Planning and Development Services

City of Aurora

Planning Division
15151 E. Alameda Parkway, Ste. 2300
Aurora, Colorado 80012
303.739.7250

Worth Discovering • auroragov.org

August 20, 2019

Mark Tiernan
Valley Country Club
14601 Country Club Dr
Aurora CO 80016

Re: **Initial Submission Review –** Valley Arapahoe – Initial Zoning and Comprehensive Plan Amendment
Application Number: **DA-2194-00**
Case Number: **2019-2004-00**

Dear Mr. Tiernan:

Thank you for your initial submission, which we started to process on Monday, July 29, 2019. We reviewed it and attached our comments along with this cover letter.

There were almost 60 objections that were received from the community and neighborhood organizations. A community meeting should be scheduled prior to the Planning Commission meeting. Please note that notices of the community meeting need to go out 10 days prior to the meeting; therefore, it is imperative that you schedule the meeting soon.

Your estimated Planning Commission hearing date is still set for September 11, 2019. Please remember that all abutter notices for public hearings must be sent and the site notices must be posted at least 10 days prior to the hearing date. These notifications are your responsibility and the lack of proper notification will cause the public hearing date to be postponed. It is important that you obtain an updated list of adjacent property owners from the county before the notices are sent out. Take all necessary steps to ensure an accurate list is obtained.

As always, if you have any comments or concerns, please give me a call. I may be reached at 303-739-7184.

Sincerely,

Heather L. Lamboy, AICP
Planning Supervisor
City of Aurora Planning Department

cc: Mindy Parnes, Planning Manager
Bonnie Niziolek, Norris Design, 1101 Bannock St, Denver CO 80204
Scott Campbell, Neighborhood Liaison
Mark Geyer, ODA
Filed: K:\$DA\.2194-00rev1.rtf

Initial Submission Review

SUMMARY OF KEY COMMENTS FROM ALL DEPARTMENTS

- Many comments from the public were received. Generally they expressed concern with traffic impacts, development on an open space, and opposition to the proposed zone change.
- Comments were received from the City of Centennial, the Southwest Metro Stormwater Authority, Arapahoe County, and the Colorado Department of Transportation. All expressed concern regarding the proposal.
- The site is located within the Centennial Airport Buffer Zone. The Arapahoe County Planning Division commented that it would not support any residential development in the buffer zone.
- PROS has commented that land should be dedicated for a trail corridor on the western edge of the site. The City of Centennial expressed support for the trail corridor.
- A neighborhood meeting is highly recommended. Work with Scott Campbell (scampbel@auroragov.org, 303-739-7441) to schedule the meeting. The neighborhood meeting should be held prior to the Planning Commission hearing on September 11, 2019.

PLANNING DEPARTMENT COMMENTS

1. Community Questions, Comments and Concerns

A. Many community comments were received, which are attached to this review letter. Staff also received correspondence from the Centennial Council of Neighborhoods. Furthermore, the Valley Club Acres HOA provided comment.

B. A copy of the Valley Club Homeowners association letter to the Southeast Metro Stormwater Authority (SEMSWA) expressing concern with flooding has been provided by the Valley Club Acres HOA.

C. The City of Centennial commented on this application. Concerns raised include setbacks from and impacts to the Valley Club Acres neighborhood. Additional concerns noted were pedestrian and vehicular access as well as the potential for retail development being incompatible with the adjacent neighborhoods located in Centennial. Centennial also offered comments on a Site Plan if it were to be brought for review, including support for the dedication of a trail corridor along the west side of the property, as being requested by PROS below.

D. Colorado Department of Transportation, *Rick Solomon*: CDOT issued two State Highway Access Permit for this site (117079 and 117080). These permits expire 11/9/19 and may be renewed for one additional year. CDOT was contacted by the traffic engineer, stating that the land uses would change with the new plans. The Rezone and Comp Plan amendment does not identify specific development on the site. New State Highway access permits will be required for the change in use. An updated Traffic Study will be required for any new permits. *Marilyn Cross*: I agree with the above assessment. The City would be advised to complete the multi-modal public improvements across the frontage of SH 88 for pedestrian and off-street cyclist with 90-degree directional ADA ramps. Signal work will also require a separate (Utility) permit at Chambers Way. Depending on the traffic #'s, an eastbound auxiliary lane may be warranted. General question: will Chambers Way north of SH 88 be shown on Comprehensive Plan or SEATS study as a collector? Will there ever be plans/potential to connect it through to Caley/Fair Ave? The west side of SH 83 lacks N-S alternate connectivity. We support using collectors for short trips, not the highway.

E. *Name*: Bill Skinner
Organization: Arapahoe County Planning Division
Address: 6924 S Lima St Centennial CO 80112
Phone: 720-874-6650
Email: REFERRALS@ARAPAHOEGOV.COM

Comment: Thank you for the opportunity to review this project. Arapahoe County Planning Division has the following comments:

- Application labels this as sustainable infill. An explanation of how replacing urban green space with a commercial hub increases sustainability should be provided.
- Refer to AC Engineering comments regarding connection E Arapahoe Rd / S Chambers Way intersection and participation in traffic signal costs.
- This is in the airport influence area Buffer Zone that recommends no residential development or other noise sensitive development. Staff will not support residential development or other noise sensitive uses in buffer zones.
- Please be sure to send a referral to the Centennial Airport for comments.
- Be sure to provide neighborhood outreach to surrounding homes and businesses in unincorporated Arapahoe County.

F. *Name*: Joseph Boateng, E.I., Engineering Inspector
Organization: Arapahoe County Public Works & Development
Address: 6924 S Lima St Centennial CO 80112
Phone: 303-910-9268
Email: REFERRALS@ARAPAHOEGOV.COM
Comment: The Engineering Division has no comments at this time.

G. *Name*: Robert Clark
Address: 6679 South Helena St. Centennial CO 80016
Phone: 303-680-2677
Email: rjclarktax@gmail.com
RE: Project Number 1388493
Thanks for your letter of August 1, 2019 regarding the rezoning of the Valley Country Club.
Regarding the goal of the SIR district to have new public spaces that help to attract people, improve property values in the surrounding areas, and increase the value of infill areas, could you please answer:
Why not have these open spaces remain as it is? It has already has the necessities such as trees, landscaping, and availability to attract people. In addition, the increased traffic on the busy Arapahoe Road would be minimized. Not trying to sound like our neighbors to the Northwest of the metro region, but this would be a smaller open space area in the center of an already busy corridor. How does this project improve property values? It is surrounded almost entirely by single-family homes. Where is the improvement? How does this project increase the value of infill areas? Recently, the City of Centennial voted down a car dealership on an infill area along busy Arapahoe Road. If the City does not want a big car dealership with the accompanying large sales and property tax on another infill area, why does this project seem to be a better deal? The SIR goal states: "Enhanced property values in neighborhoods and commercial areas in the city". This property is not connected and somewhat distant from other neighborhoods. How do these other neighborhoods and commercial areas have their property values increased?
Thanks for your time and assistance in this matter.
**Please note: Mr. Clark also submitted a letter, which is attached hereto.*

H. *Name*: Eloise Nash
Organization: The Ticket Firm
Address: 6587 S Helena St Centennial United States 80016
Phone: 3037943476
Email: steve@theticketfirm.com
Comment: I am very concerned for the increase in traffic. Arapahoe is a very busy street, especially at the Chambers light going in to Cornerstar shopping area. Additionally, there are many car accidents due to the amount of traffic and it will likely increase. Not to mention walking across Arapahoe to the shopping area is becoming less safe. Lastly, the lack of open space is becoming more of a problem. I hope that the powers that be will deny the permit.

I. *Name*: Stacey Thompson, Group Manager, Floodplain and Master Planning
Organization: Southeast Metro Stormwater Authority (SEMSWA)
Address: 7437 S. Fairplay St. Centennial Colorado 80112
Phone: 303-858-8844
Email: sthompson@semswa.org
Comment: The City of Centennial forwarded the referral to our office for review and comment. SEMSWA serves as Centennial's stormwater and floodplain management staff. We offer the following comment: The Mile High Flood District (MHFD), City of Aurora and the Southeast Metro Stormwater Authority (SEMSWA) have sponsored a master-planning study for the Cherry Creek Tributaries (upstream of Cherry Creek Reservoir). The project scope includes a Major Drainageway Plan (MDP) study and Flood Hazard Area Delineation (FHAD) study for the unstudied tributaries to Cherry Creek. Preliminary flood hazard analysis prepared by Dewberry has identified that the proposed development area has additional (100-year) flood risk due to the North Arapahoe Tributary to Cherry Creek.
The final hydrology report is posted to the MHFD/UDFCD master-planning website:
https://cherrycreektributaries.com/

J. *Name*: Annette Jewell
Organization: Valley Club Homeowners Association 6393 S. Helena St.
Address: 6393 S Helena St Centennial CO 80016-1017
Phone: 720-341-6793
Email: ajewell99@comcast.net
Comment: Dear Heather, Valley Club Acres HOA is opposed to the re-zoning of green urban space to MU-C for the submittal titled Valley Arapahoe project number 1388493. I am unable to send the documents as a zip so will be sending it in a separate email. **Please note that these comments are attached hereto.*

K. *Name*: Marie Lansford
Address: 15400 E Caley Ave Centennial Colorado 80016
Phone: 303-717-8798
Email: marielansford@comcast.net
Comment: I strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

L. *Name*: Charles Riewe
Address: 6527 S Atchison Way Centennial CO 80111
Phone: 720-837-8169
Email: criewe99@gmail.com
Comment: Sounds like a good idea - I live nearby and would not mind to see something built there.

M. *Name*: Bill Heiss
Address: 8188 S Norfolk St Englewood CO 80112
Email: wheiss@msn.com
Comment: I strongly oppose the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe. **Please note: Letter attached hereto.*

N. *Name*: Drew Dines
Address: 6609 S Helena St Centennial CO 80016
Email: Dines4pack@gmail.com
Comment: Heather, when is enough developed land enough? This development will hurt a lot more than people. The wildlife in this particular place will be heavily effected. The deer, bear, bobcat, coyote, Fox, skunks, rabbit, squirrels, birds, snakes, frogs and many other animals will be eliminated. Does tax dollars that really don't get managed properly justify the need of our one natural gift from Mother Earth. Keep it natural for Millennium. Why develop it? See the future of open land. There is living green plants and animals that will flourish more than concrete.

O. *Name*: James McCroskey
Address: 6202 S Potomac Way Centennial CO 80111
Phone: 303-503-1218
Email: jim.mccroskey@gmail.com
Comment: We are strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

P. *Name*: Kristin Stepien
Address: 15004 E Maplewood Dr. Centennial Colorado 80016
Phone: 303-588-2771
Email: kstepien@copic.com
Comment: Please, please do not do this. We have enough traffic as it is. The reasons why we moved to this area are quickly deteriorating as open space ceases to exist. If this high density housing is allowed, we will seriously consider selling our home and moving.

Q. *Name*: Virginia Kofoed
Address: 6567 S. Helena St. Centennial CO 80016
Phone: 303-690-5160
Email: dayzz@comcast.net
Comment: I strongly urge you to realize the effect this development will have on our neighborhood as well as everyone who takes Arapahoe Road to work to and from work every day. The soccer fields already clog the already busy Arapahoe Road as well as the Cornerstar Mall. Anyone living in Valley Club Acres already can't get on Arapahoe at rush hours to drive W or to take the Uturn going E. I've lived on Helena Street on the golf course side for 50 years and do not want any more development on the golf course.

2. Zoning and Land Use Comments

A. Due to the fact that the Unified Development Ordinance (UDO) will not be effective until September 20, the proposed zone change is to the Sustainable Infill Redevelopment (SIR) zoning district. When the UDO becomes effective, if the parcel is annexed the zoning district will be Mixed-Use Corridor (MU-C) to be consistent with the Comprehensive Plan Urban Hub placetype.

B. Relative to the MU-C district, the code states,
"The purpose of the MU-C zone district is to provide retail goods and services to satisfy the household and personal needs of the residents of nearby residential neighborhoods, those traveling on adjacent collector and arterial corridors, and to allow for higher intensity general business and service activities. The MU-C district should be located and designed to allow for access by pedestrians, bicyclists, and public transportation, in addition to automobiles. In Subareas A and B, the MU-C district is intended to promote sustainable infill redevelopment of older commercial sites, while mitigating the impacts of redevelopment on surrounding areas…Uses permitted in this district are as shown in Table 3.2-1 (Permitted Use Table)."

C. It is encouraged that, if the annexation and initial zoning are approved, the applicant consider providing a mix of uses consistent with the purpose and intent of the MU-C zoning district.

D. Many comments from community members expressed concern for mitigation of impacts of the development of the site. If the site is annexed and the zoning approved, there will be additional discussion on mitigating impacts to surrounding property owners as well as traffic.

REFERRAL COMMENTS FROM OTHER DEPARTMENTS AND AGENCIES

3. Civil Engineering (Kristin Tanabe / 303-739-7306 / ktanabe@auroragov.org / Comments in green)
A. No comment or concern noted.

4. Traffic Engineering (Brianna Medema / 303-739-7336 / bmedema@auroragov.org / Comments in amber)
A. No comment or concern noted.

5. Fire / Life Safety (William Polk / 303-739-7371 / wpolk@auroragov.org / Comments in blue)
A. No comment or concern noted.

6. Aurora Water (Anthony Tran / 303-739-7376 / atran@auroragov.org / Comments in red)
A. No comment or concern noted.

7. Parks, Recreation, & Open Space (PROS) (Chris Ricciardiello / 303-739-7154 /cricciar@auroragov.org / Comments in purple)
A. The information uploaded for the first submittal is insufficient for determining the actual configuration of the property and whether any adjustments to it were made to reflect the pre-application comment regarding the dedication of open space. Provide an exhibit to accompany the legal description:

   a. Realizing the requested land dedication could have impacts on the townhome layout and the total potential yield of units for the project if the northwestern corner of the site remains unchanged from the conceptual design provided at pre-app, more information than responding with "this will be addressed at the time of the first site plan submittal" is needed to deal with this issue. Adapting the design of the development and/or the size or shape of the property may be necessary to ensure that the 25-foot wide open space dedication can be provided. This should be resolved before action is taken to subdivide the property from the parent parcel and then annex it into Aurora.

8. Real Property (Maurice Brooks / 303-739-7294 / mbrooks@auroragov.org / Comments in magenta)
A. No comment or concern noted.

To: SEMSWA
From: Valley Club Acres Homeowners
Date: March 7, 2019
Subject: Drainage

We, the homeowners of Valley Club Acres, have serious concerns regarding the remapping of a section of Valley Country Club being removed from the flood plain/flood way and potentially developed. The basis of this concern is from past experience regarding the development of Arapahoe Crossing and subsequent flooding of our neighborhood.

Prior to the construction of Arapahoe Crossing, we would have water in the swales around our houses once every 2 to 3 years and only after a severe rainstorm. The storm would require 1 to 2 inches of rain within a half hour. The water would stay within the swale and dissipate after a half an hour or less.

When Arapahoe Crossing was proposed as a project engineers assured the homeowners of Valley Club Acres sufficient drainage was planned and designed to prevent flooding of our homes. However, this was not the case. After the construction of Arapahoe Crossing, measurable rain would result in a large volume of water flowing in the swales on our properties. The water in the swale would overflow and flooding would occur that could last for days. The water would become 8 - 10 feet wide and up to 4 feet in depth. The water flowing through the swale during a rainstorm would spread onto S. Helena Street and flow south down the street, turning S. Helena St. into a river, flooding the street and causing a safety hazard to anyone attempting to drive down the street.

A retention area exists under the Arapahoe Crossing parking lot and controls the release of water to flow under Parker Road and through our property via the swale. There is also a substantial detention pond located at the southwest corner of Arapahoe Crossing. None of this was sufficient to handle the drainage after Arapahoe Crossing was built.

One “solution” was to block S. Helena St. with sandbags. (below left)
Another “solution” was to install a French drain, but it was washed out during the first rainstorm after installation. (below right)

Multiple other problems were created in addition to the flooding. The "controlled" release of water created a continual stream through our back yards. We actually had cattails growing in the swales, which attracted mosquitoes, algae, and had a swampy odor. We had trash and debris that accompanied the storm water. When the water overflowed, leach fields would be flooded and back flow into our basements.

All pleas for an acceptable solution were unheard until the press was contacted.

From this experience, Valley Club Acres homeowners have serious concerns regarding removing the 14.4 acres of Valley Country Club out of the flood plain and flood way. Past experience has shown that significant flooding can occur as a result of open area being paved over for development and that engineered drawings do not reflect real life situations. In addition, Arapahoe Crossing was not in a flood plain/flood way, but strictly open field. The years of damage to property, flooding, and street access issues was unacceptable.

Sometimes a flood plain is a flood plain and no amount of experts can change that. Designating this area as anything but a flood plain threatens our property, our wells and our standard of living. Developers will tell you they can fix it, but we have lived it and learned it won’t work. By the time that is realized, it is too late and our neighborhood and homes will be ruined. If development is ever allowed to take place, any and all future drainage should run away from the existing homes and drain only to the west.

Please do not remove the 14.4 acres from the flood plain/flood way thereby protecting the existing homes and preventing our property from being damaged.

RE: Project Number 1388493

Planning and Development Services
Aurora, CO 80012

Thank you for your letter of August 1, 2019 regarding the rezoning of the Valley Country Club. It is with much disappointment we have to endure this rezoning issue. Again, money is talking and making decisions without the input of your constituents. This continues to be a problem for those of us living in the Valley Acres neighborhood.

Regarding the goal of the SIR district to have new public spaces that help to attract people, improve property values in the surrounding areas, and increase the value of infill areas, could you please answer the following questions:

Why do we have to eliminate open spaces which; enhance the beauty of our neighborhood and city? It has already has the necessities such as trees, landscaping, and availability to attract people. The traffic on Arapahoe Road is already intolerable and will only get worse. The best part of living in Colorado is our respect for open spaces and attempting to reduce these areas are getting away from the values we hold as COLORADOANS. We do not want to be another California. The traffic, the noise, the pollution, and the sirens on Arapahoe Road are constant. Our only consolation is our beautiful views and the small open space area in the center of an already busy corridor only tempers these problems.

How does this project improve property values? It is surrounded almost entirely by single-family homes. Where is the improvement? How does this project increase the value of infill areas? Recently, the City of Centennial voted down a car dealership on an infill area along busy Arapahoe Road. If the City does not want a big car dealership with the accompanying large sales and property tax on another infill area, why does this project seem to be a better deal?

The SIR goal states: “Enhanced property values in neighborhoods and commercial areas in the city”. I disagree with the tenets of this proposal.

This property is not connected and somewhat distant from other neighborhoods. How do these other neighborhoods and commercial areas have their property values increased? Please consider this as you review the merits of this application. How would this affect you?

Thanks for your time and attention to this matter.

Roxane England

TRAFFIC AND SAFETY OPERATIONS REPORT

Arapahoe Road: Yosemite to Buckley
Next Steps Operations Study

Prepared for:

13133 E Arapahoe Rd
Centennial, Colorado 80112

Prepared by:

6300 S. Syracuse Way, #600
Centennial, Colorado 80111
303.721.1440

FHU Reference No. 115257-01

August 2019

Table of Contents

List of Appendices

List of Figures

List of Tables

List of Acronyms

AADT	Annual Average Daily Traffic
APY	accidents per year
BRT	bus rapid transit
BUILD	Better Utilizing Investments to Leverage Development
CatEx	Categorical Exclusion
CDOT	Colorado Department of Transportation
CFR	Code of Federal Regulations
CIP	Capital Improvement Plan
DRCOG	Denver Regional Council of Governments
EVP	emergency vehicle preemption
FHWA	Federal Highway Administration
I-25	Interstate 25
ITS	Intelligent Transportation System
LOS	Level of Service
LOSS	level of service of safety
MPH	miles per hour
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
PEL	Planning and Environmental Linkage
RTP	Regional Transportation Plan
SH	State Highway
SPF	Safety Performance Function
SPUI	single-point urban interchange
TAZ	Traffic Analysis Zone
TDM	travel demand management
TIP	Transportation Improvement Program
TWG	Technical Working Group
VHT	vehicle hours of travel
VMS	variable message sign
vpd	vehicles per day
vph	vehicles per hour

Acknowledgements

The Arapahoe Road Corridor Study was prepared with active participation from the stakeholder agencies. The following individuals were involved and attended Technical Working Group meetings.

Jim Paral – City of Centennial

Travis Greiman – City of Centennial

Derek Holcomb – City of Centennial

Stewart Meek – City of Centennial

Brian Love – Arapahoe County

Karl Packer – Arapahoe County

Tanya Bower – City of Aurora

Josie Ortiz – City of Greenwood Village

Paul Sherner – CDOT

Marilyn Cross – CDOT

Ben Kiene – CDOT

Carrie DeJiacomo – CDOT

Nitin Deshpande – CDOT

Thomas Magenis - CDOT

Steve Cook – DRCOG

Todd Frisbie – Felsburg Holt & Ullevig

Colleen Guillotte – Felsburg Holt & Ullevig

Chris Fasching – Felsburg Holt & Ullevig

Alex Larson – Apex Design

Sam Moss – Apex Design

Executive Summary

Purpose

The City of Centennial completed a comprehensive roadway operational study of Arapahoe Road extending from Yosemite Street to Buckley Road. The study is intended to evaluate potential transportation improvements to improve mobility along Arapahoe Road while also maintaining the city's vision with respect to economic development, serving as an update and refinement to the 2007 Arapahoe Road Planning and Environmental Linkage (PEL) study. Between Interstate 25 (I-25) and Parker Road, Arapahoe Road is State Highway 88; Arapahoe Road is an arterial roadway owned and maintained by local jurisdictions west of I-25 and east of Parker Road.

The study was conducted in close coordination with a Technical Working Group (TWG) comprised of agency stakeholders including Centennial, Colorado Department of Transportation (CDOT), Denver Regional Council of Governments (DRCOG), Arapahoe County, Aurora, Greenwood Village, and Foxfield. The major tasks of the study included:

- Evaluate existing conditions
- Assess long-range land use and associated travel demand modeling
- Analyze operational characteristics of all study intersections
- Determine traffic control and roadway improvement needs
- Provide guidance on priorities towards implementation

Goals and Objectives

Specific goals of this study include:

- Evaluate conditions to understand existing and future issues and need in the corridor.
- Develop innovative and cost-effective solutions.
- Evaluate and screen solutions including some conceptual level design to understand impacts to access and properties.
- Prioritize solutions with respect to implementation.
- Identify next steps following this study. This includes more study, technology upgrades in the corridor, timing updates, and identification of funding resources.
- Engage in a public process to gauge public perspective relative to issues and solutions.

Existing Conditions

A significant amount of data was collected in support of this study. Daily traffic along Arapahoe Road currently ranges from 59,000 vehicles per day to 64,000 vehicles per day. Peak hour travel is very directional in the east end favoring the westbound direction in the morning and eastbound in the evening. Both peak hours experience a more balanced directional flow in the west end of the corridor. Numerous intersections operate at a Level of Service (LOS) F during peak hours, and some areas experience a very uneven use of lanes as drivers position themselves for a downstream maneuver.

Projected Growth

The DRCOG travel demand model was used to estimate future traffic demands along Arapahoe Road. Between 2017 and 2040, study area households will increase 25 percent, and employment will increase 45 percent. The anticipated growth is projected to increase Arapahoe Road traffic 10 to 15 percent at the west end of the corridor and 20 to 30 percent at the east end, reaching as much as 88,000 vehicles per day. Operationally, without any improvements, this would translate into more congestion occurring at the signalized intersections.

Alternatives

A wide range of improvement options were considered including (but limited to) lane re-designations, lane additions, innovative intersections, grade-separations, and parallel road enhancements/extensions. Improvements looked at individually were assessed with respect to:

- The City's Vision
- Mobility
- Safety
- Technology
- Multi-modal enhancement
- Implementation

This initial assessment led to a number of low to moderate cost solution options. Each option was assessed with respect to the delay savings and crash savings benefit it could potentially deliver as compared to its cursory level cost estimate, and the more promising alternatives were retained for further assessment. Major investment options included constructing innovative intersections at six locations and an overpass at two locations. Again, the more promising options with respect to benefits-versus-costs were retained for further analysis.

The subsequent means of analysis was to apply a traffic simulation software program to analyze 10 different packages of improvements through the corridor. Operational results were compared and entered into a master comparison matrix that also accounted for compatibility considerations as well as ease of implementation. Results of which were used to develop the recommended corridor plan.

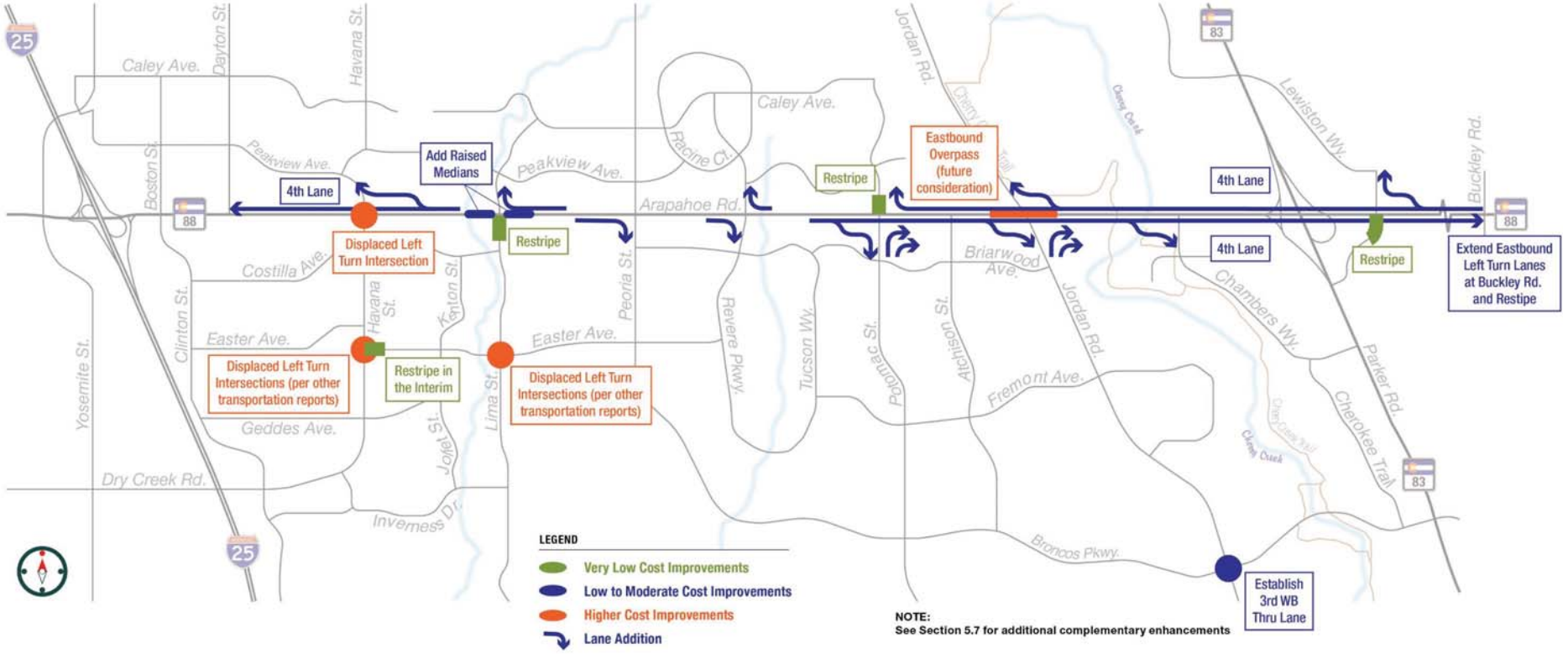
Recommended Plan

The final recommended plan is comprised of low to high level investment improvements which are represented diagrammatically in **Figure ES-1**. The primary components of the plan are listed below.

Very low investment improvements include:

- Restriping the southbound Potomac Street approach such that the right turn lane is converted to a shared through/right turn lane
- Restriping the northbound Lima Street approach to convert the center shared through/right turn to an exclusive through lane. A single right turn lane will remain.
- Restriping the northbound Lewiston Way approach to convert lane usage such that two exclusive right turn lanes are provided and only one left turn lane is provided.
- Restriping the westbound Easter Avenue approach to Havana Street such that the through movement is shared with the second left turn lane rather than the right turn lane.

Figure ES-1. Recommended Arapahoe Road Improvement Plan



Higher-cost improvements include:

- Adding a fourth Eastbound through lane from Potomac Street to Buckley Road, and restripe the Eastbound left turn lanes at Buckley
- Peoria Street; Adding an eastbound Right Turn Lane
- Adding a fourth westbound Lane from Havana to Dayton
- Revere Street; Adding an eastbound Right Turn Lane
- Revere Street; Adding a westbound Right Turn Lane
- Jordan Road/Broncos Parkway; Adding a third westbound lane and reset signal poles
- Lima Street; Adding a westbound Right Turn Lane
- Add raised medians along Arapahoe Road through the Lima Street intersection, providing median continuity from I-25 to Peoria Street
- Adding a fourth westbound through lane from Buckley Road to Potomac Street (through the Parker Interchange)
- Reconstructing the Havana Street intersection to be Displaced Left Turn configuration

An option that should be retained for future consideration is the construction of an overpass carrying eastbound Arapahoe Road over Jordan Road. A fourth eastbound lane from Jordan Road to Buckley Road should be established first. The resulting operations should then be assessed to inform whether an eastbound overpass option would be appropriate via a feasibility study.

There are also numerous complementary enhancements that should be implemented, and these include:

- In conjunction with the golf course's redevelopment, connect Briarwood Avenue from Lima Street to Peoria Street
- In conjunction with redevelopment, establish more cross-access between properties along both sides of Arapahoe Road from I-25 to Havana Street
- Upon redevelopment, construct an eastbound right turn lane into the shopping center west of Dayton Street
- Continue to incorporate technology into the corridor with respect to providing driver information
- Continue to promote and enhance bicycling accommodations throughout the study area
- Construct a Displaced Left Turn intersection at Peoria Street/Easter Avenue and at Havana Street/Easter Avenue (recommended in other transportation plans)
- Add signing along the southbound Yosemite Street left turn approach informing drivers what destination each lane best serves
- Add streetlights along the corridor where lighting is lacking
- Install sidewalks along Arapahoe Road where gaps exist. Also widen and detach sidewalks where/when possible

Implementation and Funding

A benefit-cost ratio was the primary means of developing a priority list with respect to implementation. The order of implementation will also need to consider cost, funding, and partnering for each component, so the gradual implementation of improvements need not strictly follow the exact order per the benefit-cost ratio. But this measure should be a consideration when selecting improvements that should be constructed. There are several improvements that involve simple restriping that could be implemented in very short order.

The city and the corridor stakeholders should continually seek funding for the recommended plan improvements. This could be in the form of the City's Capital Improvement Plan (CIP) program, federal funding through DRCOG, and grant pursuits. The other corridor stakeholders share in the City's desire for improved functionality, so Centennial should continue to work with CDOT, Arapahoe County, Aurora, Greenwood Village, and Foxfield, as appropriate, to establish partnerships toward implementation in phases.

1.0 Introduction

1.1 Project Background

The City of Centennial is conducting a comprehensive roadway operational improvement study of Arapahoe Road (State Highway [SH] 88B) between Interstate 25 (I-25) and Parker Road (SH 83A), much of which is located in Centennial, Colorado. The study area extends beyond these limits to include the Arapahoe intersections with Yosemite Street and Buckley Road. Arapahoe Road is a regional connector, and between I-25 and Parker Road, it a state highway. West of I-25 and east of Parker Road, Arapahoe Road is an arterial roadway owned and maintained by local jurisdictions. In addition, parallel roadways are analyzed in the study including segments of Peakview Avenue, Easter Avenue, and Broncos Parkway.

This study known as the Arapahoe Road: Yosemite to Buckley Next Steps Operation Study assesses existing conditions, identifies problem areas, and develops and evaluates transportation improvements to reduce congestion and enhance safety within the study area. Major tasks of the study include:

- Evaluate existing conditions
- Discuss long-range land use changes and associated travel demand modeling
- Analyze operational characteristics of all study intersections
- Determine traffic control needs and other roadway improvements for the long-range planning horizon (year 2040) and identify priority improvements
- Provide guidance on priorities towards implementation

1.2 Project Purpose

The Arapahoe Corridor was last studied in the 2007 Planning and Environmental Linkage (PEL) study and identified solutions that would improve capacity. Since the last study, new developments have occurred in the corridor, the Parker Road interchange was constructed, and recently the I-25 interchange was reconstructed. Therefore, the recommended solutions of the previous study warrant reconsideration, especially in light of the City's economic vision for the corridor, which includes robust commercial and employment uses along the corridor as defined in their 2040 Comprehensive Plan, adopted in fall of 2018. Further, some of the improvements identified in the 2007 PEL are precluded due to completed development. An evaluation of the roadway is needed in order to understand the capacity and needs for this corridor. The goals of this study include:

- Evaluate existing and future conditions to understand existing and future needs and issues in the corridor.
- Develop innovative and cost-effective solutions.
- Evaluate and screen solutions including some conceptual level design to understand impacts to access and properties.
- Prioritize solutions into high/medium/low categories.
- Identify next steps following this study including: additional study, technology upgrades in the corridor, safety improvements, implementation plan, and identification of funding resources.
- Engage in a public process to gather input, present findings, and recommend solutions.

