TOWN OF CASTLE ROCK

Transportation Master Plan

October 2017

Transportation Master Plan

Prepared for:

Town of Castle Rock

100 North Wilcox Street

Castle Rock, CO 80104

Prepared by:

FELSBURG HOLT & ULLEVIG

connecting and enhancing communities

6300 South Syracuse Way, Suite 600

Centennial, CO 80111

303.721.1440

FHU Reference No. 15-398-01

October 2017

Castle Rock Transportation Master Plan

The Town of Castle Rock is a desirable place to live with a high quality of life driven by the Town's small town feel, impressive views and landscape, high-quality neighborhoods and proximity to the Denver Metro Area. With rapid development and the prospect of continued growth come transportation challenges that include increasing traffic congestion, the need to serve more residents through various travel modes, and the desire to preserve the historic downtown area.

Purpose of Update

The Transportation Master Plan provides a guiding framework for the continued development and enhancement of the transportation network in the Town of Castle Rock. The purpose of the Plan is to document the existing transportation system and to analyze future transportation needs to accommodate anticipated growth within the Town. The Plan has been designed to evaluate transportation improvements necessary to support the full build of known land uses documented in the Town of Castle Rock Comprehensive Master Plan (details at CRGOV.com/CompPlan).

Plan Recommendations

This Plan considers a wide range of transportation network improvements across all travel modes and includes maps for each mode and a project list of transportation infrastructure improvements throughout the Town.

The Plan has been designed to evaluate the full build of Castle Rock. Transportation system improvements are multimodal in nature; for example, a project identified as a 4-lane Major Arterial standard cross section would be improved similar to the standard cross section shown in **Figure i**, which includes sidewalks, bike lanes, and travel lanes. The Town's 2012 Transportation Design Criteria Manual contains standard designs that accommodate all types of travel.

Figure i – 4-lane Major Arterial Cross Section

Roadway Improvements

The roadway network within the Town plays a significant role in the daily movement of people and goods throughout Castle Rock. Due to the unique geography and terrain of the area, as well as the man-made features such as Interstate 25 and the railroad tracks, the road system has developed into a unique network. These challenges to the roadway network are part of the community's charm but can make mobility less efficient than a more grid-like system would allow. The Plan recommends roadway improvements to help facilitate mobility throughout Castle Rock. A full listing of the improvements can be found in **Table i** and displayed in **Figure ii** (p. ES-8). The table has been subdivided into two principle sections, Projects Included in Base Assumptions which are projects that are in the current Town Capital Improvement Plan or are planned to be constructed by the Colorado Department of Transportation or local developments, and Improvement Projects Identified during development of the Transportation Master Plan, which are projects identified during this plan process. The project horizon column identifies the planned development period (By 2022, By 2030, By Full Build). The planning horizon has been determined through analysis of the transportation system performance over time with prioritization of projects to remedy anticipated congestion and serve future development. **Figure iii** (p. ES-9) displays the Master Streets Plan, which includes the functional classification and number of lanes on the transportation network at full build.

Active Transportation Improvements

The accommodation of bicycle and pedestrian travel is essential for Castle Rock's quality of life. Castle Rock prides itself on its park, trail, and open space system, of which bicycle and pedestrian access is a critical component. The expansion of the bicycle network for transportation and commuting purposes will increase connectivity between homes and employment areas, schools, and activity centers, such as downtown. To further enhance bikeability, additional connections between off-street and on-street bike facilities should be increased including more connections through existing and planned developments. The network maps for the bicycle and pedestrian facilities are provided as **Figure iv** (p. ES-10) and **Figure v** (p. ES-11), respectively. The planning horizon has been determined through analysis of the transportation system performance over time with phasing of projects designed to coincide with planned roadway improvement projects and consistent with the Parks and Recreation Master Plan. Priority has been assigned to projects which are located near trip destinations, including schools, commercial areas, and Downtown. A tabular listing of the phased bicycle and pedestrian projects are included in **Appendix A**.

Castle Rock Transportation Demand Management Toolbox

Castle Rock has many opportunities when it comes to initiating a Transportation Demand Management program. One of the primary opportunities is to leverage the existing Transportation Demand Management work that is happening across the region. Examples include work by the Denver Regional Council of Governments Way to Go program, the Denver South Transportation Management Association, and Colorado Springs Mountain Metro Rides Vanpool program. Castle Rock may also partner with other local jurisdictions to create park-n-ride lots in Town to serve commuters.

Bustang Transit Initiative

Colorado Department of Transportation's Division of Transit and Rail is currently evaluating the addition of a regional stop in the Castle Rock area for the Bustang Interregional Express service between Colorado Springs and Denver. The added stop would provide commuter transit services into Denver from Castle Rock, with stops in Denver located at Regional Transportation District-Colorado Station, Civic Center, 18th/California, 19th/Stout, Denver Union Station, Denver Bus Center, and a potential stop in the Denver Tech Center. An opportunity exists for Castle Rock commuters if an additional stop (location to be determined) is placed in the Town where commuters can access the service.

Table i – Roadway Improvement Projects

Project ID No.	Horizon	Roadway	Segment	New Lanes and Functional Classification	Responsibility	Planning Level Cost Estimate
Projects Included in Base Assumptions						
1	By 2022	Crystal Valley Pkwy*	Widen from Idylwood Rd to Frontage Rd	4 lane Major Arterial	Under Construction	NA****
2	By 2022	Fifth St	Complete climbing lane and sidepath along south side of street from Gilbert Street to Founders Pkwy	3 lane Major Arterial	Town CIP	$6,000,000
3	By 2022	Founders Pkwy**	Widen from Woodlands Blvd to Crowfoot Valley Rd (Note: widening is part of the Founders Pkwy and Crowfoot Valley Rd intersection improvement project)	6 lane Major Arterial	Town CIP/TIP	$3,500,000
4	By 2022	Lanterns Development	Build development roads	2 lane Collector	Developer Responsibility	NA****
5	By 2022	Plum Creek Pkwy	Widen from Gilbert Street to Ridge Rd	4 lane Major Arterial	Town CIP	$3,100,000
6	By 2022	Prairie Hawk Dr*	Widen from Meadows Blvd to Melting Snow	4 lane Major Arterial	Developer Responsibility	NA****
7	By 2022	Ridge Rd**	Widen from Plum Creek Pkwy to Fifth St	4 lane Major Arterial	Town CIP	$4,000,000
8	By 2022	Wolfensberger Rd	Widen from MAC Entrance (west of Coachline) to Prairie Hawk Dr	4 lane Major Arterial	Town CIP	$7,600,000
9	By 2030	Plum Creek Pkwy	Widen from Wolfensberger Rd to I-25	4 lane Major Arterial	Shared Town and Developer Responsibility	$6,330,000
10	By 2030	Pine Canyon/ Pioneer Ranch Developments	Build connection from Woodlands Blvd to Front St	4 lane Major Arterial	Developer Responsibility	NA****
11	By 2030	Pine Canyon Development	Build connection from Founders Pkwy to Woodlands Blvd	2 lane Collector	Developer Responsibility	NA****
12	By 2030	Pine Canyon/ Pioneer Ranch Developments	Build Woodlands Blvd Connection	4 lane Major Arterial	Developer Responsibility	NA****
13	By 2030	Pioneer Ranch Development	Build connection from Founders Pkwy to Woodlands Blvd	2 lane Collector	Developer Responsibility	NA****

Project ID No.	Horizon	Roadway	Segment	New Lanes and Functional Classification	Responsibility	Planning Level Cost Estimate
14	By 2030	Prairie Hawk Dr	Realign along Atchison Way and extend from Topeka Way to Plum Creek Pkwy	4 lane Major Arterial	Shared Town and Developer Responsibility	$6,170,000
15	By 2030	West Frontage Rd	Realign between Town Limits and Plum Creek Pkwy	4 lane Major Arterial	Shared Town and Developer Responsibility	$25,400,000
16	By Full Build	US 85	Widen from Promenade Pkwy to Town limits	4 lane Expressway	CDOT Responsibility (In DRCOG RTP)	NA****
Improvement Projects Identified during TMP						
17	By 2030	Crowfoot Valley Rd	Widen from Founders Pkwy to Town Limits	4 lane Major Arterial	Shared Town and Developer Responsibility	$4,700,000
18	By 2030	SH 86	Widen from Ridge Rd to Enderud Blvd	4 lane Highway	Shared Town and CDOT Responsibility	$2,550,000
19	By 2030	Prairie Hawk Dr	Widen from Melting Snow Dr to Wolfensberger Rd	4 lane Major Arterial	Town Responsibility	$2,700,000
20	By 2030	I-25 Interchange	Construct Interchange at Crystal Valley Pkwy	Interchange	Shared Town, Douglas County, and Developer Responsibility	$51,000,000
21	By 2030	N Meadows Dr	Widen from Meadows Blvd to US 85	4 lane Major Arterial	Shared Town and Developer Responsibility	$23,900,000
22	By 2030	East Frontage Rd	Construct operational improvements from Plum Creek Pkwy to Crystal Valley Pkwy	2 lane Minor Arterial	Shared Town and Developer Responsibility	$6,030,000
23	By Full Build	I-25 Interchange***	Construct Interchange near Highway 85/Black Feather Trail/or other Founders Pkwy/SH 86 corridor improvements	Interchange	Shared Town and Developer Responsibility	$20,000,000 - $40,000,000
24	By Full Build	Liggett Rd	Extend south to Wolfensberger Rd via Caprice Dr	2 lane Collector	Town Responsibility	$3,330,000

Project ID No.	Horizon	Roadway	Segment	New Lanes and Functional Classification	Responsibility	Planning Level Cost Estimate
25	By Full Build	Liggett Rd	Widen from Highway 85 to new Liggett Rd extension	4 lane Major Arterial	Shared Town and Developer Responsibility	$3,750,000
26	By Full Build	Meadows Pkwy	Widen from Meadows Blvd to US 85	6 lane Major Arterial	Town Responsibility	$20,300,000
27	By Full Build	Founders Pkwy	Widen from Crowfoot Valley Rd to Fifth St	6 lane Highway	Shared Town, Developer, and CDOT Responsibility	$10,700,000
28	By Full Build	Fifth St	Complete 4-lane arterial from Woodlands Blvd to Founders Pkwy	4 lane Major Arterial	Shared Town and Developer Responsibility	$5,870,000
29	By Full Build	Perry St	Extend south to East Frontage Rd	2 lane Collector	Town Responsibility	$3,720,000
30	By Full Build	Ridge Rd	Improve from Plum Creek Pkwy to Town Limits	2 lane Minor Arterial	Shared Town and Developer Responsibility	$4,170,000
31	By Full Build	Valley Dr	Connect between Hover Dr and Hudson Ln	2 lane Collector	Shared Town and Developer Responsibility	$1,520,000
					Total Planning Level Cost Estimate	**$226,340,000 - $246,340,000**

* = Project Under Construction

** = Project In Design

*** = Additional studies need to be completed to determine final I-25 or Founders Pkwy/SH 86 corridor improvements. FHWA and CDOT concurrence is necessary for corridor or interchange construction.

**** = Project cost and construction is the responsibility of the developer(s), or other entity.

Note: Project responsibility is subject to change.

Note: Planning Level Cost Estimates do not include right-of-way acquisition, all costs are in 2017 dollars

	Project No.	Horizon	Intersection	Description
Intersection Improvements	32	By 2022	Founders Pkwy and Allen Way**	Operational Improvements
	33	By 2022	Founders Pkwy and Crowfoot Valley Rd**	Add an east-west through lane in each direction, add an eastbound left turn lane, add a southbound left turn lane, convert southbound right turn into channelized right turn, convert westbound right turn into channelized right turn
	34	By 2022	SH-86/5th Street and Founders Pkwy**	Add an east-west through lane in each direction, add a north-south through lane in each direction, add a northbound turn lane, add a southbound left turn lane
	35	By 2022	Wolfensberger Rd / Red Hawk Dr	Convert to roundabout
	36	By 2022	Plum Creek Pkwy / Gilbert St	Convert to roundabout
	37	By 2022	Wolfensberger Rd and Plum Creek Blvd/Coachline Rd**	Convert to roundabout
	38	By 2030	Coachline Rd / Foothills Dr	Convert to roundabout
	39	By 2030	Prairie Hawk Dr and Wolfensberger Rd	Add an eastbound right turn lane, add a northbound right turn lane
	40	By Full Build	Highway 85 / Liggett Rd	Realign Liggett Rd to intersect Hwy 85 at Castleton Ct
	41	By Full Build	Mickelson Blvd / N Mitchell St	Convert to roundabout

* = Project Under Construction

** = Project In Design

*** = Additional studies need to be completed to determine final I-25 or Founders Pkwy/SH 86 corridor improvements.
FHWA and CDOT concurrence is necessary for corridor or interchange construction.

**** = Project cost and construction is the responsibility of the developer(s), or other entity.

Note: Project responsibility is subject to change.

Note: Planning Level Cost Estimates do not include right-of-way acquisition, all costs are in 2017 dollars

Figure ii – Proposed Roadway Improvement Projects

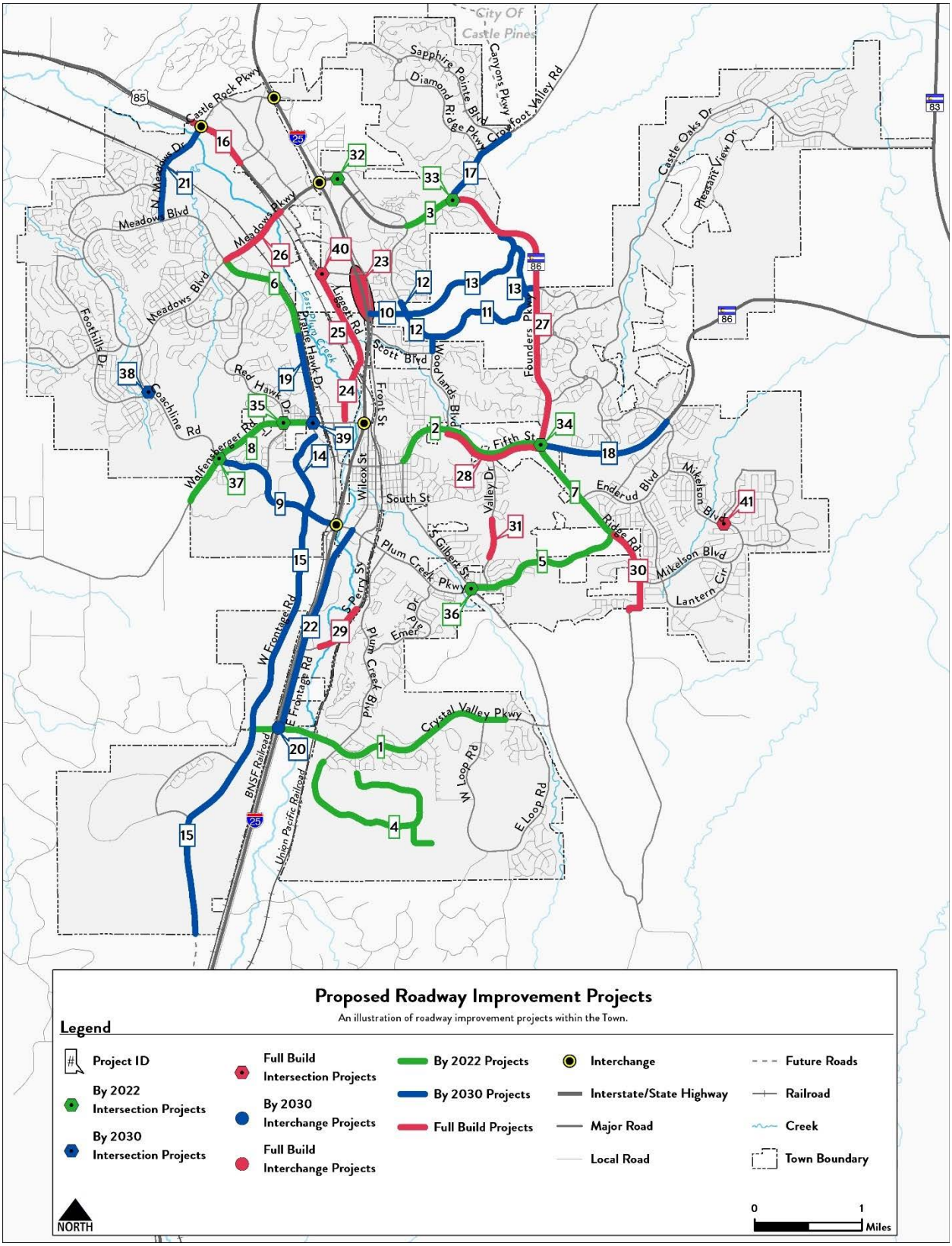


Figure iii – Master Street Plan

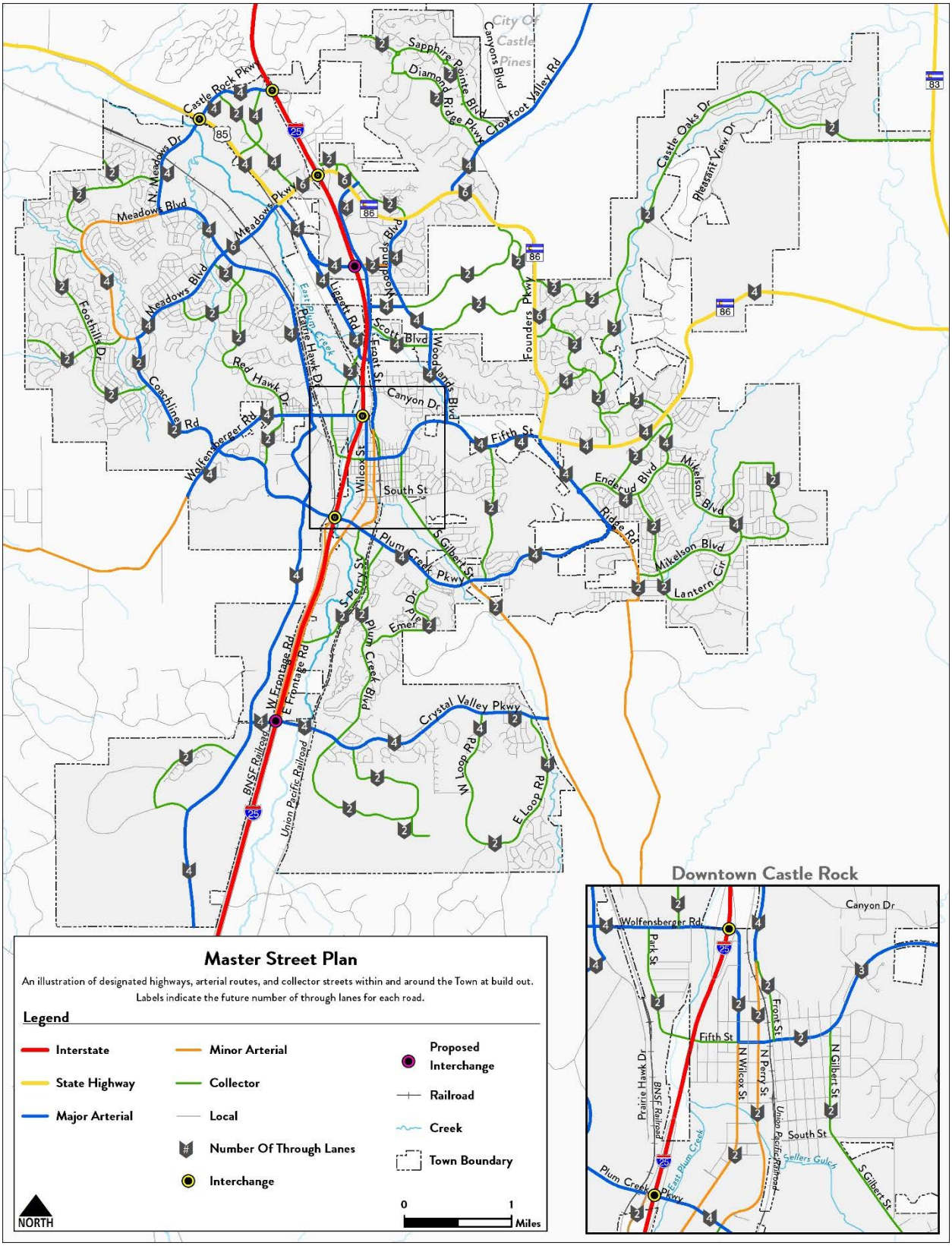


Figure iv – Existing and Proposed Bike Network

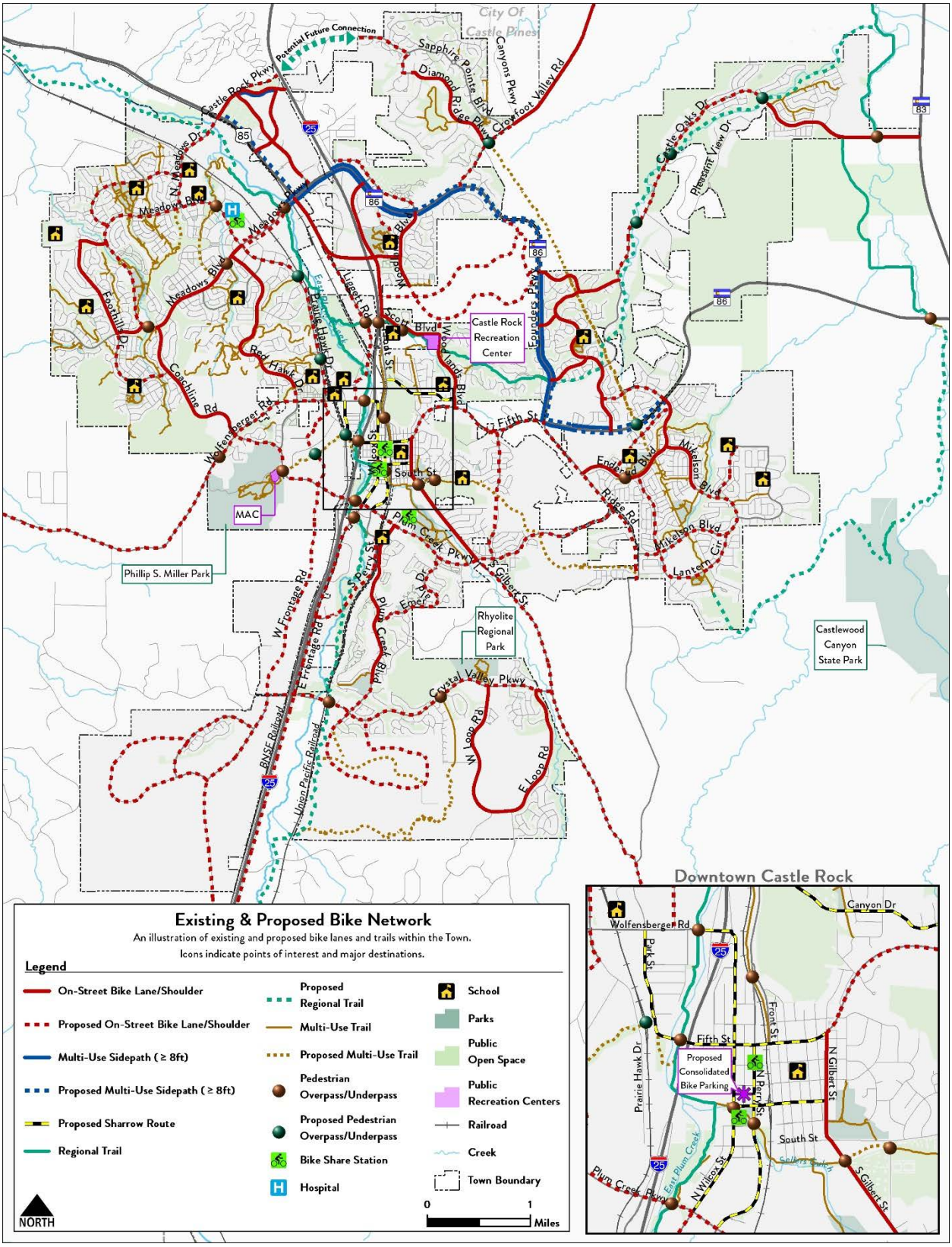


Figure v – Existing and Proposed Pedestrian Network

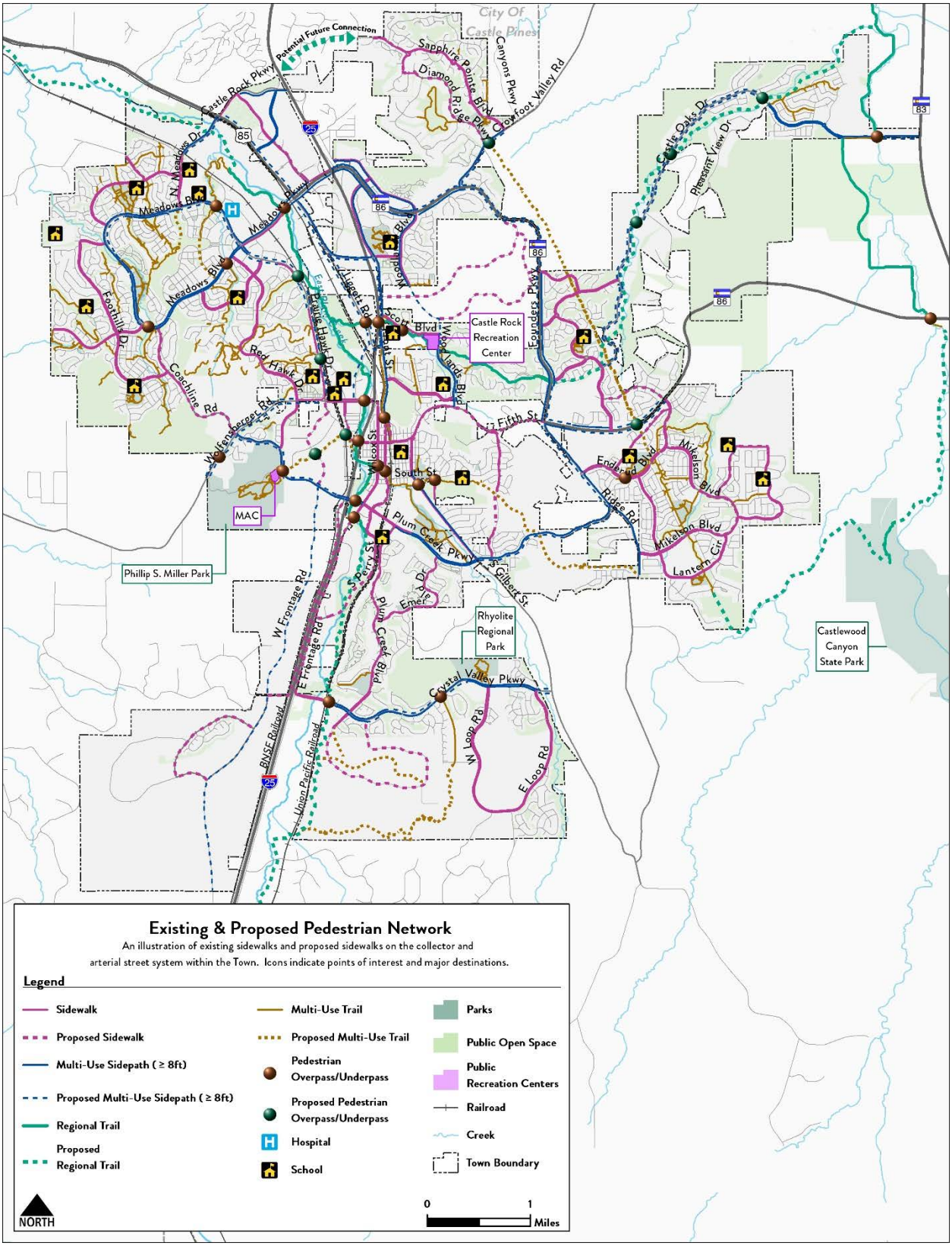


TABLE OF CONTENTS

Page

1.0 Background & Context 1

1.1 Study Purpose 3

1.2 Update Purpose 4

1.3 Progress Since Last Transportation Master Plan 4

1.4 Integrated Planning Efforts 6

1.4.1 Comprehensive Master Plan 6

1.4.2 Downtown Parking Study 6

1.5 Public Involvement Summary 7

1.6 Vision and Goals 8

2.0 Existing Conditions 11

2.1 Roadway Network 11

2.2 Active Transportation 17

2.2.1 Bicycle Network 17

2.2.2 Pedestrian Network 20

2.3 Transportation Demand Management 22

3.0 Growth Impacts 24

3.1 Land Use Development 24

3.2 Regional Travel Demand Model 27

3.2.1 Base Road Network Improvements 27

3.2.2 Roadway Forecasts and Performance 29

4.0 Recommended Transportation Plan 34

4.1 Roadway Plan 34

4.1.1 Roadway Projects 34

4.1.2 Roadway Project Phasing 47

4.2 Active Transportation 49

4.2.1 Bicycle Plan 49

4.2.2 Pedestrian Plan 54

4.3 Transportation Demand Management 56

4.4 Emerging Technologies 63

4.4.1 The Growing Role of Data and Connectivity 64

4.4.2 Safety and Infrastructure 65

LIST OF APPENDICES

Appendix A – Bicycle, Pedestrian, ITS, TDM, and Recommended Studies Project Lists
Appendix B – Public Comment Summaries
Appendix C – Travel Demand Model Land Use Data by TAZ
Appendix D – Comparison between Founders Pkwy Improvements and New Interchange Access Along I-25
Appendix E – Full Build Intersection Analysis
Appendix F – Planning Level Project Cost Worksheets

LIST OF FIGURES

Page

Figure 1 – Existing Roadway Functional Classifications 13
Figure 2 – Existing Daily Traffic Counts 15
Figure 3 – Existing Traffic Volume/Capacity Ratios 16
Figure 4 – Existing Bike Network 19
Figure 5 – Existing Pedestrian Network 21
Figure 6 – Existing Land Use 25
Figure 7 – Future Land Use Plan 26
Figure 8 – 2030 (60% of Full Build) Traffic Forecasts with By 2030 Base Assumption Projects 30
Figure 9 – 2030 (60% of Full Build) Volume/Capacity Ratios with By 2030 Base Assumption Projects 31
Figure 10 – 2040 Full Build Traffic Forecasts with All Base Assumption Projects 32
Figure 11 – 2040 Full Build Volume/Capacity Ratios with All Base Assumption Projects 33
Figure 12 – Proposed Roadway Improvement Projects 40
Figure 13 – Master Street Plan 41
Figure 14 – 2030 (60% of Full Build) Traffic Forecasts with By 2030 Base Assumption and Proposed Improvement Projects 43
Figure 15 – 2030 (60% of Full Build) Volume/Capacity Ratios with By 2030 Base Assumption and Proposed Improvement Projects 44
Figure 16 – 2040 Full Build Traffic Forecasts with All Base Assumption and Proposed Improvement Projects 45
Figure 17 – 2040 Full Build Volume/Capacity Ratios with All Base Assumption and Proposed Improvement Projects 46
Figure 18 – Existing and Proposed Bike Network 55
Figure 19 – Existing and Proposed Pedestrian Network 57
Figure 20 – Transit Trip Generators and Attractors 61

LIST OF TABLES

Table 1 – Roadway Capacities and Performance Thresholds 14
Table 2 – Streets with Bike Lanes/Shoulders 18
Table 3 – Total Households and Employment by Horizon 27
Table 4 – Base Roadway Improvement Projects 28
Table 5 – Proposed Roadway Improvement Projects 36
Table 6 – Ranked Roadway Plan Listing 48

Acknowledgements

The Town of Castle Rock would like to acknowledge the efforts of the following individuals, who assisted in the development of this plan.

Town of Castle Rock

Town Council

Mayor Jennifer Green
Mayor Pro Tem Renee Valentine
Jess Loban
James Townsend
Jason Bower
George Teal
Brett J. Ford
Mayor Paul Donahue (former)
Chip Wilson (former)
Mark Heath (former)

Public Works Commission

Kira James (Chair)
Thomas Feeney
Larry Grauberger
William Leung
Steven Peterson
Mike White
Joe Whitehead
Mike Riedmuller (former Chair)
Richard Follmer (former)
Jacob Kuntz (former)

Planning Commission

Max Brooks (Chair)
David Kay (Vice Chair)
Vicki Sikes
Eric Bender
Laurie Van Court
Charles Fletcher
James Briggs

Town of Castle Rock Staff Members

Dave Corliss, Town Manager
Bob Goebel, Director of Public Works
Dan Sailer, Assistant Public Works Director
Ryan Germeroth, Transportation Planning and Traffic Engineering Manager
Thomas Reiff, Transportation Planner (Project Manager)
Megan Bednar, Traffic Engineering Technician
Kevin Wrede, Planning Manager
Julie Kirkpatrick, Long Range Project Manager
Caroline Frizell, Senior Community Relations Specialist
Rich Havel, Trails Planner
Jason Fields, Public Works GIS Data Coordinator
Matt Rettmer, Fire Lieutenant

Consultants

Felsburg, Holt and Ullevig

Elliot Sulsky, PE, AICP
Steven Marfitano, PE
Cady Dawson
Emma Belmont, AICP
Megan Ornelas, GISP

Local Agencies

Colorado Department of Transportation

Betsy Jacobsen, Bicycle/Pedestrian/Scenic Byways Section Manager
Jeff Sanders, Transit Planning & Infrastructure Unit Manager
Jody Allen, Region 1, Project Engineer
Richard Solomon, Region 1 Permit Unit Supervisor
Paul Scherner, Region 1 Traffic Operations

Denver Regional Council of Governments

Jacob Riger, Long Range Transportation Planning Manager
Matthew Helfant, Senior Transportation Planner

Douglas County

Art Griffith, Transportation Capital Projects Manager
Jennifer Eby, Community and Resource Service Manager
Faye Estes, Mobility Program Manager
Duane Cleere, Traffic Engineering / Operations Manager
Katherine Haire, Traffic Engineer
Amy Enos Branstetter, Traffic Engineer

LIST OF ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ADA	American Disabilities Act
AV	Automatous Vehicle
CDOT	Colorado Department of Transportation
CIP	Capital Improvement Project
CV	Connected Vehicle
DRCOG	Denver Regional Council of Governments
DSTMA	Denver South Transportation Management Association
DTR	Division of Transit and Rail
EPA	US Environmental Protection Agency
FHWA	Federal Highway Administration
I-25	Interstate 25
ICT	Information and Communications Technology
ITS	Intelligent Transportation Systems
LAB	League of American Bicyclists
NACTO	National Association of City Transportation Officials
NCHRP	National Cooperative Highway Research Program
PPP	Public Private Partnerships
SLM	Shared Lane Marking
TDM	Transportation Demand Management
TMA	Transportation Management Association
TMO	Transportation Management Organization
TMP	Transportation Master Plan
UAS	Unmanned Aircraft Systems
US 85	US Highway 85
v/c	volume/capacity
V2I	Vehicle-to-Infrastructure
V2V	Vehicle-to-Vehicle
VMT	Vehicle Miles Traveled

1.0 BACKGROUND & CONTEXT

The Town of Castle Rock is a desirable place to live with a high quality of life driven by the Town's small town feel, impressive views and landscape, high-quality neighborhoods and proximity to the Denver Metro Area. With rapid development and the prospect of continued growth come transportation challenges that include increasing traffic congestion, the need to serve more residents through various travel modes, and the desire to preserve the historic Downtown area.

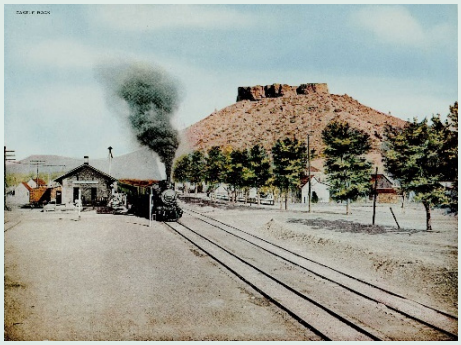
The Town of Castle Rock, located within Douglas County, Colorado, serves as the county seat. As the County's administrative center, the County Courts, County offices and services, and Douglas County School District offices are located in the Town. Nationally, the Town has been awarded many honors highlighting the Town for its high quality of life. Among these were awards from *Money* Magazine: Top Place to Live; *American City and County*: Best Small Cities; *Apartment List*: Best Cities for Young Families; and *Motovo*: Safe City Ranking.

Population growth has been significant within the Town during the last 30 years. US Decennial Census records indicated a population of 3,921 persons in 1980, which has grown to an estimated population of 55,591 in 2015. As future development projects may increase the population to almost 142,000 residents at full build, the Town is prepared to continue to provide high-quality services while preserving the history and heritage of Castle Rock.

The Town of Castle Rock is in a unique geographic area featuring dramatic buttes, rolling terrain, and creeks. In addition to the natural terrain, significant man-made barriers, including the railroads and Interstate 25 (I-25), have required the development of a unique transportation network to serve travel needs for residents, employees, and visitors. The Town features a historic downtown area originally developed with six streets named Elbert, Jerry, Wilcox, Perry, Castle, and Front. As the Town has developed, growth trends have resulted in neighborhood development around the perimeter of historic downtown.

Castle Rock Transportation Master Plan

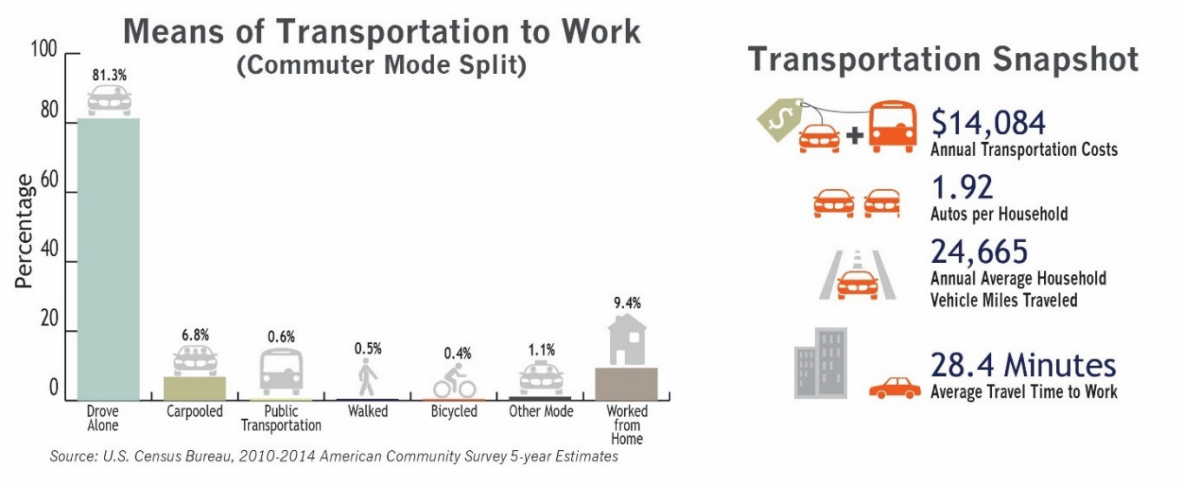
Historic Castle Rock Train Station

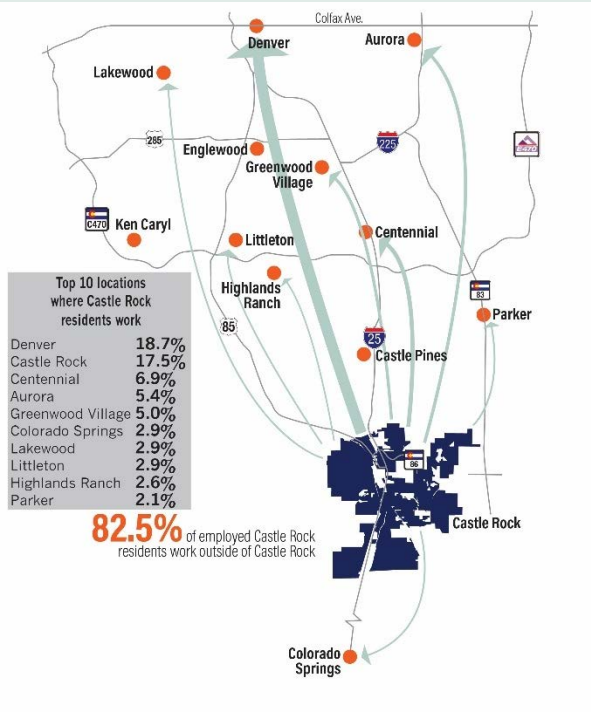


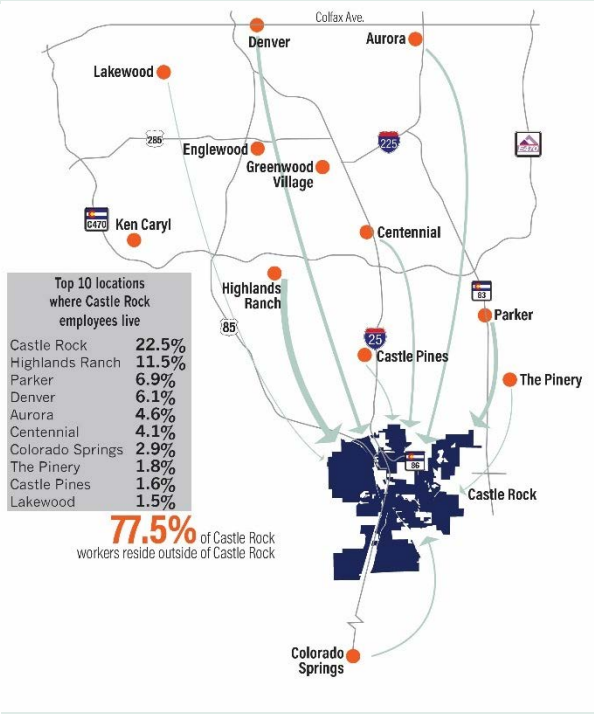
View of Castle Rock

Plum Creek Parkway Multi-Use Sidepath

Regionally, the Town is at the southern edge of the Denver Metropolitan Area, 30 miles south of Downtown Denver and 20 miles south of the Denver Tech Center. The City of Colorado Springs is located 35 miles south of Castle Rock. A majority of residents in Castle Rock commute outside the Town to employment centers in surrounding communities. This not only impacts general travel demands within Town but also outside Town. Commuting travel within the Town provides an interesting look at the travel tendencies of residents. Overall, a majority of commuters drive alone to work with the average travel time to work at 28.4 minutes.







1.1 Study Purpose

The Transportation Master Plan (TMP) provides a guiding framework for the continued development and enhancement of the transportation network in Castle Rock. The purpose of the Plan is to provide information about the existing transportation system and to analyze future transportation needs within the Town necessary to accommodate land use plans documented in the Town of Castle Rock Comprehensive Master Plan. This Plan considers a wide range of transportation network improvements necessary to continue the development of a complete transportation system that integrates all travel modes. The Plan has been designed to evaluate transportation improvements necessary to support the full build of land uses envisioned in the Comprehensive Master Plan.

Transportation Master Plans serve a vital role in the strategic planning of communities by providing an opportunity to work with the community to determine the best ways to meet future needs.

The intent of this Plan is to develop a roadmap to assist Town planners and engineers as the Town continues to develop. The Plan is organized with the following sections:

1. Background and Context

   Chapter 1 provides an overview of the Plan development process and purpose, followed by a presentation of the updated vision and goals that steer improvements identified throughout the Transportation Master Plan development process.

2. Existing Conditions

   Chapter 2 describes the state of the existing multimodal transportation system.

3. Growth Impacts

   This Plan has been designed to identify transportation network needs at full build of Castle Rock to understand the full breadth of improvements that the Town should be planning. Chapter 3 describes methodologies to evaluate the impacts of future development on the transportation system and provides future vehicular forecasts and anticipated congested locations. This information is then used to develop transportation solutions.

4. Recommended Transportation Plan

   Chapter 4 presents the transportation network improvements recommended for the Town. Recommendations include a wide range of improvement types, including roadway, bicycle, pedestrian, and transit options. Chapter 4 also presents transportation demand management policies that may be implemented, along with a discussion of emerging technologies and their possible impacts as travel characteristics continue to evolve.

1.2 Update Purpose

Transportation Master Plans are periodically updated to reflect community changes. During the update process, there is an opportunity to re-evaluate the progress since past plans and collect public comment to steer future direction. Since the 2011 Transportation Master Plan, significant changes to the pace of development has been experienced. The 2011 Plan assumed a much slower growth rate than current conditions, and as a result, the current update more accurately reflects current and projected growth trends, with a new focus on evaluating the transportation network at full build of the community. Other opportunities taken during this update were to:

- Verify and adapt the Vision and Goals
- Coordinate with other Town master plans
- Coordinate with other state, regional, and County plans
- Reaffirm and identify short, mid, and long term transportation projects
- Reassess priorities

1.3 Progress Since Last Transportation Master Plan

Since the last Transportation Master Plan in 2011, the Town and private sector have completed several major transportation network enhancements.

- **Castle Rock Parkway Interchange at I-25** – A new interchange with I-25 at Castle Rock Parkway and an associated interchange with US Highway 85 (US 85), and a connection to North Meadows Drive were opened to the traveling public in fall 2016.
- **North Meadows Drive Extension** – A new connection between the Meadows and the new Castle Rock Parkway Interchange at I-25 opened.

Changes Since the Last TMP

Castle Rock Parkway Opening

US 85 and N Meadows Drive Overpass

Free Cycle Opening

- **Castle Oaks Drive** – Castle Oaks Dr was improved from a gravel road to a two-lane facility with auxiliary lanes where appropriate.
- **Meadows Boulevard** – Widening from two to four lanes was completed along Meadows Blvd, including the addition of bike lanes.
- **Founders Parkway and Crowfoot Valley Road Multi-Use Sidepath** – A new sidepath along the south side of Founders Pkwy and west side of Crowfoot Valley Rd was constructed.
- **Wilcox Street and Plum Creek Parkway** – The intersection at Wilcox St and Plum Creek Pkwy was improved.
- **Castle Rock Adventist Hospital's FreeCycle Program** – A new bike share program was started in 2016 by the Castle Rock Adventist Hospital. Residents, employees, and visitors can use the bikes to access the expanded local bike network.
- **Continued Development of Trail and Bicycle Connection** – Connections include the addition of bicycle lanes/shoulders to roadway cross sections with sufficient width to accommodate bicycle facilities alongside existing vehicular travel lanes.

1.4 Integrated Planning Efforts

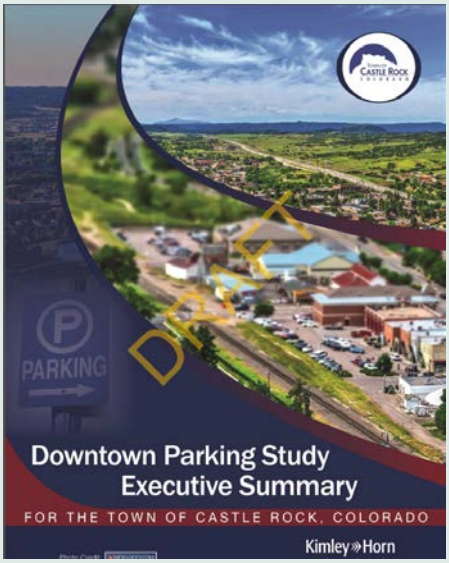
The Town of Castle Rock and other local and regional agencies have completed several studies and planning efforts in recent years. These plans and studies, such as Castle Rock's Parks and Recreation Master Plan, CDOT's SH 83-86 Corridor Optimization Plan, DRCOG's Regional Transportation Plan, and Douglas County's Master Transportation Plan, were all used to inform the development of this Transportation Master Plan. This ensures consistency across planning boundaries and aligns local and regional goals, such as increasing travel choices and improving access and mobility.

Two important planning studies currently underway by the Town of Castle Rock to guide future growth and change in the Town are the Town of Castle Rock Comprehensive Master Plan and the Downtown Parking Study. Planning from these efforts has been incorporated as part of the background and context of this transportation planning effort.

Integrated Planning Efforts

Comprehensive Master Plan

Downtown Parking Study



1.4.1 Comprehensive Master Plan

The Town of Castle Rock Comprehensive Master Plan is designed to guide Castle Rock's future through 2030 and beyond. The plan describes the community's goals and vision and will be used to guide the Town's growth, development, and plan for new Town facilities.

This Transportation Master Plan effort has been designed to evaluate transportation improvements necessary to support the full build of known land uses documented in the Comprehensive Master Plan.

1.4.2 Downtown Parking Study

The Town of Castle Rock Downtown Parking Study was developed to assess the Town's current and future parking needs in the downtown. It is intended to guide decision makers on parking management-related topics. Recommendations of the Downtown Parking Study were guided by the philosophy that parking management is about supporting walkable public spaces for people, not about warehousing cars. In short, effective parking and access management solutions focus on getting people where they want to go, using their preferred method of transportation – car, bicycle, and/or walking.

The study identifies some of the near and mid-term action items intended to jump-start implementation, of the recommended improvements, such as establishing a Downtown Parking Management Team.

1.5 Public Involvement Summary

Transparency and public participation are critical components in the planning process. It is important to gain public support and buy-in for the final transportation plan.

The process included a robust public information and comment process to engage the public. A primary component of the public process has been a series of public meetings. The public meetings gave interested members of the public an opportunity to meet the project team and discuss issues. **Appendix B** includes summaries of the public comment process.

Project Introduction (November 16, 2016) – This public meeting focused on informing the public about the upcoming Plan update and solicited input about multimodal transportation needs and deficiencies. The public also provided feedback on the Vision and Goals.

Draft Plan Recommendations (April 19, 2017) – This meeting provided the community a look at the Draft Plan Recommendations and an opportunity to comment. In addition to in-person meetings, a significant social network and project website presence was implemented to encourage broader community support.

CRgov.com/TMP – A project website was established for the Plan to allow interested community members to access project details. This website included links to surveys and an interactive web-based map.

Interactive Web-Based Map – A mapping utility was provided to encourage residents to spatially locate specific transportation network needs and issues. Participants were encouraged to identify transportation network needs for all travel modes and trip purposes.

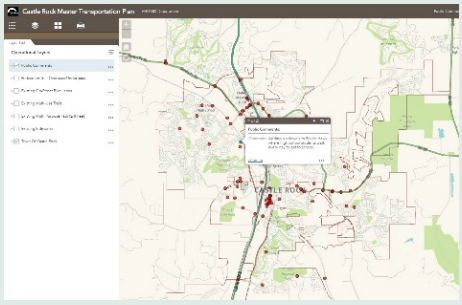
Online Survey – Two online comment forms were established following the public meetings, along with the presentation materials. These forms encouraged comment from individuals who were not available for the meetings.

Public Involvement Opportunities

Public Meetings

Project Website

Interactive Web-Based Map



1.6 Vision and Goals

Transportation planning processes have been transformed since the adoption of the first Castle Rock Transportation Master Plan in 1982. Current guidance from the Federal Highway Administration (FHWA) and Colorado Department of Transportation (CDOT) focuses on similar concepts but with increased emphasis on establishing a community vision, related measurable goals, and specific strategies to move agencies toward their stated vision.

In this spirit, this Plan update has reviewed the former Transportation Plan Principles and Policies and reorganized the components from the previous plan into the current format and structure used by federal, state, and local agencies. Such parity will help the Town because funding and assistance opportunities often request that grantees demonstrate how local projects steer the granting agency toward its own stated goals.

The following Vision and Goals align the Town with current planning methodologies and form the basis for developing transportation improvements recommended in this Plan. Plan Vision and Goals guide the development of the transportation system by providing Town staff direction on how to grow and maintain the system to meet community needs. Included under each goal are strategies to consider. These strategies provide tangible, clear methods for achieving the stated goal and ultimately the vision.

VISION

An interconnected transportation system that meets the needs of the community by providing a variety of safe travel choices.

Connectivity

Goal: An integrated, connected, and diverse transportation system that provides for the safe movement of people and goods.

Objective: Increase connectivity and minimize barriers between all travel choices.

Strategies to Consider:

Strategy: Continue to plan for future multimodal transportation needs within future developments, link to the existing network, and provide connections between existing and future developments.

Strategy: Identify and develop multimodal hubs (e.g., park and rides).

Strategy: Maximize access for all users.

Strategy: Leverage shared-use and ridesourcing mobility services to meet community mobility needs.

Strategy: Integrate on-street and off-street multimodal infrastructure.

System Operations

Goal: A well-planned, efficient, and reliable transportation system.

Objective: Minimize congestion levels on major vehicular corridors.

Strategies to Consider:

Strategy: Prioritize capital improvement projects that have a primary goal of reducing congestion by providing a multi-modal transportation system.

Strategy: Expand and implement transportation demand management (TDM) strategies.

Strategy: Monitor regulations and future infrastructure needs to encourage and accommodate innovative transportation technologies.

Strategy: Optimize signal timing in congested corridors to minimize delay for highest volume routes.

Economic Vitality

Goal: A transportation system that supports the economic vitality of the community.

Objective: Optimize access to employment, commercial, and housing land uses.

Strategies to Consider:

Strategy: Provide multimodal infrastructure to support mixed-use development and locations with high population and employment densities, such as the downtown area.

Strategy: Continue to enhance bicycle and pedestrian connections between housing and community destinations and jobs.

Environmental Stewardship

Goal: A transportation system that supports and respects the natural environment.

Objective: Minimize visual and environmental impacts.

Strategies to Consider:

Strategy: Design future streets to reduce the impacts on riparian corridors, sensitive habitats, wetlands, and other natural resources.

Strategy: Allow the use of modified street cross sections in environmentally sensitive locations to preserve unique natural areas.

Strategy: Make transportation decisions that improve the community, provide healthy living conditions, and respect the Town's historical and natural heritage.

Strategy: Employ new transportation facilities, services, and technologies to improve air quality, protect the environment, and improve energy efficiency.

Coordination and Funding

Goal: A transportation system that is coordinated and funded.

Objective: Maximize funding and coordination for multimodal transportation projects.

Strategies to Consider:

Strategy: Identify potential partners and funding sources for priority projects.

Strategy: Continue to coordinate transportation decisions with changes in land use and zoning and with future development.

Strategy: Coordinate with other local, regional, and state agencies or partners to ensure that sufficient transportation infrastructure and services are present or planned for the area.

Strategy: Preserve the right-of way needed to support buildout of the street network.

Strategy: Continue to seek outside funding sources to leverage local funds for future transportation projects.

Safety and System Preservation

Goal: A well-maintained transportation system for all users.

Objective: Minimize fatal and injury crashes for all travel choices.

Strategies to Consider:

Strategy: Use statistical analysis to assess crash locations to maximize accident reduction rates most efficiently.

Strategy: Lessen potential crashes among travel choices by reducing conflict points while maintaining connectivity.

Strategy: Develop a bicycle network that includes both on-street and multi-use trail facilities.

Strategy: Support the design of pedestrian environments with detached sidewalks especially along major vehicular corridors.

Strategy: Develop and implement Safe Routes to Schools programs.

Objective: Maintain/upgrade the condition of the transportation system.

Strategies to Consider:

Strategy: Use the Pavement Management Information Systems program to maximize system performance with limited funds.

Strategy: Include system preservation and maintenance in the budgeting process.

System Flexibility

Goal: A system designed to accommodate and adapt with emerging transportation trends.

Objective: Capitalize on emerging technologies to improve travel times and transportation choices.

Strategies to Consider:

Strategy: Track emerging technologies on an ongoing basis to adjust and improve the transportation system.

2.0 EXISTING CONDITIONS

This Chapter fully describes the existing transportation system, providing detailed descriptions of the roadway network and active transportation, including bicycles, pedestrians, and public transportation options.

Roadway Classifications

State Highway

Major Arterial Roadway

2.1 Roadway Network

The roadway network within the Town plays a significant role in the daily movement of people and goods throughout Castle Rock. Due to the unique topography of the area, the road system has developed a unique configuration with limited connectivity between development areas. The existing roadway network has been established with a hierarchical system designed to provide safe and efficient travel. This functional classification system controls the types of acceptable intersections, speeds, availability of on-street parking, and acceptable location of access to adjacent land uses. **Figure 1** (p. 13) displays the existing roadway functional classification and number of lanes on roadways within Castle Rock.

Roadway Functional Classifications

The Town of Castle Rock Transportation Design Criteria Manual provides description and design standards for the roadway types in Town. These standards serve as a framework for the reconstruction of existing facilities and development of new facilities, recognizing that existing facilities may not conform precisely to the standards and variances may be made on a case by case basis. However, the Town utilizes a complete streets approach to accommodating all travel modes. Some facilities may be on-street, or off-street depending on the situation.

Interstate Freeways and State Highways primarily serve long-distance travel between communities. Freeways provide the greatest mobility, with strictly controlled access allowed only at interchanges. State highways also serve regional traffic, with access allowed primarily at major intersections. Direct property access is carefully controlled but allowed when there is no other way to serve the property.

Major Arterial streets serve longer distance regional trips at higher speeds, with the purpose of delivering traffic from collector roads to freeways and highways. Major arterials have a minimum of two traffic lanes in each direction or have right-of-way dedicated to allow future expansion to two lanes each way with auxiliary lanes. On-street parking is not permitted. Direct property access may be allowed when there is no other way to serve the property.

Minor Arterial streets serve medium length trips at higher speeds, with the purpose of delivering traffic from collector roads to freeways and highways. Minor arterials typically have two traffic lanes in each direction with auxiliary lanes. On-street parking is not permitted. Direct property access may be allowed when there is no other way to serve the property.

Collector streets link local streets to arterial streets. Collector streets serve short to medium length trips at moderate speeds and are designed to discourage longer distance trips that should use arterial streets. Collector streets typically have one traffic lane in each direction with dedicated turn lanes.

Local streets provide direct access to local land uses. Local streets serve short length trips at low speeds and are designed to discourage non-local trips that should use higher level streets. Local streets typically have one traffic lane in each direction, and on-street parking is permitted.

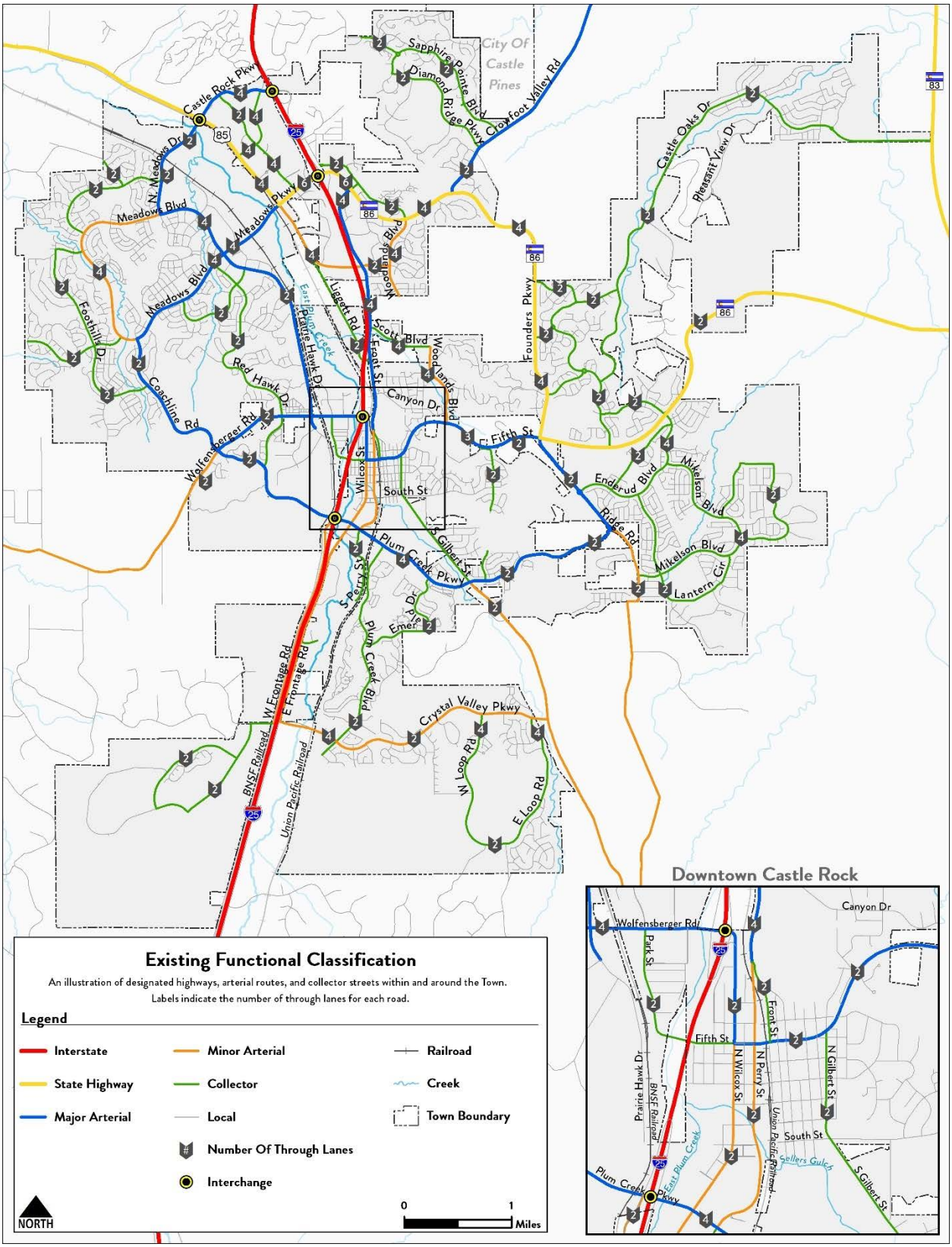
Roadway Classifications

Minor Arterial Roadway

Collector Roadway

Local Roadway

Figure 1 – Existing Roadway Functional Classifications



Existing Roadway Conditions for Motorized Vehicles

Various 24-hour traffic count sources have been compiled to provide baseline information about existing traffic volumes on the majority of major roadway segments within Town. Most counts were collected during 2015 and 2016, with a few locations from 2013 and 2014.

