



FUTURE 42

Connecting People and Places



December 2022



Acknowledgments

Prepared for



Prepared by



In Partnership With



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Acronyms and Terminology



Actuated Signals: Traffic signals that are used to prioritize movement along the primary corridor by using detection methods for all traffic movements

Acceleration/Deceleration Lanes: Lanes that allow vehicles to speed up or slow down in a designated space not used by through traffic

ADA: Americans with Disabilities Act

Bicycle Detection: A detection method that is used at actuated signals to alert the signal controller of bicycle crossing demand on a particular approach

Bikeable Shoulder: A paved shoulder that runs parallel to a roadway's travel lanes

Buffered Bicycle Lane: A conventional bicycle lane paired with a designated buffer space separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane¹

Bus Rapid Transit (BRT): A high-quality bus-based transit system that delivers fast and efficient service that may include dedicated lanes, busways, traffic signal priority, elevated platforms, and enhanced stations²

Continuous Flow Intersection (CFI): An alternative design for an at-grade road junction in which vehicles attempting to turn across the opposing direction of traffic cross before they enter the intersection

Curb Extension: A safety treatment that visually and physically narrows a roadway, creating shorter crossings for pedestrians while increasing available space for streetscape features

Level of Service (LOS): A qualitative measure to describe the operating conditions of a roadway based on factors such as speed, travel time, delay, and safety

Median: The reserved area or strip that separates opposing lanes of traffic on divided roadways, often containing landscape features

Multiuse Trail: A trail that allows for two-way off-street pedestrian and bicycle use

NAMS: Northwest Area Mobility Study

Pedestrian Refuge Island: A physical design feature that reduces the exposure time experienced by a pedestrian or bicyclist in an intersection

Pocket Bicycle Lane: A bicycle lane that integrates

a 'bicycle pocket' at an intersection to allow for bicyclists to correctly position themselves and avoid conflicts with turning vehicles

Protected Intersection: An intersection design that keeps bicyclists physically separate from motor vehicles up into the intersection, providing a high degree of comfort and safety for people of all ages and abilities

Roundabout: A circular intersection or junction in which road traffic is permitted to flow in one direction around a central island

RTD: Regional Transportation District

Streetscape: A defining feature of a street that portrays the natural built fabric of the street and adds to the experiential quality of the space, including, but not limited to, landscaping and lighting features

StreetScore+: A modeling system that gives a safety rating from 1 through 4 to bicycle and pedestrian infrastructure, with 1 indicating the most desirable conditions and 4 indicating less desirable infrastructure

TMP: Transportation Master Plan

Topography: The arrangement of the natural and artificial physical features of an area

Transit Signal Priority (TSP): Tools that modify traffic signal timing or phasing when transit vehicles are present either conditionally for late runs or unconditionally for all arriving transit

Quadrant Intersection: Adds an additional 'quadrant roadway' between two legs of an intersection

Queue Jump Lane: Lanes that combine short, dedicated transit facilities with either a leading bus interval or active signal priority to allow buses to easily enter traffic flow in priority position

Zoning: A planning method used to regulate land uses and development into areas called zoning districts

¹ National Association of City Transportation Officials (NACTO)
² Federal Transit Administration (FTA)

Improvements At-a-Glance

Multimodal Enhancements



Existing Corridor:
Streetscore+ 4
Proposed Corridor:
Streetscore+ 1

Addition of Protected
Bicycle Lanes and
Protected Intersections



Existing Corridor:
Streetscore+ 4
Proposed Corridor:
Streetscore+ 2

Separated sidewalks with
vegetated buffers added



Currently there are
limited bus stops on CO
42. The recommended
alternative fits **Future
BRT** by providing room
for **Queue Jumps** and
Lane Space for transit

Safety

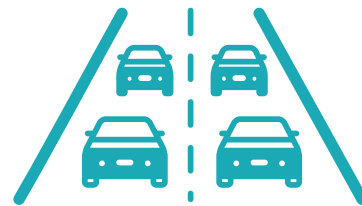


5 Years Crash Data
Existing Corridor:
445 Crashes
10 Serious Injury/Fatal
Proposed Corridor:
15% Reduction in Crashes,
Countermeasures focused on
Vision Zero for this corridor