1.3 Study Corridor

The study area, shown on **Figure 1-1**, was initially planned along Arapahoe Road from Yosemite Street to the Parker Road interchange. At the kickoff meeting among project stakeholders, it was decided to extend the study area east to Buckley Road. Stakeholders also recommended that the study area include parallel routes such as Broncos Parkway, Easter Avenue, and Peakview Avenue.

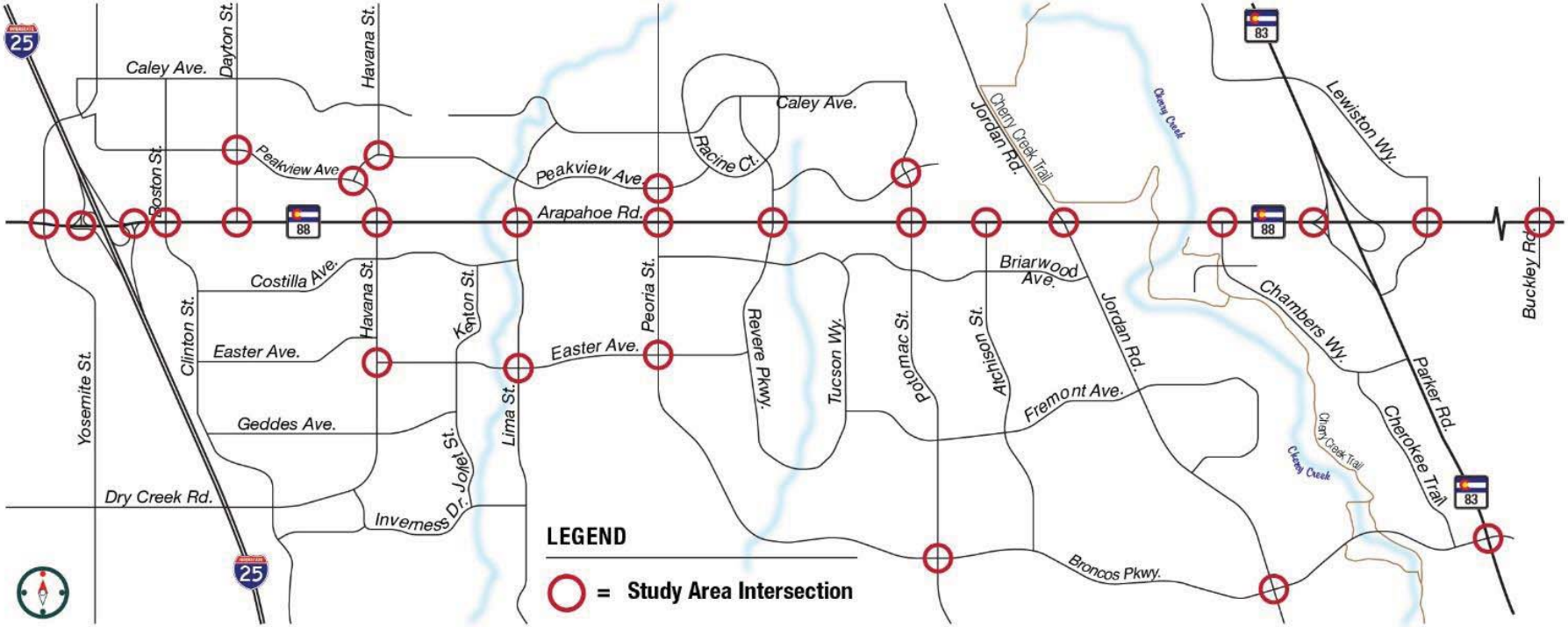
As shown on **Figure 1-1**, the study area includes 16 intersections along Arapahoe Road:

- Yosemite Street
- I-25 southbound Ramps
- I-25 northbound Ramps
- Boston Street/Clinton Street
- Dayton Street
- Havana Street
- Lima Street
- Peoria Street
- Revere Parkway
- Potomac Street
- Atchison Street
- Jordan Road
- Chambers Way
- Parker Road Interchange Ramps
- Lewiston Way
- Buckley Road

The study area also includes five intersections along Peakview Avenue, three intersections along Easter Avenue, and three intersections along Broncos Parkway:

- Peakview Avenue and Dayton Street
- Peakview Avenue and Driveway Access (between Dayton and Havana Streets)
- Peakview Avenue and Havana Street
- Peakview Avenue and Peoria Street
- Peakview Avenue and Potomac Street
- Easter Avenue and Havana Street
- Easter Avenue and Lima Street
- Easter Avenue and Peoria Street
- Broncos Parkway and Potomac Street
- Broncos Parkway and Jordan Road
- Broncos Parkway and Parker Road

Figure 1-1. Arapahoe Road Next Steps Study Area



1.4 Previous Corridor Study

Previous planning efforts in the study area relevant to this Next Steps effort includes the following studies as well as a high-level summary as to their content.

1.4.1 Arapahoe Road Corridor Study: I-25 to Parker Road

In November 2007, Arapahoe County along with the Colorado Department of Transportation (CDOT) and other corridor jurisdictions completed the development and analysis of alternatives for improvement of the Arapahoe Road Corridor from I-25 to Parker Road. The objectives of the study were to improve operations, expand mobility opportunities, enhance the corridor image, and avoid significant community and environmental impacts. In this effort, a thorough and inclusive technical and public process was used to identify a wide range of alternatives, evaluate and screen these alternatives, and select a package of reasonable improvements for further study. The package of improvements included the following and are summarized on **Figure 1-2**:

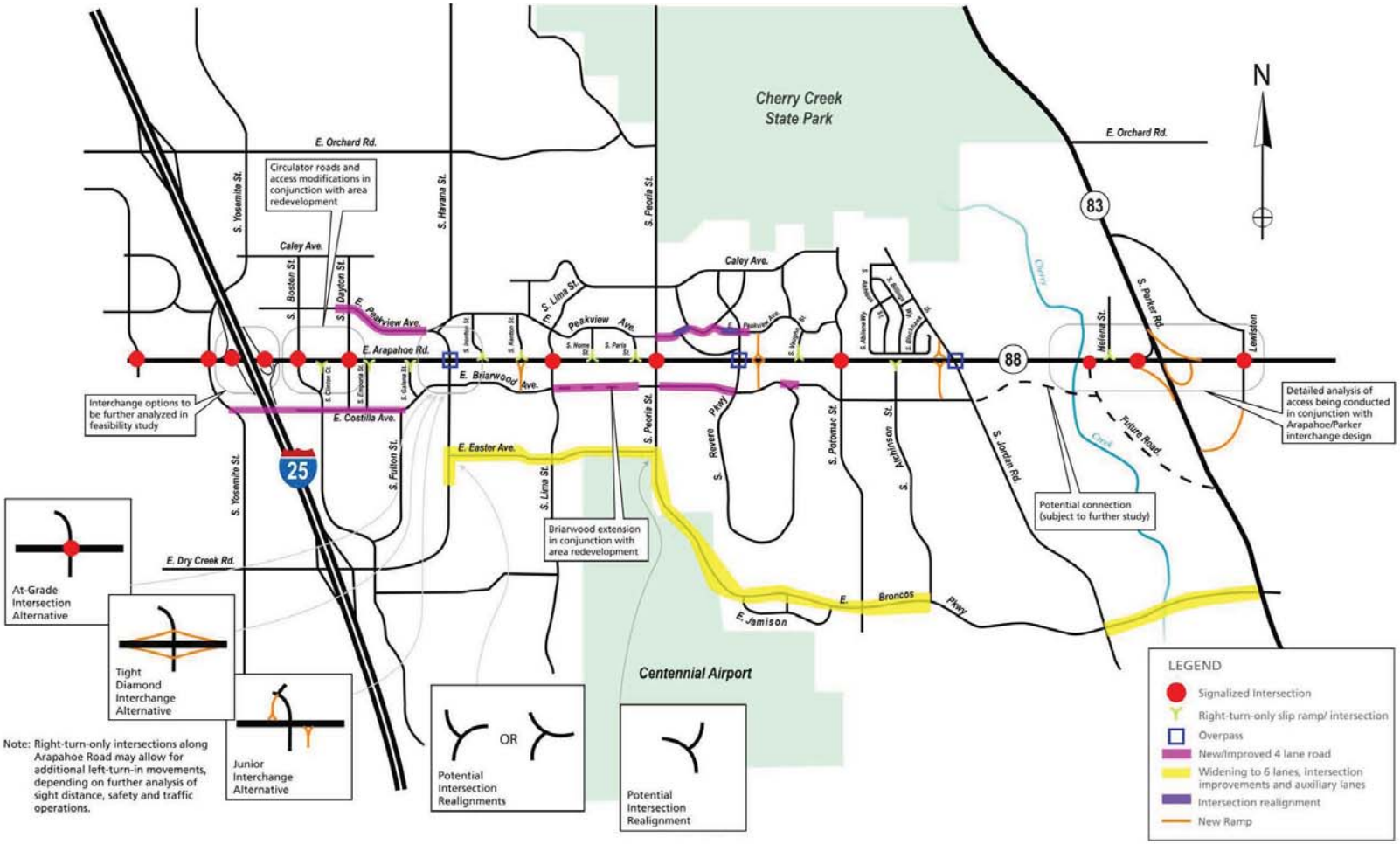
- At grade/grade separated improvements along corridor
  - Havana – tight diamond or junior interchange configuration
  - Revere – junior interchange
  - Jordan – junior interchange
  - Intersection improvements
  - Right turn only intersections
  - Access modifications
  - Median modifications
- Parallel Roadways
  - New lanes along Costilla, Briarwood, Peakview
  - Broncos Parkway improvement
  - Briarwood extension across the golf course
- Transit Services
  - Call-n-rides
  - Local service off Arapahoe Road
- Pedestrian/Bicycle Facilities
  - Sidewalks
  - Grade separation near Clinton
  - Wayfinding
- Other Improvements
  - Intelligent Transportation System (ITS) Strategies
  - Signal upgrades
  - Revisit progression regularly

1.4.2 Dry Creek/Havana Avenue Corridor Study

In January 2017 the City of Centennial and Arapahoe County completed a study of the Havana Avenue/Dry Creek Road Corridor from Yosemite Street to Easter Avenue. The recommended improvements included the following:

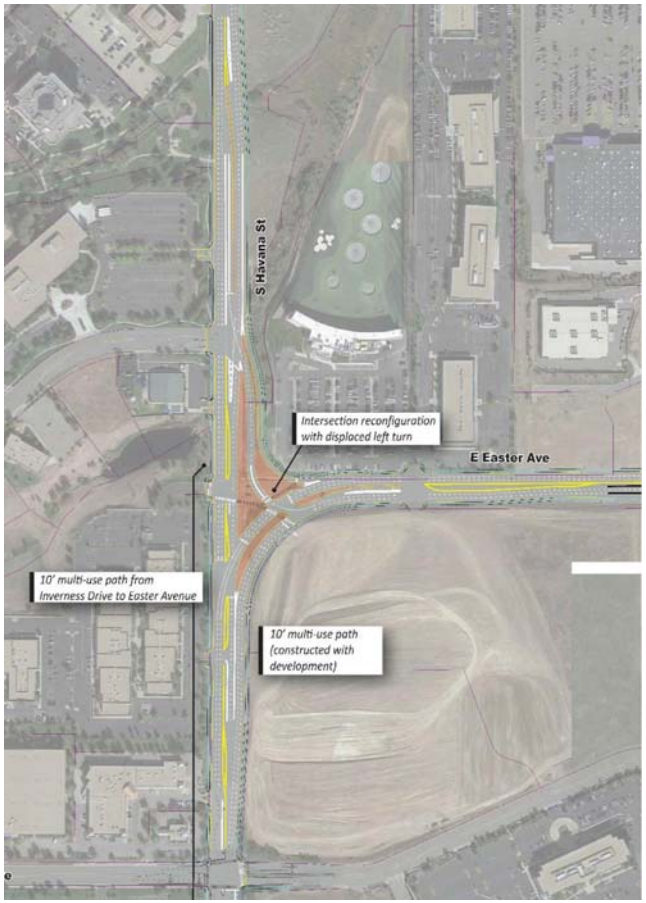
- Optimized signal timing and phasing
- Bicyclist, pedestrian and transit access improvements
- Travel Demand Management (TDM) strategies
- Additional turn lanes at intersection and lane configuration modifications
- Capacity improvements at I-25 on-ramps
- Intersection improvements to increase capacity for east-west movements along Dry Creek

Figure 1-2. Arapahoe Road Corridor Study (2007) Recommended Roadway Improvements



A key corridor capacity improvement identified in the study, relevant to this Next Steps study, is the long-term reconstruction of the Easter Avenue intersection for a displaced left turn configuration. The conceptual design shown on **Figure 1-3** is set up to better facilitate the major turn movements at the intersection that are north-south of Havana Street and the south-east movements between the east leg of Easter Avenue and the south leg of Havana Street.

Figure 1-3. Havana/Easter Displaced Left Turn Configuration

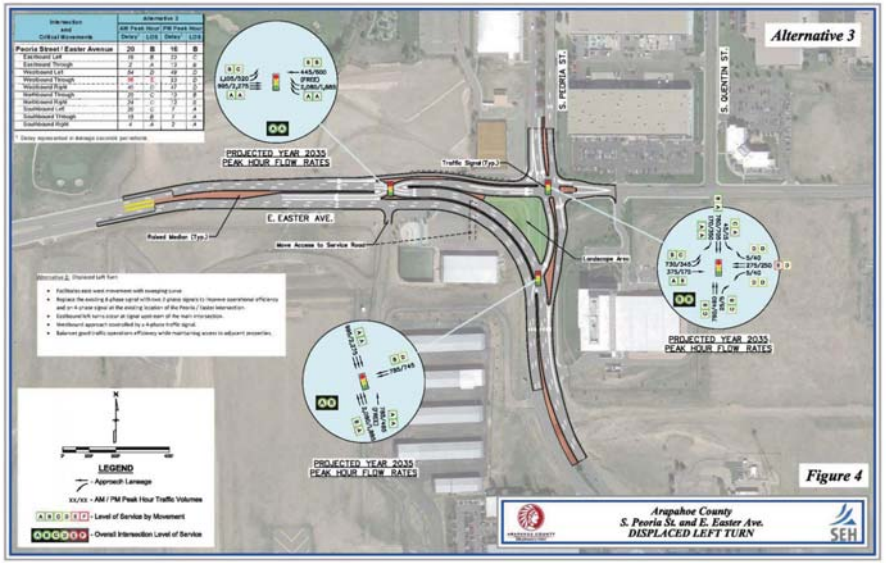


1.4.3 Other Relevant Studies

Other relevant studies include the following:

- **Centennial Transportation Plan**, adopted in December 2013. The plan's short-term needs along the corridor entail the reconstruction/improvement of several traffic signals, most of which are along parallel roads. Many of the improvements have been completed. Longer-term, the plan identifies enhancing parallel routes such as Broncos Parkway, Peakview Avenue, and Briarwood Avenue. Along Arapahoe Road itself, the plan identifies several intersection improvement locations with recommendations for consideration of Continuous Flow Intersections. In addition, the plan calls for 8-foot sidewalks along Arapahoe Road and sidewalk enhancements along the parallel roads as well. Transit-wise, the City's Transportation Plan calls for more study of possible bus rapid transit (BRT) service along Arapahoe Road.
- **Arapahoe County Transportation Plan**, adopted in December 2010. With respect to Arapahoe Road, this county-wide plan identifies a six-lane cross-section with the construction of three grade-separated junior interchanges, consistent with the 2007 Arapahoe Road Corridor Study.
- **Easter/Peoria Intersection Improvements** – This study identifies a displaced left turn configuration at the Easter/Peoria intersection (see **Figure 1-4**).

Figure 1-4. Easter/Peoria Displaced Left Turn Configuration



2.0 Data Collection

In October 2017, peak hour turning movement counts were collected. The counts include all intersections listed in the study area shown on **Figure 1-1**. In addition to the turning movements, daily counts were collected at eastbound Arapahoe Road to the southbound I-25 ramp, westbound Arapahoe Road to the northbound I-25 Ramp, eastbound Arapahoe Road to the northbound Parker Road ramp and the westbound Arapahoe Road to the northbound Parker Road ramp. Additional data collection efforts included speed data on Arapahoe Road and lane utilization data at the west and east ends of the corridor. Origin-destination data was also collected to help identify predominant travel patterns in the study area.

2.1 General Traffic Data

Figure 2-1 shows generalized corridor traffic statistics. The charts in the figure show daily counts collected at three locations on Arapahoe Road. The corridor today carries about 60,000 vehicles per day (vpd) on the east end and through the middle section of the corridor. At the west end of the corridor, the total daily traffic increases to about 70,000 vpd.

The chart also compares these 2017 counts to historic traffic data collected as far back as 2007. This data shows that total daily traffic volume in the corridor has not grown significantly in the past 10 years, and at the west end of the corridor total traffic has decreased from previous years. The decrease in total traffic at the west end may be partially attributed to construction activity that occurred around the I-25 interchange (which occurred from spring 2016 to spring 2018). On the east end of the corridor near the Parker Road interchange, recent counts show that total traffic volumes are about the same as historic levels.

Figure 2-1 provides other traffic volume characteristics in the corridor. These are discussed in the following sections.

Directional Distribution - Traffic flows are highly directional between Potomac and Buckley with the morning peak flow favoring the westbound direction and the evening peak flow favoring the eastbound direction. At the west end of the corridor between Yosemite and Havana, traffic flows are relatively balanced in each direction during the morning and evening commutes.

Hourly Traffic Patterns – **Figure 2-1** shows hourly volumes by direction. In general, the hourly volumes show heavy use through the day. During the peak periods, hourly volumes spike during the morning and evening commutes. The directionality varies by location along the corridor in that one direction serves much more traffic than the other in the east end, but the middle and west section display more balanced peak flow demands given that drivers are commuting in both directions. Off-peak traffic flows are less and are more balanced through the corridor. Traffic volumes east of Chambers gradually increase through the day, and spike dramatically during the evening commute.

2.2 Peak Hour Traffic Volumes

Due to the congested nature of this corridor, the peak hour counts at many intersections are likely a service volume. The service volume is a count of the number of vehicles that were able to travel through the intersection during the peak hour. This number typically understates the true demand volume, which is the numbers of vehicles attempting to travel through the intersection during the peak hour but were unable to due to the congested nature of the movement.

Figure 2-2 shows existing peak hour traffic volumes at the study intersections with adjustments to convert service flows to demand flows. It was assumed that constrained counts occurred at locations where peak hour factors were observed to be close to 1.0, movements exceeding capacity, and locations where turn movements had high volumes. At some of these locations, the volume adjustment was based on determining the number of unserved vehicles in queues which was assumed to be the additional vehicles that wanted to travel through the intersection but could not due to congestion. This additional volume then was carried through other intersections to balance traffic volumes between intersections. In some locations, it was estimated that this unserved volume could be as high as 1,000 vehicles in the peak hour.

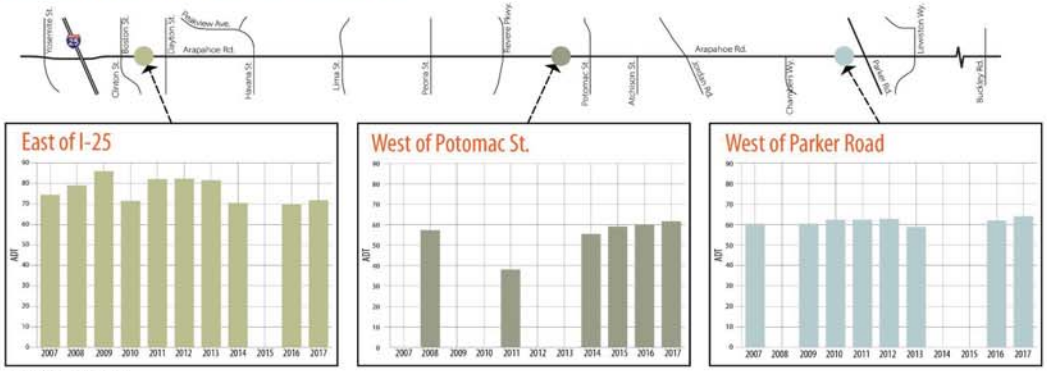
As shown on **Figure 2-2**, most service-volume to demand-volume adjustments occur in the peak direction of travel along Arapahoe Road. On the east end of the corridor adjustments were generally made at the Jordan Road and the Parker Road interchange as these are the most congested locations in this area of the corridor. These adjustments were then carried through the other intersections to balance traffic volumes. On the west end of the corridor, service to demand volume adjustments generally occurred at Havana Street and at the I-25 interchange and these were then carried through to other adjacent intersections.

2.3 Intersection Pedestrian Volumes

Figure 2-3 shows bicycle and pedestrian volumes at study intersections for the AM, Noon (where collected), and PM peak hours. Overall the number of non-motorized trips at study area intersections is low with most intersections experiencing just a few crossings during the peak hours. The most active intersections are all on the west end of the corridor. The Arapahoe Road intersections with Dayton and Yosemite and the Dayton/Peakview intersection had pedestrian counts in some of the peak hours ranging from the mid-teens to the mid-twenties. In the middle and at the east ends of the Arapahoe Road corridor, the number of pedestrian crossings at intersections during peak hours was typically three or fewer. Along the Broncos Parkway corridor, the number of pedestrians at intersections was typically one or less during the peak hours.

Figure 2-1. Data Collection Program

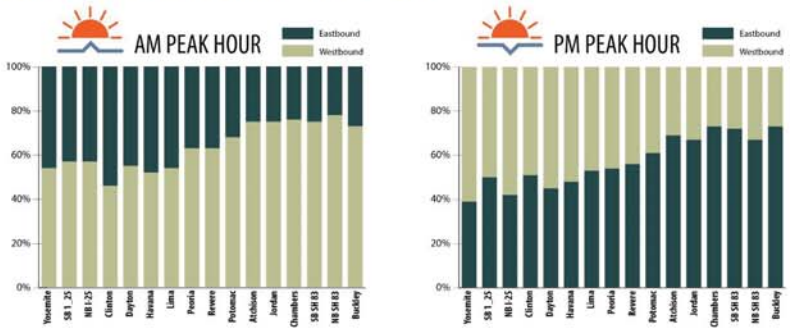
Traffic Volume Characteristics



OBSERVATIONS

- Little traffic growth at east end of corridor
- Some traffic growth near Potomac
- Lower traffic counts at I-25 interchange, construction could be a factor (which occured from Spring 2016 to Spring 2018)

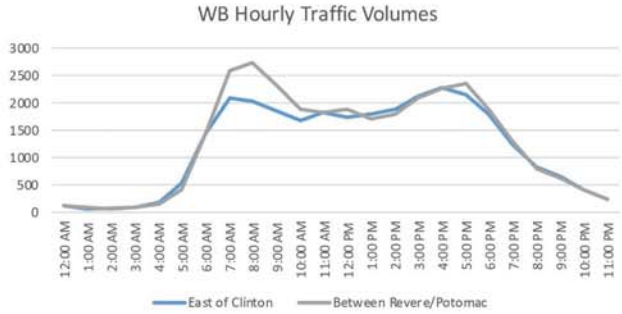
Directional Distribution of Traffic

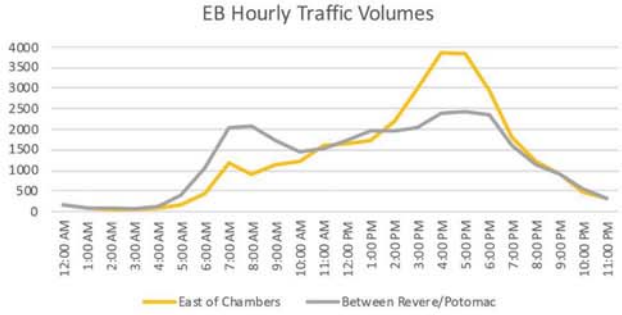


OBSERVATIONS

- Highly directional traffic between Potomac and Buckley at east end
- AM peak westbound
- PM peak eastbound
- Is more balanced during peak hours at west end

Hourly Traffic Patterns





OBSERVATIONS

- Between Revere and Potomac traffic volumes peak slightly during morning and evening commutes but are relatively steady between 6am and 6pm in both eastbound and westbound directions.
- East of Chambers, eastbound traffic volumes climb steadily throughout the day until about 6pm.

Figure 2-2. Existing Demand Volumes

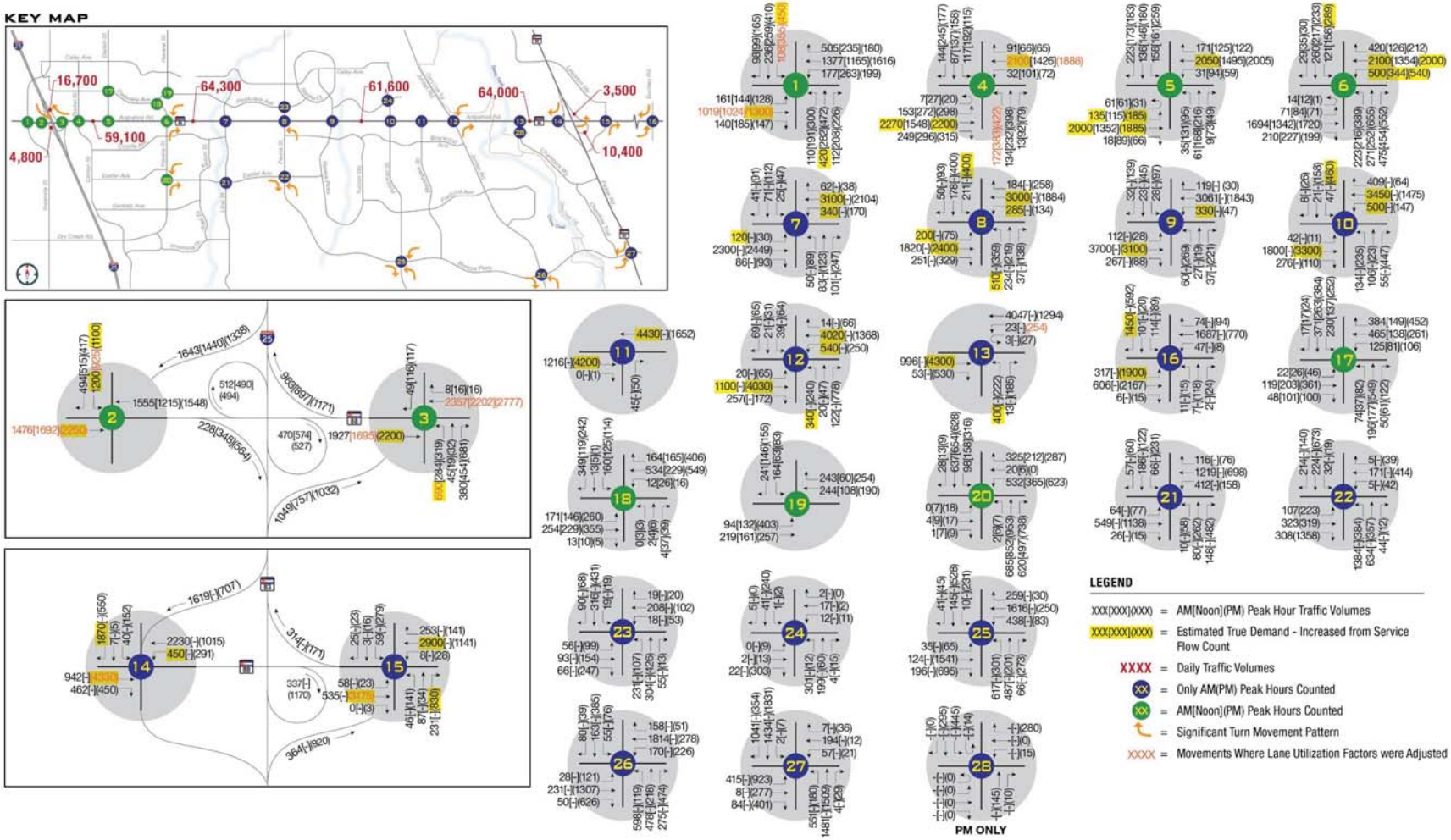
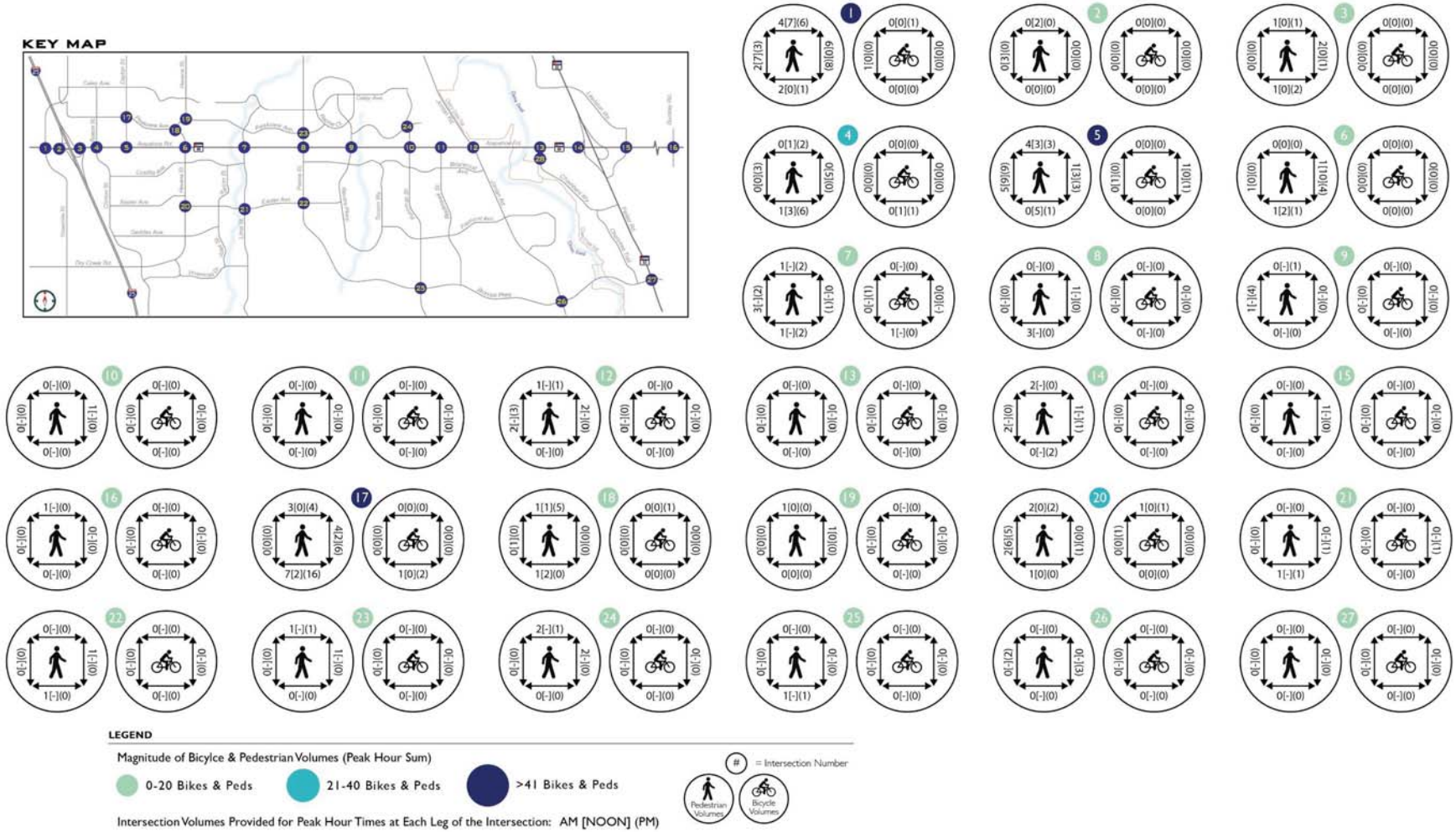


Figure 2-3. Existing Intersection Pedestrian Volumes



3.0 Existing Conditions

3.1 Travel Patterns & Travel Times

3.1.1 Origin-Destination

Mobile signals and GPS were used to collect movement and location data to assist with evaluating the origin and destination of trips. The zonal network on **Figure 3-1** was created to quantify where vehicle trips on Arapahoe Road originate and end. The red zones (100 series) represent locations internal to the Arapahoe Road corridor and the purple zones (200 series) represent locations external to the Arapahoe Road corridor. With this zonal structure, there are four types of origin-destination pairings as follows:

- Internal to Internal – This is a trip on Arapahoe Road that begins and ends in the internal red zones
- Internal to External – This is a trip on Arapahoe Road that begins in an internal red zone and ends in an external purple zone
- External to Internal – This is a trip on Arapahoe Road that begins in an external purple zone and ends in an internal red zone
- External to External – This is a trip that begins outside the red zone, travels on all or part of Arapahoe Road, and ends outside the red zone

Table 3-1 shows the percentage of Arapahoe Road trips during the peak hours for these four types of origin-destination pairs.