The Castle Rock Parkway interchange with I-25 opened in fall 2016 and the counts adjacent to this location were counted several months after the opening of the new connection. **Figure 2** (p. 15) displays the existing daily traffic counts throughout Town.

To put the daily count information into context, the existing counts have been compared to generalized daily capacities on the associated roadways. This process allows the analysis of the existing roadway network to define system deficiencies. Roadway capacity as a planning utility primarily depends on the functional classification of the roadway, coupled with the available number of through lanes. **Table 1** lists the roadway capacities and volume thresholds defining when the facility is below capacity, near capacity, slightly over capacity, and over capacity. The roadway capacities listed are based on the Town standards. **Figure 3** (p. 16) displays the existing volume/capacity (v/c) ratios for roadway segments within the Town. The sole facility slightly over capacity is Wilcox Street in Downtown Castle Rock. Facilities nearing capacity include Meadows and Founders Parkways, Fifth Street, and State Highway 86 (SH 86).

While some roadways may benefit from widening to alleviate congestion concerns (such as Meadows Parkway and Fifth Street), other facilities may be difficult to widen due to right-of-way constraints and/or a desire not to significantly impact the nature of the surrounding area (such as Wilcox Street). For facilities where widening is not desired, solutions could include improving parallel facilities, providing new adjacent connections, and/or improving active travel modes to give residents other options (such as improving the bicycle and pedestrian networks).

Table 1 – Roadway Capacities and Performance Thresholds

Functional Classification	Typical Number of Lanes	Below Capacity (<0.8)	Near Capacity (0.8–1.0)	Slightly Over Capacity (1.0–1.2)	Over Capacity (>1.2)
Collector	2	0–9,599	9,600–11,999	12,000–14,399	More than 14,400
Minor Arterial	2	0–11,999	12,000–14,999	15,000–17,999	More than 18,000
Major Arterial	4	0–27,999	28,000–34,999	35,000–41,999	More than 42,000
Highway	6	0–41,999	42,000–52,499	52,500–62,999	More than 63,000

Figure 2 – Existing Daily Traffic Counts

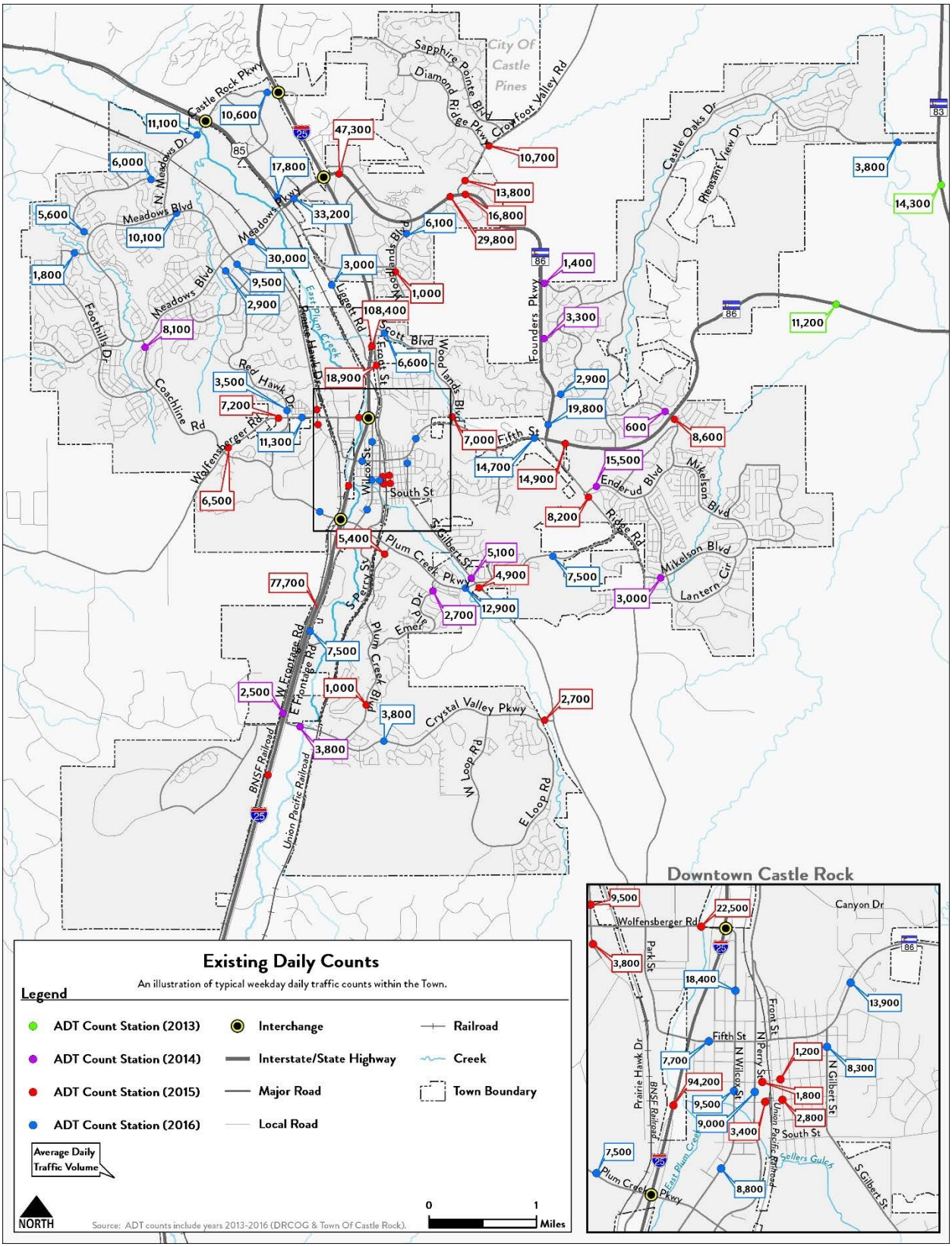
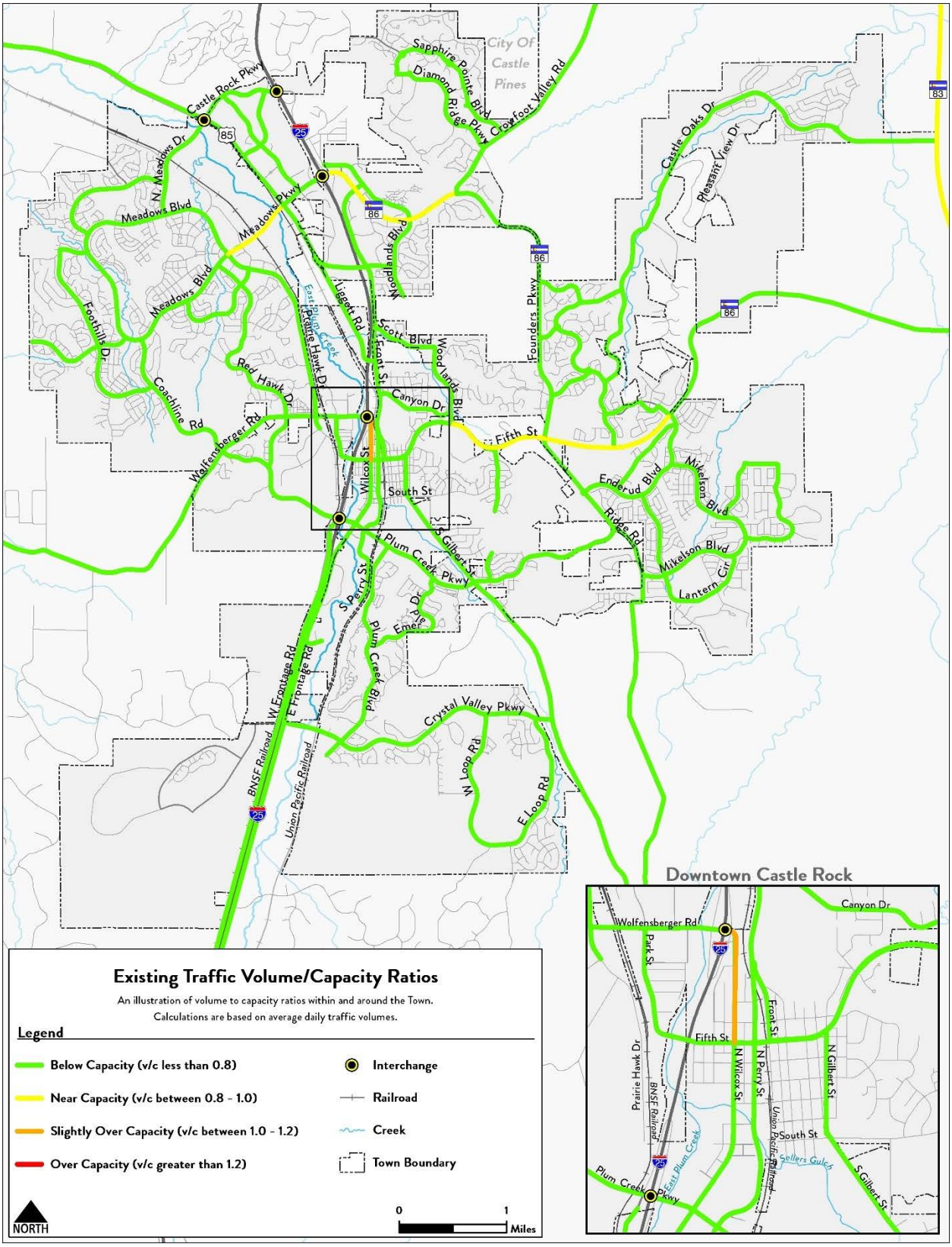


Figure 3 – Existing Traffic Volume/Capacity Ratios



2.2 Active Transportation

Active transportation refers to getting around by active modes, such as biking and walking This section discusses the existing forms of active transportation available to Castle Rock residents via the bicycle and pedestrian networks.

2.2.1 Bicycle Network

Bikeways primarily serve two purposes: for transportation (often for commuting) and for recreation. The design of bicycle facilities differs for each purpose. Commuting bicyclists often want to ride the most direct route from their origin to their destination, even along streets with higher traffic volumes. Recreational cyclists, on the other hand, prefer to ride on either detached shared use trails or streets with low traffic volumes.

Figure 4 (p. 19) identifies the existing bicycle system on roadways with a functional classification of collector and higher and along Town trails.

On-street Network

Castle Rock's current on-street bicycle network includes bike lanes, buffered bike lanes, and paved shoulders.

Table 2 (p. 18) lists the streets that currently contain bicycle facilities.

Recently, the Town has added bicycle infrastructure within existing right-of-way by reducing lane widths where possible (e.g., Mickelson Boulevard). The Town anticipates adding bicycle facilities to existing infrastructure through its Pavement Maintenance Program where right-of-way or roadway widths allow. The Town also has one buffered bike lane – located on Plum Creek Boulevard south of Plum Creek Parkway. Plum Creek Parkway west of I-25 has wide shoulders that accommodate on-street cyclists.

Active Transportation Facilities

Multi-Use Sidepath and Bike Lane on Promenade Parkway

Buffered Bike Lane on Plum Creek Boulevard

Existing Bicycle Facilities

Bike Fix-it Station at the MAC

Free Cycle Station

Trail User

Table 2 – Streets with Bike Lanes/Shoulders

Arterial Streets	Collector and Residential Streets
Coachline Rd	Enderud Blvd
Meadows Blvd	E./W. Loop Rd
Highway 85	Red Hawk Dr
Castle Rock Pkwy	Diamond Ridge Pkwy
Front St	Scott Blvd
Woodlands Blvd	Autumn Sage St
Fifth St	Crimson Dr
	Rising Sun Dr
	Copper Cloud Dr
	Gilbert St
	Mikelson Blvd

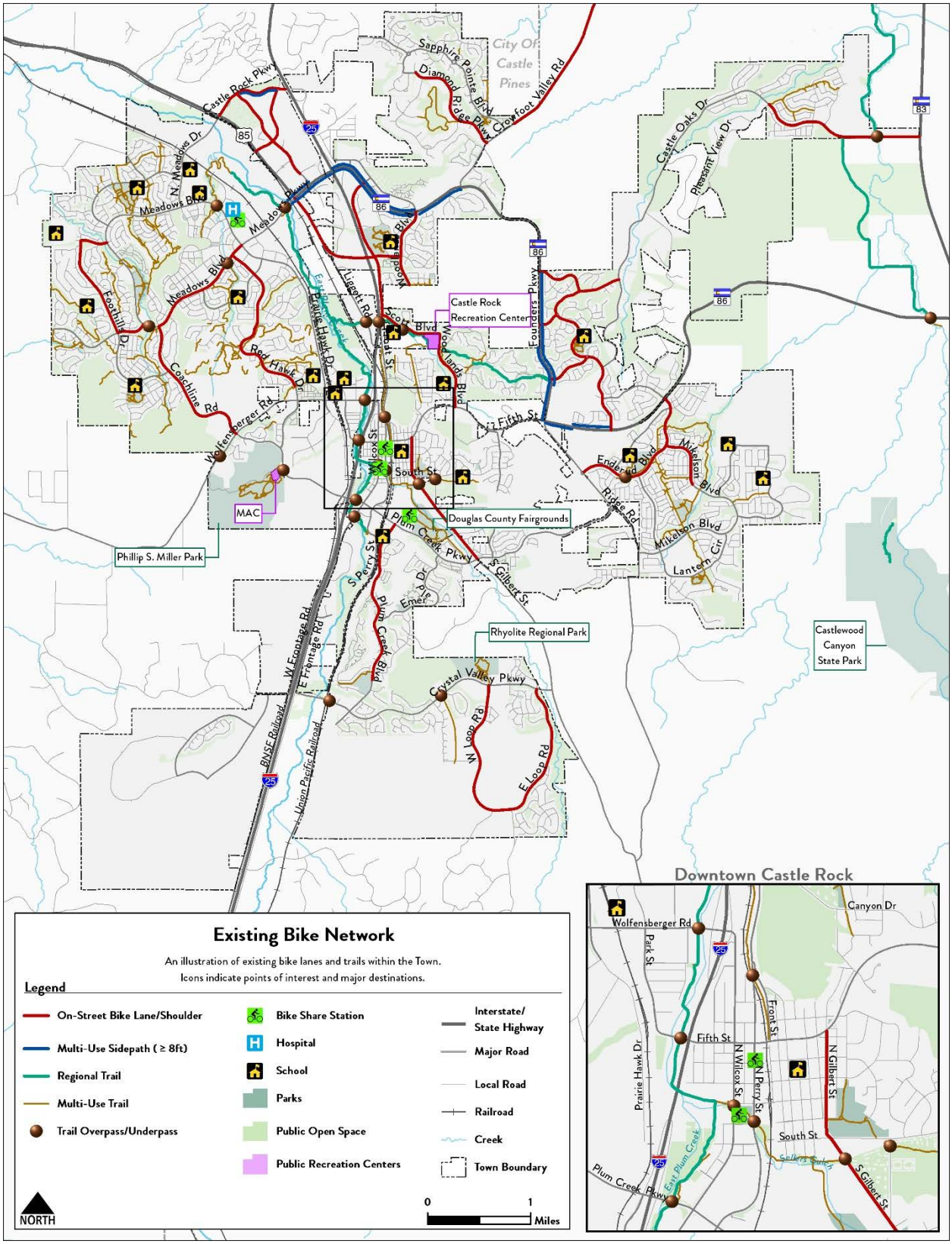
Castle Rock Free Cycle

Castle Rock Free Cycle is a bike share program in Town that allows residents and visitors (those under 18 must have a parent's consent) to check out bicycles on demand. The program, has the goal to expand transportation choices while promoting health and wellness. The program only operates in the spring and summer months. Castle Rock Adventist Hospital and Blue Navigators Marketing Group sponsor the program. Currently there is one station located at the Castle Rock Adventist Hospital.

Trails

The Town of Castle Rock is home to more than 30 miles of paved trails and approximately 40 miles of soft surface trails, as described in the Castle Rock Parks and Recreations Master Plan, 2015. The trails are used for recreation and utilitarian purposes such as transportation, and by a diverse group of users for biking and walking. The current trail network plays a critical role in connecting the Town and provides low-stress facility options for those who do not want to walk or bike on roadways with high speeds and volumes.

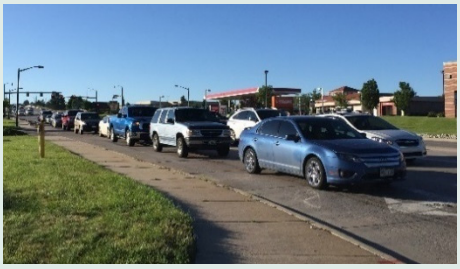
Figure 4 – Existing Bike Network



Existing Pedestrian Facilities

Standard Street Cross Section

Attached Sidewalk on Plum Creek Parkway



Sidewalk Connecting to Shopping Center

2.2.2 Pedestrian Network

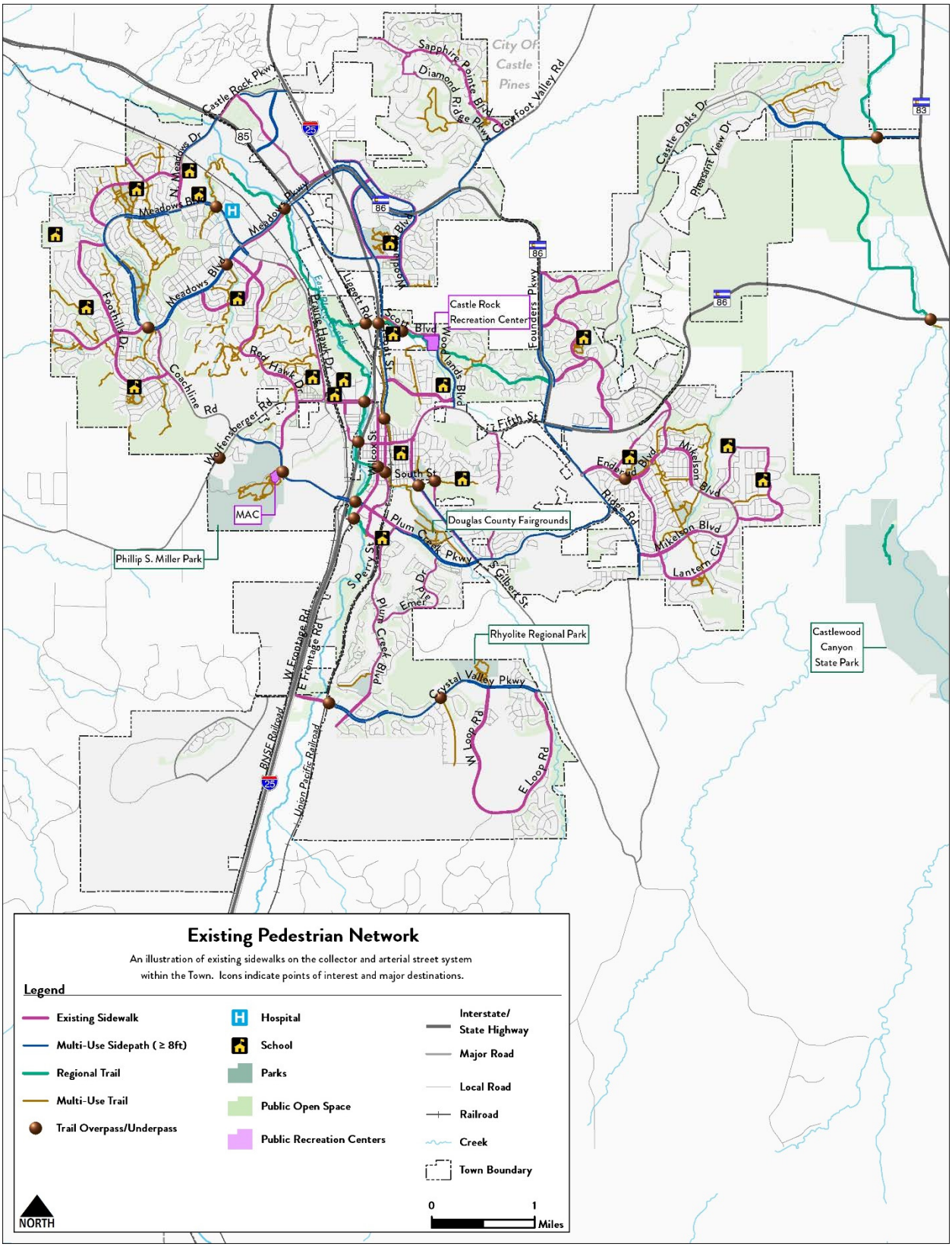
Castle Rock has a growing network of sidewalks, primarily on local and collector roads. Sidewalks and multi-use sidepaths generally provide pedestrian access between neighborhoods to commercial areas and to community resources, such as parks, libraries, recreation centers, and schools. Sidewalks and multi-use sidepaths can also be used for recreational purposes.

Because most of the Town's pedestrian network follows the roads, the natural and man-made features that constrain the roadway network also impact the ease of pedestrian mobility throughout Town. A primary example seen repeatedly throughout Town is sidewalks that traverse hills to connect the sidewalk next to the street to a commercial center entry. The image on the lower left shows the connection to Target on Founders Parkway.

Another element of Castle Rock's roadway network that impacts pedestrian travel is the wide streets with landscaped medians. Though medians can be designed to provide pedestrian refuge when crossing streets, many existing facilities throughout Town provide no refuge thus increasing the length for pedestrians to cross the street. The images to the left depict the typical pedestrian environment throughout Castle Rock.

Figure 5 (p. 21) identifies the existing sidewalks and multi-use sidepaths on roadways with a functional classification of collector and higher. Existing sidewalks on local streets and within neighborhoods are not shown due to this Plan's focus on roadways classified as collector or higher.

Figure 5 – Existing Pedestrian Network



2.3 Transportation Demand Management

Transportation Demand Management (TDM) refers to the movement of people by any other vehicle other than driving alone, including carpooling, car sharing, ride sharing, shuttles, taxis, and transit or through the reduction of peak period travel by methods such as work from home and flexible work hours. This section describes the current TDM strategies in Castle Rock.

Taxi Voucher Program

In 2011, following the discontinuation of the Town's fixed route transit service, the Town established the taxi voucher program to provide transportation assistance for Castle Rock residents who are transit dependent. Candidates for the Town's taxi voucher program include people with disabilities, older adults, and people with no access to an automobile. The initial annual program budget was $18,000. Since then, the program's annual budget has gradually increased to the current annual budget of $25,000.

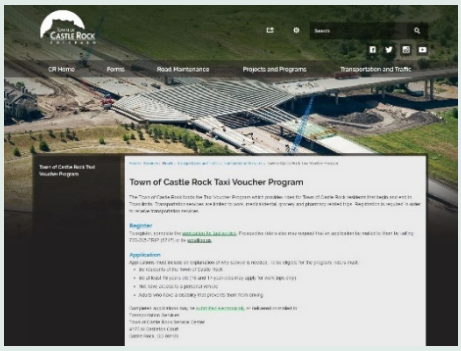
The taxi voucher program is available only to Castle Rock residents. Rides are currently limited to transit-dependent residents for bank trips, medical appointments, shopping, public meetings, or work trips. All trips must begin and end within Town limits. Service is available for people with disabilities, but they must let the Town know if assistance is needed at the time of the reservation. Riders are required to register for the program before using the service. After registering, they can call the Town and reserve a ride.

Program Tracking

In 2011, the service provided trips for 81 registered residents and approximately 1,700 total trips for the year. Since 2011, the program has seen a year over year increase in registered riders. By the end of 2016, a total of 323 riders had been registered and a total of 14,535 trips were provided. This equates to an average total of 2,422 trips per year since the program's inception. Most of the trips were work related, followed by shopping and medical trips.

Existing Public Transportation Services

Taxi Voucher Program Website Sign-Up Page



Senior Center Shuttle

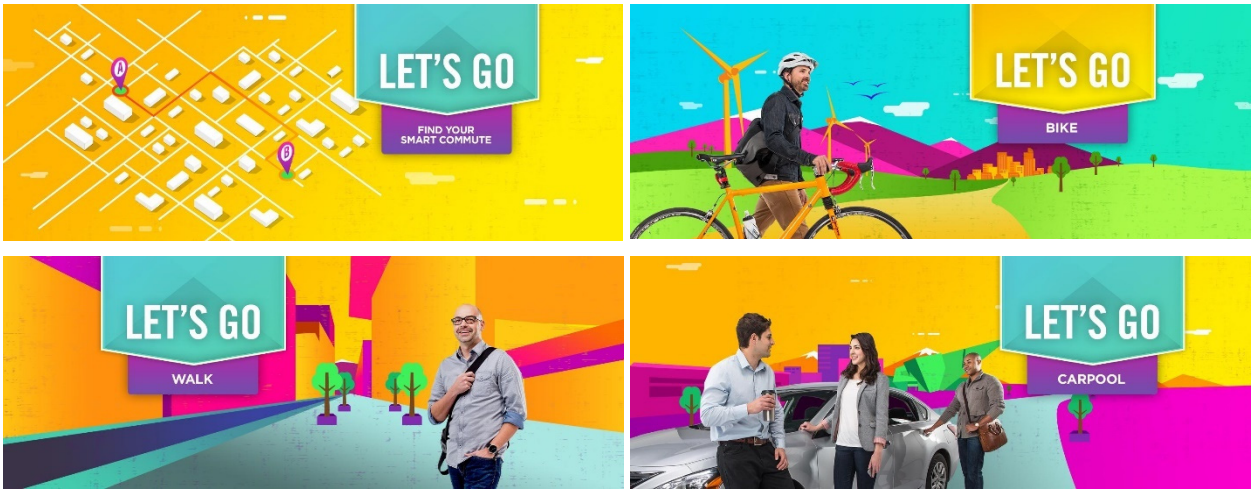
Mountain Metro Vanpool

Senior Center Shuttle

The Town of Castle Rock also contributes annually to the Senior Center for transportation purposes. The contribution helps the Senior Center operate the senior shuttle program. Additional funds for the shuttle service come from CDOT, the Denver Regional Council of Governments (DRCOG) and Douglas County. The program offers rides for people aged 50 and over and adults with disabilities. It picks up people in the southern communities of Douglas County, including Castle Rock, Larkspur, Franktown, Sedalia, Louviers, and Castle Pines. Rides are primarily provided along I-25 and go as far north as Lincoln Avenue in Lone Tree. The Senior Center service is not currently offered in Parker, Roxborough, or Highlands Ranch. The Town of Parker has their own shuttle service to serve these populations.

Way to Go

Way to Go, a DRCOG program, is another existing transportation service available to all residents in the DRCOG region, which includes Castle Rock. Way to Go helps commuters find real-life alternatives to single-occupant driving. The program promotes commute choice, offers ridematching services for vanpools and carpools, and provides information about public transportation, biking, walking, and teleworking. The program also assists employers so that they can respond to employees' needs by offering them smart transportation options. Getting started is easy. Interested commuters or employers can visit the Way to Go website (http://waytogo.org) to learn about the benefits of changing their commute and discover potential ridematches. They can also call to receive personal assistance from a Way to Go representative.



3.0 GROWTH IMPACTS

Growth within Town limits is anticipated to continue, and this process will bring along needs for enhanced multimodal transportation facilities. This Plan takes a holistic approach to transportation network improvements to ensure that as development continues, existing and future residents will continue to experience high-quality transportation. This Chapter outlines the future land use growth anticipated at full build of the Town, along with the results of a technical evaluation used to quantify the associated future vehicular volumes and roadway needs.

3.1 Land Use Development

During the last 30 years, significant changes and land use development have occurred in Castle Rock. In 1980, there were 3,921 residents in the Town, which had grown to 55,591 residents by 2015. The continued development of the community has required active management and construction of the transportation infrastructure to continue to provide high-quality transportation options for all residents. As development continues, it is expected that there could be 142,000 residents at full build of the Town. To successfully serve these new residents, the transportation network will need to continue to be improved and maintained to handle additional capacity at optimal levels of service. The Comprehensive Master Plan socioeconomic forecasts, which detail the location of existing and future residences and employment, have been included as **Figure 6** (p. 25) and **Figure 7** (p. 26). By comparing these figures, much of the new development anticipated by full build will occur south and east of existing development, which will require significant network improvements.

Figure 6 – Existing Land Use

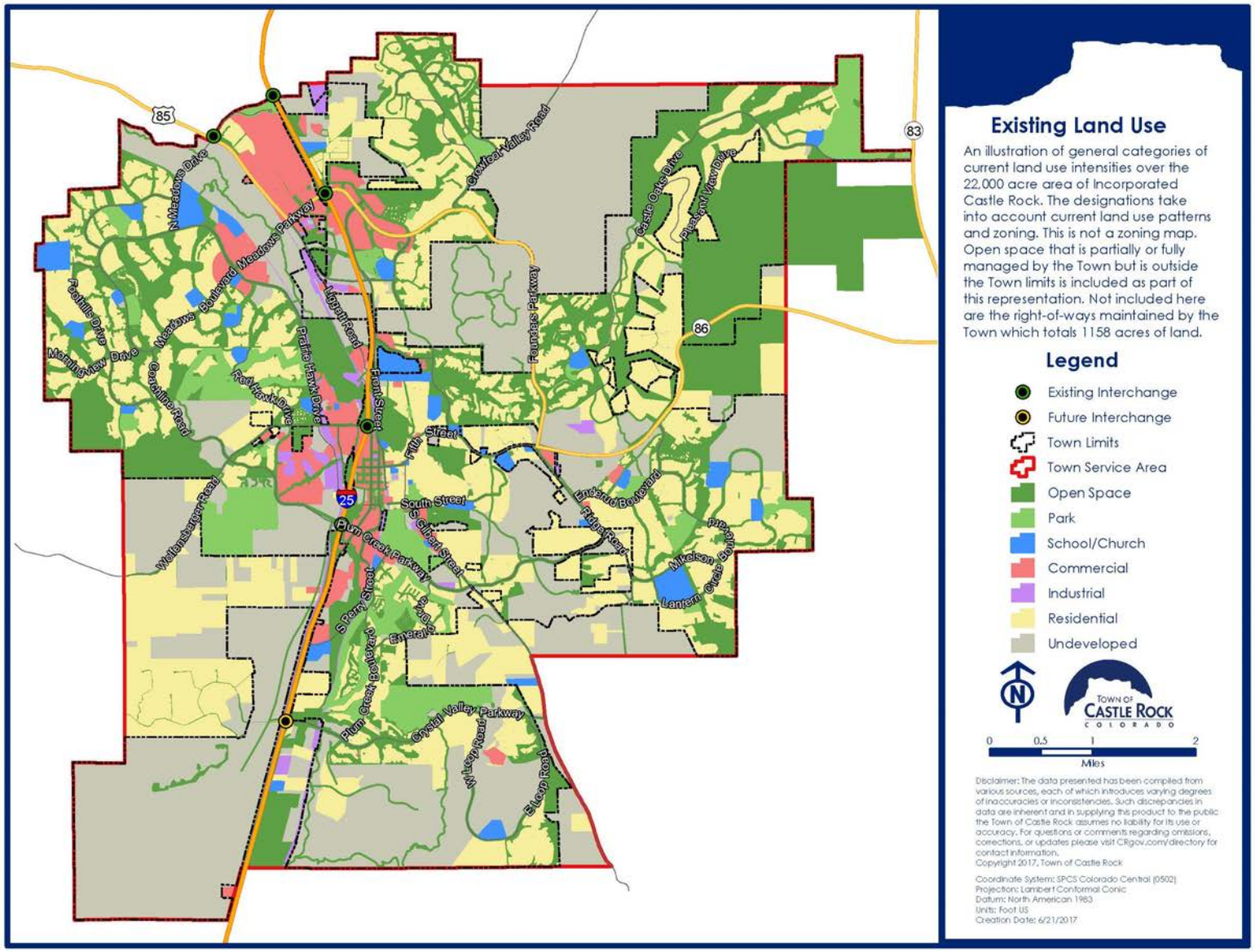
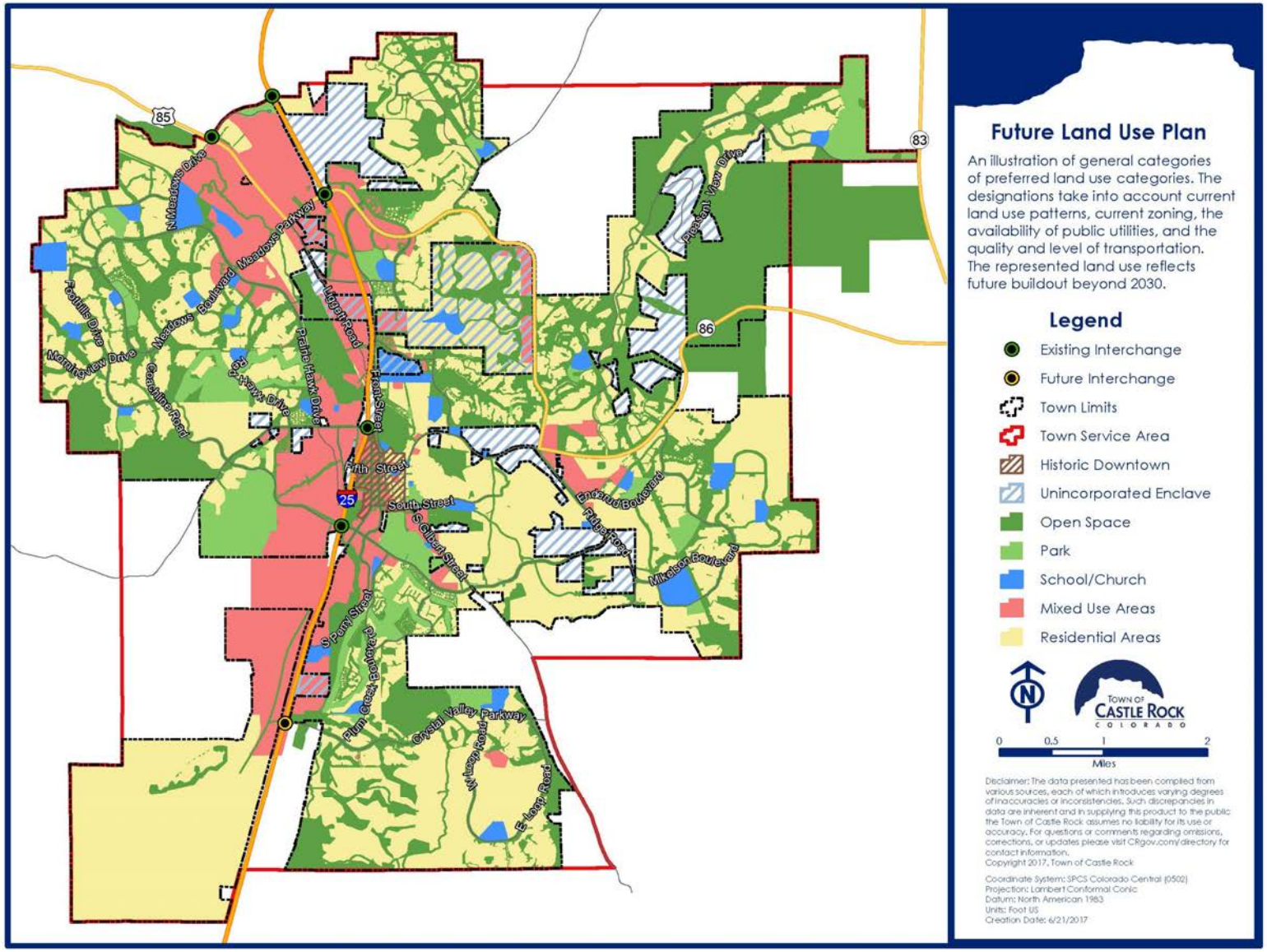


Figure 7 – Future Land Use Plan



3.2 Regional Travel Demand Model

A critical tool that has been used to understand the impacts of future development on the transportation network is the DRCOG regional travel demand model. This model allows the user to input land use scenarios, along with an assumed roadway network, with the principal output being daily roadway volumes. By altering the land use and road network assumptions, planners can consider the impact of these decisions on the operation of future transportation systems.

The land use inputs used for this study were based on the Comprehensive Master Plan full build expectations to provide planners and decision-makers insight into the ultimate roadway needs of the community. This information can then be used as development proposals and construction occur to ensure sufficient facilities and right-of-way are maintained. **Table 3**, below, provides the total households and employment assumed in the base, 2030 (60% of full build), and 2040 (full build) travel demand models.

Table 3 – Total Households and Employment by Horizon

Horizon	Total Households	Total Employees
2015	26,398	20,916
2030 (60% of Full Build)	42,867	32,501
2040 (Full Build)	53,846	40,051

Appendix C provides a tabular view of the land use inputs used for the full build travel demand model, along with a map displaying the traffic analysis zone locations. The full build land use has been input into the 2040 travel model; this represents an aggressive development rate assumption but meets the goals for this Plan to provide information about the full build improvement needs. An interim travel model has been developed to represent 2030, which is a straight-line representation of development between existing and full build conditions (effectively representing 60 percent of future development).

3.2.1 Base Road Network Improvements

The base road network serves the second critical input into the travel demand model. Characteristics of the transportation network documented in **Section 2.1**, such as the functional classification and number of through lanes, served as the starting point when considering the base road network. In addition to the known system, select future roadway improvements have been incorporated into the base road network, representing near term known improvement projects and developer improvement projects necessary to support future development. **Table 4** (p. 28) lists these base road network assumptions, along with the responsible party for each improvement. The project horizon column identifies the planned development period (By 2022, By 2030, and By Full Build). The planning horizon has been determined through analysis of the transportation system performance over time with prioritization of projects to remedy anticipated congestion and serve future development.

Table 4 – Base Roadway Improvement Projects

	Project ID No.	Horizon	Roadway	Segment	New Lanes and Functional Classification	Responsibility
Projects Included in Base Assumptions	1	By 2022	Crystal Valley Pkwy*	Widen from Idylwood Rd to Frontage Rd	4 lane Major Arterial	Under Construction
	2	By 2022	Fifth St	Complete climbing lane and sidepath along south side of street from Gilbert Street to Founders Pkwy	3 lane Major Arterial	Town CIP
	3	By 2022	Founders Pkwy**	Widen from Woodlands Blvd to Crowfoot Valley Rd	6 lane Major Arterial	Town CIP/TIP
	4	By 2022	Lanterns Development	Build development roads	2 lane Collector	Developer Responsibility
	5	By 2022	Plum Creek Pkwy	Widen from Gilbert Street to Ridge Rd	4 lane Major Arterial	Town CIP
	6	By 2022	Prairie Hawk Dr*	Widen from Meadows Blvd to Melting Snow	4 lane Major Arterial	Developer Responsibility
	7	By 2022	Ridge Rd**	Widen from Plum Creek Pkwy to Fifth St	4 lane Major Arterial	Town CIP
	8	By 2022	Wolfensberger Rd	Widen from MAC Entrance (west of Coachline) to Prairie Hawk Dr	4 lane Major Arterial	Town CIP
	9	By 2030	Plum Creek Pkwy	Widen from Wolfensberger Rd to I-25	4 lane Major Arterial	Shared Town and Developer Responsibility
	10	By 2030	Pine Canyon/ Pioneer Ranch Developments	Build connection from Woodlands Blvd to Front St	4 lane Major Arterial	Developer Responsibility
	11	By 2030	Pine Canyon Development	Build connection from Founders Pkwy to Woodlands Blvd	2 lane Collector	Developer Responsibility
	12	By 2030	Pine Canyon/ Pioneer Ranch Developments	Build Woodlands Blvd Connection	4 lane Major Arterial	Developer Responsibility
	13	By 2030	Pioneer Ranch Development	Build connection from Founders Pkwy to Woodlands Blvd	2 lane Collector	Developer Responsibility
	14	By 2030	Prairie Hawk Dr	Realign along Atchison Way and extend from Topeka Way to Plum Creek Pkwy	4 lane Major Arterial	Shared Town and Developer Responsibility
	15	By 2030	West Frontage Rd	Realign between Town Limits and Plum Creek Pkwy	4 lane Major Arterial	Shared Town and Developer Responsibility
	16	By Full Build	US 85	Widen from Promenade Pkwy to Town limits	4 lane Expressway	CDOT Responsibility (In DRCOG RTP)

* = Project Under Construction

** = Project In Design

Note: Project responsibility is subject to change.

3.2.2 Roadway Forecasts and Performance

Using the Comprehensive Master Plan land uses and base road network assumptions, future vehicular forecasts have been prepared for the 2030 Base (60% of full build) and 2040 Base (full build). All forecasts have been prepared using forecast methodologies documented in the National Cooperative Highway Research Program (NCHRP) Report 765, which details procedures for adjusting raw model outputs to account for inaccuracies built into all travel demand models. The procedure adjusts future travel model volumes based on the inaccuracies of the travel model witnessed in base year model volumes compared to known traffic counts.

To put the 2030 and 2040 forecast information into context, the volumes have been compared to generalized daily capacities on the associated roadways. This process allows the analysis of the roadway network to define future system deficiencies. Roadway capacity as a planning utility depends on the anticipated future functional classification of the roadway coupled with the available number of through lanes. The analysis results provide a means for identifying future roadway improvements, as defined in Chapter 4.

Figure 8 (p. 30) and **Figure 9** (p. 31) display the base 2030 (60% of full build) forecasts and v/c ratios. **Figure 10** (p. 32) and **Figure 11** (p. 33) display the base 2040 (full build) forecasts and v/c ratios. As can be seen, roadway system enhancements will be needed to alleviate significant areas of congestion anticipated at full build of the Town. Several mechanisms are available for handling future traffic forecasts, including widening facilities, constructing new interstate interchanges, and constructing missing links to fill gaps and provide more options. Chapter 4 identifies and discusses a combination of these alternatives.

Figure 8 – 2030 (60% of Full Build) Traffic Forecasts with By 2030 Base Assumption Projects

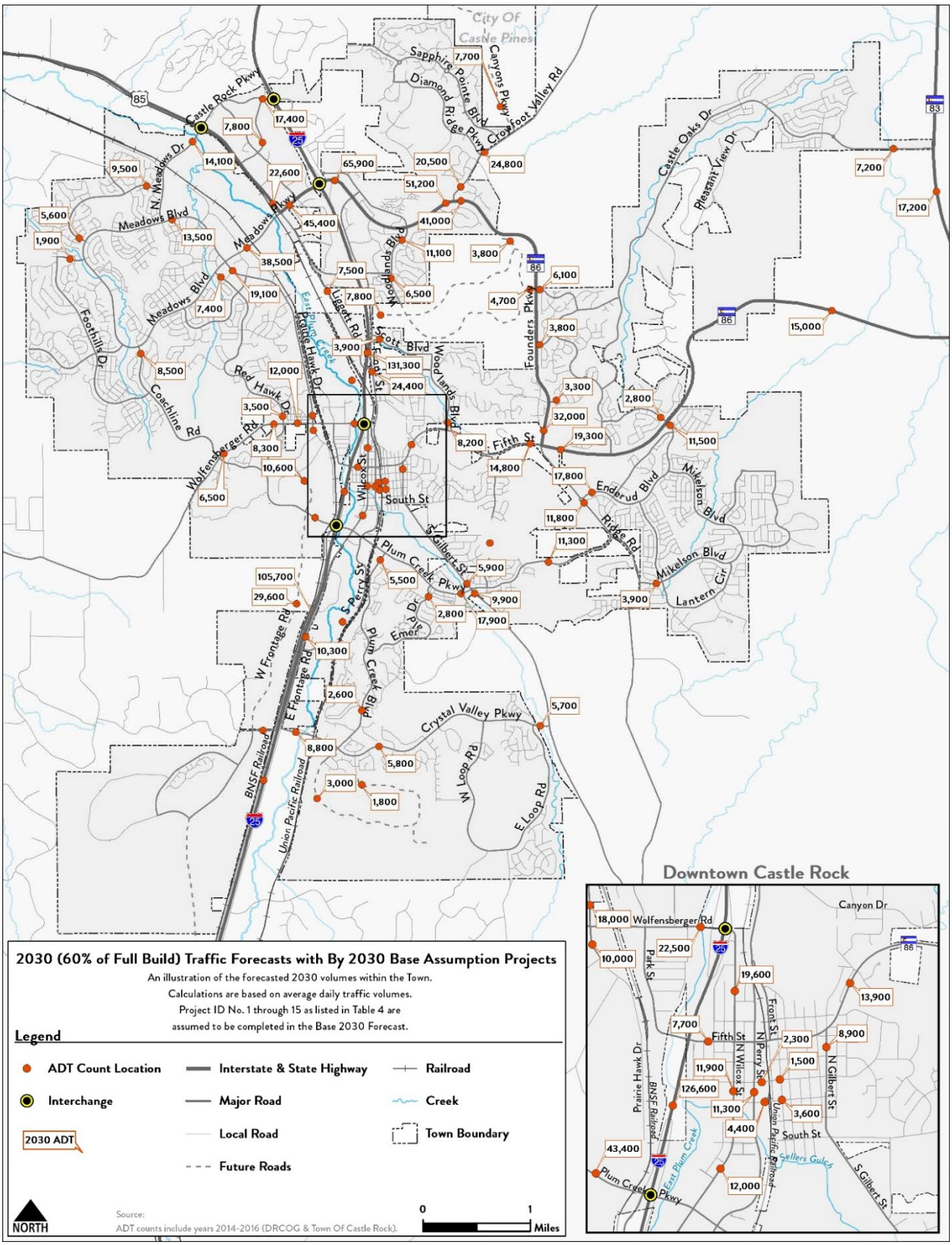


Figure 9 – 2030 (60% of Full Build) Volume/Capacity Ratios with By 2030 Base Assumption Projects

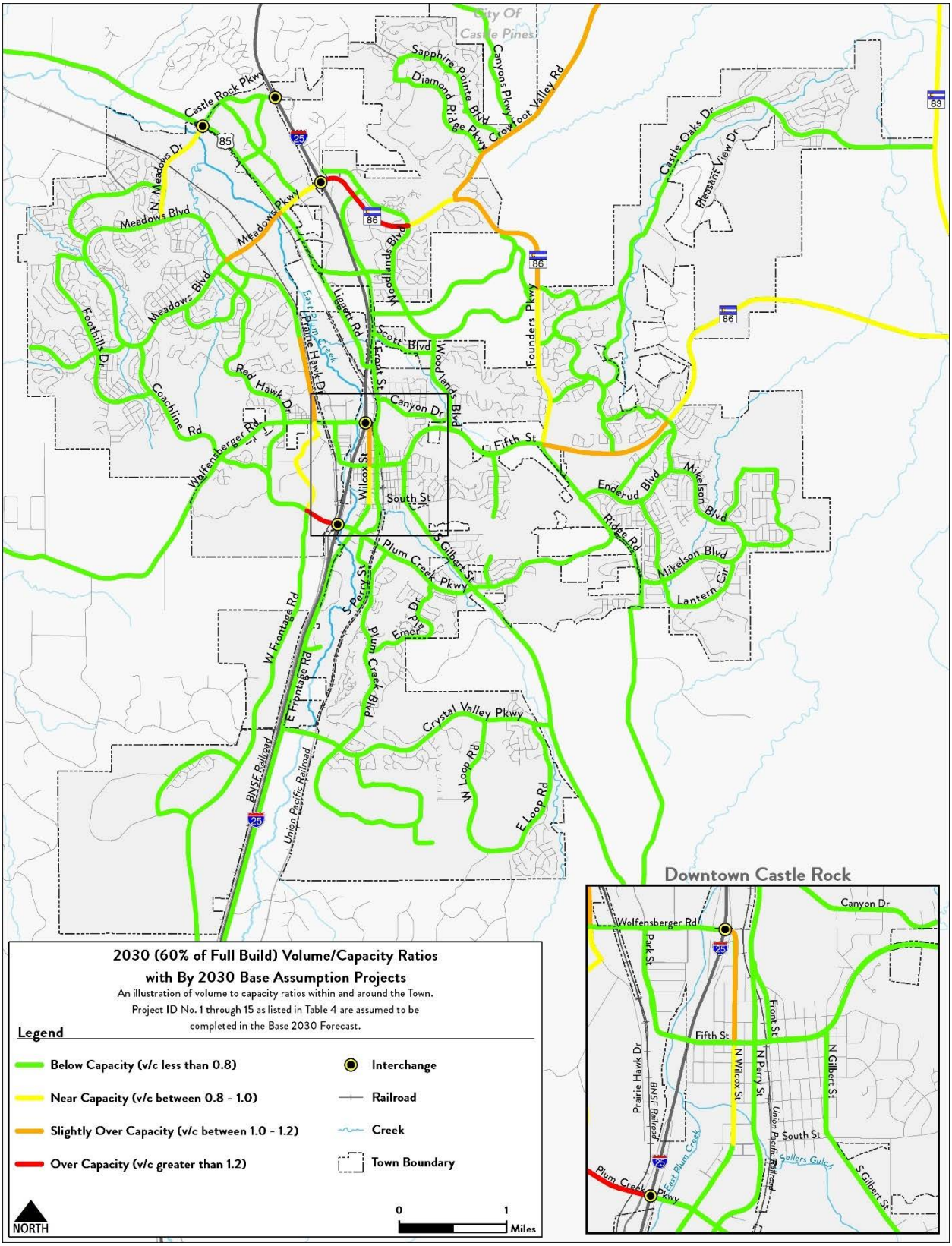


Figure 10 – 2040 Full Build Traffic Forecasts with All Base Assumption Projects

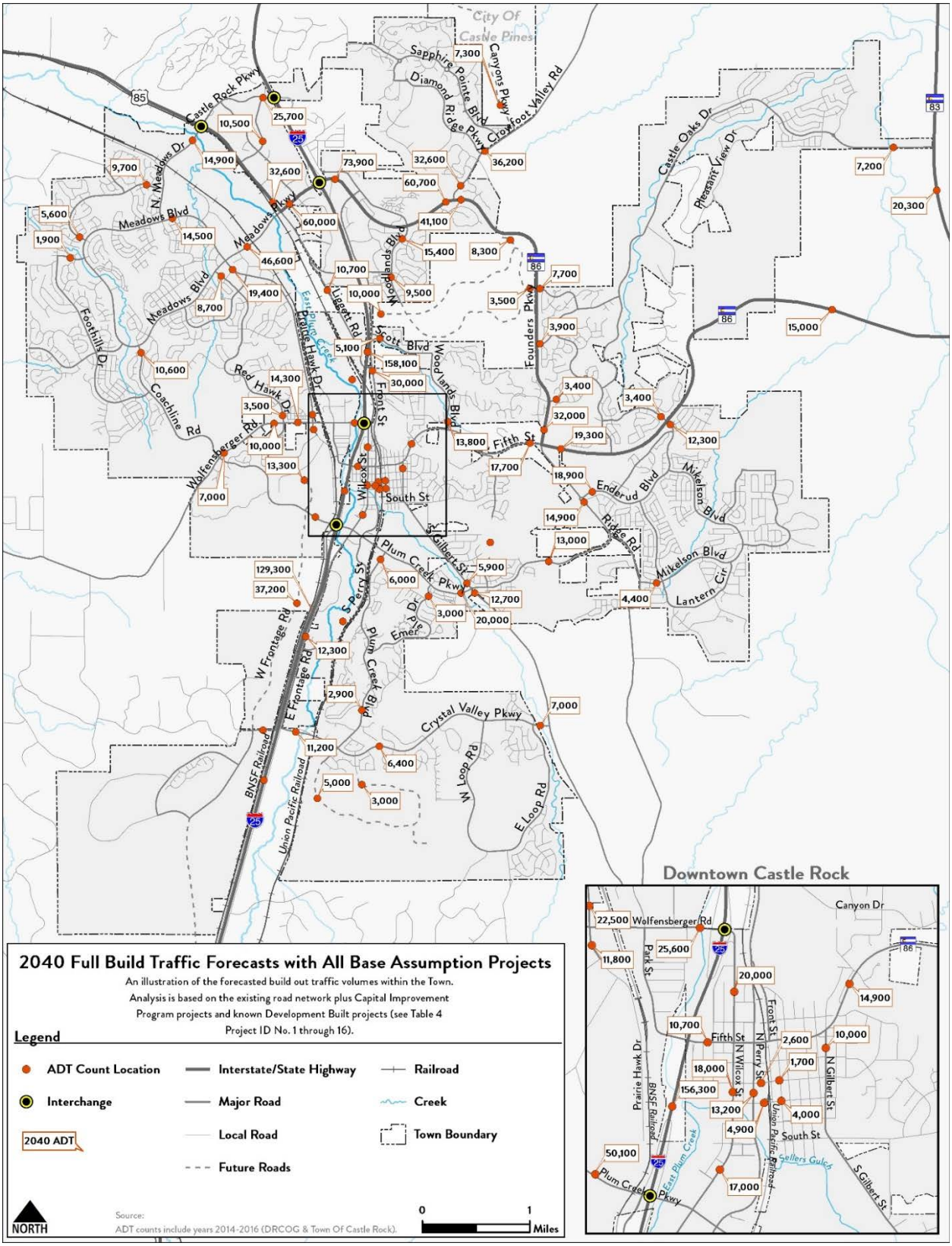
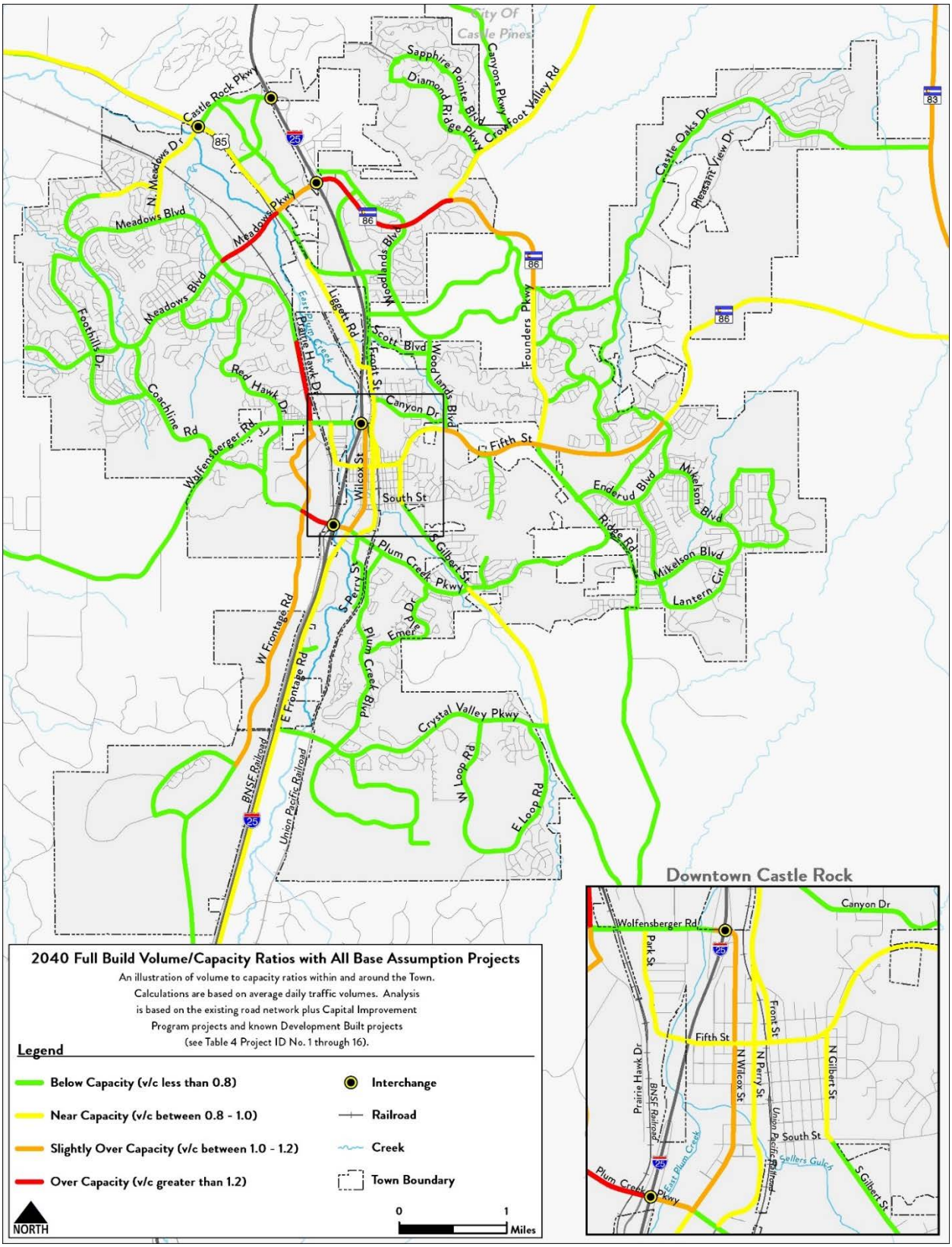


Figure 11 – 2040 Full Build Volume/Capacity Ratios with All Base Assumption Projects



4.0 RECOMMENDED TRANSPORTATION PLAN

This Chapter presents the culmination of the transportation planning process. Included in the recommended Plan are a host of multimodal transportation projects and anticipated emerging trends likely to impact the Plan into the future.

4.1 Roadway Plan

Three primary goals for the future roadway network have driven the development of the roadway plan:

- Maintain adequate capacity along existing corridors
- Ensure efficient road network connections for future development
- Fill existing network gaps with new road facilities

Taken together, these three goals will ensure the ongoing development of a robust roadway network. The planning process also accounted for project cost effectiveness, possible negative impacts to homes and businesses, and impacts to the environment during project selection. A major point of the Town's street design standards when constructing new streets or rehabilitating existing streets is to ensure the construction of a comprehensive transportation network that serves all users. In this spirit, the Town's street design standards include bicycle and pedestrian facilities for all roadway cross sections and should be a continued effort as new roadway corridors are proposed in Town.

4.1.1 Roadway Projects

Based on the land use growth forecast in the Comprehensive Master Plan, significant improvement to the roadway network will be necessary to provide adequate services at full build. Many roadway widening projects identified through this planning process are designed to alleviate future anticipated congestion. In addition to widening existing facilities, this Transportation Master Plan proposes two new interchanges with I-25. These new interchanges will provide local access to the regional transportation system and are critical Plan components designed to alleviate congestion resulting from future development at existing interchanges and on parallel corridors.

- **Crystal Valley Interchange** – This interchange has been long planned and will provide access to the regional system via I-25. The Crystal Valley Interchange is critical to continued development plans west and east of I-25 and will alleviate existing out-of-direction travel, which currently uses Plum Creek Parkway for access to I-25.
- **Highway 85/Black Feather Trail Interchange** – This interchange is a new recommendation to the Transportation Master Plan and will provide access to I-25 in the vicinity of Highway 85/Black Feather Trail. The exact location of this interchange has yet to be determined and is recommended to be studied through a subsequent Interchange Feasibility Study. This interchange is critical to the future development of the Pioneer Ranch and Pine Canyon Developments, which are positioned in existing County lands south and east of Founders Parkway, west of Front Street, and north of

Scott Boulevard, and also to relieve congestion at the I-25/Founders Parkway interchange.

This alternative was selected following a high-level preliminary planning assessment which compared several improvement alternatives:

- Widen Founders Pkwy between I-25 and Crowfoot Valley Rd to 8 lanes – This alternative would require the acquisition of right-of-way from adjacent parcels and would provide a significant barrier for multimodal travelers. This alternative was not selected as significant change to Founders Pkwy corridor is not ideal.
- Convert Founders Pkwy between I-25 and Crowfoot Valley Rd to a 6 lane Expressway – This alternative would restrict access to Founders Pkwy and require the construction of expensive grade separated crossings at critical intersections. This alternative was not selected as a significant change to the Founders Pkwy accessibility and character is not ideal.
- Construct new interchange to I-25 at Highway 85/Black Feather Trail – This alternative adds an interstate access to I-25 between the existing Founders/Meadows Pkwy and Wolfensberger Rd interchanges. This alternative has been selected during this preliminary evaluation due to its mobility benefit for the area.

This planning level evaluation will need to be continued through a more comprehensive alternatives evaluation study. That future study should include other critical stakeholders in the discussion, including the Federal Highway Administration and CDOT. Also, the study should evaluate in greater detail the impacts of possible alternatives on the rest of the transportation network in order to formalize the alternative selection process. **Appendix D** includes discussion of the analysis performed to determine the preliminary recommendation of this interchange for the Plan.

- **Table 5** (p. 36) lists proposed roadway improvement projects, beginning with the assumed projects described in Chapter 3 and itemized in **Table 4** (p. 28) and followed by the recommended roadway projects identified by this Plan. Key columns include planned development horizon (By 2022, By 2030, and By Full Build), project location, planned improvement, and responsibility. The project responsibility qualitatively assesses the agencies and partners anticipated to contribute to each project. The CDOT completed a SH 83/86 Corridor Optimization Plan in September 2004 which highlights the vision for SH 86 in Castle Rock. This plan identifies a four lane SH 86 cross-section with detached 10 foot sidewalks, which is consistent with Project No. 18 in the below table. The smaller table that follows **Table 5** lists local intersection improvements included in the current Town (CIP) listing or committed by developers. Note that Town CIP projects can change with the annual Public Works budgeting process.
- **Figure 12** (p. 40) shows the location and time horizon for all projects in the roadway plan. **Figure 13** (p. 41) incorporates all planned improvement projects into a Master Streets Plan, which identifies the functional classification and number of through lanes on all Town facilities.