Red Text is Undesirable Conditions Based on Project Goals

Green Text Indicates Conditions In Line with Project Goals

Vehicle Travel



Existing Corridor Travel Time (2019):
AM: 7 (NB)/8 (SB) Minutes
PM: 9 (NB)/9 (SB) Minutes
Proposed Corridor Travel Time (2019):
AM: 7 (NB)/8 (SB) Minutes
PM: 8 (NB)/8 (SB) Minutes
Proposed Corridor Travel Time (2050):
AM: 8 (NB)/11 (SB) Minutes
PM: 11 (NB)/11 (SB) Minutes
Speed Limit Changes:
Existing: 45/50 MPH
Proposed: 35/40 MPH

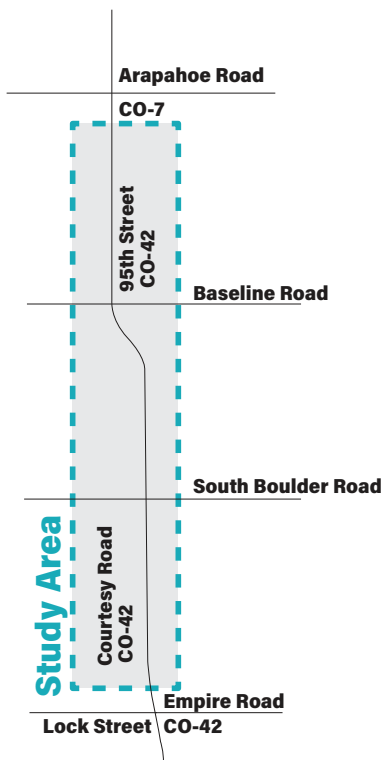
Executive Summary



The Goal of Future 42

The purpose of the Future 42: Connecting People and Places Study is to help shape the future transportation patterns along CO 42 for roadway users of all types, ages, and abilities, which includes bicyclists, pedestrians, and people with disabilities. The goal is for community members to be able to choose any mode of transportation they desire and travel safely and comfortably. The study includes recommendations for improved bicycle facilities, pedestrian facilities, bicycle lanes, pedestrian underpasses, safer motor vehicle facilities, and accommodations for future Bus Rapid Transit (BRT).

The Study Area



The Future 42 study includes ten (10) intersections and approximately three (3) miles of the CO 42 corridor along the north/south segment of CO 42 and is split between both the City of Lafayette and the City of Louisville. The study area begins north of the Lock Street/Empire Road and ends south of the intersection with Arapahoe Road. The existing roadway in the study area is a mix of two, three, and four travel lanes with auxiliary turn lanes as

needed. The main intersections of the study are:

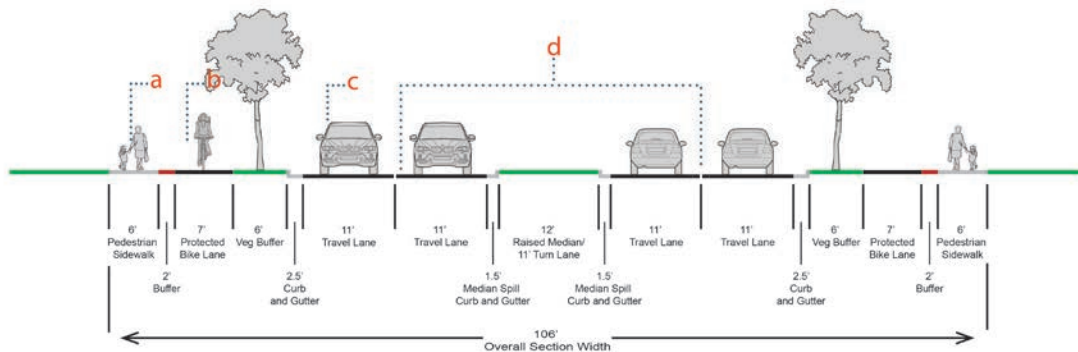
- CO 42/ Pine Street (existing signal)
- CO 42/ Short Street (existing signal)
- CO 42/ Griffith Street (existing side-street STOP)
- CO 42/ South Boulder Road (existing signal)
- CO 42/ Hecla Drive (existing side-street STOP)
- CO 42/ Paschal Drive (existing signal)
- CO 42/ Baseline Road (existing signal)
- CO 42/ Beauprez Avenue (existing right-in, right-out)
- CO 42/ Indian Peak Trail (existing side-street STOP)
- CO 42/ Northpark Drive (existing signal)