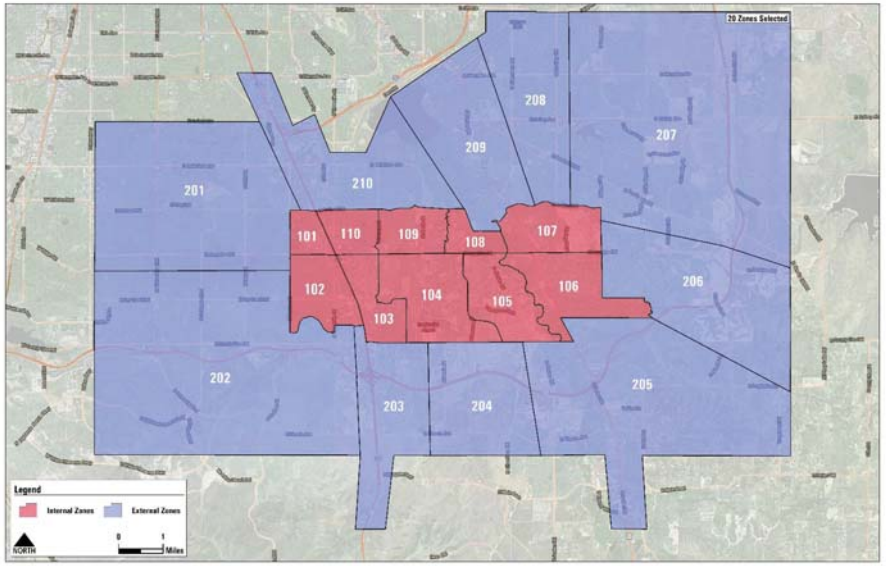
Table 3-1. Origin-Destination Pairs for Arapahoe Road Trips During the Peak Hours

Origin-Destination Pairs	AM Peak Hour	PM Peak Hour
Internal to Internal	32%	29%
Internal to External	20%	38%
External to Internal	41%	24%
External to External	7%	9%

The origin-destination data shows that in the AM peak, the predominant trip types are external to internal at 41 percent. This pattern is expected as most development along the corridor is commercial; therefore, trips are entering the corridor for employment purposes. In the PM peak, the pattern is reverse with more trips leaving the Arapahoe Road corridor, as the distribution of internal to external trips is 38 percent.

The origin-destination data also shows that almost 1/3 of peak hour trips on Arapahoe Road are trips between the internal zones along the corridor. This suggests that a parallel system of roadways along the corridor could reduce trips that are using the corridor to only travel a few miles. The data also shows that during the peak hours, less than one in 10 vehicle-trips are using the corridor to traverse through the study area. In other words, most of the trips on the Arapahoe Road corridor are not regional trips but are more with an origin or a destination (or both) within the corridor trips.

Figure 3-1. Origin-Destination Zones

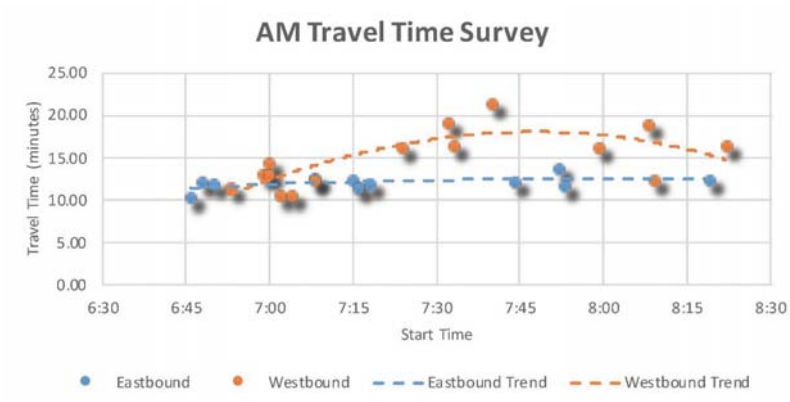


3.1.2 Travel Time

The project team drove the corridor numerous times during peak periods on mid-week days in fall 2017 and recorded the travel time between Yosemite Street and Buckley Road. **Figure 3-2** and **Figure 3-3** show the results of all travel time runs in the corridor during the morning and evening commutes, respectively.

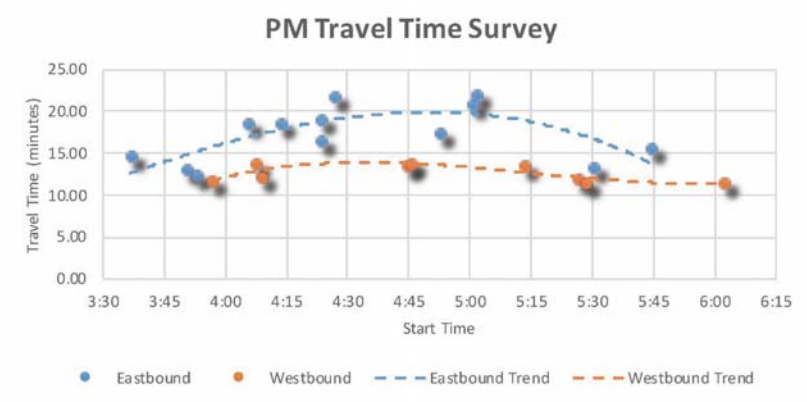
During the AM peak period (**Figure 3-2**), westbound travel times ranged from approximately 11 minutes to as high as 21 minutes. Over the peak period, the average travel time in the westbound direction was about 18 minutes. In the eastbound direction, which is the off-peak direction of travel, the travel time was relatively constant at about 12 minutes.

Figure 3-2. AM Travel Time Surveys



During the PM peak period (**Figure 3-3**) in the peak direction of travel, which is eastbound, it was observed that the longest travel time from Yosemite to Buckley was 22 minutes and that on average during the PM peak period the travel time was 20 minutes. In the off-peak direction of travel (westbound), ranged from about 11 to 14 minutes. During the PM peak period, a few travel time runs were interrupted by crashes which could increase the overall travel time, especially in the peak direction of travel, by 20 to 40 minutes.

Figure 3-3. PM Peak Period Travel Time Surveys



3.1.3 Speed

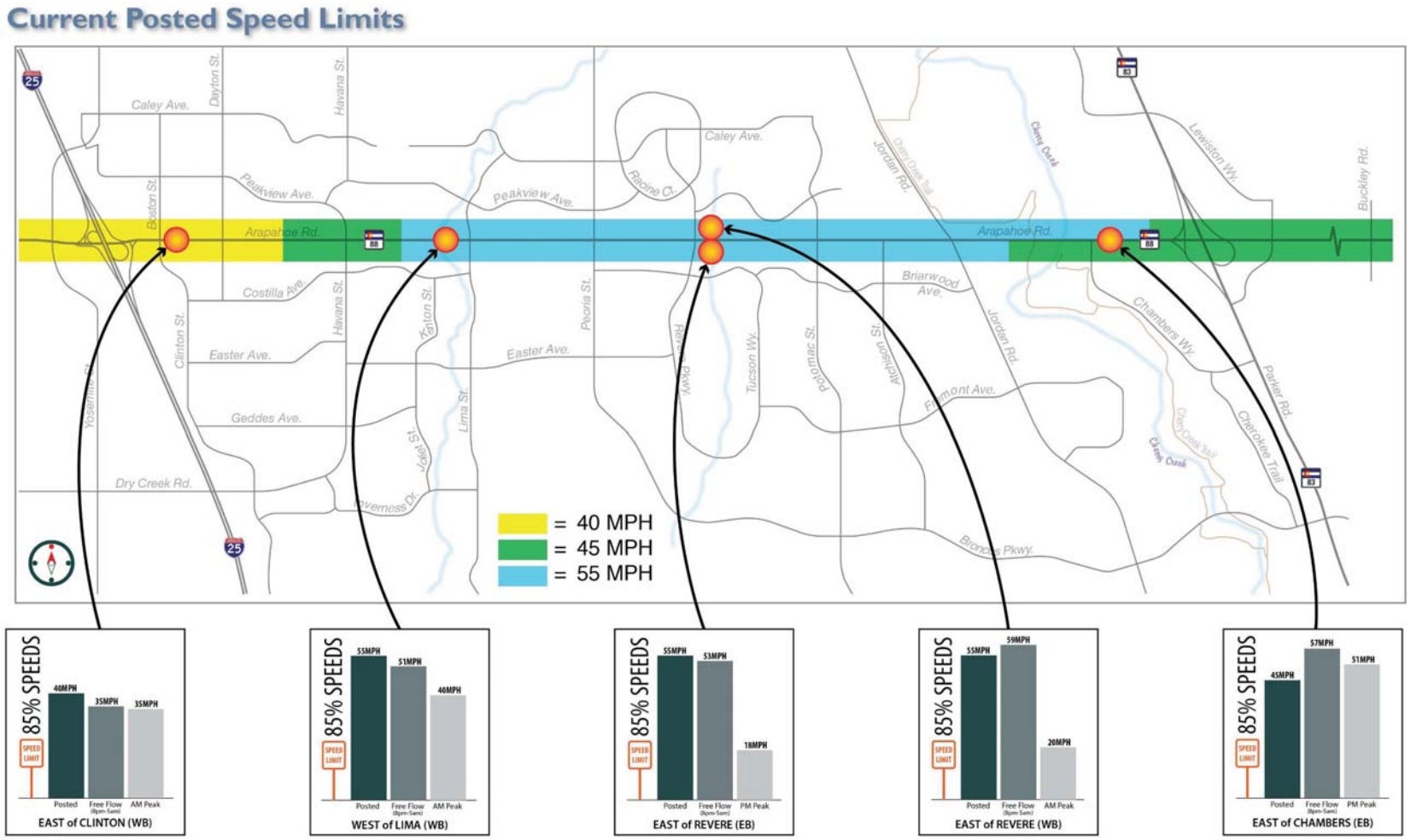
In addition to collection of travel time runs and origin-destination data, speed data was also collected at five locations in the Arapahoe Road corridor. **Figure 3-4** shows the locations and directions for the speed data collected. Eastbound speed data was collected east of Chambers and east of Revere. Westbound data was collected east of Clinton, east of Lima, and east of Revere. Each bar chart on **Figure 3-4** shows three types of data: posted speed limit, the 85th percentile speed for free flow conditions, and 85th percentile for the peak period. Free flow conditions typically occur between 8 PM and 5 AM and represent the speed drivers feel comfortable driving when they are not constrained by congestion. The 85th percentile speed is the speed at or below which 85 percent of all vehicles observed to travel under free-flowing conditions past a monitored point. Typically, highway jurisdictions use the 85th percentile speed to help set speed limits for roadways.

As shown, posted speed limits are lower on the west and east ends of the corridor as the density of intersections increase. At most locations, the free flow speed is very near the posted speed suggesting that speeding is not a rampant issue and that current posted speeds are set appropriately. The one location where this is not the case is in the eastbound direction east of Chambers, where the free flow speed is 12 miles per hour (MPH) greater than the posted speed. This suggests that speeding is an issue or that the speed limit is set too low.

The charts also show the impact of congestion on speed in the corridor. At the Revere location, the 85th percentile speed during the peak period is about 20 MPH, which is less than half the posted speed. West of Lima in the westbound direction, congestion seems to slow the 85th percentile speed to about 40 MPH.

The eastbound speed observation east of Chambers shows that the PM peak hour speeds are the lowest in the day, yet the 85th percentile speed at that time is still greater than the posted speed. While the left-most lane at this location often experiences slowing moving traffic, the other lanes, particularly the right turn lanes, serve faster moving traffic. It is likely the 85th percentile speed is much lower than observed as travel time runs and observations show queuing occurring west of Jordan Road. Currently eastbound vehicles are unable to achieve higher speeds in the PM peak due to congestion at the Jordan intersection. However, once these vehicles travel through the Jordan intersection, they are able to travel at higher speeds through the Chambers intersection before they are constrained by queuing from other intersections like Buckley Road.

Figure 3-4. Corridor Travel Speeds



3.2 Traffic Operations

Using the demand traffic volumes shown on **Figure 2-2**, existing intersection lane geometry, and existing signal timing, levels of service (LOS) were evaluated for individual turn movements and for the overall intersection. The analysis results in both level of service and the identification of critical movements, all of which are summarized on **Figure 3-5**. Critical movements were defined as turning movements where the volume was greater than 150 vehicles per hour (vph) and the volume to capacity ratio was greater than 1.0. Turning movements that meet these criteria are identified as critical turn movements on **Figure 3-5**, which suggests these movements experience queue failure relative to clearing in a single cycle and therefore are congested. Also, the Synchro queuing analysis will confirm this in noting the 95th percentile queues does not clear within two cycles.

In the AM peak hour, only the Buckley intersection shows an overall LOS F condition that is primarily due to the heavy southbound to westbound right turn movement. AM peak hour movements at other intersections also experience a poor LOS (but are not greater than 150 vph and were not identified as being critical in **Figure 3-5**), but the most notable intersection movements that are congested during the morning commute and impact adjacent intersections include:

- Westbound through movements at the Jordan and Chambers intersections
- Southbound right turn movement at the Parker Road southbound ramp terminal

During the PM peak hour, more intersections are showing a LOS F condition, suggesting a higher level of congestion during the evening commute. As with the AM peak hour, many of the intersections at a LOS F are at the east end of the corridor such as Jordan, Chambers, and the Parker ramp terminals. Key intersection movements meeting the critical movement criteria are:

- Eastbound through movements at the Peoria, Revere, Potomac, Jordan, and Chamber intersections
- Ramp terminal intersections at the Parker Interchange
- Eastbound left turn movement at the Buckley intersection

3.3 ITS Inventory

Table 3-2 shows the many ITS measures that have been implemented along Arapahoe Road. All of the study intersections contain ethernet and fiber optic communication. All traffic signals are equipped with emergency vehicle preemption (EVP). ITS technologies, including BlueTOAD, are present in the majority of the intersections.

Table 3-2. Existing Conditions Inventory

Arapahoe Road Existing Condtions Inventory (Traffic Signals, ITS, Comms)

	Intersection (CDOT O&M, unless otherwise noted)	Arapahoe Rd / Yosemite	Arapahoe Rd / SB I-25 Ramps	Arapahoe Rd / NB I-25 Ramps	Arapahoe Rd / Clinton/ Boston	Arapahoe Rd / Dayton St.	Arapahoe Rd / Havana St	Arapahoe Rd / Lima St	Arapahoe Rd / Peoria St	Arapahoe Rd / Revere Pkwy	Arapahoe Rd / Potomac St	Arapahoe Rd / Jordan Rd	Arapahoe Rd / Chambers Wy	Arapahoe Rd / US 85 SB Ramps	Arapahoe Rd / Lewiston Wy	Arapahoe Rd / Buckley Rd
Traffic Signals	O&M Jurisdiction	Greenwood Village	CDOT	CDOT	CDOT	CDOT	CDOT	CDOT	CDOT	CDOT	CDOT	CDOT	CDOT	CDOT	Aurora	Arap. County
	TS Cabinet: (# Doors or NEMA Type, Intersection Corner)	4	4	4	4	4	4	4	4	4	4	4	4	4	NEMA P	NEMA M
		SE	NE	SW	NW	NW	SW	SW	SE	SE	SE	NE	NE	SW	NW	NE
	TS Controller	E. Cobalt	I. ATC	I. ATC	I. ATC	I. ATC	I. ATC	I. ATC	I. ATC	I. ATC	I. ATC	I. ATC	I. ATC	I. ATC	Siemens	E. Cobalt?
	Uninteruptible Power Supply (UPS)	TBD	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	TBD	TBD
	Detection Type	Video	Loops	Loops	Loops	Loops	Video	Loops	Video	Video	Video	Video	Loops	Loops	Loops	Video
	Emergency Vehicle Preemption (EVP)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
	# Luminaires at TS (HPSV unless noted)	4 (LED)	4 (LED)	4 (LED)	4 (LED)	4	3	4	0	0	2	4	1	6	2	0
ITS	CCTV (Pan-Tilt-Zoom Camera)	IP (GV)	- (Fut IP)	- (Fut IP)	- (Fut IP)	Analog (Fut IP)	IP	IP	IP	IP	IP	IP	- (Fut IP)	IP	-	IP
	BlueTOAD	✓	✓	✓	✓	✓	✓	-	✓	-	✓	✓	✓	✓	-	-
	Blankout sign	-	-	-	-	SB	-	-	-	-	-	-	-	-	-	-
	Video Queue Detector (legacy TREX)	-	-	-	-	-	EB & WB	-	-	-	EB & WB	EB	-	-	-	-
Comm	Ethernet	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Fiber Optic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
	IP Radio	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-

3.4 Safety Analysis

3.4.1 Previous Recommendations

From previous studies, many improvements have been constructed within the study area. The recommendations included installing additional signal heads, construction exclusive right turn lanes and replacing span wire with mast arms. Additional signal heads were installed along Arapahoe Road at the intersections of Dayton Street, Lima Street and Jordan Road. Exclusive westbound right turn lanes were added on Dayton Street and Peoria Street, and along Havana Street in the eastbound direction. At the Lima Street and Arapahoe Road intersection, the outdated span wires have been replaced with mast arm. These improvements occurred between 2010 and 2012.

3.4.2 Overview of Crashes

Safety for the project area was assessed for the period between July 1, 2013, and June 30, 2016. **Figure 3-6** shows the breakdown of crash types of the 1,442 total crashes in the study area that averages to about 40 crashes per month. The majority of the crashes (63 percent) occurred at intersections. Rear end crashes are the most predominant crash type accounting for 60.5 percent of all crashes. Side-swipes account for 16.2 percent of crash types. Right-angle crashes, which typically are the approach turn and broadside types of crashes and are the most serious crash type, account for 16.3 percent of all crashes.

The data also shows that most crashes did not involve injuries or fatalities. Of the 1,442 recorded crashes, 79.5 percent (1,154) did not have injuries and the other remaining 20.5 percent (298) had injuries. There were no fatal crashes recorded in the crash data set analyzed for this study. Most crashes occur between 6 AM and 7 PM, and most occurred at speeds of less than 10 MPH. Since the primary crash type is low speed rear-end crashes it is likely that many of the crashes in the study area are related to congestion and traffic slowing/stopping.

Figure 3-5. 2017 Operations and Critical Movements with Existing Lane Geometry

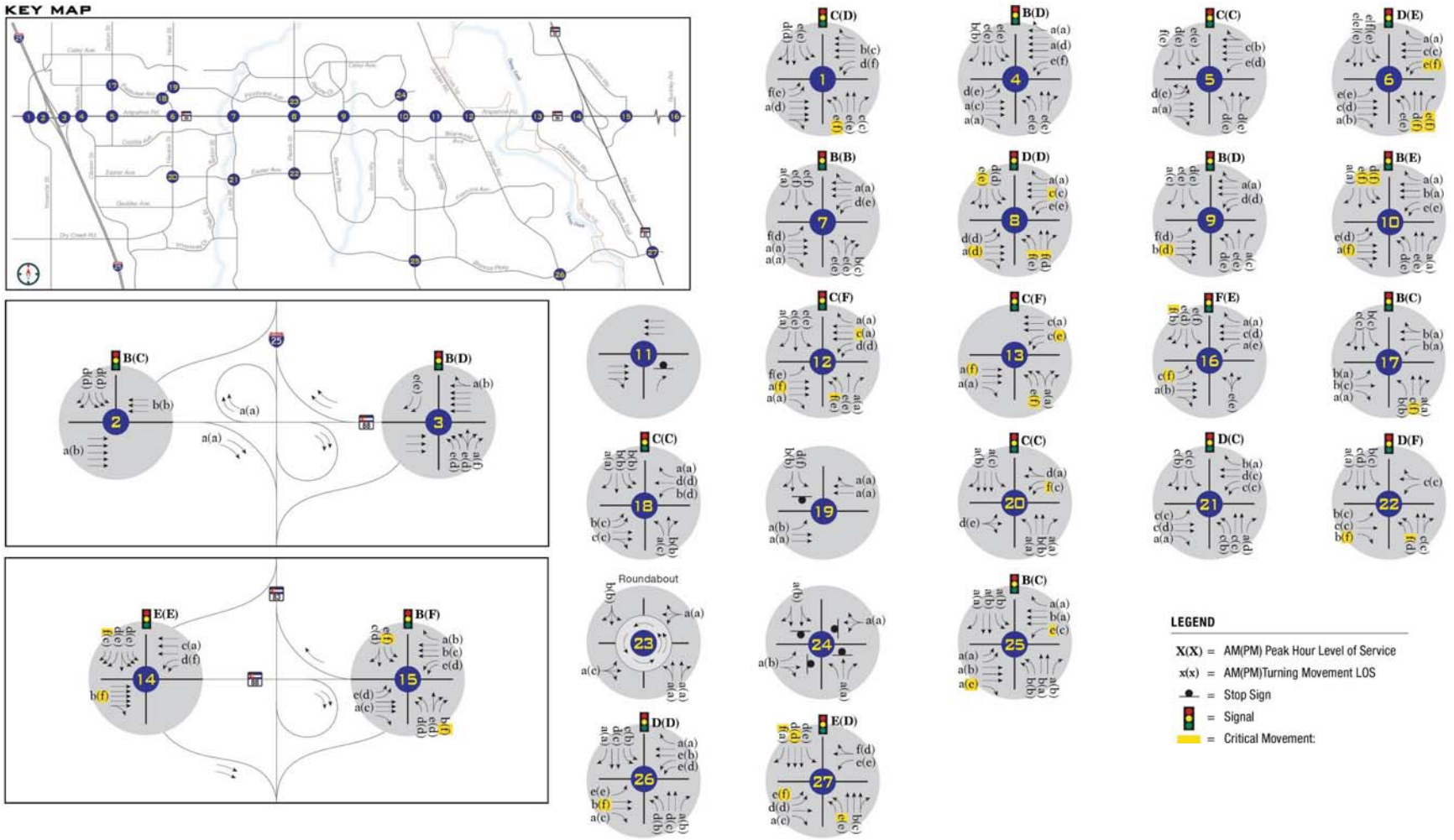
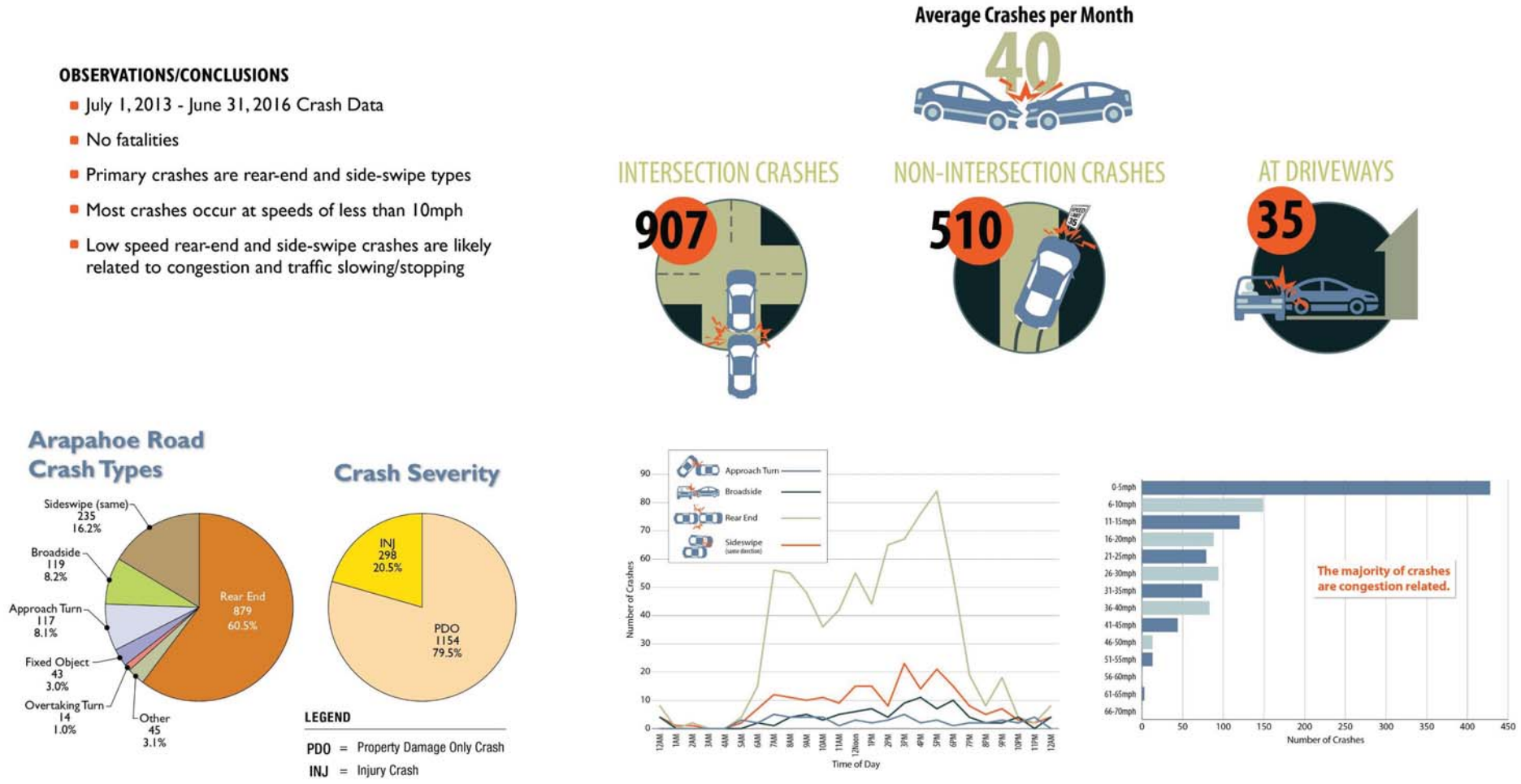


Figure 3-6. Crash Pattern General Statistics



3.4.3 Intersection Crashes

In addition to the Corridor-wide safety assessment, a level of service of safety (LOSS) analysis was also conducted for the eight signalized intersections in the study area. The assessment of the magnitude of safety problems at intersections has been refined through the use of Safety Performance Functions (SPFs). SPFs reflect the complex relationship between traffic exposure measured in Annual Average Daily Traffic (AADT) and crash counts for each intersection measured in accidents per year (APY). The SPF models provide an estimate of the normal or expected crash frequency and severity for a range of AADT among similar intersections.

This analysis uses two kinds of SPFs. The first one addresses the total number of crashes, and the second one looks only at crashes involving an injury or a fatality. Together, they allow an assessment of the magnitude of the safety problem from the frequency and severity standpoint.

Development of the SPF lends itself well to the conceptual formulation of the LOSS. The concept of LOSS uses qualitative measures that characterize safety of a roadway segment in reference to its expected frequency and severity. If the level of safety predicted by the SPF will represent a normal or an expected number of crashes at a specific level of AADT, then the degree of deviation from the norm can be stratified to represent specific levels of safety.

- LOSS I – Indicates low potential for crash reduction
- LOSS II – Indicates low to moderate potential for crash reduction
- LOSS III – Indicates moderate to high potential for crash reduction
- LOSS IV – Indicates high potential for crash reduction

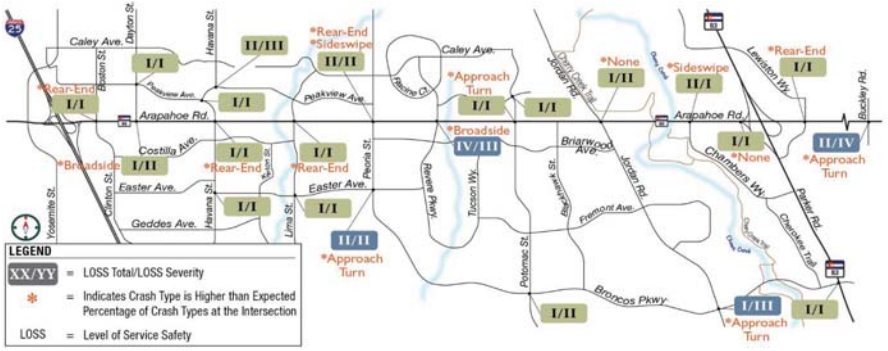
The safety performance was performed for the 33 study intersections with results shown on **Figure 3-7**. In general, most of the 33 study intersections are performing well from a safety performance perspective. The Arapahoe Road intersections with Revere and Buckley, the Broncos Parkway/Jordan Road intersection, and the Havana Street/ Peakview Avenue intersection had a safety performance of LOSS III or IV indicating these intersections have a crash frequency that is higher than expected. The Havana/Peakview intersection only had three crashes and thus was not further evaluated.

A review of crash types at each intersection showed that some intersections with a good safety performance had specific crash types that exceeded expectations. These intersections (and crash type) included:

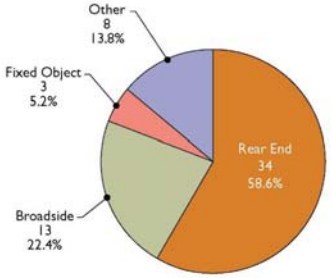
- Arapahoe Road/Clinton Street – Rear End
- Arapahoe Road/Dayton Street – Broadside
- Arapahoe Road/Havana – Rear End
- Arapahoe Road/Lima Street – Rear End
- Arapahoe Road/Peoria Street – Rear End and Side Swipe
- Arapahoe Road/Potomac – Approach Turn
- Arapahoe Road/Chambers – Sideswipe
- Arapahoe Road/Lewiston Way – Rear End
- Easter Avenue/Peoria – Approach Turn

The intersections where rear-end and swipe crashes are higher than expected are likely due to congestion on Arapahoe Road.

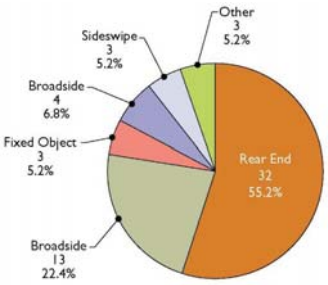
Figure 3-7. Crash Pattern Analysis at Intersections



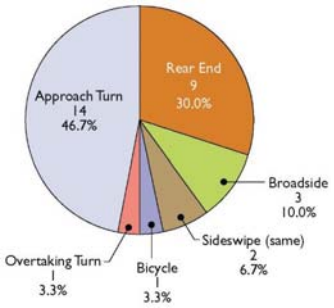
As discussed, the following four intersections, based on safety data and analysis, show crash patterns and frequencies that require further analysis.



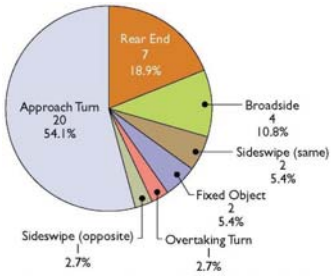
Arapahoe Road/Revere Parkway – The data shows the main issues at this intersection are broadside crashes. A total of 13 broadside crashes have occurred at this intersection, all have occurred between 3 PM and 7 PM and 12 of the 13 crashes were due to an eastbound vehicle running the red light. It is not clear why eastbound vehicles are running red lights. The issue may be related to queues backing up through the intersection. A potential solution is a longer yellow clearance interval and/or adding additional approach lanes (such as a right turn lane).



Arapahoe/Buckley Road – The issue at this intersection is eastbound left turn movements. The data shows 32 of the 58 crashes were approach turn crashes and 30 involved an eastbound left-turning vehicles. Typically, approach turn crashes are related to permissive left turn phasing. The County has taken steps to address the eastbound approach turn issue by restricting the eastbound left turn to protected only during the evening commute.



Broncos Parkway/Jordan Road – A total of 30 crashes were reported at this intersection with 16 resulting in injuries. The crash type most problematic at the intersection were approach turn crashes accounting for almost half of the crashes (14). Of the approach turn crashes, nine were in the westbound direction and five were the eastbound direction. The recommended solution is to implement protected only phasing for the westbound and eastbound left turn movements.



Peoria Street/Easter Avenue – A total of 37 crashes have occurred at this intersection and over half (20) of these crashes were approach turn related. Of the approach turn crashes, 18 involved a northbound left turn and two involved an eastbound left turn. The recommended solution is to implement protected only phasing for the northbound left turn movement.

In the later stages of the study, the unsignalized intersection of Arapahoe Road and Olathe Street (located 700 feet east of Lewiston Way) was identified as a potential safety concern. The specific pattern questioned pertains to the eastbound left turn movement from Arapahoe Road onto northbound Olathe Street. Traffic congestion along westbound Arapahoe Road often backs up to and beyond Olathe Street, thereby blocking this eastbound to northbound left turn movement. Four westbound lanes are provided along Arapahoe Road at this location; the curb-lane is a continuous right-turn acceleration/deceleration lane that extends from Buckley Road to Lewiston Way. Often, the curb-lane traffic will travel faster than the other three westbound lanes, and eastbound left turn movements have collided with westbound vehicles using the curb-lane; drivers in these two specific conflicting lanes are not able to see each other when traffic is backed up from Lewiston Way.

