicle classification counts were collected at four locations along CO-9 from Tuesday, July 31, 2018 to Thursday, August 2, 2018. The volumes at each of these four locations are shown in Table 4-2. Peak period turning movement counts (TMCs) were collected at 31 public street and driveway locations along the highway. Using data from the count stations maintained by CDOT, it was determined that July and August are the peak months for traffic volumes through this corridor. Since the counts were taken during the months with the highest volumes, no seasonal adjustment to the traffic count data was applied. The existing traffic counts figures are attached in Technical Appendix D.

Table 4-2. AVERAGE DAILY TRAFFIC

CO-9	Average Vehicles per Day	Heavy Vehicle Percentage
South of Carroll Ln	5,704	2.9%
Mark Ct to Quandary Rd	7,767	2.2%
Rivershore Dr to Green Mountain Dr	10,715	1.8%
North of Broken Lance Dr	15,976	1.6%

4.2 LOS Criteria

Traffic analyses were conducted in accordance with procedures outlined in the Highway Capacity Manual, and included intersection Level-of-Service (LOS). LOS is a measure of the quality of traffic flow and ranges from LOS A (nearly ideal traffic conditions with very little delay for motorists) to LOS F (poor traffic conditions with long motorist delays). LOS C is typically considered a “good” traffic condition. LOS D or better conditions are typically desirable during peak traffic periods; however, LOS E conditions are not uncommon. LOS F, although undesirable, is also not uncommon for side street traffic movements at full movement, unsignalized intersections with high volume arterial roadways. Figure 4-1 illustrates examples of LOS for various modes of travel.



Source: FDOT Quality/Level of Service Handbook

Figure 4-1. LOS Criteria

Table 4-3 provides a summary of the Highway Capacity Manual's LOS Criteria. This study area contains both signalized and unsignalized intersections.

TABLE 4-3. LOS CRITERIA

Level of Service (LOS)	Average Delay		Traffic Characteristics
	Signalized Intersection (seconds/vehicle)	Unsignalized Intersection (seconds/vehicle)	
A	≤ 10	≤ 10	Free Flow / Insignificant Delays
B	> 10 – 20	> 10 – 15	Stable Flow / Minimal Delays
C	> 20 – 35	> 15 – 25	Stable Flow / Acceptable Delays
D	> 35 – 55	> 25 – 35	Approaching Unstable / Tolerable Delays
E	> 55 – 80	> 35 - 50	Unstable Flow / Significant Delays
F	> 80	> 50	Forced Flow / Excessive Delays

Where an unsignalized intersection operates at LOS E or F, a volume-to-capacity ratio (V/C) has been reported for the worst-case movement. Where V/C exceeds 1.00, traffic demand during peak periods exceeds the capacity for the movement. This condition will cause queues to grow, potentially filling auxiliary lanes and blocking adjacent traffic lanes until demand decreases.

4.3 Existing Conditions

Traffic operations were evaluated using Highway Capacity Manual, 6th Edition methods as applied in the HCS 7 software. The intersections, as well as the highway as an overall segment were analyzed. The Two-Way Stop-Control and Streets methods were used to analyze the intersections along CO-9. Table 4-4 and Table 4-5 show the existing traffic operations at the stop-controlled and signalized intersections. Since the intersection at River Park Drive/Southside Drive has a left turn acceleration lane for the eastbound left (EBL) movement, the northbound through volumes were reduced to zero in the HCS models to account for the fact that they would not be conflicting with the EBL movement. This assumes that drivers will use the acceleration lane, even when northbound through movements are present. Since many drivers will wait until both directions of CO-9 are clear before turning into the acceleration lane, the intersection results without an acceleration lane were also included. Traffic operations at Southside Drive are likely in-between the with and without acceleration lane results. Both conditions with and without the acceleration lane are included for all three traffic scenarios evaluated. All of the intersections are operating well, at LOS C or better.

TABLE 4-4. INTERSECTION LOS

Intersection	AM			PM		
	Movement	Delay (sec)	LOS	Movement	Delay (sec)	LOS
Carroll Ln	EB	11.7	B	EB	11.6	B
Hamilton Ln/CR 670	EB	13.4	B	WB	13.7	B
Blue Lakes Rd	EB	12.3	B	EB	13.2	B
Mountain Kingdom Rd	SB	7.9	A	SB	7.7	A
Odins Cir	NB	7.7	A	NB	8.2	A
Ellen Cir	NB	7.7	A	NB	8.2	A
Tordal Way	WB	10.3	B	WB	10.4	B
Mark Ct	WB	10.6	B	WB	10.6	B
Quandary Rd	WB	10.8	B	WB	9.8	A
Rio Azul	WB	11.4	B	WB	14.3	B
Whispering Pines Cir	WB	11.3	B	WB	11.3	B
Silverheels Rd	WB	10.6	B	WB	11.3	B
Fredonia Gulch Rd	WB	10.7	B	SB	7.9	A
Calle De Plata	WB	10.7	B	WB	13.1	B
97 Cir	EB	13.6	B	EB	14.5	B
Red Mountain Trail	WB	10.7	B	WB	15.2	C
Sherwood Lane	WB	10.8	B	WB	11.4	B
Blue Grouse Tr	WB	10.8	B	SB	7.9	A
Blue River Rd	WB	11.6	B	WB	12.2	B
Rustic Terrace Rd	WB	11.5	B	WB	10.2	B
Blue Rock Dr	WB	11.5	B	WB	10.1	B
Leap Year Trail	EB	15.2	C	EB	16.9	C
Rock Springs Rd	SB	8.4	A	WB	10.1	B
Spruce Creek Rd	EB	15.2	C	EB	17.2	C
Crown Dr/Lakeshore Loop	EB	18.1	C	EB	22.3	C

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Intersection	AM			PM		
	Movement	Delay (sec)	LOS	Movement	Delay (sec)	LOS
Rivershore Dr	WB	16.2	C	WB	10.5	B
Green Mountain Dr/Horizon Ln	EB	20.5	C	WB	21.5	C
Wagon Rd	WB	12.3	B	WB	12.8	B
Alpenview Rd	WB	12.5	B	WB	13.5	B
Southside Dr/River Park Dr	EB	11.5	B	EB	14.8	B
Southside Dr/River Park Dr (without acceleration lane use)	EB	22.5	C	EB	23.8	C

TABLE 4-5. EXISTING SIGNALIZED INTERSECTION DELAY & LOS

Intersection	AM		PM	
	Delay (sec)	LOS	Delay (sec)	LOS
Broken Lance Dr/Boreas Pass Rd	34.2	C	34.8	C

The Two-Lane Highway method was used to conduct the segment analysis. CO-9 was analyzed as three separate segments with the boundaries determined by changes in roadway characteristics and traffic volumes. The segment boundaries are shown in Table 4-6.

TABLE 4-6. SEGMENT BOUNDARIES

Segment	Approximate Location	Mile Post
Segment 1	Carroll Lane to north of Mark Court	MP 77.49 to MP 79.97
Segment 2	North of Mark Court to Spruce Creek Road	MP 79.97 to MP 84.00
Segment 3	Spruce Creek Road to Alpenview Road	MP 84.00 to MP 85.88

Since this portion of CO-9 is a Class II highway, the Level of Service (LOS) for the segment analysis will be derived from the percent time spent following (PTSF). Table 4-7 shows the existing segment operations.

TABLE 4-7. EXISTING SEGMENT OPERATIONS

	AM				PM			
	NB		SB		NB		SB	
	PTSF	LOS	PTSF	LOS	PTSF	LOS	PTSF	LOS
Segment 1 (MP 77.49 - MP 79.97)	70.5%	D	56.1%	C	50.5%	B	71.9%	D
Segment 2 (MP 79.97 - MP 84.00)	75.2%	D	52.7%	B	57.7%	C	76.4%	D
Segment 3 (MP 84.00 - MP 85.88)	83.2%	D	56.0%	C	60.9%	C	78.5%	D

While none of the segments are operating at an unacceptable Level of Service (LOS E or F), the northbound in the AM and the southbound in the PM are operating at LOS D for all three segments. This can be attributed mostly to the limited passing opportunities through the corridor rather than high traffic volumes. Since operations of a class II highway are based on the percent time spent following rather than the V/C ratio or travel speed, inadequate passing opportunities will have a major impact on the LOS. It is not realistic to expect a mountainous, windy highway, such as CO-9, to operate at an optimal LOS A. LOS of D on this type of

highway during the peak hours is not unreasonable and is not an operational concern. The HCS results for the intersections and segments have been included in Technical Appendix D.

5.0 FUTURE TRAFFIC CONDITIONS

5.1 Traffic Growth

Traffic growth along CO-9, within the study area, was forecasted using publicly available CDOT estimates. The count station data is shown in Table 5-1.

TABLE 5-1. 2040 TRAFFIC GROWTH RATES

CDOT Count Station	MP	Annual Growth Rate	22-Year Growth Factor
100495	82.63	2.2%	1.63
100499	86.17	1.2%	1.30

The number of additional through vehicles on the mainline in 2040 should be consistent through the length of the segment, due to the low number of potential developments along the side streets. From averaging the projected volume increase at the two count stations, it is assumed that the northbound volumes will increase by 190 vehicles per hour (VPH) in the AM and 138 VPH in the PM. The southbound volumes are expected to increase by 117 VPH in the AM and 218 VPH in the PM. These additional volumes are added to the existing through movements to get the 2040 volume projections for the through movements on CO-9.

The side streets along this portion of CO-9 are not through roads, and almost exclusively serve residential areas. Due to these conditions, traffic growth on side streets will be estimated by the potential for future development on that particular street, rather than background growth on CO-9. Within the study area, no major developments are planned within the towns of Breckenridge and Blue River, so no side street growth was assumed. There is potential for an expansion of Lodge by the Blue located at MP 80.69. A proposal to add 46 lodge units and 10-15 workforce housing units was recently submitted. While it is unclear at this time whether this expansion will take place, the potential trips generated by this development are included in the 2040 volume projections.

5.2 Future Traffic - 2040 No Build Scenario

The Two-Way Stop-Control and Streets methods were used to analyze the intersections for the 2040 No Build conditions. The roadway geometry remained consistent with the existing geometry, while the volumes were updated to reflect the forecasted growth along CO-9. Table 5-2 and Table 5-3 show the projected 2040 No Build intersection operations.

TABLE 5-2. 2040 NO BUILD STOP-CONTROLLED INTERSECTION DELAY & LOS

Intersection	AM			PM		
	Movement	Delay (sec)	LOS (V/C)	Movement	Delay (sec)	LOS (V/C)
Carroll Ln	EB	16.1	C	EB	15.7	C
Hamilton Ln/CR 670	EB	20.6	C	WB	21.3	C
Blue Lakes Rd	EB	17.2	C	EB	19.9	C
Mountain Kingdom Rd	SB	8.6	A	SB	8.2	A
Odins Cir	NB	8.1	A	NB	9.0	A
Ellen Cir	NB	8.0	A	NB	9.1	A
Tordal Way	WB	12.1	B	WB	12.5	B

(continued from previous page)

Intersection	AM			PM		
	Movement	Delay (sec)	LOS (V/C)	Movement	Delay (sec)	LOS (V/C)
Mark Ct	WB	12.7	B	WB	12.7	B
Quandary Rd	WB	13.1	B	WB	10.9	B
Rio Azul	WB	14.9	B	EB	22.5	C
Whispering Pines Cir	WB	14.1	B	WB	14.4	B
Silverheels Rd	WB	12.5	B	WB	14.2	B
Fredonia Gulch Rd	WB	12.6	B	SB	8.3	A
Calle De Plata	WB	12.6	B	WB	18.3	C
97 Cir	EB	19.2	C	EB	21.8	C
Red Mountain Trail	WB	12.6	B	WB	23.2	C
Sherwood Lane	WB	12.7	B	WB	14.5	B
Blue Grouse Tr	WB	12.8	B	SB	8.3	A
Blue River Rd	WB	14.3	B	WB	15.3	C
Rustic Terrace Rd	WB	13.7	B	WB	11.4	B
Blue Rock Dr	WB	13.8	B	WB	11.3	B
Leap Year Trail	EB	21.8	C	EB	26.2	D
Rock Springs Rd	SB	9.1	A	WB	11.2	B
Spruce Creek Rd	EB	21.6	C	EB	28.0	D
Crown Dr/Lakeshore Loop	EB	28.5	D	EB	39.6	E (0.07)
Rivershore Dr	WB	23.8	C	WB	11.8	B
Green Mountain Dr/Horizon Ln	EB	35.3	E (0.11)	EB	37.7	E (0.07)
Wagon Rd	WB	15.0	C	WB	16.6	C
Alpenview Rd	WB	15.4	C	WB	18.0	C
Southside Dr/River Park Dr (with acceleration lane use)	EB	13.2	B	EB	19.8	C
Southside Dr/ River Park Dr (without acceleration lane use)	EB	43.0	E (0.35)	EB	45.1	E (0.23)

TABLE 5-3. 2040 NO BUILD SIGNALIZED INTERSECTION DELAY & LOS

Intersection	AM		PM	
	Delay (sec)	LOS	Delay (sec)	LOS
Broken Lance Dr/Boreas Pass Rd	34.6	C	34.0	C

The LOS has declined at several of the intersections from the Existing conditions scenario. Notably, the intersections at Crown Dr, Green Mountain Dr, and Southside Drive (without acceleration lane use) are expected to operate at LOS E. This poor LOS is caused by the left turn movements from the side street having difficulty finding gaps in the through traffic along CO-9. While these intersections have high delays, they have low V/C ratios. This indicates that while a left turning vehicle may have to wait before turning, since the movement is well below capacity, it is unlikely that a queue will form. Due to the low V/C ratio, these three

intersections are not of concern. The HCS results for the intersections and segments have been included in Technical Appendix D.

The segment analysis was conducted using the Two-Lane Highway method. The roadway geometry was kept the same, and the volumes were increased. Table 5-4 shows the segment operations for the 2040 No Build conditions. As can be seen in the table, operations along CO-9 are expected to deteriorate from the Existing conditions. Segments 2 & 3 are expected to operate at LOS E for at least one direction while segment 1 is expected to remain at LOS D or better. Even with the increase in traffic, the highway will still be well under capacity, but the limited passing opportunities result in poor LOS. A LOS of E on a Class II highway does not indicate a breakdown of traffic operations, but instead means that it is unlikely drivers will be able to drive at their desired speed during peak time periods, due to a slower vehicle ahead of them.