Currently, there is a *bikeable shoulder* for most of the corridor that sees some commuter cyclists use and heavy recreational bicyclist use, however, there is no formal bike lane. There are sidewalks in various parts of the study area with larger gaps mostly on the east side of the roadway in the southern half and on the west side in the northern half.

How Future 42 Makes CO 42 Safer

Any proposed changes for CO 42 should strive to make it safer for all travelers, including vehicular, bicycle, pedestrian, and transit users. To increase safety, road users will be separated from one another, with protective elements being used to shelter the most vulnerable users (pedestrians and bicyclists) from fast-moving traffic and accommodate future transit use. Vehicular traffic will be safer with the implementation of a design that is more in line with the context of the adjacent land uses and the primary vehicle in the corridor instead of a state highway with a truck as the main design vehicle.

Due to the length of CO 42, there is no single safety intervention for the entirety of the corridor. Instead, the study area has been split into two smaller segments to create a safe environment. These two segment are a four lane segment from north of Empire/Lock Street to Hecla Drive, and the two lane segment from north of Hecla Drive to Dagny Way/Northpark Drive.



Four Lane Segment: North of Empire Road/Lock Street to North of Hecla Drive

The southern segment of CO 42 runs from north of Empire Road/Lock Street to Hecla Drive and is entirely within the City of Louisville.

Pedestrian Improvements

- a) To facilitate safe pedestrian movements, a 6-foot sidewalk on both sides of the roadway is proposed along the entire length of the southern segment. The space between the sidewalk and vehicular traffic includes a 6-foot vegetated buffer, a 7-foot protected bicycle lane, and a 2-foot separator between the bicycle lane and sidewalk. The addition of a complete sidewalk with no gaps through a four-lane segment will allow for safe access from north to south and improved access to the Louisville Sports Complex and other community destinations east and west of the corridor.

Bicycle Improvements

- b) Bicyclists will have a protected bicycle lane on each side of the road that is buffered from vehicular traffic using a landscape buffer. The 7-foot wide bike lane on both sides of the street will allow for safe travel for various levels of cyclists. The separation from vehicular traffic and from the pedestrian sidewalk will allow help all groups feel safe while riding, not just confident recreational bike riders.

Transit Improvements

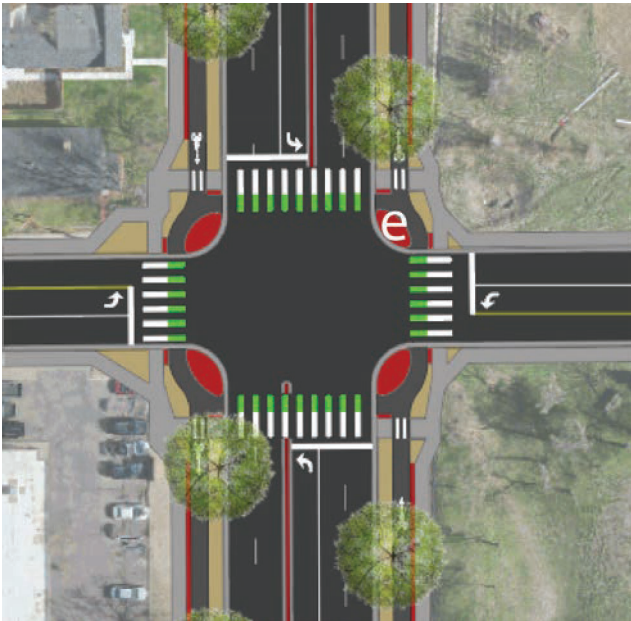
- c) This corridor is slated for *Bus Rapid Transit (BRT)* service as identified in the *RTD North Area Mobility Study (NAMS)*. It will also be an important connector to the future B-Line Rail service. Therefore a four-travel lane configuration was proposed to allow transit vehicles to move with more speed and reliability along the corridor. These buses will have stops that are in the travel lane (instead of pullout lanes), this will help to increase the speed and reliability of transit by reducing delays while merging back into traffic. The addition of two lanes in each direction reduces delays for vehicles by allowing them navigate around stopped buses.