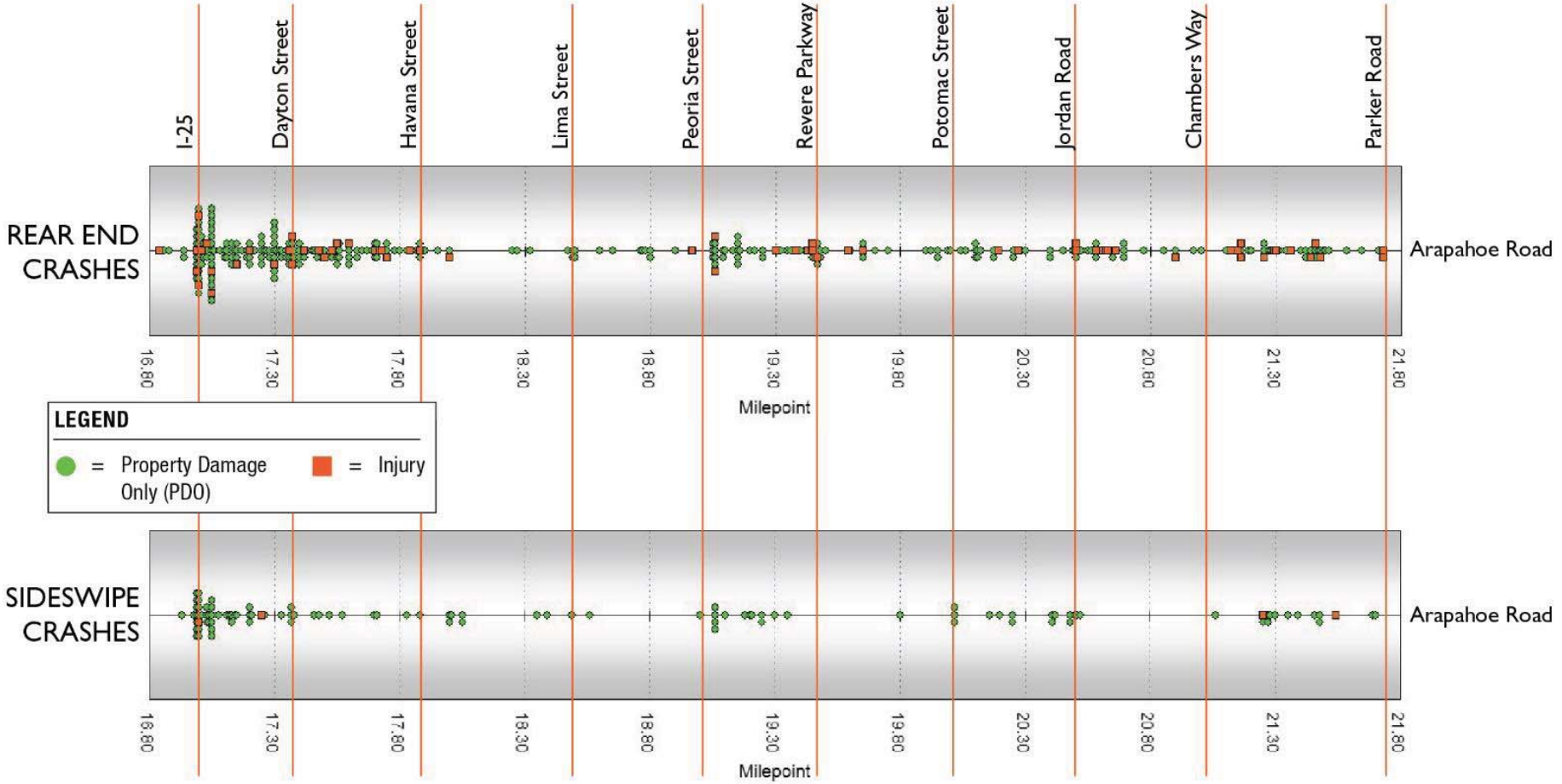
Crash data were researched at this intersection to gauge the issue. One of the crash patterns discovered at this intersection includes east-west rear-end collisions (caused by backups from Lewiston Way and Buckley Road), and the other includes the eastbound left and westbound through movements just as described above. This left "approach turn" crash has been occurring an average of once every 8 to 12 months. A deeper look at the data shows that these crashes have all occurred during the AM peak commuter period. This crash pattern can be improved by limiting the intersection to right-turn movements only, but doing so would significantly restrict the means of access into the residential area along Olathe Street. Provision of an east-west connecting road between Olathe Street and Lewiston Way would allow for the intersection to be converted to right-turns only once the residents have access to the Lewiston Way traffic signal. Such a connection should be pursued in conjunction with future development along the north side of Arapahoe Road

3.4.4 Non-Intersection Crashes

In urban corridors such as Arapahoe Road, non-intersection crashes tend to mostly consist of rear-end and side-swipe types of crashes. The data shows there are approximately 510 non-intersection related crashes and 71.2 percent (363) were rear-end types of crashes and 22.5 percent (115) were side-swipe crashes. The remaining non-intersection crashes (5.7 percent) were unclassified or fixed object crashes.

Figure 3-8 charts the Arapahoe Road non-intersection crashes by locations along the corridor. By displaying rear-end, side-swipe and driveway related crashes it is possible to determine concentrations of non-intersection crashes in the corridor. The data shows a high concentration of non-intersection crashes on the west end of the corridor. This pattern would be expected as there are a number of closely spaced signals and a number of driveway accesses between Yosemite and Havana. A smaller but notable concentration of non-intersection crashes appear at other locations along the corridor. A review of these non-intersection crashes suggest that these may be congested related as most crashes occurred during the peak periods.

Figure 3-8. Crash Pattern Analysis at Non-Intersections



4.0 Year 2040 Traffic Conditions

In this study, Year 2040 traffic projections were developed for all study intersections. These traffic projections were developed from the Denver Regional Council of Governments (DRCOG) forecasts for households and employment in the study area. This section details the household and employment forecasts, traffic growth percentages, 2040 peak hour traffic projections at intersections, and year 2040 operations at study intersections given current geometric laneage configurations.

4.1 Land Use Forecasts

DRCOG compiles existing data on households and employment regionwide. Using population forecasts provided by the State's Demographers Office and land use plans for local jurisdictions, DRCOG allocates household and employment growth among the regions of the metropolitan area and groups household and employment forecasts by Traffic Analysis Zones (TAZs). The DRCOG regional travel demand model allocates vehicle-trips between these zones and assigns these trips to the fiscally constrained roadway network to develop traffic forecasts for each link of road in the model's network. Therefore, the number of homes and jobs allocated to TAZs can significantly impact traffic projections for area roadways.

4.1.1 Household Forecasts

Figure 4-1 shows the TAZ structure for the study area. The figure also shows 2015 households and DRCOG's 2040 forecast for households for each TAZ. The darker shaded area represents high growth, whereas the lighter area represents areas of low or no growth. Since the study area primarily consists of commercial development, many TAZs do not have housing and so overall housing growth is not expected to be significant and is only expected in just a few TAZs.

Figure 4-2 shows the total household growth in the study area and within TAZs that area adjacent to Arapahoe Road corridor (distance from Arapahoe Road varies since the each TAZs size varies). In the study area TAZs, there are about 19,400 households. Most of these households exist east of Parker Road. By 2040, the number of households are expected to increase by about 25 percent in the study area with a significant amount of this growth occurring east of Parker Road. For those TAZs along the Arapahoe Road corridor, approximately 1,300 new households are forecasted, which would represent about a 19 percent increase.

Figure 4-1. Household TAZ Map

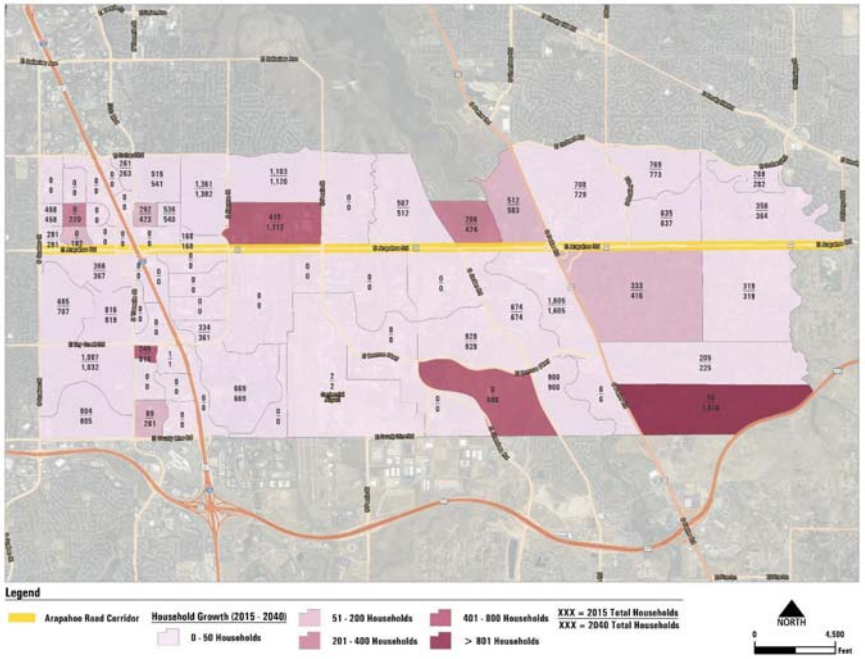
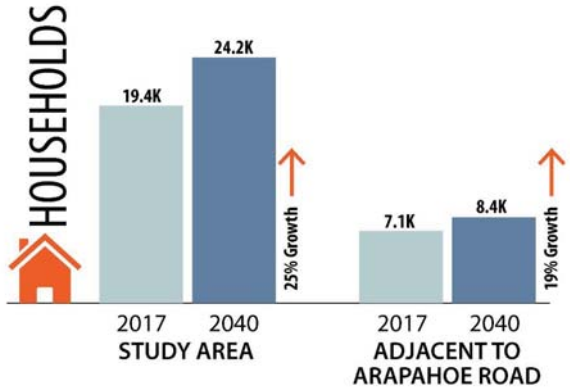


Figure 4-2. Household Forecasted Growth



4.1.2 Employment Forecasts

Figure 4-3 shows the 2015 employment and DRCOG's 2040 forecasts for employment for each study area TAZ. As with **Figure 4-2**, **Figure 4-3** also shows the data specific for TAZ's that are directly adjacent to Arapahoe Road. The employment forecasts and growth are expected to occur primarily in the commercial development areas of the corridor. The highest level of growth in expected to occur along the Broncos Parkway corridor. **Figure 4-4** shows that DRCOG is forecasting about 42,000 more jobs in the study area with about 18,000 of these jobs forecasted along the Broncos Parkway corridor. Along the Arapahoe Road corridor, forecasts show employment growth to be less than the study area as a whole, with about a 20 percent increase in employment while the entire study area employment is expected to grow by 45 percent.

Figure 4-3. Employment TAZ Map

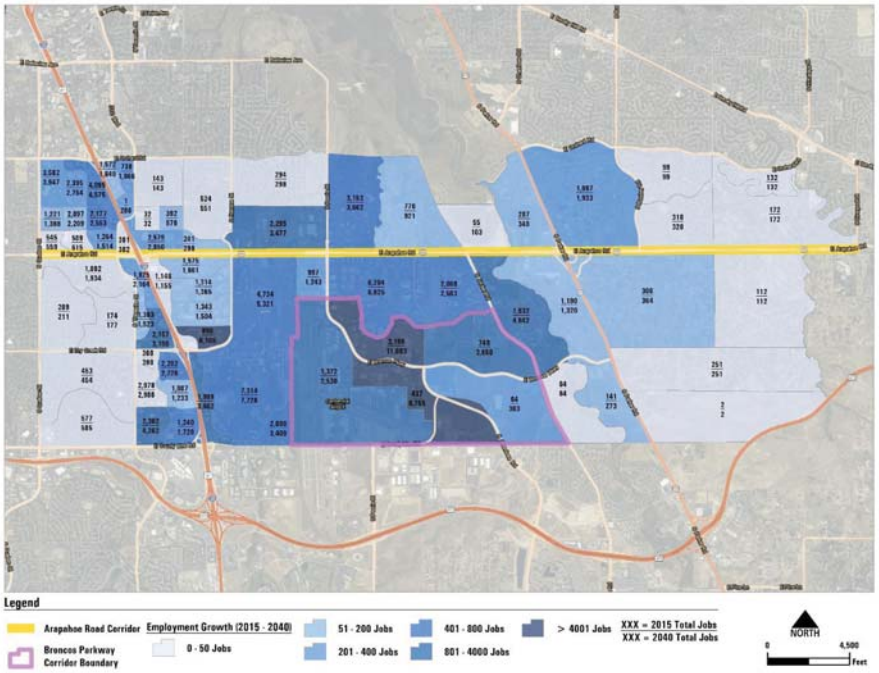
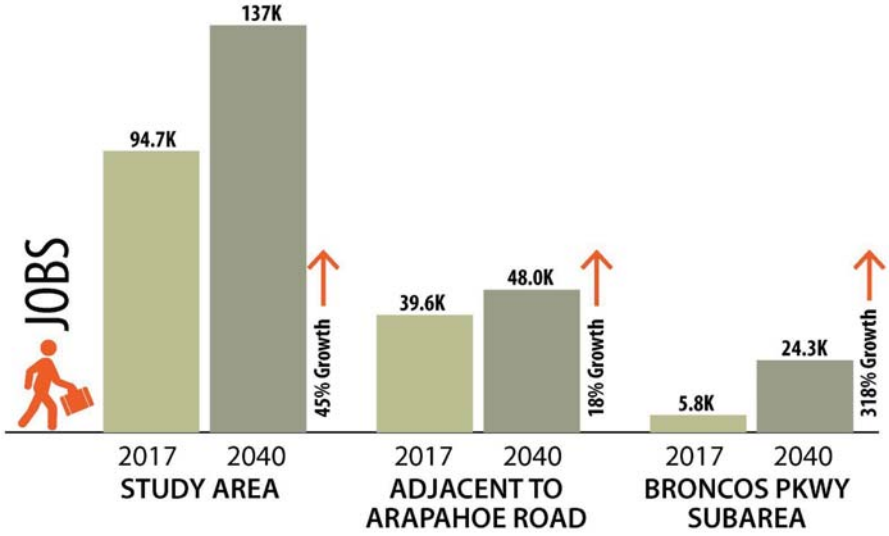


Figure 4-4. Employment Forecasted Growth

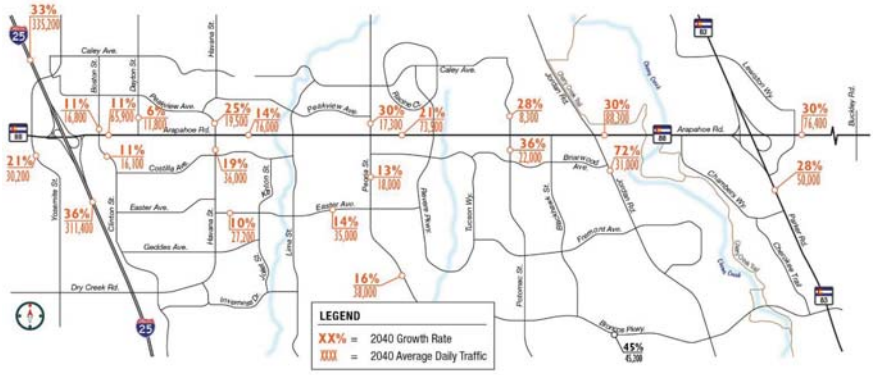


4.2 Growth Projections

The forecasts from the DRCOG travel demand model are heavily dependent on land use forecasts. In general, the study area, especially along the Arapahoe Road corridor, is relatively built out and therefore the growth in homes and jobs is modest. With this modest growth in land use, the percentage growth in traffic expected for year 2040 is modest as well.

For instance, after calibrating the travel demand model projections with existing conditions, the growth in traffic along Arapahoe Road ranges from about 11 percent to 30 percent as seen on **Figure 4-5**. The west end of the corridor is expected to experience traffic growth in the 5 to 15 percent range while the east end of the corridor is expected to see growth in 20 to 30 percent range. Growth is concentrated on the east end of the corridor with significant growth along Jordan Road.

Figure 4-5. Year 2040 Projected Daily Volumes & Growth



4.3 Projected Turning Movement Volumes

The growth forecasts from **Figure 4-5** were applied to existing demand turning movement volumes to develop Year 2040 peak hour turning movement forecasts shown on **Figure 4-6**. The recommended practices of National Cooperative Highway Research Program (NCHRP) 765 were used to develop peak hour forecasts for each turning movement. Adjustments were made to turning movement forecasts to ensure that traffic volumes were consistent between intersections and that overall traffic patterns observed in the existing peak hour flows were evident in the forecasted turning movements.

4.4 Projected Traffic Operations

Using the peak hour forecasts from **Figure 4-6**, peak hour levels of service were evaluated for Year 2040 using current lane geometry and optimized signal timing. The results are shown on **Figure 4-7** and as expected many intersections will have a LOS E or F condition in at least one of the peak periods. The figure also identifies critical movements at intersections which were defined as turn movements that are projected to be at or over capacity and have a volume of greater than 150 vph. The identification of these conditions suggest that these are movements where the queue fails to clear in a signal cycle and therefore these movements could be considered congested.

Based on the analysis, the following intersections in the study area have the most significant capacity issues:

- Arapahoe Road/Havana Street
- Arapahoe Road/Peoria Street
- Arapahoe Road/Potomac Street
- Arapahoe Road/Jordan Road
- Arapahoe Road/Parker Interchange southbound Ramp Terminal
- Arapahoe Road/Lewiston Street
- Arapahoe Road/Buckley Road
- Broncos Parkway/Potomac Street
- Broncos Parkway/Jordan Road
- Broncos Parkway/Parker Road

It should also be noted that the roundabout at the Peakview/Peoria intersection is expected to have capacity issues based on year 2040 traffic volumes.

Figure 4-6. Year 2040 Volumes

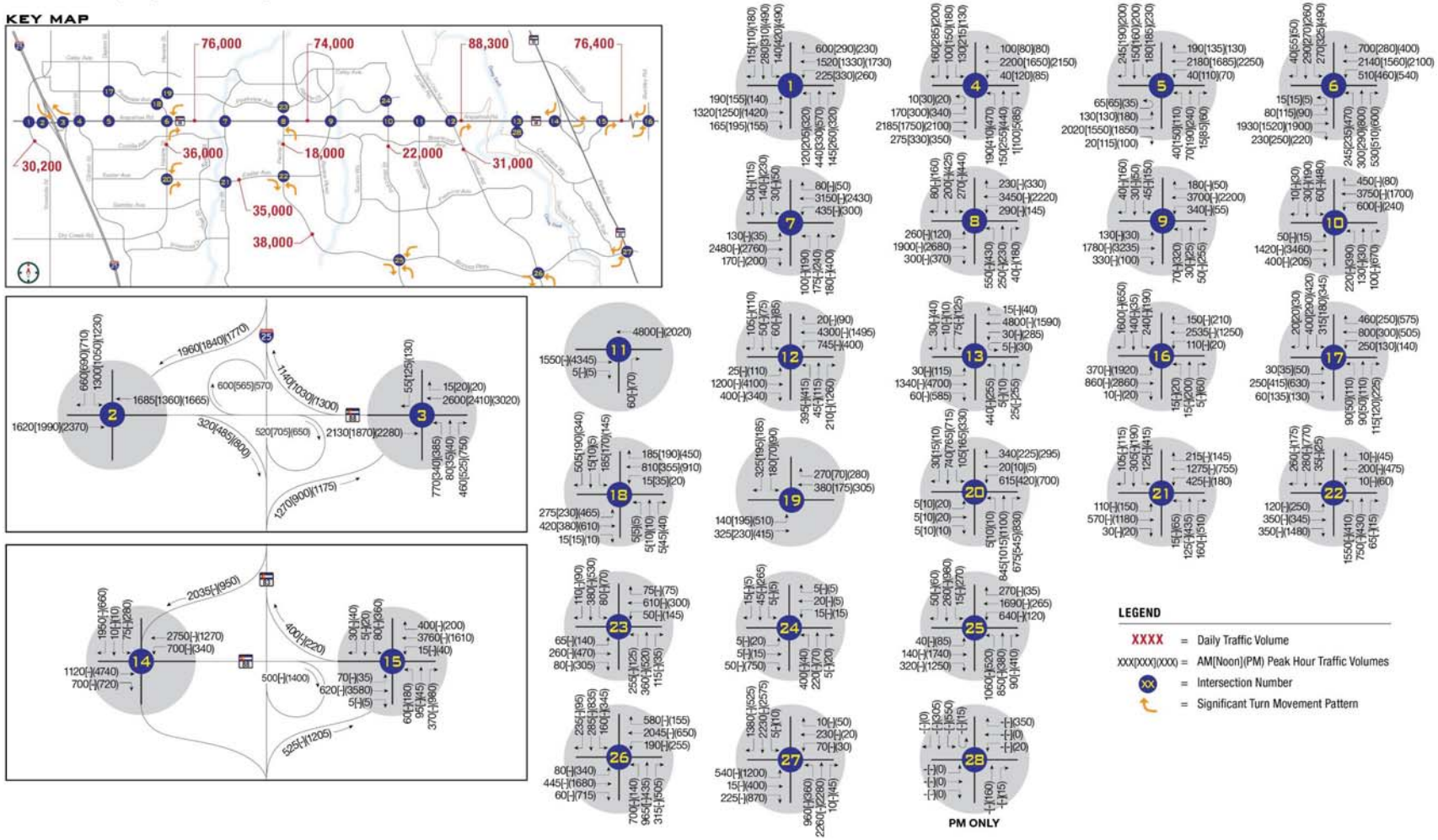
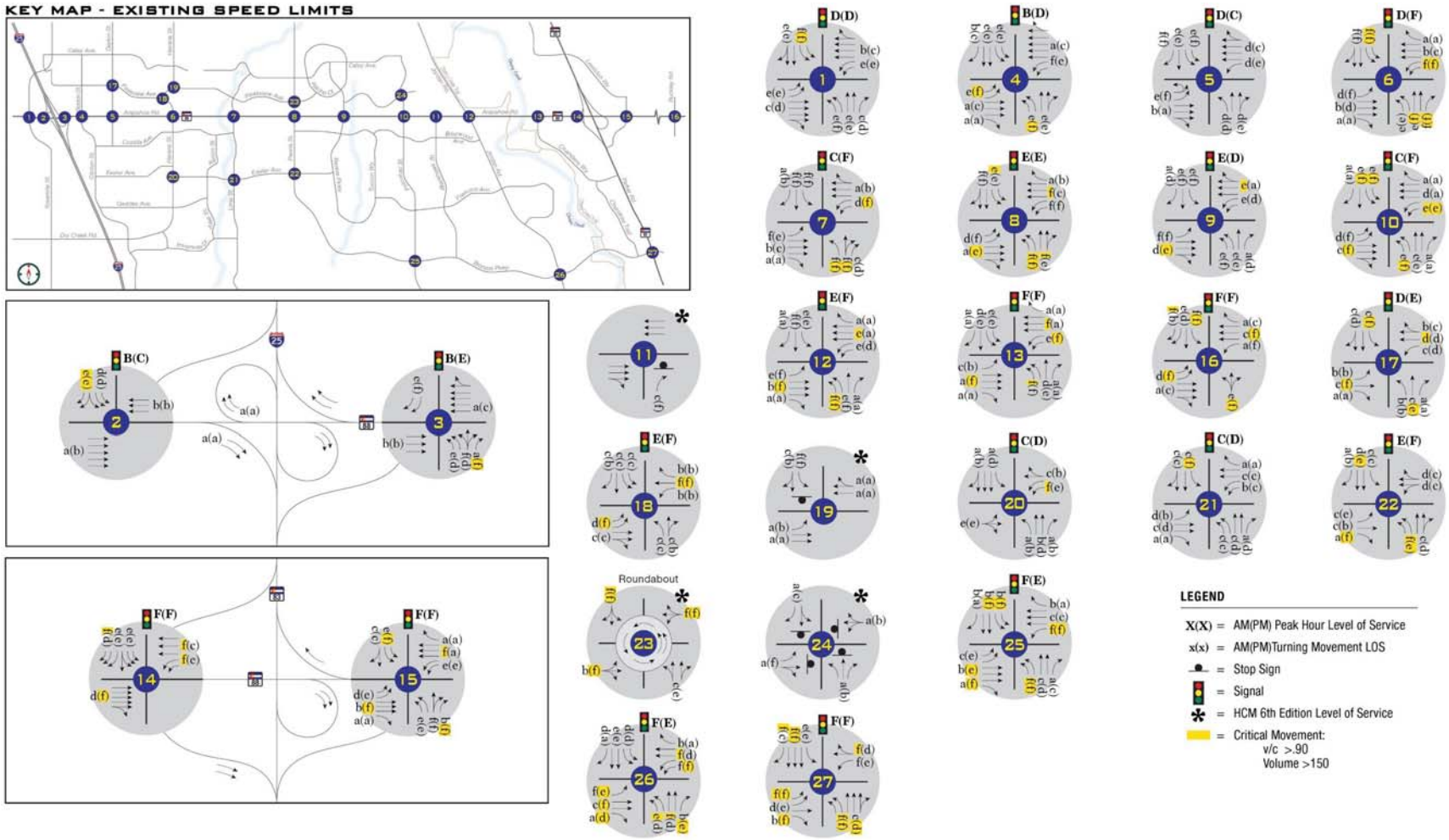


Figure 4-7. 2040 Synchro LOS by Intersection – Existing Lane Geometry



4.5 Key Transportation Issues

Based on the safety analysis, corridor features, future traffic projections, and intersections operational analysis of existing and projected traffic volumes, the key transportation issues in the study area can be grouped into three categories: Intersections, Safety, and Corridor-Wide Characteristics. These issues are summarized on **Figure 4-8** and briefly discussed in the following sections.

4.5.1 Intersections

The Arapahoe Road intersections with Jordan and Lewiston, and Buckley currently show capacity issues. In the AM peak period, the westbound traffic flow at the Jordan Road intersection has insufficient capacity, which causes traffic to queue back to the Parker Road interchange. Since the Jordan intersection constrains the westbound direction, traffic flows relatively well through intersections west of Jordan Road, or downstream of this constraint.

In the PM peak period, again the Jordan intersection constrains the eastbound traffic flow causing traffic to queue west to almost Revere Parkway. At the Lewiston intersection, the heavy northbound right-turn conflicts with the heavy eastbound through movement causing capacity issues at this intersection. Finally, at the Buckley intersection, PM commute operational issues are the result of the eastbound left turn volume that queues through the Parker Road interchange. This queueing also creates a lane utilization issue as vehicles begin to position to make the left turn at Buckley prior to the Parker Road interchange.

Although overall growth in traffic in the corridor is expected to be relatively modest, the increase in traffic will exasperate existing issues and create other operational issues at study intersections. Additional intersections with future capacity issues include the Arapahoe intersections with Havana, Peoria, Potomac, Chambers, and the southbound ramp terminal at the Parker Road interchange. Off Arapahoe Road intersections expected to experience operational issues include the following:

- Broncos Parkway/Potomac Street
- Broncos Parkway/Jordan Road
- Broncos Parkway/Parker Road
- Peakview Avenue/Peoria Street Roundabout
- Peakview Avenue/Dayton Street
- Peakview Avenue/Havana Street

All intersections, except those that were recently improved with the I-25 interchange reconstruction, are expected to have insufficient capacity to accommodate projected traffic volumes during the AM or PM or both peak periods.

The other observed intersection issue in the corridor is lane utilization. At both the west and east ends of the corridor and at a few dual left turn lane locations, the positioning to turn into a cross-street creates an imbalance in the use of upstream lanes. Locations observed with lane utilization issues are as follows:

- **West End at I-25 Interchange** – Observations shows that demand on Arapahoe Road heading to either northbound or southbound I-25, cause westbound vehicles to queue in the right most lanes of Arapahoe Road. This queue has been observed extending to Havana Street.
- **East End at Buckley Road Intersection** – In the PM peak hour, the eastbound to northbound left-turn volume has an estimated demand of 1,900 vph. This volume spills out of the existing dual left turn lane storage bays and extends westward in the left through lane as drivers position themselves in this lane to ultimately turn left at Buckley. Observations suggest that drivers start to position themselves in the left-through lane as far back as Chambers Way.
- **Westbound Dual Left Turn at Chamber Way** – These lanes during the PM peak hour show an imbalance in use as drivers position themselves in the inside lane to make an immediate left at the Briarwood intersection on Chambers Way to access the shopping center located in the southeast quadrant of the Arapahoe/Chambers intersection.

4.5.2 Safety

As discussed in a previous section, there is a significant number of crashes that occur yearly in the study area. However, most of these crashes are rear-end crashes and occur at low speeds and as a result the data shows that only about 20 percent of crashes involved an injury. So, the study area does not exhibit crash severity issues, but there are a few locations where crashes are higher than expected. **Figure 4-8** identifies crash issues in the study area which are summarized here:

- Arapahoe Road/Revere Parkway – Broadside crashes related to red light running
- Arapahoe Road/Buckley Road – Approach turn crashes with most being eastbound left against a westbound through. The County has recent implemented time of day protected only phasing to address this issue
- Broncos Parkway/Jordan Road – Approach turn crashes involving eastbound and westbound left turn movements
- Easter Avenue/Peoria Street – Approach turn crashes involving northbound left turn movement

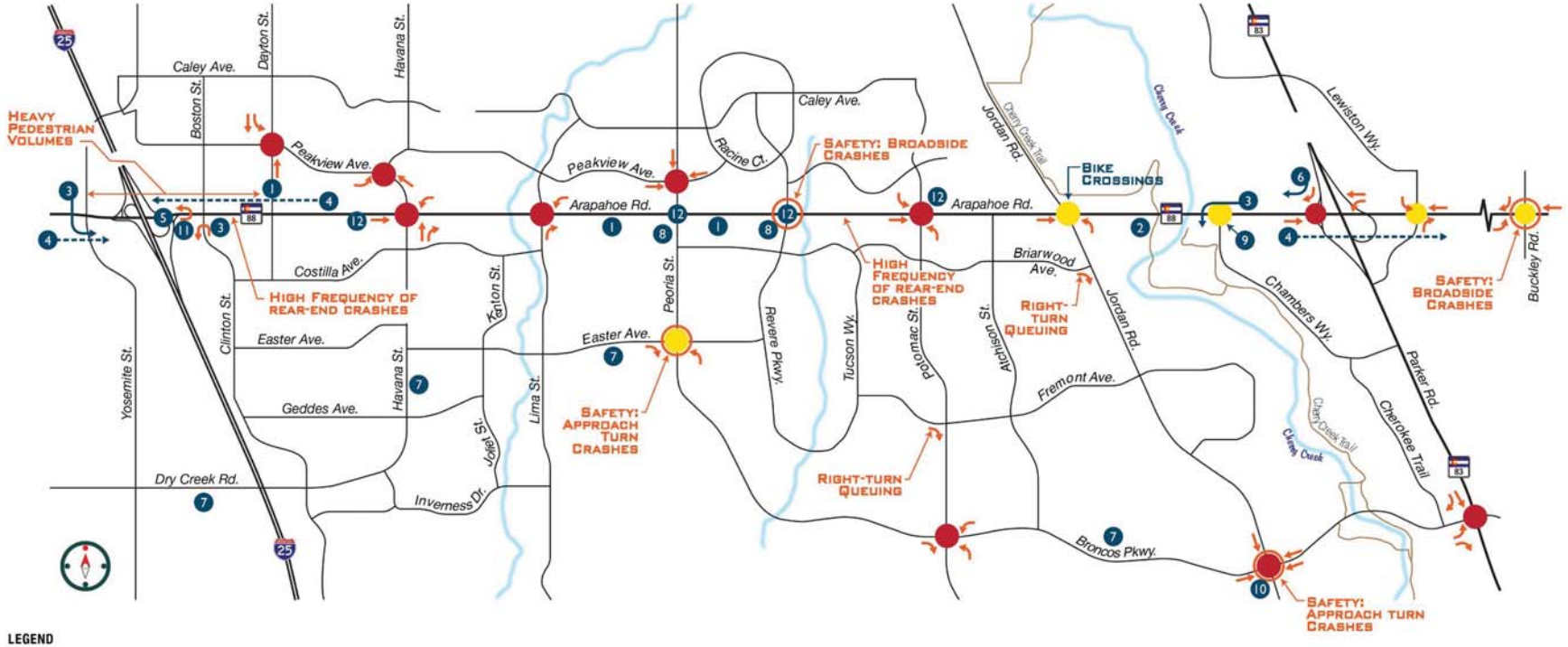
The crash data also shows a high frequency of rear end crashes at two locations in the corridor. East of the I-25 interchange to Havana Street shows a concentration of non-intersection rear end crashes likely related to the high concentration of intersections and access points in this section of the corridor. The other concentrated segment of non-intersection rear end crashes is between Revere and Potomac Street. The cause is difficult to determine but could likely be related to congestion or the lack of right turn lanes at intersections in this section.

4.5.3 Other Issues

Figure 4-8 describes other issues observed by the project team and mentioned by members of the Technical Working Group (TWG) and the public. These other issues include:

- Street lighting is missing at the Arapahoe intersections with Peoria, Revere, and Chambers
- At the Parker Road southbound off-ramp, traffic delays for drivers turning onto westbound Arapahoe Road triggers some drivers to cut through the shopping center to the northwest
- At the northbound I-25 off-ramp, the northbound left/through/right #3 lane reduces capacity for northbound right turn movements
- Missing speed limit signs in the study area
- At Broncos/Jordan intersection east/west turn movements have poor sight distance in conjunction with some permissive phasing
- U-turns conflict with overlap phasing at the Arapahoe Road intersection with Boston/Clinton
- Missing reduced speed limit sign eastbound between Jordan and Chambers
- Pedestrian volume between Dayton and I-25 creates conflicts and impacts signal timing and therefore capacity at the time of pedestrian use
- Jordan northbound through phasing does not give enough time to allow bikes to clear the intersection
- At the Arapahoe intersections with Havana, Peoria, Revere, Potomac, the opposing side-street left turns are physically tight due to median/stop bar adjacent to the respective receiving lanes
- Eastbound right turn queuing at the Briarwood and Jordan intersection
- Eastbound right turn queuing at the Fremont intersection with Potomac
- In general, corridor-wide the street signage font height is too small

Figure 4-8. Initial Summary of Transportation Issues



LEGEND

- ○ = Intersection Safety Issue
- ● = Existing Intersection Capacity Issue
- ● = Future Intersection Capacity Issue
- ↰ = Critical Movement Failure

1. Missing speed limit signage
2. EB speed drop, 55 to 45. Missing W3-5 sign like used WB past Havana.
3. Left turn lanes' lane utilization adversely affected by downstream demand
4. Through lanes' lane utilization adversely affected by downstream demand
5. Northbound left/thru/right in #3 lane reduces capacity for northbound right turn movements
6. Southbound right needs capacity
7. Lack of street name continuity
8. No street lighting at intersection
9. Only 1 luminaire
10. East/west left turn movements have poor sight distance and permissive/protected phasing
11. U-turns not prohibited but conflict with the right-turn overlap signal
12. Opposing side-street left turns tight due to median/stop bar adjacent to repective receiving lanes

CORRIDOR WIDE: Street name signage font height (unsignalized) (8"u & 6"L per MUTCD Guidance® 2D.43.05)

5.0 Potential Solutions

5.1 Range of Alternatives Considered

With a solid understanding of operations, safety, and other issues the project team, in working with the TWG, began to identify solutions in three areas: intersection operations, safety, and general study area enhancements. In general, the following solutions were deemed appropriate by the TWG for the project team to consider. Some solutions are shown in more than one category due to being able to address more than one issue.