Table 5 – Proposed Roadway Improvement Projects

Project ID No.	Horizon	Roadway	Segment	New Lanes and Functional Classification	Responsibility	Planning Level Cost Estimate
Projects Included in Base Assumptions						
1	By 2022	Crystal Valley Pkwy*	Widen from Idylwood Rd to Frontage Rd	4 lane Major Arterial	Under Construction	NA****
2	By 2022	Fifth St	Complete climbing lane and sidepath along south side of street from Gilbert Street to Founders Pkwy	3 lane Major Arterial	Town CIP	$6,000,000
3	By 2022	Founders Pkwy**	Widen from Woodlands Blvd to Crowfoot Valley Rd (Note: widening is part of the Founders Pkwy and Crowfoot Valley Rd intersection improvement project)	6 lane Major Arterial	Town CIP/TIP	$3,500,000
4	By 2022	Lanterns Development	Build development roads	2 lane Collector	Developer Responsibility	NA****
5	By 2022	Plum Creek Pkwy	Widen from Gilbert Street to Ridge Rd	4 lane Major Arterial	Town CIP	$3,100,000
6	By 2022	Prairie Hawk Dr*	Widen from Meadows Blvd to Melting Snow	4 lane Major Arterial	Developer Responsibility	NA****
7	By 2022	Ridge Rd**	Widen from Plum Creek Pkwy to Fifth St	4 lane Major Arterial	Town CIP	$4,000,000
8	By 2022	Wolfensberger Rd	Widen from MAC Entrance (west of Coachline) to Prairie Hawk Dr	4 lane Major Arterial	Town CIP	$7,600,000
9	By 2030	Plum Creek Pkwy	Widen from Wolfensberger Rd to I-25	4 lane Major Arterial	Shared Town and Developer Responsibility	$6,330,000
10	By 2030	Pine Canyon/ Pioneer Ranch Developments	Build connection from Woodlands Blvd to Front St	4 lane Major Arterial	Developer Responsibility	NA****
11	By 2030	Pine Canyon Development	Build connection from Founders Pkwy to Woodlands Blvd	2 lane Collector	Developer Responsibility	NA****
12	By 2030	Pine Canyon/ Pioneer Ranch Developments	Build Woodlands Blvd Connection	4 lane Major Arterial	Developer Responsibility	NA****
13	By 2030	Pioneer Ranch Development	Build connection from Founders Pkwy to Woodlands Blvd	2 lane Collector	Developer Responsibility	NA****

Project ID No.	Horizon	Roadway	Segment	New Lanes and Functional Classification	Responsibility	Planning Level Cost Estimate
14	By 2030	Prairie Hawk Dr	Realign along Atchison Way and extend from Topeka Way to Plum Creek Pkwy	4 lane Major Arterial	Shared Town and Developer Responsibility	$6,170,000
15	By 2030	West Frontage Rd	Realign between Town Limits and Plum Creek Pkwy	4 lane Major Arterial	Shared Town and Developer Responsibility	$25,400,000
16	By Full Build	US 85	Widen from Promenade Pkwy to Town limits	4 lane Expressway	CDOT Responsibility (In DRCOG RTP)	NA****
Improvement Projects Identified during TMP						
17	By 2030	Crowfoot Valley Rd	Widen from Founders Pkwy to Town Limits	4 lane Major Arterial	Shared Town and Developer Responsibility	$4,700,000
18	By 2030	SH 86	Widen from Ridge Rd to Enderud Blvd	4 lane Highway	Shared Town and CDOT Responsibility	$2,550,000
19	By 2030	Prairie Hawk Dr	Widen from Melting Snow Dr to Wolfensberger Rd	4 lane Major Arterial	Town Responsibility	$2,700,000
20	By 2030	I-25 Interchange	Construct Interchange at Crystal Valley Pkwy	Interchange	Shared Town, Douglas County, and Developer Responsibility	$51,000,000
21	By 2030	N Meadows Dr	Widen from Meadows Blvd to US 85	4 lane Major Arterial	Shared Town and Developer Responsibility	$23,900,000
22	By 2030	East Frontage Rd	Construct operational improvements from Plum Creek Pkwy to Crystal Valley Pkwy	2 lane Minor Arterial	Shared Town and Developer Responsibility	$6,030,000
23	By Full Build	I-25 Interchange***	Construct Interchange near Highway 85/Black Feather Trail/or other Founders Pkwy/SH 86 corridor improvements	Interchange	Shared Town and Developer Responsibility	$20,000,000 - $40,000,000
24	By Full Build	Liggett Rd	Extend south to Wolfensberger Rd via Caprice Dr	2 lane Collector	Town Responsibility	$3,330,000

Project ID No.	Horizon	Roadway	Segment	New Lanes and Functional Classification	Responsibility	Planning Level Cost Estimate
25	By Full Build	Liggett Rd	Widen from Highway 85 to new Liggett Rd extension	4 lane Major Arterial	Shared Town and Developer Responsibility	$3,750,000
26	By Full Build	Meadows Pkwy	Widen from Meadows Blvd to US 85	6 lane Major Arterial	Town Responsibility	$20,300,000
27	By Full Build	Founders Pkwy	Widen from Crowfoot Valley Rd to Fifth St	6 lane Highway	Shared Town, Developer, and CDOT Responsibility	$10,700,000
28	By Full Build	Fifth St	Complete 4-lane arterial from Woodlands Blvd to Founders Pkwy	4 lane Major Arterial	Shared Town and Developer Responsibility	$5,870,000
29	By Full Build	Perry St	Extend south to East Frontage Rd	2 lane Collector	Town Responsibility	$3,720,000
30	By Full Build	Ridge Rd	Improve from Plum Creek Pkwy to Town Limits	2 lane Minor Arterial	Shared Town and Developer Responsibility	$4,170,000
31	By Full Build	Valley Dr	Connect between Hover Dr and Hudson Ln	2 lane Collector	Shared Town and Developer Responsibility	$1,520,000
Total Planning Level Cost Estimate						**$226,340,000 - $246,340,000**

* = Project Under Construction

** = Project In Design

*** = Additional studies need to be completed to determine final I-25 or Founders Pkwy/SH 86 corridor improvements. FHWA and CDOT concurrence is necessary for corridor or interchange construction.

**** = Project cost and construction is the responsibility of the developer(s), or other entity.

Note: Project responsibility is subject to change.

Note: Planning Level Cost Estimates do not include right-of-way acquisition, all costs are in 2017 dollars

Project No.	Horizon	Intersection	Description
Intersection Improvements			
32	By 2022	Founders Pkwy and Allen Way**	Operational Improvements
33	By 2022	Founders Pkwy and Crowfoot Valley Rd**	Add an east-west through lane in each direction, add an eastbound left turn lane, add a southbound left turn lane, convert southbound right turn into channelized right turn, convert westbound right turn into channelized right turn
34	By 2022	SH-86/5th Street and Founders Pkwy**	Add an east-west through lane in each direction, add a north-south through lane in each direction, add a northbound turn lane, add a southbound left turn lane
35	By 2022	Wolfensberger Rd / Red Hawk Dr	Convert to roundabout
36	By 2022	Plum Creek Pkwy / Gilbert St	Convert to roundabout
37	By 2022	Wolfensberger Rd and Plum Creek Blvd/Coachline Rd**	Convert to roundabout
38	By 2030	Coachline Rd / Foothills Dr	Convert to roundabout
39	By 2030	Prairie Hawk Dr and Wolfensberger Rd	Add an eastbound right turn lane, add a northbound right turn lane
40	By Full Build	Highway 85 / Liggett Rd	Realign Liggett Rd to intersect Hwy 85 at Castleton Ct
41	By Full Build	Mickelson Blvd / N Mitchell St	Convert to roundabout

* = Project Under Construction

** = Project In Design

*** = Additional studies need to be completed to determine final I-25 or Founders Pkwy/SH 86 corridor improvements.
FHWA and CDOT concurrence is necessary for corridor or interchange construction.

**** = Project cost and construction is the responsibility of the developer(s), or other entity.

Note: Project responsibility is subject to change.

Note: Planning Level Cost Estimates do not include right-of-way acquisition, all costs are in 2017 dollars

Figure 12 – Proposed Roadway Improvement Projects

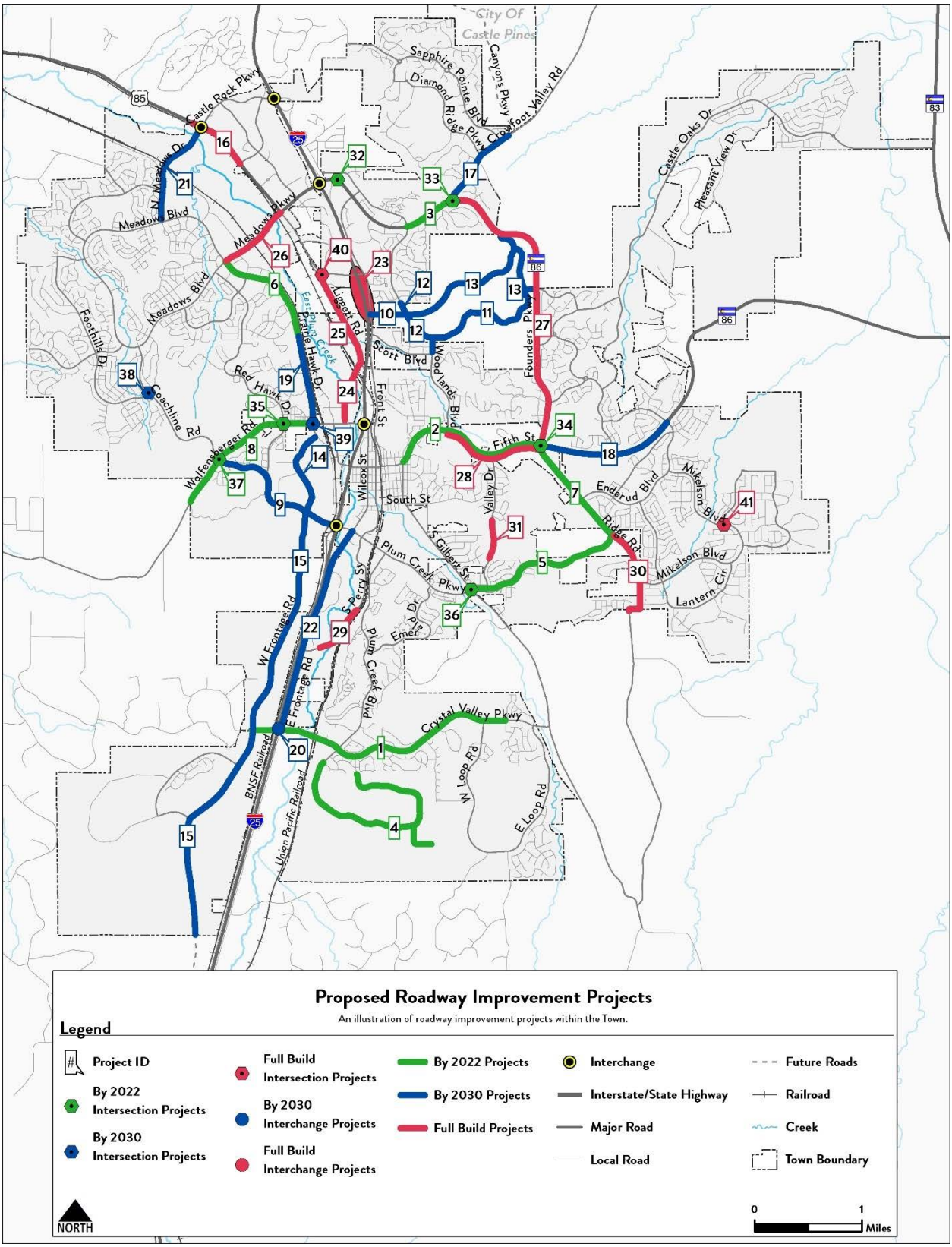
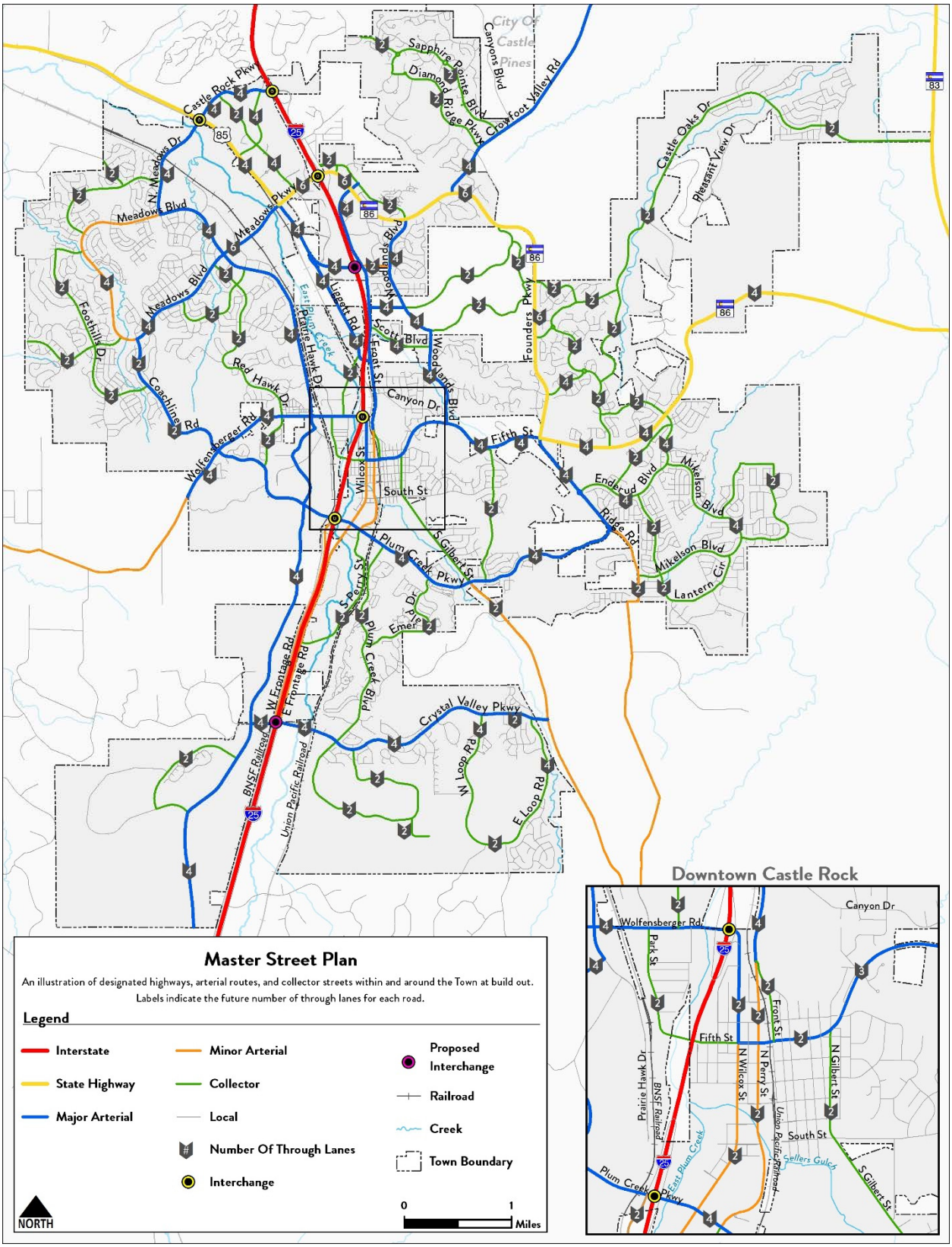


Figure 13 – Master Street Plan



Based on the Roadway Plan projects identified through the planning process, the DRCOG regional travel demand model has been reanalyzed to develop future vehicular forecasts for the 2030 (60% of full build) Improved scenario and the 2040 (full build) Improved scenario. Forecasts have been prepared using procedures discussed in Chapter 3.

Figure 14 (p. 43) and **Figure 15** (p. 44) display the 2030 (60% of full build) improved forecasts and v/c ratios. **Figure 16** (p. 45) and **Figure 17** (p. 46) display the 2040 (full build) improved forecasts and v/c ratios. These figures demonstrate the effectiveness of the roadway plan with a few locations of future deficiency still apparent.

- Wilcox and Fifth Streets – Future congestion in the Downtown area is difficult to mitigate due to space limitations and a conflict between widening and maintaining the existing historic nature of the area. Many trail connections already provide access to this area. The Town plans to maintain the Downtown area with its current characteristics and charm and will continue to enhance the transportation system into and out of this area by emphasizing active travel modes, transportation demand management measures, and alternative intersection designs. This Plan emphasizes continued development of the system with maintenance of the existing roadway network. For these reasons, widening is not recommended for these streets.

Downtown

- Meadows and Founders Parkways – Significant vehicular movements into, out, and through these corridors are expected to continue at full build of the Town. Development of the additional interchange with I-25 and Highway 85/Black Feather Trail will mitigate capacity failures of Meadows and Founders Parkways, but the corridors will continue to be heavily used in the future. It is anticipated that 6-lane widening will be necessary along Meadows Parkway, but no other significant widening projects are planned to preserve the existing utility of the corridors. Separately, with the possible construction of the I-25 and Highway 85/Black Feather Trail interchange it is anticipated that increased volumes and congestion will develop on Black Feather Trail between Front St and Woodlands Blvd. This location is currently right-of-way constrained and in close proximity to a school, further evaluation is needed to understand alternatives in this corridor and to determine how best to serve travel demand in the area.
- Corridors outside Castle Rock Town Limits – Several corridors are expected to operate near or above capacity in the future outside Town limits, including State Highway 85, State Highway 86, Crowfoot Valley Road, and State Highway 83. Due to these corridors being located outside the purview of the Town, coordination and communication with Douglas County and CDOT will be necessary.

Figure 14 – 2030 (60% of Full Build) Traffic Forecasts with By 2030 Base Assumption and Proposed Improvement Projects

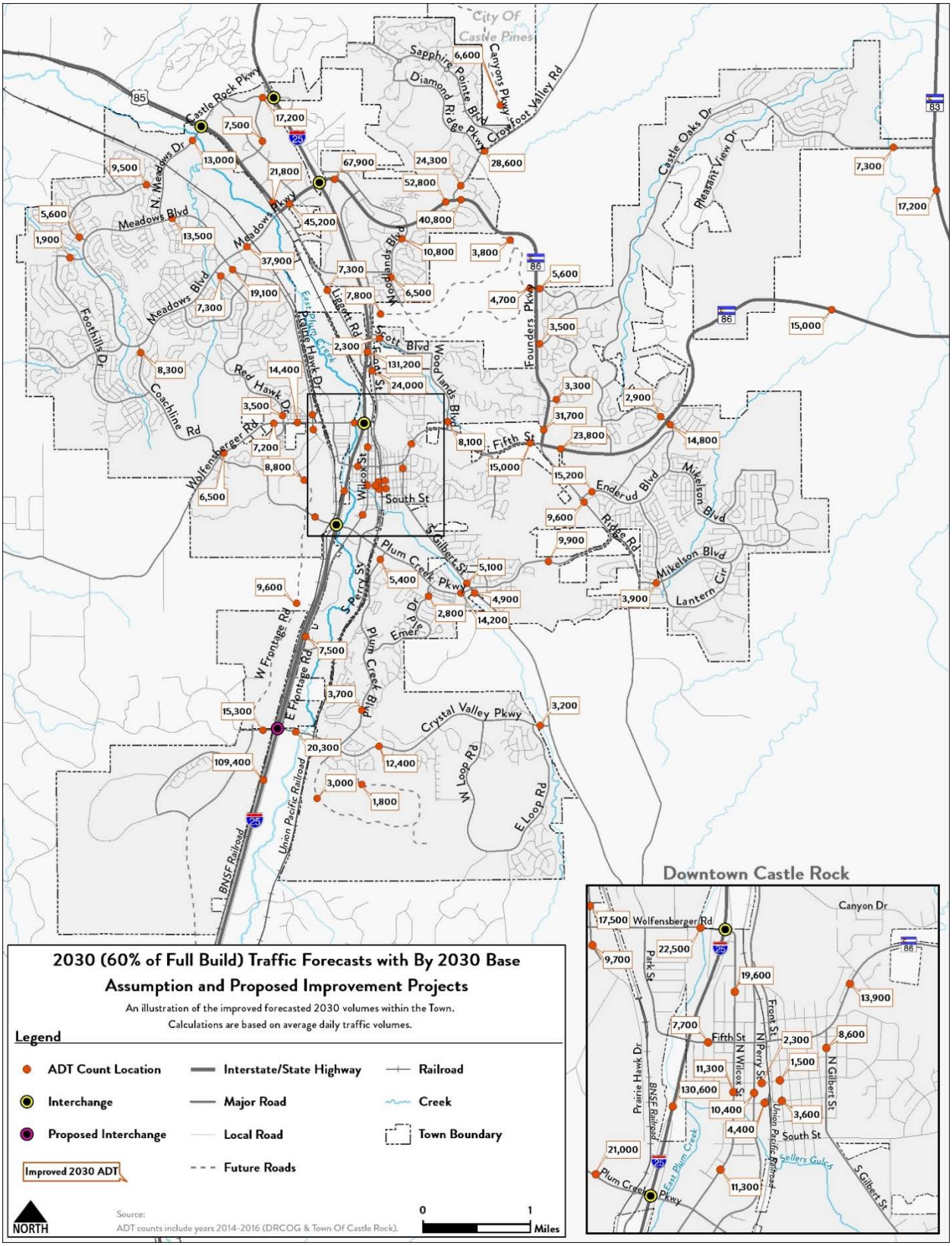


Figure 15 – 2030 (60% of Full Build) Volume/Capacity Ratios with By 2030 Base Assumption and Proposed Improvement Projects

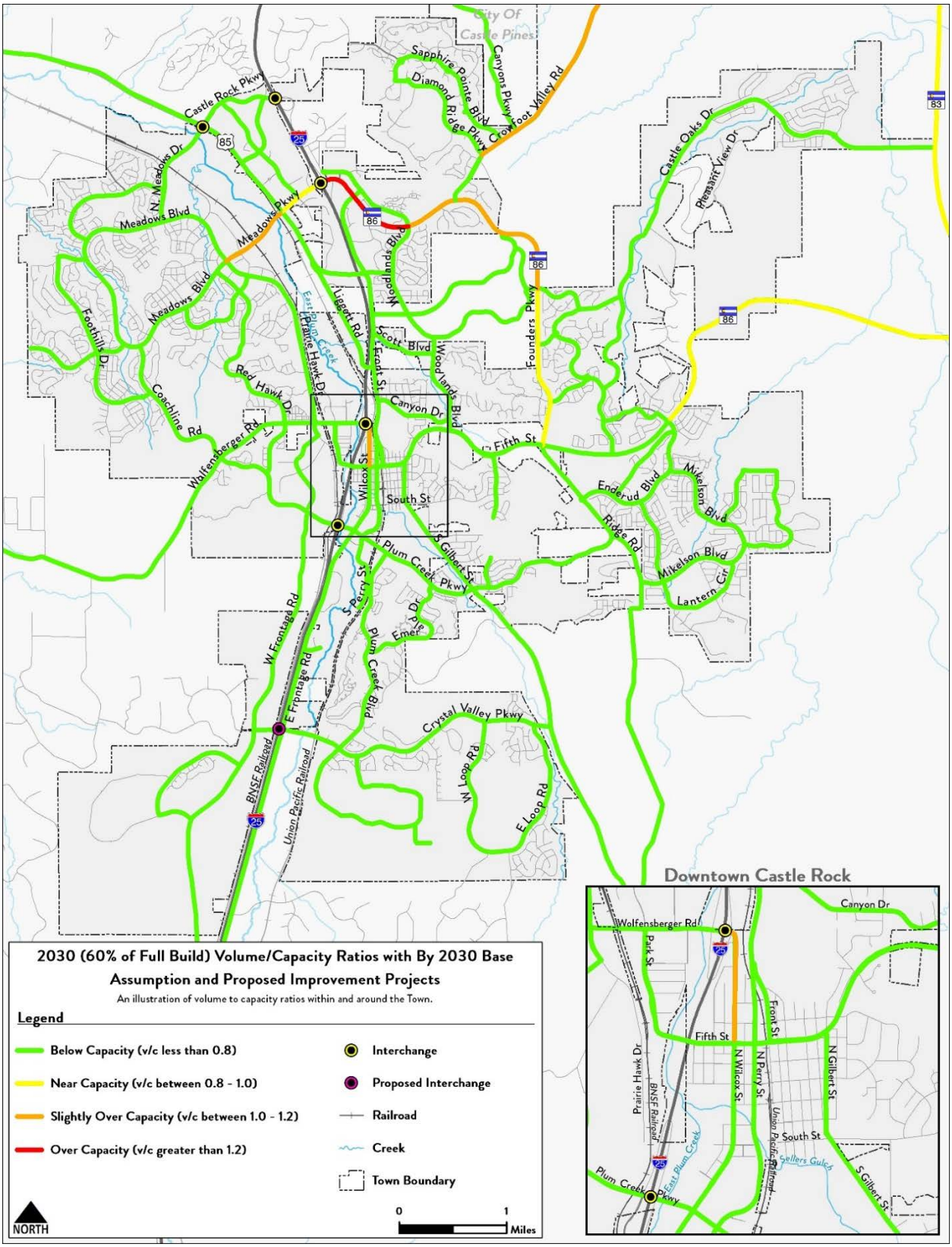


Figure 16 – 2040 Full Build Traffic Forecasts with All Base Assumption and Proposed Improvement Projects

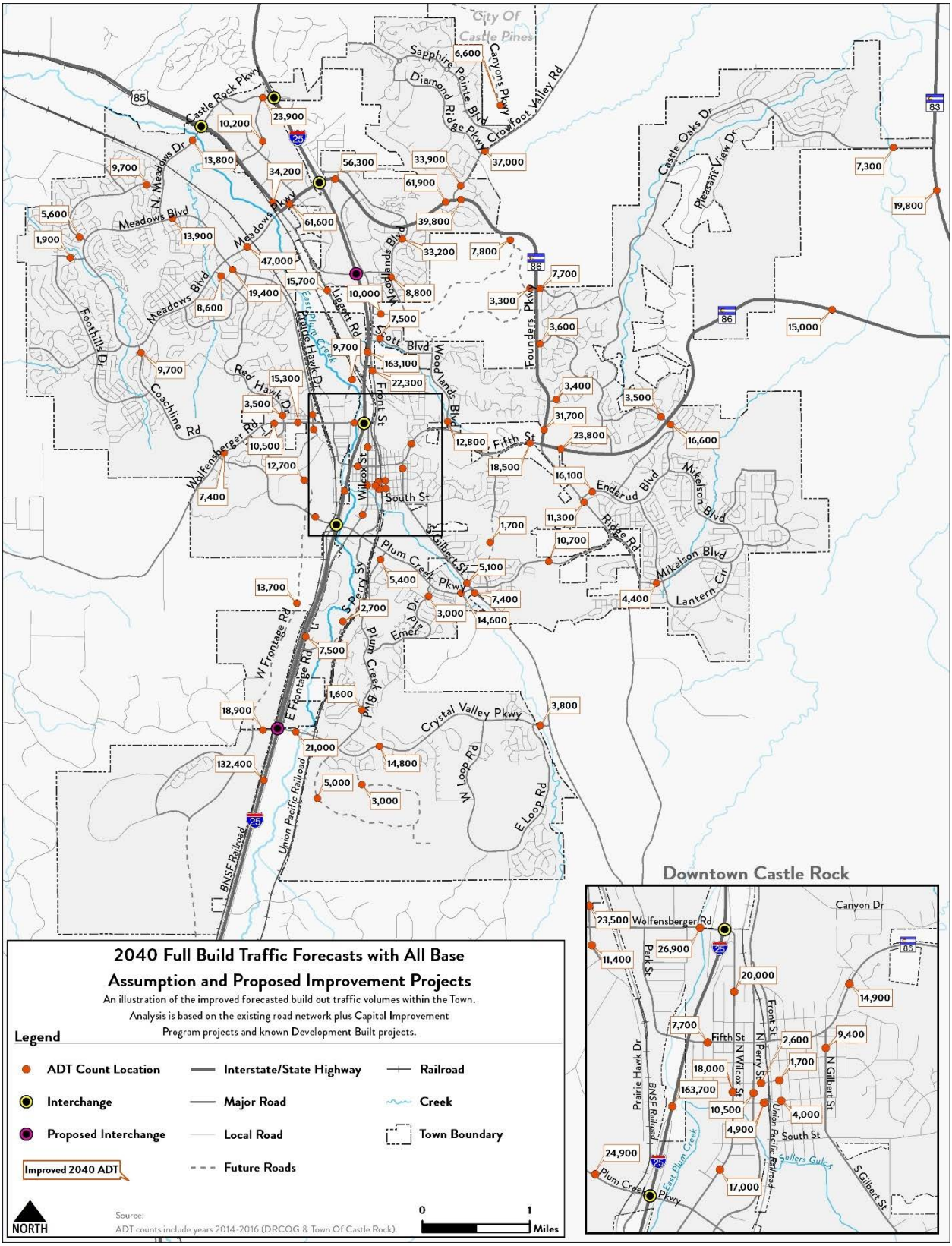
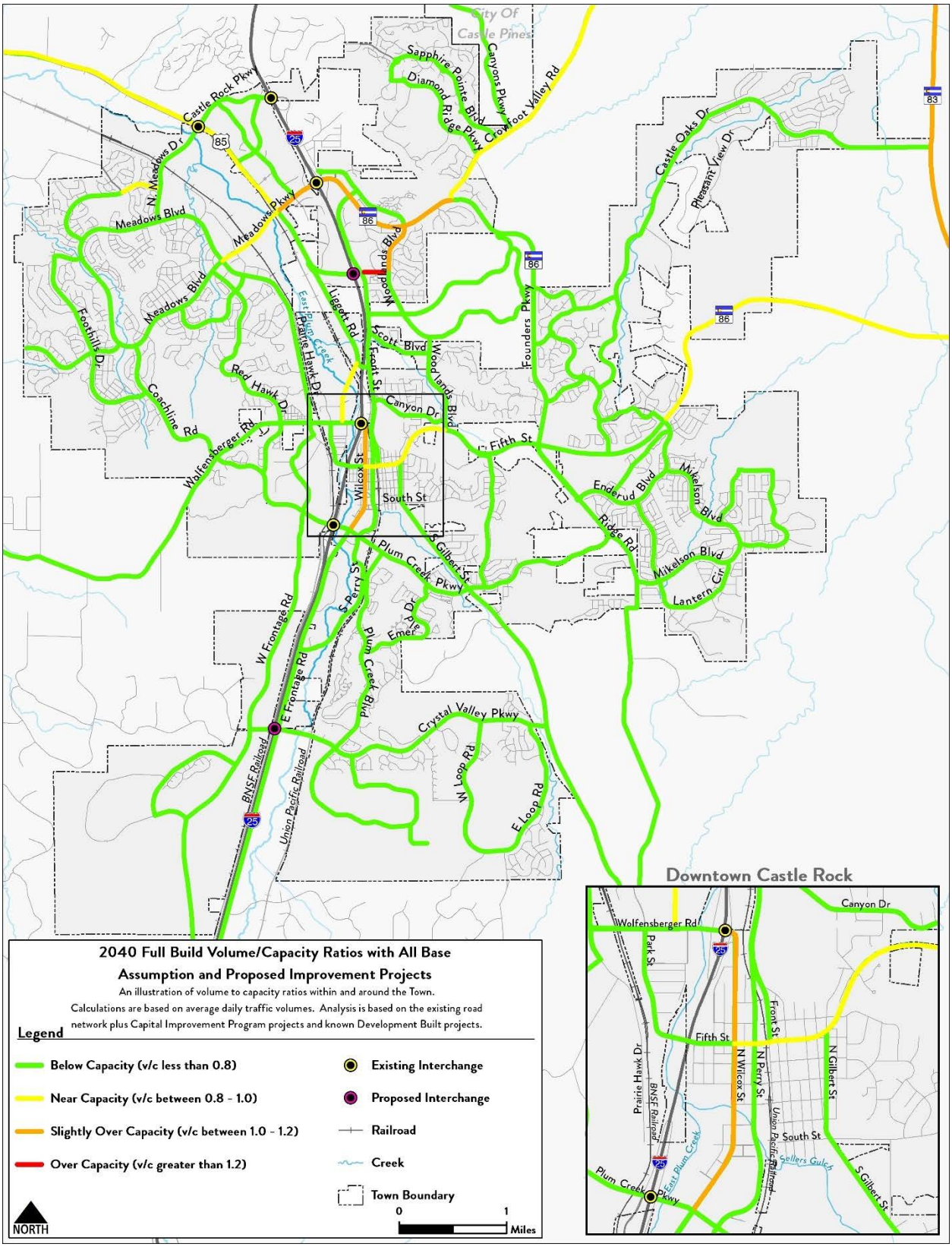


Figure 17 – 2040 Full Build Volume/Capacity Ratios with All Base Assumption and Proposed Improvement Projects



4.1.2 Roadway Project Phasing

To provide additional insight about the anticipated phasing of needs within the Roadway Plan project listing, **Table 6** (p. 48) ranks the projects. The list includes all projects from the Roadway Plan that are not included in the current Town CIP but that will require some investment from the Town. The projects are ranked in order of anticipated congestion occurrence and necessary remediation.

An important aspect of this list is the necessary flexibility and fluidity of the analysis. Specifically, as development occurs within the Town, it will not be spatially uniform and some neighborhoods/developments will likely develop sooner than others. The Town should continually monitor development patterns to ensure the continued operation of all roadway facilities and to adjust priorities as more information is known.

Key columns in **Table 6** (p. 48) include the project location and description, responsible party, and planning level cost estimates. The cost estimates represent high-level construction costs, without right-of-way acquisition, for the entire project. **Appendix E** includes worksheets developed during the planning level cost estimation process. This analysis has made no judgment about the project cost share for different stakeholders. Also, **Table 6** does not make judgment about the level of available funds for transportation projects and focuses solely on the expected cost in 2017 dollars.

Next Steps

A Signal Retiming Study is recommended as the first step to maintain adequate operations along Meadows and Founders Parkways in the near term. This signal retiming analysis should be completed for Meadows Parkway and Founders Parkway between Red Hawk Drive and Crowfoot Valley Road. The estimated cost for this study is $80,000.

An Interchange Feasibility Study is recommended as the second step to accommodate growth and maintain operations along Meadows and Founders Parkways. The study should determine a preferred location and supporting infrastructure improvements for a new interchange accessing I-25 between Meadows Parkway/Founders Parkway and Wolfensberger Road. The study should include a detailed evaluation of the corridor operations of adjacent roadways, including Meadows Parkway, Founders Parkway, Front Street, Woodlands Boulevard, Highway 85, Liggett Road, and Wolfensberger Road at a minimum. The evaluation should also determine needed improvements to the intersection at US 85 and Meadows Parkway. The estimated cost for this study is $250,000. This process should include close coordination between agencies including the Federal Highway Administration and CDOT as the project will require Federal and State approval of project concepts. Ultimately, this concept will require National Environmental Policy Act (NEPA) clearance and regional cooperation to identify funding and successfully complete the project.

A Downtown Mobility Study is recommended to determine a path forward for the transportation system in the Downtown core. The study should focus on maintaining the unique character and charm of Downtown with the anticipated increase in traffic congestion. The study is expected to recommend innovative solutions. The Town should approach mobility by focusing on improving multimodal conditions. Strategies may include TDM, non-traditional intersection design, or potential policy or code changes. Bike and pedestrian facilities in particular should be examined to improve mobility and safety. The estimated cost for this study is $120,000.

Table 6 – Ranked Roadway Plan Listing

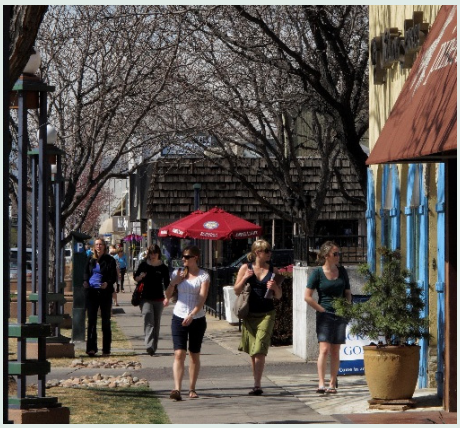
Congestion Ranking	Project ID No.	Horizon	Roadway	Segment	New Lanes and Functional Classification	Responsibility	Planning Level Cost Estimate*
1	9	By 2030	Plum Creek Pkwy	Widen from Wolfensberger Rd to I-25	4 lane Major Arterial	Shared Town and Developer Responsibility	$6,330,000
2	17	By 2030	Crowfoot Valley Rd	Widen from Founders Pkwy to Town Limits	4 lane Major Arterial	Shared Town and Developer Responsibility	$4,700,000
3	18	By 2030	SH 86	Widen from Ridge Rd to Enderud Blvd	4 lane Highway	Shared Town and CDOT Responsibility	$2,550,000
4	19	By 2030	Prairie Hawk Dr	Widen from Melting Snow Dr to Wolfensberger Rd	4 lane Major Arterial	Town Responsibility	$2,700,000
5	20	By 2030	I-25 Interchange	Construct Interchange at Crystal Valley Pkwy	Interchange	Shared Town, Douglas County, and Developer Responsibility	$51,000,000
6	15	By 2030	West Frontage Rd	Realign between Town Limits and Plum Creek Pkwy	4 lane Major Arterial	Shared Town and Developer Responsibility	$25,400,000
7	21	By 2030	N Meadows Dr	Widen from Meadows Blvd to US 85	4 lane Major Arterial	Shared Town and Developer Responsibility	$23,900,000
8	22	By 2030	East Frontage Rd	Construct operational improvements from Plum Creek Pkwy to Crystal Valley Pkwy	2 lane Minor Arterial	Shared Town and Developer Responsibility	$6,030,000
9	14	By 2030	Prairie Hawk Dr	Realign along Atchison Way and extend from Topeka Way to Plum Creek Pkwy	4 lane Major Arterial	Shared Town and Developer Responsibility	$6,170,000
10	23	By Full Build	I-25 Interchange	Construct Interchange near Highway 85/Black Feather Trail/or other Founders Pkwy/SH 86 corridor improvements	Interchange	Shared Town and Developer Responsibility	$20,000,000-$40,000,000
11	24	By Full Build	Liggett Rd	Extend south to Wolfens-berger Rd via Caprice Dr	2 lane Collector	Town Responsibility	$3,330,000
12	25	By Full Build	Liggett Rd	Widen from Highway 85 to new Liggett Rd extension	4 lane Major Arterial	Shared Town and Developer Responsibility	$3,750,000
13	26	By Full Build	Meadows Pkwy	Widen from Meadows Blvd to US 85	6 lane Major Arterial	Town Responsibility	$20,300,000
14	27	By Full Build	Founders Pkwy	Widen from Crowfoot Valley Rd to 5th St	6 lane Highway	Shared Town, Developer, and CDOT Responsibility	$10,700,000
15	28	By Full Build	Fifth St	Widen from Woodlands Blvd to Founders Pkwy	4 lane Major Arterial	Shared Town and Developer Responsibility	$5,870,000
16	29	By Full Build	Perry St	Extend south to East Frontage Rd	2 lane Collector	Town Responsibility	$3,720,000
17	31	By Full Build	Valley Dr	Connect between Hover Dr and Hudson Ln	2 lane Collector	Shared Town and Developer Responsibility	$1,520,000
18	30	By Full Build	Ridge Rd	Improve from Plum Creek Pkwy to Town Limits	2 lane Minor Arterial	Shared Town and Developer Responsibility	$4,170,000

* Planning Level Cost Estimates do not include right-of-way acquisition, all costs are present value (FY 2017, $)

Active Transportation Examples

Children Biking to School

Pedestrian Activity



4.2 Active Transportation

The Town of Castle Rock is a desirable place to live with a high quality of life driven by a small town feel, impressive views and landscape, high-quality neighborhoods, and proximity to the Denver Metro Area. With rapid development and the prospect of continued growth come transportation challenges that include increasing congestion, the need to serve more residents through various travel modes, and air quality impacts. As indicated in Chapter 1, the natural terrain and significant man-made barriers, including the railroads and I-25, have required the development of a unique transportation network to serve travel needs for residents. These features can be especially difficult for active transportation users; for example, walking and biking a hillside is much more difficult than driving the same hillside.

These challenges require a comprehensive and balanced approach to transportation that will help guide decision making and investment into the future. This Recommendations section outlines options the Town may consider to encourage expanded active mode use throughout the Town as well as regionally.

4.2.1 Bicycle Plan

The accommodation of bicycle travel is essential for Castle Rock's quality of life. Castle Rock prides itself on its parks, trails, and open space, of which bicycle access is a critical component. The expansion of the bicycle network for transportation and commuting purposes will increase connectivity between homes and employment areas, schools, and activity centers, such as downtown. To further enhance bikeability, additional connections between off-street and on-street bike facilities should be increased including more connections through existing and planned developments.

Bicycle accommodation can vary based on users' abilities and their level of comfort in using various types of facilities. Ideally, the transportation system should accommodate all types of bicyclists. The League of American Bicyclists (LAB) places cyclists in four categories as described below.

"Strong & Fearless" Bicyclists are bicycle enthusiasts who will ride their bicycle for any trip type, with bicycling being their primary commuting mode. Bicycling is part of their identity, and they will ride on nearly any roadway in any conditions.

"Enthused & Confident" Bicyclists are encouraged to bicycle by the availability of bicycle facilities. They will occasionally ride in traffic when bicycle facilities are not present but prefer to ride within their own facility. These riders may not always choose to bicycle but are comfortable doing so in many cases. Investment in additional bicycling infrastructure to improve safety and connectivity will lead to these riders making more bike trips.

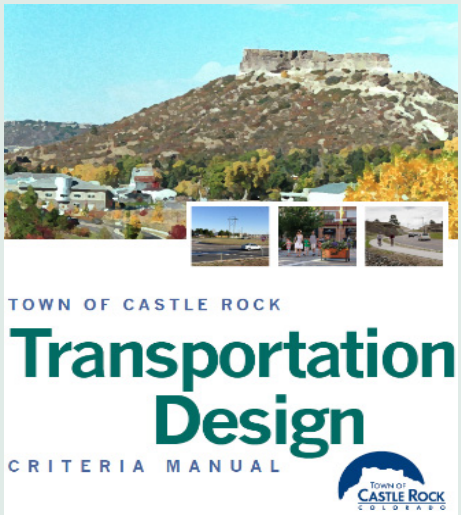
"Interested but Concerned" Bicyclists are typically the largest group of a population. They are interested in biking but are concerned about their safety. They do not like using routes without bicycle facilities because they are nervous about mixing with motorized vehicles. They primarily ride their bicycle for short trips and for recreational reasons. The addition of bicycle facilities that remove them from interacting with motorized vehicles would increase their likelihood of riding.

"No Way, No How" are people who have no interest in bicycling due to immense safety concerns, weather, topography, and/or simply a lack of interest.

Bicycle Network Plan

Castle Rock's 2012 Transportation Design Criteria Manual includes on-street bike lanes in its typical cross sections for all arterials and major and residential collectors. While the arterial on-street bike lanes provide direct connections in and around the community, they predominately serve the "strong & fearless" and "enthused & confident" bicyclists; the "interested but concerned" population (which typically accounts for upwards of 60 percent of any population) may not be comfortable riding alongside higher traffic volumes and higher speeds associated with the arterial street network. To serve the "interested but concerned" population—and to better accommodate bicyclists of all abilities throughout Castle Rock—the bike network plan includes low-stress bicycle facilities to complement the on-street bicycle facilities. Low stress facilities include multi-use trails and multi-use sidepaths. The Town's typical cross sections for arterial and collector roadways include 8- to 10-foot multi-use sidepaths. Knowing that cyclists have different needs, the bike network plan was developed using both on-street and off-street facilities to provide options for different user types.

Design Standards



This section provides an overview of the facility types identified in Castle Rock's bicycle network plan. Bicycle facilities referenced are based on the National Association of City Transportation Officials (NACTO) 2014 Urban Bikeway Design Guide and American Association of State Highway and Transportation Officials (AASHTO) 2012 Guide for the Development of Bicycle Facilities.

Bicycle Lanes/Shoulders

There are over 33.5 miles of on-street bike lanes or shoulders along Castle Rock streets. Bike lanes designate an exclusive space for bicyclists using pavement markings and signage. Shoulders are striped areas alongside roadways that can be used by bicyclists when pavement widths do not meet the minimum width to be identified as a bike lane. Both facilities are located adjacent to motor vehicle travel lanes and flow in the same direction as traffic. Bike lanes/shoulders are typically on the right side of the street, between the adjacent travel lane and curb, road edge, or parking lane. Bike lanes/shoulders enable bicyclists to ride at their preferred speed without interference from prevailing traffic conditions. Bike lanes also facilitate predictable behavior and movements between bicyclists and motorists.

Considerations

- Bike lanes/shoulders are typically installed by reallocating existing street space or with new development.
- Desirable bike lane width adjacent to a curb face is a minimum of 6 feet.
- Desirable ridable surface adjacent to a street edge is a minimum of 4 feet.
- Shoulders provide a ridable surface for cyclists, but do not meet the minimum 4-foot width to be called a bike lane.

Bicycle Facility Examples

Sharrows

Shared Lane Markings (SLMs), or "sharrows," are road markings used to indicate a shared lane environment for bicycles and automobiles. Shared lane markings reinforce the legitimacy of bicycle traffic on the street, recommend proper bicyclist positioning, and may be configured to offer directional and wayfinding guidance. The MUTCD outlines guidance for shared lane markings in section 9C.07.

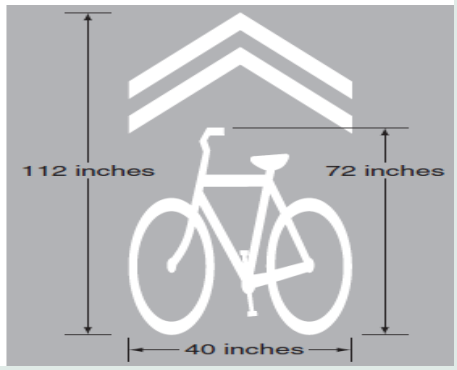
Considerations

- The Shared Lane Marking in use within the United States is the bike-and-chevron "sharrow," illustrated in MUTCD figure 9C-9.
- Used to fill a gap in an otherwise continuous bike path or bike lane/shoulder, generally for a short distance.
- Alerts motor vehicle drivers to the potential presence of bicyclists.
- Indicates a proper path for bicyclists through difficult or potentially hazardous situations, such as railroad tracks.

Current Castle Rock Design Standards

Based on the Town's 2012 Transportation Design Criteria Manual, all pavement markings should follow application and maintenance standards as identified in the MUTCD manual. Additionally, roadways identified as bicycle routes should provide additional roadway width.

Sharrow Marking



Source: 2009 MUTCD, Figure 9C-9, Shared Lane Marking.

Source: 2014 Urban Bikeway Design Guide, National Association of City Transportation Officials, www.nacto.org.

Multi-Use Sidepaths

Multi-use sidepaths serve as safe, low-stress alternatives for cyclists in locations that do not have on-street facilities or for the "interested but concerned" that don't feel comfortable riding with traffic. These paths run parallel to roadways with buffers between the roadway and path to create additional comfort for pedestrians and cyclists. Multi-use sidepaths attract a variety of user groups; to minimize conflict between users, a 10-foot width of these facility types is recommended.

Multi-Use Sidepath

Considerations

- Multi-use sidepaths should be a minimum of 8 feet, with a recommended width of 10 feet and 12 feet in locations with higher user volumes.
- The number of access points should be considered in terms of bicyclist safety and impacts on travel speed.
- Multi-use sidepaths should not be considered a substitute for on-street facilities except in limited cases.

Multi-Use Trails

Multi-use trails often serve as an integral component of a bicycle network and provide low-stress facilities for all cyclist types, especially the "interested but concerned" that are not comfortable using on-street facilities. Multi-use trails are separated from motor vehicle traffic and are used by pedestrians, cyclists, and other non-motorized users. A 32 mile network of multi-use trails connects local trails to larger regional trails to increase overall regional connectivity.

Multi-Use Trail

Considerations

- Minimum width for multi-use trails is 10 feet.
- On regional trails and those with higher pedestrian volumes, 12 feet or greater is recommended to allow comfortable passing movements.

Figure 18 (p. 55) displays the existing and future bicycle system, which includes a network of bike lanes/shoulders, sharrows, multi-use sidepaths, and multi-use trails designed to provide bicycle access for all types of users throughout Town. **Appendix A** provides a full tabular listing of the bicycle projects, including an assessment of the horizon, responsible agency, and a roadway project cross-listing. The project horizon column identifies the planned development period (By 2022, By 2030, and By Full Build). The planning horizon has been determined through analysis of the transportation system performance over time with phasing of projects designed to coincide with planned roadway improvement projects and consistent with the Parks and Recreation Master Plan. Priority has been assigned to projects which are located near bicycle trip destinations, including schools, commercial areas, and Downtown.

4.2.2 Pedestrian Plan

The accommodation of pedestrian travel, like bicycle travel, is essential for Castle Rock's quality of life and improving mobility. No matter the mode of choice, whether it be driving, biking, or walking, every trip begins and ends with some sort of pedestrian activity.

Pedestrian Infrastructure Plan

Castle Rock's 2012 Transportation Design Criteria Manual includes design criteria for pedestrian facilities, including, sidewalks, sidepaths, curb ramps, and cross walks. The manual states that sidewalks "shall be constructed on both sides of all roadways unless specifically deleted by action of the Town Council." As such, pedestrian improvements and updates will be completed in concert with the roadway projects described in the previous section. Design criteria for sidewalks and sidepaths are described in the Town's design criteria manual.

Current Castle Rock Design Standards

Per the Town's 2012 Transportation Design Criteria Manual, sidewalks shall be provided along both sides of streets within new developments and expansions of existing developments. All pedestrian facilities shall be in accordance with American Disabilities Act (ADA) regulations.

Pedestrian Facilities

Figure 18 – Existing and Proposed Bike Network

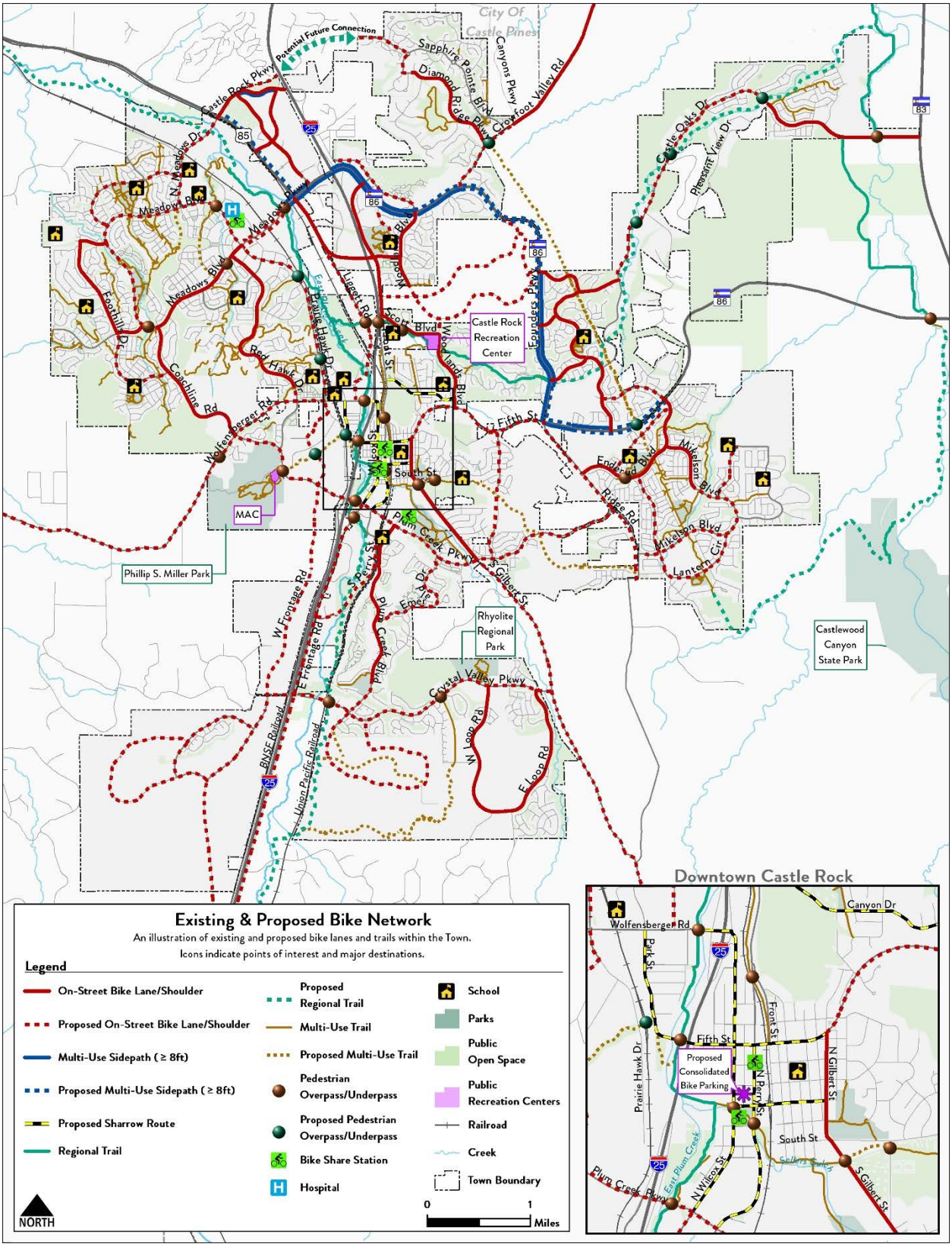


Figure 19 (p. 57) displays the existing and proposed pedestrian system within Town. As future reconstruction and development projects occur, this map should be referenced to ensure the construction of needed facilities. **Appendix A** provides a full tabular listing of the pedestrian projects, including an assessment of the horizon, responsible agency, and a roadway project cross-listing. The project horizon column identifies the planned development period (By 2022, By 2030, and By Full Build). The planning horizon has been determined through analysis of the transportation system performance over time with phasing of projects designed to coincide with planned roadway improvement projects. Separate priority has been assigned to projects which are located near bicycle trip destinations, including schools, commercial areas, and Downtown.

4.3 Transportation Demand Management

Transportation Demand Management (TDM) describes programs and strategies that are intended to make the most of the transportation system by managing the actual "demand" placed on facilities. Strategies may be designed to reduce peak demands or the total roadway travel demand, reduce congestion, minimize new roadway widening projects, extend the life of public infrastructure, and improve air quality and other public health benefits.

Programs can be promoted by individual businesses, community districts, towns, cities, and regional organizations. Typical TDM programs aim to reduce single occupancy drivers, congestion, emissions, and vehicle trips by diverting them to active modes, high occupant vehicles, or off-peak travel times including:

- Carpooling
- Vanpooling
- Schoolpooling
- Transit
- Telework
- Alternate work schedules/Flextime

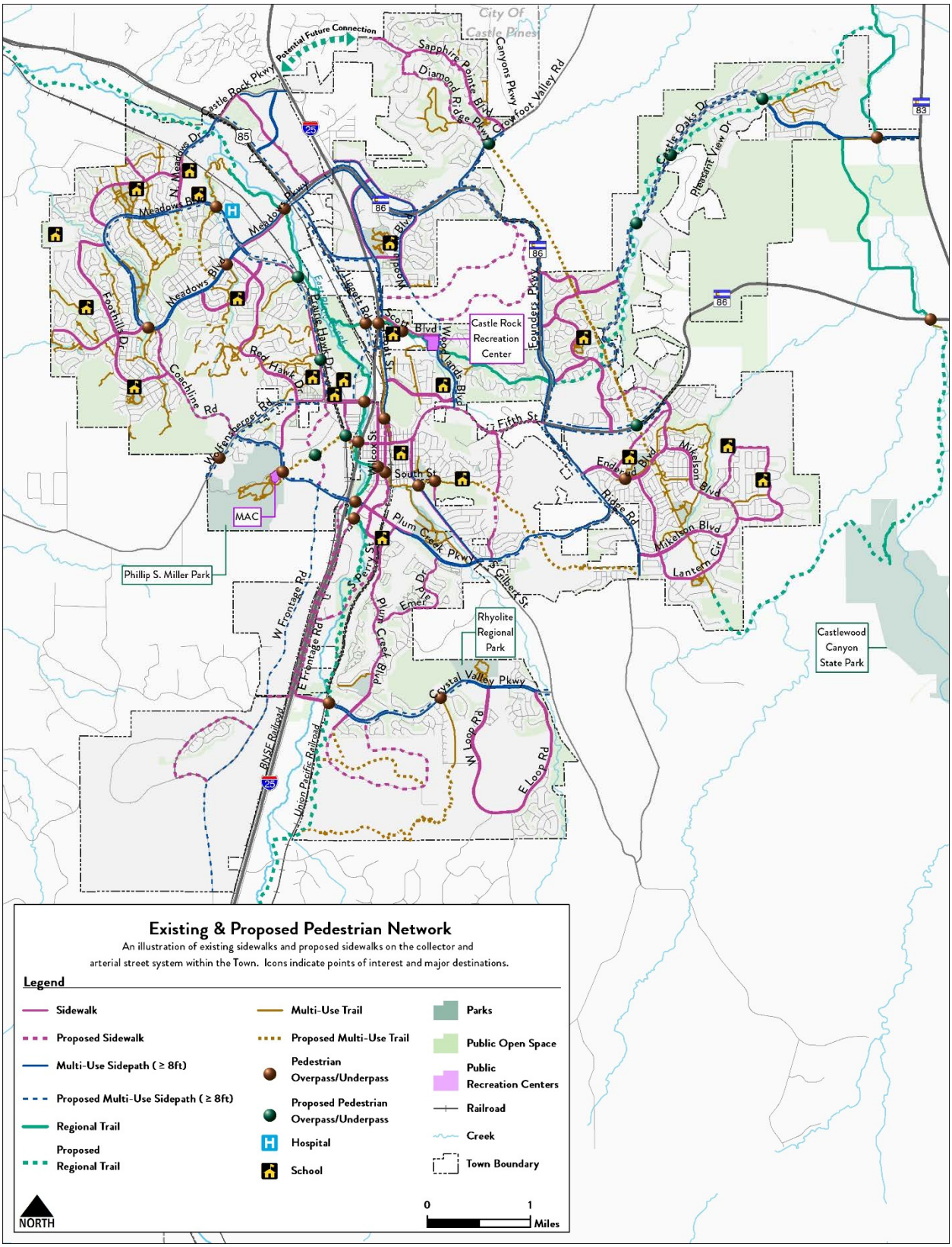
Castle Rock Transportation Demand Management Toolbox

This TDM Toolbox includes strategies customized for Castle Rock's unique needs and opportunities, and is intended to provide options to help maintain the high quality of life.

Castle Rock has many opportunities when it comes to initiating a TDM program. One of the primary opportunities is to leverage the existing TDM work that is happening across the region. Examples include work by:

- DRCOG's Way to Go – Commuter Services Program
- Denver South Transportation Management Association (DSTMA)
- Colorado Springs Mountain Metro Rides Vanpool Program

Figure 19 – Existing and Proposed Pedestrian Network



The Town may consider a combination of the following strategies to leverage these programs:

Resourcing – An important element of a successful TDM program is having resourcing, such as a dedicated staff member, to implement the program. Program staff would have the responsibility of promoting program strategies and coordinating with local business districts and local and regional partners.

Marketing and Education – A primary element of a TDM program in Castle Rock should be marketing to promote the existing services available for Castle Rock residents and educating the public on the impacts of their transportation choices. A rule of thumb, as noted by CDOT's TDM Toolkit, 2002, is to set aside at least 15 percent of a project's budget toward marketing. Some potential marketing and educational strategies include:

- Promotion of the Town's Taxi Voucher Program
- Promotion of the Town's Regional Trail Network
- Initiation and promotion of bike/walk to work/school days
- Promote the Way to Go program and ride matching software to Town residents and area employers
- Promotion of the Bustang Regional stop (upon opening)
- Promotion of infrastructure investments in active transportation that the Town is making (e.g., improvements to the trail network)
- Promoting local transit service (upon opening)
- Marketing/education around the benefits of active transportation (e.g., health and fitness)
- Work with schools to include multiple transportation projects and schoolpool into their curriculum (e.g., themed poster contests, research projects, etc.) to relieve congestion around schools

TDM

Congested Roadway

Vanpool (Mountain Metro)

Public Private Partnerships – Public Private Partnerships (PPP) may be a viable way to accomplish various elements of a TDM program. Examples could include:

- **Transit Shuttle** – Partnering to provide a transit shuttle to key destinations throughout the community, like the Town already does with the Senior Center. The Town could partner with the hospital and other medical providers to create a shuttle linking the hospital with medical uses on the south side of Town.

- **Shared Parking for Vanpools/Carpools** – Churches, schools, and large retail facilities with large parking lots that are not in regular use could be approached to help accommodate parking needs for vanpools and/or carpools.
- **Incentivize alternative work hours and/or telecommuting** – Castle Rock could work with local employers to allow alternative work hours and/or telecommuting to help reduce peak travel demands on local streets.
- **Funding partnerships** – The town could work with employers to help fund vanpool programs and encourage employee use.
- **Employer provided transit passes** – If transit services are reinitiated in Castle Rock, the Town could work with local employers to provide passes to their employees. This can be a tax write-off and be a benefit to both the employer and employee.
- **Expansion of Castle Rock Free Cycle** - To make cycling an easier option for travel.

Transportation Management Association/Organization – The Town could investigate creating or joining a Transportation Management Association (TMA) or Transportation Management Organization (TMO). TMAs and TMOs are coalitions of stakeholders that have an interest in promoting TDM strategies in a specific area. The Way to Go program supports regional TMAs such as Denver South Transportation Management Association and Transportation Solutions in the Denver Metro Area.

Infrastructure Investment – Investment in infrastructure throughout the Town can help encourage alternative and active transportation modes. Examples include:

- The Town establishing a Park-and-Ride lot to facilitate regional ridesharing, such as: carpooling, vanpooling, and a regional transit stop for Bustang.
- Expansion of and improvements to the bike and walking facilities throughout the Town, especially filling gaps in key pedestrian areas. This could include a first and last mile analysis of the networks linking to downtown and other high pedestrian use areas.
- Provide short and long term bike parking near key destinations that may include covered parking or bike lockers.
- Designating preferred parking for carpoolers downtown and working with private property owners to do this in shopping center lots.
- Considering design changes to arterial intersections, such as providing pedestrian refuge areas, and curb extensions at intersections for streets with on-street parking.
- Following Universal Design standards for pedestrian facilities during new construction and maintenance projects that can accommodate a wide range of users, including people with disabilities and other special needs.