Vehicular Improvements

- d) For vehicles, the current two-lane configuration is at or near the max capacity and the existing four lanes around the South Boulder Road intersection have poor utilization of both travel lanes. These issues create a major delay for future transit service in the corridor. To help alleviate this bottleneck, it was decided that four travel lanes would be a dual benefit for both transit service and vehicular traffic. The new lane and intersection improvements are projected to reduce vehicle crashes by 16% throughout the corridor. In addition to crash reduction, a planted *median* and streetscaping provides visual narrowing, encouraging slower speeds.

- e) *Protected intersections* are proposed to provide slower turning speeds, create more visibility to vulnerable users at conflict points, and make the overall experience safer for all modes of transportation. (South Boulder Road will not utilize a *protected intersection* design due to its large footprint)

Other safety improvements included: Adding protected left-turn signal phasing at Pine Street/Empire Road is projected to reduce crashes by 6 total crashes over 5 years.

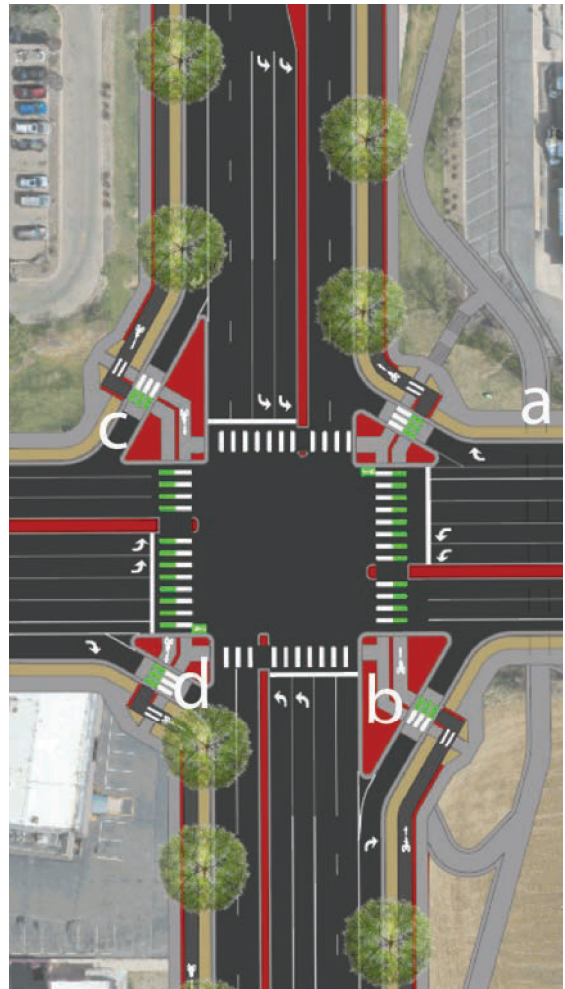


South Boulder Road Intersection

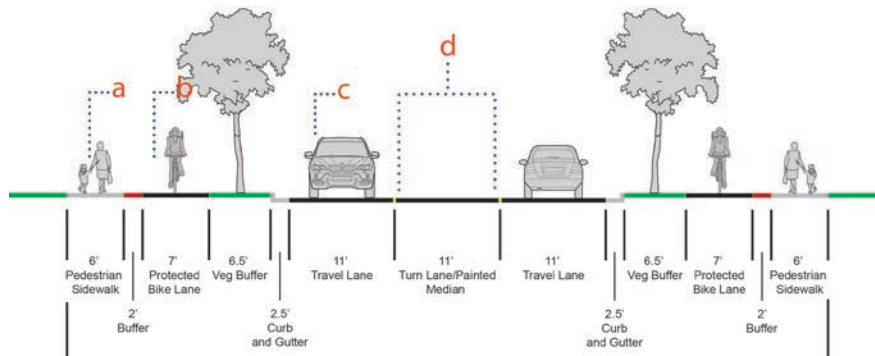
South Boulder Road has a large volume of traffic, making it a busy intersection with CO-42. Due to this congestion, a *protected intersection* would likely create a bottleneck in traffic, therefore a more traditional intersection with channelized right-turn lanes was proposed. Proposed improvements include:

- a) A bicycle and pedestrian underpass under the east leg of the intersection and exploration should happen for a southern leg underpass as well. This will allow pedestrians and bicyclists to cross without the potential for conflict with vehicular traffic.