Intersection Operations Improvement Options

- Interchanges
  - Single-point urban interchange (SPUI)
  - Tight Urban Interchange
- Innovative intersections
  - Displaced left turn intersections (also known as Continuous Flow Intersections)
  - Two-level intersections
  - Quadrant intersections
  - Through-Turn Intersections
- Right-turn lanes
- Additional through lanes
- Optimize signal progression
- Adaptive signals/controller technology
- Parallel roadway network of collectors
- Restripe to provide better lane utilization

Safety Improvement Options

- Optimize signal progression
- Consolidation or closure of accesses / intersections
- Right turn lanes
- Longer turn lanes
- Improve traffic signal zone detection/timings
- Restripe to optimize lane utilization
- Queue warning systems

Study Area Enhancements

- Signing upgrades
  - Missing speed limits
  - Street name signs
- Intersection lighting
- ITS Deployment
  - Adaptive signals/controller technology
  - Queue warning system
  - Traveler information system
  - Variable speed limits
- Multi-modal amenities
- Parallel street enhancement
- Access restrictions
- Median Treatments

Drawing from this menu of solutions, the project team and the TWG brainstormed and identified specific solutions to address issues and needs in the study area. Key takeaways from the brainstorming effort were:

- Consider displaced left turn intersections at congested intersections. The TWG recommended an evaluation of the displaced left turn option on Arapahoe Road at the Havana, Peoria, Potomac, Jordan and Buckley intersections.
- Consider grade separations at the intersections experiencing the highest levels of congestion. The TWG proposed an evaluation of a grade separations at the Jordan and Buckley intersections (which should assess the bottleneck removal impact on nearby intersections).
- Off Arapahoe Road, the TWG noted that displaced left turn intersections are planned at the Easter Avenue intersections with Havana and Peoria.
- The group recommended several new collector roads to enhance the local transportation system to help remove short trips off the Arapahoe Road corridor.
- Several recommendations were provided for low investments improvements such as new right turn lanes, converting right turn lanes to through-right turn lanes, and restriping intersection approaches to optimize lane configurations.
- Access modifications were recommended on the west end of the corridor between I-25 and Havana.
- The TWG also suggested major overarching corridor concepts such as reversible travel lanes, double decking the corridor, and eliminating left-turn and/or cross street turn movements (and allowing U-turns and parallel streets to accommodate the restricted movements).
- The group also brainstormed ITS solutions and other corridor enhancements, such as –
  - More deployment of variable message sign (VMS) for travel times and alerts
  - Time of day lane usage
  - In-pavement lighting to help drivers complete turn movements
  - Variable speed limits
  - Queue warning systems
  - Adaptive signal phasing
  - Additional advance street name signs for wayfinding

5.2 Goals and Objectives

During the brainstorming session with the TWG, there was also an opportunity for each member of the group to list their goals and objectives they would like accomplished in the corridor. In this effort, these goals and objectives were grouped by similar topics or ideas. These topics and ideas generally fit into the following six categories: City's Vision, Mobility, Safety, Technology, Multi-Modal, and Implementation. Within each category are several action items to achieve these goals and objectives with projects in the study area.

City Vision: Develop solutions that align with the City's Vision for future economic development, land use, and corridor function along Arapahoe Road.

- Identify needed connections and deficiencies for each mode of transportation to provide access to existing and future development
- Limit significant impacts to be contained within existing right-of-way
- Limit major changes to existing access
- Review solutions for consistency with the City of Centennial's Transportation and Land Use Plans

Mobility: Provide more mobility along SH 88 to accommodate through traffic on Arapahoe Road.

- Reduce delay at key intersections along the corridor
- Improve lane utilization especially at the east and west ends of the corridor
- Increase operational efficiency along the corridor

Safety: Develop a corridor with a high safety performance.

- Mitigate existing safety issues at intersections in the study area
- Recommend access modifications to reduce conflict points
- Use geometric changes to reduce congested related crashes

Technology: Leverage technology to improve operational efficiency.

- Use existing ITS infrastructure to provide the traveler with information
- Improve travel time reliability in the corridor
- Use systems to reduce congested related crashes
- Consider future technologies that could improve operational efficiency
- Implement signal control changes

Multi-Modal: Improve and expand multi-modal facilities in the study area

- Consider locations for the grade separation of bike and pedestrian facilities
- Identify opportunities to improve bus operations in the Arapahoe corridor
- Incorporate recommended bike and pedestrian facilities from the City's transportation and trails plan
- Consider impacts and feasibility of a Bus Rapid Transit (BRT) system on Arapahoe Road

Implementation: Develop and prioritize solutions that are reasonably implementable

- Develop cost estimates for solutions requiring significant infrastructure improvements
- Prioritize solutions to address immediate and future needs
- Develop a phased approach to implementation

The purpose of these six goal and objective categories is two-fold. First, these were used by the project team to help develop and refine solutions that essentially began with the brainstorming session. The following sections will present these solutions. The second use of the goals and objectives is to serve as screening criteria to evaluate solutions and determine whether solutions should be evaluated in more detail or dropped from further consideration.

5.3 Initial Alternatives Development and Screening

The initial development of alternatives consisted of 57 solutions, which are depicted on **Figure 5-1**. These 57 solutions were grouped into two categories: stand-alone solutions and complementary solutions, and then they were further subdivided into groups. Each specific solution was evaluated using the goals and objectives discussed in the previous section. Since the initial screening effort is a high-level evaluation, each criterion was represented with a single question as follows:

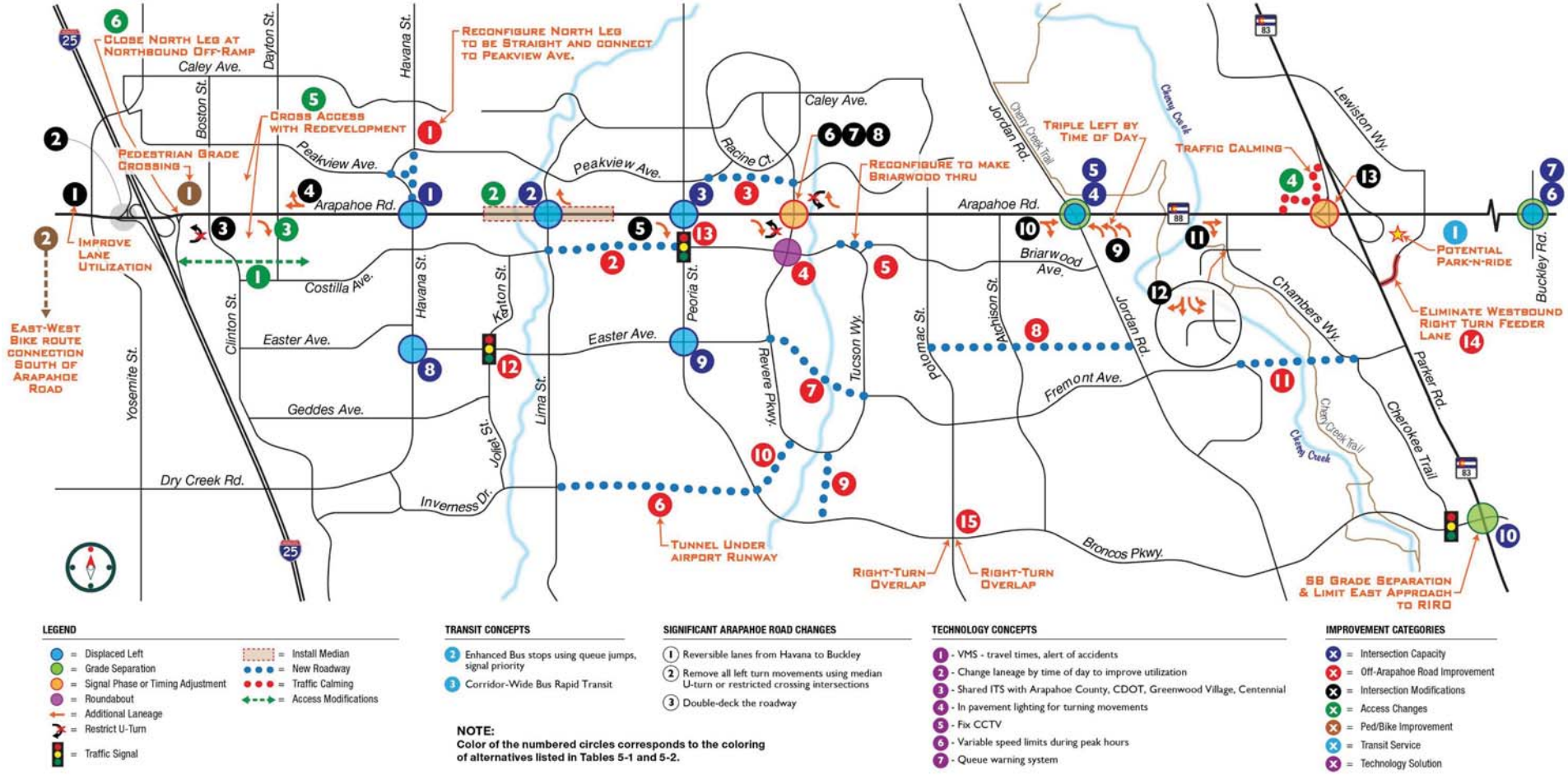
- **City Vision**: Does the solution align with the City's (and other stakeholder's) Vision for future economic development, land use, and corridor function along Arapahoe Road?
- **Mobility**: Does the solution provide more mobility in terms of moving more through traffic along the Arapahoe Road corridor?
- **Safety**: Does the solution provide enhanced safety in the corridor?
- **Technology**: Does the solution leverage technology to improve operational efficiency in the corridor?
- **Multi-modal**: Does the solution improve and expand bike, pedestrian, and/or transit facilities in the study area?
- **Implementation**: is the solution reasonably implementable within a reasonable time frame?

These criteria were applied to each solution option to make an initial assessment of whether the solution should be carried forward for further refinement and evaluation. A summary of the results of this initial screening effort are presented in the following section, while the full screening effort is available in **Appendix A – Initial Alternative Screening.**

5.3.1 Stand-alone Solutions

Stand-alone solutions were defined as solutions that could be implemented independent of any other solution option and would primarily address mobility and safety needs in the corridor. These solutions would also be consistent with the City's and other stakeholder's vision for the corridor and would be reasonably implementable. In general, stand-alone solutions were either major capacity upgrades in the Arapahoe Road corridor or were minor intersection improvements that would specifically address existing safety or operational issues. **Table 5-1** lists these standalone solutions, which were grouped into three categories: intersection capacity improvements, intersection modifications, and corridor-wide concepts. The coloring and number scheme in the table corresponds to the numbers and colors on **Figure 5-1**.

Figure 5-1. Transportation Options for Consideration



LEGEND

- Displaced Left
- Grade Separation
- Signal Phase or Timing Adjustment
- Roundabout
- Additional Laneage
- Restrict U-Turn
- Traffic Signal
- Install Median
- New Roadway
- Traffic Calming
- Access Modifications

TRANSIT CONCEPTS

2. Enhanced Bus stops using queue jumps, signal priority
3. Corridor-Wide Bus Rapid Transit

SIGNIFICANT ARAPAHOE ROAD CHANGES

1. Reversible lanes from Havana to Buckley
2. Remove all left turn movements using median U-turn or restricted crossing intersections
3. Double-deck the roadway

NOTE:
Color of the numbered circles corresponds to the coloring of alternatives listed in Tables 5-1 and 5-2.

TECHNOLOGY CONCEPTS

1. VMS - travel times, alert of accidents
2. Change laneage by time of day to improve utilization
3. Shared ITS with Arapahoe County, CDOT, Greenwood Village, Centennial
4. In pavement lighting for turning movements
5. Fix CCTV
6. Variable speed limits during peak hours
7. Queue warning system

IMPROVEMENT CATEGORIES

- Intersection Capacity
- Off-Arapahoe Road Improvement
- Intersection Modifications
- Access Changes
- Ped/Bike Improvement
- Transit Service
- Technology Solution

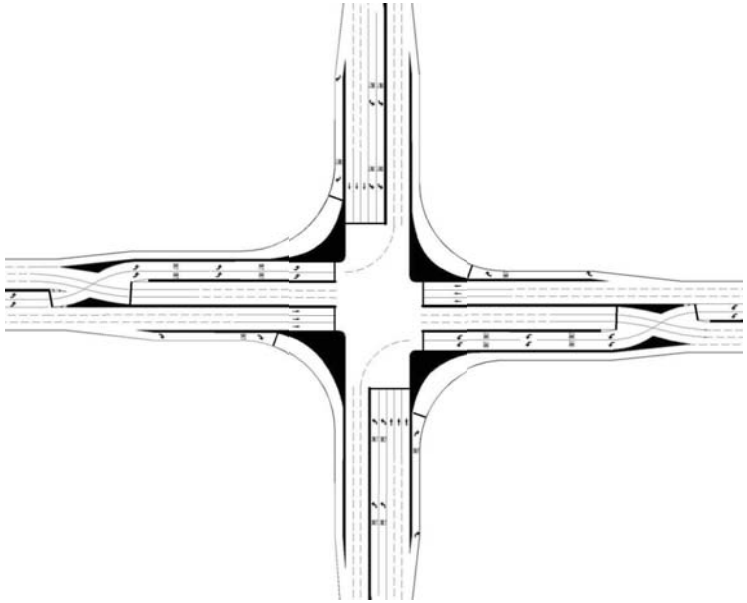
Table 5-1. Level 1 Screening of Stand-alone Alternatives

Solution Description and Location and Recommendation to Retain or Drop					Key Criteria Met if Retained or Not Met if Dropped
Intersection Capacity	1	Havana	Displaced Left Turn	Retain	Mobility
	2	Lima	Displaced Left Turn	Retain	Mobility
	3	Peoria	Displaced Left Turn	Retain	Mobility
	4	Jordan	Displaced Left Turn	Retain	Mobility
	5		Grade separation	Retain	Mobility
	6	Buckley	Displaced Left Turn	Retain	Mobility
	7		Grade separation	Retain	Mobility
	8	Havana / Easter	Displaced Left Turn	Retain	Mobility
	9	Peoria/Easter	Displaced Left Turn	Retain	Mobility
	10	Parker/Broncos	Grade separation	Retain	Mobility
Intersection Modifications	1	Yosemite	Add signing to improve southbound left turn lane utilization	Retain	Mobility, Implementation
	2	I-25 Interchange	Add signing to improve westbound to northbound dual right lane utilization	Retain	Mobility, Implementation
	3	Boston / Clinton	Restrict U-turns or add blank out signs to restrict during specific phases	Retain	Safety, Implementation
	4	Dayton	Combine westbound turn with westbound right	Retain	Mobility, Implementation*
	5	Peoria	Add eastbound right turn lane	Retain	Safety, Implementation
	6	Revere	Add right turn lanes	Retain	Safety, Implementation
	7		Adjust signal timing (to address crashes)	Retain	Safety, Implementation
	8		Restrict U-turns or add blank out signs to restrict during specific phases	Retain	Safety, Implementation
	9	Jordan	Add triple northbound left turn by TOD	Retain	Mobility, Implementation
	10		Combine eastbound through lane and eastbound right turn lane	Retain	Mobility, Implementation
	11	Chambers	Combine eastbound through lane and eastbound right turn lane	Retain	Mobility, Implementation
	12	Briarwood / Retail Access	Add southbound Dual left to improve utilization of westbound left turn lanes at Chambers/Arapahoe Intersection	Retain	Mobility, Implementation
	13	Southbound Ramp Terminal	Overlap phase for southbound right	Retain	Mobility, Implementation*
Other	1	Arapahoe Road Corridor Wide Changes	Reversible Lanes, Havana to Buckley	Drop	Implementation
	2		Remove left turn movements using median U-turn or restricted crossing intersections	Drop	City Vision
	3		Double deck the roadway	Drop	Implementation, City Vision

*Was completed during course of this study.

As shown in **Table 5-1**, the evaluation of solutions that focused on increasing intersection capacity and on minor intersection modifications were retained in the Level 1 screening effort. For example, displaced left turn (**Figure 5-2**) intersections were retained as they would enhance intersection capacity while being consistent with the City's Vision for corridor improvements. All intersection modifications were retained because they could enhance mobility or improve safety with the additional benefit of being implementable as these are low-cost solutions compared to intersection capacity improvements.

Figure 5-2. Displace Left Turn Intersection Diagrammatic



Intersection configurations that would impact access or result in significant corridor-wide changes to operations were recommended to not be further considered. Reversible lanes were dropped because the directional distribution during the peak periods on the west end of the corridor are balanced and, therefore, not compatible to reversing the flow of a traffic lane in the peak direction (since there is not a strong peak direction). Separating eastbound and westbound traffic flows by elevating one direction was also dropped due to challenges related to cost, impacts, and implementation. Further, innovative intersections such as those shown on **Figure 5-3** and **Figure 5-4** that restrict left-turn movements and/or cross street movements were dropped as these were not consistent with the City's Vision in limiting significant impacts to the existing right-of-way, to encourage economic development by not significantly altering current access, and to be consistent with the City's Transportation and Land Use Plans.

Figure 5-3. Median U-Turn Intersection Diagrammatic

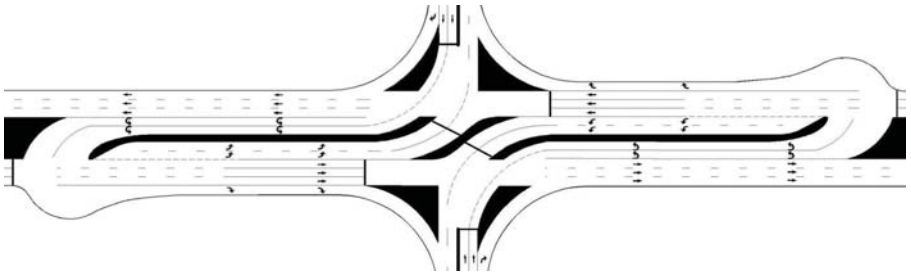
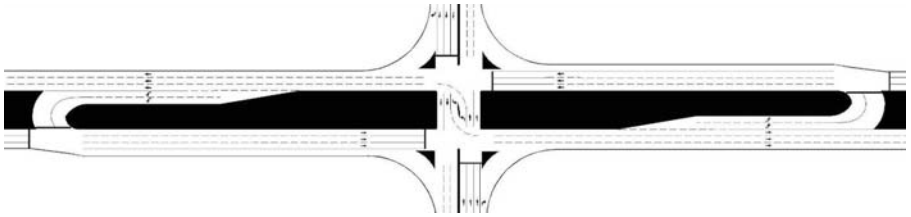


Figure 5-4. Restricted Crossing U-Turn Intersection Diagrammatic



5.3.2 Complementary Corridor Enhancements

In addition to the stand-alone solutions along the Arapahoe Road corridor, the TWG and the project team identified other solutions known as complementary solutions. A complementary solution is an improvement, a concept, or an idea that would provide some benefit to the study area but would not directly improve operations and safety at intersections in the Arapahoe Road corridor. These solutions could also be used to complement stand-alone solutions.

Complementary solutions were categorized as follows and are listed in **Table 5-2:**

- Study area improvements along parallel routes to Arapahoe Road
- Access management changes in the corridor
- Technology implementation
- Multi-modal accessibility

Table 5-2. Level 1 Screening of Complementary Enhancements

Solution Description and Location and Recommendation to Retain or Drop					Key Criteria Met if Retained or Not Met if Dropped
Study Area Intersection and Roadway Improvements	1	Havana / Peakview	Reconfigure north leg and connect to Peakview	Retain	City Vision
	2	Briarwood	New roadway between Lima and Peoria	Retain	City Vision, Implementation
	3	Peakview	Reconfigure Peakview and Racine	Retain	City Vision, Implementation
	4	Revere / Briarwood	Roundabout	Retain	City Vision, Implementation
	5	Briarwood / Tucson	Reconfigure intersection to make Briarwood through	Retain	City Vision, Implementation
	6	Broncos	Extend under airport runway	Drop	Implementation
	7	Easter	Extend between Revere and Tucson	Drop	City Vision
	8	New Connector	New roadway Potomac to Jordan	Drop	City Vision
	9	New Connector	New roadway Revere to Broncos	Drop	City Vision
	10	New Connector	New roadway Revere to Broncos	Drop	City Vision
	11	Fremont	New connection across Cherry Creek	Drop	City Vision, Implementation
	12	Easter / Kenton	Signalize	Retain	Mobility, Implementation
	13	Briarwood / Peoria	Signalize	Retain	Mobility, Implementation
	14	Parker Int.	Eliminate right turn feeder lane	Drop	Implementation
Access Changes	1	I-25 to Havana	Explore additional access control strategies	Retain	Safety, Implementation
	2	Lima	Provide raised median	Retain	Safety, Implementation
	3	West of Dayton	Add EBR at driveway west of Dayton	Retain	Safety, Implementation
	4	Parker Int.	Traffic calming through shopping center NW of Parker	Drop	Implementation
	5	I-25 to Havana	Require cross property access with redevelopment	Retain	City Vision, Safety
	6	I-25 Int.	Close access across from I-25 northbound off-ramp	Drop	Implementation
Technology	1	VMS - travel times, alert of incidents		Retain	Technology
	2	Change laneage by TOD to improve utilization		Retain	Technology
	3	Shared ITS with Arapahoe County, CDOT, Greenwood Village, Centennial		Retain	Technology
	4	In pavement lighting for turning movements		Retain	Technology
	5	Closed Circuit TV		Retain	Technology
	6	Variable speed limits at peak times		Retain	Technology
	7	Queue warning system		Retain	Technology
Multimodal Accessibility	1	Transit Service	Park-n-Ride at Parker Interchange	Drop	Implementation
	2		Bus service enhancements including queue jumps, signal priority	Retain	Multimodal
	3		Corridor Wide Bus Rapid Transit System	Retain	Multimodal
	1	Ped-Bike	Pedestrian grade separated between I-25 and Boston	Retain	Multimodal
	2		Explore E/W bike route south of Arapahoe	Retain	Multimodal

Through the initial evaluation process, many complementary solutions were carried forward. Solutions dropped were mainly proposed new connections. The tunnel under the Centennial Airport runway was dropped because previous study in the City of Centennial Transportation Plan showed high cost with little impact in attracting trips off Arapahoe Road. Other connections that were not retained were due to impacts to existing development. Solutions #4 and #6 in Access Changes were dropped as these would impact access to existing commercial developments making implementation difficult. The park-n-ride at the Parker interchange was dropped as comments made at a Working Group meeting indicated that this was found to not be a preferred location and it was not included in the DRCOG's 2040 Metro Vision Regional Transportation Plan.

5.4 Study Area Low Investment Improvements

After the initial screening of solutions, the project team used the results to develop a group of low investment improvements that could improve operations and safety in the corridor. Where applicable, the project team evaluated these improvements with respect to their reduction in delay and potential reduction in crashes and compared these benefits to overall costs to determine the effectiveness of these low-investment solutions. This section evaluates and describes these potential improvements.

5.4.1 Overview of Alternative Development ("Low Hanging Fruit")

Figure 5-6 gives a graphical representation of proposed low investment improvements. **Appendix B** provides conceptual designs of the numbered improvements. As shown, many of the improvements occur at intersections and consist of minor geometric changes to either reduce delay or to reduce crashes. Geometric changes include new right turn lanes, the restriping of approach lanes, and the conversion of existing right turn lanes to through/right turn lanes to provide some additional intersection capacity and to improve lane utilization. Other improvements include the restriping of Arapahoe Road lanes to create a left-turn trap lane and an option lane for eastbound left turn movements at the Buckley intersection. Most of these types of geometric changes were analyzed using Synchro software and VISSIM, in a few cases, to determine the reduction in delay.

Other low investment recommendations include:

- Raised median near the Lima intersection
- Signalization or roundabouts at stop-controlled intersections (off of Arapahoe Road)
- Additional advanced street name signing to assist with wayfinding

5.4.2 Methodology for Analysis

A benefit-cost evaluation was conducted for low-investment options in which it was practical to conduct an operational analysis. For example, it is not practical to determine the reduction in delay using Synchro or VISSIM for a raised median or for the installation of advanced street name signs. In addition, benefit-cost analyses were not conducted where data was not available. This included roundabout or traffic signal proposals at intersections in the study area where traffic data was not collected and would have required a before and after operational analysis.

The benefit-cost analysis includes the determination of project implementation cost and the monetization of project benefits based on reduced delay and on reduced crashes today and into the future. The monetized project benefits are then used with the project's implementation cost to determine a benefit-cost ratio, which serves as a tool in prioritizing improvements in the corridor.

Figure 5-5 shows the basic methodology for determining the delay savings associated with an option. Intersection delay is determined using optimized signal timing for 2017 and 2040 conditions with and without the proposed improvement. The delay savings between 2017 and 2040 is the **"Area"** shown in **Figure 5-5**, and this delay savings is converted to vehicle hours of travel (VHT) saved in the peak hour.

The VHT savings were annualized using 260 commute days per year. The annualized savings were then monetized using the value of people's time ($14.10) and the number of people per car (1.39). These two values are used in the Federal Highway Administration (FHWA) guidance on preparing benefit-cost analyses for Better Utilizing Investments to Leverage Development (BUILD) grants.

If the improvement has the potential to reduce the number of crashes, then monetized values for the reduction in property and injury crashes were also calculated. Values for crashes can vary, and for purposes of this study property only crashes were valued at $10,200, and injury crashes were valued at $96,100.

Low cost investments were evaluated for their benefits to corridor operations and safety at 17 intersections and along five roadway segments in the study area. These investments are not intended to solve corridor wide transportation issues but provide some improvement in operations and safety at a relatively low cost. **Table 5-3** and **Table 5-4** list low investment options that are diagrammatically illustrated in **Figure 5-6** and conceptually shown in CAD drawings provided in **Appendix B**. The tables also provide the present value of future benefits, the probable implementation cost, and benefit-cost ratio. **Appendix B** also includes the cost estimates for the improvements listed in **Table 5-3**. The costs include a rough estimate of right-of-way, design, and oversight as a percentage of the construction costs. Total costs are deemed important with respect to developing a benefit/cost ratio. **Appendix C** includes detailed information on the change in delay, VHT, and crashes. The project cost estimates shown in the tables are based on cursory-level efforts, and unforeseen nuances and material price changes would ultimately impact actual costs. However, the estimates provide a reasonable means from which to gauge value when compared to the estimates of monetized benefit.

Figure 5-5. Determining Delay Savings

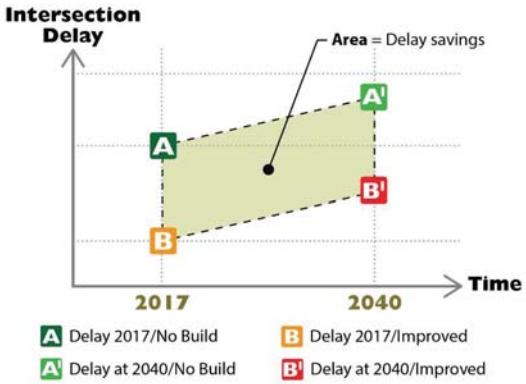


Figure 5-6. Transportation Recommendations Requiring Minimal Investment for Consideration

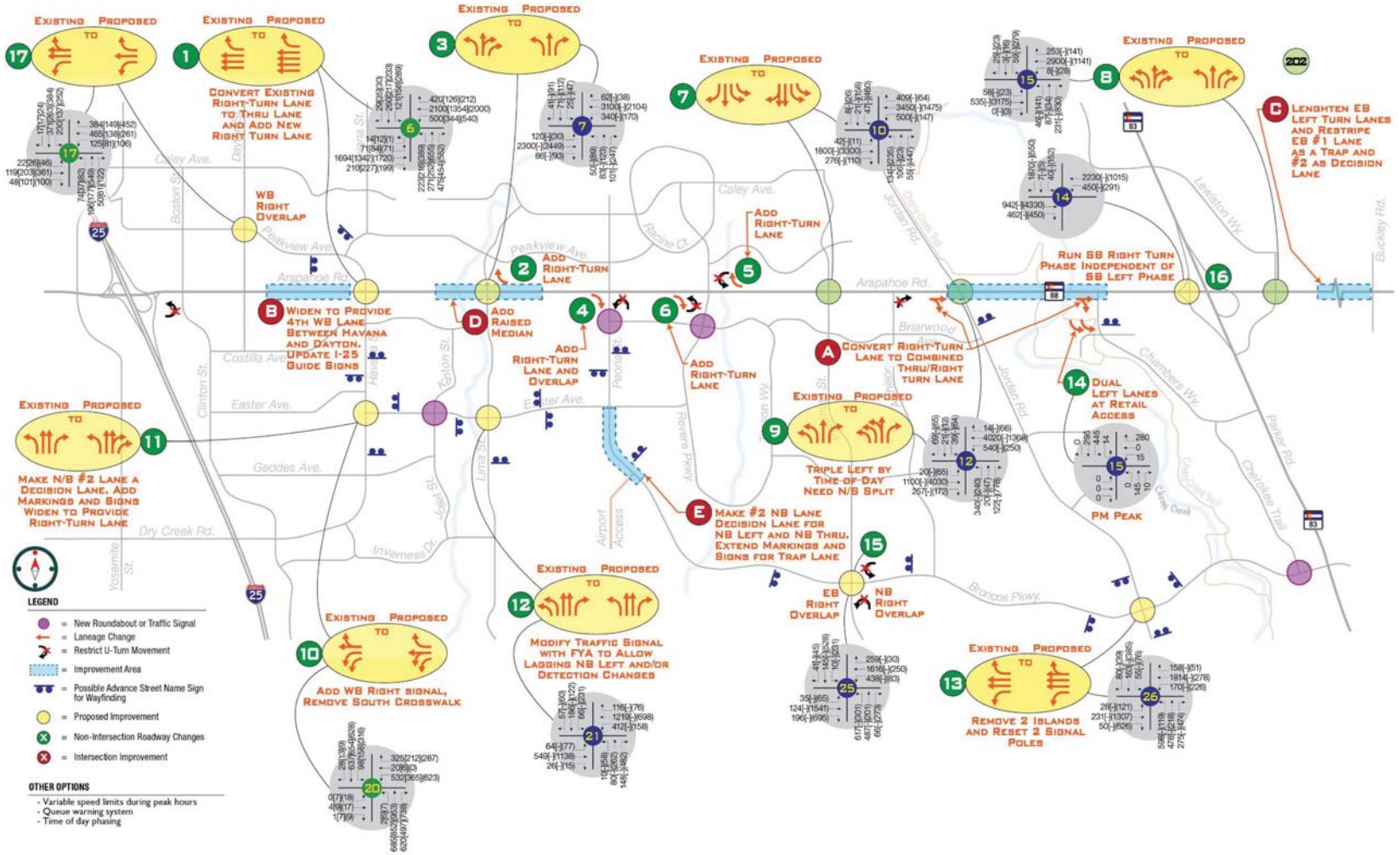


Table 5-3. Minimal Investment Improvements Benefit-Cost Analysis – Intersections

Alt	Low Investment Solution	Present Value of Future Benefits	Opinion of Probable Cost (see text)	Benefit-Cost Ratio
1	Havana (fourth westbound through lane and a westbound right turn lane)	$1.0M	$500K	**2.0**
2	Lima (westbound Right Turn Lane)	$660K	$400K	**1.6**
3	Lima/Arapahoe (restripe northbound approach to remove dual right)	$770K	$25K	**30.9**
4	Peoria (Eastbound Right Turn Lane)	$2.6M	$400K	**6.5**
5	Revere (westbound Right turn Only)	$1.7M	$400K	**4.2**
6	Revere (eastbound Right Turn Only)	$2.2M	$500K	**4.5**
7	Potomac (southbound Restriping)	$1.5M	$25K	**59.2**
8	Lewiston (Restripe northbound Approach)	$5.0M	$125K	**39.9**
9	Jordan/Arapahoe (Triple Left Turn)	$1.2M	$750K	**1.6**
10	Havana/Easter (Restripe westbound approach)	$210K	$25K	**8.4**
11	Havana/Easter (Widen northbound Approach)	$(450K)	$500K	**-0.9**
12	Lima/Easter (restripe northbound approach to single left and add FYA)	$(8K)	$50K	**-0.2**
13	Jordan/Broncos (Add third westbound Lane and reset signal poles)	$1.1M	$300K	**3.7**
14	Briarwood/Chambers (southbound dual left turn lanes and signalization)	$(21K)	$250K	**-0.1**
15	Parker southbound Ramp with Ind. Left and right phases			
16	Potomac/Broncos (eastbound and northbound right turn overlaps)			
17	Peakview/Dayton (Restripe westbound approach with overlap)	$(350K)	$25K	**-14.0**

5.4.3 Low Investment Improvements at Intersections

For most of these intersection modifications, a low initial investment in striping, pavement, or signal equipment results in a strong benefit. Based on this benefit-cost analysis carried out for each option, several options could achieve a high return on investment through reduced intersection delay and reduced crashes and therefore should be considered high priorities for implementation. These options include the following:

- Low Investment Option 3 – Restripe the Arapahoe/Lima northbound approach to eliminate dual right turn option.
- Low Investment Option 4 – Add an eastbound right turn lane at the Arapahoe/Peoria intersection.
- Low Investment Options 5 and 6 – Add eastbound and westbound right turn lanes at the Arapahoe/Revere intersection
- Low Investment Option 7 – Restripe the southbound approach at the Arapahoe/Potomac intersection from right lanes to a through and right turn lane (which will provide the additional southbound through lanes).
- Low Investment Option 8 – Restripe the northbound approach at the Arapahoe/Lewiston intersection to provide exclusive dual right turn lanes and one exclusive left turn lane. This will require signal, detection, and signage modifications as well which may be challenging given the concrete pavement.
- Low Investment option 9 – Adding triple left turn lanes along the northbound Jordan Road approach to Arapahoe Road (which may not be necessary if an addition through lane along Arapahoe Road is incorporated per next section)
- Low Investment Option 10 – Restripe the westbound approach of Easter at the Havana intersection to provide an exclusive right turn lane, and convert the outside left turn lane to serve left turns and through movement.
- Low Investment Option 13 – Add a third westbound lane at the Jordan Road/Broncos Parkway intersection.