Policy Changes – The Town may consider exploring amendments to the municipal code and development code to encourage new developments to support walking, biking, and other TDM strategies. Examples could include:

- Integration of urban design that encourages pedestrian activity
- Mixed use developments providing car and/or bike sharing facilities to mitigate transportation impacts
- Senior housing facilities providing shuttles for residents
- Parking code amendments
- Inclusion of bicycle parking and employee shower facilities into projects
- Development of a multimodal level of service standard for new development, especially in the downtown area

Incentives – The Town could consider incentivizing active mode use. Some examples are provided in the infrastructure section. Additional incentives could include tax breaks, parking cash out programs, and inclusion into the Town's healthy living program.

Transit Service – During the Transportation Master Plan public involvement process, the public was solicited for comment regarding the performance and needed improvements to the transportation network. Some interest exists related to the establishment of a dedicated transit system to serve the Town.

To further facilitate the discussion around transit services in the Transportation Master Plan process, interested members of the public were presented with the general recommendations from the Douglas County Transit Framework Plan, which identified a desire for a Local Circulator, Point-to-Point service (between cities and towns within Douglas County), and Regional Connections (between Castle Rock and Colorado Springs and greater Denver). Through this discussion, the consensus among those desiring transit service placed greatest priority for a Local Circulator and Regional Connections. The public expressed limited interest in the establishment of transit services between adjacent Douglas County cities and towns.

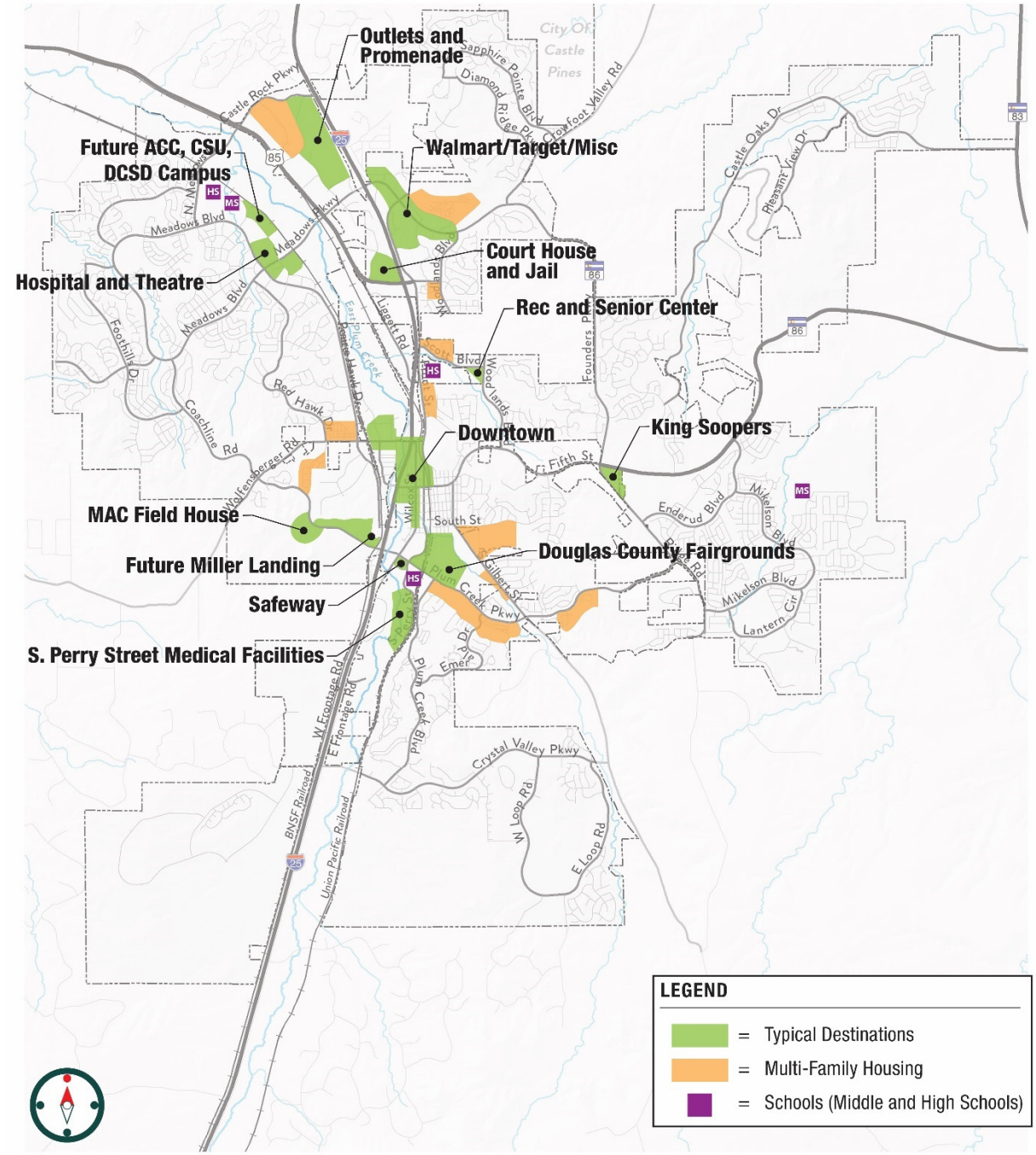
2017 Castle Rock Community Survey

"While there is support for the Town investing in public transportation service within Town limits, support drops when these residents are asked for their willingness to pay - more than half of residents are not willing to pay an additional tax to develop transportation system."

Local Transit Service – Should the Town consider local service it will need to assess what areas of the Town should be served by transit. **Figure 20** (p. 61) presents a conceptual map of possible trip start and end points or trip generators to assist in identifying the areas that possible transit routes might serve. These locations are subject to change but begin to show how transit can be used to connect residential areas to retail, commercial, or employment areas in the Town. Local transit service considerations during the planning process, include:

- Low-density development patterns
- Rolling hills and grade which make accessing destinations on foot difficult
- Large intersections which deter pedestrian travel
- Funding sources

Figure 20 – Transit Trip Generators and Attractors



Possible Next Steps

A *Town Transit Feasibility Study* would be the next step to further explore the extent of community support and to identify a vision for transit in Castle Rock. This study is identified as a potential follow-up to the Transportation Master Plan.

To accurately gauge the overall community's desire and support for transit services and the essential funding needs, it is recommended that a more comprehensive and statistically valid survey be conducted as part of a Transit Feasibility Analysis regarding the possibility of future transit service in Town and regionally.

The study should also focus on determining the needs (including user types, hours of operation, origins and destinations), service type (could include fixed/flex route, Call-and-Ride, or other shared-ride service types such as a public/private partnerships), operator options (Town or other), ridership projections, potential fare price, and funding options. To provide greater transportation options for commuters to the greater Denver Area, it is recommended that this plan also explore the opportunity for public-private partnerships (i.e., Way to Go) or other new Town run services to connect commuters to the RTD transit network. The estimated cost of this study is $125,000.

Regional Transit – Many Castle Rock residents commute into the Denver Metro Area for work. This paired with results of the 2016 Community Conversations Online Focus Group Report, the Douglas County Transit Framework Plan, and input received through the Transportation Master Plan outreach indicate support exists for regional transit connections.

CDOT Division of Transit and Rail (DTR) has also recently completed the Interconnectivity Study, which identifies potential long-term rail transit connections throughout the state. This plan identifies a stop in Castle Rock. This study is considered a vision plan with no known funding or planned timeline. Regional transit service considerations during the planning process, could include:

- A goal to consolidate trips between Castle Rock and the Southeast Light Rail end of line station, the Town could explore implementing carpool, vanpool, or shuttle services to increase accessibility for residents.
- The Town should promote DRCOG's Way to Go program to let residents and area employers know about the regional commuting options available to them.

Regional Transit

Current Initiatives

CDOT DTR is currently evaluating the addition of a regional stop in the Castle Rock area for the Bustang Interregional Express service between Colorado Springs and Denver. The added stop would provide commuter transit services into Denver from Castle Rock, with stops in Denver located at RTD-Colorado Station, Civic Center, 18th/California, 19th/Stout, Denver Union Station, and Denver Bus Center. An opportunity exists for Castle Rock commuters if an additional stop (location to be determined) is placed in the Town where commuters can access the service. A known deficiency for this option is that the service does not currently provide direct access to the Denver Tech Center, Inverness, Meridian, or RidgeGate employment centers, a concern that has been discussed with DTR during these discussions.

Next Steps

The Town should continue coordination efforts with CDOT DTR and Douglas County regarding the potential new Bustang service stop. The Town and County will be a critical partner in the implementation of a future stop. Once a stop location is selected, the Town should move forward to implement transportation infrastructure improvements designed to facilitate the use of the new station area by all travel modes (e.g., vehicle, bicycle, and pedestrian).

The Town should continue coordination efforts as plans and studies are conducted by other agencies. This includes active participation and coordination in the ongoing South I-25 Preliminary Environmental Linkages study to ensure transit options are considered in the plan. Also, as a follow-up to the Douglas County Transit Framework Plan, the Town should continue to participate and coordinate as specific transit projects are advanced from the planning efforts.

4.4 Emerging Technologies

Technology is transforming transportation systems across the country. Communities are trying to position themselves for this ever-changing market even though there is more unknown than known about these technologies. Changes in Information and Communications Technology (ICT), for example, dramatically changed how people travel and transport goods in the last 10 years in ways never imagined, including GPS enabled real-time traffic data and the ability to have information at our fingertips with smart phones. So how do communities plan for emerging technologies that will continue to fundamentally change the transportation landscape?

This section focuses on emerging technologies most applicable to Castle Rock. Like all communities, Castle Rock should actively monitor these technologies because changes are occurring at a rapid pace requiring communities to be open to potential changes. The Town should continue to leverage use of public right of way to facilitate the movement of people and goods using the transportation network. This includes potential opportunities to install equipment, such as small cell towers, readers, detectors, or dynamic signing designed to assist future technologies safe travel along the public right of way.

4.4.1 The Growing Role of Data and Connectivity

It is anticipated that data and connectivity will continue to shape our lives even beyond the progress made in recent years. Key trends include the following.

Shared-use Mobility

The ability to easily schedule and coordinate trips via carpooling, vanpooling, transit, taxi, ride sourcing, car share, bike share and other modes is rapidly changing the way people travel, which may result in a decrease in dependency on single occupancy vehicles. However, because of Castle Rock's bedroom community nature, it may have a lower tendency toward this trend than other more urban areas.

Connected Vehicles or Automatous Vehicles

Connected vehicles (CVs) and automatous vehicles (AVs) present an uncertain future for communities. These technologies include vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I) communications and/or autonomous vehicle communications. It is unknown whether key indicators such as Vehicle Miles Traveled (VMT), congestion, fuel consumption, and safety will be changed for the positive or negative with the onset of these technologies. Castle Rock should assume that CVs and AVs will be a part of the transportation network and continue to follow local, regional, and national policy trends as they relate to such CV and AV use.

Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) represent methods and techniques designed to inform the traveling public and influence behavior change among travelers. ITS can improve mobility by informing motorists about current travel conditions, increase the capacity of existing infrastructure by advising travelers about available capacity throughout the system, and increase safety by warning about upcoming conditions or through educational campaigns.

This Plan is designed to support further implementation of ITS as opportunities arise and to encourage the Town to adopt new trends and technology as they come forward.

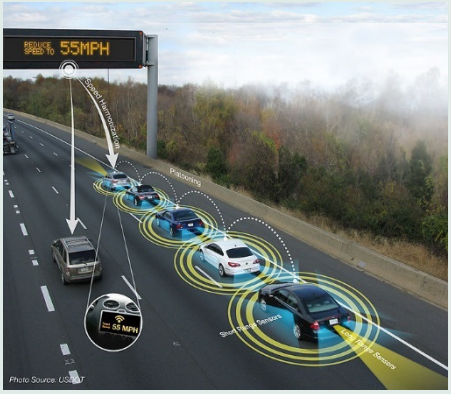
Many potential opportunities for ITS should be considered, including:

Dynamic Signal Coordination

Dynamic signal coordination can help reduce congestion through a more efficient and interconnected traffic signalization network. This may help Castle Rock reduce congestion at key intersections and along critical corridors

Emerging Technologies

Connected Vehicles



Unmanned Aircraft Systems

by providing additional vehicle capacity on the same roadways without the need for roadway widening. Another option would be for the Town to take control of CDOT traffic signals along state highways and at the interchanges, and incorporate these operations into the Town signal system.

Dynamic Signage

Dynamic signage can help reduce congestion by alerting drivers to existing delays or crashes and provide information about the use of alternative routes. This may help Castle Rock reduce delay experienced by increased peak hour congestion or incidents. Other uses for dynamic signage include the option to alter land usage during peak periods (as is done at Plum Creek Parkway and I-25) or to disseminate public information such as downtown road closures during events or emergency messages.

Data Collection and Dissemination

Other options to improve the collection and dissemination of information could include the construction of a Traffic Operations Center as part of the Public Works building expansion. This facility could include the addition of Closed Circuit TV cameras at intersections to monitor traffic flows and incidents. This facility could then also, use other technology methods to collect travel data that could be coordinated with CDOT and other local jurisdictions/agencies.

Advanced Intelligence/Robotics and Machine Learning

These technologies may change the face of the workforce and could have economic impacts. Castle Rock may consider monitoring zoning requirements to determine if they should be changed over time to evaluate the possibility that lower parking rates may be beneficial.

Unmanned Aircraft Systems

Unmanned Aircraft Systems (UAS), sometimes referred to as drones, have the potential to change the way goods are delivered, but the industry struggles to balance the potential benefits with safety and privacy concerns. Transportation system impacts could include increased ease and speed of access to goods, possible congestion reductions, and uncertainty related to safety implications (US Department of Education, 2015 OST-R Transportation Technology Scan: A Look Ahead, 2015).

4.4.2 Safety and Infrastructure

As mentioned previously, many of the impact of emerging technologies is unknown. This section describes some of the possible impacts these technology innovations may have on safety and infrastructure.

Safety Benefits

Safety of all users of the road, including bicyclists and pedestrians, may benefit from emerging technologies. This includes using hardware and sensors on vehicles that are intended to help reduce collisions by providing warnings for a range of circumstances, such as blind spot

notification or automatic breaking. However, other technologies, such as UASs, present some safety concerns.

Parking/Curb Space Usage

CVs, AVs, and ride sharing services could change the way street frontage is used. Castle Rock should continue to monitor parking and curbside drop off needs as travel patterns change. It may be necessary to transition on-street parking to curbside drop-off locations as pick-up and drop-off behavior changes.

Electric and other Alternative Fuel Vehicles

Alternative fuel (especially electric) vehicles are becoming more common due to US Environmental Protection Agency (EPA) provisions designed to reduce US dependence on petroleum by accelerating the introduction of alternative fuel vehicles. Castle Rock should continue to monitor EPA regulations as they consider expansion of Vehicle Charging Stations. The Town may consider using Public Private Partnerships to establish a network of Vehicle Charging Stations.

Appendix A – Bicycle, Pedestrian, ITS, TDM, and Recommended Studies Project Lists

Bicycle Improvement Projects

Project ID No.	Horizon	Facility	Segment	Description	Network	Responsibility	Roadway Improvement Project Number
1	By 2022	Crystal Valley Pkwy	Frontage Rd to Idylwood Rd	Bike Lane/Shoulder	On-street facility	Under construction	1
2	By 2022	Crystal Valley Pkwy	Idylwood Rd to Lake Gulch Rd	Bike Lane/Shoulder	On-street facility	Town and County	
3	By 2022	East Plum Creek Trail Extension	South of Perry Street to Crystal Valley Pkwy	Multi-Use Trail	Low-stress connector	Parks and Recreation	
4	By 2022	Emerald Dr	Plum Creek Blvd to Plum Creek Pkwy	Bike Lane/Shoulder	On-street facility	Town	
5	By 2022	Epic Trail	Connection from Plum Creek Trail to Town Limits	Multi-Use Trail	Low-stress connector	Developer	
6	By 2022	Fifth Street	Gilbert St to Woodlands Blvd	Bike Lane/Shoulder	On-street facility	Town	2
7	By 2022	Founders Pkwy	Woodlands Blvd to Crowfoot Valley Rd (north side only)	Multi-Use Sidepath	On-street facility	Town CIP/TIP	3
8	By 2022	Industrial Tributary Trail	East Plum Creek Trail (near Park St) to MAC	Multi-Use Trail	Low-stress connector	Developer and Parks and Recreation	
9	By 2022	Lanterns Development	Loop connection from Crystal Valley Pkwy	Bike Lane/Shoulder	On-street facility	Developer	4
10	By 2022	Meadows Blvd	Coachline Rd to Meadows Pkwy	Bike Lane/Shoulder	On-street facility	Town	
11	By 2022	Mickelson Blvd	Ridge Road to E Sovereign St	Bike Lane/Shoulder	On-street facility	Town	
12	By 2022	Native Legend Trail	N Meadows Dr to Meadows Blvd	Multi-Use Trail	Low-stress connector	Developer	
13	By 2022	Plum Creek Pkwy	Gilbert Street to Ridge Rd	Bike Lane/Shoulder	On-street facility	Town CIP	5
14	By 2022	Prairie Hawk Dr	Meadows Blvd to Melting Snow	Bike Lane/Shoulder	On-street facility	Developer	6
15	By 2022	Red Hawk Dr	Lincoln Mountain Dr to Wolfensberger Rd	Bike Lane/Shoulder	On-street facility	Developer	
16	By 2022	Ridge Rd	Fifth Street to Plum Creek Pkwy	Bike Lane/Shoulder	On-street facility	Town CIP	7
17	By 2022	Wilcox St	Wolfensberger Rd to Plum Creek Parkway	Sharrow Route	On-street facility	Town, CDOT	
18	By 2022	Wolfensberger Rd	MAC Entrance (west of Coachline) to Prairie Hawk Dr	Bike Lane/Shoulder	On-street facility	Town CIP	8
19	By 2030	Allen St	Town Limits to Founders Blvd	Bike Lane/Shoulder	On-street facility	Town	
20	By 2030	Butterfield Crossing Dr	Meadows Blvd to N Meadows Dr	Bike Lane/Shoulder	On-street facility	Town	
21	By 2030	Canyon Dr	Front St to Woodlands Blvd	Sharrow Route	On-street facility	Town	
22	By 2030	Castle Oaks Dr	Autumn Sage St to Pleasant View	Bike Lane/Shoulder	On-street facility	Developer	
23	By 2030	Castle Oaks Dr/McMurdo Gulch Trail	Overpass/Underpass near Pleasant View Dr (north)	Overpass/Underpass	Overpass/Underpass	Parks and Recreation and Developer	
24	By 2030	Castle Oaks Dr/McMurdo Gulch Trail	Overpass/Underpass near Pleasant View Dr (south)	Overpass/Underpass	Overpass/Underpass	Parks and Recreation and Developer	
25	By 2030	Castle Oaks Dr/McMurdo Gulch Trail	Overpass/Underpass near Rocky View Dr	Overpass/Underpass	Overpass/Underpass	Parks and Recreation and	
26	By 2030	Crowfoot Valley Rd	Founders Blvd to Town Limits	Bike Lane/Shoulder	On-street facility	Town and Developer	17
27	By 2030	Diamond Ridge Bike Lane Extension	Azurite Ln - Tremolite Dr - Sapphire Pointe Blvd	Bike Lane/Shoulder	On-street facility	Town	
28	By 2030	East Frontage Rd	Plum Creek Pkwy to Crystal Valley Pkwy	Bike Lane/Shoulder and Multi-Use Sidepath	On-street facility	Town	22
29	By 2030	Factory Shops Blvd	New Beale St to Meadows Pkwy	Multi-Use Sidepath	Low-stress connector	Town	
30	By 2030	Fifth Street/Park St	Wolfensberger Rd to N Gilbert St	Sharrow Route	On-street facility	Town	
31	By 2030	Foothills Dr	Coachline Dr to Morning View Dr	Bike Lane/Shoulder	On-street facility	Town	
32	By 2030	Heritage Ave	Enderud Blvd to Enderud Blvd	Bike Lane/Shoulder	On-street facility	Town	
33	By 2030	High Point Ln/Valley View Dr	Enderud to Autumn Sage	Bike Lane/Shoulder	On-street facility	Town	
34	By 2030	McMurdo Gulch Trail	East of Founders Pkwy to Cherry Creek Trail	Multi-Use Trail	Low-stress connector	Parks and Recreation and Developer	
35	By 2030	Meadows Pkwy	Factory Shops Blvd to I-25	Factory Shops Blvd to I-25	Low-stress connector	Town and CDOT	
36	By 2030	Memmen Ridge Trail Extension	Memmen Trail to Oman Rd	Multi-Use Trail	Low-stress connector	Parks and Recreation	
37	By 2030	Mitchell Creek Trail Extension	Enderud Blvd to SH 86 (5th St)	Multi-Use Trail	Low-stress connector	Parks and Recreation and Developer	
38	By 2030	N Meadows Dr	Meadows Blvd to US 85	Bike Lane/Shoulder	On-street facility	Town and Developer	21
39	By 2030	N Mitchell St	Mikelson Blvd to Mesa Middle School	Bike Lane/Shoulder	On-street facility	Town	
40	By 2030	Native Legend Trail Extension	Chaffee Ct (trail terminus) to Meadows Blvd at N Meadows Drive	Multi-Use Trail	Low-stress connector	Developer	
41	By 2030	Perry St	Fifth Street to Plum Creek Pkwy	Sharrow Route	On-street facility	Town	
42	By 2030	Pine Canyon Development	Connection from Founders Pkwy to Woodlands Blvd	Bike Lane/Shoulder	On-street facility	Developer	11
43	By 2030	Pine Canyon/Pioneer Ranch Developments	Connection from Woodlands Blvd to Front St	Bike Lane/Shoulder	On-street facility	Developer	10
44	By 2030	Pine Canyon/Pioneer Ranch Developments	Woodlands Blvd connection	Bike Lane/Shoulder	On-street facility	Developer	12
45	By 2030	Pioneer Ranch Development	Connection from Founders Pkwy to Woodlands Blvd	Bike Lane/Shoulder	On-street facility	Developer	13
46	By 2030	Plum Creek Blvd (east side)	Donnington Cir to Crystal Valley Pkwy	Buffered Bike Lanes	On-street facility	Developer	
47	By 2030	Plum Creek Blvd (west side)	Crosshaven Pl to Crystal Valley Pkwy	Buffered Bike Lanes	On-street facility	Developer	
48	By 2030	Plum Creek Pkwy	I-25 to Gilbert St	Bike Lane/Shoulder	On-street facility	Town	
49	By 2030	Plum Creek Pkwy	Wolfensberger Rd to I-25	Bike Lane/Shoulder	On-street facility	Town and Developer	9

Bicycle Improvement Projects

Project ID No.	Horizon	Facility	Segment	Description	Network	Responsibility	Roadway Improvement Project Number
50	By 2030	Power Line Trail	SH 86 (5th St) to Crowfoot Valley Rd	Multi-Use Trail	Low-stress connector	Parks and Recreation and Developer	
51	By 2030	Prairie Hawk Dr	Melting Snow to Wolfensberger Rd	Bike Lane/Shoulder	On-street facility	Town	19
52	By 2030	Prairie Hawk Dr	Realignment along Atchison Way and extend from Topeka	Bike Lane/Shoulder	On-street facility	Town and Developer	14
53	By 2030	Prairie Hawk Dr Realignment/PS Miller Trail	Overpass/Underpass	Overpass/Underpass	Overpass/Underpass	Developer	14
54	By 2030	Prairie Hawk Dr south of Fence Post Dr	Overpass/Underpass	Overpass/Underpass	Overpass/Underpass	Town	
55	By 2030	Prairie Hawk Dr/PS Miller Trail	Overpass/Underpass	Overpass/Underpass	Overpass/Underpass	Developer	
56	By 2030	Second St	N Gilbert St to Perry St (Festival Park)	Sharrow Route	On-street facility	Town	
57	By 2030	SH 86 (Founders Pkwy)	Ridge Rd to Enderud Blvd (north and south sides)	Multi-Use Sidepath	Low-stress connector	CDOT, Town, Developer	18
58	By 2030	Trail Boss Dr	Founders Pkwy to Woodlands Blvd	Bike Lane/Shoulder	On-street facility	Town	
59	By 2030	West Frontage Rd	Realignment between Town Limits and Plum Creek Pkwy	Bike Lane/Shoulder	On-street facility	Town and Developer	15
60	By 2030	Wolfensberger Rd	Prairie Hawk Dr to Wilcox	Multi-Use Sidepath	Low-stress connector	Town, CDOT	
61	By Full Build	Cherry Creek Trail Extension	SH 86 to Castlewood Canyon State Park	Multi-Use Trail	Low-stress connector	County	
62	By Full Build	Crowfoot Valley Rd/Power Line Trail	Overpass/Underpass	Overpass/Underpass	Overpass/Underpass	Parks and Recreation	17
63	By Full Build	Dawson Ridge	Loop connection west from Dawson Ridge Blvd	Bike Lane/Shoulder	On-street facility	Developer	
64	By Full Build	Diamond Ridge Connection	Sapphire Pointe Blvd to Castle Rock Pkwy	TBD	TBD	Town, County	
65	By Full Build	East Plum Creek Trail Extension	Castle View High School north (ultimately to Chatfield State	Multi-Use Trail	Low-stress connector	Parks and Recreation and	
66	By Full Build	Fifth Street	Between Woodlands Blvd and Founders Pkwy	Multi-Use Sidepath	On-street facility	Town	28
67	By Full Build	Founders Pkwy	Copper Cloud Dr to SH 86	Multi-Use Sidepath	Low-stress connector	Developer, CDOT, Town	27
68	By Full Build	Founders Pkwy	Crimson Sky Dr to Crowfoot Valley Rd (east side only)	Multi-Use Sidepath	Low-stress connector	CDOT and Town	27
69	By Full Build	Founders Pkwy	Rising Sun Dr to Crowfoot Valley Rd (west side only)	Multi-Use Sidepath	Low-stress connector	Developer, CDOT, Town	27
70	By Full Build	Lake Gulch Rd	Plum Creek Pkwy to Crystal Valley Pkwy	Bike Lane/Shoulder	On-street facility	Town, County	
71	By Full Build	Lantern Circle	Mikelson Blvd to Mikelson Blvd	Bike Lane/Shoulder	On-street facility	Town	
72	By Full Build	Lantern Trail	Enderud Blvd to Mikelson Blvd	Bike Lane/Shoulder	On-street facility	Town	
73	By Full Build	Liggett Rd	Extension south to Wolfensberger Rd via Caprice Dr	Bike Lane/Shoulder	On-street facility	Town	24
74	By Full Build	Liggett Rd	Hwy 85 to new extension	Bike Lane/Shoulder	On-street facility	Town	25
75	By Full Build	Meadows Pkwy	Meadows Blvd to Bridge	Bike Lane/Shoulder	On-street facility	Town, CIP	26
76	By Full Build	Memmen Trail Extension	Ridge Road to Memmen Trail	Multi-Use Trail	Low-stress connector	Developer	
77	By Full Build	Mitchell Creek Trail Extension	Killen Ave to Castlewood Canyon State Park	Multi-Use Trail	Low-stress connector	Parks and Recreation	
78	By Full Build	Perry St	Extension south to East Frontage Rd	Bike Lane/Shoulder	On-street facility	Town	29
79	By Full Build	Prairie Hawk Dr/Red Hawk Trail	Underpass	Overpass/Underpass	Overpass/Underpass	Parks and Recreation	
80	By Full Build	Ridge Rd	Plum Creek Pkwy to Appleton Way (west side only)	Bike Lane/Shoulder	On-street facility	Developer	30
81	By Full Build	SH 86 (Fifth St)/Mitchell Creek Trail	Overpass/Underpass	Overpass/Underpass	Overpass/Underpass	Parks and Recreation	
82	By Full Build	US 85	Castle Rock Pkwy to Meadows Pkwy	Multi-Use Path	Low-stress connector	Town	16
83	By Full Build	Valley Dr	Fifth Street and Hover Dr	Bike Lane/Shoulder	On-street facility	Town	
84	By Full Build	Valley Dr	Hover Drive to Hudson Lane	Bike Lane/Shoulder	On-street facility	Town	31
85	By Full Build	Valley Dr	Hudson Ln to Plum Creek Pkwy	Bike Lane/Shoulder	On-street facility	Town	

Pedestrian Improvement Projects

Project ID No.	Horizon	Facility	Segment	Sidewalk gaps (may not be consistent though entirety of Roadway Project Segment)	Responsibility	Roadway Improvement Project Number
1	By 2022	Crystal Valley Pkwy	Frontage Rd to Idylwood Rd	Castlemaine Ct to W Loop Rd	Under construction	1
2	By 2022	Fifth Street	Gilbert St to Woodlands Blvd	Woodlands Blvd to Founders Pkwy	Town	2
3	By 2022	Founders Pkwy	Woodlands Blvd to Crowfoot Valley Rd (north side only)	Full segment on north side	Town CIP/TIP	3
4	By 2022	Lanterns Development	Loop connection from Crystal Valley Pkwy	Full segment	Developer	4
5	By 2022	Plum Creek Pkwy	Gilbert Street to Ridge Rd	Full segment on south side	Town CIP	5
6	By 2022	Prairie Hawk Dr	Meadows Blvd to Melting Snow	Full segment	Developer	6
7	By 2022	Ridge Rd	US 86 (Fifth St) to Plum Creek Pkwy	Full segment on south/west side	Town CIP	7
8	By 2022	Wolfensberger Rd	MAC Entrance (west of Coachline) to Prairie Hawk Dr	Full segment	Town CIP	8
9	By 2030	Coachline Rd	Meadows Blvd to Wolfensberger Rd	Full segment	Town	
10	By 2030	Crowfoot Valley Rd	Founders Blvd to Town Limits	Full segment on south side	Town and Developer	17
11	By 2030	East Frontage Rd	Plum Creek Pkwy to Crystal Valley Pkwy	Full segment	Town	22
12	By 2030	Factory Shops Blvd	Promenade Pkwy to Meadows Pkwy	Full segment on east side	Town	
13	By 2030	Meadows Blvd	Painthorse Dr to Meadows Pkwy	Gaps throughout segment	Town	
14	By 2030	Mikelson Blvd	Lantern Cir to Mitchel Park	Full segment on west side	Town	
15	By 2030	N Meadows Dr	Meadows Blvd to US 85	North half of segment	Town and Developer	21
16	By 2030	N Mitchell St/Mitchell St	Mikelson Blvd to Admore St	Full segment on south/east side	Town	
17	By 2030	Perry St	Plum Creek Pkwy to South St	Full segment on west side	Town	
18	By 2030	Pine Canyon Development	Connection from Founders Pkwy to Woodlands Blvd	Full segment	Developer	11
19	By 2030	Pine Canyon/Pioneer Ranch Developments	Connection from Woodlands Blvd to Front St	Full segment	Developer	10
20	By 2030	Pine Canyon/Pioneer Ranch Developments	Woodlands Blvd connection	Full segment	Developer	12
21	By 2030	Pioneer Ranch Development	Connection from Founders Pkwy to Woodlands Blvd	Full segment	Developer	13
22	By 2030	Plum Creek Pkwy	Wolfensberger Rd to I-25	South segment between Wolfensberger Rd and Red Hawk Dr and north segment between Red Hawk Dr and I-25	Town and Developer	9
23	By 2030	Prairie Hawk Dr	Melting Snow to Wolfensberger Rd	Full segment on east side	Town	19
24	By 2030	Prairie Hawk Dr	Realignment along Atchison Way and extend from Topeka Way to Plum Creek Pkwy	Full segment	Town and Developer	14
25	By 2030	Rosecrown Ave	Waverton Ranch Rd to Butterfield Crossing Dr	Full segment on east side	Town	
26	By 2030	SH 86 (Founders Pkwy)	Ridge Rd to Enderud Blvd	Gaps throughout segment	CDOT, Town, Developer	18
27	By 2030	West Frontage Rd	Realignment between Town Limits and Plum Creek Pkwy	Full segment	Town and Developer	15
28	By 2030	Woodlands Blvd	Scott Blvd to Fifth St	Full segment on east side	Town	
29	By Full Build	Castle Oaks Dr	Autumn Sage St to Pleasant View Dr	Full segment	Town	
30	By Full Build	Emerald Dr	Plum Creek Blvd to Plum Creek Pkwy	Full segment on east side	Town	
31	By Full Build	Fifth Street	Between Woodlands Blvd and Founders Pkwy	Full segment	Town	28
32	By Full Build	Founders Pkwy	Crowfoot Valley Rd to US 86 (Fifth St)	Gaps throughout segment	Developer, CDOT, Town	27
33	By Full Build	Gambel Ridge Dr	Dawson Ridge Loop	Full segment	Town	
34	By Full Build	Heritage Ave	Bancroft Dr to Enderud Blvd	Gaps throughout segment	Town	
35	By Full Build	Liggett Rd	Extension south to Wolfensberger Rd via Caprice Dr	Full segment	Town	24
36	By Full Build	Liggett Rd	Hwy 85 to new Liggett Rd extension	Full segment	Town	25
37	By Full Build	Perry St	Extension south to East Frontage Rd	Full segment	Town	29
38	By Full Build	Plum Creek Blvd	Cherry Plum Way to Plum Creek Pkwy	Gaps throughout segment	Town	
39	By Full Build	Santa Fe Dr	Promenade Pkwy to I-25	Gaps throughout segment	Town	
40	By Full Build	Sapphire Point Blvd/Diamond Ridge	Mesa Dr to Crowfoot Valley Rd	Full segment	Town	
41	By Full Build	US 85	Widen from Promenade Pkwy to Town Limits	Full segment	Town	16
42	By Full Build	Valley Dr	Hover Drive to Hudson Lane	Full segment	Town	31
43	By Full Build	Valley View Dr	Autumn Sage St to SH 86	Full segment	Developer	

ITS, TDM, and Recommended Studies Project List

Project ID No.	Horizon	Project	Description
Intelligent Transportation Systems (ITS)			
1	By 2022	Traffic Operations Center	Construct new facility in Public Works building expansion
2	By 2022	Traffic Signal Retiming	Conduct signal retiming study along Meadows Pkwy and Founders Pkwy between Red Hawk Dr and Crowfoot Valley Rd
3	By 2022	Traffic Signal Upgrades	Install travel time monitoring devices and closed circuit televisions
4	By 2030	Dynamic Signage	Look to install dynamic signage along busy corridors
Transportation Demand Management (TDM)			
1	By 2022	Bustang Park-n-Ride	Establish a new Park-n-Ride to serve Bustang service
2	By 2022	Promote Car/Vanpooling	Work with partner agencies to promote and expand car/vanpooling opportunities for commuters
3	By 2030	New Park-n-Ride Lot	Partner with Douglas County to explore additional Park-n-Ride lots
Studies			
1	By 2022	Downtown Mobility Study	Conduct study to improve downtown access and mobility
2	By 2022	I-25 Interchange Feasibility Study	Conduct study to examine the I-25 and Black Feather Tr area interchange
3	By Full Build	Transit Feasibility Study	Conduct study to explore extent of community support and vision for transit in Town

Appendix B – Public Comment Summaries

FELSBURG HOLT & ULLEVIG
connecting and enhancing communities

February 14, 2017

PUBLIC COMMENT SUMMARY MEETING 1

SUBJECT: Town of Castle Rock Transportation Master Plan
FHU Reference No. 15-398-01

A robust public involvement plan has been developed and implemented to collect public input throughout the development of the Transportation Master Plan. A variety of means and tools have been used to collect public comment to date, including:

- Transportation Master Plan Open House – November 16, 2016
- Interactive Web-Based Map Comment Tool – Active November through January
- On-line Survey – Active November through January
- Town of Castle Rock Transportation Master Plan Website – Including project team contact
- Town of Castle Rock Facebook Announcements
- Public Mailing Announcements

To date, a significant collection of public comments have been received (approximately 164 comments). The comments have varied in topic, by travel means, and in specificity. Attached is a table containing all of the comments received, along with the date, source, and main issue area. The comments received through the public involvement process represent observations from interested members of the public who have chosen to participate in the planning process.

The comments have been classified into key issue areas with the comments focused on the following general themes:

- Roadway (41% of comments) – Including comments identifying:
    - Areas of roadway congestion
    - Need for better roadway connectivity; including additional access points to I-25
    - Observations about poor signal timings
    - Identification of locations where traffic signals are needed
    - Issues with intersection queuing and inadequate storage lengths
    - Locations where on-street parking is a concern
- Bike/Ped (33% of comments) – Including comments identifying:
    - A desire for more focus on bicycle facilities Townwide
    - Locations of missing on-street bicycle facilities
    - Locations of missing sidewalks and trail connections
- Transit (18% of comments) – Including comments identifying:
    - A desire for the Town to provide local transit options
    - A desire for commuter transit options to the greater Denver area; including potential participation in RTD

6300 South Syracuse Way, Suite 600 Centennial, CO 80111 tel 303.721.1440 fax 303.721.0832
www.fhueng.com info@fhueng.com

- Rail (1 comment) – The comment relates to the existing railroad through Town
- Development (8% of comments) – Including comments regarding land development trends in Town and parking requirements of private developers at the time of approvals

The travel mode specific comments will serve as a critical starting point during the development of network recommendations for the Transportation Master Plan. In particular, the roadway, bicycle/pedestrian, and transit comments will be used to identify local infrastructure needs. In some cases, the comments received relate to topics outside of the direct purview of this Plan. Some examples include comments regarding signal timing (due to the specific nature of these changes and the regional nature of the plan), winter maintenance, and development related comments (which are addressed in the Comprehensive Plan). In the cases where the Transportation Master Plan cannot adequately address or influence individual comments, Town staff has been forwarded this memorandum for action.

Comment	Date	Source	Comment	Issue Area
1	11/10/2016	Email	As a shuttle driver with The CR Senior Activity Center, my riders have expressed their concern for the lack of mobility in Castle Rock. They have mentioned on more than one occasion how effective the shuttle the town had and discontinued several years ago was. The Center is now the only source of transportation for these seniors, and although we have several vehicles for this purpose, and do it very efficiently, we cannot accomidate all of their requests. This service is essential for their continued ability to live and strive in your community, not to mention the people who commute to Denver each day, creating unnecessary traffic on the additional roads you have planned. My cost effective idea would be simply to lobby the residents of Castle Rock for the need of public transportation, not unlike my community of Parker who have realized the value of such a service. Thank you for this consideration from a driver who understands these challenges of not only seniors, but of the general frustrations of residents as well.	Transit
2	11/15/2016	Facebook	I say free zip lines from mtn/hill to mtn/hill peak 😁 I do think there needs to be a light or 4 way stop on wolfensberger by the grave yard.	Roadway
3	11/15/2016	Facebook	Let's get a bus system running from downtown cr up to the outlets and around town	Transit
4	11/15/2016	Facebook	Make the drivers happier and cyclists feel safer. Put bikes lane everyone.	Bike/Ped
5	11/15/2016	Facebook	Get the free bus up and running again!	Transit
6	11/15/2016	Facebook	There needs to be a light on wolfensberger or a 4 way stop by the cemetery asap!	Roadway
7	11/16/2016	Email	My wife and I have lived in Castle Rock for nine years and love it here. We are in Red Hawk filing #3 in a house way too big for us but we love the views. Over the years we have been here the “on the street” parking on Red Hawk Drive near Wolfensberger has progressively gotten worse. It is not just an eye sore it is dangerous when pedestrians and cars are darting out of the townhome entrance. Now with more development on the West side of Red Hawk Drive it is probably going to get worse. Red Hawk Drive is becoming more of a major thoroughfare and should be kept clear for emergency and maintenance vehicles. My comment or suggestion is that I would love to see more multi-family developments in town, just please require adequate on property parking to keep our streets safer and better kept. Now for the question. At some point we want to downsize and get closer to the town center so we can bike to the restaurants and shops. I happened to play golf with a long term transportation planner that mentioned eventually the freight train traffic was going to be moved out of the Castle Rock corridor and there would likely just be single commuter rail passing through town. How do I find out which rail would be going away? We are not in a hurry to move but if we knew where the rail line might be moving from I would buy a lot for a future home for us now and just wait it out.	Roadway
8	11/16/2016	Email	Disappointing on the rail news, I could not care less about the passenger train, I was just hoping to lose the freight activity and possibly gain a rails to trails recreational opportunity.	Bike/Ped
9	11/15/2016	Email	Are there plans to bring light rail to Castle Rock? I am considering a home in Castle Rock but the traffic into Denver is horrible and getting worse, what does Castle Rock have connecting commuters to the infrastructure of the Denver metro?	Transit
10	11/16/2016	Open House	Vision - "A safe" should not use the word unless you mean it now. No sidewalk on 5th St from Woodlands to Ridge Rd 3 years too long	Bike/Ped
11	11/16/2016	Open House	Need a left turn light from Plum Creek Pkwy to Plum Creek Blvd	Roadway
12	11/16/2016	Open House	On and off ramps to I-25 from Santa Fe and Black Feather Trail	Roadway
13	11/16/2016	Open House	Right turn on green arrow only from Home Depot Center onto I-25 north	Roadway
14	11/16/2016	Open House	Founders needs a bike land or path between SH 86 and Crowfoot. Nowhere to safely ride	Roadway
15	11/16/2016	Open House	Need light at Wolfensberger & Plum Creek	Roadway
16	11/16/2016	Open House	Need light at Wolfensberger & Red Hawk	Roadway

Comment	Date	Source	Comment	Issue Area
17	11/16/2016	Open House	Widen Plum Creek west of railroad to Wolfensberger	Roadway
18	11/16/2016	Open House	Need light/left turn signals on Front Street & Canyon	Roadway
19	11/16/2016	Open House	Need light/left turn signals on Front Street & Oakwood St	Roadway
20	11/16/2016	Open House	There is a bicycle path over Wolfensberger just west of Plum Creek?	Bike/Ped
21	11/16/2016	Open House	Signage needed on Front St so bikers/walkers know that there is a trail on west side of Front St. More access points (end of Canyon) would also help.	Bike/Ped
22	11/16/2016	Open House	E Frontage Road needs widened from Crystal Calley to Plum Creek Pkwy for bikes	Bike/Ped
23	11/16/2016	Open House	If you live in Terrain, there is no safe way to ride a bicycle. Not on Founders, not on Ridge Rd, and not on 86 either way.	Bike/Ped
24	11/16/2016	Open House	Bike lanes up and down Founders Pkwy to and from Terrain. This is a bike friendly city - right? Look at what Lone Tree has done.	Bike/Ped
25	11/16/2016	Open House	Roundabout is not well marked to direct people to Outlets and Promenade area	Roadway
26	11/16/2016	Open House	We do not need a roundabout at 3rd and Perry! I don't see that as a priority project.	Roadway
27	11/16/2016	Open House	Interchange at Wolfensberger/I-25/Wilcox is dangerous!!	Roadway
28	11/16/2016	Open House	Heavy trucks continue to use Lake Gulch Rd/Plum Creek as a bypass to I-25 and Parker Rd - supposedly to avoid the CHP weigh stations. This a a dangerous practice on a winding 2-lane road.	Roadway
29	11/16/2016	Open House	Need a signal at Valley Drive and 5th Street to facilitate northbound lefts accessing 5th Street	Roadway
30	11/16/2016	Open House	The Valley Drive snow route is not enforced leading to unsafe road conditions	Roadway
31	11/16/2016	Open House	Left turn storage is needed on northbound Prairie Hawk accessing the Charter School	Roadway
32	11/16/2016	Open House	I-25 is congested south of Crystal Valley	Roadway
33	11/16/2016	Open House	Meadows Blvd is congested over Plum Creek	Roadway
34	11/16/2016	Open House #1	As I mentioned in person this evening, the fact that we have no public transportation options has us already behind the curve. It is my impression, based on my recent experience living for 8 years in the Bay Area of CA (where in my previous city of Palo Alto we also recently worked extensively on a Master Transp. Plan) that in the next decades to come people will be sharing much more. We are only beginning to see the onset of some major economic shifts to a sharing economy and transportation will be <u>massively</u> affected by the shift. We should be offering EVERY possible MODE of public transportation @ reduced costs to ensure that citizens are mobile and that Castle Rock can be a hub or connection for citizens and outsiders en route elsewhere alike. Bicycle and pedestrian pathways <u>need to be</u> prioritized. NOT AN AFTERTHOUGHT - please!! Traffic or congestion issues are truly only a concern for the very near future as it is inevitable that due to already existing traffic + congestion as well as increasing populations #s as well as increases in costs of living + transportation people will change their primary means of transportation from individual car ownership to car sharing &/or public transportation. We must be ready for it!! - shared car parking lots - HOV lanes for buses & public trans - Bike lanes EVERYWHERE!! - A light rail, etc. Another quick note that I feel a bicycle (and a public trans) focused sub-committee would be an asset to the community and to those working on future planning for our town.	Bike/Ped/Transit
35	11/16/2016	Open House	Need to have more options nearby to get to work in downtown Denver due to traffic issues and cost of parking in the downtown area (cost of housing limits people who can live closer to work). Placement of signal light on Valley and Fifth St. - traffic is increasing rapidly, hard to get out of subdivision onto 5th. Dangerous intersection - Also turn lane onto Valley and onto Fifth going east needs better, larger storage.	Transit/Roadway
36	11/16/2016	Open House	Potential lite rail options Separate bike lanes from roads	Transit/Bike/Ped
37	11/16/2016	Open House	Left turn (arrow) signal needed on Plum Creek Pkwy turning from E. to South Plum Ck Drive residential area	Roadway

Comment	Date	Source	Comment	Issue Area
38	11/16/2016	Open House	Move the post office out of current downtown location! (Better spot might be Ligget Rd.!)	Development
39	11/16/2016	Open House	Because this affects my neighborhood a traffic light on 5th & Valley. It can take up to 6-7 minutes to get out on 5th. Sometimes there are 10+ cars waiting to get out on 5th from Valley. Also, turn signals need to be adjusted. It once took me 15 minutes to get through the intersection of 85 & Meadows. There are some signals that only allow 1 car to get through.	Roadway
40	11/16/2016	Open House	Public Transit in city, region w/pt to pt options. Transit such as Access-a-ride locally for individuals with disabilities, beyond seniors.	Transit
41	11/16/2016	Open House	Interconnect neighborhoods, i.e., Woodlands to Founders Limit downtown development. Adding apartment traffic on already congested streets Make certain right of way easement are adequate for projected population	Development
42	11/16/2016	Open House	-Get ahead on projects, have less dense housing. -Make developer pay more, and yes I know they are paying more in 2017. -Have infrastructure in before development, too fast growth, not enough roads, stop piling on commercial on top of each other, especially on Founders.	Development
43	11/16/2016	Open House	All streets need sidewalks. Connect bike paths. Provide public transportation. All grocery stores are not near pedestrian walkways at this time. You must have a car to get food, clothes, drugs or other necessities. As the citizens age, they need help to get around, i.e., public transit. Castle Rock is not a very pedestrian friendly town.	Bike/Ped/ Transit
44	11/16/2016	Open House	1. Increase tax base to speed up 5-year plan projects. Construction of new streets/improvements is <u>too slow</u>. Several projects planned for the next 5 years need to be completed <u>now</u>. 2. Get Castle Rock to join RTD. The council needs to endorse joining RTD with <u>enthusiasm</u>. Without the support of the city the conservative voters in this town will not approve the tax increase. We have no mass transit to Denver. 3. Ask Greyhound bus lines to renew stopping in Castle Rock.	Transit
45	11/16/2016	Open House	Provide regional transit service, especially CR to DTC and to downtown Denver. Future parking structures should accommodate multimodal connections, i.e., bus (or future rail), bike lanes & bike storage, and good sidewalk connections for pedestrians. Designers should be allowed to pay in-lieu fees toward the construction of a multimodal parking structure, rather than constructing individual, non-public garages or lots. Continue to expand off-street bike/ped trails that connect to regional trail facilities. Ensure that all sidewalks & curb cuts are ADA compliant.	Transit/Bike/Ped
46	11/16/2016	Open House	I would like to see public transportation such as "small buses" going from Founders, Castlewood Ranch & Terrain to area where Target is located. Also to downtown area.	Transit
47	11/16/2016	Open House	Study feasability of extending Allen St. to the new Castle Rock interchange. Connect Woodlands Blvd. Add lanes left & rt turn into the charter school on Prairie Hawk. Two left turn lanes onto Wolfenberger from Prairie Hawk.	Roadway
48	11/30/2016	Web Comment	Kinner St south of Wolfensberger Rd - Need a sidewalk.	Bike/Ped
49	11/30/2016	Web Comment	Founders Pkwy West of I-25 - congestion	Roadway
50	11/30/2016	Web Comment	General Transit - Light Rail connection to Denver	Transit
51	11/30/2016	Web Comment	General Pedestrian/Bicycle - Trail/Bike path system (not on main streets) to connect the entire city.	Bike/Ped
52	11/30/2016	Web Comment	Expand Daniels Park from Santa Fe to Castle Pines Parkway to include bike lanes each direction.	Bike/Ped
53	11/30/2016	Web Comment	US 85 west of North Daniels Park Rd - A bike/walking path parallel to Santa Fe.	Bike/Ped
54	11/30/2016	Web Comment	US 85 and North Daniels Park Rd - A stop light at Daniels Park and Santa Fe.	Roadway

Comment	Date	Source	Comment	Issue Area
55	11/30/2016	Web Comment	3rd St and Perry St - No to a roundbout..it will cause traffic to back up on all street due to people too scared to go.	Roadway
56	11/30/2016	Web Comment	5th St and Perry St - Don't widen fifth street! It will lose it's charm and what's left of the small town feel.	Roadway
57	11/30/2016	Web Comment	Founders Pkwy and Front St - Longer left turn at the light. Changes too fast	Roadway
58	11/30/2016	Web Comment	Founders Pkwy and Trail Boss Dr - Better timing of lights..Takes too long to turn green	Roadway
59	11/30/2016	Web Comment	Founders Pkwy and Allen Way - The three lanes where Allen intersects with Founders on the north side. The far right should be marked for right turn and entry onto I-25 north only (there IS a solid white line). The middle should be straight or right turn onto westbound lanes.	Roadway
60	11/30/2016	Web Comment	Add bike lanes in each direction on S. Lake Gulch Road between Plum Creek Pkwy and Crystal Valley Pkwy or beyond.	Bike/Ped
61	11/30/2016	Web Comment	East Plum Creek Pkwy east of South Wilcox St - glad to see plum creek dip gone	Roadway
62	11/30/2016	Web Comment	US 85 and Castlegate Dr North - Why do the bike lanes on North Meadows stop at the intersection with Santa Fe? It was just built!	Bike/Ped
63	11/30/2016	Web Comment	I-25 and Crystal Valley Pkwy - The crystal valley interchange needs to be a very high priority for the town	Roadway
64	11/30/2016	Web Comment	West Plum Creek Pkwy West of I-25 - There are a high number of bicycles on Plum Creek to Wolfensburger. We should consider making a wide bike lane as funds become available	Bike/Ped
65	11/30/2016	Web Comment	West Plum Creek Pkwy and Auburn Dr - This intersection is challenging for pedestrians and it is becoming more commonly used as pedestrians walk to PSM park. Is it possible to put in a bridge similar to what is connecting PSM to Ridgeline open space over Wolfensburger	Bike/Ped
66	11/30/2016	Web Comment	SH86 west of High Point Rd - This road needs to be a four lane instead of the current two	Roadway
67	11/30/2016	Web Comment	Auburn Dr north of Castle Highlands Pkwy - This road needs to be a no parking zone. There are so many cars on the street that it is difficult to navigate and the school bus drops kids here as well.	Roadway
68	11/30/2016	Web Comment	General Transit - Keep the town out of RTD. It costs to much and is unlikely to provide services we need. No need to recreate CATCO either.	Transit
69	11/30/2016	Web Comment	Red Hawk Dr and Lincoln Mountain Dr - This should be a no parking zone	Roadway
70	11/30/2016	Web Comment	West Plum Creek Pkwy and Granger Ct - Can we connect the path to PSM all the way down plum creek, on the south side of plum creek, to Wolfensburger and then south on Wolfensburger to the west entrance of PSM	Bike/Ped
71	11/30/2016	Web Comment	Perry St and Union Pacific Railroad Crossing south of 8th St - Don't waste the money on a "quite zone" for the train tracks. Ever.	Rail
72	11/30/2016	Web Comment	South of 2nd St and East of Wilcox St in Festival Park - Charge every new developer a minimum $10 million transportation improvement surcharge that goes directly to transportation funds...above and beyond what they already pay.	Development
73	11/30/2016	Web Comment	EB Plum Creek at the I-25 SB on ramp and frontage road alignment needs to be redesigned	Roadway
74	11/30/2016	Web Comment	Prairie Hawk Dr south of Sky Rock Way - Adding a sidewalk to Prairie Hawk where high school students walk every day to get to school.	Bike/Ped
75	11/30/2016	Web Comment	US 85 and Meadows Pkwy - Making a double left turn lane at north bound Santa Fe to west bound Meadows.	Roadway
76	11/30/2016	Web Comment	Founders Pkwy and Trail Boss Dr - Adding a right turn lane at south bound Trail Boss Dr and Founders Parkway.	Roadway
77	11/30/2016	Web Comment	North Meadows Dr and Butterfield Crossing Dr - Adding right turn lane at south bound Meadows Dr and Butterfield Crossing Dr	Roadway
78	11/30/2016	Web Comment	Meadows Blvd east of Factory Shops Blvd - Cars exiting in the very right lane of the southbound I-25 off ramp should NOT be able to cross all 4 lanes of traffic to turn left at N. Castleton Dr.	Roadway

Comment	Date	Source	Comment	Issue Area
79	11/30/2016	Web Comment	Public Transit (Heavy Rail) - I realize this isn't something the town can do on its own but we really do need a non-car way of getting to Denver and/or Colo Springs. So how about two transit stations in town, one here (Meadows Pkwy and US 85) and another one to the south.	Transit
80	11/30/2016	Web Comment	Northwest of Merry Rest Way in The Meadows - Add 8' wide (or 6' at a min) concrete path down to new development so walkers don't cut up the hill. Add one connector to the new area to the south off of N Meadows Dr and a new connector to the north to the north area of North Meadows Drive.	Bike/Ped
81	11/30/2016	Web Comment	General Transit - Restart bus service with BusStang to replace old FREX stop. Why does the service not stop in CR? It should, the old service was very popular.	Transit
82	11/30/2016	Web Comment	Southwest of Founders Pkwy and East of Front St, North of Scott Blvd - Road development in this new subdivision(s) should follow existing terrain and remove the least amount of hills/pines, do not allow Orange County style grading where everything is flattened. To many other developments in CR require way to much dozing.	Development
83	11/30/2016	Web Comment	Crystal Valley Pkwy west of Loop Rd - Add bike lanes all along Crystal Valley Parkway, especially since new roads going in	Bike/Ped
84	11/30/2016	Web Comment	Northwest of Fifth St and SH 86 intersection - Build a trail system to connect the ridge along Founders where Terrain and Founders Village are to the downtown area. Right now, the only way to get there is to get in the car and drive down 5th or walk/ride down 5th which is not safe.	Bike/Ped
85	11/30/2016	Web Comment	Ban car and vendor parking along Wolfensburger and Red Hawk. Reduced visibility creates accident potential.	Roadway
86	11/30/2016	Web Comment	5th St west of Reservoir Rd - 5th street very unsafe for walking along	Bike/Ped
87	11/30/2016	Web Comment	Ban vendor and car parking at Red Hawk and Wolfensburger. Creates low visibility when trying to turn east.	Roadway
88	11/30/2016	Web Comment	5th St east of Woodlands Blvd - Complete missing sidewalks & trail connections	Bike/Ped
89	11/30/2016	Web Comment	Would be helpful if Woodlands missing link could be completed	Roadway
90	11/30/2016	Web Comment	SH 86 east of Founders Pkwy - Please do not blow up these beautiful rock formations.	Development
91	11/30/2016	Web Comment	Castle Oaks Dr northwest of Autumn Sage St - Work better with developments on designing dirt trails. Starwood Development ended up making a very fragmented dirt trail system and could tell amateurs build it. Give them tips and suggestions on what to do with existing terrain.	Bike/Ped
92	11/30/2016	Web Comment	Founders Pkwy north of Crimson Sky Dr - Work better with CDOT on creating bike lanes on their roads, it's over due for this road. Founders gets heavy with bicycle traffic on warm days and have seen many close calls with cars and bikes.	Bike/Ped
93	11/30/2016	Web Comment	SH 86 and Fifth St - This intersection is getting quite busy now during rush hour. Longer waits and will only get worse with all the new development. Not sure what fixes besides limit development in this area as there appears to be not enough room to expand.	Roadway
94	11/30/2016	Web Comment	South Wilcox St and 2nd St - Downtown parking is horrible as is, and adding a lot of cars downtown with the huge buildings without a plan for parking is a horrible idea. Get a parking plan first, then allow building. The town is allowing the opposite right now.	Development
95	11/30/2016	Web Comment	North Liggett Rd west of I-25 - If over 1 million sqft of commercial/retail is going in this area, need a new exit here as most of that traffic will most likely go to Founders and that is an overloaded road now.	Roadway
96	11/30/2016	Web Comment	Southwest of Founders Pkwy and east of Front St - The proposed trail system for these two developments is very weak. Suggest they build a more robust trail network that takes advantage of the ridge line. Afraid you will allow stripping of all vegetation like Terrain is doing which is sad.	Bike/Ped

Comment	Date	Source	Comment	Issue Area
97	11/30/2016	Web Comment	East Enderud Blvd and Lantern Trail - We need to upgrade and manage bike paths. Cars and bikes never mix well, cars have to share the road with the bikes. However the bikes don't want to share the road with the cars! Keep them as far away from each other as possible!	Bike/Ped
98	12/8/2016	Survey Comment	lightrail (although that ship may have sailed) parking	Transit
99	11/4/2016	Email	Perhaps as a precursor, I would like to bring two matters to your attention. 1. As one drives east on Butterfield Crossing Dr. and come to the T-intersection with Meadows Blvd, attempting to turn left (north) is impeded by landscaping in the island on Meadows Blvd making it difficult to see northbound oncoming traffic. 2. Southside sidewalk on Meadows Pkwy going under railroad, as one approaches the parking lot to the trails for Plum Creek had sunken. It is often flooded or iced over and impassable to foot traffic.	Roadway/Bike/Ped
100	12/8/2016	Survey Comment	The intersection of Founders Pkwy and Crowfoot has become very congested throughout the day, but particularly at rush hour. Is there a plan to add a lane in either direction (turning left from Founders onto Crowfoot or from Crowfoot onto Founders)?	Roadway
101	12/20/2016	Survey Comment	The light timing is horrible. There are potholes ALL ALONG Butterfield Crossing, in the meadows. I'm surprised no one has files a small claim for damages.	Roadway
102	12/13/2016	Survey Comment	All the changes to castle rock and the downtown castle rock area will cause the area to lose its charm. Not that anyone cares about that or those of us who have lived here a lifetime. The only concerns seems to be to add more roads and mor housing to accommodate more money and more people-- which will cause castle rock to be like every other town along I25 to the point you can't tell the difference in between towns. Sad that so much history will be ignored and pushed aside for "progress and more money".	Development
103	12/20/2016	Survey Comment	Invest in more trees along roadways	Roadway/Bike/Ped
104	12/20/2016	Survey Comment	we need to invest heavily in trails	Bike/Ped
104	12/21/2016	Survey Comment	If Woodlands Blvd is connected please do not make the connection 4 lanes. Front Street and Founders parkway are the major transportation avenues. 4 lane connector of Woodlands will just make for more congestion.	Roadway
105	12/21/2016	Survey Comment	Wider and more bike lanes along all major roads and side streets to stop some of the car congestion	Bike/Ped
106	12/20/2016	Facebook	Too late now, you've ruined what made Castle Rock a once great place to live. Founders Pkwy has become a freeway!! I'd like more alternative roads to lighten the load off founders. Scott/woodland should connect to founders (where that sharp turn is by the rec center). It will once they develop that entire area. There are plans in the works for two more developments that will ensure every inch of land between Front Street and Founders is covered in houses and apartment buildings. Stop the madness 😄 Too Many People Need public transportation! RTD light rail No Make the meadows a meadow again. Bulldoze it Again? They already have.	Development/Roadway /Transit

Comment	Date	Source	Comment	Issue Area
106 cont	12/20/2016	Facebook	Stop all the building Quality vs quantity Small family oriented. Slow pace of life Why did the clean air shuttle lose funding or go out of service? Better light timing STOP THE BUILDING! From what I've heard there have been 50,000 new residences approved. No clue on the timeline, but still. Ugh :(Expeditious traffic flowm Public Transportation Needed! Light rail and bulldoze some track homes Incorporate Taxi or cab services in Castle Rock for transportation. Affordable transportation please.	Development/Transit/Roadway
107	12/22/2016	Survey Comment	More public transportation options in Castle Rock	Transit
108	1/10/2017	Web Comment	Fully synchronized traffic signals, with a master computer controlled system.	Roadway
109	1/10/2017	Web Comment	Bike lanes on every street.	Bike
110	1/10/2017	Web Comment	Return the free bus system, but improve headways.	Transit
111	1/10/2017	Web Comment	Adjacent sidewalks required of all developments before construction begins.	Development/Bike/Ped
112	1/10/2017	Web Comment	Bus route to the DTC	Transit
113	1/10/2017	Web Comment	Widen the Frontage road to Crystal valley	Roadway
114	1/10/2017	Web Comment	Transpiration to the light rail. RTD service.	Transit
115	1/10/2017	Web Comment	North of Meadows Pkwy, West of Factory Shops Blvd, East of US 85 - Leaving the Mod Pizza mad greens complex, a turnout directly onto meadows for west bound traffic.	Development
116	1/10/2017	Web Comment	It is very dangerous crossing the street in Downtown Castle Rock as a pedestrian. We only have pedestrian crossing signals at places that currently have stop lights, and even then, cars have a green light and can turn when pedestrians have the "walk" sign	Roadway
117	1/10/2017	Web Comment	a roundabout on 3rd/Perry will eat up far too many parking spaces in an area that is already ridiculously low in parking options for customers. Parking is consumed by business owners and their employees all day long leaving precious few for customers.	Roadway
118	1/10/2017	Web Comment	roundabout on 3rd/Perry will eat up FAR too many parking places. We are DESPERATE for downtown parking for customers. As it is, downtown parking is consumed by business owners and their employees.. please, please don't use up more	Roadway
119	1/10/2017	Web Comment	The busstang that travels up and down 25 would be great if it stopped in Castle Rock for those who can't drive. We have family who due to an accident can no longer drive on I25. It would be easier for them to use the busstang than the light rail.	Transit
120	1/10/2017	Web Comment	Meadows Pkwy east of Limelight Ave - Southside sidewalk on Meadows Pkwy going under railroad, as one approaches the parking lot to the trails for Plum Creek had sunken. It is often flooded or iced over and impassable to foot traffic.	Bike/Ped
121	1/10/2017	Web Comment	Light rail, and RTD service!!	Transit
122	1/10/2017	Web Comment	Sidewalks in the downtown are too narrow - there are poles in the middle of the walks and many other obstacles. Make new development replace narrow sidewalks with wide 10 feet or wider walks.	Ped
123	1/10/2017	Web Comment	Walking downtown at night is scary. Its too dark in many places. I don't feel safe having to walk from my car to a restuarant.	Ped
124	1/10/2017	Web Comment	There is no bike parking downtown. I will not ride a $2,000 bike downtown without a place to lock it up and know it will be there when I return. Install new bike racks or lockers so I know my bike is safe when I'm eating at a restuarant.	Bike
125	1/10/2017	Web Comment	East Enderud Blvd just east of Heritage Ave - Cars do not stop when I walk my kids to school and we are in a crosswalk.	Ped
126	1/10/2017	Web Comment	2nd Street just West of railroad tracks - None of the sidewalks downtown cross the railroad tracks to connect the homes to downtown. this makes pushing strollers hard when I want to eat at a restuarant with my baby	Ped

Comment	Date	Source	Comment	Issue Area
127	1/10/2017	Web Comment	Founders Pkwy west of Ridge Rd - Biking on the east side of town is difficult. There is no continuous trail along Founders. This is a safety issue.	Bike
128	1/10/2017	Web Comment	Downtown sidewalks are too dark to walk around at night - more lighting is needed	Ped
129	1/10/2017	Web Comment	Prohibit bicycles on Highway 86.. too dangerous.	Bike
130	1/10/2017	Web Comment	E. Wolfensberger Rd and Red Hawk Dr - We really need a traffic light here. This is a dangerous intersection. Cars shouldn't be allowed to park along Red Hawk Ridge Dr.	Roadway
131	1/10/2017	Web Comment	Meadows Blvd and Low Meadows Blvd - This intersection needs a traffic light...very difficult to turn left onto Meadows Blvd.	Roadway
132	1/10/2017	Web Comment	Extend East Plum Creek Trail all the way to C470	Bike
133	1/10/2017	Web Comment	5th Street and Perry Street - Roundabouts are a good idea to keep traffic slow and orderly. That intersection at 5th and Perry can be like a raceway with people trying to beat you off the line to cut in front of you for a right turn on wilcox	Roadway
134	1/17/2017	Survey Comment	Put in more bike lanes/paths	Bike
135	1/17/2017	Survey Comment	Don't forget about the cyclists on the roadways! Please improve the bike lanes or remember to add them when building new roads or expanding old ones.	Bike
136	1/19/2017	Web Comment	You need a bike lane on Frontage road the heads south past Medved. City induced traffic in the CVR area and a speed limit of 55mph are going to cause cyclist deaths as the population increases. Lake Gulch road need to have bike lane. I dont care if you say it is a county road. The city of Castle Rock is causing the hazard by increasing the population and traffic leading to this area. You have to take the lead on this before you kill a cyclist. An option is to provide a path from CVR into the city. Contact the local cycling club, 6202, to help maintain it.	Bike
137	1/19/2017	Web Comment	To help prevent traffic accidents on highway 25, several large, wide reflective banners need to painted across the traffic lanes In several areas entering and exiting the city. Speed enforcement is needed with CSP taking violators off the highway to write enforcement.	Roadway
138	1/19/2017	Web Comment	You need more entrances into communities. Crystal valley is a prefect example. 2 ways in and out. Perfect for creating traffic jams. Lake Gulch needs to be widened with a bike land. Stop unrestrained growth. Stop modifying master plan by stuffing more homes with communities. You are creating traffic, example clearly seen at the meadows.	Roadway/Development
139	2/14/2017	Comment Form	I personally think that on the I-25 highway they should extend the lightrail to open up more ways of transportation and to get another option for getting to Denver.	Transit
140	2/14/2017	Comment Form	Need more bike lanes on major roads: Founders and Fifth Street. Need public transportation. With Castle Rock being a bedroom community we need safe trails, bike lanes, and public transportation for youth and seniors who don't drive.	Bike/Ped/Transit
141	2/14/2017	Comment Form	I know we don't like RTD, we need to either join RTD or buy a bus and help people get to and from Denver because we love to build housed we need to do something before gridlock sets in!	Transit

FELSBURG HOLT & ULLEVIG
connecting and enhancing communities

May 18, 2017

PUBLIC COMMENT SUMMARY MEETING 2

SUBJECT: Town of Castle Rock Transportation Master Plan
FHU Reference No. 15-398-01

A robust public involvement plan has been developed and implemented to collect public input throughout the development of the Transportation Master Plan. This memorandum summarizes comments collected at and following the second public meeting. A variety of means and tools have been used to collect public comment, including:

- Transportation Master Plan Open House – April 19, 2017
- On-line Survey – Active April through May
- Town of Castle Rock Transportation Master Plan Website – Including project team contact
- Town of Castle Rock Facebook Announcements
- Public Mailing Announcements

Twenty-five comments were collected during and following the second public meeting. The comments have varied in topic, by travel means, and in specificity. Attached is a table containing all of the comments received, along with the date, source, and main issue areas. The comments received through the public involvement process represent observations from interested members of the public who have chosen to participate in the planning process.