- b) Channelizing islands at South Boulder Road will allow pedestrians to cross at grade safely. These islands help to shorten the crossing distance of crossing all of the lanes at once and allow for a pedestrian to safely cross using two light cycles.
- c) Speed tables to assist in slowing and alerting drivers to crossing bicyclists and pedestrians.
- d) Channelized right turn islands are oversized to allow space at South Boulder Road for the expected queue jumps that will be needed to accommodate future *BRT*.



Two-Lane Segment: North of Hecla Drive to Dagny Way/Northpark Drive



CO 42 transitions from the City of Louisville to the City of Lafayette at the intersection of Paschal Drive. The CO 42 cross-section changes from a four-lane cross-section to a two-lane cross-section, with a single travel lane in both directions and a left turn lane or painted *median* in the middle. At intersections, auxiliary right-turn lanes are added as needed.

Pedestrian Improvements

- a) To facilitate safe pedestrian movements, a 6-foot sidewalk is proposed on both sides of the roadway along the entire length of the northern segment. Between the sidewalk and vehicular traffic will be a 6.5-foot vegetated buffer, a 7-foot protected bicycle lane, and a 2-foot separator between the bicycle lane and sidewalk. The addition of a complete sidewalk with no gaps will allow for improved access to destinations such as the YMCA and bus stops.

Bicycle Improvements

- b) Bicyclists will have a protected bicycle lane both north and southbound allowing for a safe, low-stress connection to the YMCA and bus service along Arapahoe Road. Cyclists will be separated from vehicular traffic with a 6.5-foot vegetated buffer that will protect cyclists. Cyclists will also be separated from the pedestrian sidewalk with a 2-foot buffer. The new bicycle facilities will allow for low-stress connections for families to bike to the YMCA.

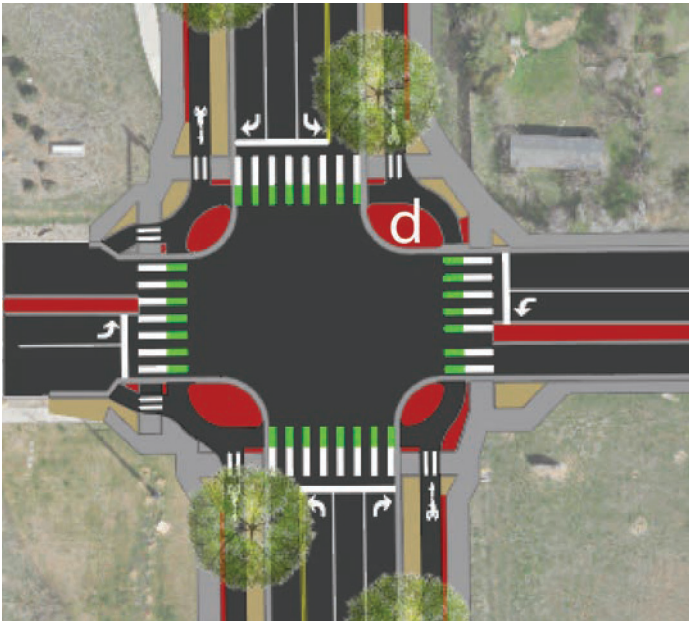
- At Baseline Road, there will be both protected and on-street bicycle facilities to allow users that feel more confident to bypass the turns of the protected bicycle lane.

Transit Improvements

- c) In order to help facilitate efficient transit throughout the northern section, channelized right turn islands are oversized to allow space at Baseline road for the expected queue jumps that will be needed to accommodate future *BRT*. Queue jumps in conjunction with *transit signal priority* will be necessary to provide speed and reliability for transit service on the corridor.