TABLE 5-4. 2040 NO-BUILD SEGMENT OPERATIONS

	AM				PM			
	NB		SB		NB		SB	
	PTSF	LOS	PTSF	LOS	PTSF	LOS	PTSF	LOS
Segment 1 (MP 77.49 - MP 79.97)	79.5%	D	67.0%	C	60.6%	C	80.6%	D
Segment 2 (MP 79.97 - MP 84.00)	82.5%	D	62.7%	C	67.5%	C	85.2%	E
Segment 3 (MP 84.00 - MP 85.88)	88.5%	E	65.3%	C	69.8%	C	85.2%	E

5.3 Future Traffic - 2040 ACP Scenario

The 2040 ACP scenario used the same traffic volumes as the 2040 No Build scenario. The roadway geometry, however, was updated to reflect the changes proposed in the recommended Access Plan.

5.3.1 Auxiliary Lanes

With the increased volumes expected for 2040, each of the turning movements was assessed to see if the threshold was met for an auxiliary lane, based on the SHAC requirements. To warrant a left turn deceleration lane, a volume greater than 10 vehicles per hour (vph) is needed, and a volume greater than 25 vph is needed to warrant a right turn deceleration lane. A right turning movement of 50 vph from the side street warrants an acceleration lane, however, none of the movements that do not already have an acceleration lane are that high. Table 5-5 shows the movements that currently do not have an auxiliary lane, but are expected to meet the threshold in the year 2040. AASHTO 2018 was used to determine the deceleration lengths, and the SHAC was used to determine the storage lengths. The “Difficulty to Build” column in Table 5-5 assesses the level of construction required to build each proposed auxiliary lane, given the surrounding landscape. A ranking of 1 indicates that minimal excavation and/or roadway realignment is needed, while a ranking of 3 indicates that significant excavation and/or roadway realignment will be needed in order to fit the auxiliary lane.

TABLE 5-5. POTENTIAL AUXILIARY LANES

Intersection	MP	Speed Limit	Movement	Volume	Decel Length	Storage Length	Total Length	Difficulty to Build (1-3)
Blue Lakes Rd	78.80	30	SBR	30	150	40	150	2
Tordal Way	79.53	30	SBL	24	150	25	175	3
Mark Ct	79.83	30	SBL	19	150	25	175	2
Quandary Rd	80.30	50	SBL	21	415	25	440	1
Rio Azul	80.69	50	SBL	32	415	41	456	2
Whispering Pines Cir	81.18	50	SBL	19	415	25	440	1
Sherwood Ln	81.92	50	SBL	10	415	25	440	1
Blue River Rd	82.66	50	SBL	51	415	47	462	2
Spruce Creek Rd	83.98	50	SBR	25	415	25	415	1
Wagon Rd	85.08	50	SBL	18	415	25	440	1

5.3.2 Traffic Operations - 2040 ACP Scenario

The 2040 Build models were updated to include the warranted auxiliary lanes, as well as several other changes proposed by the Access Plan. The intersections of Calle De Plata and Fredonia Gulch were combined into one intersection, as were the intersections of Red Mountain Trail and 97 Circle. Sherwood Lane is planned to be a gated access, only accessible to emergency vehicles. The volumes from Sherwood Lane have been routed to Blue Grouse Trail. Table 5-6 and Table 5-7 show the traffic operations for intersections along CO-9 in the 2040 ACP scenario. The results do not differ much from the 2040 No Build results. Since the worst movement at the majority of the intersections is the left turn out of the side street rather than the left turn to the side street, the addition of auxiliary lanes on CO-9 has little effect on the LOS. They do, however, improve safety and operations on CO-9 by providing left turning vehicles a storage area that is removed from the through lane. Although several intersections are LOS E, they are not of concern because of the low V/C ratios. If operations at these intersections do become problematic, left turn acceleration lanes may be considered to help the left turns out of the side streets.

Currently, the left turn acceleration lane at Southside Drive is not prominent, and is only separated from the NB through movement by an 8" white line. One way to make acceleration lanes more likely to be used by drivers is to stripe them more prominently and, if spacing permits, put several feet of space between the acceleration lane and the through movements on CO-9. Although this will require additional width, it could increase the percentage of drivers that use them, and thus improve the LOS at the intersection.

TABLE 5-6. 2040 ACP STOP-CONTROLLED INTERSECTION DELAY & LOS

Intersection	AM			PM		
	Movement	Delay (sec)	LOS	Movement	Delay (sec)	LOS
Carroll Ln	EB	16.1	C	EB	15.7	C
Hamilton Ln/CR 670	EB	20.6	C	WB	21.3	C
Blue Lakes Rd	EB	16.4	C	EB	17.8	C
Mountain Kingdom Rd	SB	8.6	A	SB	8.2	A
Odins Cir	NB	8.1	A	NB	9.0	A
Ellen Cir	NB	8.0	A	NB	9.1	A
Tordal Way	WB	12.1	B	WB	9.7	A
Mark Ct	WB	11.9	B	WB	9.5	A
Quandary Rd	WB	12.4	B	WB	10.9	B
Rio Azul	WB	14.9	B	EB	22.3	C
Whispering Pines Cir	WB	11.1	B	WB	9.7	A
Silverheels Rd	WB	12.5	B	WB	14.2	B
Calle De Plata/Fredonia Gulch	WB	12.6	B	WB	18.3	C
Red Mountain Trail/97 Circle	EB	22.4	C	WB	28.2	D
Sherwood Lane	SB	8.8	A	SB	8.3	A
Blue Grouse Tr	WB	12.8	B	WB	10.0	A
Blue River Rd	WB	14.3	B	WB	15.3	C
Rustic Terrace Rd	WB	13.7	B	WB	11.4	B
Blue Rock Dr	WB	13.8	B	WB	11.3	B
Leap Year Trail	EB	21.8	C	EB	26.2	D
Rock Springs Rd	SB	9.1	A	WB	11.2	B
Spruce Creek Rd	EB	21.4	C	EB	23.7	C
Crown Dr/Lakeshore Loop	EB	28.5	D	EB	39.6	E (0.07)
Rivershore Dr	WB	23.8	C	WB	11.8	B
Green Mountain Dr/Horizon Ln	EB	35.3	E (0.11)	EB	37.7	E (0.07)
Wagon Rd	WB	15.0	C	WB	10.8	B
Alpenview Rd	WB	15.4	C	WB	18.0	C
Southside Dr/River Park Dr (with acceleration lane use)	EB	13.2	B	EB	19.8	C
Southside Dr/River Park Dr (without acceleration lane use)	EB	43.0	E (0.35)	EB	45.1	E (0.23)

TABLE 5-7. 2040 ACP SIGNALIZED INTERSECTION DELAY AND LOS

Intersection	AM		PM	
	Delay (sec)	LOS	Delay (sec)	LOS
Broken Lance Dr/Boreas Pass Rd	34.6	C	34.0	C

5.3.3 Roundabouts

Roundabouts have been considered for the intersections of CO-9 and Southside Dr/River Park Drive and at CO-9 and Blue River Road. The roundabouts were modeled in Sidra with one lane approaches/exits and one circulating lane. The roundabout designs and traffic results can be found in Technical Appendix D. Table 5-8 shows the projected roundabout operations for 2040.

TABLE 5-8. ROUNDABOUT OPERATIONS

Intersection	AM			PM		
	Movement	Delay (sec)	LOS	Movement	Delay (sec)	LOS
Southside Dr/River Park Dr	NB	16.0	C	SB	11.9	B
Blue River Rd	NB	8.6	A	SB	9.8	A

Both of the roundabouts are expected to operate well, with the roundabout at Southside Drive operating at LOS B and C, and the roundabout at Blue River Drive operating at LOS A. The stop-controlled intersection at Southside Drive could potentially face operational issues by 2040, especially if drivers are hesitant to use the left turn acceleration lane. A roundabout would be a good solution since it will allow the left turns out of Southside Dr, without stopping traffic on CO-9. While a roundabout would operate well at Blue River Road, it will likely be unnecessary from a traffic operational standpoint as the stop-controlled scenario is expected to operate at LOS B and C during the morning and afternoon peaks. A more detailed discussion on the roundabouts is provided in Section 9.

5.3.4 Passing Lanes

The highway segments of CO-9 are expected to operate similarly to the 2040 No Build scenario since most of the changes proposed by the ACP do not have a measurable impact on the HCS segment results. Several possibilities to improve segment operations were considered.

Passing lanes are one option to reduce the time spent following, but since the road is primarily downhill in the northbound direction, a passing lane was only considered for the southbound direction. The best option, given the terrain and location of cross streets and access points, was a 0.75-mile-long passing lane between MP 82.50 – MP 83.25 (Leap Year Trail to 97 Circle). Using the HCS Two-Lane Highway method, segment operations of the whole study area without the passing lane was compared to operations if a 0.75-mile SB passing lane were implemented. Table 5-9 shows the results that a passing lane would have on segment operations. As can be seen in the table, a southbound passing lane would improve the LOS for the southbound direction by one letter grade in both the AM and PM, but would have no effect on the northbound direction.

TABLE 5-9. PASSING LANE RESULTS

	AM				PM			
	NB		SB		NB		SB	
	PTSF	LOS	PTSF	LOS	PTSF	LOS	PTSF	LOS
Full Segment (No Passing Lane)	77.4%	D	55.8%	C	58.4%	C	78.4%	D
Full Segment (Passing Lane)	77.4%	D	43.9%	B	58.4%	C	64.4%	C

There are not many locations within the study area of CO-9 for a passing lane. There are few segments of straight highway with good sight distance, and the areas that are straight typically have a higher density of access points. Since most of the highway has a steep embankment and/or slopes on both sides of the road, adding a passing lane will likely require a large amount of excavation or embankment as well. These reasons, coupled with the marginal operational benefits that a passing lane would provide, make a passing lane an inefficient solution to the poor LOS.

A less costly option is to add several slow vehicle turnouts along CO-9. These would be paved pullouts on the side of the road, several hundred feet long, with signage instructing slow moving vehicles to pull over and allow vehicles to pass. One of the major complaints received about travel on CO-9, especially in the southbound direction, is that vehicles often get stuck behind slow vehicles, especially trucks, for many miles due to a lack of passing opportunities. One potential turnout location for the southbound direction of travel is the area north of Crown Drive. This area has an existing large dirt pull-off and sufficient sight distance, so the amount of construction required would be limited to paving the pull-offs. This would give vehicles two additional opportunities to pass prior to reaching the steeper inclines south of Blue River. The example below shows an existing slow-vehicle turnout on US 50 going eastbound on Monarch Pass outside of Monarch, CO.



Figure 5-1. Slow Vehicle Turnout – US 50 Monarch Pass Eastbound

(Source: Google Earth)



Figure 5-2. Advanced Regulatory Signs – Slow Vehicle Turnout

(US 50 Monarch Pass Eastbound)

6.0 ACCESS PLAN DEVELOPMENT AND APPLICATION

Using the traffic volume forecasts, input from the County, Towns and CDOT, input from the public outreach program, and guidance from the SHAC, an Access Plan was developed for the project. This Plan considers access points in logical groupings, as well as circulation opportunities via the existing and potential future local street system.

6.1 Process

The Access Plan was developed using a 4-step process:

6.1.1 Step One – Methodology & Compatibility Index

The project purpose, as described in Section 1.2, along with a traffic methodology and access plan methodology were established at the beginning of the project to define the goals, approach, and assumptions used to develop the Plan. In addition, a compatibility index for the Access Plan was developed to provide a logical means for determining whether the Access Plan meets the established project goals. The compatibility index identified a set of evaluation criteria that correspond with each project goal as defined in Section 1.1. A simple rating system that identifies the plan as favorable, neutral, or unfavorable with respect to each criterion was defined. Each of the three ratings under each criterion was then defined to assist in the evaluation. The traffic methodology memo can be found in Technical Appendix D and the access plan methodology memo and compatibility index can be found in Technical Appendix E.

6.1.2 Step Two – Development of the Access Plan

The existing inventory of access points was reviewed with existing parcel and ownership information. This review determined which parcels adjacent to CO-9 lacked access to the highway, which parcels had multiple accesses to consider for consolidation, and which parcels had access or potential access to an existing or proposed local road. An Access Plan was developed assuming future land use changes by applying access management principles and techniques discussed in Section 2. Major full movement intersections were located based on traffic projections, spacing, and functional intersection area. Ideally, providing one major full movement intersection within each half-mile was identified. Access for each parcel in between major intersections was either limited to one access per ownership or provided via a local road. Shared access between parcels was developed, wherever feasible. Access points were aligned, where feasible, with access points on the opposite side of the highway. If this was not feasible or if land use suggested limited use, access points were located to remove conflicting left-turn movements.

6.1.3 Step Three – Refine the Access Plan

A Draft Access Plan was presented to an internal review team consisting of representatives from the Town of Blue River, the Town of Breckenridge, Summit County and CDOT. Based on comments received from the team, the draft plan was refined and presented at the first public open house. Public comment was reviewed and the Plan was modified at several points throughout the project, as appropriate. Improvements considered cost prohibitive, with unmanageable physical constraints, with significant traffic operational deficiencies, inconsistent with overall community expectations, or not appearing to provide a reasonable level of access, were revised in the plan. In some cases, access conditions were defined to allow phased implementation of long-term solutions.

6.1.4 Step Four – Evaluation

Following the public outreach process, the refined Access Plan was evaluated using the compatibility index described in Step One to determine whether project goals were met.

6.2 Evaluation Results

The results of the evaluation by objective are listed in Table 6-1. Overall, the Access Plan rates favorably and is compatible with project goals. Plan adoption by the County, Towns and CDOT is recommended. Details of the Plan evaluation can be found in Technical Appendix E. A graphical representation of the Access Plan is located in Section 7.