The comments have been classified into key issue areas with the comments focused on the following general themes:

- Roadway (32% of comments) – Including comments:
    - In support and against additional roundabouts at specific locations
    - In support of additional access points to I-25; especially the proposed Crystal Valley interchange
    - Regarding signal timing at specific intersections
- Bike/Ped (16% of comments) – Including comments:
    - In support of enhanced pedestrian crossing of particular roadways/intersections
- Transit (30% of comments) – Including comments:
    - Encouraging the Town to provide local transit options
    - Expressing a desire for commuter transit options to the greater Denver area; including potential participation in RTD
    - Against providing additional transit and participation in RTD
- Development (22% of comments) – Including comments regarding land development trends in Town and parking requirements of private developers at the time of approvals

6300 South Syracuse Way, Suite 600 Centennial, CO 80111 tel 303.721.1440 fax 303.721.0832
www.fhueng.com info@fhueng.com

In general, comments were supportive of the direction of the Transportation Master Plan. In some cases, the comments received relate to topics outside of the direct purview of this Plan. Some examples include development related comments (which are addressed in the Comprehensive Plan). In the cases where the Transportation Master Plan cannot adequately address or influence individual comments, Town staff has been forwarded this memorandum for action.

Comment	Date	Source	Comment	Issue Area
1	4/19/2017	Public Meeting	A roundabout at Coachline and Wolfensberger is going to more of a pain than the present 4 way stop. The change to a 4 way was a great improvement - better than a traffic light. Completion of the signal crosswalk at the park and the Native Trail is essential. It needs to be completed as soon as possible.	Roadway Pedestrian
2	4/19/2017	Public Meeting	Looks good so far. I like the additions/conversion to roundabouts. I am disappointed about the urgency of the growth here - land use. I think we should be more proactive in keep our environment open.	Roadway Development
3	4/19/2017	Public Meeting	I am so pleased to see the progress since Nov. As far as I am seeing the town is moving in the right direction. Thank you for listing public transit services & even more so for proposing: - The Bustang Stop excellent!! - New Park & Ride lots and the county transit assessment & transit feasibility studys - Please conduct them!! We need more public transport options!! The bicycle improvements map is VERY encouraging to me - I am somewhere between "strong & fearless" & "enthused & confident" and would love to see much more bicycle traffic - lanes & sharrows will probably help. The additional I-25 exit sounds like a great idea & thank you once again for involving the community & requesting our feedback.	Transit Bicycle Roadway
4	4/19/2017	Public Meeting	*The Town of Castle Rock is missing the basic service of public transportation. Residents of all ages need this very basic service. *Have we looked at all options with RTD since the year we voted all out of the RTD District? Our population has grown extensively since that the and it needs to be revisited. *It was a huge mistake to sell our local buses for pennies on the dollar in 2010. *This is a basic service that every citizen deserves. No differt then police/fire safety. We cannot depend on everyone else to solve this problem. *While improving the roadway system - ped. system and bicycle planning are very important - so is public transportation. Town Council needs to raise their awareness in this area. Most of our surveys have need addressed public transportation to the extent they need too.	Transit
5	4/19/2017	Public Meeting	-Crystal Valley Parkway interchange should be completed as quickly as possible. -NO RTD PARTICIPATION - Not Bustang, not light rail, not bussing. We would simply subsidize the system for others use. Stay away! -Work with the town to increase development fees (massively) on infill projects/ developments to fund additional projects. -Eliminate the taxi voucher service.	Roadway Transit Development
6	4/23/2017	Website Comment	There is so much that needs to be done sooner, rather than later. I see so many areas of improvement that are experiencing problems now that won't get relief for 2,3 or more years hence. For example, the new Crystal Valley interchange is really needed now so that all those people don't have to funnel through Castle Rock downtown every morning and night. Most of the studies and predictions assume use of the private automobile as the mode of transport. I wonder what is going to happen when I-25 becomes a daily parking lot from Castle Rock to Denver on a daily basis. We can build feeder streets etc., but the interstate can't accommodate much more capacity. I can appreciate Castle Rock's interest in doing studies to evaluate transit, but I'm not sure that studies will change people's minds in this community. I really think that the Town Council should become an advocate for joining RTD, but I am skeptical about that ever happening in my lifetime. I see every other municipality around Denver being a part of RTD and having service already, except for us. Also, we have no connections to Colorado Springs and the surrounding areas. I wonder if there is any possibility to getting Greyhound to stop here again. We used to have some regular service through them. In short, it's almost impossible to go somewhere without a car. Pedestrian and bicycle improvements are nice but not very practical for at least half of the year and will not move large numbers of people.	Roadway Transit

Comment	Date	Source	Comment	Issue Area
7	4/22/2017	Website Comment	I find them rather confusing, will need to study more. However, besides the Bustang I think we need to aggressively pursue joining RTD.	Transit
8	4/21/2017	Website Comment	When is Alberta Development Partners, LLC going to finish their contractual work on Meadows Pkwy?	Roadway
9	4/21/2017	Website Comment	I find it interesting that under "Transit", you state that in 2005, Castle Rock residents opted out of RTD, but you fail to mention that in 2010, the Castle Rock Town Council voted to end funding for the contracted town transit {CATCO} and ear-marked that funding and future expenditures to the N. Meadows Ext. Project.	Transit
10	4/21/2017	Website Comment	I like them	General
11	4/21/2017	Website Comment	Hopefully they will prove effective. So many cars in CR now make it hard to get around in a timely manner, so something needs to be done, and these improvements seem decent.	General
12	4/26/2017	Website Comment	If possible the Crystal Valley Interchange project should be designed, and timed to go forward along with the I-25 expansion project. If the interchange project is to be done first, it's design should incorporate I-25 expansion plan design elements.	Roadway
13	4/27/2017	Website Comment	I think the roundabouts are dangerous, especially when they are tightly designed with minimal space between lanes / interchanges. The Roundabouts near the Promenade are dangerous and poorly marked. As are the lanes from Castle Rock Parkway to US85. A roundabout at Wolfensberger and Plum Creek is not necessary - and the stop signs have effectively minimized traffic accidents there. I feel there is no need to add a roundabout at that intersection. A traffic light would be more appropriate, and probably cost less. Crowfoot and Founders needs to be addressed- quickly. Traffic there is brutal - especially during rush hour and the dinner hour. And PLEASE add a stop sign at the intersection near Target / Chik Fil A - teens blow through the stop sign coming out of target all the time and almost hit the left turning traffic (whom has no stop sign) all the time. All this growth has caused a mess for our town. It's sad that you're now just addressing it by adding unnecessary projects. Save the money and use it elsewhere. Make our Railroad crossings safer. Mark our busy roads better with Pedestrian Crossings, and well designed lane lines - add cross lights at Wolfensberger and Plum Creek rather than the roundabout. Forget the round about at 3rd and Perry it's too tight there and will be very difficult to maneuver. The idea is to bring MORE foot traffic, and visitors to downtown, not chase them away!!!!	Roadway Development Pedestrian
14	4/27/2017	Website Comment	Seem to be rather benign and will not address the actual traffic problems facing the town. The planning committee may be getting bullied by the developers like the Meadows to allow additional housing by rezoning parcels of land without truly accounting for the additional people it will add. Additionally, the clustering of businesses has created more of a problem than the planning considered. Additionally, Castle Rock should be working with surrounding towns to help provide additional options for transportation such as bike paths from Castle Rock to Denver and working with RTD to ensure there will be routes provided immediately upon passing the RTD (chicken or egg argument).	Development Bicycle Transit
15	4/27/2017	Website Comment	We definitely need to revisit the public transportation and light rail issues. Times.have changed and with more folks commuting north we need more public transportation options. I think we need to.break the plans down to.5 & 10 year increments, not TWENTY THREE years... growth is massive here and we need to address changes more frequently.	Transit

Comment	Date	Source	Comment	Issue Area
16	4/27/2017	Website Comment	I think the town under-estimates what that future impact will be. With the current growth issues we are facing today, between the town and CDOT, everyone is at least 5 years behind what needs to be done today. From watching the town council meetings on some of the new residential/commercial projects getting approved, some of the biggest complaints during public comments are about the parking and traffic issues. It's becoming a snowball effect with each new project and the problem is getting worse and worse. Especially with downtown, each new project that is being built, there's a negative affect on available parking. I think it was wrong to approve the Riverfront project with just enough parking for their building with possible over-flow to the street from the apartments alone. I know there's a parking study being done now, but that's at least 3 years too late. The town can't keep approving project after project downtown when there is no dedicated parking required with each new project. With event's happening downtown almost every weekend during the warm months, this needs to be high on the priority list with very short term solutions to improve the issue. I know my family and other's have limited what they go to because of the parking hassle. This will be the Achilles heel to having a vibrant downtown or and OK downtown. The amount of commercial that is being proposed along founders with the two new developments there are going to make the crowfoot/founders and founders/5th/ridge even worse that what is currently being projected in your 2040 study. Even looking at the required traffic studies for all the proposed projects, each one shows different projections for common reviewed area's. They are even using 5-7 year old data for some intersections because there one day count didn't yield results in their favor. There should be a multiple day count required as each day is different and I feel they pick days they know typically have lower traffic counts such as Fridays since people either have off or work from home more that day. There's been too many mis-steps on allowing dense commercial/resi projects to go forward and ignoring the complaints about traffic issues that keep getting raised during every community survey, open house and public comment. Until I see some real progress being made on the current traffic issues, I have little faith that the Town can handle what they are projecting for the future.	Development
17	4/27/2017	Website Comment	Sounds great and badly needed ! Would like to see a plan to bring back something similar to the Clean Air Shuttle we used to have. With more and more teenagers now in town, it would be great for them to be able to get around. Also to cut down on Drinking and Driving! We need public transportation around town - with the freeway in the middle, it makes getting around by foot and bicycle really hard and dangerous!	Transit
18	4/27/2017	Website Comment	I think instead of a round a bout at wolfensburger and plum creek there should be a stop light instead. Additionally I would like to see a stop light at Coachline and Foothills instead of a 4 way stop. Signal lights near the new Kings Soooooers and the Outlet Mall need to be revaluated and retimed as traffic in that area is increasing daily.	Roadway
19	4/27/2017	Website Comment	Take care of the current problems first, please. There is a trail head that is supposed to cross the street at a blind curve to go to Bluefield Park. There are 2 signs that point to non-existent crosswalks on opposite sides of the road, but there is no crosswalk! Cars fly around that blind curve at 55mph and no one stops. The closest stop light is 1/2 mile away. Someone is going to be killed trying to get to the park (this is the park the concerts are at, the Easter egg hunt, etc., which makes it all the more baffling that there's not a crossing light), the swimming pool, Meadowview Elem, etc. This has been an issue for nearly 15 years, but has never been addressed. Instead, there's now going to be another 160 homes built behind the blind curve! There needs to be a stop light with a crosswalk at Springmeadow and Meadows. Also, N. Meadows should have been built as 4 lanes; this road is already busy. It seems like CR's growth plan is equivalent to a money-hungry horse chasing an over-crowded cart toward the edge of a dried-up well.	Pedestrian Roadway

Comment	Date	Source	Comment	Issue Area
20	4/27/2017	Website Comment	It all looks great! The team behind this has clearly been very thoughtful in planning for our towns future. Though I don't look forward to construction, I know it will lead to our town being a more practical place to live. Thanks for the hard work!	General
21	4/28/2017	Website Comment	I think your ideas are good. However, my biggest concern is not having any public transportation. We have so many new stores coming to town and not enough people who are willing to work for those type of wages. You need public transportation to bring in people who are willing to work for those wages. I believe you will see a lot of empty businesses because they can't find enough employees.	Transit
22	4/28/2017	Website Comment	Too many roundabouts! One at Allen and Founders? That's ridiculous. Most people don't even use them properly and that area is already a disaster. I do not see how a roundabout would improve or make the area any safer. I see ZERO plans for downtown pedestrians. As traffic increases it's becoming more dangerous for pedestrians. I see nothing about improving or widening Sante Fe near castle pines. We have so much traffic buildup there and it will only increase as more developments are built. Also, Daniels Park and Sante Fe?!? A light is NEEDED! Also, this needs to get in the hands of more residents and more time provided to respond.	Roadway Pedestrian
23	4/29/2017	Website Comment	I think not making changes to the plan on an annual basis seems too infrequent.	General
24	5/2/2017	Website Comment	A good start. Would really support exploring transit with RTD.	Transit
25	5/2/2017	Website Comment	• I don’t live in those neighborhood (clearly, no one does yet :-) but I am someone who would benefit from the completion of the connection as a way to access the Founders Parkway Commercial area. The turns off of and onto Front Street en route to Founders are often EXTREMELY backed up. Further, it would allow me to get to that part of “town” and home again without having to wait on the train. • In addition, I’m sure all of the persons trying to make lefts onto Front Street from neighborhoods with one way stop intersections (For example, Canyon and Oakwood Drives) would appreciate a safer, faster alternative – and I would appreciate not having to deal with the unsafe decisions some of them make out of frustration. • Finally, there’s a new School being built that backs to Woodlands Blvd just off Founders as well as more development near Target, both of which will add more strain to the aforementioned intersections.	Roadway
26	4/27/2017	E-mail	I know tonight is limited to just the zoning issue, but I had some ideas on the traffic concerns that were raised at the last meeting. I also personally had concerns after I tried to cross the street recently at the one crosswalk in front of the elementary school, and a car just drove through the cross walk while I was in it. I‘m not sure people understand where the one crosswalk is and they don’t always stop. Also, there is a blind curve at the top of the hill near Woodlands. It can be scary. So the traffic concerns are legitimate. These are some ideas that might help our safety concerns; • Only allow a right turn for people coming out of the church driveway when turning onto Canyon. • Put in noticeable pedestrian crossing signs, something like we have downtown, at the current stop sign/crosswalk and further up the street.	Pedestrian Roadway

FELSBURG HOLT & ULLEVIG
connecting and enhancing communities

August 15, 2017

PUBLIC COMMENT SUMMARY – DRAFT PLAN

SUBJECT: Town of Castle Rock Transportation Master Plan
FHU Reference No. 15-398-01

A robust public involvement plan has been developed and implemented to collect public input throughout the development of the Transportation Master Plan. This memorandum summarizes comments collected after release of the Draft Transportation Master Plan. The Plan was posted to the Town of Castle Rock Transportation Master Plan Website along with project team contact information for those wishing to provide feedback.

Twelve comments were collected regarding the Draft Transportation Master Plan. The comments varied in topic, by travel means, and in specificity. Attached is a table containing all of the comments received, along with the date, source, and main issue areas. The comments received through the public involvement process represent observations from interested members of the public who have chosen to participate in the planning process.

The comments have been classified into key issue areas with the comments focused on the following general themes:

- Roadway (44% of comments) – Including comments:
  - Regarding roadway connections for Diamond Ridge, Sapphire Pointe, and The Meadows
  - Supporting the Woodlands Blvd and Prairie Hawk Dr extensions
- Bike/Ped (32% of comments) – Including comments:
  - In support of enhanced bicycle and pedestrian facilities
- Transit (12% of comments) – Including comments:
  - Encouraging the Town to provide local transit options
  - In favor of future Bustang stops for commuters
- Development (12% of comments) – Including comments regarding land development trends in Town

In general, comments were supportive of the direction of the Transportation Master Plan. In some cases, the comments received relate to topics outside of the direct purview of this Plan. Some examples include development related comments (which are addressed in the Comprehensive Plan). In the cases where the Transportation Master Plan cannot adequately address or influence individual comments, Town staff has been forwarded this memorandum for action.

6300 South Syracuse Way, Suite 600 Centennial, CO 80111 tel 303.721.1440 fax 303.721.0832
www.fhueng.com info@fhueng.com

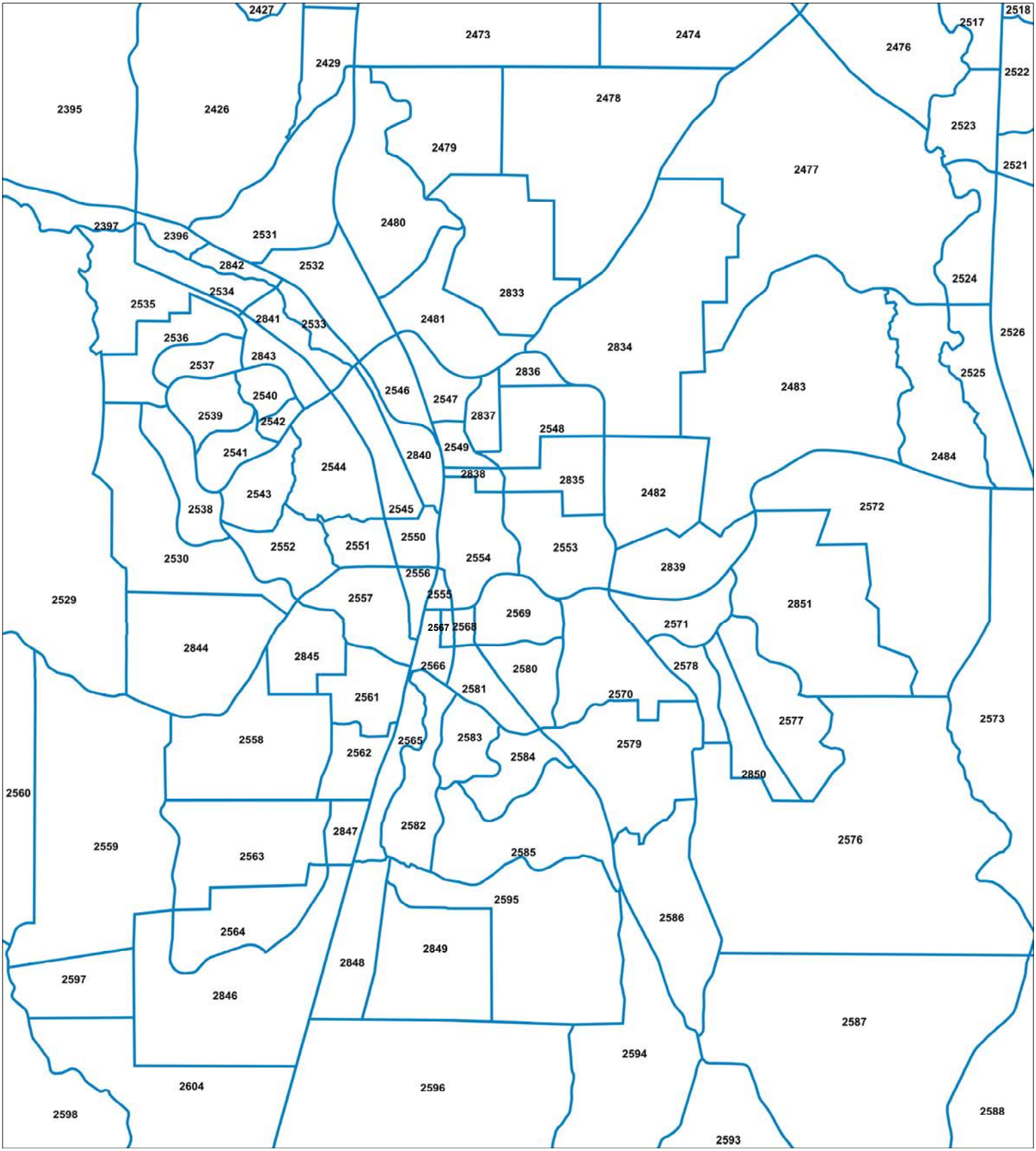
Comment	Date	Source	Comment	Issue Area
1	7/27/2017	Website Comment	Something needs to be done to give easier access to Diamond Ridge and Sapphire Pointe residents to I-25. Access either needs to be allowed through Happy Canyon, or north of there. Doing something would help reduce the traffic congestion on Crowfoot Valley Road and Founders Pkwy, as well as make the commute for residents of those neighborhoods more practical. Widening Hwy 86 between Founders Pkwy and Parker Rd should be part of future plans as well.	Roadway
2	7/27/2017	Website Comment	Does the design for the N Meadows improvements (#21 or #26) include wideing or extending the Left turn lane? i.e. East bound Meadows onto Northbound Santa Fe (Hwy 85)? It's the only turn in the intersection that's not 2 lanes. It requires wider bridge to add the lanes.	Roadway
3	7/27/2017	Website Comment	As a resident of Castle Rock for over 11 years, it's a shame what the town has done to create a traffic cluster due to poor planning. There really doesn't need to be wider roads if stores, restaurants and local public transportation were planned out better. 1. People love to walk, ride bikes to places to eat, shop, have coffee, hang out with friends. Instead of providing close proximity of these things, people have to drive. The movie theater area would have been a perfect place for more places to eat (NON-FOOD CHAINS as we have enough) and provide a Sprouts/Trader Joe's. That would have been the smart thing to do instead of a State Farm, Senior Living, Orange Theory Fitness. The Maverick gas station was a huge A+! Instead of more houses next to the town homes in the Meadows, that should have been kept as commerical businesses that people could walk to enjoy the beautiful view of the mountains. 2. There are no local shuttles provided to residents on the weekends to take people to the outlets, Soopers, Target, MAC, etc. This would run on the hour/half-hour from stops at the Grange, School, Hospital, Taft House, etc. Also, in the evenings going to downtown Castle Rock so people can drink/eat and not drive. What a concept to have weekend public transportation! POOR PLANNING HAS CAUSED A TRAFFIC CLUSTER AND IS ONLY GETTING WORSE. What happened to taking into consideration of the carbon footprint and ozone?! I see the sign on Hwy 85 every day, yet Castle Rock has zero common sense for any kind of planning to reduce people needing to drive everywhere. Maybe reverse planning is in order instead of wider roads and more cars.	Pedestrian Bicycle Transit

Comment	Date	Source	Comment	Issue Area
4	7/28/2017	Website Comment	Your transportation plan is a band-aid on a huge, gaping, terminal wound. The Town should have come up with more responsible and reasonable development planning guidelines years ago, instead of zealously striving with greedy developers to build sprawl on every square foot of land. Castle Rock has forever lost its "small town" charm and warmth; no more original buildings, businesses, manageable communities. It has morphed into the same Front Range sprawl that is plaguing Colorado everywhere, and it has all the same horrible impacts - traffic congestion, crime, overcrowding, and it is sucking the Denver Basin water dry. The traffic plan is going to ruin more private property and businesses owners' lives, cost all taxpayers hundreds of millions of dollars, make elected officials and developers richer, and the proposed roadway projects will predictably fall far short of any expectations and fail in less than 5 years of completion. The Town is a terrible neighbor to its unincorporated Douglas County neighbors and is ruining its citizens' lives. Want some examples? How about the Riverwalk and other high rise buildings in downtown Castle Rock? A cookie-cutter knock-off of Lone Tree and downtown Denver, and no parking. How about the sprawl that will surround Philip S. Miller Park, which was a real gem for the Town. And then there's Promenade - what a mess! This highly touted "upscale shopping experience" is a nightmare, a mish-mash of too much curbing/guttering and roundabouts; you can't walk to anything - you have to drive in what is one of the most highly congested and polluted areas in Castle Rock. What a disgrace. Wake up! We're running out of land and water. I suggest the Town take a pause, review what you've done, and think about revising your long-term goals; consider scaling back, slowing down, and give serious thought to revising your unsustainable vision for Castle Rock and surrounding communities.	Development
5	7/28/2017	Website Comment	A couple of observations...-looks like the bulk of the bicycle paths consists of white painted stripes on widened asphalt cross sections made for autos and trucks-looks like the potential impact of autonomous cars may not have been considered in the Plan-how the transportation funding scenarios sink with the funding needed for water, education and health care will be an interesting community discussion	BicycleRoadway

Comment	Date	Source	Comment	Issue Area
6	7/28/2017	Website Comment	Please start heading the calls to slow down the development and stop cramming in as many homes and commercial space as possible. Founders from Crowfoot to 5th should never be made into a six lane highway. I have asked many neighbors if they knew this was in the plans and not one of them knew that. They said they would probably look to move elsewhere if that happens with the increase of traffic noise and congestion. The three options that were presented to fix the founders issue, the first two are something that was never intended and the recommended third option may relieve some of the traffic but because of the cramming that has been approved, will still be bad. Also, please do not put any commercial/retail along founders between crowfoot and 5th except what has already been approved. You are only adding to the problem with the submitted plans under review for the new developments along that area. Please work better with the developers on the planned trail systems within the neighborhoods. They consider normal sidewalks as "trails" and when they actually do a nature trail, 90% of it is under the power lines so you hear a constent buzzing sound. Not very nature like. We complain to the town and we are told to talk to the developer and they just ignore us. Things like this gives the town the reputation that they are very developer friendly and let them over-promise and under deliver. Overall, looking at past traffic plans and what the reality has been with the growth, I don't trust many of the studies that are done. I think that most of the numbers used for future estimates are under estimating what it will actually be. Reading some of the traffic plans that the developers do, you allow them to submit studies with various ways of estimating traffic. This includes one day counts (i would expect a multi-day count to get a valid sample), there are times that the counting device malfunctions so they use numbers and estimated growth from 5-10 years ago. Reading three studies done from three developers all in the same area, each one had different estimates for traffic patterns on the same roads. A lot of the difference's I feel are because they are fitting those studies to fit around what they want to do. Things like this make it hard to see what the real impact is, hence the under-estimating comes into play. You are also looking at making changes to roadways (like six or eight lane express way) that people were trying to escape from when we moved here. With some of the future plans the town has for growth, I think a lot of people that have moved here over the past 10 years will not like what it will become, just like the people that have lived here for 20+ years don't like what Castle Rock is today. Pick an identity and stick with it, right now the identity is trying to fill in every open space possible with as many people possible.	Development
7	7/27/2017	Website Comment	Looks amazing! I love extending Woodlands and Prairie Hawk.	Roadway
8	7/27/2017	Website Comment	There is a need for a stoplight at Valley and 5th. This is a very difficult intersection to turn left onto 5th from Valley.	Roadway
9	8/1/2017	Website Comment	Would also like to see a sidewalk added on the south side of Coachline on the west side to enable families from The Meadows to access the MAC and south end of downtown by bike.	Bicycle
10	8/7/2017	Website Comment	Definitely in favor of the Bustang stop or stops! I have seen comments indicating that local residents do not want it to be easier for low income people from other places to come to Castle Rock. It's stupid, but maybe this concern could be addressed in some subtle way. Don't they realize that some local employers have to pay workers more due to transportation costs? Public transit must be seen as more convenient than personal vehicles.	Transit

Comment	Date	Source	Comment	Issue Area
11	8/10/2017	Website Comment	Meadows Parkway- when we moved in 5 yrs ago, we were told that it was going to be repaved after building was done- That will NEVER happen (you have taken every piece of land away- the main reason people moved to CR and blocked all views) then- at the last Open House - I was told that the Parkway was going to be upgraded to 6 lanes, that work on the parkway wasn't going to happen till the upgrade. Now I see the upgrade won't happen until 2027!- this roadway needs to be repaved!! there are more patches and open holes then actual concrete anymore. Regarding bike lanes.... Has anyone responsible for planning ACTUALLY ridden along Meadows Parkway or Boulevard? Just because you say there is a bike lane, does not mean one exists. There is NOT one bike lane logo from Coachline to the Maverick gas station indicating there is a bike lane. It clearly could not cost that much to add a few to alert drivers The road condition is ABSOLUTELY TERRIBLE AND UNSAFE for road bikes. Concrete gaps and patches that can easily cause a cyclist to lose control are prevalent the entire length of Meadows. The lane narrows to almost nothing where a sewer opening is present, not to mention the downward slope in the lane. Some sewer openings have debris screens that stick out enough to cause a loss of control. This So-called bike lane is TOO NARROW. What good is a bike lane that ends when Meadows continues under the rail bridge? Why not shrink the center median, (which is in some areas are full of weeds!!!) and widen the bike lane???? If Castle Rock is so Bicycle friendly, as the sign just off 25 states, why are there NO other signs reminding drivers to be cautious of cyclists... no matter how ignorant some cyclists can be!!! NOT ALL cyclists disobey the rules of the road!!! Have you thought about asking cyclists to participate in meetings and get our thoughts? I would be happy to contribute in bike lane development in Castle Rock. Something also has to be done with 85- I know that is not CR domain- but now with the increase of houses in CR and the parking lot of 25, more people are taking 85- which is now a parking lot (where it starts to down to 2 lanes again). The way the traffic/houses are- we have actually talked about moving out. Meadows parkway can also become a parking lot-especially on weekends- getting to the other side of 25 is sometimes impossible (unless you want to sit for 30 min). Red lights- (or at least a 4 way stop sign) needed and the outlets and Mc Donalds- the back up trying to get out of the McDonalds side is sometimes 8-10 cars deep. so people are making rights and getting on to Factory Shops BLVD and then making a U-turn at the Lowes- which sometimes is causing "close calls"- due to the Right turn on red coming out of Lowes- There is 2 lanes doing that and not expecting people to do U-turns. We can provide pictures for anything we have discussed if you need it. Thank you! So far the other improvements you have made appear to be good. Unfortunately the housing growth is faster than the road work. SLOW it down- every inch of CR does NOT need to be filled. Leave some land for the wildlife that was here way before us.	Roadway Bicycle
12	8/13/2017	Website Comment	When is the extension Prairie Hawk Drive going to be extended to Plum Creek Parkway -- to have a smooth connection from the Meadows to the South of Town? This needs to take place soon because getting to the South of Town is difficult and dangerous for big trucks, cars and people. The land is purchased and the project would not cause construction tie-ups.	Roadway

Appendix C – Travel Demand Model Land Use Data by TAZ


2427
2473
2474
2476
2517
2518
2429
2522
2395
2426
2478
2523
2479
2477
2521
2397
2396
2531
2480
2842
2532
2524
2534
2833
2535
2841
2533
2481
2526
2536
2834
2843
2537
2836
2525
2483
2540
2546
2547
2539
2542
2837
2548
2541
2549
2840
2484
2544
2838
2835
2543
2482
2538
2545
2572
2550
2552
2551
2553
2530
2554
2839
2556
2529
2557
2555
2851
2569
2567
2568
2571
2844
2845
2566
2580
2578
2561
2581
2570
2577
2573
2558
2565
2583
2579
2562
2584
2850
2560
2847
2582
2576
2559
2563
2585
2595
2586
2564
2849
2848
2597
2846
2587
2594
2604
2596
2588
2598
2593

TAZ	2015 Total Households	2015 Total Employment	2030 Total Households	2030 Total Employment	2040 Total Households	2040 Total Employment
2395	129	253	250	249	330	246
2396	8	0	9	0	9	0
2397	43	138	98	138	134	138
2425	1,224	297	1,442	278	1,587	266
2426	1,352	618	1,438	604	1,495	594
2427	1,133	214	1,231	204	1,297	198
2429	39	3	146	3	218	3
2477	438	274	798	290	1,038	300
2478	10	4	654	98	1,083	161
2479	57	6	149	4	211	2
2480	264	145	367	143	435	142
2481	455	1,187	875	1,245	1,155	1,284
2482	298	58	492	52	621	48
2483	102	45	281	41	400	38
2484	20	0	22	0	24	0
2524	129	2	371	2	532	2
2525	33	337	32	324	31	315
2529	336	73	416	71	470	70
2530	674	200	735	200	775	200
2531	571	517	723	522	825	525
2532	725	1,563	927	3,540	1,062	4,858
2533	13	124	12	524	12	791
2534	23	0	64	105	92	175
2535	71	0	203	12	291	20
2536	727	134	727	144	727	150
2537	398	118	398	108	398	101
2538	651	75	651	90	651	100
2539	338	0	434	54	498	0
2540	32	0	457	0	740	0
2541	156	16	329	51	444	74
2542	0	0	150	192	250	320
2543	191	0	564	28	812	0
2544	301	265	1,092	731	1,620	1,041
2545	1	2	1	15	1	24
2546	147	1,737	161	1,857	170	1,937
2547	134	1,604	134	1,724	134	1,804
2548	0	0	676	35	1,126	58
2549	228	5	348	326	428	540
2550	0	619	0	668	0	700
2551	514	65	554	65	580	65
2552	99	31	220	31	300	31
2553	446	104	497	90	531	80
2554	1,026	437	1,026	391	1,026	360
2555	116	611	166	675	200	717
2556	88	413	125	537	150	619
2557	412	787	543	1,032	630	1,196
2558	118	21	155	14	179	9
2559	280	54	530	39	697	29
2560	268	74	429	67	537	62
2561	42	3	84	493	112	819
2562	18	0	19	330	19	550
2563	125	26	125	26	125	26
2564	31	0	372	9	600	0
2565	53	151	236	453	358	655
2566	181	1,506	347	1,544	458	1,569
2567	129	1,187	135	1,194	139	1,199
2568	175	143	190	141	200	140
2569	493	88	527	215	550	300
2570	432	80	732	112	932	133
2571	209	315	509	531	709	675

TAZ	2015 Total Households	2015 Total Employment	2030 Total Households	2030 Total Employment	2040 Total Households	2040 Total Employment
2572	40	54	46	58	50	60
2573	131	96	147	97	158	98
2576	230	39	299	39	345	39
2577	714	96	714	124	714	142
2578	609	80	610	73	610	69
2579	444	32	665	31	813	31
2580	708	198	738	190	758	184
2581	233	285	299	300	343	310
2582	462	1,415	462	1,466	462	1,500
2583	627	109	641	104	650	101
2584	290	0	370	10	424	0
2585	190	23	344	100	446	151
2586	15	0	14	0	13	0
2587	22	0	21	0	21	0
2593	98	268	100	272	101	275
2594	40	17	41	15	42	13
2595	671	61	1,468	95	2,000	118
2596	477	41	489	57	497	68
2597	218	21	219	19	220	18
2598	169	55	284	54	361	53
2604	154	34	242	47	300	56
2833	1,055	60	1,090	60	1,114	60
2834	40	0	621	112	1,008	187
2835	0	0	570	326	950	543
2836	42	0	44	0	45	0
2837	440	173	440	173	440	173
2838	0	0	222	0	370	0
2839	55	20	400	47	630	65
2840	3	209	1	1,512	0	2,381
2841	0	0	0	42	0	70
2842	0	35	0	14	0	0
2843	0	316	0	676	0	916
2844	20	0	26	0	30	0
2845	5	125	42	134	66	140
2846	0	21	3,000	2,002	5,000	3,323
2847	0	0	0	1,119	0	1,865
2848	5	40	5	46	5	50
2849	0	0	720	35	1,200	58
2850	560	64	570	156	577	217
2851	925	200	1,525	235	1,925	258
Total	26,398	20,916	42,867	32,501	53,846	40,051

Appendix D – Comparison between Founders Pkwy Improvements and New Interchange Access Along I-25

FELSBURG HOLT & ULLEVIG
connecting and enhancing communities

March 22, 2017

MEMORANDUM

TO: Tom Reiff

FROM: Steven Marfitano
Elliot Sulsky

SUBJECT: Comparison between Founders Pkwy Improvements and New Interchange Access Along I-25, FHU Project No. 15-398-01

Needs Identification

Travel demand modeling completed during the Transportation Master Plan process has revealed significant future congestion along Founders Pkwy between I-25 and Crowfoot Valley Rd. The travel demand was determined using a refined version of the Denver Regional Council of Governments (DRCOG) regional travel demand model. The goal for the analysis was to determine future traffic demand at Full Build of the Town of Castle Rock (using the 2040 model as a basis). The following table provides the range of Existing and 2040 Full Build traffic forecasts on Founders Pkwy between I-25 and Crowfoot Valley Rd compared to other Front Range high-volume arterial streets and expressways for context.

Table 1 Traffic Volume Comparison

Road	Location	Jurisdiction	Existing Daily Traffic Volumes
Founders Pkwy	Between I-25 and Crowfoot Valley Rd	Castle Rock	47,300–29,800
Founders Pkwy	*Between I-25 and Crowfoot Valley Rd*	*Castle Rock*	*73,900–60,700 (2040 Full Build)*
US 85 (Santa Fe)	South of I-25	Denver	88,000
SH 83 (Parker Rd)	South of I-225 to Hampden Ave	Aurora	85,000
US 285 (Hampden Ave)	East of Sheridan Blvd	Lakewood	74,000
US 85 (Santa Fe)	South of US 285 (Hampden Ave)	Englewood	70,000
SH 88 (Arapahoe Rd)	East of I-25	Greenwood Village	68,000
SH 83 (Parker Rd)	North of Lincoln Ave	Parker	59,000
US 85 (Santa Fe)	South of Bowles Ave/Littleton Blvd	Littleton	54,000
SH 121 (Wadsworth Blvd)	South of Alameda Ave	Lakewood	52,000

6300 South Syracuse Way, Suite 600 Centennial, CO 80111 tel 303.721.1440 fax 303.721.0832
www.fhueng.com info@fhueng.com

As can be seen from this table, future volumes are expected to reach levels currently experienced along US 285, US 85, and SH 88. US 285 and US 85 are currently expressways with a combination of grade-separated interchanges and at-grade intersections.

For the Town of Castle Rock to maintain vehicle operations along Founders Pkwy consistent with Town goals, road system upgrades will be needed to handle future traffic volumes forecast at Full Build of the Town. As a 6-lane principal arterial with a planning-level capacity of 52,500, build-out forecasts would create volume capacity ratios in the range of 1.4 to 1.15.

Options Discussion

Three options have been identified aimed at either accommodating or alleviating future traffic volumes along the Founders Pkwy corridor. These options are described below and include a general description of the improvement, the anticipated effects on volumes and volume-to-capacity ratios along Founders Pkwy, the approximate range of cost to construct (not including right-of-way costs), and pros and cons for each option.

Option 1. Widen Founders Pkwy between I-25 and Crowfoot Valley Rd to 8 Lanes

Option 1 would widen Founders Pkwy to four through lanes in each direction, maintaining its current classification as a principal arterial with access provided with at-grade intersections. Assuming the same per-lane capacity as used for 4- or 6-lane principal arterials, and 8-lane arterial alternative would have a theoretical capacity of approximately 70,000 vehicles per day, approaching the 73,900 build-out forecast east of I-25. However, 8-lane arterial roadways with access provided by at-grade signalized intersections are not frequently seen in the Denver metropolitan area or in many other areas because of the traffic operational issues that limit their capacity and functionality. Key disadvantages of this option for Founders Pkwy include:

- The street width through signalized intersections necessitates long cross-street clearance intervals and very long pedestrian crossing times. Both of these reduce green-times that can be provided for Founders Pkwy traffic, resulting in reduced capacity per lane
- With the many signalized and unsignalized access points on Founders Pkwy, 8-lane roads cause safety and access issues related to drivers weaving across multiple lanes to make left- and right-turning movements.
- Constructing such a wide corridor (which would at times require four through lanes in each direction and two turn lanes, resulting in a ten-lane facility) would require significant right of way acquisition, drainage and water quality mitigation, and utility relocation. In addition, the roadway width and would create a major barrier for local crossing traffic and particularly for pedestrians and bicyclists.

Preliminary planning level construction cost estimates for **Option 1** are in the range of $15 to $25 million.

Option 2. Convert Founders Pkwy Between I-25 and Crowfoot Valley Rd to a 6-lane Expressway

Option 2 focuses on improvements to Founders Pkwy that will allow the corridor to serve anticipated Full Build roadway volumes. The option would convert the existing 6-lane arterial roadway into a 6-lane expressway by providing grade-separated interchanges at Front St and Woodlands Blvd, where a combination of Founders Pkwy and cross-street volumes are anticipated to be greatest. Full evaluation of the corridor would be necessary to determine how or if other minor street accesses would be restricted along the corridor, requiring local users to access adjacent properties via parallel collector facilities, such as Allen Way, Trail Boss Dr, and Sam

Walton Ln. This evaluation should use vehicle progression along the corridor to test the efficiency of maintaining individual accesses along the corridor.

By increasing the regional functionality of this facility and constructing critical interchanges, it is expected that Founders Pkwy would adequately handle future vehicle volumes at Full Build. At a planning level a typical expressway capacity threshold is 12,000 vpd per lane, or 72,000 vpd for a 6-lane expressway, approximately equal to the 73,900 vpd build-out forecasts at the highes volume segment of Founders Pkwy immediately east of I-25.

Roadway improvements associated with **Option 2** represent a significant change to the existing character and configuration of Founders Pkwy. This option would likely result in a corridor with diminished access to adjacent land uses, including full access closures and limiting access to right-turn movements at other locations. Additionally, construction-related impacts of this option to daily operations along the corridor would likely be significant.

Preliminary planning level construction cost estimates suggest that **Option 2** may cost between $70 and $80 million. This cost estimate assumes two interchanges (Front St and Woodlands Blvd, with cost range for a single point urban or diamond) and mainline Founders Pkwy upgrades to control access between I-25 and Crowfoot Valley Rd.

Option 3 Construct New Interchange to I-25 at Highway 85/Black Feather Trail

Option 3 focuses on providing new I-25 access at or south of the existing Highway 85/Black Feather Trail grade separated crossing.

- **Option 3a** would provide an interchange at the existing Highway 85/Black Feather Trail location. Close spacing between I-25 and Front St would require a unique intersection treatment at the crossing to accommodate future I-25 ramps and the Front St/Black Feather Trail intersection. A potential option is constructing two closely spaced roundabouts. Another concern is the close spacing between the I-25 interchanges at Founders Pkwy and this option. Highway 85, which is 0.9 miles, and may require unique solutions to address weaving along I-25. The intersection operations of this interchange option will require further analysis to determine the viability of the intersection configurations. Preliminary traffic demand forecasting indicates that this option will likely require widening of Liggett Rd and Black Feather Trail to four lanes each.

- **Option 3b** focuses on providing a new I-25 access at a location between the Highway 85 and Liggett Rd overpasses. It is anticipated that the new interchange would require extension west from I-25 to Liggett Rd and east to Front St. Potential options include constructing two closely spaced 2-lane roundabouts, a tight diamond interchange, a single point urban interchange (SPUI), or a diverging diamond interchange. By shifting the interchange further south than Option 3a, this alternative would provide better spacing between interchanges for weaving movements along I-25. The intersection operations of this interchange option would require further analysis to determine the viability of the intersection configurations. Preliminary traffic demand forecasting indicates that this option would require widening of Liggett Rd to four lanes.

It is anticipated that construction of this interchange would redirect significant traffic volumes away from Founders Blvd and toward the new interchange. Full Build traffic volumes along Founders Pkwy are expected to decrease from 73,900 vpd east of I-25 to 59,000 vpd east of I-25. This would result in a volume-to-capacity ratio of 1.12 on the highest volume section of Founders Pkwy just east of I-25, and volume-capacity ratios of less than 1.0 farther east.

In addition to relief to Founders Parkway, this interchange would also provide more direct access to future annexation parcels located east of I-25, increasing regional mobility. There is also an opportunity for this option to relieve traffic volumes along Meadows Pkwy west of I-25.

Preliminary planning level construction cost estimates and construction considerations for the two interchange options are:

- Preliminary construction cost estimates suggest that **Option 3a** may cost between $20 and $30 million dollars. This cost estimate assumes two closely spaced 2-lane roundabouts to reuse the existing Highway 85 overpass. This cost estimate does not include right-of-way acquisitions that may be required.

  Roadway improvements associated with **Option 3a** would use the existing Highway 85 crossing of I-25 while sparing significant improvements to Founders Pkwy. It is expected that intersection improvements will be required at Founders Pkwy/Front St, Founders Pkwy/Woodlands Blvd, and Meadows Pkwy/US 85 to accommodate altered travel patterns as drivers choose to use the new interchange.

- Preliminary planning level construction cost estimates suggest that **Option 3b** may cost between $30 and $40 million dollars. This cost estimate assumes a new 4-lane road between Liggett Rd and Front St with an interchange at I-25 (unknown type, cost for diamond). This cost estimate does not include right-of-way acquisitions that may be required.

  Roadway improvements associated with **Option 3b** would require the construction of a new interchange to I-25 while sparing significant improvements to Founders Pkwy. It is expected that intersection improvements would be required at Founders Pkwy/Front St, Founders Pkwy/Woodlands Blvd, and Meadows Pkwy/US 85 to accommodate altered travel patterns as drivers choose to use the new interchange. This option would provide the most direct access to future annexation parcels located east of I-25, increasing regional mobility.

Initial Alternatives Evaluation

Following is a high-level alternatives evaluation of the three options outlined above. Each option is given an initial comparative rating of **+**, +, **0**, **-** or **—** relative to each of four evaluation criteria.

Table 2 Initial Alternatives Evaluation

	Option 1 Widen Founder to 8 Lanes		Option 2 Upgrade Founders to an Expressway		Option 3 Provide a New Interchange on I-25	
Traffic Safety and Operations	-	Weaving issues Pedestrian crossing	+	Improves safety at major intersection	0	Improve safety and operations on Founders I-25 operations need analysis
Community and Business Impacts	—	Wide community barrier R.o.w. in entire corridor	-	Access reduced on Founders Pkwy	+	No reduced access on Founders Pkwy Interchange provides access for other development
Reduces Congestion	0	Theoretical capacity near forecasts; But expect lower capacity due to diminishing returns from new lanes	+	Improvement capacity near forecasts	+	Reduced volume approximately 10% over capacity on Founders Pkwy
Cost and Constructability	+	$15-25 Million Construction Highest r.o.w. costs Water quality, utility impacts	—	$70- 80 Million Construction Middle r.o.w. costs Challenging construction impacts	0	$20-40 Million Construction Lowest r.o.w. costs Construction impacts on I-25

Recommendation

Based on the high-level nature of the Transportation Master Plan process, many questions remain about the true impacts, feasibility, and cost of the three options. For purposes of this transportation planning process, it is recommended that a further study of the Founders Pkwy corridor and associated potential I-25 interchange be explored through a detailed feasibility study. This plan would include full evaluation of the Meadows Pkwy and Founders Pkwy corridor between Meadows Blvd and Crowfoot Valley Rd, including progression analysis along the entire corridor. The analysis would further refine, evaluate, and quantify the benefits, costs and impacts of each option, including the feasibility, benefits and impacts of different I-25 interchange locations and configurations.

Based on the initial planning level evaluation summarized above, **Option 3**, a new interchange on I-25, appears to have the greatest potential benefits to mobility in the area and it is recommended that this option be explored in greater detail. Several core reasons for this recommendation are that the interchange option would:

- provide substantial relief to Founders Pkwy and Meadows Pkwy
- preserve the function and character of the Founders Pkwy corridor
- provide enhanced regional connectivity in a difficult to access portion of Castle Rock east and west of I-25
- potentially deliver a solution for Founders Pkwy at a lower cost than introducing interchanges on a developed commercial corridor

Appendix E – Full Build Intersection Analysis

FELSBURG HOLT & ULLEVIG

connecting and enhancing communities

August 15, 2017

MEMORANDUM

TO: Mr. Tom Reiff
Town of Castle Rock
100 Wilcox Street
Castle Rock, Colorado 80104

FROM: Steven Marfitano/Tyler Spurlock

SUBJECT: Castle Rock Transportation Master Plan
Full Build Intersection Analysis
FHU Reference No. 15-398-01

This memorandum contains information regarding PM peak hour intersection analyses for ten intersections in Castle Rock. Existing traffic volumes were counted (**Figure 1**) and future turning movement projections were estimated using the build out travel demand model completed for the Master Transportation Plan (**Figure 2**). Future turning movements were projected using the NCHRP 765 methodology which involves using existing turning movements, existing daily volumes, and projected future daily volumes to project future turning movements. Engineering judgment was used to adjust the results and balance traffic along corridors. Traffic volume projections between the intersections of Meadows Parkway/Factory Shops and Meadows Parkway/Santa Fe Drive do not balance as the data for Meadows Parkway/Factory Shops was collected before the opening of Castle Rock Parkway and the data for Meadows Parkway/Santa Fe Drive was collected after the opening.

Synchro was used to understand the existing and future intersection operations during the PM peak hour, **Figures 3** and **4**, respectively. Build out turning movement forecasts were analyzed first assuming the existing lane geometry and secondarily with modifications to geometry, phasing, and signal timings to improve Level of Service (LOS) to LOS D. Future LOS results with existing/planned geometry are indicated in black and LOS results with geometric changes are indicated in red.

The intersections of Meadows Parkway/Santa Fe Drive and Meadows Parkway/Factory Shops Boulevard were unable to be improved to LOS D with geometric, timing, and phasing changes based on known physical infrastructure constraints. The modifications identified for these intersections represent some necessary improvements, but major modifications (e.g. grade separation/alternative intersection configurations) may be necessary to provide acceptable LOS. For the intersection of Meadows Parkway/Santa Fe Drive, additional lane geometry was analyzed to determine what improvements would result in LOS D for the build out scenario (without constraints) and are shown on **Figure 4**. For this intersection and other locations along Founders Pkwy, Meadows Pkwy, and Front St, further analysis is needed to identify preferred improvements based on the proposed new I-25 interchange in the Black Feather Trail Area.

6300 South Syracuse Way, Suite 600 Centennial, CO 80111 tel 303.721.1440 fax 303.721.0832
www.fhueng.com info@fhueng.com

Also attached to this memo are a table of recommended improvements and Synchro HCM 2010 Worksheets for the Town Build Out scenario with modified geometry, which provide a more in-depth review of the results of these analyses. Asterisks on the Synchro HCM 2010 Worksheets indicate that "HCM 210 computation engine requires equal clearance times for phases crossing the barrier." This indicates that concurrent phases such as left turn phases and through phases are required to have the same yellow and red clearance times in HCM 2010, Synchro modifies the analysis to provide an output for instances where this is not the case. This commonly happens in our analyses and does not impact the validity of the LOS results.

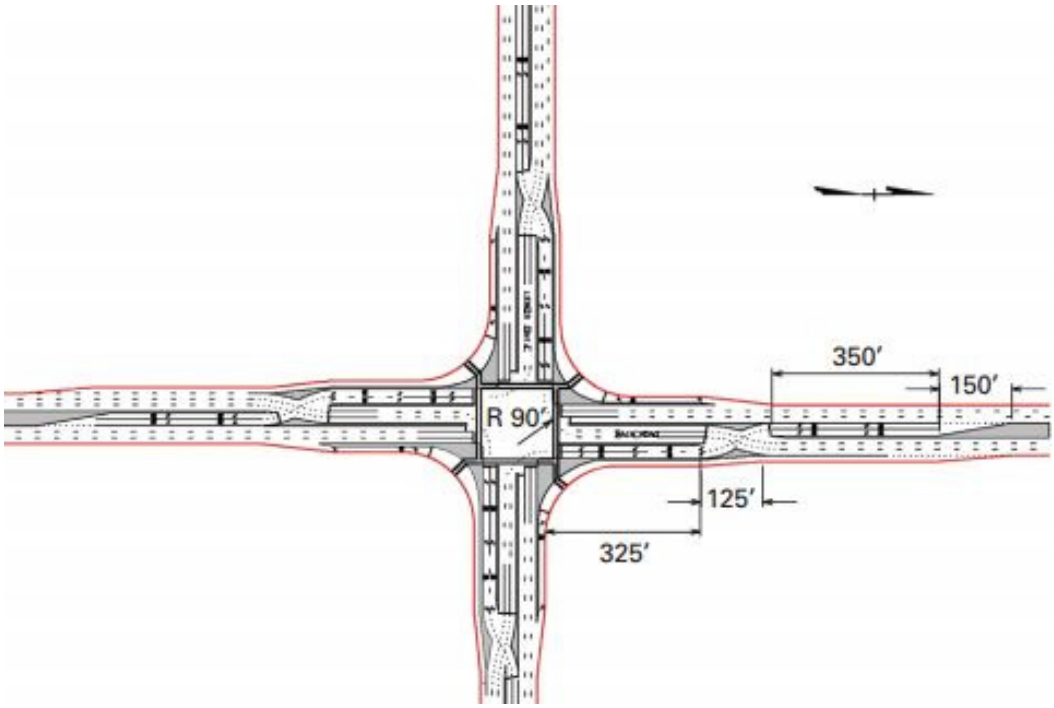
The FHWA's Capacity Analysis for Planning Junctions (Cap-X) Tool was used to analyze the intersection of Meadows Parkway/Santa Fe Drive to determine viable alternative intersection options. This tool uses volume to capacity ratios and critical lane volumes to analyze an intersections potential operations. Build-Out PM peak hour turning movement counts were used as inputs and the following alternative intersections were analyzed:

- Conventional Shared Right Turn Lane
- Quadrant Roadway
- Partial Displaced Left Turn
- Displaced Left Turn
- Restricted Crossing U-Turn
- Median U-Turn
- Partial Median U-Turn

For the analyzed intersection, the Cap-X tool indicates that a Full Displaced Left Turn (which can consist of a displaced left turn for the north-south <u>and</u> east-west directions) and a north/south Partial Displaced Left Turn (which consists of a displaced left turn only in the north <u>and/or</u> south directions) are viable options for at-grade intersection alternatives. An east-west partial displaced left turn intersection is not identified as a viable option. These interchange configurations should be explored further when planning along the Meadows/Founders Pkwy corridor is undertaken.

Figure 1 shows a full displaced left-turn intersection, from the Federal Highway Administration Tech Brief entitled *Displaced Left-Turn Intersection*, Publication FHWA-HRT-09-055.