Vehicular Improvements

- d) *Protected intersections* will be installed to provide slower turning speeds, create more visibility to vulnerable users at conflict points, and make the overall experience safer for all modes of transportation. The new intersections are projected to reduce vehicle crashes by 16% throughout the corridor. In addition to the safety improvements, the over all amount of paved roadway will be reduced in the northern section allowing an opportunity for stormwater infiltration and reduction in runoff.

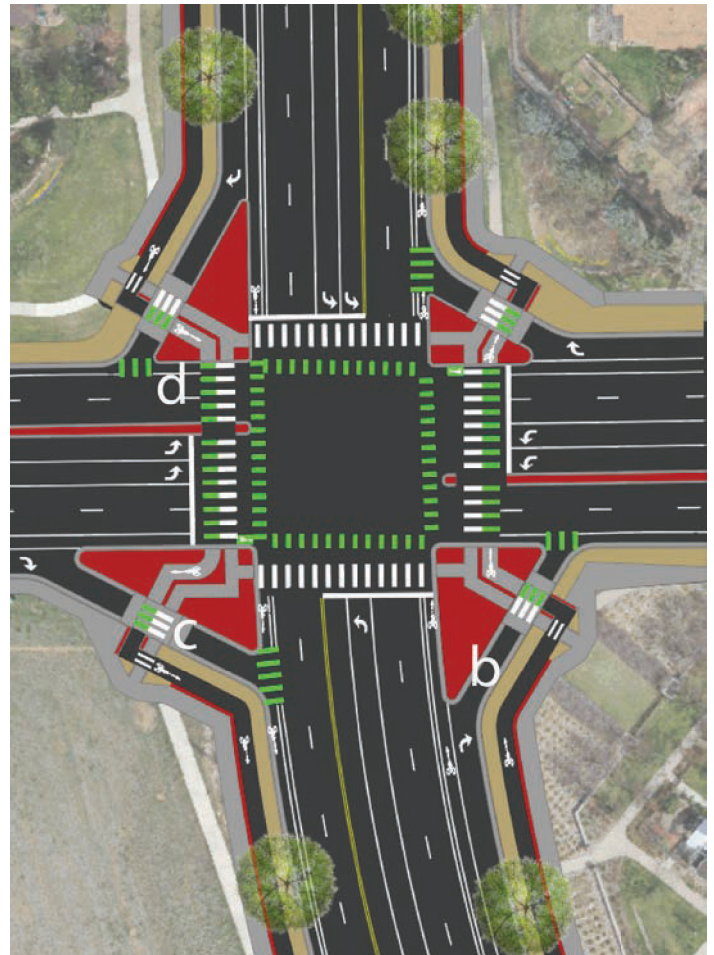


Baseline Road Intersection

Baseline Road has a large volume of traffic, making it a busy intersection with CO-42. Due to this, a *protected intersection* is not being proposed because it would have created a traffic bottleneck. Therefore a more traditional intersection with channelized right-turn lanes is proposed. Recommended improvements include:

- a) The addition of a bicycle and pedestrian underpass. This would allow pedestrians and bicyclists to cross without the potential for conflict with vehicular traffic. This will allow pedestrians and bicyclists to cross without the potential for conflict with vehicular traffic.

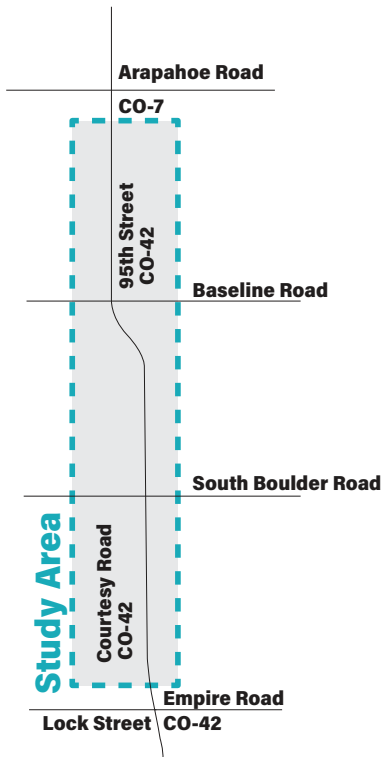
- b) Channelizing islands at Baseline Road will allow pedestrians to cross safely at grade. These islands help to shorten the crossing distance of and allow for a pedestrian to safely cross using two light cycles.
- c) Speed tables to assist in slowing and alerting drivers to crossing bicyclists and pedestrians.
- d) Channelized right turn islands are oversized to allow space at Baseline Road for the expected queue jumps that will be needed to accommodate future BRT.