A few low investment options had lower benefit-cost ratios but should still be considered as options for future implementation. These options include:

- Low Investment Option 1 – If the existing westbound right turn lane is converted to a through/right lane, then consideration should be given to widening and provide a new right-turn lane.
- Low Investment Option 2 – Add a westbound right turn lane.

Low investment options 11, 12, 14, and 17 are shown to have negative returns on investment and are not recommended to be implemented.

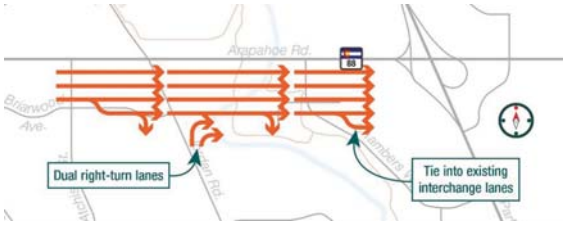
Low investment option 15 is simply a signal phasing adjustment to better achieve an optimal condition. This can be completed as part of an on-going signal timing adjustment program. Option 16 would require the installation of signal heads with for the two right turn movements. Many of the right turn movements are completing the maneuver during the reflecting left turn signal phase already, but the benefit of this improvement would help process these right turns more rapidly. A specific benefit value was not calculated to simply better right turn movements, but they are heavy movements and this improvement would be worthy of implementation.

5.4.4 Low Investment Improvements Along Roadway Segments

The last section discussed low investment improvement specifically at intersections. Low investment improvements are possible along extended sections of Arapahoe Road, including roadway lane and striping changes to improve lane utilization issues in an attempt to reduce congestion at the west and east ends. A total of five roadway low investment options were developed. Each option is identified in **Figure 5-6** as options A-E with options A-C shown diagrammatically in **Figure 5-7** through **Figure 5-9**. **Appendix B** shows conceptual layouts of options A, B, C, and E. Because Option D is simply a raised median, versus the existing painted median, east and west of Lima Street on Arapahoe Road, a layout was not prepared.

Low investment option A is shown on **Figure 5-7**. This option uses existing pavement and some minor roadway widening to provide an additional eastbound through lane through the Jordan and Chambers Road intersections. The existing exclusive right turn lane at these intersections is converted to a through/right turn lane to provide the additional eastbound lane. In addition, the exclusive right turn lane at Cornerstar Way would be converted to a through/right lane, and east of this intersection some minor widening would occur to tie this lane into the existing lanes feeding the Parker Road intersection. It may be necessary to explore replacing the right turn deceleration lane for this access in the future pending traffic conditions and right-of-way availability.

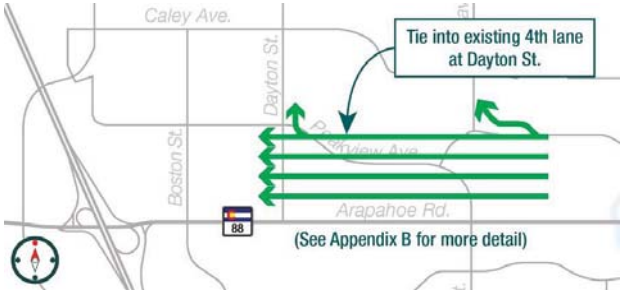
Figure 5-7. Option A – Eastbound Jordan to Chambers



In extending a fourth lane through Jordan and Chambers, both intersections would require signal and raised island modifications. At the Jordan Road intersection, the northbound right turn lane operates with a free condition as it has a dedicated receiving lane on Arapahoe Road. With the conversion of this receiving lane to a fourth through lane, it will be necessary to provide dual right turn lanes to accommodate the heavy right turn movement volume. This would require widening of the northbound approach and could encroach on the right-of-way in the southeast corner of the Jordan Road intersection.

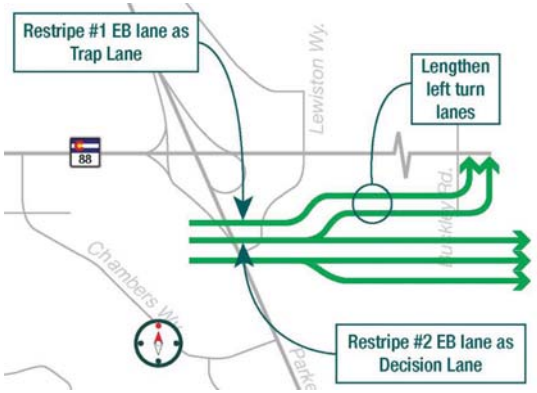
Low investment option B is shown on **Figure 5-8**. This option would convert the existing westbound right turn lane to a through/right lane to create a fourth lane westbound through the Havana Street intersection. This fourth lane would continue west and tie into the fourth lane at the Dayton Street intersection. To extend this lane to Dayton Street, Arapahoe Road adjacent to the car dealerships would need to be widened since Arapahoe Road reduces to only three through lanes between the Havana and Dayton intersections. This improvement would likely require right-of-way and possibly some low retaining walls.

Figure 5-8. Option B – Westbound between Havana and Dayton



Low investment option C is shown on **Figure 5-9** and located at the far east of the corridor at the Buckley Road intersection. The main issue at the Buckley intersection is the high volume of eastbound to northbound left turn movements, which creates a significant queue to the west for two reasons. First, the existing left turn bays are too short.

Figure 5-9. Option C – Eastbound Lane Reconfiguration to Buckley Road



Second, the heavy left turn volume leads drivers to begin positioning themselves in eastbound lane #1 as far back as the Chambers Way intersection, creating a lane utilization issue at the corridor's east end during the PM peak hour. To address these two issues, the left turn bays should be lengthened back to Olathe Street. Second, the eastbound lanes at least to Lewiston should be restriped to convert the eastbound #1 lane into a trap lane and the eastbound #2 lane as an option lane for vehicles to either access the left turn lanes or continue east in the through lanes. **Figure 5-9** shows this diagrammatically, and **Appendix B** shows a conceptual design of this option.

Option D simply includes a raised median in lieu of the existing striped median along Arapahoe Road east and west of the Lima Street intersection.

Similar to Option C, Option E would be implemented along Broncos Parkway approaching the Easter Avenue intersection. During the morning commute, a high number of vehicles turn left from northbound Broncos Parkway to westbound Easter Avenue. Due to this high volume of vehicles approaching the intersection, they tend to position themselves in the northbound #1 lane creating an imbalance in lane utilization. Option E proposes to restripe the northbound lanes on Broncos Parkway to make the #1 lane a trap lane that feeds directly into the northbound turn lanes and the #2 lane an option lane that allows vehicles to either access the left turn lanes or continue north through the Easter intersection. **Appendix B** provides a conceptual design of the option.

Since each option entails several intersections, Synchro was not the best tool to analyze the reduction in delay that might be generated by these options. As part of the analysis of corridor operations, the project team created a VISSIM model for the Arapahoe Road corridor (see **Section 5.6.1** with respect to the model's development). For options A, B, and C, the VISSIM model was used to determine the reduction in delay that these options might be able to achieve if implemented. Option D was not analyzed since a raised median is an access management tool and would have a minimal effect on delay in the corridor. Option E was not analyzed using VISSIM since a model was not created along the Broncos Parkway corridor.

Table 5-4 shows the benefit-cost results for options A, B, and C. As shown, each of these options show a positive rate on return. Option A provides a high rate of return and should be considered as high priority improvement as the implementation effort only requires median modifications, restriping, and signage to position vehicles in the right lanes. Option A will require two signal modifications, some widening, and the installation of northbound dual right turn lanes at Jordan, which could have right-of-way impacts. Nevertheless, this option should be a high priority as this, paired with Option C, could result in a noticeable decrease in congestion during the evening commute. Option B would provide some congestion improvements on the west end of the corridor but given the costs and the right-of-way constraints near the auto dealerships makes this option a lower priority, but still worthwhile.

Table 5-4. Minimal Investment Improvements Benefit-Cost Analysis – Roadway Segments

#	Low Investment Solution	Present Value of Future Benefits	Opinion of Probable Cost	Benefit-Cost Ratio
A	Fourth eastbound lane from Jordan to Chambers	$3.3M	$100K	**33**
B	Fourth westbound Lane from Havana to Dayton	$4.9M	$1M	**5.0**
C	Lengthen eastbound Left turn lanes at Buckley, restripe #1 lane as trap lane and #2 lane as decision lane	$280K	$150K	**1.9**
A & C	Fourth Eastbound lane from Jordan to Chambers with longer eastbound left turn lanes at Buckley, and restripe #1 lane as trap lane and #2 lane as decision lane	$4.1M	$250K	**16.6**

5.5 Major Investment Intersection Capacity Improvements

In addition to the minor investment improvement options, major investment improvement options have also been identified and analyzed. These include the intersection reconstruction projections in which new intersection configurations would be established, some of which include a grade-separated overpass. The most common intersection reconstruction project includes a Displaced Left Turn Intersection in which left turn movements are extracted from the actual intersection and cross-over opposing through traffic flow prior to reaching the actual intersection. **Figure 5-2** depicted this concept. This process entailed first assessing each improvement in isolation with respect to its benefit at the specific location it would be built. Promising improvement options were then "packaged" in corridor-long alternatives that were analyzed using VISSIM software to fully assess system effects of the combination of improvements (covered in section 5-6 of the report).

Table 5-5 summarizes the benefits with respect to the intersection reconstruction projects, as well as the potential project costs and resulting benefit-cost ratio. Benefits were estimated in the same manner as the minor improvement analysis (**Appendix C** shows more detail relative to the benefit calculations).

Table 5-5. Major Investment Improvements (Capacity Increases)

Location	Improvement Description	Economic Analysis		
		Present Value of Future Benefits	Initial Project Cost	Benefit-Cost Ratio
Potomac	Displaced Left Turn	$2.85M	$7.5M	**0.06**
Potomac	Displaced Left Turn - fourth Lane eastbound	$13.3M	$8.0M	**0.26**
Havana	Displaced Left Turn	$48.6M	$6.6M	**1.17**
Havana	Displaced Left Turn - fourth Lane westbound	$49.6M	$7.1M	**1.11**
Lima	Displaced Left Turn	$18.5M	$6.5M	**0.45**
Peoria	Displaced Left Turn	$38.9M	$7.5M	**0.82**
Jordan	Displaced Left Turn	$6.3M	$6.5M	**0.15**
Jordan	Displaced Left Turn - fourth Lane eastbound/westbound	$46.5M	$8.5M	**0.87**
Buckley	Displaced Left Turn	$272M	$6.5M	**6.66**
Jordan Road	Eastbound Overpass	$105M	$15.1M	**1.11**
Buckley Road	Westbound Overpass	$285M	$21.M	**2.16**

From the analysis and results of **Tables 5-3** through **5-5**, numerous findings were discovered, summarized as follows:

- A Displaced Left Turn intersection at Buckley Road removes a key metering effect along the corridor such that westbound traffic will more readily reach other intersections to the west, thereby creating more issues during peak hours, especially the AM peak hour. In isolation, the improvement would be a significant boon to the Arapahoe Road/Buckley Road intersection's operations, but the negative impacts to intersections further west would offset much of this benefit. As such, a Displaced Left Turn configuration at this intersection is not recommended.
- An overpass at the Buckley intersection results in a similar challenge, and this would be more expensive and out of context with the surroundings. This too is dropped from further consideration.
- A Displaced Left Turn intersection at the Potomac intersection provides very little benefit to justify the costs given a Benefit-Cost Ratio well below 1.0. This option should be dropped.
- Similarly, a Displaced Left Turn intersection at Jordan Road provides very little benefit to justify the costs given a Benefit-Cost Ratio well below 1.0. This option should be dropped.
- A Displaced Left Turn intersection at Havana provides significant operational improvement and should be seriously considered as a recommendation in the final plan.
- Additional eastbound capacity between Potomac and Buckley provides significant operational benefit at a relatively low cost.
- An additional westbound lane between Buckley and Potomac provides significant corridor benefit, particularly during the AM peak period, but this will require widening through the Parker interchange and it could also impact the Cherry Creek Bridge (and possibly the trail below).

- The construction of a Displaced Left Turn intersection at Peoria Street does not provide sufficient benefit and this option should be dropped at these locations.
- An eastbound grade-separated overpass of Arapahoe Road crossing Jordan would be very beneficial and should be further analyzed.

The above findings were then used to develop various corridor alternative packages, addressed in the next subsection.

5.6 Corridor Improvement Concepts

5.6.1 VISSIM Model

Appendix D includes a memo that briefly discusses the model development process and references calibration. An AM peak hour and a PM peak hour VISSIM simulation model was created for the corridor. A significant amount of effort was spent on calibrating both peak hours per FHWA and CDOT guidelines. The calibration process leveraged extensive traffic data collected and previously presented. In addition, project team members conducted travel time runs from end to end in both directions during both peak hours. Traffic queueing observations were also conducted throughout the corridor.

Both models were then calibrated to existing AM and PM peak hour conditions with respect to traffic flow demands, travel time, speeds, and queues. Adjustment to the modeling parameters was made to emulate these variables observed in the field to within accepted tolerances. The resulting calibrated AM and PM peak hour models were then the basis for evaluating future conditions including a range of corridor alternatives.

5.6.2 Description of Long-Term Corridor Improvements

The various options were mixed and matched and then packaged into corridor-wide alternatives, which were then analyzed using VISSIM software. A total of 12 corridor scenarios were developed, and each one is defined below. **Appendix B** includes alternative concepts and layouts. Most alternatives build on the previous alternative with respect to adding at least one improvement. Alternatives 5 through 10 each mimic a previous alternative with one or two improvement adjustments. Higher number alternatives were developed as results of the first set were being assessed.

- **No Build** – As the name implies, this is simply the existing physical conditions along the highway with no enhancements. Results serve as the basis from which to measure all other corridor alternatives.
- **Low-Cost Improvements Corridor Alternative** – This includes the relatively easy improvements to implement including:
  - Restriping the northbound Lima Street approach
  - Adding a westbound right turn lane at Lima Street
  - Adding an eastbound right turn lane at Peoria Street
  - Adding eastbound and westbound right turn lanes at Revere Parkway
  - Restriping the southbound Potomac Street approach to include two through lanes (right turn would be made from a shared lane)
  - Establishing northbound Jordan Road dual right turn lanes
  - Converting the right turn lanes to a fourth eastbound through lane at Jordan Road and Chambers Way (right turns would be made from a shared lane)
  - Signalizing and incorporating southbound dual left turn lanes into Cornerstar from Chambers Way
  - Restriping the northbound off ramp approach from Parker Road (opposite of Lewiston Way) which will require detection, signal, and signage modifications.
- **Alternative 1 Corridor Alternative** – This alternative includes all of the low-cost improvement projects with the following additions/adjustments:
  - Converting the westbound Havana Street right turn lane into a through lane to Dayton Street, where it already exists to I-25. An additional westbound exclusive right turn lane would be constructed at the Havana Street intersection.
  - Establishing a fourth eastbound through lane from just west of Potomac Street to Buckley Road (through the Parker Road Interchange). An additional eastbound right turn lane would be constructed at Potomac, Jordan Road, and Chambers Way.
  - Establishing dual northbound right turn lanes at the Potomac Street intersection.
  - Establishing a fourth westbound lane from Buckley Road to west of Lewiston, connecting with the right turn lane that feeds northbound Parker Road. An additional westbound right turn lane would be constructed at Lewiston Way.
- **Alternative 2 Corridor Alternative** – This alternative includes all of the low-cost improvement projects and those identified in Alternative 1, with the following additions/adjustments:
  - Reconstructing the Havana Street intersection as a Displaced Left Turn configuration.
  - Extending the westbound fourth lane identified in Alternative 1 (Buckley to Parker Road) to Potomac Street where it would drop as a right turn lane. An additional westbound exclusive right turn lane at Jordan Road would be constructed.
- **Alternative 3 Corridor Alternative** – This alternative includes all of the low-cost improvement projects and those identified in Alternative 2, with the following additions/adjustments:
  - Reconstructing the Potomac Street intersection as a Displaced Left Turn configuration.
  - Reconstructing the Jordan Road intersection as a Displaced Left Turn configuration.
- **Alternative 4 Corridor Alternative** – This alternative includes all of the low-cost improvement projects and those identified in Alternative 3, with the following additions/adjustments:
  - Constructing the Jordan Road intersection with an eastbound flyover to serve through traffic. A Displaced Left Turn intersection would not be constructed.
- **Alternative 5 Corridor Alternative** – This alternative includes all of the low-cost improvement projects and those identified in Alternative 4, except that the Displaced Left Turn intersection at Potomac Street would be removed. The Potomac Street intersection would remain at grade with the restriping of the southbound approach as previously described.
- **Alternative 6 Corridor Alternative** – This alternative includes all of the low-cost improvement projects and those identified in Alternative 2, with the addition of a Displaced Left Turn intersection being constructed at the Peoria Street intersection as well. Alternative 2 includes a Displaced Left Turn intersection at Havana Street, which is also included as part of Alternative 6.
- **Alternative 7 Corridor Alternative** – This alternative includes all of the low-cost improvement projects and those identified in Alternative 3, with the exception that a Displaced Left Turn intersection would be built at Peoria Street and NOT at Potomac Street. Alternative 3 includes Displaced Left Turn intersections at Havana Street and Jordan Road, which are also included as part of Alternative 7.
- **Alternative 8 Corridor Alternative** – This alternative includes all of the low-cost improvement projects and those identified in Alternative 4, with the exception that a Displaced Left Turn intersection would be built at Peoria Street and NOT at Potomac Street. Alternative 4 includes an eastbound overpass at Jordan Road, which is also included as part of Alternative 8.

- **Alternative 9 Corridor Alternative** – This alternative includes all of the low-cost improvement projects and those identified in Alternative 2, except that the eastbound through lane from just west of Potomac Street to Buckley Road is discontinuous through the Parker Road Interchange, thereby leaving a gap in the additional lane.
- **Alternative 10 Corridor Alternative** – This alternative, a hybrid of previous alternatives, includes:
  - All low-cost improvements projects, with the adjustment that the fourth eastbound lane begins just east of Jordan Road (not west of Jordan Road).
  - Converting the westbound Havana Street right turn lane into a through lane to Dayton Street, where it already exists to I-25. An additional westbound exclusive right turn lane would be constructed at the Havana Street intersection.
  - Reconstructing the Havana Street intersection as a Displaced Left Turn configuration.
  - Constructing the Jordan Road intersection with an eastbound flyover to serve through traffic.

5.6.3 Operations Analysis of Long-Term Corridor Improvements

Each corridor alternative was analyzed using the calibrated VISSIM simulation software. This tool provides a better perspective in that it can account for metering effects (and their removal) that one improvement (or set of improvements) might have on downstream intersections. Benefits realized at an intersection that is improved could create congestion at other intersections, possibly offsetting any gain realized at the improvement location. Both AM and PM periods were assessed by averaging 12 runs each. Two measures extracted from the runs include total corridor delay in vehicle-hours and total number of vehicles entering the system. Networks that experience congestion cannot accommodate as many vehicles, so a measure of comparative network performance that has been summarized (after averaging 12 runs of each peak period) include the total number of vehicles entering the Arapahoe Road Corridor. A greater number of entering vehicles would tend to represent a more positive operating transportation system.

Table 5-6 presents a summary of the results, showing differences compared to the No Build scenario (which represents no enhancements over existing conditions). Compared to the No Build, each alternative represents improvement relative to delay and to the number of additional vehicles that can be processed, some more than others. Also, some corridor alternatives would be more advantageous to one peak hour over the other.

Table 5-6. Major Investment System Measures Evaluation – Differences Compared to No Build

Alternative	AM		PM	
	Corridor Delay (Hrs)	Vehicles Entering Arapahoe	Corridor Delay (Hrs)	Vehicles Entering Arapahoe
No Build	0	0	0	0
Low Cost	-100	296	47	407
Alt 1	-104	299	-600	2169
Alt 2	-549	1271	-548	1928
Alt 3	-339	1256	-459	2047
Alt 4	-434	1392	-659	1771
Alt 5	-359	1129	-588	1876
Alt 6	-357	961	-444	1841
Alt 7	-342	1200	-374	2109
Alt 8	-283	936	-474	1973
Alt 9	-524	1145	-584	2059
Alt 10	-347	839	-453	1540

The VISSIM runs were further dissected with respect to travel time profiles along the corridor. **Appendix E** contains AM and PM profiles, and **Table 5-7** shows the corridor-long travel times for each alternative by peak hour. The travel times in **Table 5-7** represent the raw averaged results from VISSIM, measured from the center of the Buckley Road intersection to the center of the Yosemite Street intersection. The beginning point for each direction of travel time is at the center of the intersection. As such, delay related to entering the end-point intersections from outside the corridor (northbound, southbound, and eastbound approaches at the Yosemite intersection and northbound, southbound, and westbound approaches at the Buckley intersection) is not included in the table entries shown in **Table 5-7**. Because Alternatives 1 through 10 allow a greater number of vehicles to enter the system than the Low-Cost and the No Build alternatives, some of the intersections experience a greater delay in Alternatives 1 through 10 since a greater amount of traffic flow is attempting to pass through. This is most noticeable in the westbound AM travel time in which the No Build and Low Cost scenario yield lower travel times. The metering effect to entering traffic at Buckley Road is largely removed in Alternatives 1 through 10, and downstream intersections feel the effects. Traffic experiences much more delay in entering the Buckley intersection in the No Build and the Low Cost alternative, and this is not captured in **Table 5-7**, since the travel time begins once a vehicle reaches the center of the intersection. The profiles in **Appendix E** show the intersection locations, for each alternative, where delay is most prevalent.

Table 5-7. Arapahoe Road 2040 Travel Time; Between Yosemite and Buckley (center of intersection to center of intersection, in seconds)

Corridor Alternative	Eastbound		Westbound*	
	AM	PM	AM	PM
No Build	966	2837	1309	700
Low Cost	972	2284	1335	680
Alt 1	960	1038	1414	757
Alt 2	761	961	1444	771
Alt 3	717	936	1799	770
Alt 4	690	1038	1766	787
Alt 5	669	1021	1784	753
Alt 6	753	929	1454	730
Alt 7	736	1327	1825	724
Alt 8	682	1078	1742	716
Alt 9	748	950	1429	752
Alt 10	669	1242	1709	751

*Does not include delays related to traffic entering the intersection at Buckley Road, which are substantial in the No Build and Low Cost alternatives. Comparing results of Alternatives 1 through 10 with the No Build and Low Cost alternatives is not an "apples to apples" comparison.

A detailed review of the analysis results has led to the following findings:

- All of the low-cost improvements are worthy of implementation as they provide more benefit than cost.
- The Havana Street intersection is a favorable location for a Displaced Left Turn intersection.
- The Displaced Left Turn intersection option is not a favorable option at Peoria Street, Potomac Street, or Jordan Road.
- An eastbound flyover ramp at Jordan Road would be very beneficial, particularly to PM operations, and additional study with respect to feasibility should be considered.
- Providing a fourth westbound lane from Buckley to Potomac, including through the Parker Road interchange, is a key toward improving operations during the AM peak hour
- Providing a fourth westbound lane from Havana to Dayton is also a key toward improving operations during the AM peak hour.
- Providing a fourth eastbound lane from Potomac to Buckley is a key toward improving operations during the PM peak hour.
- Extending the eastbound left turn lanes at Buckley Road and reconfiguring the entry to these lanes such that one lane is a "trap" lane and the other is a "decision" lane will better accommodate the long queue that forms given these left turn drivers positioning themselves well ahead of the intersection.

5.6.4 Comparative Evaluation of Long-Term Corridor Improvements

This report identified other criteria beyond operations in selecting a preferred set of improvements. These included the potential to align with the City's vision for the corridor with respect to land use and economics, the potential to implement the plan, and cost.

Table 5-8 identifies various goals and objectives designed to capture the spirit of these other criteria. Each corridor alternative is listed along the left side, and a subjective score ranging from 1 (poorest) to 4 (best) was assigned. Scores were then summed and an overall ranking was recorded.

The overall results shown in **Table 5-8** indicate that Alternative 2 scores the highest when balancing all the criteria. Alternative 2 is lower cost than most other corridor alternatives, less than one-half the cost of six other corridor alternatives. Performance-wise, it ranks at, or near, the top in all the mobility categories that have been considered. Key major considerations in this performance are comprised of adding a fourth through lane along key segments and constructing a Displaced Left Turn intersection at Havana Street. From a compatibility standpoint with respect to the City's vision, Alternative 2 is among the top four alternatives.

5.6.5 Findings and Conclusions Long-Term Corridor Improvements

Results of the analyses have led to a series of conclusions with respect to the investment options considered in this analysis.

- Havana Street is the only intersection location in which a Displaced Left Turn intersection would be worthwhile. Other intersection locations would not deliver enough benefit to justify the cost for this type of improvement.
- The provision of a fourth eastbound through lane along Arapahoe Road from Potomac Street to Buckley Road is shown to provide significant benefit, particularly during the PM peak hour. This should be coupled with the incorporation of an eastbound left turn "trap" lane at Buckley Road, as well as a left turn "decision" lane. Widening into the median and converting the dual left turn lanes at Lewiston Way to a single left-turn lane will be necessary. Additional consideration for some of the cross-streets (including Cornerstar) may be appropriate with respect to auxiliary lanes or turn restrictions.
- The provision of a fourth westbound through lane along Arapahoe Road from Buckley Road to Potomac Street will provide significant benefit, particularly during the AM peak hour. This may require widening of the bridge that spans Cherry Creek, and it would require modification to the Parker Road interchange relative to accommodating an additional westbound through lane.
- The provision of a fourth westbound through lane from Havana Street to Dayton Street will provide appreciable benefit to be included in the plan, in conjunction with a displaced left turn intersection at Havana Street. Westbound traffic regularly begins to position itself to access I-25 east of Havana Street that leads to heavy usage in the curb lane. Extending the two lanes that access I-25 back from Dayton Street to Havana Street will alleviate some of this traffic flow concentration.
- Where existing right turn lanes are converted to through lanes, a new right turn lane alongside Arapahoe Road should be constructed.
- An eastbound overpass of Jordan Road would provide significant travel benefit, and this should be a future option within the corridor.

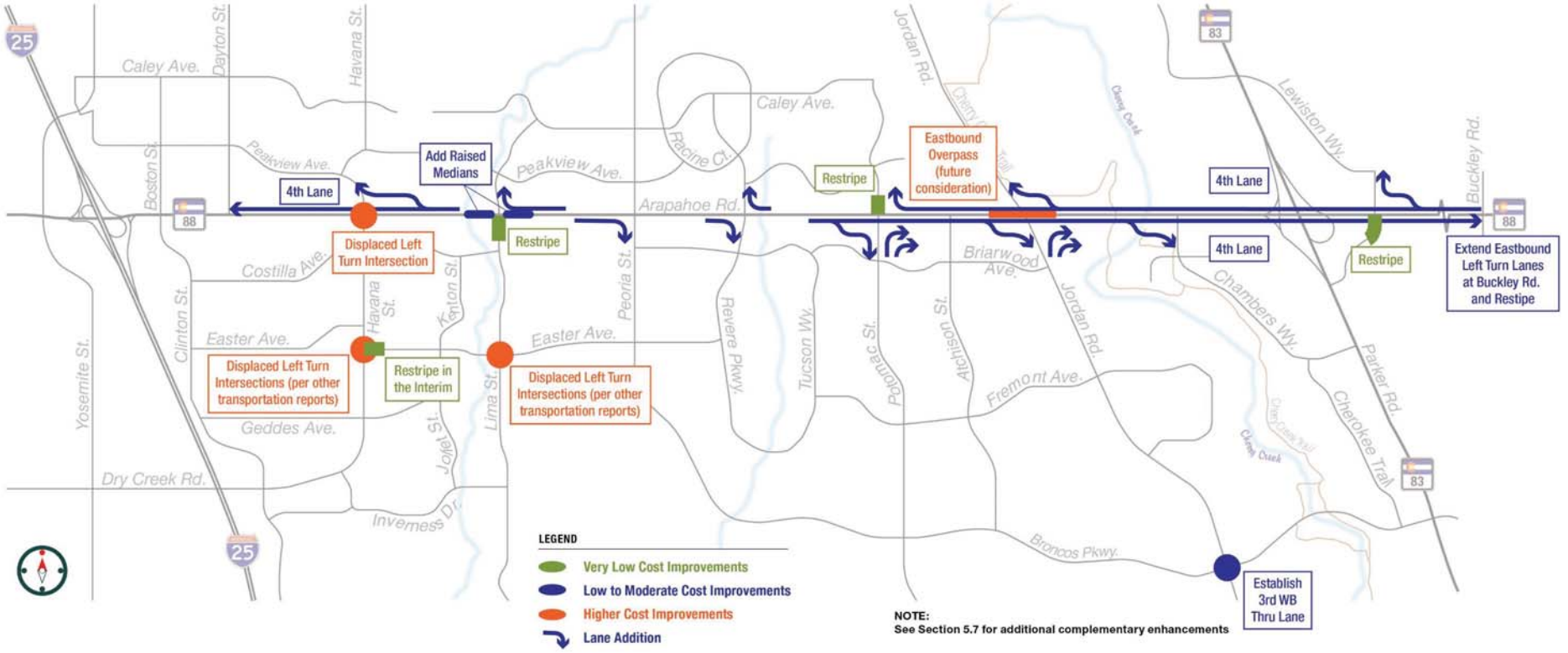
Figure 5-10 provides a diagrammatic summary illustration of the recommended long-term plan including the major investments as well as the minimal investments for the corridor. **Appendix F** shows a conceptual design layout of the recommended long-term plan.

Table 5-8. Evaluation and Screening of Corridor Alternatives (1)

Alternative	Compatibility			Network Operations												Implementation			Overall Score and Rank (2)	
	Align the City's Vision for future economic development, land use, and corridor function with mobility needs along Arapahoe Road			Provide additional capacity and improved operations to accommodate through traffic on Arapahoe Road												Build a project that is cost effective and feasible				
	Relative Impacts to Access	Relative use of existing pavement and right-of-way	Consistency with intent of the study	Network Improvement: Change in network delay relative to the No Build				Vehicles Served: Change in the number of vehicles entering Arapahoe relative to the No Build				Intersection operations: the number of intersections with a delay greater than 100 seconds per vehicle		Intersection operations: the number of intersections with a delay greater than 150 seconds per vehicle		Funding Availability	Estimated Costs			
				AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak			Cost			
	Score	Score	Score	Delay	Score	Delay	Score	Veh.	Score	Delay	Score	# of Int.	Score	# of Int.	Score	Score	Millions	Score		
Low Cost	4	4	4	100	0	-47	0	296	0	407	0	5	2	5	0	4	2.5	4	22.00	4
Alt 1	4	3	4	104	0	600	3	299	0	2169	4	5	2	2	2	3	6.1	3	28.00	2
Alt 2	3	2	3	549	4	548	3	1271	3	1928	3	5	2	2	4	2	10.5	2	31.00	1
Alt 3	1	1	1	339	2	459	2	1256	3	2047	3	7	0	2	4	1	22.9	1	19.00	7
Alt 4	0	0	0	434	3	659	4	1392	4	1771	2	6	1	2	3	0	29.5	0	17.00	8
Alt 5	1	2	2	359	2	588	3	1129	2	1876	2	6	1	2	3	1	21.5	1	20.00	6
Alt 6	2	2	2	357	2	444	2	961	1	1841	2	6	1	2	4	2	16.5	2	22.00	4
Alt 7	1	1	1	342	2	374	1	1200	2	2109	4	6	1	4	1	1	22.9	1	16.00	9
Alt 8	0	0	0	283	1	474	2	936	1	1973	3	6	1	3	2	0	29.5	0	10.00	11
Alt 9	4	3	4	103	0	584	3	293	0	2059	3	5	2	3	3	3	6.1	3	28.00	2
Alt 10	1	1	2	347	2	453	2	839	1	1541	1	6	1	3	2	1	23.5	1	15.00	10

(1) Scoring in each category is subjective, informed by analyses. A scale of 1 to 4 has been used with 1 being poorest and 4 being best (except very last column per following footnote).
(2) Final column ranking is based on sum of scores from each category. Ranking of 1 is best, 10 is worst (opposite of scoring scale).