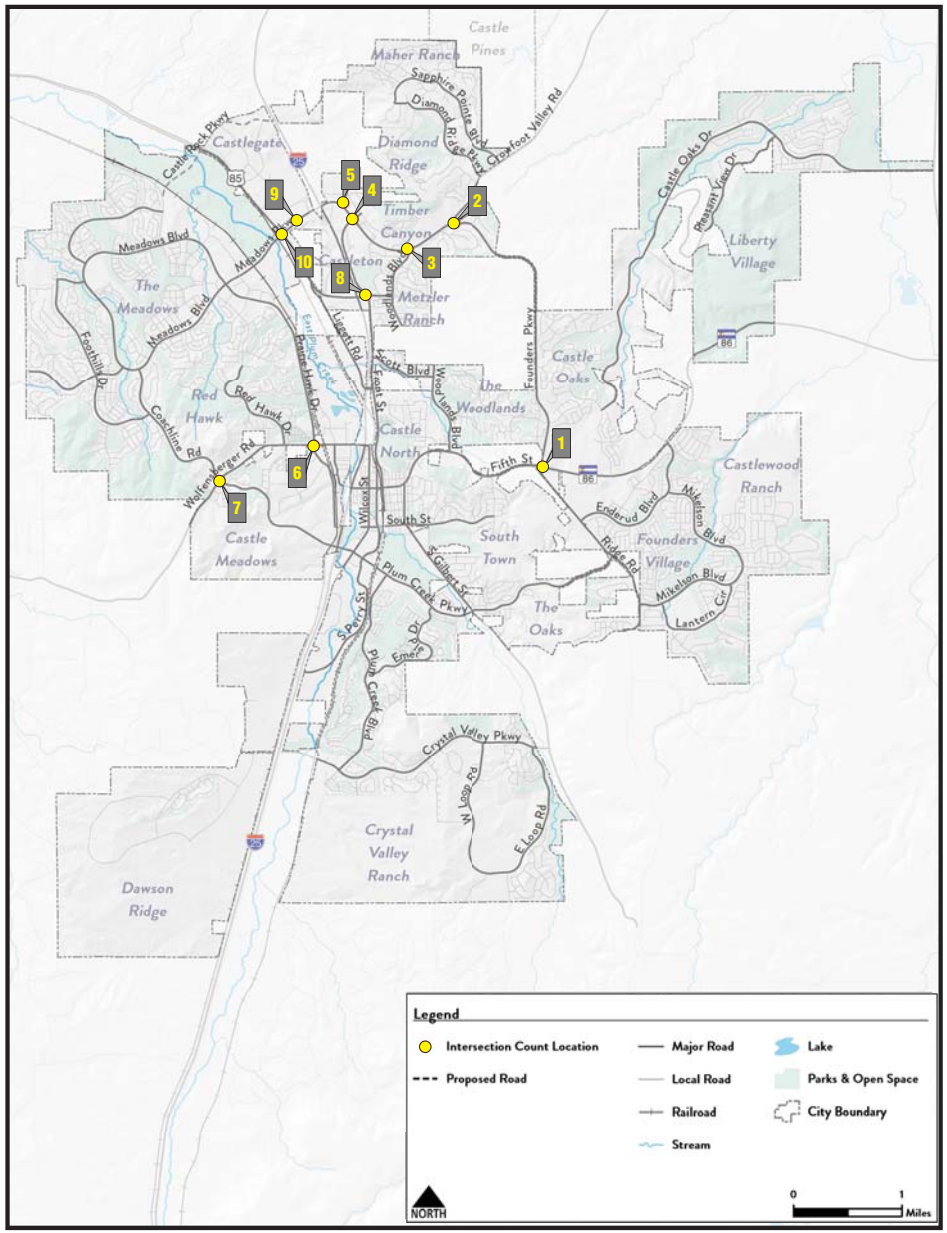
Figure 1 – Full Displaced Left Turn Intersection

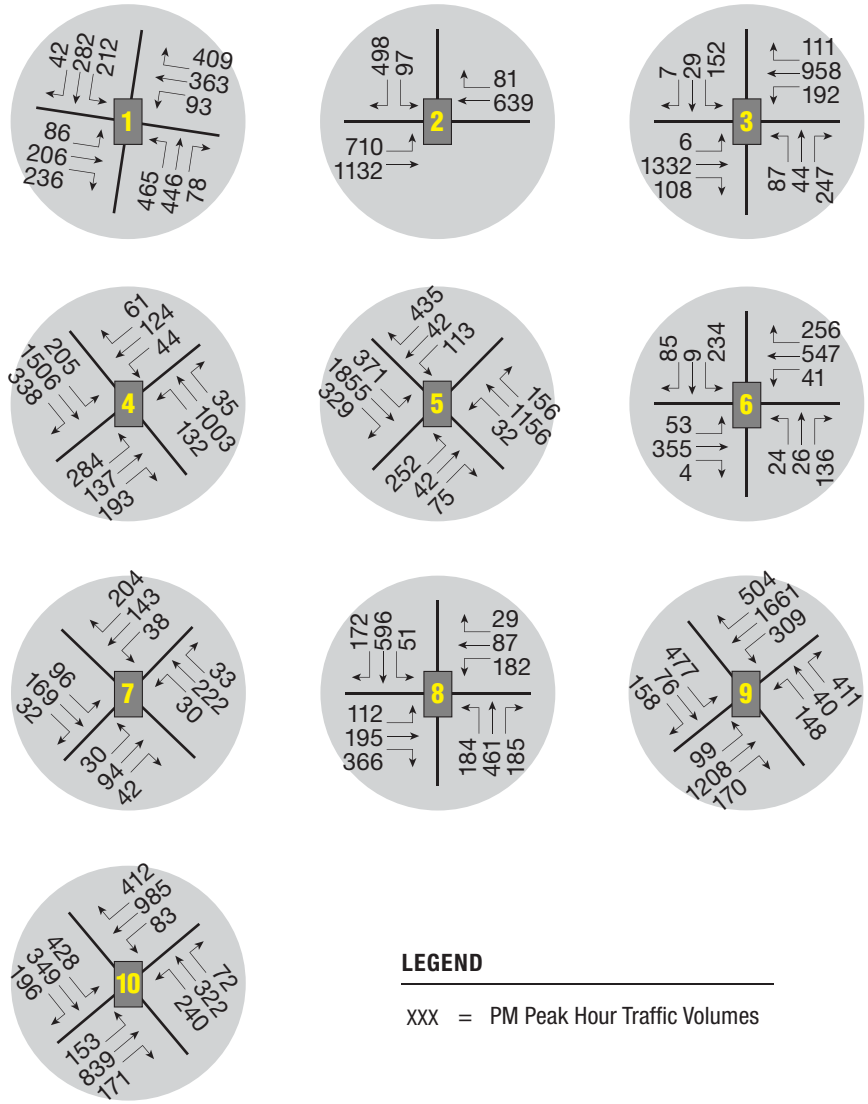


If you have any questions, please feel free to contact Steven Marfitano, 303.721.1440.

Attachments

KEY MAP





LEGEND

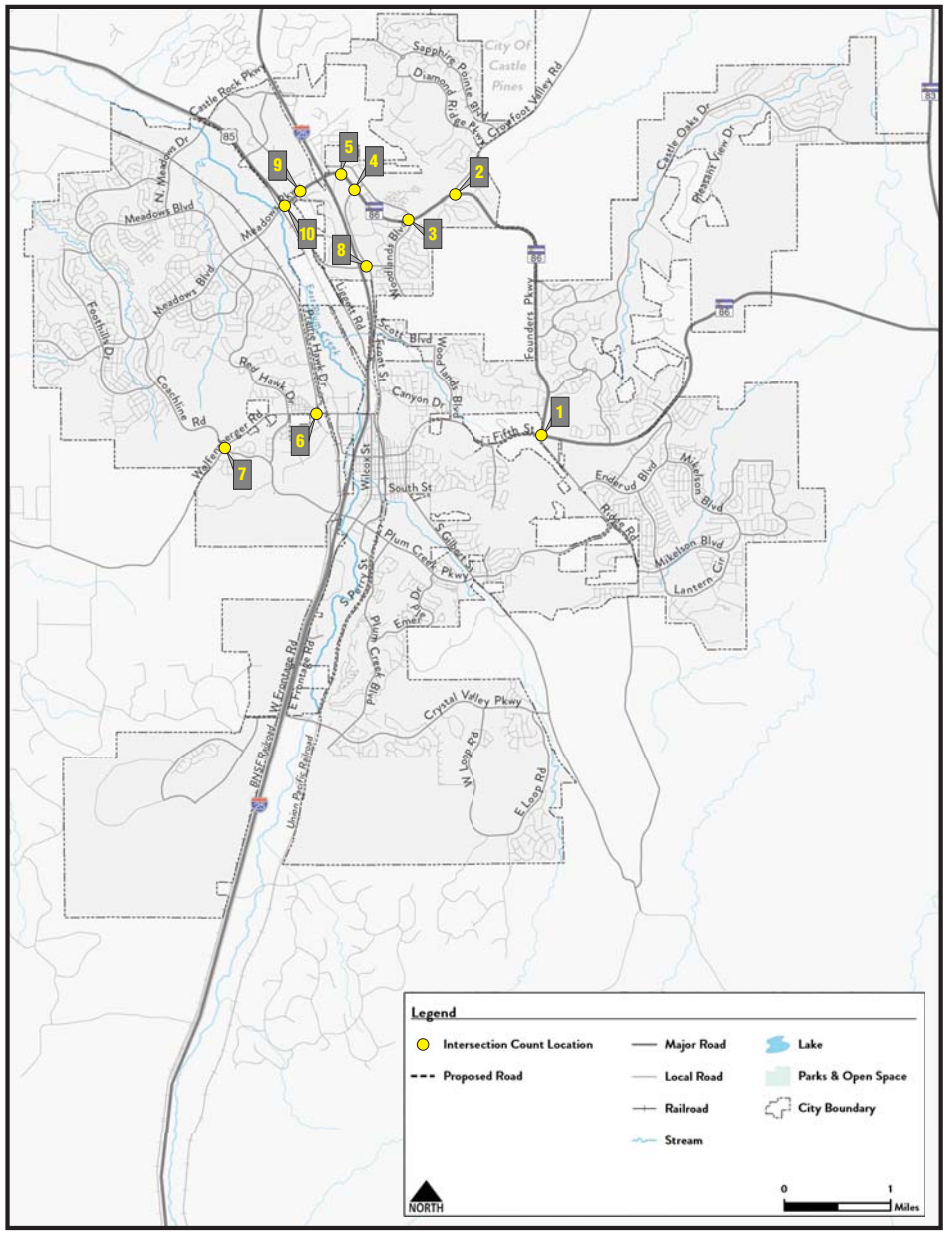
XXX = PM Peak Hour Traffic Volumes

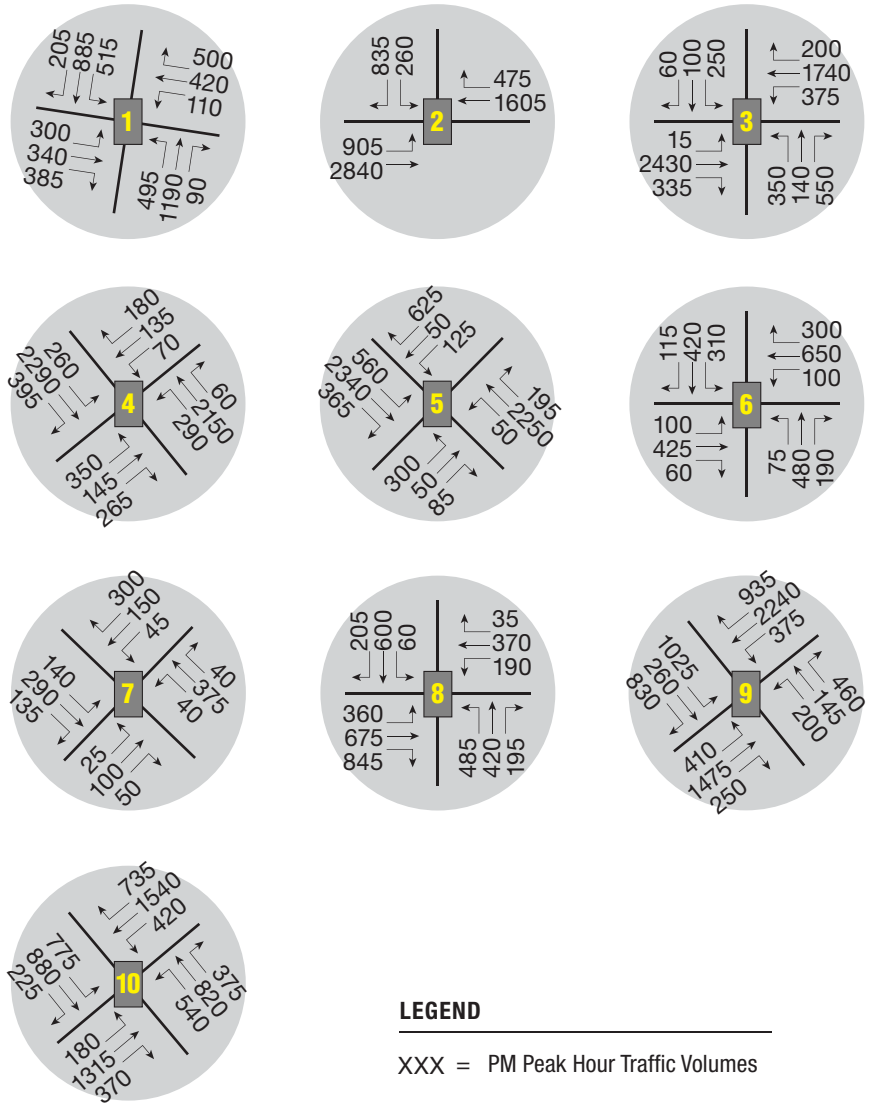
Figure 1

Existing PM Peak Hour Traffic Volumes

FELSBURG HOLT & ULLEVIG

KEY MAP





LEGEND

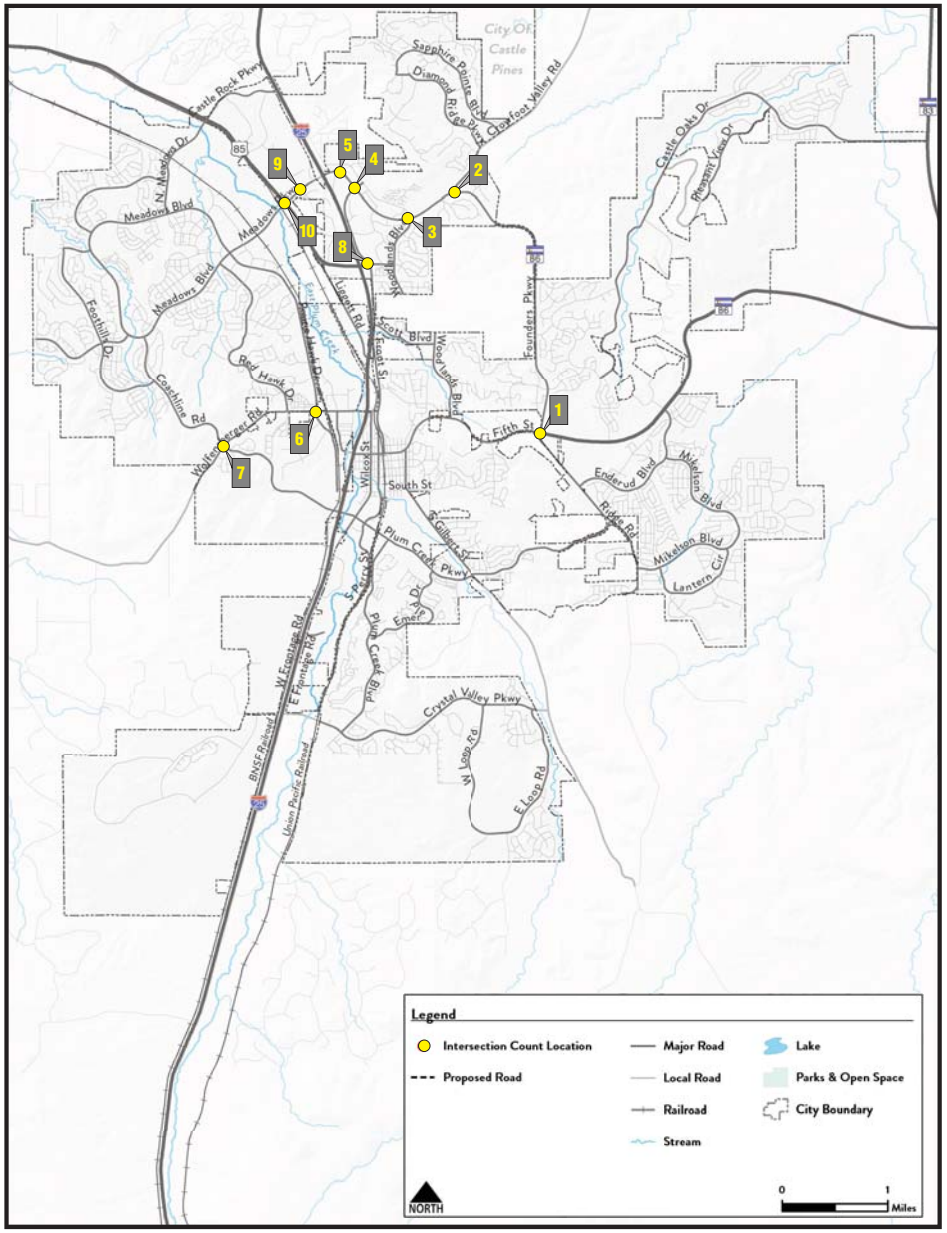
XXX = PM Peak Hour Traffic Volumes

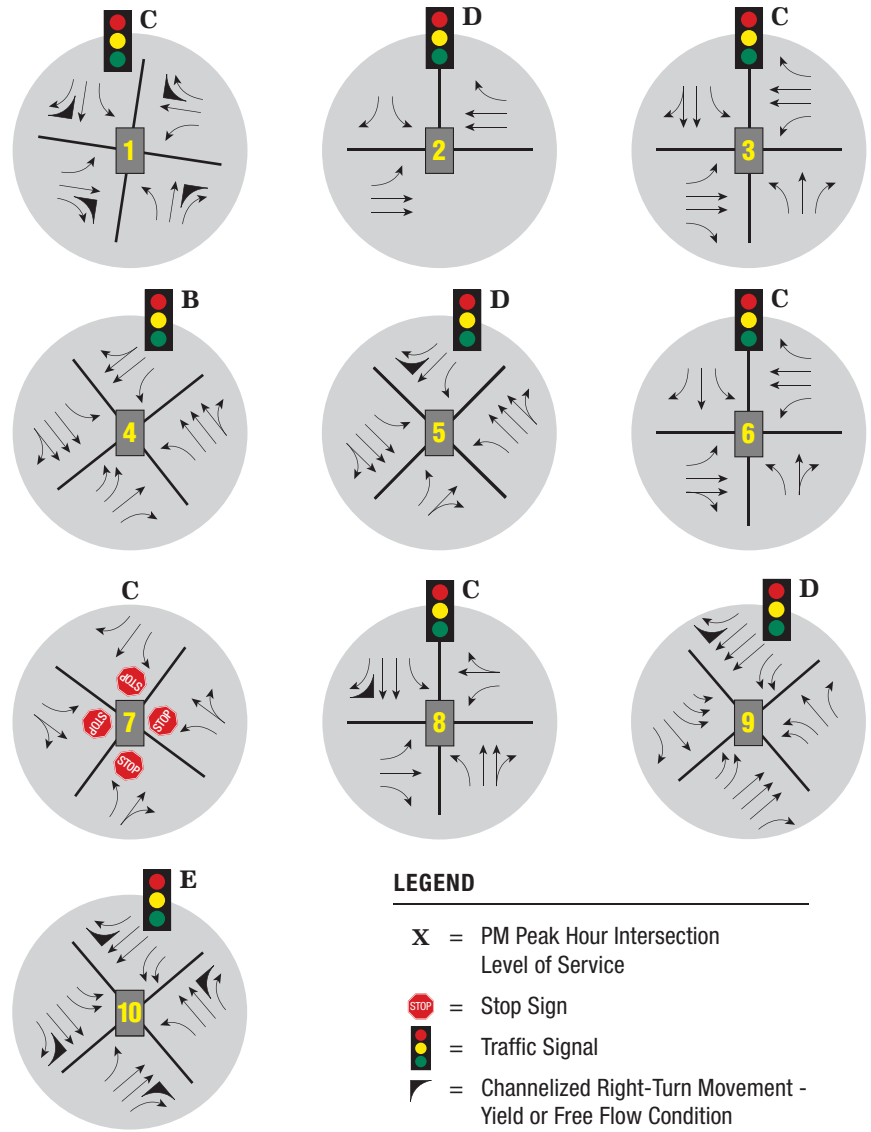
Figure 2

Estimated Castle Rock Build-Out
PM Peak Hour Traffic Volumes

FELSBURG HOLT & ULLEVIG

KEY MAP





LEGEND

X = PM Peak Hour Intersection Level of Service

STOP = Stop Sign

= Traffic Signal

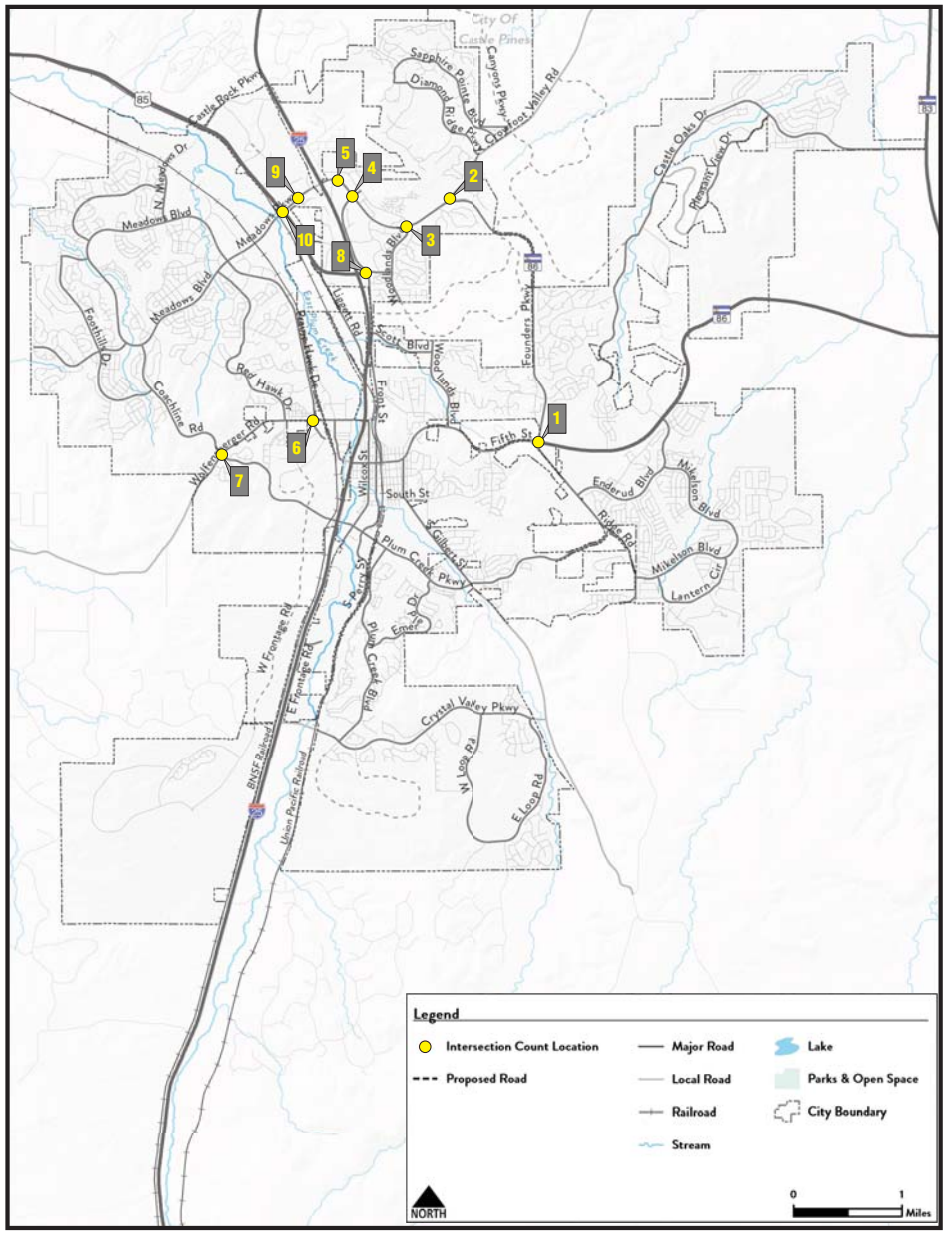
= Channelized Right-Turn Movement - Yield or Free Flow Condition

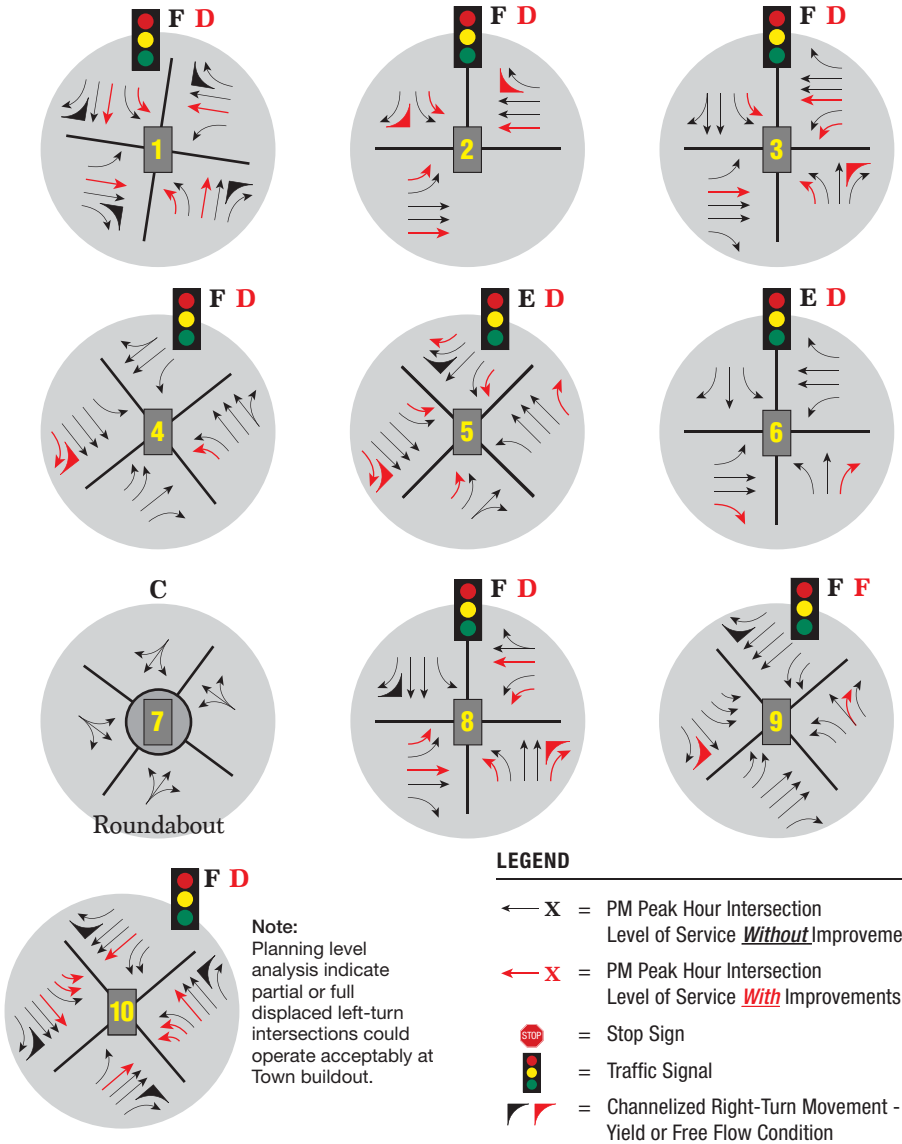
Figure 3

Existing PM Peak Hour Levels of Service and Lane Geometry

FELSBURG HOLT & ULLEVIG

KEY MAP





Note:
Planning level analysis indicate partial or full displaced left-turn intersections could operate acceptably at Town buildout.

LEGEND

- X = PM Peak Hour Intersection Level of Service ***Without*** Improvements
- X = PM Peak Hour Intersection Level of Service ***With*** Improvements
- = Stop Sign
- = Traffic Signal
- = Channelized Right-Turn Movement - Yield or Free Flow Condition

Figure 4

Estimated Castle Rock Build-Out PM Peak Hour Levels of Service and Lane Geometry

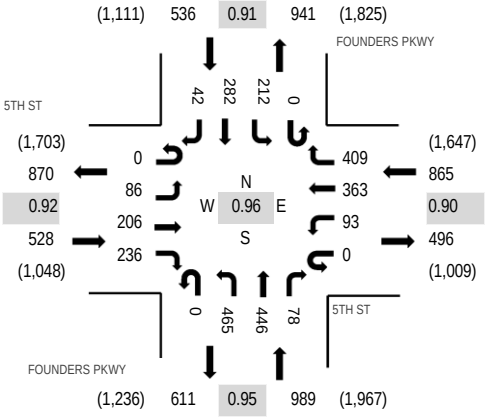
Intersection	Improvement Description
#1 - Ridge Road/Founders Parkway & Fifth Street	Add an east-west through lane in each direction.
	Add a north-south through lane in each direction.
	Add a northbound left turn lane.
	Add a southbound left turn lane.
#2 - Founders Parkway & Crowfoot Valley	Add an east-west through lane in each direction.
	Add an eastbound left turn lane.
	Add a southbound left turn lane.
	Convert southbound right turn into channelized right turn.
	Convert westbound right turn into channelized right turn.
#3 - Woodlands Boulevard/Allen Street & Founders Parkway	Add an east-west through lane in each direction.
	Add a westbound left turn lane.
	Add a northbound left turn lane.
	Add a southbound left turn lane.
	Convert northbound right turn into channelized right turn.
#4 - Front Street & Founders Parkway	Add a westbound left turn lane.
	Add an eastbound channelized right turn lane.
#5 - Allen Way & Founders Parkway	Add an eastbound left turn lane.
	Add a northbound left turn lane.
	Add a southbound left turn lane.
	Add a westbound right turn lane.
	Add an eastbound channelized right turn lane.
	Add a southbound channelized right turn lane.
#6 - Prairie Hawk Drive & Wolfensberger Road	Add an eastbound right turn lane.
	Add a northbound right turn lane.
#7 - Wolfensberger Road & Coachline Road	Convert to a single lane roundabout.
#8 - Front Street & Black Feather Trail	Add an east-west through lane in each direction.
	Add an eastbound left turn lane.
	Add a westbound left turn lane.
	Add a northbound left turn lane.
	Add a northbound channelized right turn lane.
#9 - Castleton Drive/Factory Shops Boulevard & Founders Parkway	Add at right turn movement to the existing northbound through movement.
	Convert southbound right turn into channelized right turn.
#10 - Santa Fe Drive/US Highway 85 & Founders Parkway	Add an east-west through lane in each direction.
	Add a north-south through lane in each direction.
	Add two northbound left turn lanes.
	Add two southbound left turn lanes

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

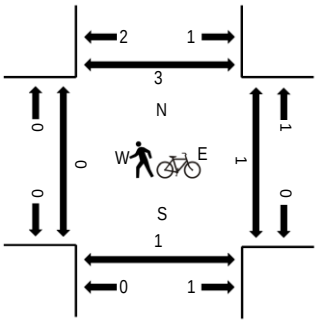
Location: 1 FOUNDERS PKWY & 5TH ST PM
Date and Start Time: Thursday, August 11, 2016
Peak Hour: 04:30 PM - 05:30 PM
Peak 15-Minutes: 04:45 PM - 05:00 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

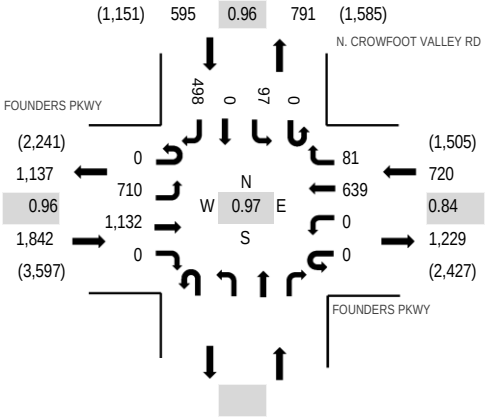
Interval Start Time	5TH ST Eastbound				5TH ST Westbound				FOUNDERS PKWY Northbound				FOUNDERS PKWY Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	15	54	72	0	28	87	81	0	102	85	22	0	57	77	12	692	2,879	0	0	0	0
4:15 PM	0	14	48	68	0	16	64	95	0	118	132	23	0	48	78	21	725	2,907	0	0	0	0
4:30 PM	0	18	51	64	0	25	88	92	0	108	114	28	0	42	58	14	702	2,918	0	0	0	1
4:45 PM	0	23	58	69	0	24	90	99	0	127	113	17	0	62	69	9	760	2,917	0	1	0	1
5:00 PM	0	20	47	43	0	23	90	95	0	139	108	12	0	56	76	11	720	2,894	0	0	0	0
5:15 PM	0	25	50	60	0	21	95	123	0	91	111	21	0	52	79	8	736		0	0	0	0
5:30 PM	0	14	55	43	0	19	73	95	0	113	109	20	0	63	83	14	701		0	0	0	0
5:45 PM	0	31	46	60	0	23	92	109	0	121	104	29	0	48	58	16	737		0	0	0	0
Count Total	0	160	409	479	0	179	679	789	0	919	876	172	0	428	578	105	5,773		0	1	0	2
Peak Hour	0	86	206	236	0	93	363	409	0	465	446	78	0	212	282	42	2,918		0	1	0	2

All Traffic Data Services Inc.

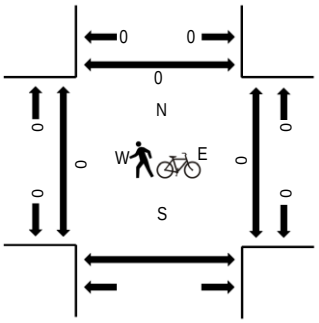
(303) 216-2439
www.alltrafficdata.net

Location: 2 N. CROWFOOT VALLEY RD & FOUNDERS PKWY PM
Date and Start Time: Thursday, August 11, 2016
Peak Hour: 04:45 PM - 05:45 PM
Peak 15-Minutes: 05:15 PM - 05:30 PM

Peak Hour - All Vehicles



Peak Hour - Pedestrians/Bicycles on Crosswalk



Note: Total study counts contained in parentheses.

Traffic Counts

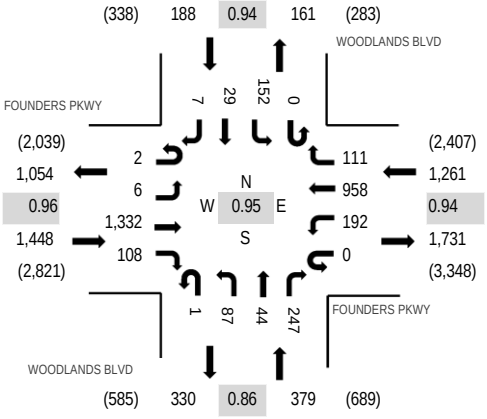
Interval Start Time	FOUNDERS PKWY Eastbound				FOUNDERS PKWY Westbound				Northbound				N. CROWFOOT VALLEY RD Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	158	227	0	0	0	194	48					0	15	0	112	754	3,107	0	0		0
4:15 PM	0	166	288	0	0	0	187	38					0	23	0	102	804	3,138	0	0		0
4:30 PM	0	174	270	0	0	0	148	23					0	34	0	120	769	3,150	0	0		0
4:45 PM	0	169	281	0	0	0	151	22					0	28	0	129	780	3,157	0	0		0
5:00 PM	0	175	276	0	0	0	175	24					0	23	0	112	785	3,146	0	0		0
5:15 PM	0	215	271	0	0	0	156	17					0	22	0	135	816		0	0		0
5:30 PM	0	151	304	0	0	0	157	18					0	24	0	122	776		0	0		0
5:45 PM	0	168	304	0	0	0	128	19					0	37	0	113	769		0	0		0
Count Total	0	1,376	2,221	0	0	0	1,296	209					0	206	0	945	6,253		0	0		0
Peak Hour	0	710	1,132	0	0	0	639	81					0	97	0	498	3,157		0	0		0

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

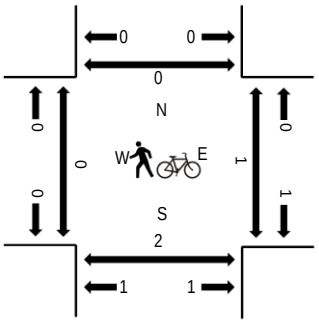
Location: 3 WOODLANDS BLVD & FOUNDERS PKWY PM
Date and Start Time: Thursday, August 11, 2016
Peak Hour: 04:30 PM - 05:30 PM
Peak 15-Minutes: 05:00 PM - 05:15 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

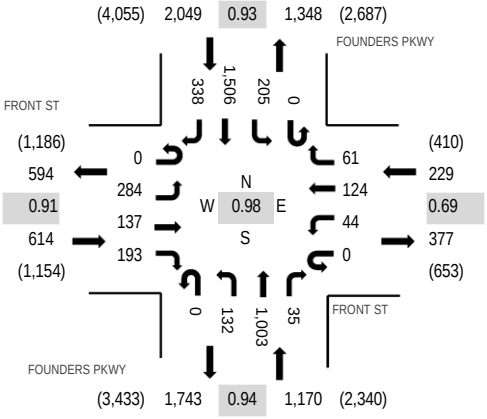
Interval Start Time	FOUNDERS PKWY Eastbound				FOUNDERS PKWY Westbound				WOODLANDS BLVD Northbound				WOODLANDS BLVD Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	1	286	23	0	21	245	17	0	12	7	50	0	24	3	3	692	3,020	0	1	0	1
4:15 PM	0	1	310	32	0	37	228	21	0	10	5	54	0	35	8	1	742	3,188	0	0	0	0
4:30 PM	0	0	345	26	0	45	230	23	0	13	12	64	0	37	9	2	806	3,276	0	0	0	0
4:45 PM	0	2	305	31	0	58	211	33	0	30	10	56	0	38	6	0	780	3,236	0	1	0	0
5:00 PM	1	0	348	31	0	45	253	26	1	26	14	69	0	37	5	4	860	3,235	0	0	1	0
5:15 PM	1	4	334	20	0	44	264	29	0	18	8	58	0	40	9	1	830		0	0	0	0
5:30 PM	0	0	329	25	0	35	245	19	0	13	6	62	0	24	8	0	766		0	1	0	0
5:45 PM	0	3	338	25	0	31	214	33	0	14	9	68	0	37	7	0	779		1	0	0	0
Count Total	2	11	2,595	213	0	316	1,890	201	1	136	71	481	0	272	55	11	6,255		1	3	1	1
Peak Hour	2	6	1,332	108	0	192	958	111	1	87	44	247	0	152	29	7	3,276		0	1	1	0

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

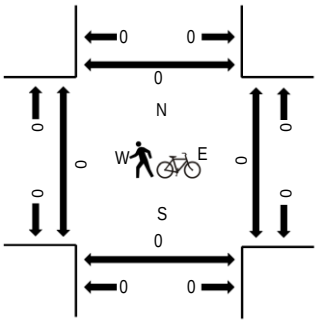
Location: 4 FOUNDERS PKWY & FRONT ST PM
Date and Start Time: Thursday, August 11, 2016
Peak Hour: 05:00 PM - 06:00 PM
Peak 15-Minutes: 05:15 PM - 05:30 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

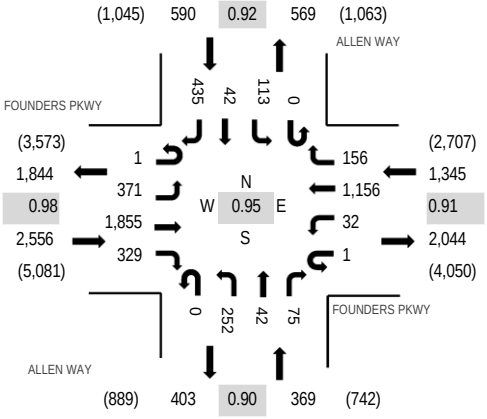
Interval Start Time	FRONT ST Eastbound				FRONT ST Westbound				FOUNDERS PKWY Northbound				FOUNDERS PKWY Southbound					Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
4:00 PM	0	64	29	38	0	8	23	14	0	32	263	4	2	33	349	76	935	3,897	0	0	0	0
4:15 PM	0	86	30	42	0	9	30	17	0	44	268	2	0	30	377	97	1,032	3,949	0	0	0	0
4:30 PM	1	38	23	31	0	8	19	13	0	29	226	7	0	34	419	91	939	3,958	0	0	0	0
4:45 PM	2	80	33	43	0	6	22	12	0	32	256	7	0	44	360	94	991	4,039	0	0	1	0
5:00 PM	0	65	31	47	0	12	20	10	0	39	253	10	0	45	356	99	987	4,062	0	0	0	0
5:15 PM	0	85	40	42	0	7	34	11	0	30	278	11	0	39	383	81	1,041		0	0	0	0
5:30 PM	0	62	33	40	0	8	25	19	0	40	233	9	0	68	394	89	1,020		0	0	0	0
5:45 PM	0	72	33	64	0	17	45	21	0	23	239	5	0	53	373	69	1,014		0	0	0	0
Count Total	3	552	252	347	0	75	218	117	0	269	2,016	55	2	346	3,011	696	7,959		0	0	1	0
Peak Hour	0	284	137	193	0	44	124	61	0	132	1,003	35	0	205	1,506	338	4,062		0	0	0	0

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

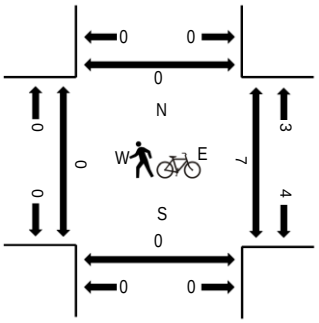
Location: 5 ALLEN WAY & FOUNDERS PKWY PM
Date and Start Time: Thursday, August 11, 2016
Peak Hour: 04:15 PM - 05:15 PM
Peak 15-Minutes: 04:15 PM - 04:30 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

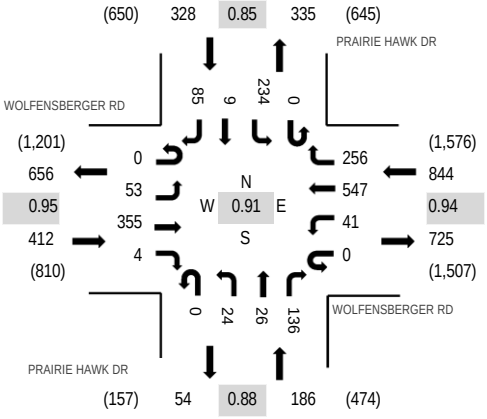
Interval Start Time	FOUNDERS PKWY Eastbound				FOUNDERS PKWY Westbound				ALLEN WAY Northbound				ALLEN WAY Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	105	405	91	0	11	283	45	0	69	10	20	0	22	9	106	1,176	4,844	0	0	0	0
4:15 PM	0	84	479	88	0	10	332	43	0	58	14	15	0	31	11	118	1,283	4,860	0	0	0	0
4:30 PM	0	87	469	98	0	11	231	29	0	74	8	24	0	28	7	106	1,172	4,808	0	5	0	0
4:45 PM	1	94	465	67	1	3	320	40	0	63	13	15	0	30	8	93	1,213	4,775	0	1	0	0
5:00 PM	0	106	442	76	0	8	273	44	0	57	7	21	0	24	16	118	1,192	4,731	0	0	0	0
5:15 PM	0	79	474	97	0	16	327	33	0	59	7	18	0	21	16	84	1,231		0	1	0	0
5:30 PM	0	54	502	98	0	16	265	28	0	67	7	24	0	23	12	43	1,139		0	0	0	0
5:45 PM	1	84	448	87	0	18	283	37	0	63	5	24	0	25	15	79	1,169		0	0	0	0
Count Total	2	693	3,684	702	1	93	2,314	299	0	510	71	161	0	204	94	747	9,575		0	7	0	0
Peak Hour	1	371	1,855	329	1	32	1,156	156	0	252	42	75	0	113	42	435	4,860		0	6	0	0

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

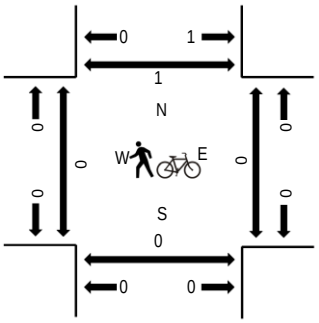
Location: 6 PRAIRIE HAWK DR & WOLFENSBERGER RD PM
Date and Start Time: Thursday, August 11, 2016
Peak Hour: 05:00 PM - 06:00 PM
Peak 15-Minutes: 05:00 PM - 05:15 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

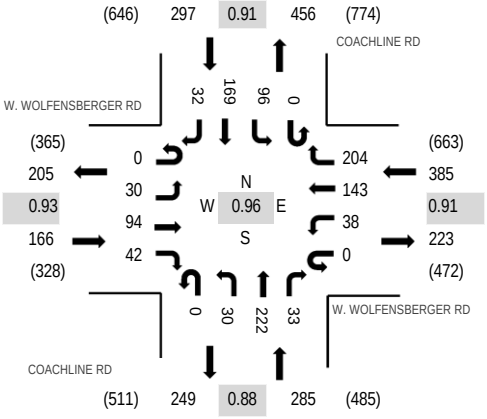
Interval Start Time	WOLFENSBERGER RD Eastbound				WOLFENSBERGER RD Westbound				PRAIRIE HAWK DR Northbound				PRAIRIE HAWK DR Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	8	75	4	0	22	106	55	0	4	7	64	0	90	11	22	468	1,740	0	0	0	0
4:15 PM	0	11	94	6	0	20	109	50	0	5	11	47	0	42	3	23	421	1,757	0	0	0	0
4:30 PM	0	16	82	3	0	13	95	51	0	11	7	67	0	49	2	14	410	1,768	0	0	0	0
4:45 PM	0	20	77	2	0	12	134	65	0	6	9	50	0	45	5	16	441	1,767	0	0	0	0
5:00 PM	0	18	92	1	0	13	133	63	0	8	10	67	0	53	3	24	485	1,770	0	0	0	0
5:15 PM	0	20	77	2	0	9	143	74	0	4	6	24	0	53	5	15	432		0	0	0	0
5:30 PM	0	7	82	0	0	10	123	68	0	7	8	25	0	56	1	22	409		0	0	0	0
5:45 PM	0	8	104	1	0	9	148	51	0	5	2	20	0	72	0	24	444		0	0	0	1
Count Total	0	108	683	19	0	108	991	477	0	50	60	364	0	460	30	160	3,510		0	0	0	1
Peak Hour	0	53	355	4	0	41	547	256	0	24	26	136	0	234	9	85	1,770		0	0	0	1

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

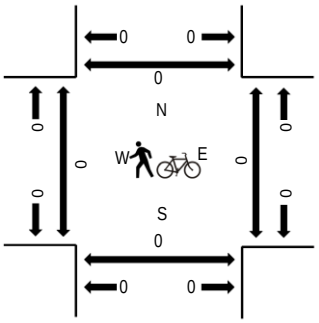
Location: 7 COACHLINE RD & W. WOLFENSBERGER RD PM
Date and Start Time: Thursday, August 11, 2016
Peak Hour: 05:00 PM - 06:00 PM
Peak 15-Minutes: 05:00 PM - 05:15 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

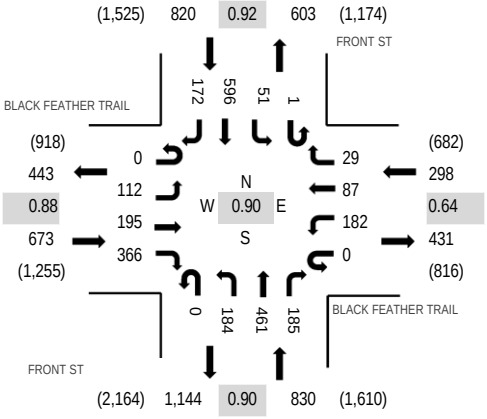
Interval Start Time	W. WOLFENSBERGER RD Eastbound				W. WOLFENSBERGER RD Westbound				COACHLINE RD Northbound				COACHLINE RD Southbound					Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
4:00 PM	0	5	22	10	0	6	23	31	0	2	37	7	0	44	47	5	239	989	0	0	0	0
4:15 PM	0	4	28	11	0	6	22	32	0	10	43	3	0	41	46	9	255	1,045	0	0	0	0
4:30 PM	0	6	28	8	0	10	34	33	0	7	40	4	0	27	48	5	250	1,081	0	0	0	0
4:45 PM	0	7	22	11	0	7	32	42	0	4	38	5	0	18	52	7	245	1,115	0	0	0	0
5:00 PM	0	6	27	12	0	7	35	61	0	16	51	14	0	19	38	9	295	1,133	0	0	0	0
5:15 PM	0	9	30	8	0	7	44	38	0	6	67	6	0	31	38	7	291		0	0	0	0
5:30 PM	0	11	17	8	0	16	33	57	0	6	54	5	0	24	46	7	284		0	0	0	0
5:45 PM	0	4	20	14	0	8	31	48	0	2	50	8	0	22	47	9	263		0	0	0	0
Count Total	0	52	194	82	0	67	254	342	0	53	380	52	0	226	362	58	2,122		0	0	0	0
Peak Hour	0	30	94	42	0	38	143	204	0	30	222	33	0	96	169	32	1,133		0	0	0	0

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

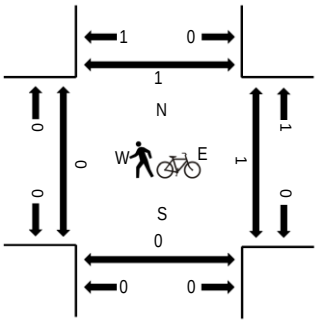
Location: 8 FRONT ST & BLACK FEATHER TRAIL PM
Date and Start Time: Thursday, August 11, 2016
Peak Hour: 05:00 PM - 06:00 PM
Peak 15-Minutes: 05:00 PM - 05:15 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

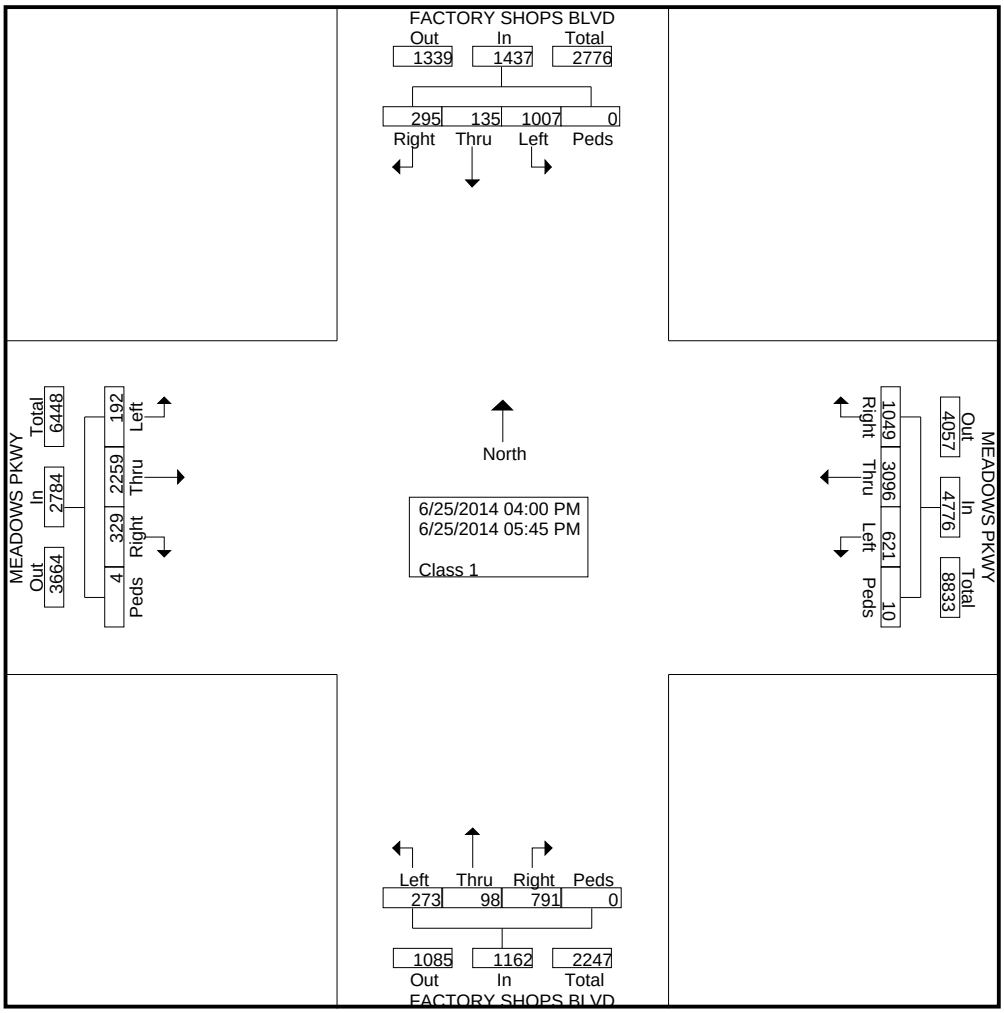
Interval Start Time	BLACK FEATHER TRAIL Eastbound				BLACK FEATHER TRAIL Westbound				FRONT ST Northbound				FRONT ST Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	33	40	61	0	83	53	13	0	52	93	55	0	11	130	38	662	2,451	0	1	0	0
4:15 PM	0	36	39	77	0	41	29	8	0	51	125	25	0	11	121	36	599	2,521	0	0	0	0
4:30 PM	0	23	43	71	0	44	26	6	0	45	86	43	0	12	145	40	584	2,567	0	0	0	0
4:45 PM	0	33	50	76	0	56	16	9	0	54	106	45	0	11	115	35	606	2,601	0	0	0	0
5:00 PM	0	29	70	97	0	46	29	10	0	50	141	45	0	14	157	44	732	2,621	0	0	0	0
5:15 PM	0	36	34	100	0	49	23	6	0	48	112	56	0	12	127	42	645		0	1	0	1
5:30 PM	0	23	51	91	0	36	18	4	0	47	105	41	0	12	155	35	618		0	0	0	0
5:45 PM	0	24	40	78	0	51	17	9	0	39	103	43	1	13	157	51	626		0	0	0	0
Count Total	0	237	367	651	0	406	211	65	0	386	871	353	1	96	1,107	321	5,072		0	2	0	1
Peak Hour	0	112	195	366	0	182	87	29	0	184	461	185	1	51	596	172	2,621		0	1	0	1

All Traffic Data Services,Inc.
9660 W 44th Ave
Wheat Ridge,CO 80033
www.alltrafficdata.net

File Name : #3 FACTORYSHOPSBLVD&MEADOWSPKWYPM
Site Code : 00000000
Start Date : 6/25/2014
Page No : 1

Groups Printed- Class 1

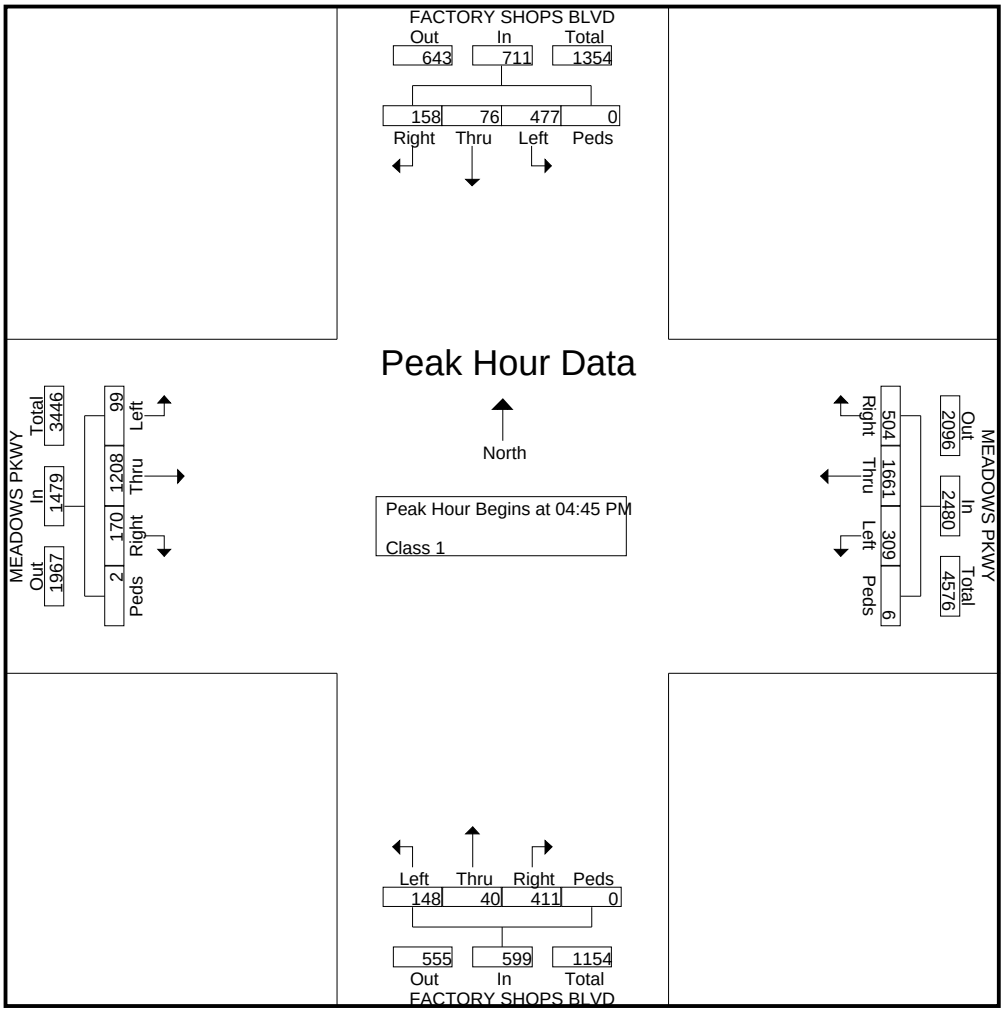
	FACTORY SHOPS BLVD Southbound				MEADOWS PKWY Westbound				FACTORY SHOPS BLVD Northbound				MEADOWS PKWY Eastbound				
Start Time																	Int. Total
04:00 PM	31	18	113	0	135	338	91	0	111	11	29	0	37	267	20	0	1201
04:15 PM	33	16	160	0	147	333	58	0	83	14	34	0	47	265	26	1	1217
04:30 PM	30	11	116	0	144	404	77	2	88	13	30	0	36	278	22	1	1252
04:45 PM	40	16	128	0	121	408	63	2	89	6	38	0	32	276	32	0	1251
Total	134	61	517	0	547	1483	289	4	371	44	131	0	152	1086	100	2	4921
05:00 PM	43	22	109	0	148	452	80	4	127	10	35	0	39	282	21	2	1374
05:15 PM	38	20	109	0	119	371	74	0	93	17	38	0	52	315	27	0	1273
05:30 PM	37	18	131	0	116	430	92	0	102	7	37	0	47	335	19	0	1371
05:45 PM	43	14	141	0	119	360	86	2	98	20	32	0	39	241	25	0	1220
Total	161	74	490	0	502	1613	332	6	420	54	142	0	177	1173	92	2	5238
Grand Total	295	135	1007	0	1049	3096	621	10	791	98	273	0	329	2259	192	4	10159
Apprch %	20.5	9.4	70.1	0	22	64.8	13	0.2	68.1	8.4	23.5	0	11.8	81.1	6.9	0.1	
Total %	2.9	1.3	9.9	0	10.3	30.5	6.1	0.1	7.8	1	2.7	0	3.2	22.2	1.9	0	



All Traffic Data Services,Inc.
9660 W 44th Ave
Wheat Ridge,CO 80033
www.alltrafficdata.net

File Name : #3 FACTORYSHOPSBLVD&MEADOWSPKWYPM
Site Code : 00000000
Start Date : 6/25/2014
Page No : 2

	FACTORY SHOPS BLVD Southbound					MEADOWS PKWY Westbound					FACTORY SHOPS BLVD Northbound					MEADOWS PKWY Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	40	16	128	0	184	121	408	63	2	594	89	6	**38**	0	133	32	276	**32**	0	340	1251
05:00 PM	**43**	**22**	109	0	174	**148**	**452**	80	**4**	**684**	**127**	10	35	0	**172**	39	282	21	**2**	344	**1374**
05:15 PM	38	20	109	0	167	119	371	74	0	564	93	**17**	38	0	148	**52**	315	27	0	394	1273
05:30 PM	37	18	**131**	0	**186**	116	430	**92**	0	638	102	7	37	0	146	47	**335**	19	0	**401**	1371
Total Volume	158	76	477	0	711	504	1661	309	6	2480	411	40	148	0	599	170	1208	99	2	1479	5269
% App. Total	22.2	10.7	67.1	0		20.3	67	12.5	0.2		68.6	6.7	24.7	0		11.5	81.7	6.7	0.1		
PHF	.919	.864	.910	.000	.956	.851	.919	.840	.375	.906	.809	.588	.974	.000	.871	.817	.901	.773	.250	.922	.959

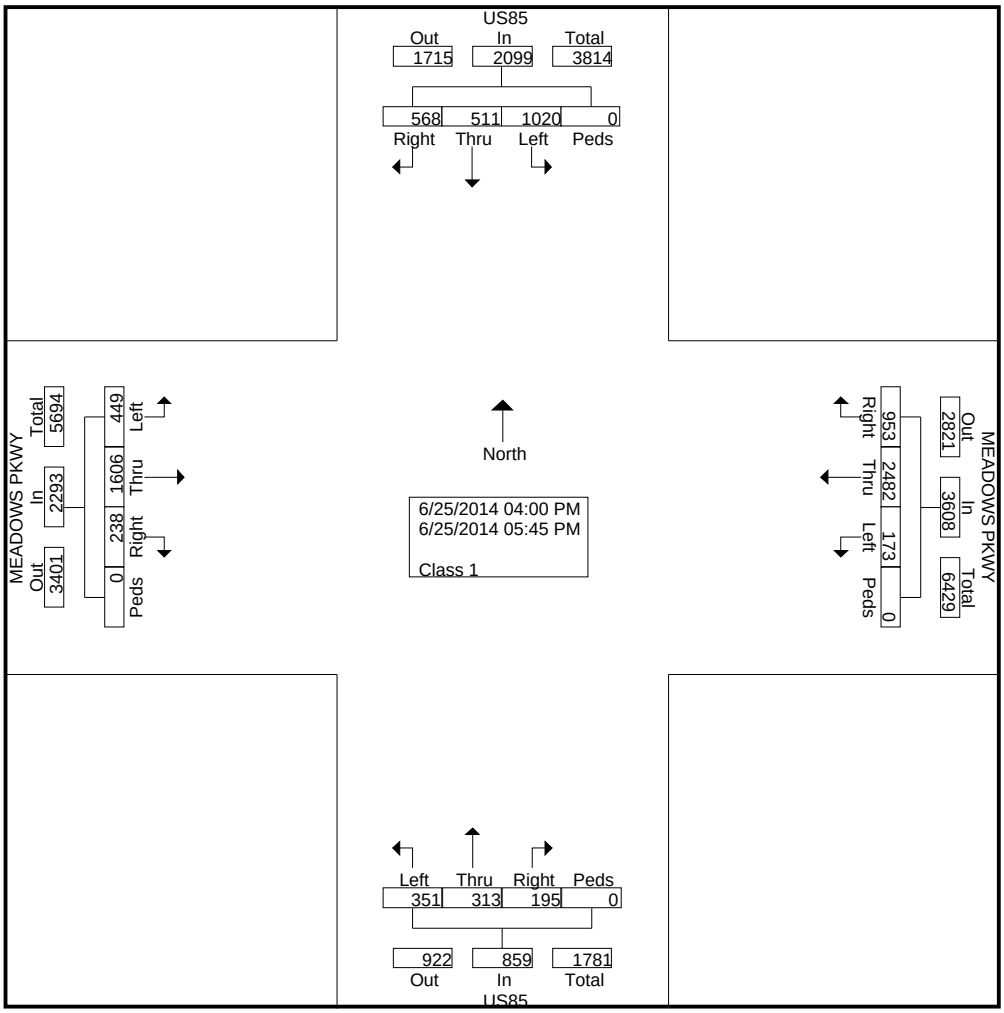


All Traffic Data Services,Inc.
9660 W 44th Ave
Wheat Ridge,CO 80033
www.alltrafficdata.net