TABLE 6-1. ACCESS PLAN COMPATIBILITY EVALUATION SUMMARY

Project Goal	Evaluation Criteria	Rating
Provide effective and efficient through travel for traffic on CO-9.	Highway Segment LOS	Neutral
	Functional Intersection Area	Favorable
	Number of Access Points	Favorable
Provide safe, effective, and efficient access to and from CO-9 for businesses, residents and guests.	Intersection Sight Distance	Favorable
	Intersection Level of Service (LOS)	Favorable
	Conformance with State Highway Access Code Auxiliary Lane Requirements	Favorable
	Out of Direction Travel Distance	Neutral
	Intersection Crash Risk	Favorable
Maintain compatibility with existing and proposed off-system connections that provide local circulation to support the transportation system.	Local Route Connectivity	Favorable
	Function of Local Transportation System	Favorable
Provide a plan that is adoptable by all entities and can be implemented in phases.	Public Support	Favorable
	Phasing Opportunities	Favorable
	Physical Constraints	Neutral
Support the economic viability of the project area.	Business Market Area	Neutral
Maintain compatibility with previous local planning efforts, including wildlife planning.	Compatibility with Local Planning	Favorable
	Compatibility with Summit County Safe Passages Plan	Favorable
Support the development of alternative modes, including transit, pedestrian, and bicycle routes.	Access for multi-modal Users (cyclists, Pedestrians, Transit)	Favorable

7.0 ACCESS PLAN RECOMMENDATIONS

This section presents details of the recommended Access Plan for CO-9. The Plan has been developed with considerable participation from Blue River, Breckenridge, Summit County, CDOT, and the public. After evaluating both existing and future conditions, the Plan defines how each access will function in the future. In general, key full movement intersections with the potential for auxiliary lanes and the long-term potential for signalization have been identified. Functional intersection area was considered in evaluating the spacing between major intersections. In considering locations of major intersections, out of direction travel was generally limited to a maximum distance of one mile, where feasible ($\frac{1}{2}$ mile each way). Minor intersections were located in areas where spacing between major intersections was greater than $\frac{1}{2}$ mile, and an additional intersection with the potential for auxiliary lanes reduced the out of direction travel. These minor intersections would not have the potential for signalization.

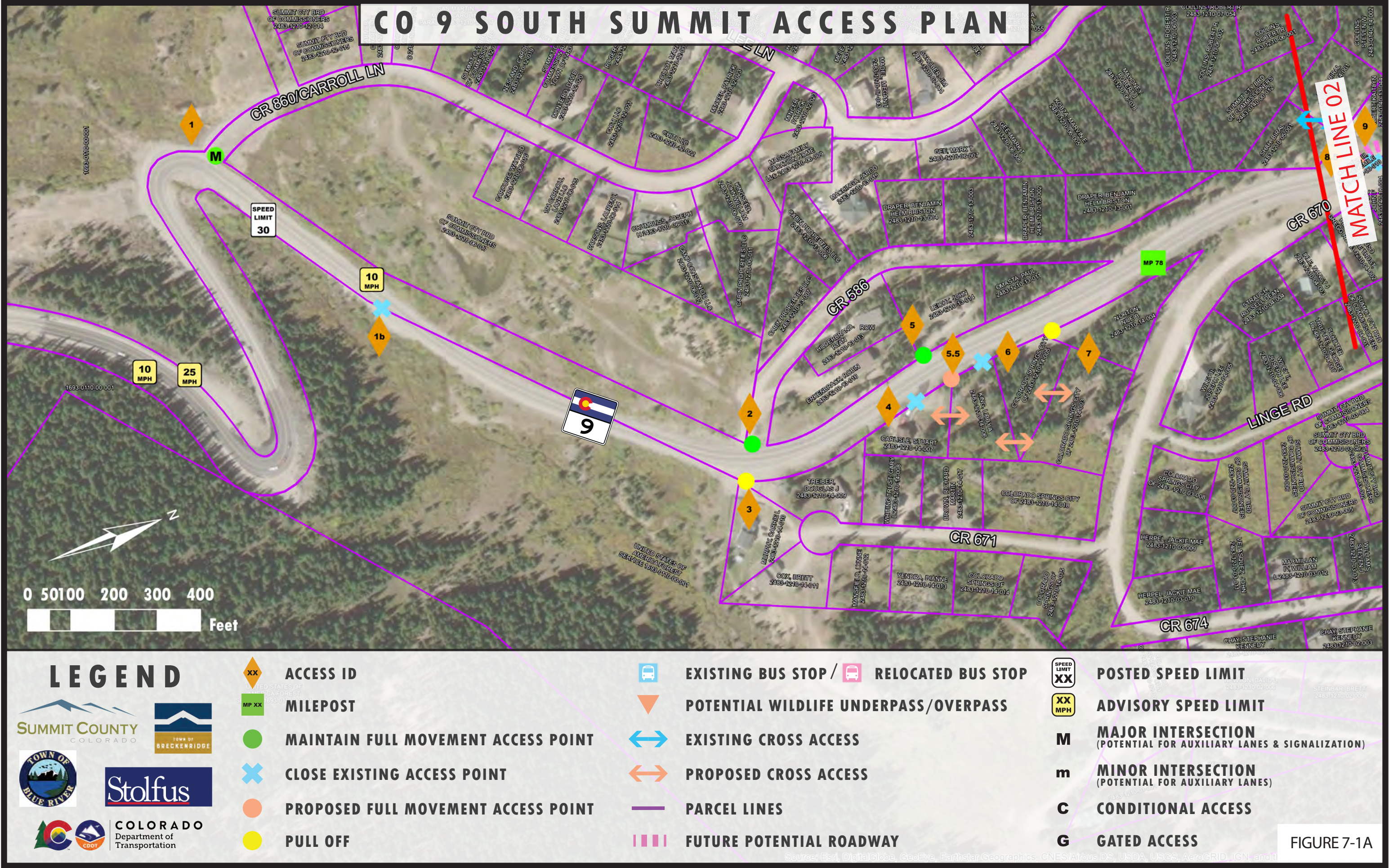
In addition, highway access is reduced to one location per ownership and where feasible, shared between adjacent properties. Access is located outside the functional intersection area of the nearest key full movement intersections, where possible. Closely spaced access points on opposite sides of the highway are realigned or relocated to eliminate overlapping vehicle conflicts. If overlapping vehicle conflicts did not exist, recommendations on relocated access were limited. However, if land use changes significantly in the future, consideration should be made to align intersections if it was not specifically identified in the plan. Where reasonable access can be provided to an alternate route/cross street, access points are relocated to the local street system. Shared access points were considered where feasible, while taking into consideration the existing topography and/or features. Shared access points were not considered if a significant cross-access easement would be required. Limited movement access points were not considered along CO-9 due to the highway characteristics. This segment is a two-lane undivided section and there are no plans to expand the section within the study's planning period. Access points between major intersections are identified as unsignalized full movement intersections. If auxiliary lanes or signals are warranted at these access points or if safety or operational issues develop in the future, restricting access may need to be reconsidered. Pull-offs identified in Section 3.2 were reviewed and recommended to remain open or stay closed based on location, sight distance, primary use, and ownership.

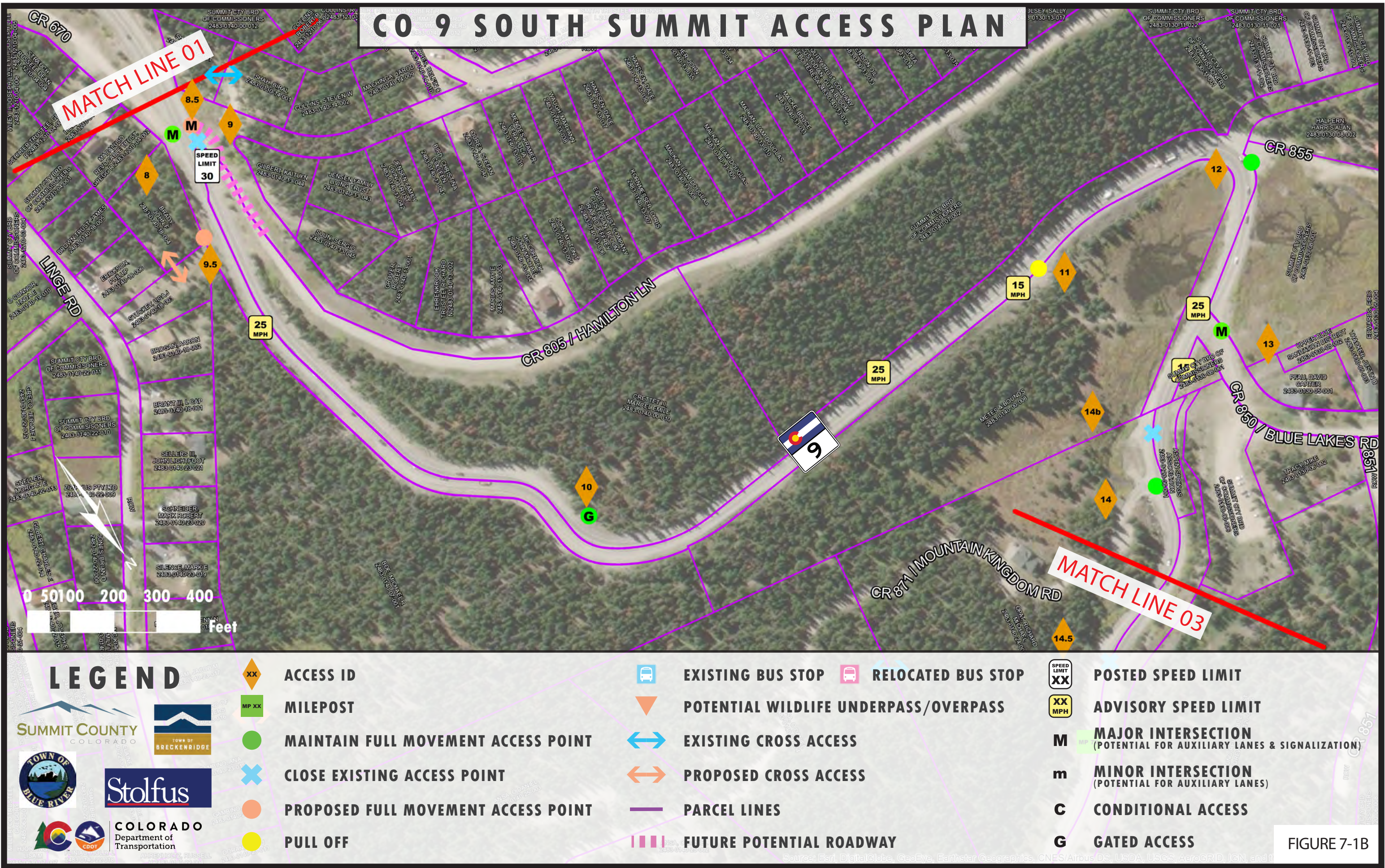
The narratives in this section are intended to serve as a summary of the key features of the Access Plan. The figures are intended to provide a graphical representation of the plan. For the Access Plan, a detailed explanation of each access in the study area, by milepost, is presented in the Access Plan Table, Exhibit A of the Draft IGA. Reference these exhibits for specific access configurations and conditions. Recognizing that this plan is a long-term planning document and not a detailed engineering design, milepost designations are intended to be approximate. As more detailed information is available, these designations may be modified (generally within 0.05 miles of the specified milepost designation). The Draft IGA and Draft Access Plan Tables are located in Technical Appendix F and Technical Appendix G, respectively.

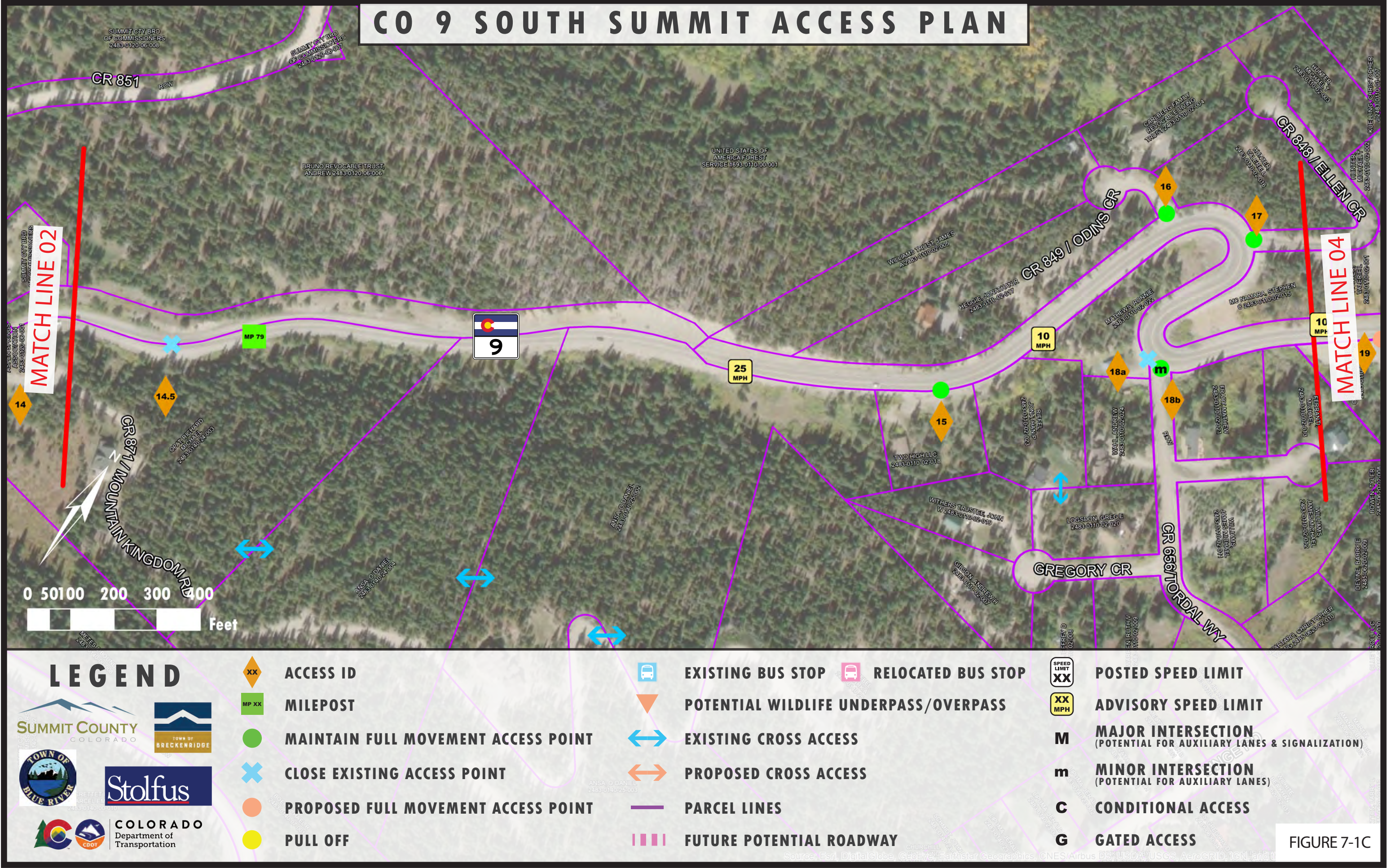
7.1 Access Plan

Key features of the Access Plan are summarized by major intersection on the following pages and illustrated in Figures 7-1A through 7-1O. Auxiliary lanes should be provided at major intersections identified in the Access Plan as prescribed by the State Highway Access Code. At major intersections, full movement intersections with potential for auxiliary lanes and long-term signalization, or other traffic control, have been identified as part of the Access Plan; however, the type of traffic control is not specified. At minor intersections, full movement intersections with the potential for auxiliary lanes without the option for signalization were also identified. Alternative intersection control can be considered at these locations. Traffic control will be evaluated on a case-by-case basis as future conditions warrant. Potential traffic control may include stop signs, traffic signals, roundabouts, or other traffic control recognized by the Manual on Uniform Traffic Control Devices (MUTCD).