Figure 5-10. Recommended Arapahoe Road Improvement Plan



5.7 Other Study Area Recommendations

5.7.1 Multi-modal Recommendations

Multi-modal facilities have been fully assessed by the City as part of the Centennial Transportation Plan, as well as by the County as part of the Arapahoe County Bicycle and Pedestrian Master Plan. **Figure 5-11** combines the elements of these plans for the study area, including existing and planned trails, sidepaths, bike lanes, shoulders, shared roadways, and transit facilities. Bicycle facilities are planned along the parallel routes flanking Arapahoe Road, and several Arapahoe Road intersections are shown to be enhanced for bicycle and pedestrian connection.

Sidewalks do not exist in several areas along Arapahoe Road, thereby leaving gaps in pedestrian accommodation. As conditions allow and as opportunities present themselves, the gaps should be completed and sidewalks should ultimately be constructed along the entire corridor. In addition, pedestrian connections to the Arapahoe Road sidewalks should be provided, where appropriate, to enhance their access from neighborhoods and the business community. Where possible, existing attached sidewalks should be reconstructed to be detached from the roadway and widened where possible.

5.7.2 Other Recommendations

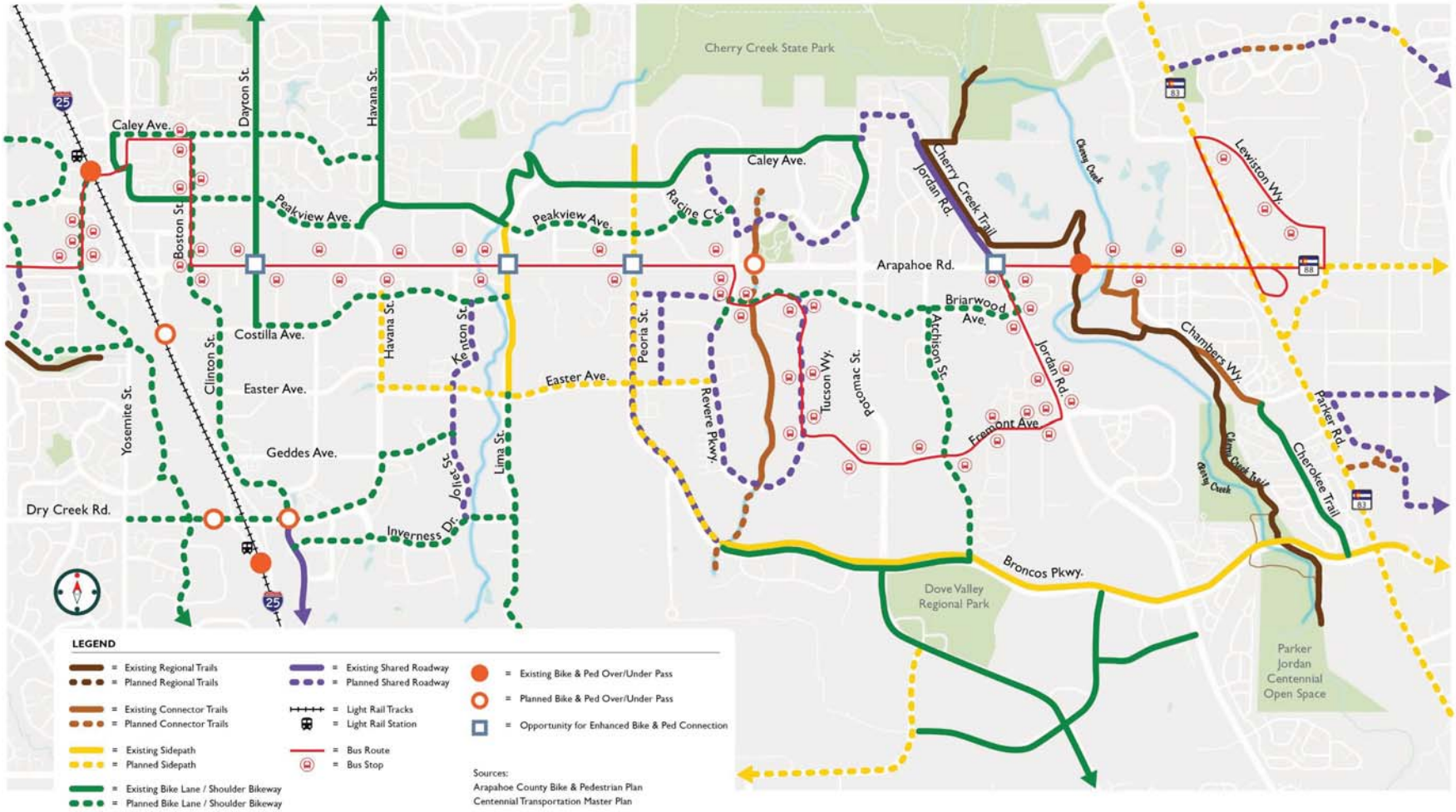
This study had also considered other improvements, most of which are off Arapahoe Road, which were not subjected to the same level of analysis as improvements options along Arapahoe Road. Each falls into three categories: (1) drop from further consideration, (2) retain for implementation when appropriate, and (3) conduct additional future analysis pending. The recommended classification of each is presented below:

1. Reconfiguring Havana/Peakview intersection – **Drop** as this was recently rebuilt to its current configuration.
2. Connecting Briarwood across the golf course (Lima to Peoria) – **Retain** pending future redevelopment of the golf course. East-west roadway connections will relieve traffic demand along Arapahoe Road.
3. Realigning Peakview between Peoria and Revere to be more the thoroughfare rather than relying on Racine Ct. for travel – **More Analysis** is needed. The east-west roads exist and some traffic already uses these roads to avoid Arapahoe Road. It is questionable whether realigning intersections to establish the east-west road as the thoroughfare will attract any more traffic from Arapahoe Road than already exists along Peakview.
4. Roundabout at Revere/Briarwood – **More Analysis** is needed to assess if this is the best traffic control device at this intersection. The final disposition of this option will have minimal impact on Arapahoe Road.
5. Realigning Briarwood at Tucson Ct. to be more the thoroughfare rather than force east-west traffic to turn - **More Analysis** is needed. The east-west roads exist and some traffic uses this road to circumvent Arapahoe Road. It is questionable whether realigning the intersection to establish the east-west road as the thoroughfare will attract any more traffic from Arapahoe Road than already exists along Briarwood.
6. Adding a signal at Kenton/Easter – **More Analysis** is needed to assess if this is the best traffic control device at this intersection. The final disposition of this option will have minimal impact on Arapahoe Road.
7. Signalizing Peoria/Briarwood – **More Analysis** is needed to determine whether warrants will be satisfied at this intersection. This may be informed by the disposition of number 2 above relative to connecting Briarwood across the existing golf course.
8. Modifying property access between I-25 and Havana – **Retain** and apply as the area redevelops. Cross-access between adjoining properties should be encouraged as opportunities arise.
9. Eastbound right turn lane at the shopping center driveway west of Dayton – **Retain** and implement when conditions allow. This may also be related to establishing cross-access per number 8 above.
10. Bus Service queue jumps/signal priority – **More Analysis** is needed. This enhancement may encourage more transit use within the corridor, but this would need to be paired with major bus routing changes to foster greater ridership. All other traffic passing through each intersection would incur additional delay. Further, widening to provide bus-only through lanes would impact adjacent properties.
11. BRT – **Drop**. The regional BRT study did not identify Arapahoe Road as a good candidate for BRT service at this time.
12. Pedestrian grade-separations – **More Analysis** is needed. Pedestrian activity does not overwhelm the corridor, but there are some intersections in which it is evident. A significant amount of time is needed for a pedestrian to cross Arapahoe Road, and the through-put of Arapahoe Road suffers during peak hours when a pedestrian is crossing at a signalized intersection. A grade-separated pedestrian crossing at strategic locations could eliminate this impact on the Arapahoe Road through-put, and it would improve safety. However, a pedestrian grade separated crossing is costly, would impact adjacent properties, and would only partially eliminate at-grade pedestrian crossings due the perceived extra time of a pedestrian to climb up and back down upon crossing.
13. East-west bike routes southwest of Arapahoe/Yosemite - **Retain.** Ongoing efforts should continue to reasonably enhance alternative travel modes throughout the study area.

Intelligent Transportation System (ITS) Strategies

Our transportation system is rapidly changing, and technology is providing greater benefit than ever to the users of the transportation system. This trend is anticipated to continue, and there are many ideas that (if they come to fruition) could greatly benefit the transportation system with respect to traveler information, safety, and greater through-put of current roadways. Some ideas have seen only minimal implementation nationally, so the evolution of high-tech solutions continues to unfold and be tested in other areas. **Table 5-2** identified seven technology-based enhancements that could aid travel along Arapahoe Road, and effort should continue to assess and implement measures as appropriate; these enhancements have the potential to further improve travel along Arapahoe Road. The final plan presented in the preceding section does not rely on these measures, which builds in a level of conservatism in the plan, but the enhancements below could collectively have a noticeable positive effect on corridor operations.

Figure 5-11. Pedestrian and Multi-Modal Considerations



High Tech Enhancements

High-tech enhancements include:

- **VMS –** Strategically placed signs can be used to inform drivers of incidents, providing the opportunity for alternative routes to be taken. Travel time indication can also be relayed on these signs based on real-time data input.
- **Varying Intersection lane geometry by time of day –** The true laneage needs at intersections varies by time of day since prevalent patterns change by time of day. Rededicating a lane's movement designation to better handle the changing nature of traffic patterns throughout the day can lead to efficiency. Driver awareness would be critical as a different designation is possible each time a driver passes through the intersection. One potential candidate for this idea is the northbound approach of Jordan Road in which triple left-turn lanes could be invoked during the AM peak hours, and dual left-turn lanes would remain for all of the times. Given an additional westbound through lane, per the recommended plan, a third left turn lane is not critical. But this measure could be a good interim solution until the fourth westbound through lane is constructed.
- **Shared ITS equipment and data** among Centennial, CDOT, Arapahoe County, and Greenwood Village – Economies of scale and cost savings are possible for all public entities that have a hand in operating and maintaining Arapahoe Road.
- **In Pavement lighting** for turning movements – This enhancement will help reinforce driving lanes through multi-lane turning movements, aiding in keeping drivers in their own lane and avoiding possible sideswipe crashes. This measure can be useful at nighttime, and it reinforces the intersection striping.
- **Close Circuit Video** is helpful provided that it is informing a traffic control center and actions are being taken in response to what is occurring on video. Arapahoe Road, being a critical part of a regional transportation system, is an excellent candidate, but the closed circuit video would not be of much value as a stand-alone idea.
- **Variable Speed Limits** at peak times could be a measure in which an ideal harmonization travel speed could be determined and set "on the fly." Pending traffic demands, different speeds will provide different capacities. While possible, this would require that most drivers follow the posted dynamic speed limit. Also, this would not be beneficial at the intersections that are (and will continue to be) the primary cause of congestion along Arapahoe Road. More study might be appropriate, but there may be limited applicability of this measure along Arapahoe Road.
- **A Queue Warning System** would be a measure of driver information specifically intended to advise drivers of downstream stop-and-go traffic. Real-time data could be fed to a system that is converted into "stopped traffic ahead" warnings, possibly posted on a VMS. Additional study should be conducted as to the true viability of this measure in light of combining it with other high-tech measures.

Other high-tech solutions can be considered as well relative to maintenance, likely as a part of each agency's overall operations and maintenance program.

Signing and Lighting

Signing additions were also presented in the list shown in **Table 5-1**. The intent is to improve lane utilization of certain movements that are served by two or more lanes, but experience a high concentration of use in one lane, limiting the value of the second lane. Locations include:

- **Yosemite Street** - The southbound left dual turn lanes. Signage should be added to convey that the right left-turn lane best provides access to I-25 and that the left left-turn lane best provides the ability to continue east along Arapahoe Road.
- **Buckley Road** – In conjunction with the trap-lane and decision-lane restriping for the eastbound to northbound left turn movements, eastbound signing should be provided just east of Lewiston Way to convey that the two left-most lanes will both deliver traffic to the left turn movement onto northbound Buckley Road. This will reduce the extreme stacking that occurs in one lane today, comprised of drivers positioning themselves well ahead of the Buckley Road left movement.

Other signage had been contemplated to spread out demand onto the eastbound to northbound I-25 loop ramp, but overhead signage was completed during the course of this study. In addition, advanced cross-street identification signing has been installed at the major intersections.

Street lighting along the corridor is another area that should be advanced as conditions allow. Street lights are provided at most of the cross-street intersections; Peoria Street, Revere Street, and Buckley Road are the exceptions. Segments within the City of Aurora also have street lights installed as does the bridge that spans Cherry Creek, but the remainder of the corridor is not lit. Additional street lighting should be installed over time, with the priority areas being where spillover from business lighting does not occur. Many auto dealerships, for example, provide robust lighting for their own parking lots. In some areas, this spills onto Arapahoe Road and can benefit travel during the night. Other segments do not contain the adjacent business lighting; these segments would be the priority with respect to additional street light installation. More analysis is needed, but additional street lighting should be provided along the corridor.

6.0 Implementation Plan

A host of improvements are recommended as part of the Arapahoe Road Corridor Plan that can be implemented over time as conditions allow and as opportunities arise. Only limited fiscal resources are available to the City and the corridor partners, so it is critical to identify the higher priority projects and provide a means to inform which improvements will be more optimal with respect to benefits and implementation. Toward that end, this section provides guidance in the decision-making that balances benefit, cost, funding, and ease of construction.

6.1 Study Area Low Investment Improvements

There were numerous low to mid-investment improvements included in the Arapahoe Road Corridor Plan. Four in particular require a very low investment as they simply involve restriping existing pavement. These should be implemented as soon as possible, and they include:

- Restriping the southbound Potomac Street approach such that the right turn lane is converted to a shared through/right turn lane
- Restriping the northbound Lima Street approach to convert the center shared through/right turn to an exclusive through lane. A single right turn lane will remain.
- Restriping the northbound Lewiston Way approach to convert lane usage such that two exclusive right turn lanes are provided (two exist today with one being shared with the through movement) and only one left turn lane is provided (dual left turns are provided today). An exclusive single through lane would end up being provided. Signal and signage modifications will also be required (possibly including the vehicle detection). Being concrete, these modifications may pose some challenge. This improvement will require coordination with Aurora and Foxfield.
- Restriping the westbound Easter Avenue approach to Havana Street such that the through movement is shared with the second left turn lane rather than the right turn lane.

The above improvements can be installed with relative ease as each involves striping and corresponding signing adjustments. Other than Easter and Havana, Coordination with CDOT will be required for all of these (including Lewiston Way that is part of the Parker Road interchange ROW originally obtained by CDOT).

6.2 Moderate Investment Improvements

Beyond the very low investment improvements above, a second series of improvements fall in the low to moderate cost category, and many have been separately assessed in the preceding chapters with respect to benefits and costs. **Table 6-1** shows these improvements, listed in order of benefit-cost ratio. The restriping projects listed above are included for comparison reasons. The improvement alternative numbering (and lettering) is consistent with that used in the previous chapter.

Table 6-1. Minimal Investment Improvements Priority List*

Alternative Number/ Letter	Description	Opinion of Probable Cost	Benefit-Cost Ratio	Notes
7	Potomac Street, Restripe Southbound Approach	$25K	59.2	Signing and signal timing changes needed as well
8	Lewiston Way; Restripe Northbound Approach	$125K	39.9	This intersection is also within Aurora and Foxfield. Coordination with both is needed. Signing and signal timing changes needed as well.
3	Lima Street; Restripe Northbound Approach	$25K	30.9	Signing changes needed as well
A & C Combined	Add fourth Eastbound through lane from Potomac Street to Buckley Road, and restripe Eastbound left turn lanes at Buckley. Can be phased, in order of need:	$250K	16.4	Improvement extends approximately 2.5 miles and will affect Aurora, Foxfield, and unincorporated Arapahoe County. Coordination will be needed. Possible overhead signing may also be needed.
	a. Fourth Eastbound lane, Jordan to Parker			Dual Northbound right turn lanes needed at Jordan
	b. Restripe Eastbound left turn lanes at Buckley			
	c. Fourth Eastbound lane, Potomac to Jordan			Dual Northbound right turn lanes needed at Potomac
	d. Restripe Eastbound lefts at Buckley			
	e. Fourth Eastbound lane, Parker to Buckley			
	f. New exclusive right turn lanes alongside the fourth through lane should be built subsequent to the fourth through lane being established.			
10	Havana/Easter; Restripe Westbound Approach	$25K	8.4	
4	Peoria Street; Add Eastbound Right Turn Lane	$400K	6.5	Potential service station ROW needed
B	Add fourth Westbound Lane from Havana to Dayton	$1M	4.9	Potential auto dealer ROW needed; possible retaining walls
6	Revere Street; Add Eastbound Right Turn Lane	$500K	4.5	Potential ROW needed
5	Revere Street; Add Westbound Right Turn Lane	$400K	4.2	
13	Jordan Road/Broncos Parkway; Add third Westbound Lane and reset signal poles	$300K	3.7	East and west intersection approaches are within unincorporated Arapahoe County. Coordination is required.
2	Lima Street; Add westbound Right Turn Lane	$400K	1.6	Potential for ROW need
NA	Add fourth westbound through lane from Buckley Road to Potomac Street (through Parker Interchange). Can be phased, in order of preference:	$1.5M		This improvement was not analyzed in isolation (so no benefit-cost ratio) but it will be beneficial as demonstrated in the Corridor Alternative 2 analysis.
	a. Fourth Westbound lane Buckley to Parker			
	b. Fourth westbound lane Jordan to Potomac			
	c. Fourth westbound lane Parker to through Jordan			
	d. New exclusive right turn lanes should be built subsequent to the fourth through lane being established.			

* All Arapahoe Road improvements from Lewiston Avenue west require coordination with CDOT.

A significant improvement will include adding a fourth lane in each direction at the corridor's east end between Potomac and Buckley Road. These two widening projects can be further broken-out into smaller projects, allowing a phased implementation as conditions allow and as funding becomes available. For some segments, this improvement involves converting a right turn lane into a through/right lane, and then constructing an additional right turn lane alongside the four through lanes subsequently (or as part of lane conversion project). Dual right turn lanes will also be needed along the northbound approaches of Potomac Street and Jordan Road once the fourth eastbound through lane is established in lieu of the existing single free-flow right turn lanes. Benefit-cost ratios were not specifically calculated for each potential phase of establishing a fourth through lane in each direction, but a potential phasing order of the improvements is provided in **Table 6-1** based on relative ease of implementation and the impact on known bottle-necks.

The fourth westbound lane from Buckley to Potomac was not evaluated as an isolated improvement as this idea was not among the considerations at the time the options of **Table 5-3** were developed. But the corridor alternatives which incorporated the full extent of this improvement clearly shows operational benefit during the AM peak hour. The corridor analyses indicate that the entire length of this fourth westbound lane would be needed; alternatives that included a shorter version of this lane did not operate nearly as well. As such, this improvement was incorporated into the recommended plan, but the specific benefits were not calculated as a stand along project.

Table 6-2 shows the major investment improvement elements of the plan. These improvements will require a greater cost, but all three are shown to provide an excellent return on investment. There are two listings for the rebuilding of the Havana Street intersection; both include a Displaced Left Turn alternative. The difference between the two pertains to a fourth westbound through lane to Dayton Street. The addition of the fourth westbound lane was shown individually in **Table 6-1** and it is recommended regardless of the rebuilding of the Havana Street intersection. The two listings for Havana Street in **Table 6-2** are intended to inform the Displaced Left Turn intersection effects with and without the fourth lane, which shows that the Displaced Left Turn option is a prudent investment either way.

Table 6-2. Major Investment Improvements Priority List

Location	Improvement Description	Initial Project Cost	Benefit-Cost Ratio	Notes
Havana Street	Displaced Left Turn	$6.6M	**7.36**	**Full intersection re-build**
Havana Street	Displaced Left Turn - fourth Lane westbound	$7.1M	**7**	**Full intersection re-build**
Jordan Road	Eastbound Overpass	$15.1M	**6.9**	**Future consideration. More vetting of impacts needed.**

6.3 Other Corridor Enhancements

This study had also considered numerous other improvements as well, most of which are off Arapahoe Road, which were not subjected to the same level of analysis as improvements options along Arapahoe Road. These off-Arapahoe improvements are classified as either being retained "Improvements to Implement" or "Improvements to be Further Vetted." **Table 6-3** shows each improvement by classification along with comments relative to circumstances or nuances that will need addressing for implementation.

Table 6-3. Off-Corridor Improvements

	Improvement	Comments
IMPROVEMENTS TO IMPLEMENT		
1	Connect Briarwood across the golf course (Lima to Peoria)	Complete when golf course redevelops. Possible signalization needed at Peoria intersection.
2	Property Access modifications between I-25 and Havana	Implement as conditions (like redevelopment) occur to reduce driveway access points onto Arapahoe Road and make existing signals more accessible to all development.
3	Add Eastbound right turn lane at shopping center driveway west of Dayton	Implement as conditions (like redevelopment) occur. May not be needed pending results of item 2 above. (This access could be removed in the future.)
4	High Tech enhancements	Numerous high-tech alternatives should be advanced to optimize travel within the corridor. See Section 5.7.2.
5	East-West bike routes southwest of Arapahoe/Yosemite	Improved bicycle accommodation in the study area will help encourage alternative modes
6	Displaced left turn at Easter/Peoria	Identified in other studies. Will better accommodate heavy traffic pattern between the west and south legs.
7	Displaced left turn at Easter/Havana	Identified in other studies. Will better accommodate heavy traffic pattern between the east and south legs.
8	Southbound Yosemite signing additions to improve lane utilization in dual left turn lanes	Add signage to convey which left turn lane best positions a driver with respect to their destination (I-25 or eastbound Arapahoe Road)
9	Install street lights where not provided; particularly at intersections and driveways	
10	Add sidewalks	Provide sidewalks where none exist. Where narrow attached sidewalks exist, reconstruct as wider detached walks.
IMPROVEMENTS TO BE FURTHER VETTED		
1	Realigning Peakview between Peoria and Revere to be more the thoroughfare	Reconstruction and ROW needed. Benefit may not be significant.
2	Roundabout at Revere/Briarwood	Feasibility study should be completed. This will not significantly impact Arapahoe Road.
3	Realign Briarwood at Tucson Ct. to be more the thoroughfare rather than force east-west traffic to turn	Reconstruction and ROW needed. Benefit may not be significant.
4	Adding a signal at Kenton/Easter	A signal warrant analysis should be completed to gauge the near-term need.
5	Signalizing Peoria/Briarwood	A signal warrant analysis should be completed to gauge the near-term need. Connecting Briarwood from the west (Lima to Peoria) may trigger a stronger need to signalize this intersection.
6	Bus Service queue jumps/signal priority	This enhancement may encourage more transit use within the corridor, but this would need to be paired with major bus routing.
7	Pedestrian Grade Separations	Feasibility study should be completed at specific locations. There is potential benefit to Arapahoe Road in signal timing if the long pedestrian walk phase to cross Arapahoe Road is eliminated. Challenges exist relative to usage of a pedestrian crossing, especially given the relatively high cost.

In order for the two significant "capacity" elements of the recommendations to be eligible of federal funding (e.g., through DRCOG's Transportation Improvement Program -TIP), they must be identified as eligible in DRCOG's Appendix 4 of the Fiscally Constrained Regional Transportation Plan (RTP). The current 2040 RTP does identify a grade-separation at Jordan Road (for completion in the 2030-2040 staging period), but it does not identify the significant capacity widening from Potomac Street to Buckley Road. Stakeholders will need to work through DRCOG's upcoming fiscally constrained RTP development through spring 2020 for the new 2050 RTP (adoption in early 2021) to retain or add these projects to the eligible project list."

6.4 Funding

One fundamental means for funding the transportation improvements is through the City's Capital Improvement Plan (CIP). The CIP is prepared for a five- or ten-year period and is typically updated annually. Numerous improvements, especially the lower cost improvements presented in this plan could be good candidates for CIP dollars, in whole or in part.

Much of the corridor is a designated state highway which opens up other avenues for funding possibilities. DRCOG and CDOT both administer surface transportation programs comprised of State and Federal funding sources. DRCOG's process now entails sub-regional planning defined by each county's boundary. Centennial is an active member of the Arapahoe County sub-regional area, and funding for some of improvements could be requested through this process. Local match dollars are often key awarding funding. Local match dollars could come in the form of budgeted CIP money contingent on receiving funding through DRCOG. Centennial should coordinate with other stakeholders (Arapahoe County, Aurora, Foxfield, and CDOT) for additional local match dollars that would further strengthen funding through DRCOG. Some of the improvements are outside Centennial's city limits (entirely or in part), so cooperation is required for the plan to ultimately be realized.

Funding sources can also be realized through various grant programs. The more prominent Federal grant program best suited for Arapahoe Road is the BUILD Discretionary Grants. This is intended to improve connectivity in rural and urban communities nationwide, and Arapahoe Road is a key facility in providing connectivity to a large region given the significant transportation barriers of Cherry Creek State Park to its north and the Centennial Airport to its south. Other mini grants available through CDOT may be appropriate for select improvements, especially where alternative modes of travel are being enhanced, such as sidewalk improvements. Obtaining grant monies is a competitive process, and success is often related to a project which:

- Shows a high benefit-cost ratio
- Includes a significant local match dollar amount
- Includes a broad support of stakeholders

One other funding source pertains to the development community. The City requires development to finance the street network within and adjacent to the development. Potentially, some of the right turn lane additions shown in the plan could be funded through development at the time of entitlement. The other stakeholder agencies employ similar programs, and the development community could then be a partner toward the ultimate plan, as opportunities arise.

6.5 General National Environmental Policy Act Requirements

The Arapahoe Road Next Steps Operations Study provides a framework for the long-term implementation of the transportation improvements as funding becomes available. As proposed projects or phases of a proposed project move forward into the project delivery process, the National Environmental Policy Act (NEPA) may apply. NEPA applicates to any transportation project that has a federal nexus, including, but not limited, to instances where:

- Federal funds or assistance will be used at some phase of project development.
- Federal funding or assistance eligibility must be maintained.
- Federal permits or approvals are required.
- There will be new or revised access to the interstate system, which requires FHWA approval.

The application of NEPA and NEPA class of action should be confirmed with the CDOT Region 1 Regional Environmental Manager prior to project commencement.

Based on the proposed transportation improvements, the majority of the proposed projects would qualify as a NEPA Categorical Exclusion (CatEx) class of action. CatExs are for actions that do not individually or cumulatively have a significant environmental impact and are excluded from the requirement to prepare an Environmental Assessment or Environmental Impact Statement. The CatEx actions that will most likely apply include:

- C3. – Construction of bicycle and pedestrian lanes, paths, and facilities
- C26. – Modernization of a highway by resurfacing, restoration, rehabilitation, reconstruction, adding shoulders, or adding auxiliary lanes (including parking, weaving, turning, and climbing) if the project meets the constraints in 23 Code of Federal Regulations [CFR] 771.117(e).
- C27. – Highway safety or traffic operations improvements projects, including the installation of ramp metering control devices and lighting if the project meets the constraints in 23 CFR 771.117(e).

Proposed projects that do not qualify as a CatEx would most likely require preparation of an Environmental Assessment. Types of projects that typically require an Environmental Assessment include new interchanges and regionally significant projects, such as general purpose or auxiliary lanes greater than 1 mile in length, as defined by DRCOG. In addition, the proposed improvements at Arapahoe Road/Havana Street and Arapahoe Road/Revere Parkway may require a technical memorandum documenting the change in recommended alternative at that location from the 2007 PEL Study. Additional information on NEPA can be found in the CDOT NEPA Manual or from the CDOT Region 1 Regional Environmental Manager.

Appendix A. Initial Alternative Screening

Appendix B. Layout of Numbered Improvements and Cost Estimates

Appendix C. Improvement Benefit Calculations

Appendix D. VISSIM Calibration Process

Appendix E. Corridor Alternative Travel Time Profiles

Appendix F. Recommended Plan shown on Aerial Photography

August 16, 2019

Heather Lamboy
City of Aurora Planning Division
15151 E. Alameda Pkwy., Ste. 2300
Aurora, CO 80112
hlamboy@auroragov.org
(303) 739-7184

Re: DA-2194-00: Valley Arapahoe Initial Zoning and Comprehensive Plan Amendment, Case Nos. 2019-2004-00 and 2019-1002-00 (Valley Country Club Annexation)

Heather Lamboy:

The City of Centennial appreciates receiving and being given an opportunity to offer comments on **DA-2194-00: Valley Arapahoe Initial Zoning and Comprehensive Plan Amendment, Case Nos. 2019-2004-00 and 2019-1002-00** (the "Site.") Please find our comments below:

1. The City of Centennial previously engaged in discussions with the golf course owner and developer who proposed a substantially similar annexation and development proposal. At that time, the City of Centennial viewed developer prepared plans for the Site that showed multi-family buildings no closer than 70 feet to the eastern property line, and the multi-family buildings directly adjacent to the 70 foot buffer had a maximum height of two stories. The remaining three story buildings were concentrated internally to the site and along E. Arapahoe Rd. Buffering also included berms, substantial landscaping, and a solid wall all designed to protect the adjacent single family properties. We trust that Aurora would consider similar development design to best balance the interests of the residences to the east of the Site.
2. One of the justifications offered in the referral is that the Sustainable Infill Redevelopment Zone District (SIR) is a transition and buffer for the Cornerstar retail center on the south side of E. Arapahoe Rd. However, the Site is directly west, not in between, existing large lot residential essentially nullifying the transition and buffer value of the Site for the adjacent single family homes. Based on our understanding of the proposed zoning, SIR does not clearly guarantee an adequate transition to Valley Club Acres:
    a. We are concerned that structures may be located within 14 to 25 feet from existing Valley Club Acres home site property lines. If the property is to be developed for residential purposes, the City of Centennial strongly recommends a lower density residential zoning that is compatible with the existing neighboring residential uses. A lower density residential zoning would lessen the impact of private golf course land transitioning to a developed use.
    b. We are concerned that structures may be built to maximum height of 38 to 75 feet. This is not appropriate for all sections of the proposed Site without adequate setbacks and buffering.
    c. We are concerned that non-residential uses such as retail would be inappropriate for the Site as it would create an island of residential (Valley Club Acres and residential on the Site) amongst non-residential uses.
    d. Centennial asks that Aurora consider during this annexation and development project that the homes immediately adjacent to the Site have long enjoyed the presence of a lawfully established golf course. The conversion of the golf course

to multi-family use may significantly and substantially impair the values of the existing Valley Club Acre home sites in terms of reasonable expectation and quiet enjoyment. Although property owners can reasonably expect vacant developable land to be devoted to new uses which can impair their owner's property value, this expectation is not present when converting a fully functioning and operational use to a new and substantially more intensive use.

3. If and when a site plan is submitted, any access to the site from E. Arapahoe Rd. should comply with the *Arapahoe Road: Yosemite to Buckley Next Steps Operations Study* prepared for the City of Centennial by Felsburg, Holt, and Ullevig (FHU), August 2019.
    a. The proposed Site should be accessed at the existing signaled intersection, with no additional access unless specifically requested by emergency service providers.
    b. The existing City of Aurora-owned properties to the west of the site have direct access to E. Arapahoe Rd. This access should be combined with a future access point for the Site.
4. If and when a site plan is submitted, sidewalk that is separated from the E. Arapahoe Rd. back of curb should be installed along the ROW frontage. The sidewalk should also extend along the City of Aurora ROW frontage adjacent to 6699 S. Helena St. so that safe pedestrian access can be offered to the retail centers to the east (Centennial Center and Arapahoe Crossing).
5. If and when a site plan is submitted, there needs to be a landscape buffer along the eastern portion of the Site adjacent to the Valley Club Acres neighborhood. This buffer should consider a wall, berm, extensive evergreen and deciduous landscaping. Consultation on final design of a buffer should occur with adjacent property owners.
6. Based on our understanding, a significant portion of the property is within the 100-year floodplain. Please be aware that the Southeast Metro Stormwater Authority (SEMSWA) will also be offering comments on the proposal.
7. The City of Centennial is in support of the proposed trail easement.
8. The City would like to ensure that we receive future referrals for proposals related to this project, including public hearing dates.

Again, thank you for the referral. Please contact me at (303) 754-3356 or mgradis@centennialco.gov with any questions.

Sincerely,

City of Centennial

Michael Gradis, AICP
Senior Planner

Enclosed: Arapahoe Road: Yosemite to Buckley Next Steps Operations Study, August 2019

Lamboy, Heather

From: Joseph Boateng <JBoateng@arapahoegov.com>
Sent: Friday, August 02, 2019 4:21 PM
To: Lamboy, Heather
Subject: AURORA REF/ DA-1758-09/WATERSTONE CSP WITH WAIVERS AND PLAT

Dear Heather,
Arapahoe County Engineering thanks you for giving us the opportunity to review the AURORA REF/ DA-1758-09/WATERSTONE CSP WITH WAIVERS AND PLAT.
The Engineering Division has no comments regarding the referral at this time based on the information submitted.

Please know that other Divisions in the Public Works Department may submit comments as well.

If you have any questions, please feel free to contact our offices.