File Name : #4 US85&MEADOWSPKWYPM
Site Code : 00000000
Start Date : 6/25/2014
Page No : 1

Groups Printed- Class 1

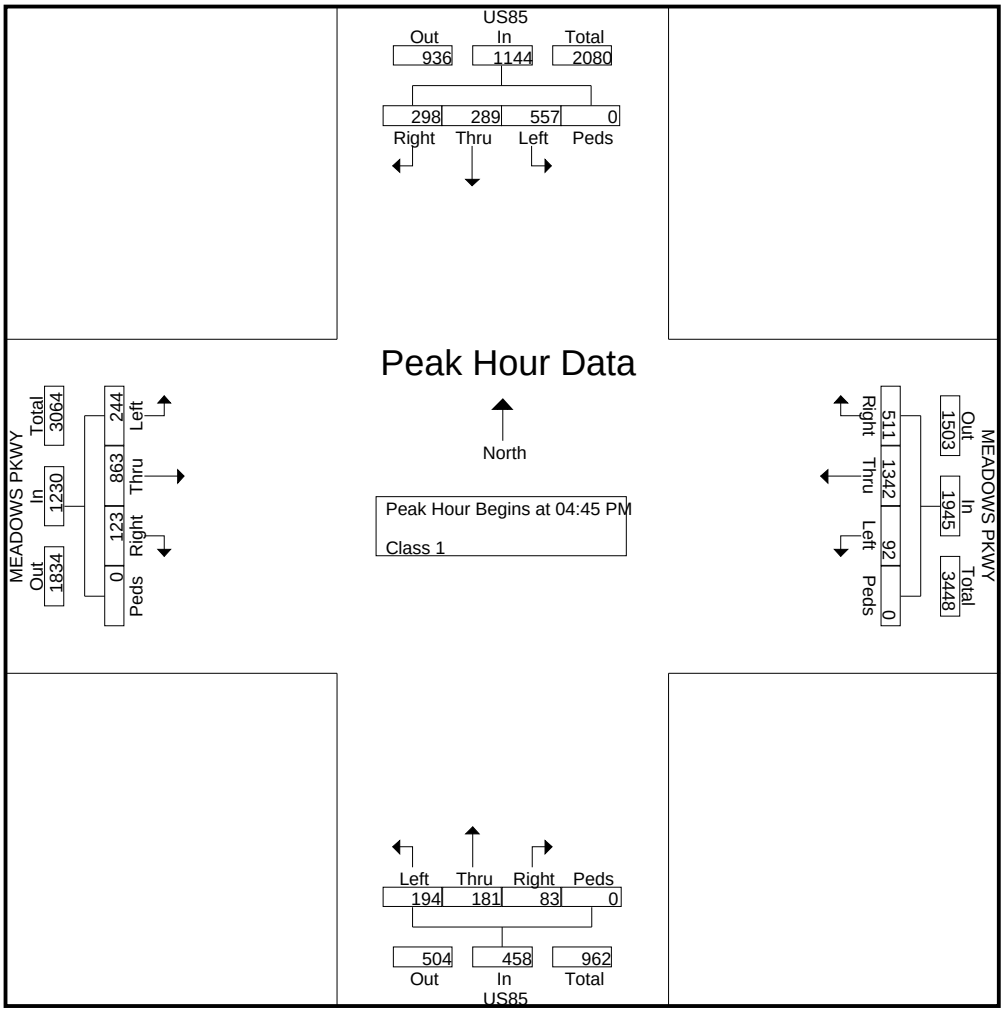
	US85 Southbound				MEADOWS PKWY Westbound				US85 Northbound				MEADOWS PKWY Eastbound				
Start Time																	Int. Total
04:00 PM	66	53	118	0	101	252	16	0	55	39	35	0	33	182	68	0	1018
04:15 PM	52	51	103	0	136	266	20	0	36	22	29	0	29	218	44	0	1006
04:30 PM	73	78	119	0	114	273	20	0	6	40	43	0	27	193	52	0	1038
04:45 PM	68	69	135	0	142	367	23	0	11	22	34	0	41	190	47	0	1149
Total	259	251	475	0	493	1158	79	0	108	123	141	0	130	783	211	0	4211
05:00 PM	80	64	141	0	145	306	22	0	26	73	67	0	20	202	82	0	1228
05:15 PM	71	78	139	0	112	347	27	0	16	44	38	0	34	242	52	0	1200
05:30 PM	79	78	142	0	112	322	20	0	30	42	55	0	28	229	63	0	1200
05:45 PM	79	40	123	0	91	349	25	0	15	31	50	0	26	150	41	0	1020
Total	309	260	545	0	460	1324	94	0	87	190	210	0	108	823	238	0	4648
Grand Total	568	511	1020	0	953	2482	173	0	195	313	351	0	238	1606	449	0	8859
Apprch %	27.1	24.3	48.6	0	26.4	68.8	4.8	0	22.7	36.4	40.9	0	10.4	70	19.6	0	
Total %	6.4	5.8	11.5	0	10.8	28	2	0	2.2	3.5	4	0	2.7	18.1	5.1	0	

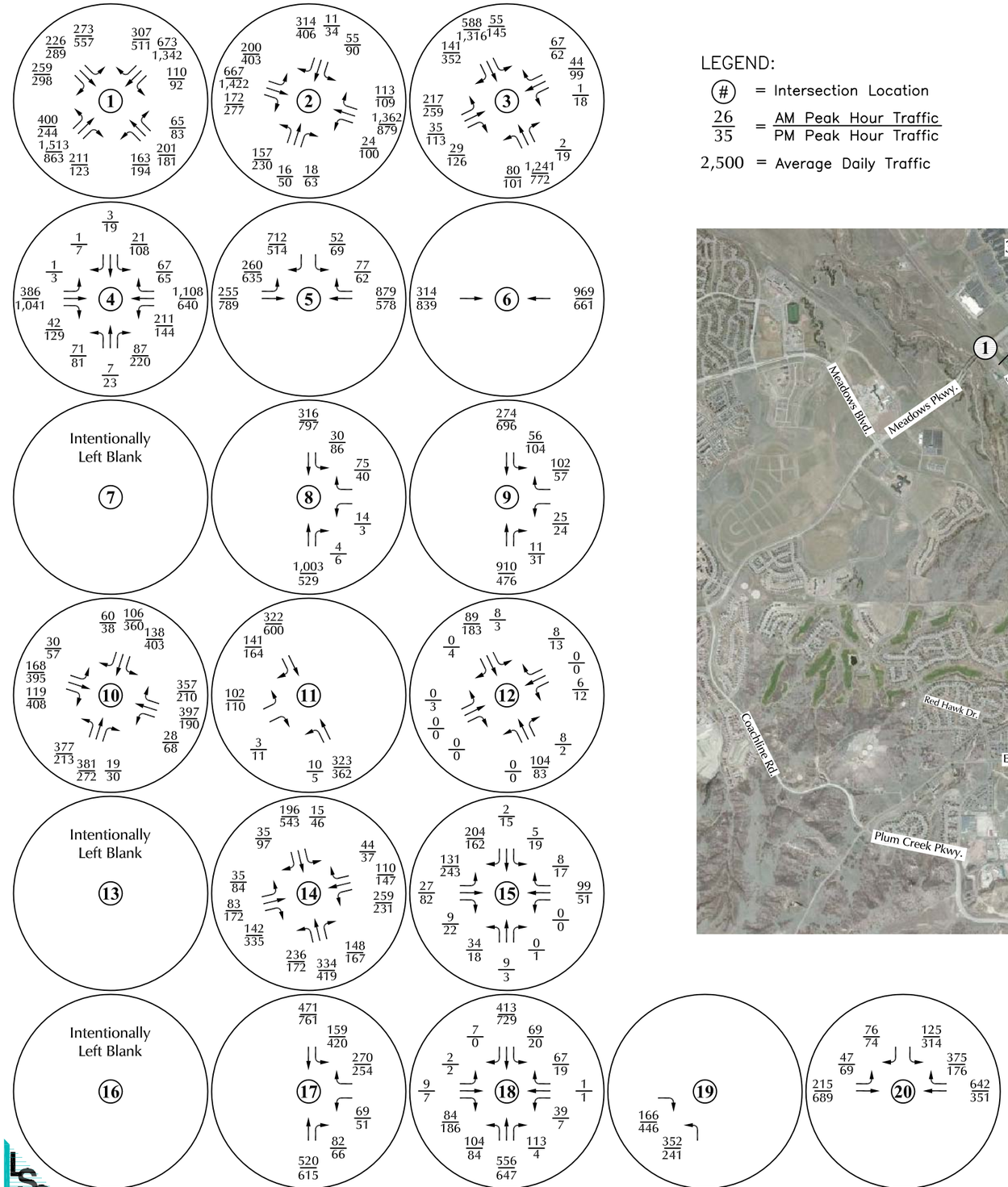


All Traffic Data Services,Inc.
9660 W 44th Ave
Wheat Ridge,CO 80033
www.alltrafficdata.net

File Name : #4 US85&MEADOWSPKWYPM
Site Code : 00000000
Start Date : 6/25/2014
Page No : 2

	US85 Southbound					MEADOWS PKWY Westbound					US85 Northbound					MEADOWS PKWY Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	68	69	135	0	272	142	**367**	23	0	**532**	11	22	34	0	67	**41**	190	47	0	278	1149
05:00 PM	**80**	64	141	0	285	**145**	306	22	0	473	26	**73**	**67**	0	**166**	20	202	**82**	0	304	**1228**
05:15 PM	71	**78**	139	0	288	112	347	**27**	0	486	16	44	38	0	98	34	**242**	52	0	**328**	1200
05:30 PM	79	78	**142**	0	**299**	112	322	20	0	454	**30**	42	55	0	127	28	229	63	0	320	1200
Total Volume	298	289	557	0	1144	511	1342	92	0	1945	83	181	194	0	458	123	863	244	0	1230	4777
% App. Total	26	25.3	48.7	0		26.3	69	4.7	0		18.1	39.5	42.4	0		10	70.2	19.8	0		
PHF	.931	.926	.981	.000	.957	.881	.914	.852	.000	.914	.692	.620	.724	.000	.690	.750	.892	.744	.000	.938	.973



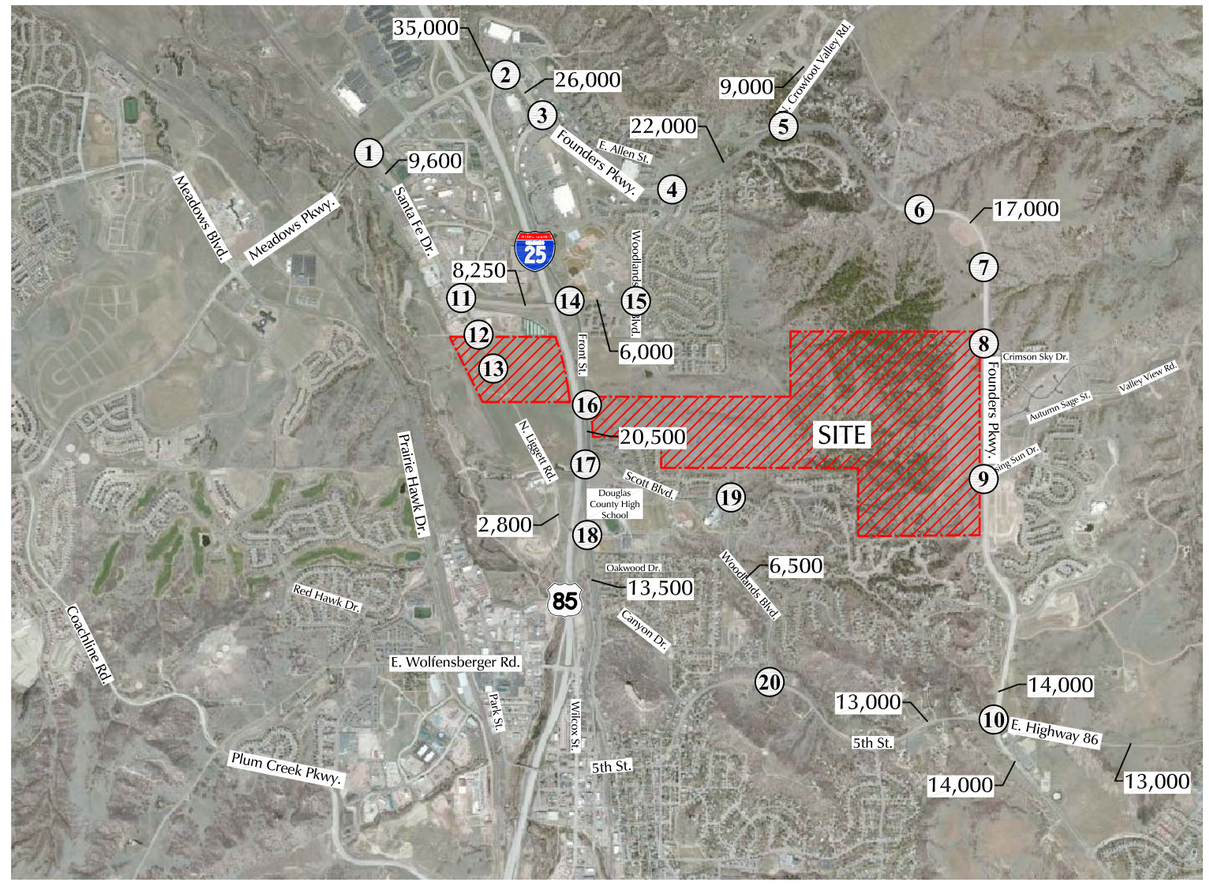


LEGEND:

(#) = Intersection Location

26/35 = AM Peak Hour Traffic / PM Peak Hour Traffic

2,500 = Average Daily Traffic



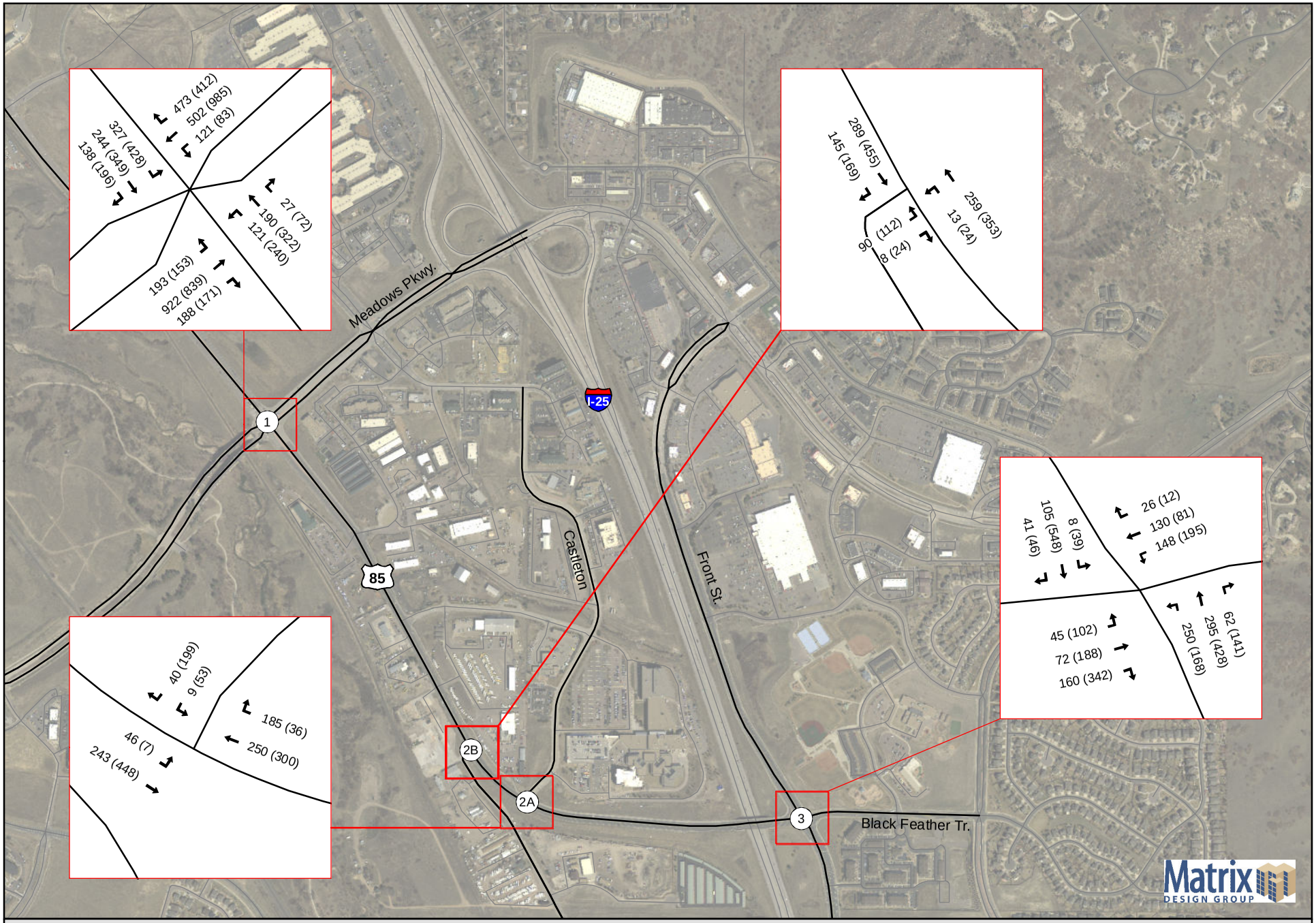
Approximate Scale
Scale: 1"=3,000'

Figure 3a

Existing Traffic Volumes

Pine Canyon Update (LSC #160590)

LSC TRANSPORTATION CONSULTANTS, INC.



2801 US 85
Traffic Impact Analysis

N

0 1,000 2,000 Feet

Figure 2
Existing Peak Hour Traffic Volumes

FILE: G:\gis_projects\Castle_Rock_Highway_85\active\apps\CastleRock_Figure2_Existing_Peak.mxd, 11/11/2016, andrea_santoro

COUNTER MEASURES INC.
1889 YORK STREET
DENVER.COLORADO
303-333-7409

N/S STREET: SANTA FE DR
E/W STREET: MEADOWS PKWY
CITY: CASTLE ROCK
COUNTY: DOUGLAS

File Name : SANTMEADA
Site Code : 00000013
Start Date : 11/8/2016
Page No : 1

Groups Printed- 1 - VEHICLES

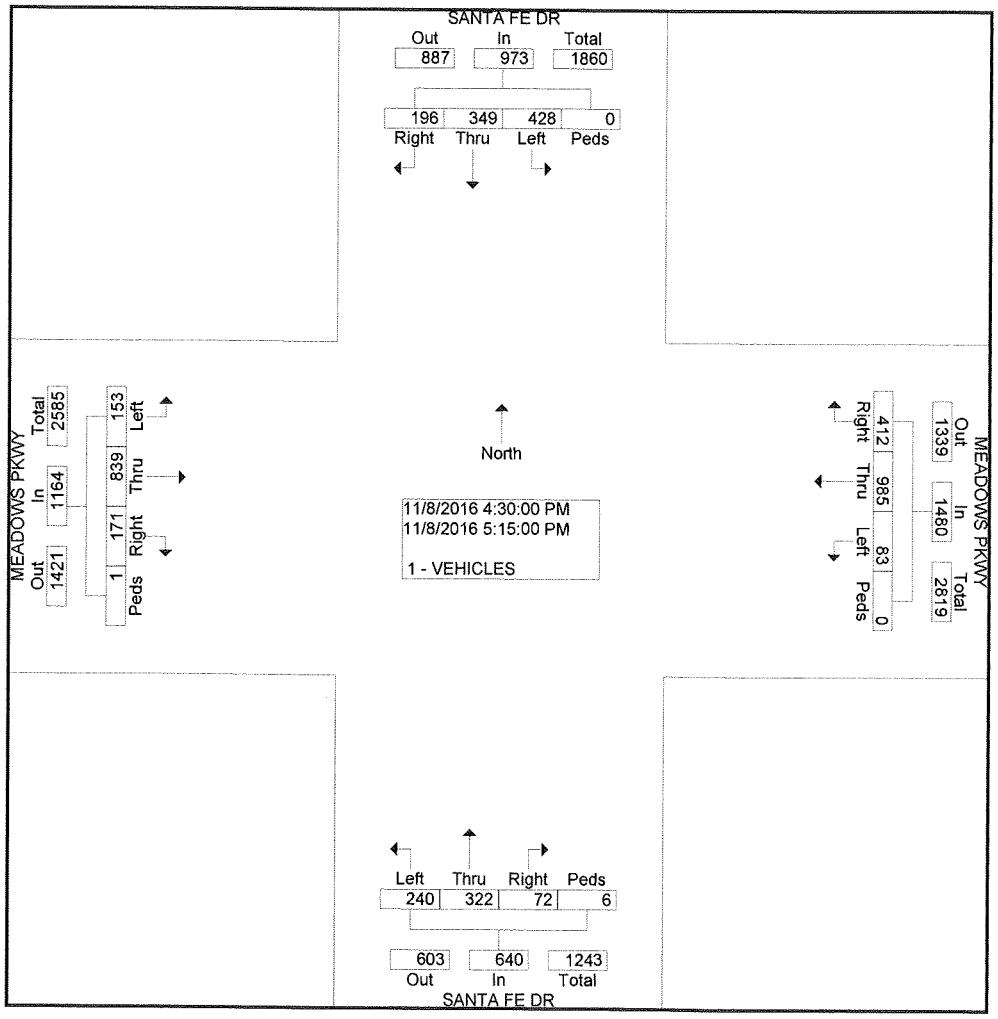
	SANTA FE DR Southbound				MEADOWS PKWY Westbound				SANTA FE DR Northbound				MEADOWS PKWY Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
06:30 AM	43	32	12	0	19	91	69	0	12	58	7	0	42	212	17	0	614
06:45 AM	48	23	26	0	16	91	93	0	8	51	7	0	43	216	30	0	652
Total	91	55	38	0	35	182	162	0	20	109	14	0	85	428	47	0	1266
07:00 AM	75	42	30	0	9	77	105	0	14	52	7	0	50	225	20	0	706
07:15 AM	72	59	30	0	36	113	129	0	18	61	3	0	51	217	29	0	818
07:30 AM	98	61	44	0	26	92	165	50	23	46	9	0	52	222	52	0	940
07:45 AM	79	79	37	0	37	149	108	20	47	56	10	0	45	231	62	0	960
Total	324	241	141	0	108	431	507	70	102	215	29	0	198	895	163	0	3424
08:00 AM	78	45	27	0	22	148	71	0	33	27	5	0	45	252	45	0	798
08:15 AM	73	36	34	0	17	100	83	0	26	39	11	0	37	243	30	0	729
Total	151	81	61	0	39	248	154	0	59	66	16	0	82	495	75	0	1527
04:00 PM	98	70	50	0	25	188	89	0	61	71	21	0	40	212	20	0	945
04:15 PM	109	70	32	0	30	230	112	0	78	83	16	0	23	194	47	0	1024
04:30 PM	85	62	38	0	22	247	121	0	65	93	12	0	43	229	43	0	1060
04:45 PM	127	109	39	0	13	245	75	0	50	68	14	0	39	176	42	0	997
Total	419	311	159	0	90	910	397	0	254	315	63	0	145	811	152	0	4026
05:00 PM	100	98	64	0	26	255	121	0	55	100	27	0	34	211	48	1	1140
05:15 PM	116	80	55	0	22	238	95	0	70	61	19	6	37	223	38	0	1060
05:30 PM	124	73	62	0	28	251	93	1	66	60	14	9	30	206	32	0	1049
05:45 PM	102	60	50	1	13	259	71	0	52	51	10	0	13	136	23	0	841
Total	442	311	231	1	89	1003	380	1	243	272	70	15	114	776	141	1	4090
Grand Total	1427	999	630	1	361	2774	1600	71	678	977	192	15	624	3405	578	1	14333
Apprch %	46.7	32.7	20.6	0.0	7.5	57.7	33.3	1.5	36.4	52.5	10.3	0.8	13.5	73.9	12.5	0.0	
Total %	10.0	7.0	4.4	0.0	2.5	19.4	11.2	0.5	4.7	6.8	1.3	0.1	4.4	23.8	4.0	0.0	

COUNTER MEASURES INC.
1889 YORK STREET
DENVER.COLORADO
303-333-7409

N/S STREET: SANTA FE DR
E/W STREET: MEADOWS PKWY
CITY: CASTLE ROCK
COUNTY: DOUGLAS

File Name : SANTMEADA
Site Code : 00000013
Start Date : 11/8/2016
Page No : 2

	SANTA FE DR Southbound					MEADOWS PKWY Westbound					SANTA FE DR Northbound					MEADOWS PKWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Intersection	04:30 PM																				
Volume	428	349	196	0	973	83	985	412	0	1480	240	322	72	6	640	153	839	171	1	1164	4257
Percent	44.0	35.9	20.1	0.0		5.6	66.6	27.8	0.0		37.5	50.3	11.3	0.9		13.1	72.1	14.7	0.1		
05:00 Volume	100	98	64	0	262	26	255	121	0	402	55	100	27	0	182	34	211	48	1	294	1140
Peak Factor																					0.934
High Int.	04:45 PM					05:00 PM					05:00 PM					04:30 PM					
Volume	127	109	39	0	275	26	255	121	0	402	55	100	27	0	182	43	229	43	0	315	
Peak Factor					0.885					0.920					0.879					0.924	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	86	206	236	93	363	409	465	446	78	212	282	42
Future Volume (veh/h)	86	206	236	93	363	409	465	446	78	212	282	42
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	93	224	0	101	395	0	505	485	0	230	307	0
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	213	439	373	337	447	380	595	733	623	401	489	416
Arrive On Green	0.06	0.24	0.00	0.06	0.24	0.00	0.22	0.39	0.00	0.09	0.26	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	93	224	0	101	395	0	505	485	0	230	307	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	3.5	9.4	0.0	3.8	18.4	0.0	17.7	19.2	0.0	8.0	13.1	0.0
Cycle Q Clear(g_c), s	3.5	9.4	0.0	3.8	18.4	0.0	17.7	19.2	0.0	8.0	13.1	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	213	439	373	337	447	380	595	733	623	401	489	416
V/C Ratio(X)	0.44	0.51	0.00	0.30	0.88	0.00	0.85	0.66	0.00	0.57	0.63	0.00
Avail Cap(c_a), veh/h	213	476	405	349	497	422	599	733	623	401	489	416
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	25.9	29.9	0.0	24.2	33.0	0.0	17.8	22.4	0.0	22.7	29.3	0.0
Incr Delay (d2), s/veh	1.4	0.9	0.0	0.5	16.0	0.0	11.0	4.7	0.0	2.0	6.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	5.0	0.0	1.9	11.4	0.0	10.4	10.8	0.0	1.2	7.6	0.0
LnGrp Delay(d),s/veh	27.3	30.8	0.0	24.7	49.0	0.0	28.8	27.0	0.0	24.7	35.3	0.0
LnGrp LOS	C	C		C	D		C	C		C	D	
Approach Vol, veh/h		317			496			990			537	
Approach Delay, s/veh		29.8			44.0			27.9			30.7	
Approach LOS		C			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	40.4	10.4	26.2	24.8	28.6	10.0	26.6
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	8.0	33.0	6.0	23.0	20.0	21.0	5.0	24.0
Max Q Clear Time (g_c+I1), s	10.0	21.2	5.8	11.4	19.7	15.1	5.5	20.4
Green Ext Time (p_c), s	0.0	3.5	0.0	2.6	0.1	2.3	0.0	1.2

Intersection Summary	
HCM 2010 Ctrl Delay	32.2
HCM 2010 LOS	C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	710	1132	639	81	97	498
Future Volume (veh/h)	710	1132	639	81	97	498
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1676	1676	1676	1676	1676	1676
Adj Flow Rate, veh/h	772	1230	695	88	105	541
Adj No. of Lanes	1	2	2	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	652	2298	838	375	298	848
Arrive On Green	0.54	0.96	0.26	0.26	0.19	0.19
Sat Flow, veh/h	1597	3269	3269	1425	1597	1425
Grp Volume(v), veh/h	772	1230	695	88	105	541
Grp Sat Flow(s),veh/h/ln	1597	1593	1593	1425	1597	1425
Q Serve(g_s), s	49.0	3.8	24.7	5.8	6.9	0.0
Cycle Q Clear(g_c), s	49.0	3.8	24.7	5.8	6.9	0.0
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	652	2298	838	375	298	848
V/C Ratio(X)	1.18	0.54	0.83	0.23	0.35	0.64
Avail Cap(c_a), veh/h	652	2628	1194	534	298	848
HCM Platoon Ratio	1.33	1.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.58	0.58	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.4	0.8	41.7	34.7	42.5	15.9
Incr Delay (d2), s/veh	92.2	0.1	3.4	0.3	3.2	3.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	37.9	1.4	11.2	2.3	3.3	18.7
LnGrp Delay(d),s/veh	119.6	0.9	45.1	35.0	45.7	19.5
LnGrp LOS	F	A	D	D	D	B
Approach Vol, veh/h		2002	783		646	
Approach Delay, s/veh		46.6	44.0		23.8	
Approach LOS		D	D		C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				92.6		27.4	55.0	37.6
Change Period (Y+Rc), s				6.0		5.0	6.0	* 6
Max Green Setting (Gmax), s				99.0		10.0	49.0	* 45
Max Q Clear Time (g_c+I1), s				5.8		8.9	51.0	26.7
Green Ext Time (p_c), s				22.0		0.3	0.0	4.9

Intersection Summary	
HCM 2010 Ctrl Delay	41.7
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	1332	108	192	958	111	87	44	247	152	29	7
Future Volume (veh/h)	6	1332	108	192	958	111	87	44	247	152	29	7
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	7	1448	117	209	1041	121	95	48	268	165	32	8
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	309	1714	767	213	1905	852	454	402	342	385	639	154
Arrive On Green	0.01	0.48	0.48	0.13	1.00	1.00	0.06	0.22	0.22	0.07	0.23	0.23
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1774	1863	1583	1774	2831	681
Grp Volume(v), veh/h	7	1448	117	209	1041	121	95	48	268	165	20	20
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1774	1863	1583	1774	1770	1742
Q Serve(g_s), s	0.2	42.8	4.9	7.5	0.0	0.0	4.9	2.5	19.2	8.0	1.0	1.1
Cycle Q Clear(g_c), s	0.2	42.8	4.9	7.5	0.0	0.0	4.9	2.5	19.2	8.0	1.0	1.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.39
Lane Grp Cap(c), veh/h	309	1714	767	213	1905	852	454	402	342	385	400	393
V/C Ratio(X)	0.02	0.84	0.15	0.98	0.55	0.14	0.21	0.12	0.78	0.43	0.05	0.05
Avail Cap(c_a), veh/h	522	1947	871	213	1905	852	620	402	342	385	400	393
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.61	0.61	0.61	0.66	0.66	0.66	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.5	27.0	17.2	24.9	0.0	0.0	33.6	37.9	44.4	34.3	36.4	36.4
Incr Delay (d2), s/veh	0.0	2.0	0.1	45.6	0.2	0.1	0.2	0.6	16.4	0.8	0.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	21.4	2.2	6.2	0.1	0.0	2.5	1.3	9.9	0.6	0.5	0.6
LnGrp Delay(d),s/veh	15.5	29.0	17.3	70.5	0.2	0.1	33.8	38.5	60.9	35.1	36.6	36.6
LnGrp LOS	B	C	B	E	A	A	C	D	E	D	D	D
Approach Vol, veh/h		1572			1371			411			205	
Approach Delay, s/veh		28.1			10.9			52.0			35.4	
Approach LOS		C			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	30.9	12.0	64.1	11.8	32.1	5.5	70.6
Change Period (Y+Rc), s	5.0	5.0	4.5	6.0	5.0	5.0	4.5	6.0
Max Green Setting (Gmax), s	8.0	18.0	7.5	66.0	18.0	8.0	15.5	58.0
Max Q Clear Time (g_c+I1), s	10.0	21.2	9.5	44.8	6.9	3.1	2.2	2.0
Green Ext Time (p_c), s	0.0	0.0	0.0	13.3	0.1	0.6	0.0	38.5

Intersection Summary	
HCM 2010 Ctrl Delay	24.7
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	205	1506	338	132	1003	35	284	137	193	44	124	61
Future Volume (veh/h)	205	1506	338	132	1003	35	284	137	193	44	124	61
Number	3	8	18	7	4	14	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	223	1637	367	143	1090	38	309	149	210	48	135	66
Adj No. of Lanes	1	3	0	1	3	0	2	1	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	369	2065	458	264	2375	83	705	427	363	284	399	185
Arrive On Green	0.17	0.99	0.99	0.06	0.47	0.47	0.09	0.23	0.23	0.03	0.17	0.17
Sat Flow, veh/h	1774	4165	925	1774	5046	176	3442	1863	1583	1774	2348	1092
Grp Volume(v), veh/h	223	1329	675	143	732	396	309	149	210	48	100	101
Grp Sat Flow(s),veh/h/ln	1774	1695	1700	1774	1695	1832	1721	1863	1583	1774	1770	1670
Q Serve(g_s), s	8.2	1.8	1.9	5.0	17.5	17.5	8.5	8.0	14.1	2.7	6.0	6.4
Cycle Q Clear(g_c), s	8.2	1.8	1.9	5.0	17.5	17.5	8.5	8.0	14.1	2.7	6.0	6.4
Prop In Lane	1.00		0.54	1.00		0.10	1.00		1.00	1.00		0.65
Lane Grp Cap(c), veh/h	369	1681	843	264	1596	862	705	427	363	284	301	284
V/C Ratio(X)	0.60	0.79	0.80	0.54	0.46	0.46	0.44	0.35	0.58	0.17	0.33	0.36
Avail Cap(c_a), veh/h	369	1808	906	308	1808	977	873	427	363	314	301	284
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.41	0.41	0.41	0.88	0.88	0.88	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.5	0.3	0.3	14.5	21.4	21.4	34.6	38.7	41.1	39.2	43.8	44.0
Incr Delay (d2), s/veh	1.1	1.0	2.0	1.5	0.2	0.3	0.4	2.2	6.6	0.3	3.0	3.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	0.4	0.7	2.5	8.2	8.9	4.1	4.4	6.8	1.3	3.2	3.2
LnGrp Delay(d),s/veh	15.6	1.2	2.3	16.0	21.6	21.8	35.0	41.0	47.7	39.4	46.8	47.5
LnGrp LOS	B	A	A	B	C	C	D	D	D	D	D	D
Approach Vol, veh/h		2227			1271			668			249	
Approach Delay, s/veh		3.0			21.0			40.3			45.6	
Approach LOS		A			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	33.5	15.0	62.5	16.1	26.4	12.0	65.5
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	6.0	18.0	10.0	64.0	17.0	7.0	10.0	64.0
Max Q Clear Time (g_c+I1), s	4.7	16.1	10.2	19.5	10.5	8.4	7.0	3.9
Green Ext Time (p_c), s	0.0	0.6	0.0	37.0	0.6	0.0	0.1	47.1

Intersection Summary	
HCM 2010 Ctrl Delay	16.2
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	371	1855	329	32	1156	156	252	42	75	113	42	435
Future Volume (veh/h)	371	1855	329	32	1156	156	252	42	75	113	42	435
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	403	2016	358	35	1257	170	274	46	82	123	46	0
Adj No. of Lanes	1	3	0	1	3	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	433	2173	377	118	1488	201	508	160	285	419	439	373
Arrive On Green	0.20	0.50	0.50	0.01	0.11	0.11	0.09	0.27	0.27	0.06	0.24	0.00
Sat Flow, veh/h	1774	4362	758	1774	4532	613	1774	601	1072	1774	1863	1583
Grp Volume(v), veh/h	403	1557	817	35	940	487	274	0	128	123	46	0
Grp Sat Flow(s),veh/h/ln	1774	1695	1729	1774	1695	1755	1774	0	1674	1774	1863	1583
Q Serve(g_s), s	21.2	51.1	53.9	1.6	32.7	32.7	10.5	0.0	7.3	6.3	2.3	0.0
Cycle Q Clear(g_c), s	21.2	51.1	53.9	1.6	32.7	32.7	10.5	0.0	7.3	6.3	2.3	0.0
Prop In Lane	1.00		0.44	1.00		0.35	1.00		0.64	1.00		1.00
Lane Grp Cap(c), veh/h	433	1689	861	118	1113	576	508	0	444	419	439	373
V/C Ratio(X)	0.93	0.92	0.95	0.30	0.84	0.84	0.54	0.00	0.29	0.29	0.10	0.00
Avail Cap(c_a), veh/h	502	1721	877	143	1113	576	508	0	444	419	439	373
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.51	0.51	0.51	0.90	0.90	0.90	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	33.7	27.9	28.6	31.8	50.5	50.5	32.7	0.0	35.0	32.3	35.9	0.0
Incr Delay (d2), s/veh	13.6	4.8	11.7	1.2	5.5	10.1	1.1	0.0	1.6	0.4	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.7	24.9	28.4	0.8	16.2	17.5	2.6	0.0	3.6	3.1	1.3	0.0
LnGrp Delay(d),s/veh	47.3	32.7	40.3	33.0	56.0	60.6	33.8	0.0	36.7	32.7	36.4	0.0
LnGrp LOS	D	C	D	C	E	E	C		D	C	D	
Approach Vol, veh/h		2777			1462			402			169	
Approach Delay, s/veh		37.1			57.0			34.7			33.7	
Approach LOS		D			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.4	36.4	7.9	64.3	15.0	32.8	28.3	43.9
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	6.9	29.1	5.1	60.9	10.5	25.5	28.5	37.5
Max Q Clear Time (g_c+I1), s	8.3	9.3	3.6	55.9	12.5	4.3	23.2	34.7
Green Ext Time (p_c), s	0.0	0.9	0.0	3.8	0.0	0.9	0.7	2.8

Intersection Summary	
HCM 2010 Ctrl Delay	42.8
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	53	355	4	41	547	256	24	26	136	234	9	85
Future Volume (veh/h)	53	355	4	41	547	256	24	26	136	234	9	85
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	58	386	4	45	595	278	26	28	148	254	10	92
Adj No. of Lanes	1	2	0	1	2	1	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	206	862	9	294	833	373	601	95	502	625	840	714
Arrive On Green	0.04	0.24	0.24	0.04	0.24	0.24	0.03	0.37	0.37	0.11	0.45	0.45
Sat Flow, veh/h	1774	3589	37	1774	3539	1583	1774	258	1364	1774	1863	1583
Grp Volume(v), veh/h	58	190	200	45	595	278	26	0	176	254	10	92
Grp Sat Flow(s),veh/h/ln	1774	1770	1856	1774	1770	1583	1774	0	1622	1774	1863	1583
Q Serve(g_s), s	2.2	8.2	8.2	1.7	13.9	14.7	0.8	0.0	6.9	7.5	0.3	3.0
Cycle Q Clear(g_c), s	2.2	8.2	8.2	1.7	13.9	14.7	0.8	0.0	6.9	7.5	0.3	3.0
Prop In Lane	1.00		0.02	1.00		1.00	1.00		0.84	1.00		1.00
Lane Grp Cap(c), veh/h	206	425	446	294	833	373	601	0	597	625	840	714
V/C Ratio(X)	0.28	0.45	0.45	0.15	0.71	0.75	0.04	0.00	0.29	0.41	0.01	0.13
Avail Cap(c_a), veh/h	230	492	516	326	983	440	653	0	597	726	840	714
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.4	29.1	29.1	24.8	31.6	31.9	16.7	0.0	20.1	13.7	13.6	14.4
Incr Delay (d2), s/veh	0.7	0.7	0.7	0.2	2.0	5.7	0.0	0.0	1.3	0.4	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	4.1	4.3	0.8	7.0	7.0	0.4	0.0	3.3	3.7	0.1	1.4
LnGrp Delay(d),s/veh	26.2	29.8	29.8	25.0	33.7	37.6	16.8	0.0	21.4	14.1	13.7	14.8
LnGrp LOS	C	C	C	C	C	D	B		C	B	B	B
Approach Vol, veh/h		448			918			202			356	
Approach Delay, s/veh		29.4			34.4			20.8			14.3	
Approach LOS		C			C			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.9	39.1	8.4	27.6	7.4	46.6	8.8	27.2
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	15.0	23.0	5.0	25.0	5.0	33.0	5.0	25.0
Max Q Clear Time (g_c+I1), s	9.5	8.9	3.7	10.2	2.8	5.0	4.2	16.7
Green Ext Time (p_c), s	0.4	1.2	0.0	6.5	0.0	1.5	0.0	4.5

Intersection Summary	
HCM 2010 Ctrl Delay	28.1
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	18.1
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations												
Traffic Vol, veh/h	0	96	169	32	0	30	222	33	0	30	94	42
Future Vol, veh/h	0	96	169	32	0	30	222	33	0	30	94	42
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	104	184	35	0	33	241	36	0	33	102	46
Number of Lanes	0	0	1	1	0	0	1	1	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	3
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	3	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	3	2
HCM Control Delay	22.3	20.5	14.5
HCM LOS	C	C	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	36%	0%	12%	0%	100%	0%	0%
Vol Thru, %	0%	69%	64%	0%	88%	0%	0%	100%	0%
Vol Right, %	0%	31%	0%	100%	0%	100%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	30	136	265	32	252	33	38	143	204
LT Vol	30	0	96	0	30	0	38	0	0
Through Vol	0	94	169	0	222	0	0	143	0
RT Vol	0	42	0	32	0	33	0	0	204
Lane Flow Rate	33	148	288	35	274	36	41	155	222
Geometry Grp	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.08	0.334	0.635	0.068	0.599	0.071	0.095	0.334	0.433
Departure Headway (Hd)	8.87	8.13	7.937	7.039	7.869	7.094	8.255	7.743	7.025
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	402	441	452	506	457	502	432	463	510
Service Time	6.665	5.924	5.72	4.821	5.652	4.876	6.036	5.522	4.804
HCM Lane V/C Ratio	0.082	0.336	0.637	0.069	0.6	0.072	0.095	0.335	0.435
HCM Control Delay	12.4	15	23.7	10.3	21.8	10.4	11.9	14.4	15.1
HCM Lane LOS	B	B	C	B	C	B	B	B	C
HCM 95th-tile Q	0.3	1.4	4.3	0.2	3.8	0.2	0.3	1.4	2.2

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Lane Configurations				
Traffic Vol, veh/h	0	38	143	204
Future Vol, veh/h	0	38	143	204
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	41	155	222
Number of Lanes	0	1	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	14.5
HCM LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	112	195	366	182	87	29	184	461	185	51	596	172
Future Volume (veh/h)	112	195	366	182	87	29	184	461	185	51	596	172
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	122	212	0	198	95	32	200	501	201	55	648	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	312	269	228	258	207	70	237	1216	485	422	1416	633
Arrive On Green	0.07	0.14	0.00	0.08	0.16	0.16	0.13	0.49	0.49	0.04	0.40	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1334	449	1774	2472	987	1774	3539	1583
Grp Volume(v), veh/h	122	212	0	198	0	127	200	358	344	55	648	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	0	1783	1774	1770	1689	1774	1770	1583
Q Serve(g_s), s	5.2	9.9	0.0	7.0	0.0	5.8	9.9	11.6	11.7	1.6	12.1	0.0
Cycle Q Clear(g_c), s	5.2	9.9	0.0	7.0	0.0	5.8	9.9	11.6	11.7	1.6	12.1	0.0
Prop In Lane	1.00		1.00	1.00		0.25	1.00		0.58	1.00		1.00
Lane Grp Cap(c), veh/h	312	269	228	258	0	277	237	871	831	422	1416	633
V/C Ratio(X)	0.39	0.79	0.00	0.77	0.00	0.46	0.84	0.41	0.41	0.13	0.46	0.00
Avail Cap(c_a), veh/h	312	393	334	258	0	396	315	871	831	447	1416	633
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	30.2	37.2	0.0	33.2	0.0	34.6	38.1	14.6	14.6	14.6	19.8	0.0
Incr Delay (d2), s/veh	0.8	6.5	0.0	13.0	0.0	1.2	14.5	1.4	1.5	0.1	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	5.6	0.0	2.4	0.0	2.9	5.8	6.0	5.8	0.8	6.2	0.0
LnGrp Delay(d),s/veh	31.0	43.7	0.0	46.2	0.0	35.8	52.5	16.0	16.1	14.7	20.9	0.0
LnGrp LOS	C	D		D		D	D	B	B	B	C	
Approach Vol, veh/h		334			325			902			703	
Approach Delay, s/veh		39.1			42.1			24.1			20.4	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.7	50.3	12.0	19.0	17.0	42.0	11.0	20.0
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	5.0	37.0	7.0	19.0	16.0	26.0	6.0	20.0
Max Q Clear Time (g_c+I1), s	3.6	13.7	9.0	11.9	11.9	14.1	7.2	7.8
Green Ext Time (p_c), s	0.0	9.9	0.0	1.1	0.2	6.7	0.0	1.5

Intersection Summary	
HCM 2010 Ctrl Delay	27.8
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	99	1208	170	309	1661	504	148	40	411	477	76	158
Future Volume (veh/h)	99	1208	170	309	1661	504	148	40	411	477	76	158
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	108	1313	185	336	1805	0	161	43	447	518	83	172
Adj No. of Lanes	2	3	1	2	3	1	2	1	1	3	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	168	1728	538	477	2185	680	892	483	410	563	210	178
Arrive On Green	0.05	0.34	0.34	0.14	0.43	0.00	0.26	0.26	0.26	0.11	0.11	0.11
Sat Flow, veh/h	3442	5085	1583	3442	5085	1583	3442	1863	1583	5003	1863	1583
Grp Volume(v), veh/h	108	1313	185	336	1805	0	161	43	447	518	83	172
Grp Sat Flow(s),veh/h/ln	1721	1695	1583	1721	1695	1583	1721	1863	1583	1668	1863	1583
Q Serve(g_s), s	3.7	27.6	10.5	11.2	37.7	0.0	4.4	2.1	31.1	12.3	5.0	13.0
Cycle Q Clear(g_c), s	3.7	27.6	10.5	11.2	37.7	0.0	4.4	2.1	31.1	12.3	5.0	13.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	168	1728	538	477	2185	680	892	483	410	563	210	178
V/C Ratio(X)	0.64	0.76	0.34	0.70	0.83	0.00	0.18	0.09	1.09	0.92	0.40	0.97
Avail Cap(c_a), veh/h	359	2225	693	477	2352	732	892	483	410	563	210	178
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.31	0.31	0.31	0.52	0.52	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.1	35.3	29.6	49.3	30.2	0.0	34.6	33.7	44.5	52.7	49.5	53.0
Incr Delay (d2), s/veh	1.3	0.4	0.1	2.5	1.3	0.0	0.4	0.4	70.8	20.6	1.2	57.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	12.9	4.6	5.5	17.8	0.0	2.1	1.1	21.6	6.7	2.6	8.5
LnGrp Delay(d),s/veh	57.3	35.6	29.7	51.8	31.5	0.0	35.0	34.1	115.2	73.3	50.7	110.2
LnGrp LOS	E	D	C	D	C		C	C	F	E	D	F
Approach Vol, veh/h		1606			2141			651			773	
Approach Delay, s/veh		36.4			34.7			90.0			79.1	
Approach LOS		D			C			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		35.6	21.1	45.3		18.0	10.3	56.1
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		20.5	15.5	52.5		13.5	12.5	55.5
Max Q Clear Time (g_c+I1), s		33.1	13.2	29.6		15.0	5.7	39.7
Green Ext Time (p_c), s		0.0	2.1	11.2		0.0	0.1	11.9

Intersection Summary	
HCM 2010 Ctrl Delay	48.8
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	153	839	171	83	985	412	240	322	72	428	349	196
Future Volume (veh/h)	153	839	171	83	985	412	240	322	72	428	349	196
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	166	912	0	90	1071	0	261	350	0	465	379	0
Adj No. of Lanes	1	2	1	2	2	1	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	163	1156	517	138	973	435	287	1209	541	373	1020	456
Arrive On Green	0.09	0.33	0.00	0.08	0.55	0.00	0.16	0.34	0.00	0.11	0.29	0.00
Sat Flow, veh/h	1774	3539	1583	3442	3539	1583	1774	3539	1583	3442	3539	1583
Grp Volume(v), veh/h	166	912	0	90	1071	0	261	350	0	465	379	0
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1721	1770	1583	1774	1770	1583	1721	1770	1583
Q Serve(g_s), s	11.0	28.0	0.0	3.0	33.0	0.0	17.4	8.7	0.0	13.0	10.2	0.0
Cycle Q Clear(g_c), s	11.0	28.0	0.0	3.0	33.0	0.0	17.4	8.7	0.0	13.0	10.2	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	163	1156	517	138	973	435	287	1209	541	373	1020	456
V/C Ratio(X)	1.02	0.79	0.00	0.65	1.10	0.00	0.91	0.29	0.00	1.25	0.37	0.00
Avail Cap(c_a), veh/h	163	1156	517	143	973	435	296	1209	541	373	1020	456
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.67	0.67	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	54.5	36.6	0.0	54.4	27.0	0.0	49.4	28.9	0.0	53.5	34.0	0.0
Incr Delay (d2), s/veh	76.1	3.7	0.0	6.6	56.1	0.0	29.8	0.6	0.0	131.8	1.0	0.0
Initial Q Delay(d3),s/veh	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.8	14.3	0.0	1.6	23.3	0.0	10.9	4.3	0.0	13.0	5.1	0.0
LnGrp Delay(d),s/veh	130.8	40.4	0.0	61.0	83.1	0.0	79.2	29.5	0.0	185.3	35.1	0.0
LnGrp LOS	F	D		E	F		E	C		F	D	
Approach Vol, veh/h		1078			1161			611			844	
Approach Delay, s/veh		54.3			81.4			50.7			117.8	
Approach LOS		D			F			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.0	47.0	9.8	45.2	24.4	40.6	16.0	39.0
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	13.0	41.0	5.0	39.0	20.0	34.0	11.0	33.0
Max Q Clear Time (g_c+I1), s	15.0	10.7	5.0	30.0	19.4	12.2	13.0	35.0
Green Ext Time (p_c), s	0.0	5.4	0.0	7.3	0.1	5.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	76.8
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	300	340	385	110	420	500	495	1190	90	515	885	205
Future Volume (veh/h)	300	340	385	110	420	500	495	1190	90	515	885	205
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	326	370	0	120	457	0	538	1293	0	560	962	0
Adj No. of Lanes	1	2	1	1	2	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	305	781	349	293	556	249	598	1343	601	563	1307	585
Arrive On Green	0.12	0.22	0.00	0.05	0.16	0.00	0.17	0.38	0.00	0.16	0.37	0.00
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	3442	3539	1583	3442	3539	1583
Grp Volume(v), veh/h	326	370	0	120	457	0	538	1293	0	560	962	0
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1721	1770	1583	1721	1770	1583
Q Serve(g_s), s	13.0	10.0	0.0	6.0	13.7	0.0	16.8	39.3	0.0	17.9	25.9	0.0
Cycle Q Clear(g_c), s	13.0	10.0	0.0	6.0	13.7	0.0	16.8	39.3	0.0	17.9	25.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	305	781	349	293	556	249	598	1343	601	563	1307	585
V/C Ratio(X)	1.07	0.47	0.00	0.41	0.82	0.00	0.90	0.96	0.00	0.99	0.74	0.00
Avail Cap(c_a), veh/h	305	837	374	293	611	273	626	1343	601	563	1307	585
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	37.1	37.3	0.0	36.8	44.9	0.0	44.5	33.4	0.0	45.9	30.1	0.0
Incr Delay (d2), s/veh	71.1	0.4	0.0	0.9	8.2	0.0	15.6	17.2	0.0	36.4	3.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.9	4.9	0.0	0.3	7.4	0.0	9.3	22.4	0.0	11.3	13.2	0.0
LnGrp Delay(d),s/veh	108.2	37.8	0.0	37.8	53.1	0.0	60.1	50.6	0.0	82.4	33.8	0.0
LnGrp LOS	F	D		D	D		E	D		F	C	
Approach Vol, veh/h		696			577			1831			1522	
Approach Delay, s/veh		70.8			49.9			53.4			51.7	
Approach LOS		E			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.0	46.7	11.0	29.3	24.1	45.6	18.0	22.3
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	18.0	40.0	6.0	26.0	20.0	38.0	13.0	19.0
Max Q Clear Time (g_c+I1), s	19.9	41.3	8.0	12.0	18.8	27.9	15.0	15.7
Green Ext Time (p_c), s	0.0	0.0	0.0	4.2	0.3	8.3	0.0	1.5

Intersection Summary	
HCM 2010 Ctrl Delay	55.0
HCM 2010 LOS	D

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	905	2840	1605	475	260	835
Future Volume (veh/h)	905	2840	1605	475	260	835
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1676	1676	1676	1676	1676	1676
Adj Flow Rate, veh/h	984	3087	1745	0	283	0
Adj No. of Lanes	2	3	3	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	958	3239	1612	502	1453	669
Arrive On Green	0.31	0.71	0.35	0.00	0.47	0.00
Sat Flow, veh/h	3097	4728	4728	1425	3097	1425
Grp Volume(v), veh/h	984	3087	1745	0	283	0
Grp Sat Flow(s),veh/h/ln	1549	1526	1526	1425	1549	1425
Q Serve(g_s), s	40.2	78.7	45.8	0.0	6.9	0.0
Cycle Q Clear(g_c), s	40.2	78.7	45.8	0.0	6.9	0.0
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	958	3239	1612	502	1453	669
V/C Ratio(X)	1.03	0.95	1.08	0.00	0.19	0.00
Avail Cap(c_a), veh/h	958	3239	1612	502	1453	669
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	44.9	17.1	42.1	0.0	20.2	0.0
Incr Delay (d2), s/veh	16.9	0.9	48.3	0.0	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.4	32.9	26.5	0.0	3.0	0.0
LnGrp Delay(d),s/veh	61.8	18.0	90.4	0.0	20.5	0.0
LnGrp LOS	F	B	F		C	
Approach Vol, veh/h		4071	1745		283	
Approach Delay, s/veh		28.6	90.4		20.5	
Approach LOS		C	F		C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				98.0		67.0	46.2	51.8
Change Period (Y+Rc), s				6.0		5.0	6.0	* 6
Max Green Setting (Gmax), s				91.0		28.0	40.2	* 46
Max Q Clear Time (g_c+I1), s				80.7		8.9	42.2	47.8
Green Ext Time (p_c), s				10.1		0.9	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	45.9
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	2430	335	375	1740	200	350	140	550	250	100	60
Future Volume (veh/h)	15	2430	335	375	1740	200	350	140	550	250	100	60
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	16	2641	364	408	1891	217	380	152	0	272	109	65
Adj No. of Lanes	1	3	1	2	3	1	2	1	1	2	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	29	2509	781	356	2952	919	435	326	277	315	307	172
Arrive On Green	0.02	0.49	0.49	0.10	0.58	0.58	0.13	0.18	0.00	0.09	0.14	0.14
Sat Flow, veh/h	1774	5085	1583	3442	5085	1583	3442	1863	1583	3442	2192	1224
Grp Volume(v), veh/h	16	2641	364	408	1891	217	380	152	0	272	87	87
Grp Sat Flow(s),veh/h/ln	1774	1695	1583	1721	1695	1583	1721	1863	1583	1721	1770	1647
Q Serve(g_s), s	1.3	74.0	22.7	15.5	37.3	10.0	16.3	11.0	0.0	11.7	6.6	7.2
Cycle Q Clear(g_c), s	1.3	74.0	22.7	15.5	37.3	10.0	16.3	11.0	0.0	11.7	6.6	7.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.74
Lane Grp Cap(c), veh/h	29	2509	781	356	2952	919	435	326	277	315	248	231
V/C Ratio(X)	0.56	1.05	0.47	1.15	0.64	0.24	0.87	0.47	0.00	0.86	0.35	0.38
Avail Cap(c_a), veh/h	148	2509	781	356	2952	919	551	326	277	321	248	231
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.16	0.16	0.16	0.09	0.09	0.09	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	73.2	38.0	25.0	67.3	21.0	15.3	64.3	55.6	0.0	67.2	58.3	58.6
Incr Delay (d2), s/veh	2.7	25.8	0.1	69.6	0.0	0.0	12.1	4.7	0.0	20.6	3.8	4.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	40.6	9.9	10.8	17.3	4.3	8.5	6.1	0.0	6.5	3.5	3.6
LnGrp Delay(d),s/veh	75.9	63.8	25.1	136.9	21.1	15.3	76.4	60.3	0.0	87.8	62.1	63.2
LnGrp LOS	E	F	C	F	C	B	E	E		F	E	E
Approach Vol, veh/h		3021			2516			532			446	
Approach Delay, s/veh		59.2			39.3			71.8			78.0	
Approach LOS		E			D			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.7	31.3	20.0	80.0	24.0	26.0	6.9	93.1
Change Period (Y+Rc), s	5.0	5.0	4.5	6.0	5.0	5.0	4.5	6.0
Max Green Setting (Gmax), s	14.0	26.0	15.5	74.0	24.0	16.0	12.5	77.0
Max Q Clear Time (g_c+I1), s	13.7	13.0	17.5	76.0	18.3	9.2	3.3	39.3
Green Ext Time (p_c), s	0.0	1.5	0.0	0.0	0.7	1.0	0.0	37.4

Intersection Summary	
HCM 2010 Ctrl Delay	53.9
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	260	2290	395	290	2150	60	350	145	265	70	135	80
Future Volume (veh/h)	260	2290	395	290	2150	60	350	145	265	70	135	80
Number	3	8	18	7	4	14	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	283	2489	0	315	2337	65	380	158	288	76	147	87
Adj No. of Lanes	1	3	1	2	3	0	2	1	1	2	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	226	2451	763	344	2452	68	373	811	689	132	800	448
Arrive On Green	0.09	0.48	0.00	0.10	0.48	0.48	0.11	0.44	0.44	0.04	0.37	0.37
Sat Flow, veh/h	1774	5085	1583	3442	5087	141	3442	1863	1583	3442	2190	1226
Grp Volume(v), veh/h	283	2489	0	315	1555	847	380	158	288	76	117	117
Grp Sat Flow(s),veh/h/ln	1774	1695	1583	1721	1695	1838	1721	1863	1583	1721	1770	1646
Q Serve(g_s), s	11.0	57.8	0.0	10.9	52.6	53.2	13.0	6.3	16.3	2.6	5.4	5.8
Cycle Q Clear(g_c), s	11.0	57.8	0.0	10.9	52.6	53.2	13.0	6.3	16.3	2.6	5.4	5.8
Prop In Lane	1.00		1.00	1.00		0.08	1.00		1.00	1.00		0.74
Lane Grp Cap(c), veh/h	226	2451	763	344	1634	886	373	811	689	132	647	602
V/C Ratio(X)	1.25	1.02	0.00	0.92	0.95	0.96	1.02	0.19	0.42	0.58	0.18	0.19
Avail Cap(c_a), veh/h	226	2451	763	344	1639	888	373	811	689	172	647	602
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.49	0.49	0.00	0.71	0.71	0.71	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.9	31.1	0.0	53.5	29.7	29.9	53.5	20.9	27.5	56.7	25.9	26.0
Incr Delay (d2), s/veh	130.7	16.7	0.0	22.0	9.7	16.1	51.6	0.5	1.9	3.9	0.6	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.7	30.8	0.0	6.2	26.8	30.8	8.8	3.3	7.5	1.3	2.7	2.7
LnGrp Delay(d),s/veh	183.6	47.8	0.0	75.5	39.4	46.0	105.1	21.4	29.3	60.7	26.5	26.7
LnGrp LOS	F	F		E	D	D	F	C	C	E	C	C
Approach Vol, veh/h		2772			2717			826			310	
Approach Delay, s/veh		61.7			45.7			62.7			35.0	
Approach LOS		E			D			E			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	59.1	17.0	63.8	18.0	50.7	17.0	63.8
Change Period (Y+Rc), s	5.0	6.0	6.0	* 6	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	6.0	23.0	11.0	* 58	13.0	16.0	12.0	57.0
Max Q Clear Time (g_c+I1), s	4.6	18.3	13.0	55.2	15.0	7.8	12.9	59.8
Green Ext Time (p_c), s	0.0	1.5	0.0	2.7	0.0	2.2	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	54.0
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	560	2340	365	50	2250	195	300	50	85	125	50	625
Future Volume (veh/h)	560	2340	365	50	2250	195	300	50	85	125	50	625
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	609	2543	0	54	2446	212	326	54	92	136	54	0
Adj No. of Lanes	2	3	1	1	3	1	2	1	0	2	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	605	3074	957	69	2379	741	334	108	184	185	243	364
Arrive On Green	0.18	0.60	0.00	0.04	0.47	0.47	0.10	0.17	0.17	0.05	0.13	0.00
Sat Flow, veh/h	3442	5085	1583	1774	5085	1583	3442	620	1056	3442	1863	2787
Grp Volume(v), veh/h	609	2543	0	54	2446	212	326	0	146	136	54	0
Grp Sat Flow(s),veh/h/ln	1721	1695	1583	1774	1695	1583	1721	0	1676	1721	1863	1393
Q Serve(g_s), s	24.6	55.4	0.0	4.2	65.5	11.5	13.2	0.0	11.0	5.5	3.6	0.0
Cycle Q Clear(g_c), s	24.6	55.4	0.0	4.2	65.5	11.5	13.2	0.0	11.0	5.5	3.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.63	1.00		1.00
Lane Grp Cap(c), veh/h	605	3074	957	69	2379	741	334	0	292	185	243	364
V/C Ratio(X)	1.01	0.83	0.00	0.78	1.03	0.29	0.98	0.00	0.50	0.74	0.22	0.00
Avail Cap(c_a), veh/h	605	3074	957	89	2379	741	334	0	292	253	243	364
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.23	0.23	0.00	0.12	0.12	0.12	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	57.7	21.9	0.0	66.7	37.3	22.9	63.0	0.0	52.3	65.3	54.5	0.0
Incr Delay (d2), s/veh	19.4	0.5	0.0	4.2	15.4	0.0	42.4	0.0	6.0	7.1	2.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.3	25.8	0.0	2.2	34.0	5.0	8.3	0.0	5.6	2.8	2.0	0.0
LnGrp Delay(d),s/veh	77.1	22.4	0.0	70.9	52.7	22.9	105.4	0.0	58.3	72.3	56.6	0.0
LnGrp LOS	F	C		E	F	C	F		E	E	E	
Approach Vol, veh/h		3152			2712			472			190	
Approach Delay, s/veh		32.9			50.7			90.8			67.9	
Approach LOS		C			D			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.0	28.9	10.0	89.1	18.1	22.8	29.1	70.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.3	21.6	7.0	83.1	13.6	18.3	24.6	65.5
Max Q Clear Time (g_c+I1), s	7.5	13.0	6.2	57.4	15.2	5.6	26.6	67.5
Green Ext Time (p_c), s	0.1	0.7	0.0	25.6	0.0	0.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	45.5
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	100	425	60	100	650	300	75	480	190	310	420	115
Future Volume (veh/h)	100	425	60	100	650	300	75	480	190	310	420	115
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	109	462	65	109	707	326	82	522	207	337	457	125
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	186	712	318	267	747	334	380	654	556	396	821	697
Arrive On Green	0.06	0.20	0.20	0.07	0.21	0.21	0.05	0.35	0.35	0.14	0.44	0.44
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	109	462	65	109	707	326	82	522	207	337	457	125
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	4.4	10.8	3.1	4.3	17.7	18.4	2.6	22.7	8.8	10.3	16.4	4.3
Cycle Q Clear(g_c), s	4.4	10.8	3.1	4.3	17.7	18.4	2.6	22.7	8.8	10.3	16.4	4.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	186	712	318	267	747	334	380	654	556	396	821	697
V/C Ratio(X)	0.59	0.65	0.20	0.41	0.95	0.98	0.22	0.80	0.37	0.85	0.56	0.18
Avail Cap(c_a), veh/h	186	712	318	269	747	334	393	654	556	407	821	697
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.3	33.0	30.0	26.5	35.0	35.3	17.4	26.3	21.8	18.6	18.7	15.3
Incr Delay (d2), s/veh	4.6	2.1	0.3	1.0	20.9	42.4	0.3	9.8	1.9	15.5	2.7	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	5.5	1.4	2.2	10.8	12.0	1.3	13.4	4.1	6.7	9.0	2.0
LnGrp Delay(d),s/veh	32.9	35.1	30.3	27.5	55.8	77.7	17.7	36.1	23.7	34.1	21.4	15.9
LnGrp LOS	C	D	C	C	E	E	B	D	C	C	C	B
Approach Vol, veh/h		636			1142			811			919	
Approach Delay, s/veh		34.2			59.4			31.1			25.3	
Approach LOS		C			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.4	37.6	10.9	24.1	9.4	45.6	10.0	25.0
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	13.0	31.0	6.0	18.0	5.0	39.0	5.0	19.0
Max Q Clear Time (g_c+I1), s	12.3	24.7	6.3	12.8	4.6	18.4	6.4	20.4
Green Ext Time (p_c), s	0.1	3.7	0.0	3.7	0.0	7.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	39.4
HCM 2010 LOS	D