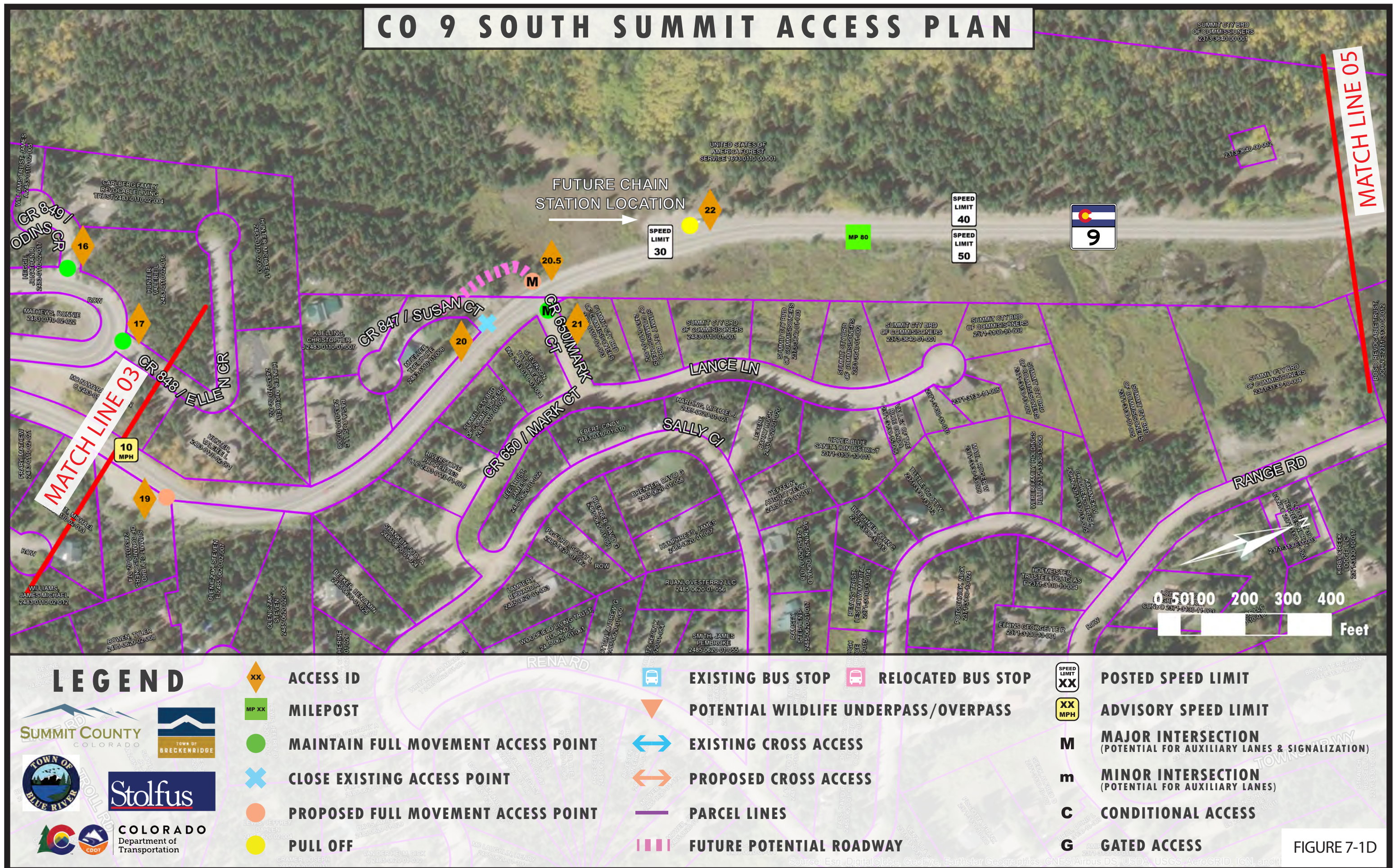
Traffic signals may be implemented at intersections if and when warranted per current MUTCD standards and when funding is available. However, based on future projections, traffic signals are not anticipated to be warranted within the study period.







CO 9 SOUTH SUMMIT ACCESS PLAN



CO 9 SOUTH SUMMIT ACCESS PLAN

MATCH LINE 04

MATCH LINE 06

LEGEND

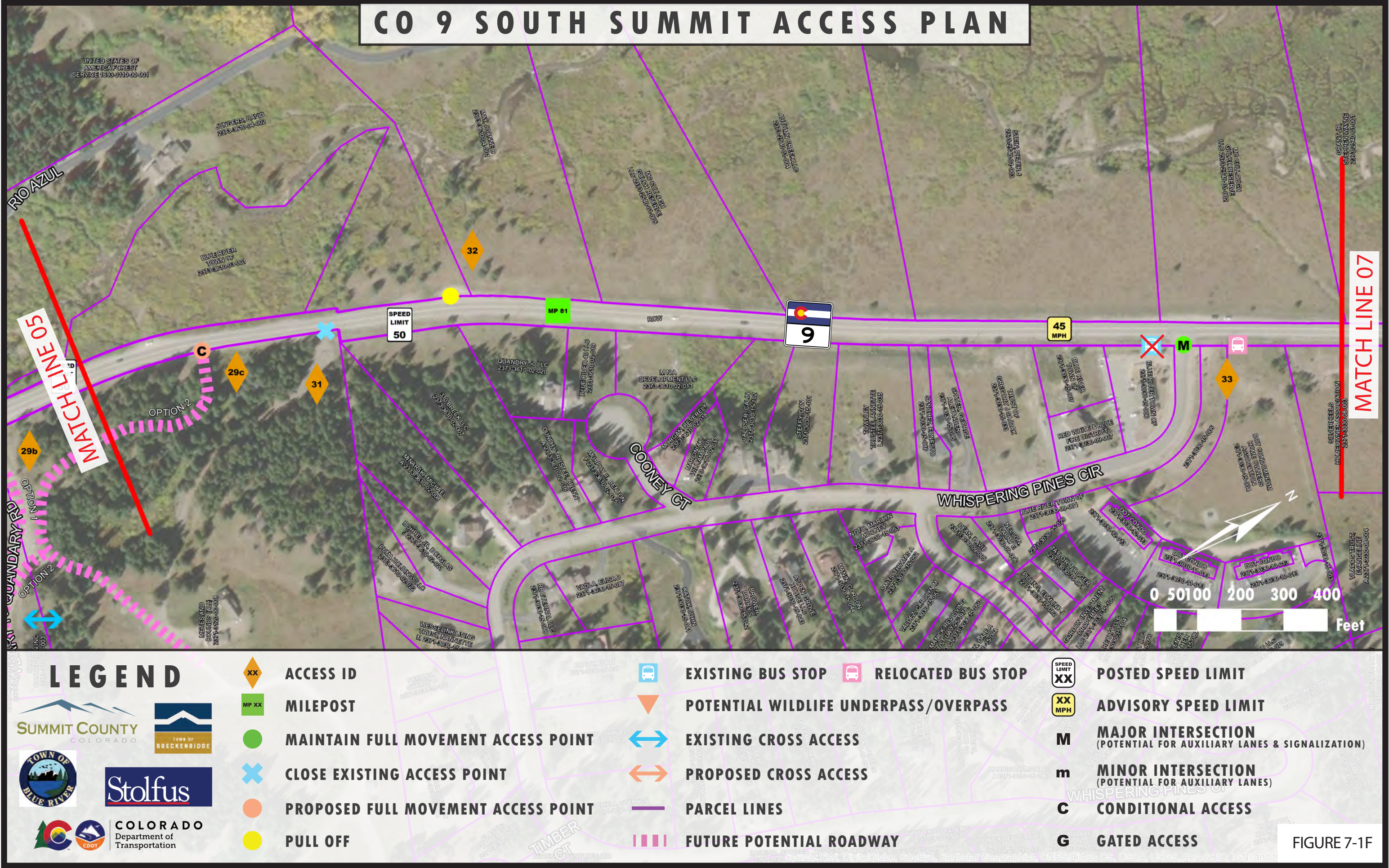
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- MILEPOST** (Green circle with MP XX)
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- CLOSE EXISTING ACCESS POINT** (Blue X)
- PROPOSED FULL MOVEMENT ACCESS POINT** (Orange circle)
- PULL OFF** (Yellow circle)
- EXISTING BUS STOP** (Blue bus icon)
- POTENTIAL WILDLIFE UNDERPASS/OVERPASS** (Orange triangle)
- EXISTING CROSS ACCESS** (Blue double arrow)
- PROPOSED CROSS ACCESS** (Orange double arrow)
- PARCEL LINES** (Purple line)
- FUTURE POTENTIAL ROADWAY** (Pink dashed line)
- RELOCATED BUS STOP** (Pink bus icon)
- POSTED SPEED LIMIT** (Black square with XX)
- ADVISORY SPEED LIMIT** (Yellow square with XX MPH)
- MAJOR INTERSECTION (POTENTIAL FOR AUXILIARY LANES & SIGNALIZATION)** (M)
- MINOR INTERSECTION (POTENTIAL FOR AUXILIARY LANES)** (m)
- CONDITIONAL ACCESS** (C)
- GATED ACCESS** (G)

Scale: 0 50 100 200 300 400 Feet

North Arrow

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the

FIGURE 7-1E



CO 9 SOUTH SUMMIT ACCESS PLAN

MATCH LINE 06

MATCH LINE 08

LEGEND

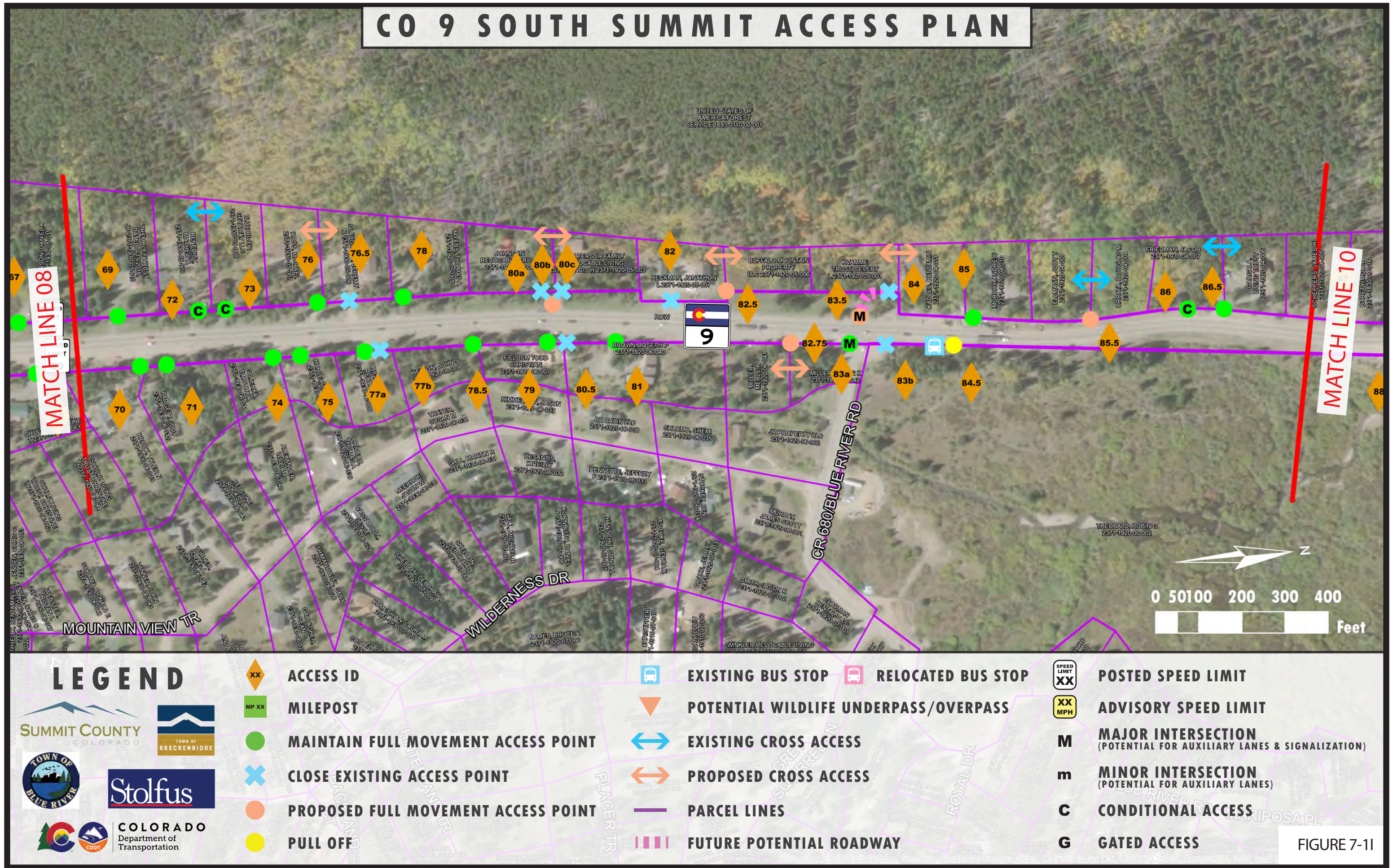
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- MILEPOST** (Green square with MP XX)
- MAINTAIN FULL MOVEMENT ACCESS POINT** (Green circle)
- CLOSE EXISTING ACCESS POINT** (Blue X)
- PROPOSED FULL MOVEMENT ACCESS POINT** (Orange circle)
- PULL OFF** (Yellow circle)
- EXISTING BUS STOP** (Blue bus icon)
- POTENTIAL WILDLIFE UNDERPASS/OVERPASS** (Orange triangle)
- EXISTING CROSS ACCESS** (Blue double arrow)
- PROPOSED CROSS ACCESS** (Orange double arrow)
- PARCEL LINES** (Purple line)
- FUTURE POTENTIAL ROADWAY** (Pink dashed line)
- POSTED SPEED LIMIT** (Black square with XX)
- ADVISORY SPEED LIMIT** (Yellow square with XX MPH)
- MAJOR INTERSECTION** (M)
- MINOR INTERSECTION** (m)
- CONDITIONAL ACCESS** (C)
- GATED ACCESS** (G)