Sincerely,

Joseph Boateng
Engineering Services

Joseph Boateng, E.I.
Engineering Inspector
Arapahoe County Public Works & Development
6924 S Lima St, Centennial, CO 80112-3853
Direct: 303-910-9268 | Main: 720-874-6575
jboateng@arapahoegov.com **http://www.arapahoegov.com**

Date: August, 2019
To: Ms. Heather Lamboy
From: Valley Club Acres HOA Board
Subject: Valley Arapahoe proposed change in zoning

Dear Ms. Lamboy,

We strongly oppose the re-zoning of the 15.759 acres of parcel number 2073-19-4-00-005 for the following reasons:

In the letter from Norris Design dated July 23, 2019 titled Valley Arapahoe Land Development – Initial Zoning Letter of Introduction it is stated:

- Under the section titled; 'Initial Zoning' item 3. "New popular public spaces that help to attract people, **improve property values in the surrounding areas,** and increase the value of infill areas for development." (emphasis ours)
- And stated under the section, 'Initial Zoning' item 7, "Enhanced property values in neighborhoods...."

Real estate agents will tell you that open space, and golf course with mountain views increase property values. To re-zone and have a 38' – 75' buildings in what used to be open space and golf course will not improve our property values. It will substantially decrease and cause damage to our property values.

- Under 'Approval Criteria' item 2. last sentence ".... landscape buffers to ensure the future development is compatible with the adjacent residential homes to the east."

How can any building be the equivalent to an open space, and golf course with mountain views?

In the letter titled Valley Arapahoe Land Development – Comprehensive Plan Amendment Letter of Introduction it is stated:

- Under the section titled; 'Housing for All Principle' first paragraph, last sentence states "These uses allows (sic) for higher density flats and townhomes including single-story, multigenerational senior-friendly housing that will add variety to neighborhood housing options, **as much of the housing stock in the Parker and Arapahoe Road area consists of detached single-family homes**." (emphasis ours)

This is very confusing as there are substantial, available, apartments in the area and high-density housing developments are already significantly represented and overbuilt.

Just north of this parcel, located at Parker Road and Fraser Ave, are the following apartment complexes; The Grove (216 units) and The Orchards (240 units).

To the south of Cornerstar are located Caliber @ Cornerstar (140 units) Echelon (140 units) and Acadia (400 units) apartments.

These four complexes total 1136 apartment units (all have vacancies).

The Legends by Dominium, is a congregate care facility, with 209 units breaking ground in the fall at the corner of Parker Road and Fair Ave. This will bring the total number of apartment units in the area to 1345.

The area immediately east of the open space parcel contains 36 private homes. Hardly "much of the housing stock.... consists of detached single-family homes" in comparison to local apartment units.

- under the paragraph titled; A Healthy Community Principle it states "There are existing trail connections to Cherry Creek State Park to the north...."

There currently is no trail access to the north as the only access would be through Valley Country Club which is a private club.

- Under the paragraph titled 'Easy Mobility....' last sentence states "Additionally, many daily needs are within walking distance from the site in the Cornerstone (sic) shopping center directly to the south."

Even with cross walks very few people walk to Cornerstar or Arapahoe Crossing. Traffic is at 55 mph on both state highways and to say this is walkable is laughable if not extremely dangerous.

In the document 'Response to Pre-Application Meetings Notes' the Public Works section it states:

- Access permits are anticipated to be required for both the signalized intersection of Arapahoe Rd and Chambers Way and the Arapahoe Rd Right-in, Right-Out (sic)

We are very concerned about safety as the acceleration lane that is at Arapahoe Road and Helena Street will be at the same location as the Right-in, Right-out access. As drivers are accelerating to merge onto westbound Arapahoe Road, they will quickly be upon someone slowing or stopped to turn right into the development. This is also the location of the route 66 RTD bus stop. The number of accidents along the Arapahoe Road corridor at this location will increase.

The close proximity of high-density residential housing and/or commercial development poses additional significant impact decreasing property values through loss of open space and golf course with mountain views thus causing damages to these homeowners. There would also be additional impact to the residential members of our Home Owners Association (HOA), such as, but not limited to:

- Additional trash and increased debris on all neighboring properties from new development (prevailing winds will tend to blow trash onto golf course)
- Storm run-off bringing trash and other debris into water quality ponds from parking lots and dumpsters (diapers, cigarette butts, food wrappers, plastic bags, etc.) on neighboring and adjoining properties
- Increased noise pollution (truck deliveries, trash truck pickups, increased car traffic, music, air conditioning)
- Increased pedestrian trespassing on adjacent private property and increased dog feces as well.
- Increased crime, vandalism, loitering and graffiti

These are only some of the larger issues our HOA Board currently deals with on a regular basis. Additional development will only increase these, and other, issues.

Each of these will have a financial impact and cause damages to the residents of our HOA.

In addition, attached please find a letter from Valley Club Acres HOA sent to SEMSWA documenting past flooding as a result of Arapahoe Crossing being developed. These photos were taken during non-historic rains. Also included please find recent pictures posted by Valley Country Club on their Facebook page showing flooding on the golf course from a recent non-historic rain storm. Having the 15.759 acres of open space paved over and developed puts our 36 homes at risk of further flooding, documented by the Country Club itself.

We respectfully request that the City of Aurora carefully consider the detrimental impacts and concerns that Valley Club Acres HOA has raised and reject the plan to re-zone.

Sincerely,

Annette Jewell

Valley Club Acres HOA Board
Annette Jewell, Valley Club Acres HOA Secretary

P.S. Please see attached comments from Arapahoe County below. (emphasis ours)

The following comments were left on the Aurora website by Bill Skinner from Arapahoe County:

• Application labels this as sustainable infill. An explanation of how replacing urban green space with a commercial hub increases sustainability should be provided.
• Refer to AC Engineering comments regarding connection E Arapahoe Rd / S Chambers Wy intersection and participation in traffic signal costs.
• This is in the airport influence area Buffer Zone that recommends no residential development or other noise sensitive development. Staff will not support residential development or other noise sensitive uses in buffer zones.
• Please be sure to send a referral to the Centennial Airport for comments.
• Be sure to provide neighborhood outreach to surrounding homes and businesses in unincorporated Arapahoe County.

Lamboy, Heather

From: Woodruff, Clayton <Clayton.Woodruff@RTD-Denver.com>
Sent: Thursday, August 15, 2019 8:15 AM
To: Lamboy, Heather
Subject: RE - Northeast Corner E Arapahoe Road and S Chambers Way

The RTd has no comment on this project

C. Scott Woodruff
Engineer III
Regional Transportation District
1560 Broadway, Suite 700, FAS-73 | Denver, CO 80202

o 303.299.2943 | m 303-720-2025
clayton.woodruff@rtd-denver.com

Lamboy, Heather

From: Judith Wedel <jkswedel@live.com>
Sent: Tuesday, August 13, 2019 5:38 PM
To: Lamboy, Heather
Subject: Fwd: Valley Arapahoe

Heather,

We are strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

Sincerely, Erica

Erica Kelley

14852 E. Maplewood Pl.

Centennial, CO 80016

Lamboy, Heather

From: Greg Carter <grcarter7@yahoo.com>
Sent: Thursday, August 15, 2019 6:22 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

Dear Heather,
We are opposed to the rezoning of the 15.75 acres of Valley Country Club from Open Space/Golf Course to MU-C.
This property should remain as open space, the homeowners bought property as One Acre golf course lots with Mountain View's. Property values would be damaged severely if this is allowed to happen. Multi story apartments would not fit with our existing single family homes on one acre lots. This would destroy our privacy, increase crime and ruin our quality of life.
As far as a right in and right out, we are concerned with having a safety issue as the acceleration lane from Helena Street west bound would be extremely to close and we would not want any interior road adjoining or next to our properties.
Please do not approve any zoning change for this Open Space property.
Thank You

Greg and Nancy Carter
6699 S. Helena St

Sent from my iPhone

Lamboy, Heather

From: Gary/Rhonda Livingston <we3liv@aol.com>
Sent: Thursday, August 15, 2019 8:09 PM
To: Lamboy, Heather
Subject: Valley Arapahoe Proposed Change in zoning

Dear Ms. Lamboy,

On behalf of Centennial Council of Neighbors, an umbrella group of about 50 Centennial neighborhoods, we are submitting this letter of opposition. Our opposition is regarding the rezoning for The Valley Arapahoe parcel near Arapahoe Road and Chambers Way.

The proposed rezoning would negatively impact the character of the surrounding area and cause a very dangerous situation along Arapahoe Road. This area of Arapahoe Road is already very dangerous and many accidents happen in and near that particular intersection. The proposed zoning would allow high density residential and that type of use would add to the frustration that drivers experience at that intersection every day.

High density residential at that particular site is not in character with the immediate surrounding community. Please do not allow the proposed zoning change for this site.

Thank you for your consideration.

Sincerely,
Rhonda Livingston
VP of Plans Review, Centennial Council of Neighborhoods (CenCON)

Lamboy, Heather

From: Sharon Charlton <charltonss@comcast.net>
Sent: Sunday, August 11, 2019 7:01 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

We are strongly opposed to the re-zoning of urban green space to commercial hub per the development application by Valley Arapahoe.

Sincerely,

Sharon and Scott Charlton
6527 South Helena St
Centennial, CO 80016

Sent from my iPhone

Lamboy, Heather

From: Cynthia Charney <cynthia.charney@outlook.com>
Sent: Sunday, August 11, 2019 5:46 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

We are strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

Sincerely,
Cynthia Charney
Piney Creek
5478 South Hannibal Way

Lamboy, Heather

From: Lynn Corrigan -25mc <lynn25mc@gmail.com>
Sent: Tuesday, August 13, 2019 5:23 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

I am strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

Sincerely,
Lynn Corrigan
6490 E Mineral Dr
Centennial, CO 80112

Lamboy, Heather

From: Drew Dines <dines4pack@gmail.com>
Sent: Monday, August 12, 2019 7:17 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

Heather
When is enough developed land enough? This development will hurt a lot more than people. The wildlife in this particular place will be heavily effected. The deer, bear, bobcat, coyote, Fox, skunks, rabbit, squirrels, birds, snakes, frogs and many other animals will be eliminated. Does tax dollars that really don't get managed properly justify the need of our one natural gift from Mother Earth. Keep it natural for Millennium. Why develop it? See the future of open land. There is living green plants and animals that will flourish more than concrete.
Drew

Lamboy, Heather

From: Roger DuCharme <rogerd@shiputs.net>
Sent: Monday, August 12, 2019 5:11 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

Ms. Heather Lamboy,

I am strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe. I hope that the city is more in terested in the wishes of the neiborhood than commercial developers who will ruin our neiborgholod in which we have lived for almost thirty years. Valley Acres is a small residential noeghborhhod. High-rise apartments do not belong here, please do the right thing, I implore you.

Sincerely,

Roger C. DUCharme
6362 S Helena Street
Cenntennial, CO 80016

Lamboy, Heather

From: Gretchen Griffin <gurdie_tx@sbcglobal.net>
Sent: Sunday, August 11, 2019 6:22 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

We are strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

Gretchen Griffin
6333 S Helena
Centennial, CO 80016

Sent from my iPhone

Lamboy, Heather

From: Parveen Gupta <parveen_gupta@yahoo.com>
Sent: Monday, August 12, 2019 3:24 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

Hi,

We are strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

Sincerely,
Parveen and Abha Gupta
15021 E Aberdeen Ave
Centennial, CO - 80016

Lamboy, Heather

From: William Heiss <WHeiss@msn.com>
Sent: Tuesday, August 13, 2019 6:49 PM
To: Lamboy, Heather
Subject: Re: Valley Arapaho

Thank you! I believe our green space is shrinking rapidly, and once gone it's usually gone forever. Additionally, Arapaho has become so busy that for most of the day I go to extremes to avoid it. This development would add a LOT of traffic and emissions to the already congested area around Arapaho and Parker.
Bill Heiss

On Aug 13, 2019, at 6:38 PM, Lamboy, Heather <hlamboy@auroragov.org> wrote:

> Hi Bill,
>
> Thank you for contacting me regarding your concern. I will be sure to include this as part of the record.
>
> **Heather L. Lamboy, AICP**
>
> Planning Supervisor
> Planning & Development Services
> hlamboy@auroragov.org
> Direct: (303) 739-7184
>
> <image001.png><image002.png>
> Facebook | Twitter | Instagram | Nextdoor | AuroraTV.org
>
> ---
>
> **From:** William Heiss [mailto:wheiss@msn.com]
> **Sent:** Tuesday, August 13, 2019 12:49 PM
> **To:** Lamboy, Heather <hlamboy@auroragov.org>
> **Subject:** Valley Arapaho
>
> I am strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.
>
> Sincerely,
>
> Bill Heiss
> 8188 S Norfolk St
> Englewood, CO 80112

Lamboy, Heather

From: Ron Phelps <ronphelps@gmail.com>
Sent: Tuesday, August 13, 2019 12:40 PM
To: Lamboy, Heather
Subject: No! Rezoning of Urban Green Space

Dear Ms. Heather Lamboy,
I'm running for Centennial City Council this year and wanted to offer my thoughts to you regarding a rezoning of Urban Green Space to a commercial or residential use (parcel number 2073-19-4-00-005).

Open space is precious and once gone can never be reclaimed.

Please record this email in the public record as strongly opposed.

Thank you.
Ron
2043 E. Nichols Dr, Centennial CO 80122

_____-
Ron Phelps
Candidate for Centennial City Council
www.ronphelps.com
(303) 895.8980
.

Lamboy, Heather

From: William Heiss <wheiss@msn.com>
Sent: Tuesday, August 13, 2019 12:49 PM
To: Lamboy, Heather
Subject: Valley Arapaho

I am strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

Sincerely,

Bill Heiss
8188 S Norfolk St
Englewood, CO 80112

Lamboy, Heather

From: Linda Henderson <lhender147@gmail.com>
Sent: Tuesday, August 13, 2019 3:33 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

Dear Ms. Lamboy,

We are strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe. We live in Orchard Valley, a small development west of Parker & Orchard Road. We do not wish to see Arapahoe Road become any more congested than it currently is. The plans in this proposal for rezoning from a green space to MU-C, a commercial and dense residential (apartments) zone, which allows for 3-6 stories, is nothing more than a grab for money by developers. We have got to put a stop to over-developing the precious space we have left in this city . . . whether it be Aurora or Centennial.

Sincerely,

Linda Henderson
14792 E. Lake Place
Centennial, CO 80016

Lamboy, Heather

From: George Holland <ghholland@icloud.com>
Sent: Monday, August 12, 2019 3:21 PM
To: Lamboy, Heather
Cc: gwendolyn.holland@centura.org
Subject: Valley Arapahoe

Hi Heather,

We oppose the insane building of additional commercial and high rise property in an already high traffic and unsafe area for pedestrians and road travelers alike.

Thank you,
George Holland
6043 S Eagle St
Centennial CO 80016

Sent from my iPhone

Lamboy, Heather

From: denzil inman <djfoodwizard@gmail.com>
Sent: Friday, August 16, 2019 7:24 AM
To: Lamboy, Heather
Cc: mgradis@centennialco.gov; council@centennialco.gov
Subject: Valley Arapahoe

We are strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe. We need open space and we don't need anymore traffic on Arapahoe.
Sincerely,

Denzil Inman
Diane Gimber
6917 S. Madison Way
Centennial, CO 80122

Lamboy, Heather

From: m kehl <mc_kehl@yahoo.com>
Sent: Wednesday, August 14, 2019 10:42 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

Ms. Lamboy,

We are strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe. The greenway and wildlife corridor along Cherry Creek is an important and integral part of the Cherry Creek Reservoir and surrounding communities. Development and destruction of the area with have long lasting and devastating effects. It is important to protect and preserve this open space.

Sincerely,

Mary C. Kehl
6475 S. Helena St.
Centennial, CO 80016

Lamboy, Heather

From: Keith <keith@rockerbob.com>
Sent: Thursday, August 15, 2019 9:38 AM
To: Lamboy, Heather
Subject: Valley Arapahoe

I passionately oppose the rezoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

We have plenty of businesses and far too little open space. The businesses that move in will likely be owned by chains, and no locally owned business will be able to compete. The only benefit will be more tax revenue for Aurora, but that won't change how much tax I pay so it is irrelevant. We will get more traffic, pollution, noise, and general chaos. We will lose local businesses and a measure of tranquility, which is mostly gone already.

Sincerely,

Keith Lewis
14204 E Chenango PL
Aurora, CO 80015

Lamboy, Heather

From: Bob Lansford <boblansford@comcast.net>
Sent: Wednesday, August 14, 2019 7:59 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

Heather,

I am opposed to the zoning of land owned by Valley Country Club for MU-C use. And this comes from a member of Valley Country Club!

My reasoning is brief; open-space is getting very scarce in metro Denver and the traffic congestion on Arapahoe Road is already outrageous. So, I'm just asking for you to do the right thing and vote against this development.

Sincerely,

Bob Lansford
15400 E Caley Ave
Centennial, CO 80016
303-808-7282

Lamboy, Heather

From: Beth Lascor <ehlascor@gmail.com>
Sent: Sunday, August 11, 2019 5:53 PM
To: Lamboy, Heather
Cc: John Lascor
Subject: Valley Arapahoe

We are strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

Sincerely,

John & Beth Lascor

15607 E Weaver Ave.

Centennial, CO 80016

Lamboy, Heather

From: Steve Litt <swlitt@gmail.com>
Sent: Tuesday, August 13, 2019 5:16 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

I oppose having more traffic and development on open space in our county and specifically the plan proposed by the Valley Arapahoe community.

We are strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

Sincerely, Steve Litt, 7640 S Jasmine Way, Centennial, CO 80112

--
Steve Litt, LCSW
303-758-6568 www.SteveLittLCSW.com

Lamboy, Heather

From: Gary/Rhonda Livingston <we3liv@aol.com>
Sent: Thursday, August 15, 2019 7:46 PM
To: Lamboy, Heather
Subject: rezoning Arapahoe Road/Chambers Way

Dear Ms. Lamboy,

We are strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe. This type of zoning would negatively change the character of the community. The intersection at Arapahoe and Chambers would also be negatively impacted. Traffic is usually bad at this intersection on a typical basis. Adding more traffic to this intersection will be a disaster waiting to happen. We have witnessed too many accidents at this intersection over the years.

Thank you for your consideration in this rezoning matter.

Gary and Rhonda Livingston
residents near Arapahoe Road and Jordan Road

Lamboy, Heather

From: Walt and Betty <wwboehn@comcast.net>
Sent: Monday, August 12, 2019 5:04 PM
To: Lamboy, Heather
Subject: Protest of open space land development

For the record, I strongly oppose development proposed by Valley Country Club to change open space to high density housing near Arapahoe Rd.

W W Boehnke

14850 E Maplewood Dr

Centennial Co 80016

Lamboy, Heather

From: Mary DuCharme <maryd@shiputs.net>
Sent: Monday, August 12, 2019 5:00 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

Sent from my iPad

Dear Heather Lamborghini,

I am strongly opposed to the rezoning of Urban GreenSpace to Commercial Hub per the development application by Valley Arapahoe. I do hope that Centennial government will represent the wishes of the voters and not cater to big business.

Mary E. DuCharme
6362 South Helena Street
Centennial Co 80016

Lamboy, Heather

From: Elisabeth Mankamyer <elisabeth.mankamyer@gmail.com>
Sent: Friday, August 16, 2019 3:14 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

Hello,

I am writing to you to share my opposition to the re-zoning of the 15.759 acres of land currently owned by Valley Country Club. I live in Algonquin Acres at Arapahoe and Jordan Roads. I am also a member of Valley CC. The reasons for my opposition are threefold. First, traffic on Arapahoe Road is terrible at peak times. In the evening, it can take me 30 minutes to get from Jordan Road to Parker Road on Arapahoe. Additional housing at Arapahoe and Chambers will only make this so much worse and overwhelm our already full streets. Second, the preservation of open space should be valued. To have 15 undeveloped acres along Arapahoe Road is positive for residents, wildlife and traffic. The current use is much better than any development, especially residential. Third, this will have a major impact on local schools. Our current schools are at capacity (often exceeding capacity). Additional high density residential projects are impacting our school populations and new development at Arapahoe and Chambers will only make that worse, which may necessitate boundary changes or additional costs to expand our schools or build more. There are areas more appropriate for the development being sought here and I do not think the pros outweigh the cons. Again, as a member of Valley Country Club and seeing this from that perspective and as a homeowner very near by, I do not support the rezoning request and respectfully ask Aurora to deny the rezoning.

Thank you.

Best,
Elisabeth Mankamyer
6540 S Billings Way
Centennial, CO 80111
425-273-0277

Lamboy, Heather

From: Jill Meakins <jillmeakins@comcast.net>
Sent: Monday, August 12, 2019 2:54 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

I am strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

This area of Arapahoe Road is at a standstill EVERY DAY between 3:30 and 6:00 pm (from Potomac to Parker Road.) Adding a thousand vehicles trying to get home to this new development would be a mistake. It is hard to believe ANYONE would want to fight every day just to get home after work.

I live at Potomac and Arapahoe Road and I do not go to the grocery store on Parker after 3pm. It would take me 45 minutes to get there.

Adding additional commercial and apartments to this site would be detrimental to the existing neighborhood of homeowners who invested in properties with mountain views and green space.

Our cities are losing urban green space at an alarming rate. For what? More apartment high-rises that destroy property values for adjacent neighborhoods. Aurora (and Centennial) aren't Denver. Open space is important to us - we value the positive attributes open space has for residents. Please KEEP our green space!

Sincerely,

Jill Meakins
6483 S. Abilene St.
Centennial, CO 80111

Lamboy, Heather

From: Frank Middleton <frankm101@hotmail.com>
Sent: Thursday, August 15, 2019 11:26 AM
To: Lamboy, Heather
Subject: Valley Arapahoe

Heather;

Please please please vote no on changing green belt to commercial from the Valley Country Club.

Our quality of life is at stake. We will have less traffic, cleaner air, more greenbelt. It is an all win. With commercial the only winner is the developer.

Frank Middleton
Centennial

Sent from Mail for Windows 10

Lamboy, Heather

From: Phil H <phend519@gmail.com>
Sent: Tuesday, August 13, 2019 1:02 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

My wife and I are really opposed to any more traffic or more commercial buildings or Apartments because of re-zoning of the green space to development in Valley Country Club on Arapahoe Rd.

Regards: Phil Henderson

303-693-6375

Lamboy, Heather

From: Eddie Pells <eddie.pells@gmail.com>
Sent: Wednesday, August 14, 2019 10:34 AM
To: Lamboy, Heather
Subject: valley arapahoe

I am strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.
Plenty of empty commercial space across the street at Cornerstar, and no need for more -- or more traffic. Sincerely, Edward Pells
5441 S. Helena St.
Centennial

Lamboy, Heather

From: Shari Riggert <shari@arrowstagelines.com>
Sent: Sunday, August 11, 2019 5:50 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

Roger and Shari Riggert are opposed to the re-zoning of open space to MU-C per the development application by Valley Arapahoe.

Sincerely,

Shari Riggert

15564 E Weaver Ave

Centennial, Co 80016

Sent from my iPhone

Lamboy, Heather

From: CARI ROBERTS <c3erob@comcast.net>
Sent: Friday, August 16, 2019 9:13 AM
To: Lamboy, Heather
Subject: Opposition to the re-zoning of existing urban green space for Valley Arapahoe development

Dear Ms Lamboy,

Far too often public comment by home owners (especially those that are directly impacted by developers motivated by profit) are not considered by elected public officials that seem to justify catering to developers. As a nearby property owner that stands to be adversely impacted by this proposed development, I hope that you are looking for honest input to consider prior to approving the re-zoning issue.

I would like to take this time to strongly opposed to the re-zoning of existing urban green space to allow a "Commercial Hub" per the development application by Valley Arapahoe.

We have enough "commercial hubs" already built in the proposed area of Arapahoe Road and Parker Road, and the natural greenbelt spaces are disappearing at an alarming rate.

Allowing natural greenbelt land to be rezoned for large commercial development without full consideration to the cumulative environmental impacts along with the impacts to those who have invested and live in the neighborhood directly adjacent to it, would be irresponsible for elected officials who have no personal stake in their decisions (they are not directly impacted by the poor decisions they make).

Sincerely,

Clark Roberts

6500 S Helena Street

Centennial, CO 80016

Lamboy, Heather

From: Gayle & Norm Rullo <ruffalo8@msn.com>
Sent: Monday, August 12, 2019 3:55 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

We are strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

Sincerely,

Norman & Gayle Rullo
5925 S Elkhart Ct
Centnnial, CO 80016

Lamboy, Heather

From: S Sand <ssand77@yahoo.com>
Sent: Tuesday, August 13, 2019 10:37 AM
To: Lamboy, Heather
Subject: Valley Arapahoe

Dear Ms. Lamboy,

I want to express my absolute opposition to the re-zoning of the urban green space near Arapahoe Rd. and Chambers per the development application by Valley Country Club.
We are currently experiencing major encroachment of our neighborhoods and unbearable traffic on Arapahoe Rd. in this already plenty-well-developed area.

Respectfully,

Sue Sanders
13253 E. Briarwood Ave.
Centennial, CO 80122
Sent from Yahoo Mail on Android

Lamboy, Heather

From: ankttime <ankttime@comcast.net>
Sent: Tuesday, August 13, 2019 7:46 PM
To: Lamboy, Heather
Subject: Rezoning area near Arapahoe & Chambers Way

The traffic pattern alone should say NO to rezoning for multi-family development. Please!

Sent from my Verizon, Samsung Galaxy smartphone

Lamboy, Heather

From: Mary Schwartz <mschwartz80014@yahoo.com>
Sent: Wednesday, August 14, 2019 3:54 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

I am strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe
Our urban green space is a valuable asset in our community. It is important to our quality of life in Aurora.

Sincerely,

Mary C. Schwartz
13890 E. Marina Dr., #510
Aurora, CO 80014

Lamboy, Heather

From: Kade Sessions <kade@sessionsllc.com>
Sent: Monday, August 12, 2019 12:17 PM
To: Lamboy, Heather
Cc: Steve Sessions
Subject: Valley Arapahoe
Attachments: PastedGraphic-2.tiff

Ms. Lamboy,

We are strongly opposed to the rezoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

Sincerely,

Kade Sessions
President
Sessions Group, LLC
303-356-5508 Cell
303-781-0652 Fax
www.sessionsllc.com

Lamboy, Heather

From: Vern Sessions <vksessions@aol.com>
Sent: Monday, August 12, 2019 9:37 AM
To: Lamboy, Heather
Subject: Valley Arapahoe

Heather Lamboy,

Good morning,

We are strongly opposed to the rezoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

Sincerely,

Evelyn and Vernon Sessions
6405 S Helena Street
Centennial Co 80016

Sent from my iPhone

Lamboy, Heather

From: Steve Sessions <steve@sessionsllc.com>
Sent: Monday, August 12, 2019 9:45 AM
To: Lamboy, Heather
Subject: Valley Arapahoe

Ms. Lamboy,

We are strongly opposed to the rezoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

Sincerely,

Steve & Debbie Sessions
5403 South Walden Street
Centennial Co 80015

Lamboy, Heather

From: Liam Sherry <centennialstateapps@comcast.net>
Sent: Sunday, August 11, 2019 6:48 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

Hi there, please stop the madness of development along Arapahoe road! Not only will this proposed development increase the already busy traffic along Arapahoe Road, it will also destroy the value of properties of several of my neighbors. Valley Country Club is losing revenue because of unrealistic membership fees and simply wants to dump land to a developer who wishes to construct a large housing project.

Thanks!

Liam D. Sherry

15695 E. Peakview Ave, Centennial, CO 80016

Lamboy, Heather

From: sj s <sjscharmed@yahoo.com>
Sent: Thursday, August 15, 2019 11:12 AM
To: Lamboy, Heather
Subject: Valley Arapahoe

Please keep this land open space. We already have too much impervious cover which will create runoff problems down the road.

Thanks

Lamboy, Heather

From: Phil Smith <philnsharonsmith@gmail.com>
Sent: Wednesday, August 14, 2019 7:58 PM
To: Lamboy, Heather
Subject: Rezoning

We live in Centennial, CO We strongly oppose rezoning 15,759 acres of land located at Arapahoe Rd. and Chambers Way. The increase of traffic on Arapahoe is congested now and rezoning will make it worse. Centennial needs open space.
Sharon M. Smith
Philip L. Smith
8123 S. Wabash Court
Centennial

Lamboy, Heather

From: Kristin Stepien <kstepien@copic.com>
Sent: Monday, August 12, 2019 2:47 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

Heather,

We are strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe. Please, please do not do this.

We have enough traffic as it is. The reasons why we moved to this area are quickly deteriorating as open space ceases to exist. If this high density housing specifically is allowed, we will seriously consider selling our home and moving. Thank you for your consideration!

Kristin Stepien, CIC, ARM
Vice President of Sales and Business Development
Phone: 720-858-6186 // Fax: 720-858-6001
Toll Free: 800-421-1834 Ext. 6186
kstepien@copic.com // www.callcopic.com

Lamboy, Heather

From: Nicole Tapia <nicole.tapia5@gmail.com>
Sent: Thursday, August 15, 2019 9:19 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

Good evening,
I am strongly opposed to the rezoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe, Project number: 1388493.

Sincerely,
Nicole Tapia
16363 E Fremont Ave
Apt 1024
Aurora, CO 80016 hlamboy@auroragov.org

Lamboy, Heather

From: T Van Sant <tiffvansant@gmail.com>
Sent: Wednesday, August 14, 2019 8:21 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

Heather, I am strongly opposed to the re-zoning of the Urban Green Space to Commercial Hub per the development application by Valley Arapahoe. This is already a very busy/congested/overcrowded section of Arapahoe Road therefore adding high density residential and/or commercial space would severely impact nearby residents in a negative way.

Sincerely,
Tiffany Van Sant
15034 E Maplewood Dr,
Centennial, CO 80016
Orchard Valley Subdivision

Lamboy, Heather

From: Jim Bahne <bahne6649@comcast.net>
Sent: Wednesday, August 14, 2019 9:15 AM
To: Lamboy, Heather
Subject: Valley Arapahoe

We are strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

Sincerely,

James and Kathryn Bahne

6649 S Helena St

Centennial

Lamboy, Heather

From: Erica Wedel <ewedel@live.com>
Sent: Tuesday, August 13, 2019 5:19 AM
To: Lamboy, Heather
Subject: Valley Arapahoe

Heather,

We are strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

Sincerely, Erica

Erica Kelley

14852 E. Maplewood Pl.

Centennial, CO 80016

Lamboy, Heather

From: Wendi T. <wendimarie89@gmail.com>
Sent: Monday, August 12, 2019 10:22 AM
To: Lamboy, Heather
Subject: Valley Arapahoe

Hello Heather,
I am strongly opposed to the re-zoning of urban green space to commercial hub per the development application by Valley Arapahoe.

Please let me know how I can help.

Sincerely,
Wendi M. Townsend
14801 E Penwood Pl
Aurora, CO 80015

Sent from my LG G6

Lamboy, Heather

From: Doretha Williams <dwill2935@outlook.com>
Sent: Friday, August 16, 2019 4:27 AM
To: Lamboy, Heather
Subject: Valley Arapahoe

We are strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.
The traffic on Arapahoe Road at Chambers Way is already a bottle neck of traffic and we do not need more commercial traffic along that area of Arapahoe Road.
Sincerely,

Citizens for a Better Centennial

R. Thomas and Doretha Williams
6350 S Jericho Ct
Centennial, CO 80016

Lamboy, Heather

From: JOE ZHOU <jiningzhou@yahoo.com>
Sent: Thursday, August 15, 2019 3:11 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

We are strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe. Sincerely, Jinng Zhou
Jie Ye
13714 E Caley Dr
Centennial CO 80111

Lamboy, Heather

From: Mary Luger <mary_luger@icloud.com>
Sent: Saturday, August 10, 2019 4:34 PM
To: Lamboy, Heather
Subject: Valley/Arapahoe

My husband and I are opposed to the re-zoning of open space to MU-C per the development application by Valley Arapahoe.

Sincerely,

Mary Luger

15606 E Weaver Avenue

Centennial, Colorado

80016

Lamboy, Heather

From: Gino Braiotta <gbraiotta@gmail.com>
Sent: Tuesday, August 13, 2019 1:46 PM
To: Lamboy, Heather
Cc: Bianca Braiotta; Maria Smothers
Subject: Valley Arapahoe

Dear Heather Lamboy,

We are strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe. Additional commercial and high density residential units would only serve to exacerbate the existing traffic density issues on Arapahoe Rd/Chambers Way and the surrounding areas.

Best regards,
Gino Braiotta
14809 E Maplewood Dr
Centennial CO 80016

Lamboy, Heather

From: Kim budd-davis <kimbudddavis@gmail.com>
Sent: Monday, August 12, 2019 2:39 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

I am strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

Sincerely,
Kimberly Budd-Davis
15094 E Maplewood Dr,
Centennial, CO 80016

Lamboy, Heather

From: anneburton@attglobal.net
Sent: Wednesday, August 14, 2019 6:58 AM
To: Lamboy, Heather
Subject: Valley Arapahoe

We are strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

Sincerely,
Anne & Tyler Burton
6661 S. Abilene Way
Centennial, CO 80111

Lamboy, Heather

From: scallbeck2@gmail.com
Sent: Tuesday, August 13, 2019 6:11 PM
To: Lamboy, Heather
Subject: Valley Arapahoe

We are strongly opposed to the re-zoning of Urban Green Space to Commercial Hub per the development application by Valley Arapahoe.

Sincerely,
Spencer Callbeck

Sent from my iPhone