Notes

Intersection	
Intersection Delay, s/veh	18.3
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	614	494	190	538
Demand Flow Rate, veh/h	626	504	194	549
Vehicles Circulating, veh/h	260	294	526	488
Vehicles Exiting, veh/h	777	426	360	310
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	17.8	13.6	9.2	26.3
Approach LOS	C	B	A	D

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	626	504	194	549
Cap Entry Lane, veh/h	871	842	668	694
Entry HV Adj Factor	0.980	0.980	0.978	0.979
Flow Entry, veh/h	614	494	190	538
Cap Entry, veh/h	854	825	653	679
V/C Ratio	0.719	0.598	0.291	0.792
Control Delay, s/veh	17.8	13.6	9.2	26.3
LOS	C	B	A	D
95th %tile Queue, veh	6	4	1	8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	360	675	845	190	370	35	485	420	195	60	600	205
Future Volume (veh/h)	360	675	845	190	370	35	485	420	195	60	600	205
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	391	734	0	207	402	38	527	457	0	65	652	0
Adj No. of Lanes	2	2	1	2	2	0	2	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	455	971	435	212	667	63	529	1585	709	83	1207	540
Arrive On Green	0.13	0.27	0.00	0.06	0.20	0.20	0.15	0.45	0.00	0.05	0.34	0.00
Sat Flow, veh/h	3442	3539	1583	3442	3270	308	3442	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	391	734	0	207	217	223	527	457	0	65	652	0
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1721	1770	1808	1721	1770	1583	1774	1770	1583
Q Serve(g_s), s	14.5	24.7	0.0	7.8	14.4	14.6	19.9	10.6	0.0	4.7	19.3	0.0
Cycle Q Clear(g_c), s	14.5	24.7	0.0	7.8	14.4	14.6	19.9	10.6	0.0	4.7	19.3	0.0
Prop In Lane	1.00		1.00	1.00		0.17	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	455	971	435	212	361	369	529	1585	709	83	1207	540
V/C Ratio(X)	0.86	0.76	0.00	0.98	0.60	0.61	1.00	0.29	0.00	0.78	0.54	0.00
Avail Cap(c_a), veh/h	582	1470	658	212	544	556	529	1585	709	136	1207	540
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	55.2	43.2	0.0	60.9	46.9	47.0	55.0	22.8	0.0	61.3	34.6	0.0
Incr Delay (d2), s/veh	10.1	1.2	0.0	55.2	1.6	1.6	37.8	0.5	0.0	14.5	1.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.5	12.2	0.0	5.3	7.2	7.5	12.2	5.3	0.0	2.6	9.7	0.0
LnGrp Delay(d),s/veh	65.4	44.4	0.0	116.1	48.6	48.6	92.8	23.2	0.0	75.8	36.3	0.0
LnGrp LOS	E	D		F	D	D	F	C		E	D	
Approach Vol, veh/h		1125			647			984			717	
Approach Delay, s/veh		51.7			70.2			60.5			39.9	
Approach LOS		D			E			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.1	64.2	13.0	41.7	25.0	50.3	22.2	32.5
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	10.0	36.0	8.0	54.0	20.0	26.0	22.0	40.0
Max Q Clear Time (g_c+I1), s	6.7	12.6	9.8	26.7	21.9	21.3	16.5	16.6
Green Ext Time (p_c), s	0.0	8.2	0.0	9.0	0.0	2.8	0.7	8.5

Intersection Summary	
HCM 2010 Ctrl Delay	55.2
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	410	1475	250	375	2290	935	200	145	460	1025	260	830
Future Volume (veh/h)	410	1475	250	375	2290	935	200	145	460	1025	260	830
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	446	1603	272	408	2489	0	217	414	329	1114	283	0
Adj No. of Lanes	2	3	1	2	3	1	2	1	1	3	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	413	1751	545	455	1814	565	426	363	308	1044	528	449
Arrive On Green	0.12	0.34	0.34	0.13	0.36	0.00	0.12	0.19	0.19	0.21	0.28	0.00
Sat Flow, veh/h	3442	5085	1583	3442	5085	1583	3548	1863	1583	5003	1863	1583
Grp Volume(v), veh/h	446	1603	272	408	2489	0	217	414	329	1114	283	0
Grp Sat Flow(s),veh/h/ln	1721	1695	1583	1721	1695	1583	1774	1863	1583	1668	1863	1583
Q Serve(g_s), s	18.0	45.3	14.8	17.5	53.5	0.0	8.6	29.2	22.2	31.3	19.3	0.0
Cycle Q Clear(g_c), s	18.0	45.3	14.8	17.5	53.5	0.0	8.6	29.2	22.2	31.3	19.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	413	1751	545	455	1814	565	426	363	308	1044	528	449
V/C Ratio(X)	1.08	0.92	0.50	0.90	1.37	0.00	0.51	1.14	1.07	1.07	0.54	0.00
Avail Cap(c_a), veh/h	413	1783	555	455	1814	565	426	363	308	1044	528	449
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.25	0.25	0.25	0.09	0.09	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	66.0	47.1	20.5	64.1	48.3	0.0	61.9	60.4	35.0	59.3	45.4	0.0
Incr Delay (d2), s/veh	47.3	2.2	0.2	2.4	167.9	0.0	4.3	91.6	70.3	47.6	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.3	21.6	6.5	8.5	53.2	0.0	4.5	24.2	15.7	19.0	10.1	0.0
LnGrp Delay(d),s/veh	113.3	49.3	20.7	66.5	216.1	0.0	66.2	152.0	105.3	107.0	46.5	0.0
LnGrp LOS	F	D	C	E	F		E	F	F	F	D	
Approach Vol, veh/h		2321			2897			960			1397	
Approach Delay, s/veh		58.2			195.0			116.6			94.7	
Approach LOS		E			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	35.8	33.7	24.3	56.2	22.5	47.0	22.5	58.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	31.3	29.2	18.9	52.6	18.0	42.5	18.0	53.5
Max Q Clear Time (g_c+I1), s	33.3	31.2	19.5	47.3	10.6	21.3	20.0	55.5
Green Ext Time (p_c), s	0.0	0.0	0.0	4.4	0.4	5.7	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	124.7
HCM 2010 LOS	F

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	1315	370	420	1540	735	540	820	375	775	880	225
Future Volume (veh/h)	180	1315	370	420	1540	735	540	820	375	775	880	225
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	196	1429	0	457	1674	0	587	891	0	842	957	0
Adj No. of Lanes	1	3	1	2	3	1	3	3	1	3	3	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	177	1571	489	469	1756	547	637	925	288	864	1156	360
Arrive On Green	0.10	0.31	0.00	0.14	0.35	0.00	0.13	0.18	0.00	0.17	0.23	0.00
Sat Flow, veh/h	1774	5085	1583	3442	5085	1583	5003	5085	1583	5003	5085	1583
Grp Volume(v), veh/h	196	1429	0	457	1674	0	587	891	0	842	957	0
Grp Sat Flow(s),veh/h/ln	1774	1695	1583	1721	1695	1583	1668	1695	1583	1668	1695	1583
Q Serve(g_s), s	11.0	29.7	0.0	14.5	35.3	0.0	12.8	19.1	0.0	18.4	19.7	0.0
Cycle Q Clear(g_c), s	11.0	29.7	0.0	14.5	35.3	0.0	12.8	19.1	0.0	18.4	19.7	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	177	1571	489	469	1756	547	637	925	288	864	1156	360
V/C Ratio(X)	1.10	0.91	0.00	0.97	0.95	0.00	0.92	0.96	0.00	0.97	0.83	0.00
Avail Cap(c_a), veh/h	177	1572	489	469	1757	547	637	925	288	864	1156	360
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.09	0.09	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	49.5	36.5	0.0	47.3	35.1	0.0	47.5	44.6	0.0	45.3	40.4	0.0
Incr Delay (d2), s/veh	98.4	8.2	0.0	7.5	1.6	0.0	19.0	21.9	0.0	24.4	6.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.2	15.1	0.0	7.4	16.7	0.0	7.0	10.8	0.0	10.5	10.0	0.0
LnGrp Delay(d),s/veh	147.9	44.7	0.0	54.8	36.8	0.0	66.5	66.5	0.0	69.7	47.3	0.0
LnGrp LOS	F	D		D	D		E	E		E	D	
Approach Vol, veh/h		1625			2131			1478			1799	
Approach Delay, s/veh		57.2			40.6			66.5			57.8	
Approach LOS		E			D			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.0	26.0	20.0	40.0	19.0	31.0	16.0	44.0
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	19.0	20.0	15.0	34.0	14.0	25.0	11.0	38.0
Max Q Clear Time (g_c+I1), s	20.4	21.1	16.5	31.7	14.8	21.7	13.0	37.3
Green Ext Time (p_c), s	0.0	0.0	0.0	2.2	0.0	2.8	0.0	0.7

Intersection Summary	
HCM 2010 Ctrl Delay	54.3
HCM 2010 LOS	D

Notes

Appendix F – Planning Level Project Cost Worksheets

Opinion of Probable Cost

Project #9: Plum Creek Pkwy widening from Wolfensberger Rd to I-25

FHU Ref # 115398-01

Roadway Length (Miles)
1.37

Date Prepared: April 6, 2017
Prepared By: Mike Matz

Project Construction Items	Unit	Quantity	Unit Cost ($)	Total Cost	
Clearing and Grubbing	ACRE	0	$6,000	$0	
Removal of Sidewalk	SY	0	$16	$0	
Removal of Pavement Marking	SF	9,645	$1	$9,645	
Removal of Asphalt Mat	SY	2,667	$14	$37,333	
Removal of Concrete Pavement	SY	0	$11	$0	
Epoxy Pavement Marking	GAL	110	$150	$16,500	
Curb and Gutter (Type 2-IB)	LF	0	$21	$0	
Curb and Gutter (Type 2-IIB)	LF	7,240	$23	$166,520	
Hot Mix Asphalt (HMA)	SY	7,340	$30	$220,200	
Concrete Pavement (11")	SY	27,800	$64	$1,779,200	
Aggregate Base Course (ABC)	CY	1,230	$50	$61,500	
Concrete Sidewalk (6")	SY	8,040	$33	$265,320	
Bridge Replacement	SF	0	$150	$0	
Earthwork & Subgrade Preparation	SY	36,170	$4	$144,680	
Signalized Intersection	EACH	0	$300,000	$0	
Median Decorative Splashguard	LF	0	$5	$0	
Total accounted construction items				**$2,700,898**	**(A)**

	% Range	% Used		
Project Construction Bid Items (from above)	Project Dependent		$2,700,898	(A)
Landscaping	6% of (A)	6.00%	$162,053.89	(B)
Additional Removals	0-5% of (A)	0.00%	$0	(C)
Drainage	5-10% of (A)	5.00%	$135,045	(D)
Erosion Control	3-8% of (A)	3.00%	$81,027	(E)
Signing	1-5% of (A)	1.00%	$27,009	(F)
Lighting	3% of (A)	3.00%	$81,027	(G)
Utilities	10% of (A)	10.00%	$270,090	(H)
Environmental	1-5% of (A)	1.00%	$27,009	(I)
Construction Traffic Control	5 to 25% of (A)	5.00%	$135,045	(J)
Mobilization	(4 to 10%) of (A+B+C+D+E+F+G+H+I+J) Default = 6%	6.00%	$217,152	(K)
Contingencies	(15% - 30%) of (A+B+C+D+E+F+G+H+I+J+K)	30.00%	$1,150,907	(L)
Total of Construction Bid Items	**(A+B+C+D+E+F+G+H+I+J+K+L)**		**$4,987,262**	**(M)**
Total Construction Engineering	15% of (M)	15.00%	$748,089	(N)
Total Final Engineering	12% of (M)	12.00%	$598,471	(O)
Total Project Cost	**(M+N+O)**		**$6,330,000**	

1. In providing opinions of probable construction cost, the Client understands that Felsburg Holt & Ullevig has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinions of probable construction costs provided herein are to be made on the basis of our qualifications and experience. FHU makes no warranty, expressed or implied, as to the accuracy of such opinions as compared to bid or actual costs.

Opinion of Probable Cost

Project #14: Prairie Hawk Dr reallignment along Atchison Way and extension from Topeka Way to Plum Creek Pkwy

FHU Ref # 115398-01

Roadway Length (Miles)
0.795

Date Prepared: April 6, 2017
Prepared By: Joe Haberl

Project Construction Items	Unit	Quantity	Unit Cost ($)	Total Cost	
Clearing and Grubbing	ACRE	6	$6,000	$36,000	
Removal of Sidewalk	SY	0	$16	$0	
Removal of Pavement Marking	SF	0	$1	$0	
Removal of Asphalt Mat	SY	0	$14	$0	
Removal of Concrete Pavement	SY	11,535	$11	$126,885	
Epoxy Pavement Marking	GAL	70	$150	$10,500	
Curb and Gutter (Type 2-IB)	LF	8,400	$21	$176,400	
Curb and Gutter (Type 2-IIB)	LF	8,400	$23	$193,200	
Hot Mix Asphalt (HMA)	SY	24,255	$30	$727,650	
Concrete Pavement (11")	SY	0	$64	$0	
Aggregate Base Course (ABC)	CY	4,045	$50	$202,250	
Concrete Sidewalk (6")	SY	9,330	$33	$307,890	
Bridge Replacement	SF	0	$150	$0	
Earthwork & Subgrade Preparation	SY	41,980	$4	$167,920	
Signalized Intersection	EACH	2	$300,000	$600,000	
Median Decorative Splashguard	LF	4,200	$5	$21,000	
Total accounted construction items				**$2,569,695**	**(A)**

	% Range	% Used		
Project Construction Bid Items (from above)	Project Dependent		$2,569,695	(A)
Landscaping	6% of (A)	6.00%	$154,182	(B)
Additional Removals	0-5% of (A)	0.00%	$0	(C)
Drainage	5-10% of (A)	10.00%	$256,970	(D)
Erosion Control	3-8% of (A)	3.00%	$77,091	(E)
Signing	1-5% of (A)	1.00%	$25,697	(F)
Lighting	3% of (A)	3.00%	$77,091	(G)
Utilities	10% of (A)	10.00%	$256,970	(H)
Environmental	1-5% of (A)	1.00%	$25,697	(I)
Construction Traffic Control	5 to 25% of (A)	5.00%	$128,485	(J)
Mobilization	(4 to 10%) of (A+B+C+D+E+F+G+H+I+J) Default = 6%	6.00%	$214,313	(K)
Contingencies	(15% - 30%) of (A+B+C+D+E+F+G+H+I+J+K)	30.00%	$1,071,563	(L)
Total of Construction Bid Items	**(A+B+C+D+E+F+G+H+I+J+K+L)**		**$4,857,751**	**(M)**
Total Construction Engineering	15% of (M)	15.00%	$728,663	(N)
Total Final Engineering	12% of (M)	12.00%	$582,930	(O)
Total Project Cost	**(M+N+O)**		**$6,170,000**	

1. In providing opinions of probable construction cost, the Client understands that Felsburg Holt & Ullevig has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinions of probable construction costs provided herein are to be made on the basis of our qualifications and experience. FHU makes no warranty, expressed or implied, as to the accuracy of such opinions as compared to bid or actual costs.

Opinion of Probable Cost

Project #15: West Frontage Rd realignment from Town limits to Plum Creek Pkwy

FHU Ref # 115398-01

Roadway Length (Miles)
4.237

Date Prepared: April 6, 2017
Prepared By: Mike Matz

Project Construction Items	Unit	Quantity	Unit Cost ($)	Total Cost	
Clearing and Grubbing	ACRE	27	$6,000	$162,000	
Removal of Sidewalk	SY	0	$16	$0	
Removal of Pavement Marking	SF	29,830	$1	$29,830	
Removal of Asphalt Mat	SY	64,630	$14	$904,820	
Removal of Concrete Pavement	SY	0	$11	$0	
Epoxy Pavement Marking	GAL	340	$150	$51,000	
Curb and Gutter (Type 2-IB)	LF	44,750	$21	$939,750	
Curb and Gutter (Type 2-IIB)	LF	44,750	$23	$1,029,250	
Hot Mix Asphalt (HMA)	SY	129,260	$30	$3,877,800	
Concrete Pavement (11")	SY	0	$64	$0	
Aggregate Base Course (ABC)	CY	21,550	$50	$1,077,500	
Concrete Sidewalk (6")	SY	49,720	$33	$1,640,760	
Bridge Replacement	SF	0	$150	$0	
Earthwork & Subgrade Preparation	SY	223,720	$4	$894,880	
Signalized Intersection	EACH	0	$300,000	$0	
Median Decorative Splashguard	LF	44,750	$5	$223,750	
Total accounted construction items				**$10,831,340**	**(A)**

	% Range	% Used		
Project Construction Bid Items (from above)	Project Dependent		$10,831,340	(A)
Landscaping	6% of (A)	6.00%	$649,880.40	(B)
Additional Removals	0-5% of (A)	0.00%	$0	(C)
Drainage	5-10% of (A)	5.00%	$541,567	(D)
Erosion Control	3-8% of (A)	3.00%	$324,940	(E)
Signing	1-5% of (A)	1.00%	$108,313	(F)
Lighting	3% of (A)	3.00%	$324,940	(G)
Utilities	10% of (A)	10.00%	$1,083,134	(H)
Environmental	1-5% of (A)	1.00%	$108,313	(I)
Construction Traffic Control	5 to 25% of (A)	5.00%	$541,567	(J)
Mobilization	(4 to 10%) of (A+B+C+D+E+F+G+H+I+J) Default = 6%	6.00%	$870,840	(K)
Contingencies	(15% - 30%) of (A+B+C+D+E+F+G+H+I+J+K)	30.00%	$4,615,451	(L)
Total of Construction Bid Items	**(A+B+C+D+E+F+G+H+I+J+K+L)**		**$20,000,286**	**(M)**
Total Construction Engineering	15% of (M)	15.00%	$3,000,043	(N)
Total Final Engineering	12% of (M)	12.00%	$2,400,034	(O)
Total Project Cost	**(M+N+O)**		**$25,400,000**	

1. In providing opinions of probable construction cost, the Client understands that Felsburg Holt & Ullevig has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinions of probable construction costs provided herein are to be made on the basis of our qualifications and experience. FHU makes no warranty, expressed or implied, as to the accuracy of such opinions as compared to bid or actual costs.

Opinion of Probable Cost

Project #17: Crowfoot Valley Rd widening from Founders Pkwy to Town limits

FHU Ref # 115398-01

Roadway Length (Miles)
0.824

Date Prepared: April 6, 2017
Prepared By: Mike Matz

Project Construction Items	Unit	Quantity	Unit Cost ($)	Total Cost	
Clearing and Grubbing	ACRE	6	$6,000	$36,000	
Removal of Sidewalk	SY	0	$16	$0	
Removal of Pavement Marking	SF	5,810	$1	$5,810	
Removal of Asphalt Mat	SY	16,440	$14	$230,160	
Removal of Concrete Pavement	SY	0	$11	$0	
Epoxy Pavement Marking	GAL	65	$150	$9,750	
Curb and Gutter (Type 2-IB)	LF	8,710	$21	$182,910	
Curb and Gutter (Type 2-IIB)	LF	8,710	$23	$200,330	
Hot Mix Asphalt (HMA)	SY	25,140	$30	$754,200	
Concrete Pavement (11")	SY	0	$64	$0	
Aggregate Base Course (ABC)	CY	4,190	$50	$209,500	
Concrete Sidewalk (6")	SY	4,840	$33	$159,720	
Bridge Replacement	SF	0	$150	$0	
Earthwork & Subgrade Preparation	SY	43,510	$4	$174,040	
Signalized Intersection	EACH	0	$300,000	$0	
Median Decorative Splashguard	LF	8,710	$5	$43,550	
Total accounted construction items				**$2,005,970**	**(A)**

	% Range	% Used		
Project Construction Bid Items (from above)	Project Dependent		$2,005,970	(A)
Landscaping	6% of (A)	6.00%	$120,358.20	(B)
Additional Removals	0-5% of (A)	0.00%	$0	(C)
Drainage	5-10% of (A)	5.00%	$100,299	(D)
Erosion Control	3-8% of (A)	3.00%	$60,179	(E)
Signing	1-5% of (A)	1.00%	$20,060	(F)
Lighting	3% of (A)	3.00%	$60,179	(G)
Utilities	10% of (A)	10.00%	$200,597	(H)
Environmental	1-5% of (A)	1.00%	$20,060	(I)
Construction Traffic Control	5 to 25% of (A)	5.00%	$100,299	(J)
Mobilization	(4 to 10%) of (A+B+C+D+E+F+G+H+I+J) Default = 6%	6.00%	$161,280	(K)
Contingencies	(15% - 30%) of (A+B+C+D+E+F+G+H+I+J+K)	30.00%	$854,784	(L)
Total of Construction Bid Items	**(A+B+C+D+E+F+G+H+I+J+K+L)**		**$3,704,064**	**(M)**
Total Construction Engineering	15% of (M)	15.00%	$555,610	(N)
Total Final Engineering	12% of (M)	12.00%	$444,488	(O)
Total Project Cost	**(M+N+O)**		**$4,700,000**	

1. In providing opinions of probable construction cost, the Client understands that Felsburg Holt & Ullevig has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinions of probable construction costs provided herein are to be made on the basis of our qualifications and experience. FHU makes no warranty, expressed or implied, as to the accuracy of such opinions as compared to bid or actual costs.

Opinion of Probable Cost

Project #18:SH 86 widening from Ridge Rd to Enderud Blvd

FHU Ref # 115398-01

Roadway Length (Miles)
1.28

Date Prepared: April 6, 2017
Prepared By: Mike Matz

Project Construction Items	Unit	Quantity	Unit Cost ($)	Total Cost	
Clearing and Grubbing	ACRE	5	$6,000	$30,000	
Removal of Sidewalk	SY	0	$16	$0	
Removal of Pavement Marking	SF	13,520	$1	$13,520	
Removal of Asphalt Mat	SY	0	$14	$0	
Removal of Concrete Pavement	SY	0	$11	$0	
Epoxy Pavement Marking	GAL	110	$150	$16,500	
Curb and Gutter (Type 2-IB)	LF	0	$21	$0	
Curb and Gutter (Type 2-IIB)	LF	0	$23	$0	
Hot Mix Asphalt (HMA)	SY	19,530	$30	$585,900	
Concrete Pavement (11")	SY	0	$64	$0	
Aggregate Base Course (ABC)	CY	3,260	$50	$163,000	
Concrete Sidewalk (6")	SY	0	$33	$0	
Bridge Replacement	SF	0	$150	$0	
Earthwork & Subgrade Preparation	SY	33,800	$4	$135,200	
Signalized Intersection	EACH	0	$300,000	$0	
Median Decorative Splashguard	LF	13,520	$5	$67,600	
Total accounted construction items				**$1,011,720**	**(A)**

	% Range	% Used		
Project Construction Bid Items (from above)	Project Dependent		$1,011,720	(A)
Landscaping	6% of (A)	6.00%	$60,703.20	(B)
Additional Removals	0-5% of (A)	5.00%	$50,586	(C)
Drainage	5-10% of (A)	10.00%	$101,172	(D)
Erosion Control	3-8% of (A)	3.00%	$30,352	(E)
Signing	1-5% of (A)	1.00%	$10,117	(F)
Lighting	3% of (A)	3.00%	$30,352	(G)
Utilities	10% of (A)	10.00%	$101,172	(H)
Environmental	1-5% of (A)	1.00%	$10,117	(I)
Construction Traffic Control	5 to 25% of (A)	5.00%	$50,586	(J)
Mobilization	(4 to 10%) of (A+B+C+D+E+F+G+H+I+J) Default = 6%	6.00%	$87,413	(K)
Contingencies	(15% - 30%) of (A+B+C+D+E+F+G+H+I+J+K)	30.00%	$463,287	(L)
Total of Construction Bid Items	**(A+B+C+D+E+F+G+H+I+J+K+L)**		**$2,007,576**	**(M)**
Total Construction Engineering	15% of (M)	15.00%	$301,136	(N)
Total Final Engineering	12% of (M)	12.00%	$240,909	(O)
Total Project Cost	**(M+N+O)**		**$2,550,000**	

1. In providing opinions of probable construction cost, the Client understands that Felsburg Holt & Ullevig has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinions of probable construction costs provided herein are to be made on the basis of our qualifications and experience. FHU makes no warranty, expressed or implied, as to the accuracy of such opinions as compared to bid or actual costs.

Opinion of Probable Cost

Project #19: Prairie Hawk Dr widening from Melting Snow Dr to Wolfensberger Rd

FHU Ref # 115398-01

Roadway Length (Miles)
0.827

Date Prepared: April 6, 2017
Prepared By: Mike Matz

Project Construction Items	Unit	Quantity	Unit Cost ($)	Total Cost	
Clearing and Grubbing	ACRE	6	$6,000	$36,000	
Removal of Sidewalk	SY	2,430	$16	$38,880	
Removal of Pavement Marking	SF	5,830	$1	$5,830	
Removal of Asphalt Mat	SY	0	$14	$0	
Removal of Concrete Pavement	SY	0	$11	$0	
Epoxy Pavement Marking	GAL	65	$150	$9,750	
Curb and Gutter (Type 2-IB)	LF	8,740	$21	$183,540	
Curb and Gutter (Type 2-IIB)	LF	4,370	$23	$100,510	
Hot Mix Asphalt (HMA)	SY	12,620	$30	$378,600	
Concrete Pavement (11")	SY	0	$64	$0	
Aggregate Base Course (ABC)	CY	2,110	$50	$105,500	
Concrete Sidewalk (6")	SY	4,860	$33	$160,380	
Bridge Replacement	SF	0	$150	$0	
Earthwork & Subgrade Preparation	SY	21,840	$4	$87,360	
Signalized Intersection	EACH	0	$300,000	$0	
Median Decorative Splashguard	LF	8,740	$5	$43,700	
Total accounted construction items				**$1,150,050**	**(A)**

	% Range	% Used		
Project Construction Bid Items (from above)	Project Dependent		$1,150,050	(A)
Landscaping	6% of (A)	6.00%	$69,003.00	(B)
Additional Removals	0-5% of (A)	0.00%	$0	(C)
Drainage	5-10% of (A)	5.00%	$57,503	(D)
Erosion Control	3-8% of (A)	3.00%	$34,502	(E)
Signing	1-5% of (A)	1.00%	$11,501	(F)
Lighting	3% of (A)	3.00%	$34,502	(G)
Utilities	10% of (A)	10.00%	$115,005	(H)
Environmental	1-5% of (A)	1.00%	$11,501	(I)
Construction Traffic Control	5 to 25% of (A)	5.00%	$57,503	(J)
Mobilization	(4 to 10%) of (A+B+C+D+E+F+G+H+I+J) Default = 6%	6.00%	$92,464	(K)
Contingencies	(15% - 30%) of (A+B+C+D+E+F+G+H+I+J+K)	30.00%	$490,059	(L)
Total of Construction Bid Items	**(A+B+C+D+E+F+G+H+I+J+K+L)**		**$2,123,590**	**(M)**
Total Construction Engineering	15% of (M)	15.00%	$318,539	(N)
Total Final Engineering	12% of (M)	12.00%	$254,831	(O)
Total Project Cost	**(M+N+O)**		**$2,700,000**	

1. In providing opinions of probable construction cost, the Client understands that Felsburg Holt & Ullevig has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinions of probable construction costs provided herein are to be made on the basis of our qualifications and experience. FHU makes no warranty, expressed or implied, as to the accuracy of such opinions as compared to bid or actual costs.

Opinion of Probable Cost

Project #21: N Meadows Dr Widen from Meadows Blvd to US 85

FHU Ref # 115398-01

Roadway Length (Miles)
0.997

Date Prepared: April 6, 2017
Prepared By: Brittany Bennett

Project Construction Items	Unit	Quantity	Unit Cost ($)	Total Cost	
Clearing and Grubbing	ACRE	7	$6,000	$42,000	
Removal of Sidewalk	SY	650	$16	$10,400	
Removal of Pavement Marking	SF	7,900	$1	$7,900	
Removal of Asphalt Mat	SY	0	$14	$0	
Removal of Concrete Pavement	SY	0	$11	$0	
Epoxy Pavement Marking	GAL	88	$150	$13,200	
Curb and Gutter (Type 2-IB)	LF	10,530	$21	$221,130	
Curb and Gutter (Type 2-IIB)	LF	10,530	$23	$242,190	
Hot Mix Asphalt (HMA)	SY	25,740	$30	$772,200	
Concrete Pavement (11")	SY	0	$64	$0	
Aggregate Base Course (ABC)	CY	130	$50	$6,500	
Concrete Sidewalk (6")	SY	11,700	$33	$386,100	
Bridge Replacement	SF	0	$150	$0	
Earthwork & Subgrade Preparation	SY	52,650	$4	$210,600	
Signalized Intersection	EACH	1	$300,000	$300,000	
Median Decorative Splashguard	LF	10,530	$5	$52,650	
Total accounted construction items				**$2,264,870**	**(A)**

	% Range	% Used		
Project Construction Bid Items (from above)	Project Dependent		$2,264,870	(A)
Landscaping	6% of (A)	6.00%	$135,892.20	(B)
Additional Removals	0-5% of (A)	0.00%	$0	(C)
Drainage	5-10% of (A)	5.00%	$113,244	(D)
Erosion Control	3-8% of (A)	3.00%	$67,946	(E)
Signing	1-5% of (A)	1.00%	$22,649	(F)
Lighting	3% of (A)	3.00%	$67,946	(G)
Utilities	10% of (A)	10.00%	$226,487	(H)
Environmental	1-5% of (A)	1.00%	$22,649	(I)
Construction Traffic Control	5 to 25% of (A)	5.00%	$113,244	(J)
Mobilization	(4 to 10%) of (A+B+C+D+E+F+G+H+I+J) Default = 6%	6.00%	$182,096	(K)
Contingencies	(15% - 30%) of (A+B+C+D+E+F+G+H+I+J+K)	30.00%	$965,106	(L)
Total of Construction Bid Items	**(A+B+C+D+E+F+G+H+I+J+K+L)**		**$4,182,128**	**(M)**
Total Construction Engineering	15% of (M)	15.00%	$627,319	(N)
Total Final Engineering	12% of (M)	12.00%	$501,855	(O)
Total Project Cost	**(M+N+O)**		**$23,900,000**	

1. In providing opinions of probable construction cost, the Client understands that Felsburg Holt & Ullevig has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinions of probable construction costs provided herein are to be made on the basis of our qualifications and experience. FHU makes no warranty, expressed or implied, as to the accuracy of such opinions as compared to bid or actual costs.

Opinion of Probable Cost

Project #22: E Frontage Rd Operational Improvements from Plum Creek Pkwy to Crystal Valley Pkwy

FHU Ref # 115398-01

Roadway Length (Miles)
1.937

Date Prepared: April 6, 2017
Prepared By: Brittany Bennett

Project Construction Items	Unit	Quantity	Unit Cost ($)	Total Cost	
Clearing and Grubbing	ACRE	13	$6,000	$78,000	
Removal of Sidewalk	SY	0	$16	$0	
Removal of Pavement Marking	SF	0	$1	$0	
Removal of Asphalt Mat	SY	0	$14	$0	
Removal of Concrete Pavement	SY	0	$11	$0	
Epoxy Pavement Marking	GAL	0	$150	$0	
Curb and Gutter (Type 2-IB)	LF	0	$21	$0	
Curb and Gutter (Type 2-IIB)	LF	0	$23	$0	
Hot Mix Asphalt (HMA)	SY	9,260	$30	$277,800	
Concrete Pavement (11")	SY	0	$64	$0	
Aggregate Base Course (ABC)	CY	6,550	$50	$327,500	
Concrete Sidewalk (6")	SY	23,150	$33	$763,950	
Bridge Replacement	SF	7,020	$150	$1,053,000	
Earthwork & Subgrade Preparation	SY	17,594	$4	$70,376	
Signalized Intersection	EACH	0	$300,000	$0	
Median Decorative Splashguard	LF	0	$5	$0	
Total accounted construction items				**$2,570,626**	**(A)**

	% Range	% Used		
Project Construction Bid Items (from above)	Project Dependent		$2,570,626	(A)
Landscaping	6% of (A)	6.00%	$154,237.56	(B)
Additional Removals	0-5% of (A)	0.00%	$0	(C)
Drainage	5-10% of (A)	5.00%	$128,531	(D)
Erosion Control	3-8% of (A)	3.00%	$77,119	(E)
Signing	1-5% of (A)	1.00%	$25,706	(F)
Lighting	3% of (A)	3.00%	$77,119	(G)
Utilities	10% of (A)	10.00%	$257,063	(H)
Environmental	1-5% of (A)	1.00%	$25,706	(I)
Construction Traffic Control	5 to 25% of (A)	5.00%	$128,531	(J)
Mobilization	(4 to 10%) of (A+B+C+D+E+F+G+H+I+J) Default = 6%	6.00%	$206,678	(K)
Contingencies	(15% - 30%) of (A+B+C+D+E+F+G+H+I+J+K)	30.00%	$1,095,395	(L)
Total of Construction Bid Items	**(A+B+C+D+E+F+G+H+I+J+K+L)**		**$4,746,712**	**(M)**
Total Construction Engineering	15% of (M)	15.00%	$712,007	(N)
Total Final Engineering	12% of (M)	12.00%	$569,605	(O)
Total Project Cost	**(M+N+O)**		**$6,030,000**	

1. In providing opinions of probable construction cost, the Client understands that Felsburg Holt & Ullevig has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinions of probable construction costs provided herein are to be made on the basis of our qualifications and experience. FHU makes no warranty, expressed or implied, as to the accuracy of such opinions as compared to bid or actual costs.

Opinion of Probable Cost

Project #24: Ligett Rd extension South to Wolfensberger Rd via Caprice Dr

FHU Ref # 115398-01

Roadway Length (Miles)
0.557

Date Prepared: April 6, 2017
Prepared By: Brittany Bennett

Project Construction Items	Unit	Quantity	Unit Cost ($)	Total Cost	
Clearing and Grubbing	ACRE	4	$6,000	$24,000	
Removal of Sidewalk	SY	0	$16	$0	
Removal of Pavement Marking	SF	0	$1	$0	
Removal of Asphalt Mat	SY	0	$14	$0	
Removal of Concrete Pavement	SY	0	$11	$0	
Epoxy Pavement Marking	GAL	120	$150	$18,000	
Curb and Gutter (Type 2-IB)	LF	0	$21	$0	
Curb and Gutter (Type 2-IIB)	LF	5,890	$23	$135,470	
Hot Mix Asphalt (HMA)	SY	7,190	$30	$215,700	
Concrete Pavement (11")	SY	0	$64	$0	
Aggregate Base Course (ABC)	CY	1,600	$50	$80,000	
Concrete Sidewalk (6")	SY	3,930	$33	$129,690	
Bridge Replacement	SF	4,800	$150	$720,000	
Earthwork & Subgrade Preparation	SY	17,320	$4	$69,280	
Signalized Intersection	EACH	0	$300,000	$0	
Median Decorative Splashguard	LF	5,890	$5	$29,450	
Total accounted construction items				**$1,421,590**	**(A)**

	% Range	% Used		
Project Construction Bid Items (from above)	Project Dependent		$1,421,590	(A)
Landscaping	6% of (A)	6.00%	$85,295.40	(B)
Additional Removals	0-5% of (A)	0.00%	$0	(C)
Drainage	5-10% of (A)	5.00%	$71,080	(D)
Erosion Control	3-8% of (A)	3.00%	$42,648	(E)
Signing	1-5% of (A)	1.00%	$14,216	(F)
Lighting	3% of (A)	3.00%	$42,648	(G)
Utilities	10% of (A)	10.00%	$142,159	(H)
Environmental	1-5% of (A)	1.00%	$14,216	(I)
Construction Traffic Control	5 to 25% of (A)	5.00%	$71,080	(J)
Mobilization	(4 to 10%) of (A+B+C+D+E+F+G+H+I+J) Default = 6%	6.00%	$114,296	(K)
Contingencies	(15% - 30%) of (A+B+C+D+E+F+G+H+I+J+K)	30.00%	$605,768	(L)
Total of Construction Bid Items	**(A+B+C+D+E+F+G+H+I+J+K+L)**		**$2,624,994**	**(M)**
Total Construction Engineering	15% of (M)	15.00%	$393,749	(N)
Total Final Engineering	12% of (M)	12.00%	$314,999	(O)
Total Project Cost	**(M+N+O)**		**$3,330,000**	

1. In providing opinions of probable construction cost, the Client understands that Felsburg Holt & Ullevig has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinions of probable construction costs provided herein are to be made on the basis of our qualifications and experience. FHU makes no warranty, expressed or implied, as to the accuracy of such opinions as compared to bid or actual costs.

Opinion of Probable Cost

Project #25: Ligett Rd widening from Highway 85 to the New Extension

FHU Ref # 115398-01

Roadway Length (Miles)
0.91

Date Prepared: April 6, 2017
Prepared By: Brittany Bennett

Project Construction Items	Unit	Quantity	Unit Cost ($)	Total Cost	
Clearing and Grubbing	ACRE	6	$6,000	$36,000	
Removal of Sidewalk	SY	0	$16	$0	
Removal of Pavement Marking	SF	6,410	$1	$6,410	
Removal of Asphalt Mat	SY	0	$14	$0	
Removal of Concrete Pavement	SY	0	$11	$0	
Epoxy Pavement Marking	GAL	72	$150	$10,800	
Curb and Gutter (Type 2-IB)	LF	9,610	$21	$201,810	
Curb and Gutter (Type 2-IIB)	LF	9,610	$23	$221,030	
Hot Mix Asphalt (HMA)	SY	16,020	$30	$480,600	
Concrete Pavement (11")	SY	0	$64	$0	
Aggregate Base Course (ABC)	CY	2,670	$50	$133,500	
Concrete Sidewalk (6")	SY	10,680	$33	$352,440	
Bridge Replacement	SF	0	$150	$0	
Earthwork & Subgrade Preparation	SY	27,320	$4	$109,280	
Signalized Intersection	EACH	0	$300,000	$0	
Median Decorative Splashguard	LF	9,610	$5	$48,050	
Total accounted construction items				**$1,599,920**	**(A)**

	% Range	% Used		
Project Construction Bid Items (from above)	Project Dependent		$1,599,920	(A)
Landscaping	6% of (A)	6.00%	$95,995.20	(B)
Additional Removals	0-5% of (A)	0.00%	$0	(C)
Drainage	5-10% of (A)	5.00%	$79,996	(D)
Erosion Control	3-8% of (A)	3.00%	$47,998	(E)
Signing	1-5% of (A)	1.00%	$15,999	(F)
Lighting	3% of (A)	3.00%	$47,998	(G)
Utilities	10% of (A)	10.00%	$159,992	(H)
Environmental	1-5% of (A)	1.00%	$15,999	(I)
Construction Traffic Control	5 to 25% of (A)	5.00%	$79,996	(J)
Mobilization	(4 to 10%) of (A+B+C+D+E+F+G+H+I+J) Default = 6%	6.00%	$128,634	(K)
Contingencies	(15% - 30%) of (A+B+C+D+E+F+G+H+I+J+K)	30.00%	$681,758	(L)
Total of Construction Bid Items	**(A+B+C+D+E+F+G+H+I+J+K+L)**		**$2,954,284**	**(M)**
Total Construction Engineering	15% of (M)	15.00%	$443,143	(N)
Total Final Engineering	12% of (M)	12.00%	$354,514	(O)
Total Project Cost	**(M+N+O)**		**$3,750,000**	

1. In providing opinions of probable construction cost, the Client understands that Felsburg Holt & Ullevig has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinions of probable construction costs provided herein are to be made on the basis of our qualifications and experience. FHU makes no warranty, expressed or implied, as to the accuracy of such opinions as compared to bid or actual costs.

Opinion of Probable Cost

Project #26: Meadows Pkwy widening from Meadows Blvd to US 85

FHU Ref # 115398-01

Roadway Length (Miles)
0.691

Date Prepared: April 6, 2017
Prepared By: Brittany Bennett

Project Construction Items	Unit	Quantity	Unit Cost ($)	Total Cost	
Clearing and Grubbing	ACRE	5	$6,000	$30,000	
Removal of Sidewalk	SY	0	$16	$0	
Removal of Pavement Marking	SF	4,870	$1	$4,870	
Removal of Asphalt Mat	SY	0	$14	$0	
Removal of Concrete Pavement	SY	0	$11	$0	
Epoxy Pavement Marking	GAL	730	$150	$109,500	
Curb and Gutter (Type 2-IB)	LF	7,300	$21	$153,300	
Curb and Gutter (Type 2-IIB)	LF	7,300	$23	$167,900	
Hot Mix Asphalt (HMA)	SY	46,220	$30	$1,386,600	
Concrete Pavement (11")	SY	0	$64	$0	
Aggregate Base Course (ABC)	CY	7,710	$50	$385,500	
Concrete Sidewalk (6")	SY	8,110	$33	$267,630	
Bridge Replacement	SF	39,760	$150	$5,964,000	
Earthwork & Subgrade Preparation	SY	36,490	$4	$145,960	
Signalized Intersection	EACH	0	$300,000	$0	
Median Decorative Splashguard	LF	7,300	$5	$36,500	
Total accounted construction items				**$8,651,760**	**(A)**

	% Range	% Used		
Project Construction Bid Items (from above)	Project Dependent		$8,651,760	(A)
Landscaping	6% of (A)	6.00%	$519,105.60	(B)
Additional Removals	0-5% of (A)	0.00%	$0	(C)
Drainage	5-10% of (A)	5.00%	$432,588	(D)
Erosion Control	3-8% of (A)	3.00%	$259,553	(E)
Signing	1-5% of (A)	1.00%	$86,518	(F)
Lighting	3% of (A)	3.00%	$259,553	(G)
Utilities	10% of (A)	10.00%	$865,176	(H)
Environmental	1-5% of (A)	1.00%	$86,518	(I)
Construction Traffic Control	5 to 25% of (A)	5.00%	$432,588	(J)
Mobilization	(4 to 10%) of (A+B+C+D+E+F+G+H+I+J) Default = 6%	6.00%	$695,602	(K)
Contingencies	(15% - 30%) of (A+B+C+D+E+F+G+H+I+J+K)	30.00%	$3,686,688	(L)
Total of Construction Bid Items	**(A+B+C+D+E+F+G+H+I+J+K+L)**		**$15,975,648**	**(M)**
Total Construction Engineering	15% of (M)	15.00%	$2,396,347	(N)
Total Final Engineering	12% of (M)	12.00%	$1,917,078	(O)
Total Project Cost	**(M+N+O)**		**$20,300,000**	

1. In providing opinions of probable construction cost, the Client understands that Felsburg Holt & Ullevig has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinions of probable construction costs provided herein are to be made on the basis of our qualifications and experience. FHU makes no warranty, expressed or implied, as to the accuracy of such opinions as compared to bid or actual costs.

Opinion of Probable Cost

Project #27: Founders Pkwy widening from Crowfoot Valley Rd to 5th St

FHU Ref # 115398-01

Roadway Length (Miles)
2.819

Date Prepared: April 6, 2017
Prepared By: Brittany Bennett

Project Construction Items	Unit	Quantity	Unit Cost ($)	Total Cost	
Clearing and Grubbing	ACRE	18	$6,000	$108,000	
Removal of Sidewalk	SY	9,260	$16	$148,160	
Removal of Pavement Marking	SF	0	$1	$0	
Removal of Asphalt Mat	SY	0	$14	$0	
Removal of Concrete Pavement	SY	0	$11	$0	
Epoxy Pavement Marking	GAL	250	$150	$37,500	
Curb and Gutter (Type 2-IB)	LF	29,770	$21	$625,170	
Curb and Gutter (Type 2-IIB)	LF	29,770	$23	$684,710	
Hot Mix Asphalt (HMA)	SY	36,390	$30	$1,091,700	
Concrete Pavement (11")	SY	0	$64	$0	
Aggregate Base Course (ABC)	CY	6,070	$50	$303,500	
Concrete Sidewalk (6")	SY	24,810	$33	$818,730	
Bridge Replacement	SF	0	$150	$0	
Earthwork & Subgrade Preparation	SY	148,845	$4	$595,380	
Signalized Intersection	EACH	0	$300,000	$0	
Median Decorative Splashguard	LF	29,770	$5	$148,850	
Total accounted construction items				**$4,561,700**	**(A)**

	% Range	% Used		
Project Construction Bid Items (from above)	Project Dependent		$4,561,700	(A)
Landscaping	6% of (A)	6.00%	$273,702.00	(B)
Additional Removals	0-5% of (A)	0.00%	$0	(C)
Drainage	5-10% of (A)	5.00%	$228,085	(D)
Erosion Control	3-8% of (A)	3.00%	$136,851	(E)
Signing	1-5% of (A)	1.00%	$45,617	(F)
Lighting	3% of (A)	3.00%	$136,851	(G)
Utilities	10% of (A)	10.00%	$456,170	(H)
Environmental	1-5% of (A)	1.00%	$45,617	(I)
Construction Traffic Control	5 to 25% of (A)	5.00%	$228,085	(J)
Mobilization	(4 to 10%) of (A+B+C+D+E+F+G+H+I+J) Default = 6%	6.00%	$366,761	(K)
Contingencies	(15% - 30%) of (A+B+C+D+E+F+G+H+I+J+K)	30.00%	$1,943,832	(L)
Total of Construction Bid Items	**(A+B+C+D+E+F+G+H+I+J+K+L)**		**$8,423,270**	**(M)**
Total Construction Engineering	15% of (M)	15.00%	$1,263,491	(N)
Total Final Engineering	12% of (M)	12.00%	$1,010,792	(O)
Total Project Cost	**(M+N+O)**		**$10,700,000**	

1. In providing opinions of probable construction cost, the Client understands that Felsburg Holt & Ullevig has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinions of probable construction costs provided herein are to be made on the basis of our qualifications and experience. FHU makes no warranty, expressed or implied, as to the accuracy of such opinions as compared to bid or actual costs.

Opinion of Probable Cost

Project #28: Fifth St widening from Woodlands Blvd to Founders Pkwy

FHU Ref # 115398-01

Roadway Length (Miles)
0.961

Date Prepared: April 6, 2017
Brittany Bennett

Project Construction Items	Unit	Quantity	Unit Cost ($)	Total Cost	
Clearing and Grubbing	ACRE	7	$6,000	$42,000	
Removal of Sidewalk	SY	0	$16	$0	
Removal of Pavement Marking	SF	0	$1	$0	
Removal of Asphalt Mat	SY	20,300	$14	$284,200	
Removal of Concrete Pavement	SY	0	$11	$0	
Epoxy Pavement Marking	GAL	42	$150	$6,343	
Curb and Gutter (Type 2-IB)	LF	10,150	$21	$213,150	
Curb and Gutter (Type 2-IIB)	LF	10,150	$23	$233,450	
Hot Mix Asphalt (HMA)	SY	29,320	$30	$879,600	
Concrete Pavement (11")	SY	0	$64	$0	
Aggregate Base Course (ABC)	CY	4,890	$50	$244,500	
Concrete Sidewalk (6")	SY	11,280	$33	$372,240	
Bridge Replacement	SF	0	$150	$0	
Earthwork & Subgrade Preparation	SY	50,750	$4	$203,000	
Signalized Intersection	EACH	0	$300,000	$0	
Median Decorative Splashguard	LF	5,080	$5	$25,400	
Total accounted construction items				**$2,503,883**	**(A)**

	% Range	% Used		
Project Construction Bid Items (from above)	Project Dependent		$2,503,883	(A)
Landscaping	6% of (A)	6.00%	$150,232.96	(B)
Additional Removals	0-5% of (A)	0.00%	$0	(C)
Drainage	5-10% of (A)	5.00%	$125,194	(D)
Erosion Control	3-8% of (A)	3.00%	$75,116	(E)
Signing	1-5% of (A)	1.00%	$25,039	(F)
Lighting	3% of (A)	3.00%	$75,116	(G)
Utilities	10% of (A)	10.00%	$250,388	(H)
Environmental	1-5% of (A)	1.00%	$25,039	(I)
Construction Traffic Control	5 to 25% of (A)	5.00%	$125,194	(J)
Mobilization	(4 to 10%) of (A+B+C+D+E+F+G+H+I+J) Default = 6%	6.00%	$201,312	(K)
Contingencies	(15% - 30%) of (A+B+C+D+E+F+G+H+I+J+K) \	30.00%	$1,066,954	(L)
Total of Construction Bid Items	**(A+B+C+D+E+F+G+H+I+J+K+L)**		**$4,623,469**	**(M)**
Total Construction Engineering	15% of (M)	15.00%	$693,520	(N)
Total Final Engineering	12% of (M)	12.00%	$554,816	(O)
Total Project Cost	**(M+N+O)**		**$5,870,000**	

1. In providing opinions of probable construction cost, the Client understands that Felsburg Holt & Ullevig has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinions of probable construction costs provided herein are to be made on the basis of our qualifications and experience. FHU makes no warranty, expressed or implied, as to the accuracy of such opinions as compared to bid or actual costs.

Opinion of Probable Cost

Project #29: Perry St extension to E Frontage Rd

FHU Ref # 115398-01

Roadway Length (Miles)
0.8

Date Prepared: April 6, 2017
Prepared By: Brittany Bennett

Project Construction Items	Unit	Quantity	Unit Cost ($)	Total Cost	
Clearing and Grubbing	ACRE	6	$6,000	$36,000	
Removal of Sidewalk	SY	0	$16	$0	
Removal of Pavement Marking	SF	0	$1	$0	
Removal of Asphalt Mat	SY	0	$14	$0	
Removal of Concrete Pavement	SY	0	$11	$0	
Epoxy Pavement Marking	GAL	28	$150	$4,224	
Curb and Gutter (Type 2-IB)	LF	0	$21	$0	
Curb and Gutter (Type 2-IIB)	LF	8,450	$23	$194,350	
Hot Mix Asphalt (HMA)	SY	15,020	$30	$450,600	
Concrete Pavement (11")	SY	0	$64	$0	
Aggregate Base Course (ABC)	CY	2,510	$50	$125,500	
Concrete Sidewalk (6")	SY	7,510	$33	$247,830	
Bridge Replacement	SF	2,720	$150	$408,000	
Earthwork & Subgrade Preparation	SY	24,880	$4	$99,520	
Signalized Intersection	EACH	0	$300,000	$0	
Median Decorative Splashguard	LF	4,230	$5	$21,150	
Total accounted construction items				**$1,587,174**	**(A)**

	% Range	% Used		
Project Construction Bid Items (from above)	Project Dependent		$1,587,174	(A)
Landscaping	6% of (A)	6.00%	$95,230.44	(B)
Additional Removals	0-5% of (A)	0.00%	$0	(C)
Drainage	5-10% of (A)	5.00%	$79,359	(D)
Erosion Control	3-8% of (A)	3.00%	$47,615	(E)
Signing	1-5% of (A)	1.00%	$15,872	(F)
Lighting	3% of (A)	3.00%	$47,615	(G)
Utilities	10% of (A)	10.00%	$158,717	(H)
Environmental	1-5% of (A)	1.00%	$15,872	(I)
Construction Traffic Control	5 to 25% of (A)	5.00%	$79,359	(J)
Mobilization	(4 to 10%) of (A+B+C+D+E+F+G+H+I+J) Default = 6%	6.00%	$127,609	(K)
Contingencies	(15% - 30%) of (A+B+C+D+E+F+G+H+I+J+K)	30.00%	$676,327	(L)
Total of Construction Bid Items	**(A+B+C+D+E+F+G+H+I+J+K+L)**		**$2,930,749**	**(M)**
Total Construction Engineering	15% of (M)	15.00%	$439,612	(N)
Total Final Engineering	12% of (M)	12.00%	$351,690	(O)
Total Project Cost	**(M+N+O)**		**$3,720,000**	

1. In providing opinions of probable construction cost, the Client understands that Felsburg Holt & Ullevig has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinions of probable construction costs provided herein are to be made on the basis of our qualifications and experience. FHU makes no warranty, expressed or implied, as to the accuracy of such opinions as compared to bid or actual costs.

Opinion of Probable Cost

Project #30: Ridge Road Improvements from Plum Creek Parkway to Town Limits

FHU Ref # 115398-01

Roadway Length (Miles)
0.715

Date Prepared: April 6, 2017
Prepared By: Brittany Bennett

Project Construction Items	Unit	Quantity	Unit Cost ($)	Total Cost	
Clearing and Grubbing	ACRE	5	$6,000	$30,000	
Removal of Sidewalk	SY	0	$16	$0	
Removal of Pavement Marking	SF	15,110	$1	$15,110	
Removal of Asphalt Mat	SY	10,070	$14	$140,980	
Removal of Concrete Pavement	SY	0	$11	$0	
Epoxy Pavement Marking	GAL	2,520	$150	$378,000	
Curb and Gutter (Type 2-IB)	LF	7,560	$21	$158,760	
Curb and Gutter (Type 2-IIB)	LF	7,560	$23	$173,880	
Hot Mix Asphalt (HMA)	SY	12,590	$30	$377,700	
Concrete Pavement (11")	SY	0	$64	$0	
Aggregate Base Course (ABC)	CY	2,100	$50	$105,000	
Concrete Sidewalk (6")	SY	8,390	$33	$276,870	
Bridge Replacement	SF	0	$150	$0	
Earthwork & Subgrade Preparation	SY	21,400	$4	$85,600	
Signalized Intersection	EACH	0	$300,000	$0	
Median Decorative Splashguard	LF	7,560	$5	$37,800	
Total accounted construction items				**$1,779,700**	**(A)**

	% Range	% Used		
Project Construction Bid Items (from above)	Project Dependent		$1,779,700	(A)
Landscaping	6% of (A)	6.00%	$106,782.00	(B)
Additional Removals	0-5% of (A)	0.00%	$0	(C)
Drainage	5-10% of (A)	5.00%	$88,985	(D)
Erosion Control	3-8% of (A)	3.00%	$53,391	(E)
Signing	1-5% of (A)	1.00%	$17,797	(F)
Lighting	3% of (A)	3.00%	$53,391	(G)
Utilities	10% of (A)	10.00%	$177,970	(H)
Environmental	1-5% of (A)	1.00%	$17,797	(I)
Construction Traffic Control	5 to 25% of (A)	5.00%	$88,985	(J)
Mobilization	(4 to 10%) of (A+B+C+D+E+F+G+H+I+J) Default = 6%	6.00%	$143,088	(K)
Contingencies	(15% - 30%) of (A+B+C+D+E+F+G+H+I+J+K)	30.00%	$758,366	(L)
Total of Construction Bid Items	**(A+B+C+D+E+F+G+H+I+J+K+L)**		**$3,286,252**	**(M)**
Total Construction Engineering	15% of (M)	15.00%	$492,938	(N)
Total Final Engineering	12% of (M)	12.00%	$394,350	(O)
Total Project Cost	**(M+N+O)**		**$4,170,000**	

1. In providing opinions of probable construction cost, the Client understands that Felsburg Holt & Ullevig has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinions of probable construction costs provided herein are to be made on the basis of our qualifications and experience. FHU makes no warranty, expressed or implied, as to the accuracy of such opinions as compared to bid or actual costs.

Opinion of Probable Cost

Project #31: Valley Dr connection from Hover Dr to Hudson Ln

FHU Ref # 115398-01

Roadway Length (Miles)
0.457

Date Prepared: April 6, 2017
Prepared By: Brittany Bennett

Project Construction Items	Unit	Quantity	Unit Cost ($)	Total Cost	
Clearing and Grubbing	ACRE	3	$6,000	$18,000	
Removal of Sidewalk	SY	0	$16	$0	
Removal of Pavement Marking	SF	0	$1	$0	
Removal of Asphalt Mat	SY	0	$14	$0	
Removal of Concrete Pavement	SY	0	$11	$0	
Epoxy Pavement Marking	GAL	24	$150	$3,619	
Curb and Gutter (Type 2-IB)	LF	0	$21	$0	
Curb and Gutter (Type 2-IIB)	LF	4,830	$23	$111,090	
Hot Mix Asphalt (HMA)	SY	8,050	$30	$241,500	
Concrete Pavement (11")	SY	0	$64	$0	
Aggregate Base Course (ABC)	CY	1,350	$50	$67,500	
Concrete Sidewalk (6")	SY	4,290	$33	$141,570	
Bridge Replacement	SF	0	$150	$0	
Earthwork & Subgrade Preparation	SY	13,680	$4	$54,720	
Signalized Intersection	EACH	0	$300,000	$0	
Median Decorative Splashguard	LF	2,420	$5	$12,100	
Total accounted construction items				**$650,099**	**(A)**

	% Range	% Used		
Project Construction Bid Items (from above)	Project Dependent		$650,099	(A)
Landscaping	6% of (A)	6.00%	$39,005.97	(B)
Additional Removals	0-5% of (A)	0.00%	$0	(C)
Drainage	5-10% of (A)	5.00%	$32,505	(D)
Erosion Control	3-8% of (A)	3.00%	$19,503	(E)
Signing	1-5% of (A)	1.00%	$6,501	(F)
Lighting	3% of (A)	3.00%	$19,503	(G)
Utilities	10% of (A)	10.00%	$65,010	(H)
Environmental	1-5% of (A)	1.00%	$6,501	(I)
Construction Traffic Control	5 to 25% of (A)	5.00%	$32,505	(J)
Mobilization	(4 to 10%) of (A+B+C+D+E+F+G+H+I+J) Default = 6%	6.00%	$52,268	(K)
Contingencies	(15% - 30%) of (A+B+C+D+E+F+G+H+I+J+K)	30.00%	$277,020	(L)
Total of Construction Bid Items	**(A+B+C+D+E+F+G+H+I+J+K+L)**		**$1,200,422**	**(M)**
Total Construction Engineering	15% of (M)	15.00%	$180,063	(N)
Total Final Engineering	12% of (M)	12.00%	$144,051	(O)
Total Project Cost	**(M+N+O)**		**$1,520,000**	

1. In providing opinions of probable construction cost, the Client understands that Felsburg Holt & Ullevig has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinions of probable construction costs provided herein are to be made on the basis of our qualifications and experience. FHU makes no warranty, expressed or implied, as to the accuracy of such opinions as compared to bid or actual costs.

@CRgov

6300 South Syracuse Way, Suite 600
Centennial, CO 80111
303.721.1440

FELSBURG HOLT & ULLEVIG
connecting and enhancing communities