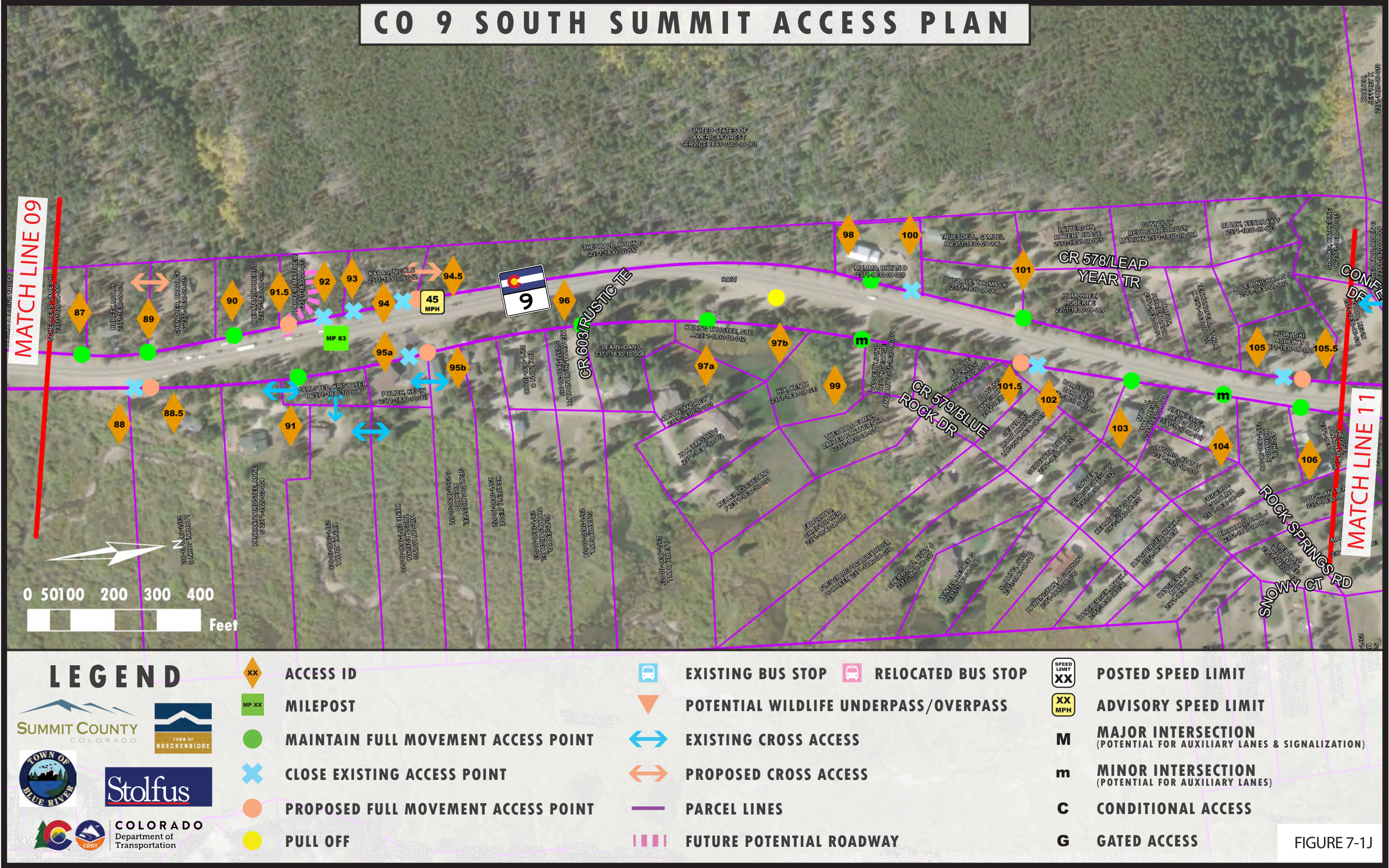
Stolfus

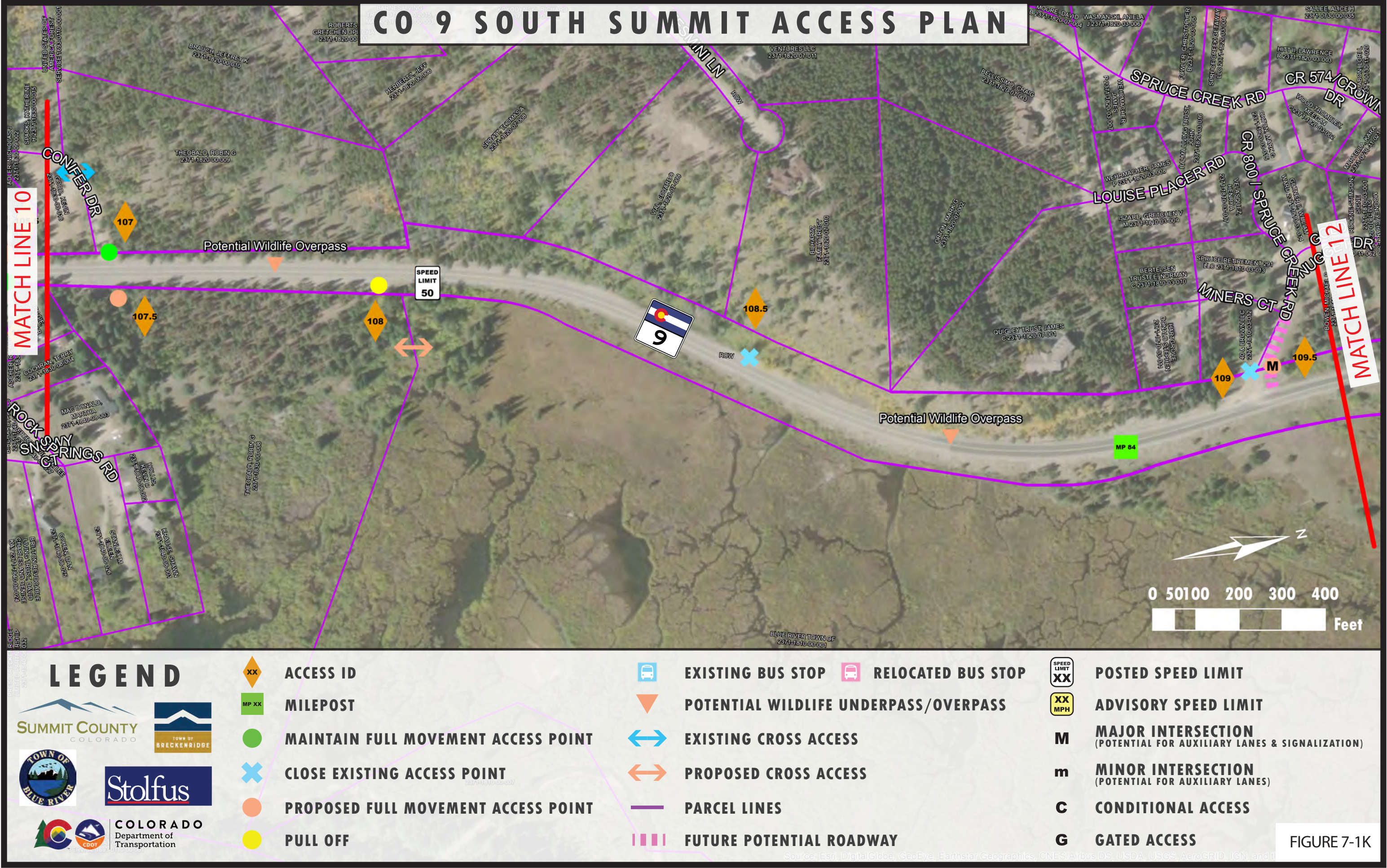
COLORADO Department of Transportation

FIGURE 7-1G

CO 9 SOUTH SUMMIT ACCESS PLAN









CO 9 SOUTH SUMMIT ACCESS PLAN

LEGEND

	ACCESS ID		EXISTING BUS STOP		RELOCATED BUS STOP		POSTED SPEED LIMIT
	MILEPOST		POTENTIAL WILDLIFE UNDERPASS/OVERPASS				ADVISORY SPEED LIMIT
	MAINTAIN FULL MOVEMENT ACCESS POINT		EXISTING CROSS ACCESS				MAJOR INTERSECTION (POTENTIAL FOR AUXILIARY LANES & SIGNALIZATION)
	CLOSE EXISTING ACCESS POINT		PROPOSED CROSS ACCESS				MINOR INTERSECTION (POTENTIAL FOR AUXILIARY LANES)
	PROPOSED FULL MOVEMENT ACCESS POINT		PARCEL LINES				CONDITIONAL ACCESS
	PULL OFF		FUTURE POTENTIAL ROADWAY				GATED ACCESS

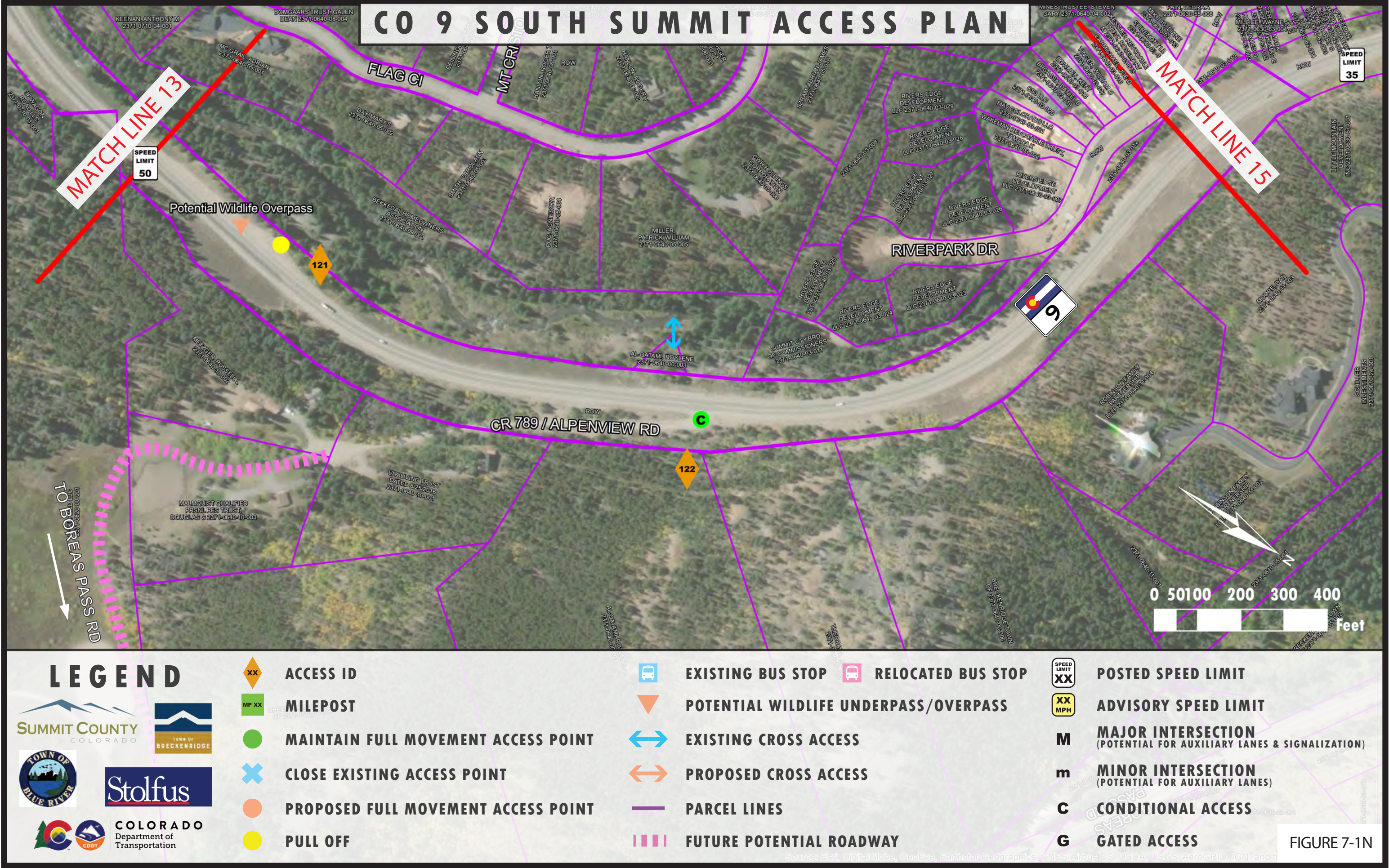
Scale: 0 50 100 200 300 400 Feet

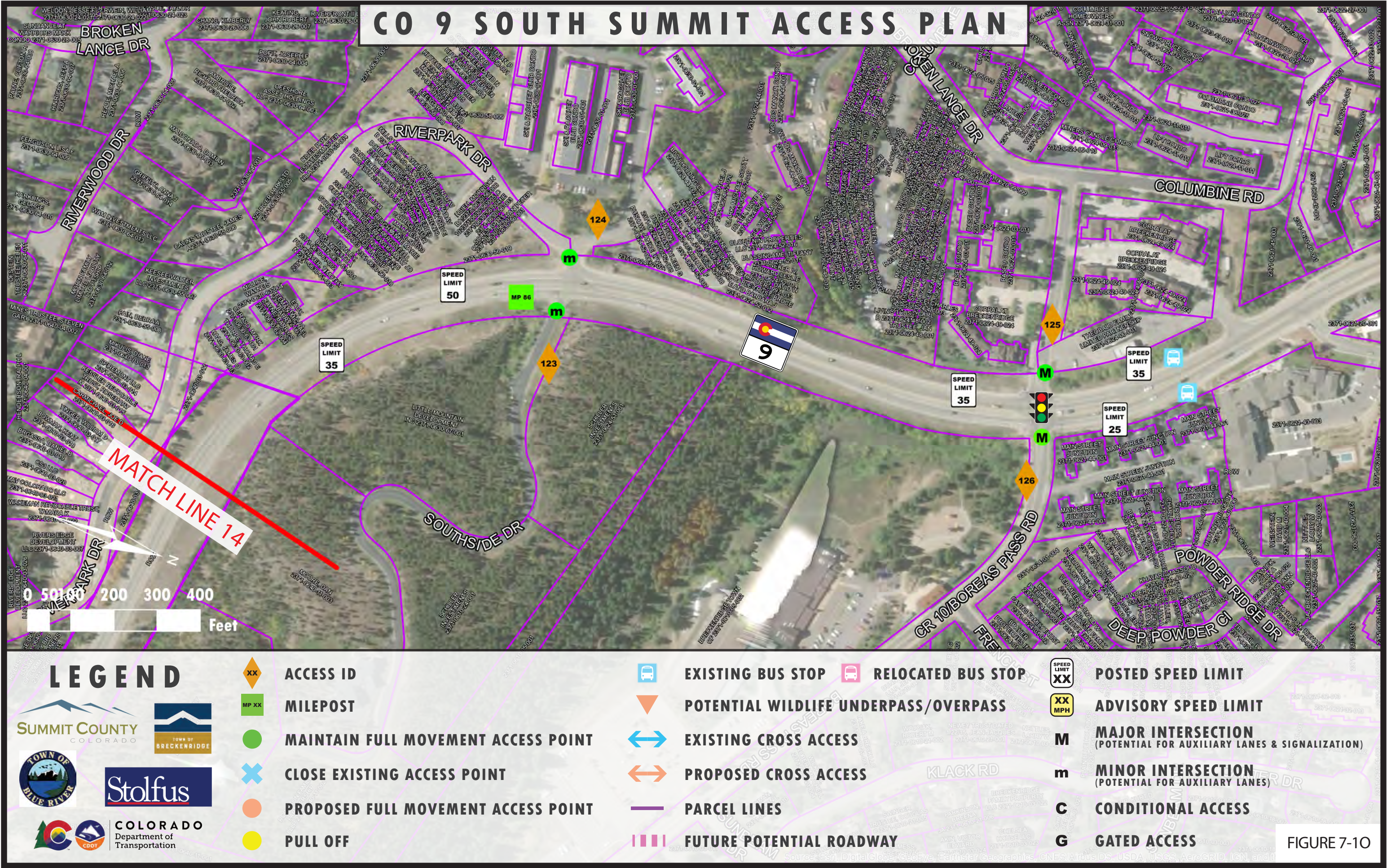
Match Lines: MATCH LINE 12 (Left), MATCH LINE 14 (Right)

Map Labels: CR 574/CROWN DR, CR 550 / HORIZON LN, CR 790 / GRN MT DR, CR 11 / WAGON RD, CR 541/LAKESHORE LP, LAKECREST DR, BURNTWOOD LN, MT CRISTO, FLAG CI.

Speed Limits: 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 110, 115, 120, 125, 130, 140, 150, 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, 260, 270, 280, 290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, 410, 420, 430, 440, 450, 460, 470, 480, 490, 500, 510, 520, 530, 540, 550, 560, 570, 580, 590, 600, 610, 620, 630, 640, 650, 660, 670, 680, 690, 700, 710, 720, 730, 740, 750, 760, 770, 780, 790, 800, 810, 820, 830, 840, 850, 860, 870, 880, 890, 900, 910, 920, 930, 940, 950, 960, 970, 980, 990, 1000.

Figure 7-1M





The Access Plan will reduce the number of access points from 147 to 125. This change in access includes the following:

- 24 access closures
- 10 accesses relocated
- 11 shared access points
- 4 public road access points realigned to improved locations

Carroll Lane to Tordal Way (Figure 7-1A – 7-1C)

Carroll Lane, Hamilton Lane with CR 670, and Blue Lakes Road are identified as major intersections with the potential for future auxiliary lanes and future signalization, if warranted, or other traffic control recognized by the MUTCD. Hamilton Lane is relocated to line up with CR 670. Tordal Way has been identified as a minor unsignalized intersection with potential for auxiliary lanes. Access to other parcels in this segment are reduced to one location per ownership, shared where feasible and relocated to alternative routes/cross streets. Cross-access for properties with proposed shared access on CO-9 is required as properties redevelop. Accesses across the highway were lined up where feasible, and if not, conflicting left-turn movements were avoided. Pull-offs were reviewed and remained open if they were deemed essential for maintenance activities. Pull-offs that were closed are at unsafe locations and should not be used in the future. The pull-off area near Blue Lakes Road at the Quandary Peak trailhead was closed to discourage illegal parking along CO-9 for overflow parking when the trailhead parking is full. USFS is actively working on a parking solution for the Quandary Peak trailhead.

Tordal Way to Whispering Pines Circle (Figure 7-1D – 7-1F)

Susan Court with Mark Court, Quandary Road and Whispering Pines Circle are all full movement major intersections with potential for auxiliary lanes and future signalization, if warranted, or other traffic control recognized by the MUTCD. Susan Court is realigned to line up with Mark Court. Access to other parcels in this segment are reduced to one location per ownership, shared where feasible and relocated to alternative routes/cross streets. Cross-access for properties with proposed shared access on CO-9 is required as properties redevelop. Accesses across the highway were lined up where feasible, and if not, conflicting left-turn movements were avoided. Pull-offs were reviewed and remained open if they were deemed essential for maintenance activities. Pull-offs that were closed are at unsafe locations and should not be used in the future. A future chain station at Access no. 22 has been proposed by CDOT Region 2 Maintenance. The chain station would serve the southbound direction for commercial vehicles and trucks to chain up during an active chain law prior to ascending Hoosier Pass. Access no. 28 currently used for trailhead parking is to be closed and relocated to Rio Azul. Rio Azul is a private roadway, so in order to provide access to the trailhead parking from Rio Azul either a shared access easement with the adjacent property owner is required or the segment of Rio Azul between CO 9 and the proposed trailhead parking access would need to be converted to a public roadway maintained by either the Town of Blue River or Summit County. Lodge by the Blue is currently in the process of redevelopment. Due to topography and environmental challenges in the area, the flexibility to select one of two final access locations has been included in the plan to allow for further engineering investigation of the preferred location. Access to the properties on the east side of CO 9 in this area is conditional to one location, either at Access no. 29b or 29c. Access will not be granted at both locations when the property redevelops and cross access to all parcels currently using Access 29a or 29b must be provided to the final access location to CO 9. Whichever access is implemented may be a full movement major intersection with potential for auxiliary lanes and future signalization, if warranted, or other traffic control recognized by the MUTCD. If access is granted at Access no. 29b, it must be aligned with Rio Azul. If access is granted at Access no. 29c, Access no. 29a and 29b must be closed and Rio Azul will be a minor unsignalized intersection with potential for auxiliary lanes. The transit stop located at Lodge by the Blue and at Whispering Pines Circle would be relocated on the far side of the intersection. See Figure 7-2 for a depiction of the access conditions.

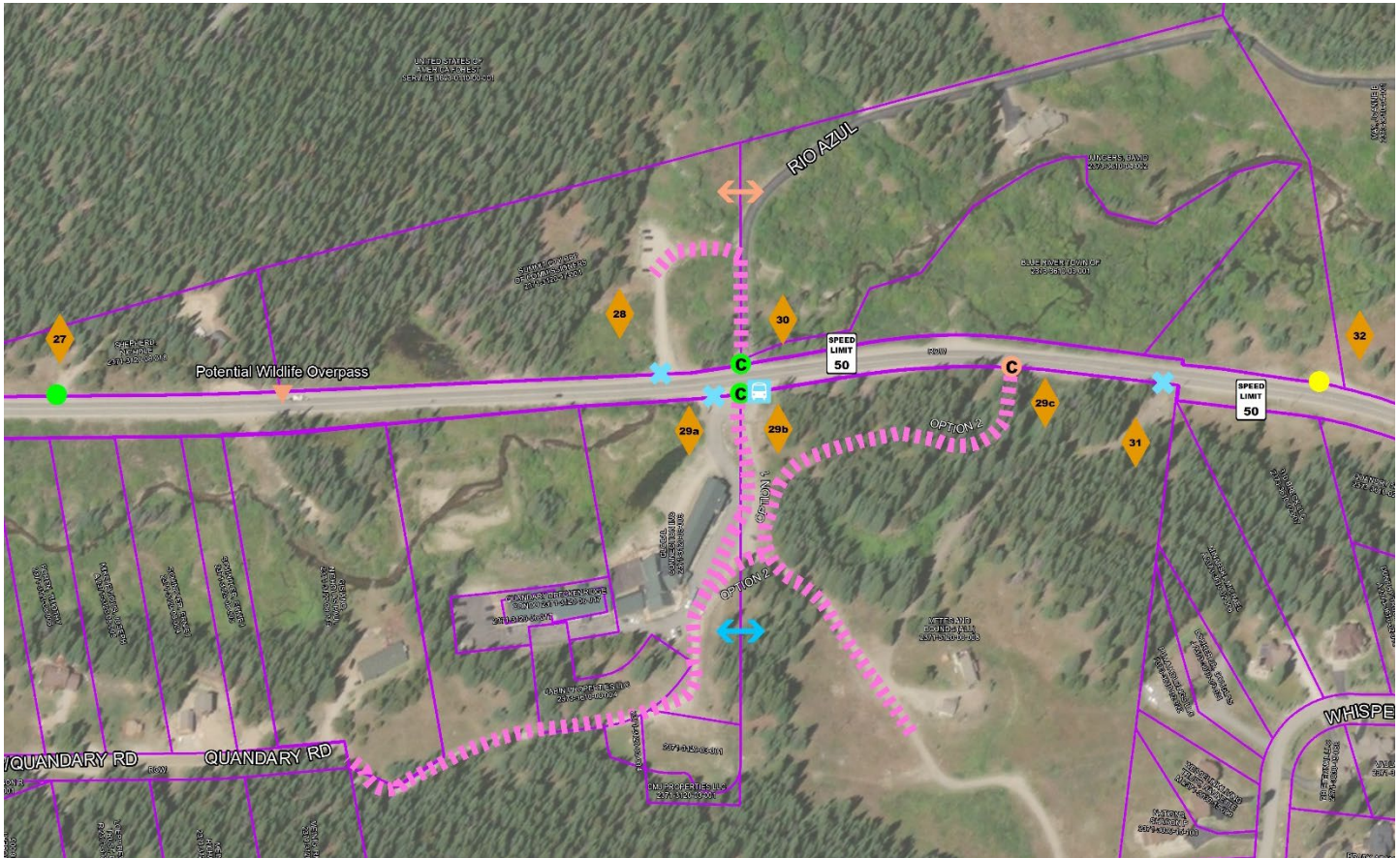


Figure 7-2. Lodge by the Blue Conditional Accesses

Whispering Pines Circle to Blue River Road (Figure 7-1G – 7-1I)

Blue River Road is a full movement major intersection with potential for auxiliary lanes and future signalization, if warranted, or other traffic control recognized by the MUTCD. Calle De Plata has been identified as a minor unsignalized intersection with potential for auxiliary lanes. Access to other parcels in this segment are reduced to one location per ownership, shared where feasible and relocated to alternative routes/cross streets. Cross-access for properties with proposed shared access on CO-9 is required as properties redevelop. Accesses across the highway were lined up where feasible, and if not, conflicting left-turn movements were avoided. Pull-offs were reviewed and remained open if they were deemed essential for maintenance activities. Pull-offs that were closed are at unsafe locations and should not be used in the future. Access no. 36, Fredonia Gulch Road, is a conditional unsignalized full movement intersection. When property redevelops and alternate access to Calle de Plata is available, this access should close. 97 Circle should be realigned across from Access no. 39 to create a 4-legged intersection when safety or operational issues occur or when a public project is funded. Access no. 38b may remain as an access to 97 Circle outside the CO 9 traveled way. Access no. 40, Red Mountain Trail, will be a gated unsignalized full movement access point as the property redevelops, if safety or operational issues occur, or when a public project is funded in this segment of the corridor.

Blue River Road to Crown Drive (Figure 7-1J – 7-1L)

Spruce Creek Road will be aligned to reduce a skew at the intersection of CO-9. Spruce Creek Road is a full movement major intersection with potential for auxiliary lanes and future signalization, if warranted, or other traffic control recognized by the MUTCD. Blue Rock Drive and Rock Springs Road have been identified as minor unsignalized intersections with potential for auxiliary lanes. Access to other parcels in this segment are reduced to one location per ownership, shared where feasible and relocated to alternative routes/cross streets. Cross-access for properties with proposed shared access on CO-9 is required as properties redevelop.

Accesses across the highway were lined up where feasible, and if not, conflicting left-turn movements were avoided. Pull-offs were reviewed and remained open if they were deemed essential for maintenance activities. Pull-offs that were closed are at unsafe locations and should not be used in the future. Access no. 110 is currently used for Goose Pasture Tarn parking. It is recommended that if legal agreements do not exist, cross access agreements required between properties upon redevelopment. Access no. 111.5 is a conditional access requested by the Town of Breckenridge to be used as a one-way exit for support of the Goose Pasture Tarn Dam Rehabilitation project. Once the project construction is complete, this access will be removed.

Crown Drive to Broken Lance Drive (Figure 7-1M – 7-1O)

Crown Drive with Lakeshore Loop and Horizon Lane with Green Mountain Drive are full movement major intersections with potential for auxiliary lanes and future signalization, if warranted, or other traffic control recognized by the MUTCD. Broken Lance Drive/Boreas Pass Road is a four-legged signalized full movement major intersection. Wagon Road has been identified as a minor unsignalized intersection with potential for auxiliary lanes. River Park Drive with Southside Drive has been identified as a minor unsignalized intersection with potential for auxiliary lanes, or an alternative intersection solution, such as a roundabout. Access to other parcels in this segment are reduced to one location per ownership, shared where feasible and relocated to alternative routes/cross streets. Cross-access for properties with proposed shared access on CO-9 is required as properties redevelop. Accesses across the highway were lined up where feasible. Pull-offs were reviewed and remained open if they were deemed essential for maintenance activities. Access no.122, Alpenview Road, is a conditional unsignalized full movement intersection. Due to sight distance concerns created by the intersection skew, Alpenview Road will be closed when alternative access to Boreas Pass Road is available.

8.0 ACCESS PLAN IMPLEMENTATION

The improvements recommended in the Access Plan represent a long-range plan to implement over time as traffic and safety needs arise and as funding becomes available. Construction of the improvements recommended may be completed using public and/or private funding. The following cases will trigger construction:

1. A property redevelops or changes use, resulting in an increase in traffic to and from the site of 20% or more. In this case, limited improvements at the specific access point may be required by CDOT. As part of Blue River, Breckenridge and/or Summit County's development review process, additional transportation improvements may also be necessary to address specific traffic-related impacts created by the development. These improvements will be compatible with the Access Plan. In addition, upon redevelopment, the local agencies will require property owners to provide legally defined cross-access easements for shared access points, as defined by the Access Plan. If a property does not redevelop, the property owner will not be required to construct access modifications or provide legally defined cross-access easements. (Private Funding).
2. Blue River, Breckenridge, and/or Summit County obtains funding to complete improvements to a segment of the CO-9 corridor, or a local route. (Public Funding)
3. State and/or Federal Funding are obtained to complete improvements to a segment of the CO-9 corridor. Typically, a project will be identified in the Statewide Transportation Improvement Program (STIP) to obtain funding. (Public Funding)
4. A safety or operational issue develops that can be mitigated through the implementation of access management techniques consistent with the Access Plan. Depending on the extent and type of safety or operational issue, improvements may address a segment of the CO-9 corridor, or a local route, or may be limited to an isolated location or access point. Public funding from any combination of agencies may be obtained to construct improvements. (Public Funding)
5. Any combination of 1, 2, 3, or 4.

Under case 1, a property owner must follow the access permit process as defined by Section 2 of the SHAC. CDOT will remain the issuing authority for CO-9. In short, the process requires property owners to submit an application for an access permit. Once the access permit is issued, construction plans for permitted improvements must be developed and submitted to CDOT for review. A Notice to Proceed will be issued following acceptance of the Construction Documents by CDOT, thereby allowing the applicant to proceed with construction. As determined by the CDOT Permit Unit, access permits may allow for construction of interim conditions and define requirements for future conditions that match the Access Plan depending upon individual circumstances specific to each permit.

Under case 2, Blue River, Breckenridge, and/or Summit County may obtain funds either through local government budgeting, application for grant monies, or other potential funding sources. Once funding is available, the local agencies will work through the CDOT planning process to develop a highway improvement project. If the project is within CDOT ROW, the project will follow either the process and procedures for design, construction, and management detailed in CDOT's Local Agency Manual or the appropriate CDOT permitting process (access permit or special use permit) based on the type of project and the funding source. If a local agency project is developed off of the State Highway System, for instance, completion of an alternate local route that does not intersect with CO-9, CDOT will not be involved in the project. The local agency will administer the project according to their standards and procedures.

Under case 3, a project receiving State and/or Federal funds must be identified in the STIP. In Colorado, a minimum four years of transportation projects and their funding sources must be identified in the STIP. The STIP is updated at least every four years through a continuing, comprehensive and cooperative process involving CDOT, FHWA, Federal Transit Administration (FTA), Transportation Planning Regions (TPRs), and Town and County Governments. Projects within the study area are established in the STIP by request of the Intermountain TPR. The Intermountain TPR 2040 Regional Transportation Plan (RTP), adopted in February 2015, lists CO-9 from Breckenridge to Frisco as a Regional Priority Corridor, which begins at the north end of our study limits. The STIP may be amended as needed in accordance with the STIP Amendment Guidelines. Funding is extremely limited at this time and no future projects have been identified. Similar to case 2, once funding is available, a project will follow CDOT's relevant process and procedures.

Under case 4, any agency may identify a safety or operational issue along the corridor through a crash pattern, complaints, observation, or other manner. A single agency or partnership of agencies may obtain funding to implement access management techniques that are consistent with the Plan and specifically address the issue. Depending on who the lead agency is for the project, the project may be administered through the local agency process, as described in case 2, or through CDOT's process, as described in case 3.

Detailed engineering drawings of exact roadway alignments and access improvements will be required as project funding is identified. Details related to storm drainage, utilities, landscaping, environmental issues, pedestrian/bicycle facilities, roadway sections, and other topographic features will be considered during this design process. Environmental evaluations appropriate to the size, type, and funding of the project will be completed as part of the design phase.

To provide for continued commitment to the access modifications recommended by this study, it is recommended that Blue River, Breckenridge, Summit County and CDOT execute an IGA to adopt this long-range Access Plan as an Access Plan for the segment of CO-9 between Carroll Lane (MP 77.49) and the Broken Lance Drive/Boreas Pass Road (MP 86.26). The Access Plan identifies access locations and levels of access by milepost for CO-9 within the project limits. In recognition of the plan's long-range nature and the potential for conditions to change over time, a critical element of the IGA is the definition of a process for plan modifications. Exhibit B to the IGA defines this process, which basically requires mutual agreement of the IGA parties on modifications to the plan that are located within their respective boundaries. For the CO-9 corridor, the process for administration of the plan shall be as described in the SHAC. The Draft IGA, the Access Plan Table that will serve as Exhibit A, and Exhibit B are presented in Technical Appendices F and G.

9.0 CONCEPTUAL DESIGN

Several conceptual design alternatives were considered while developing the ACP. The conceptual design efforts are summarized in the sections below.

9.1 Conceptual Trail Design

In June 2013, Summit County Open Space and Trails and Community Development, in cooperation with Park County, the Town of Breckenridge, the Town of Blue River, and the Town of Alma completed the Hoosier Pass Recreational Pathway Feasibility Study. This feasibility study identified the desire for a future trail project in South Summit County within the limits of the Access Plan that will provide a multi-modal recreational link between the towns and counties.

Three proposed pathway alignments and alternatives were included in the study. The alignments were developed using baseline information and considered opportunities and constraints. Due to potential right-of-way impacts, feasibility of the design options as related to challenging corridor topography, and access concerns, a preferred alternative was not identified at the conclusion of the study.

Using existing data, LIDAR topography information provided by Summit County, aerial mapping, ROW and parcel data, recommendations from Hoosier Pass Recreational Pathway Feasibility Study, industry design standards, and input from CDOT, Summit County, Blue River, Breckenridge, and the general public, a conceptual design (15%) for the trail along the Access Plan corridor was developed. This effort expanded on the existing study findings and typical sections that were evaluated to refine options for this specific stretch of the CO-9. The goal of this effort was to identify which side of the highway the trail should be constructed on and to develop a hybrid alignment that is technically feasible along the corridor from a conceptual three-dimensional design perspective.

9.1.1 Design Elements for Conceptual Trail Design

The conceptual trail design was developed using the “Proposed Corridor Cross Sections” shown in the Feasibility Study as a starting point. The design standards and elements were confirmed with Summit County’s Road and Bridge Standards and the AASHTO Guide for the Development of Bicycle Facilities.

9.1.2 Trail Typical Sections

Using the Pathway Feasibility Study as a starting point, four trail typical sections were developed. Each trail typical section is applied at different locations along the corridor based on topography, existing features, potential environmental concerns, and right-of-way constraints. Application of the trail typical sections along the corridor can be found in Technical Appendix H.

Sidewalk

The sidewalk typical section was developed to continue the existing sidewalk from the Town of Breckenridge south along CO-9 to Southside Drive/River Park Drive, where existing development and steep terrain make it difficult to build a detached pedestrian facility.

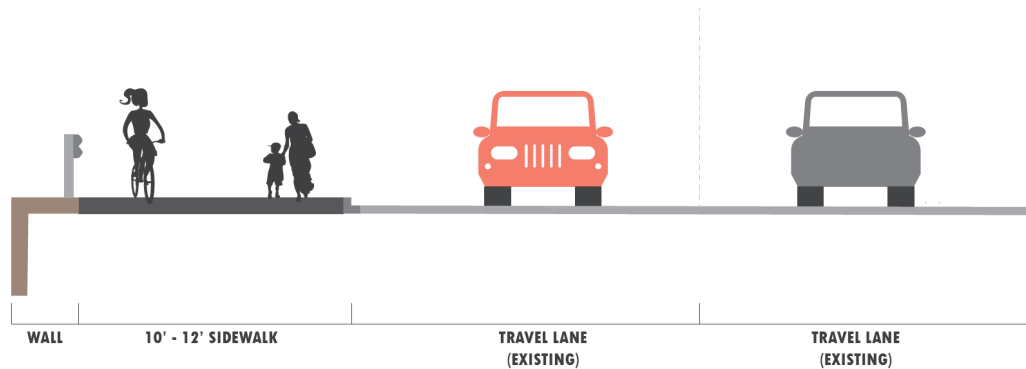


Figure 9-1. Sidewalk Typical Section

Shared Use Trail

The shared use trail typical section is very similar to the typical section defined in the Pathway Feasibility Study. This typical section is applied in areas where a detached pedestrian facility was feasible with the existing topography. The shared use trail was the preferred typical section; however, it was difficult to implement along CO-9 without significant ROW and environmental impacts in many areas. The shared use trail begins at Mark Court to Quandary Road, and again near Horizon Lane and continues to Southside Drive/River Park Drive.

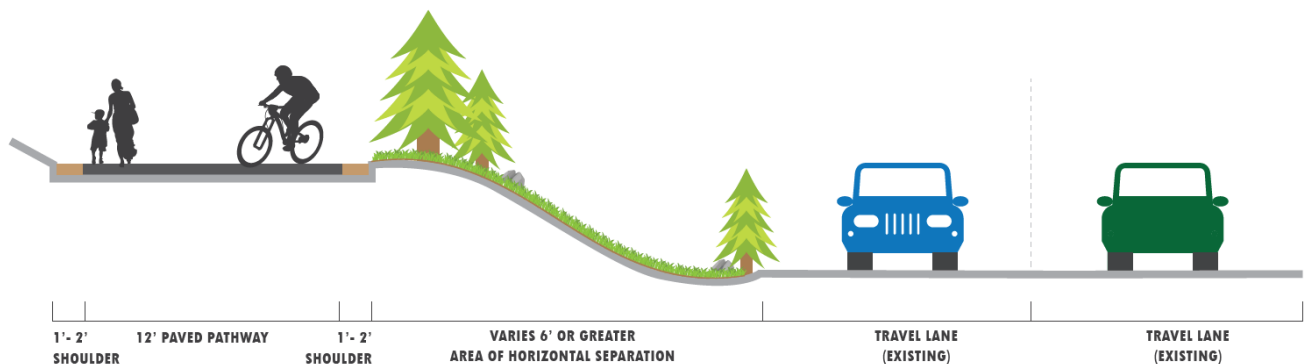


Figure 9-2. Shared Use Trail Typical Section

Shared Use Sidepath

The shared use sidepath was developed to balance the impacts of a detached pedestrian facility and provide a more feasible option for implementation in the corridor. This includes a 5' minimum horizontal separation between the roadway and the path. The separation must differ from the roadway and trail surface material. ROW impacts are minimized to private properties with the sidepath, and in many locations, temporary construction easements would be needed as opposed to permanent property acquisitions. The shared use sidepath begins at Quandary Road through most of the study area to Horizon Lane.

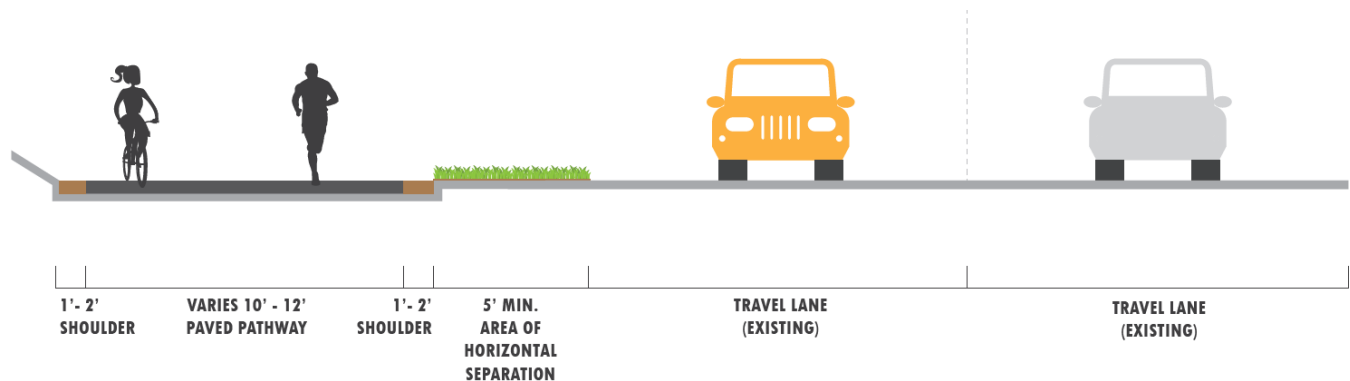


Figure 9-3. Shared Use Sidepath Typical Section

Highway – Widened Shoulders

Widened shoulders were provided as an option in the Pathway Feasibility Study. Although this typical section is the least desired, widened shoulders were applied to areas where a detached pedestrian facility was infeasible due to steep terrain. This is located at the beginning of the study limits to Mark Court where CO-9 is descending from the Hoosier Pass Summit.

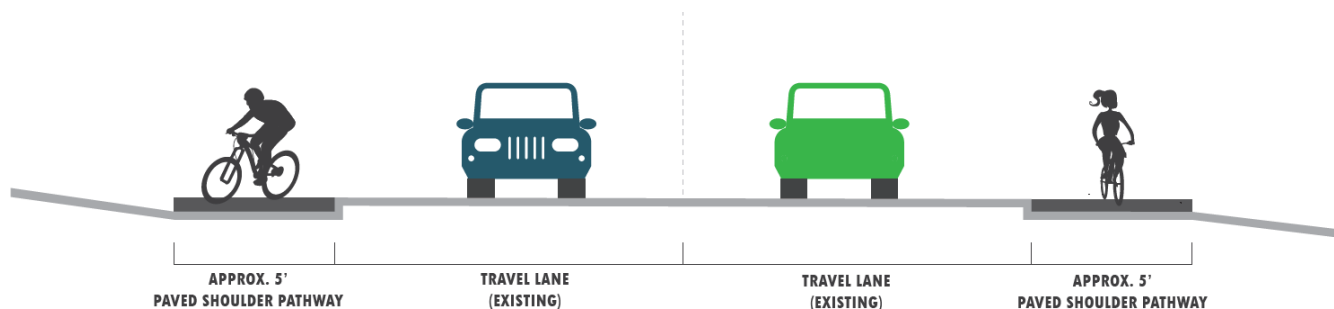


Figure 9-4. Highway – Widened Shoulders Typical Section

9.1.3 Horizontal and Vertical Alignment

Several factors were considered in determining the horizontal and vertical alignment of the trail:

- Existing topography
- Frequency and location of access points
- Right-of-way
- Environmental concerns

The horizontal alignment of the trail followed flat terrain where feasible. Locating the trail on both the east side or west side of CO-9 was investigated. Keeping the trail consistently on one side of the highway eliminates the need for highway pedestrian crossings, which are not recommended due to the speed limit on CO-9. It was determined that the west side of the highway was the preferred location for the trail after considering the factors described above. A crossing location was identified near Mark Court at the transition from the widened shoulders to the shared use trail, where the speed is posted at 30 mph and favorable for a crossing. A maximum trail grade of 8% was used to develop the trail vertical alignment. A minimum design speed of 20 mph was used for trail grades 4% or less, and 30 mph for trail grades exceeding 4%. Because the trail was considered as a recreational facility in the design, the trail does not meet ADA compliance for minimum grades. The horizontal and vertical geometry of the trail is detailed in the conceptual design plans provided in Technical Appendix H.

9.1.4 Opinion of Probable Cost – Conceptual Trail Design

A conceptual Opinion of Probable Cost (OPC) using 2019 dollars was prepared for the conceptual trail design using unit cost data from the CDOT 2019 Cost Data Book and recent project bids from similar projects. Due to the conceptual nature of the study, several items were quantified as percentage items of the construction bid items. In addition, a 30% contingency was included to plan for miscellaneous items either not specifically quantified or unknown at this time. A breakdown of the conceptual OPC is presented in Table 9-1. A more detailed OPC can be found in Technical Appendix H. The total anticipated cost is \$19.3 million. This cost does not include ROW needs or environmental investigations.

TABLE 9-1. OPC BREAKDOWN

Study Element	Cost (2019 Dollars)
Attached Sidewalk	\$316,500
Detached Shared Use Trail	\$2,416,500
Shared Use Sidepath	\$2,616,500
Widened Shoulders	\$1,310,000
Drainage	\$666,000
Miscellaneous Construction	\$512,000
Phasing and Traffic Control	\$1,169,000
Construction Engineering (20.45%)	\$2,217,000
Engineering Design and Clearances (15%)	\$1,084,000
Utilities	\$707,000
Contingency (30%)	\$4,454,000
Total	\$19,300,000

9.2 Conceptual Roundabout Design

As previously discussed in Section 5.3.3, two intersection locations were considered for intersection improvements. The two locations under consideration include:

- CO-9 and Southside Drive/River Park Drive
- CO-9 and Blue River Road

These intersections were discussed by the study team as locations that were either difficult to turn from the local roads onto CO-9, had high turning movements, and/or challenges related to widening CO-9 to provide auxiliary lanes. Both locations were developed conceptually from horizontal information only. Vertical geometry will need to be investigated further if the roundabout locations are being considered in the future. The roundabouts were designed using the *National Cooperative Highway Research Program (NCHRP) Report - Roundabouts: An Informational Guide (Second Edition)*. The two roundabouts were designed using a WB-50 as the minimum design vehicle for turning movements onto and off of the local roads, since large truck usage is not expected. Through movements are compatible with larger trucks traveling along CO-9.

CO-9 and Southside Drive/River Park Drive

This intersection is identified as a minor intersection in the Access Plan. The existing intersection has southbound right-turn acceleration and deceleration lanes on CO-9, and a northbound left-turn deceleration lane onto River Park Drive. This intersection serves Ski and Racquet Club, as well as several condominiums and townhomes. There is also a bus stop for the Breckenridge Free Ride transit service. The close proximity to the Boreas Pass Road intersection does not make this an ideal location for signalization and is not recommended. A roundabout at this location would provide the opportunity to maintain full movement intersection with signalization, which is desirable for the transit service.

The proposed roundabout is a single-lane roundabout with an inscribed circle diameter of 105'. A truck apron is provided to assist with truck turning movements. The entry and exit speeds are anticipated to be lower in this stretch, since the posted speed entering and exiting the roundabout is 35 mph in both directions. River Park Drive was realigned to optimize the geometry of the roundabout leg so that it comes in perpendicular to the roundabout center. The transit stop would be relocated along River Park Drive to accommodate the realigned River Park Drive. A pedestrian crossing is shown on the west leg of the roundabout and is compatible with the conceptual trail design plan. It is anticipated that retaining walls are needed at the northeast corner of CO-9 and Southside Drive and along the realigned River Park Drive due to steep grades adjacent to the roadway. The conceptual design layout is provided on the next page.



Figure 9-5. Conceptual Roundabout Design – CO-9 and Southside Drive/River Park Drive

CO-9 and Blue River Road

This intersection is identified as a major intersection in the Access Plan. Blue River Road serves as the primary access for several residential properties. The intersection is not expected to reach warrants for signalization in the planning year 2040, but the thresholds for auxiliary lanes is anticipated. Alternative intersection solutions were investigated at this location to provide the agencies with an idea of potential impacts for each option.

Similar to the roundabout at Southside Drive/River Park Drive, the proposed roundabout is a single-lane roundabout with an inscribed circle diameter of 105'. A truck apron is provided to assist with truck turning movements. This stretch of CO-9 is posted at 50 mph in both directions. Speed control is recommended at each of the approaches along CO-9 in order to slow down through movements approaching the roundabout and to control speed through the roundabout. The geometry introduces step-down speed control, beginning at 40 mph and stepping down to 30 mph, and then 25 mph. Speed control allows the local road traffic to enter the roundabout safely and provide gaps in through traffic flow. A bus bay is provided in the northbound direction to accommodate the existing transit stop at this location. The conceptual design layout is provided below. The roundabout requires few property impacts and promotes slower speeds compared to a traditional intersection.



Figure 9-6. Conceptual Roundabout Design – CO-9 and Blue River Road

Alternatively, a traditional intersection with auxiliary lanes that meet 2040 future needs was also developed as an alternative using the lengths recommended in Chapter 5. The conceptual design layout is provided. The traditional intersection has a smaller footprint compared to the roundabout, but speeds will remain the same along CO-9.



Figure 9-7. Conceptual Intersection Design – CO-9 and Blue River Road

9.3 Conceptual Wildlife Crossing Design

In October of 2017, the USFS released *Summit County Safe Passages: A County-wide Connectivity Plan for Wildlife*. The report identifies CO-9 within the study area as a corridor with wildlife movement, particularly bighorn sheep, black bear, elk, lynx, moose, and mule deer. The plan identified several locations along CO-9 with a potential for a wildlife overpass or underpass. The study did not complete conceptual design for any of the overpasses. The USFS requested that the team consider one location near access 121 (south of Alpenview Road) as a potential overpass and complete the conceptual investigation of the feasibility of a wildlife overpass at this location.

There were no established wildlife crossing design standards to reference at the time of this report, so the proposed wildlife crossing was designed using previous projects where CDOT implemented wildlife crossings, along with guidance from experienced CDOT staff and guidelines from other states. The following design elements were implemented for this particular crossing:

- A 30' protection berm on each end of the crossing was used. These encourage wildlife to use the crossing by helping the crossing blend with natural habitat.
- The slopes are no steeper than 3:1 in order for wildlife to use the crossings approaching and leaving the crossing.
- The crossing is designed so that the trail will go under the crossing tunnel next to the roadway to eliminate human to animal interaction and conflict.
- A 23.5' clearance was used from the underside of the crossing to the centerline of CO-9.
- The overpass crossing is 230' in length and 80' wide. Under the structure, there is a 60' width for the highway and an additional 20' for the trail.

The conceptual OPC is \$8.4 M for the overpass. The conceptual design plan and OPC is provided in Technical Appendix I.

10.0 TRANSIT PLANNING

Regional and local transit lines service the CO-9 corridor within the study limits. Some services provide direct transit stops along the route, while some provide connections to other local or regional services. The service providers and routes include:

- Summit Stage
 - Park County and Blue River Commuter Routes
 - Frisco-Breckenridge Route
- Breckenridge Free Ride
 - Gray Route Southside
- Bustang Outrider
 - Connects regional West Line route with Summit Stage services via Frisco Transit Center

The study team identified transit goals along the CO-9 corridor:

- Identify stop locations that are safe and logical
- Increase ridership
- Find space for a potential park and ride for commuters.

The Park County Blue River Commuter provides several stops for the local residents and guests commuting between Park County and Summit County. A summary of the existing bus stops is provided below, along with the proposed recommendation of the existing stops based on the access plan and transit design best practices. Ideally, Summit County would prefer that stops are located on the far side of each intersection to limit turning vehicle conflicts. Discussions about transit stop usage, frequency, and location are ongoing based on current and future demands in residential areas. There is an increase of short-term rental properties, which can drive the need for transit use. Short-term rentals are located in areas such as Sherwood Forest, Whispering Pines, Crown Road, and Blue River Road.

A future park and ride is desired by the Town of Blue River to have a safe place to park and access a transit stop for residents and guests that do not have a nearby transit stop that they are able to walk to. The Town is currently exploring options for a location. It is preferred that the park and ride be located at a major intersection as identified in the Access Plan.

TABLE 10-1. TRANSIT STOP EVALUATION

CO 9 South Summit Access Control Plan								Stolfus
Transit Stop Evaluation - Blue River Commuter Route								
Stop Location	Direction	Facility	Pull-Off	Geometric Constraints	ACP Compatibility	Access ID	Onboarding/ Ridership*	Recommendations
Main Street Junction/Sinclair	Northbound	Sidewalk Bench, Sign	Appears to be paved room for pull-off, but stop is north of this area	None	North of major intersection	126	0.5%	Formal paved pull-off. Many people get off the bus at this stop.
	Southbound	Sign	Shoulder	None		125	17.0%	Formal pull-off from highway.
Blue River Road	Northbound	Sign	Gravel shoulder, north of intersection	None	North of major intersection	84.5	11.6%	Formalize pull-off, pedestrian connection to Blue River Road.
Sherwood Lane/97 Circle	Northbound	Sign	None	Slight horizontal curve approaching intersection	Major intersection	44	10.6%	Add pull-off to far side of intersection.
	Southbound	Sign	Intersection utilized for pull-off	None	Relocated access	38a	2.5%	Move stop ahead of intersection, create pull-off.
Town Hall	Northbound	Sign	Intersection utilized for pull-off. Park and ride in Town Hall parking lot.	None	Major intersection	33	15.1%	Move stop to far side of intersection, create pull-off. Potential partnership opportunity.
McCullough Gulch/Lodge by the Blue	Northbound	Sign	Intersection utilized for pull-off	None	Major intersection	29b	9.6%	Move stop to far side of intersection, partnership opportunity with developer.
Quandary Road (U-turn point)	Northbound	Sign	Large pull-off, used for turnaround. School bus also uses this.	Horizontal curve approaching intersection	Major intersection	24b	5.6%	
	Southbound	Sign	Gravel shoulder	None		23	0.1%	Formalize pull-off.

*Ridership - % of riders boarding at this location in relation to stops along entire route (Breckenridge to Fairplay) 5/19/19 to 7/6/19. Separated northbound and southbound

11.0 LIST OF ACRONYMS

AASHTO = American Association of State Highway and Transportation Officials

ACP = Access Control Plan

ADT = Average Daily Traffic Volume (vehicles/day)

ATS = Average Travel Speed

BA = Business Access

BOCC = Summit County Board of County Commissioners

CDOT = Colorado Department of Transportation

CDPHE = Colorado Department of Public Health and Environment

CO-9 = Colorado State Highway 9

FA = Field Access

FHWA = Federal Highway Administration

FTA = Federal Transit Administration

HCM 2010 = Highway Capacity Manual 2010

HCS = Highway Capacity Software

IGA = Intergovernmental Agreement

LOS = Level of Service

MP = Milepost

MPO = Metropolitan Planning Organization

mph = Miles Per Hour

MUTCD = Manual on Uniform Traffic Control Devices

MS4 = Municipal Separate Storm Sewer

NCHRP = National Cooperative Highway Research Program

OPC = Opinion of Probable Cost

PFFS = Percent of Free Flow Speed

PRU = Public Road Unsignalized

PTSF = Percent Time Spent Following

PVRU = Private Road Unsignalized

R = Residential Access

RCP = Reinforce Concrete Pipe

RTP = Regional Transportation Plan

R-A = Regional Highway

RMMWC = South Summit Modern Women's Club

RP = Reference Point

ROW = Right-of-Way

RTP = Regional Transportation Plan

STIP = Statewide Transportation Improvement Program

TMC = Turning Movement Count

TPR = Transportation Planning Region

UPRR = Union Pacific Railroad

v/c = Volume-to-Capacity Ratio

12.0 GLOSSARY

Access – Any driveway or other point of entry and/or exit such as a street, road or highway that connects to the general street system

Access Category – means one of eight categories described in Section Three of the State Highway Access Code, and determines the degree to which access to a state highway is controlled

Access Control Plan or Access Plan – A plan which designates access locations and levels of access for the purpose of bringing those portions of roadway included in the planning area into conformance with the highway functional classification to the extent feasible

Access Management – Systematic control of the location, spacing, design, and operation of driveways, median openings, and street connections to a roadway

Access Permit – Means by which access improvements are reviewed, approved and constructed in accordance with the State Highway Access Code

Average Daily Traffic Volume (ADT) – The total 24-hour volume of vehicular traffic at a particular location measured in vehicles per day

Average Travel Speed (ATS) – The highway segment length divided by the average travel time taken by vehicles to traverse it during a designated time interval

Driveway – An access that is not a public street, road, or highway

Full Movement Access – An access without turn restrictions

Functional Intersection Area – Area upstream and downstream of an intersection where intersection operation and conflicts influence driver behavior, vehicle operations, or traffic conditions.

Intergovernmental Agreement (IGA) – A legally-binding agreement between two or more governmental agencies

Issuing Authority – The entity responsible for issuing access permits for a segment of state highway. The board of county commissioners, the governing body of a municipality, or the department of transportation may be the Issuing Authority.

Level-of-Service (LOS) – An indication of the quality of traffic flow as measured by vehicle delays or travel speeds. Level-of-service grades range from LOS A (ideal traffic flow) to LOS F (heavily congested conditions). LOS D is typically considered an acceptable traffic condition during peak demand periods in urbanized locations.

Light Detection and Ranging (LIDAR) – a surveying method that measures distance to target

Percent of Free Flow Speed (PFFS) – The ability of vehicles to travel at or near the posted speed limit.

Percent Time Spent Following (PTSF) – The average percentage of time that vehicles must travel in platoons behind slower vehicles due to the inability to pass.

Reference Point (RP) – Similar to a milepost, reference points identify the location of each access point in the ACP tables to avoid discrepancies between the original mile posting and the actual length of the highway segment based on a control point established for the corridor. All other access point locations are measured from the control point established for each section.

Right-of-way (ROW) – The entire width between the boundary lines of every way publicly maintained when any part thereof is open to the use of the public for purposes of vehicular travel

State Highway Access Code (SHAC) – A manual containing the access regulations that apply to state highways within Colorado

Turning Movement Count (TMC) – A tally of the number of vehicles turning left, right, or traveling through an intersection

Volume-to-Capacity Ratio (v/c) – The sufficiency of an intersection to accommodate vehicular demand. A v/c over 1.00 means the traffic demand exceeds the capacity.