Project Overview



Introduction



The purpose of the Future 42: Connecting People and Places Study is to help shape the future transportation patterns along CO 42 for roadway users of all types, ages, and abilities, which includes bicyclists, pedestrians, and people with disabilities. The goal is for community members to be able to choose any mode they desire and travel safely and comfortably. The study includes recommendations for

improved bicycle facilities, pedestrian facilities, bicycle, and pedestrian underpasses, safer motor vehicle facilities, and accommodations for future *Bus Rapid Transit (BRT)*.

Many improvement options were considered and reviewed for their effectiveness throughout the development of this study. These were narrowed down to three different alternatives. These alternatives were evaluated to determine which would work best for the CO 42 corridor. Each of the alternatives listed below takes different approaches to improve the corridor:

Alternative 1 incorporates *protected intersections* at all roadway intersections (Intersection Alternative 1) with one-way separated bicycle facilities connecting the intersections through out the corridor (Corridor Alternative 1) to provide the best separation and comfort for both bicyclists and pedestrians landscaped buffers would be used between vehicles and bicycle and pedestrian spaces.

Alternative 2 is most like the current arrangement, with no special treatments for bikes and pedestrians at the intersections (Intersection Alternative 1), however, full-length and low-stress bicycle and pedestrian facilities

are provided for the entirety of the corridor (Corridor Alternative 2).

Alternative 3 proposes the use of Dutch-style *roundabouts* (Intersection Alternative 3) at the intersections to create a more comfortable environment for all users along the corridor with two-way protected bicycle lanes (Corridor Alternative 3) to enhance comfort and safety for bicyclists and pedestrians. This bicycle lane would be located on only one side of the roadway but allow for 2-way bike traffic.

The elements of the alternatives served as a menu of options that would help achieve the goals of Future 42. The most effective parts of these alternatives were then mixed together to find the best solutions for the corridor to create a recommended alternative to move forward to the final design.

Project Study Area

The Future 42 study area bisects both the Cities of Lafayette and Louisville and encompasses 12 different intersections. The study area contains the entirety of the corridor's right-of-way (ROW) from just south of Arapahoe Road on the northern end of the corridor to just north of Lock Street/ Empire Road on the southern end. The study was done with the support of the Colorado Department of Transportation (CDOT), which owns the entirety of the ROW.

The intersections included in the study were:

- CO 42/ Pine Street (existing signal)
- CO 42/ Short Street (existing signal)
- CO 42/ Griffith Street (existing side-street STOP)
- CO 42/ South Boulder Road (existing signal)
- CO 42/ Hecla Drive (existing side-street STOP)
- CO 42/ Paschal Drive (existing signal)
- CO 42/ Baseline Road (existing signal)
- CO 42/ Beauprez Avenue (existing right-in, right-out)
- CO 42/ Indian Peak Trail (existing side-street STOP)
- CO 42/ Northpark Drive (existing signal)

This study excluded the intersections of CO 42 and Empire Road/Lock Street and CO 42 and Arapahoe Road due to separate projects that have developed proposed improvements to those intersections. For Empire Road/Lock Street intersection, an evaluation will need to happen once the implementation of the Future 42 recommended alternative and other new developments occur to see if the proposed improvement of a *roundabout* is still applicable. The preferred alternative incorporates the most recent proposed improvements of those projects, and no additional modifications were made to the layout assumptions of those intersections.

Figure 1 shows that the study area intersects multiple *zoning* districts. There are predominately residential districts in the northern section of the study area, a mix of commercial and residential districts as CO 42 passes close to Main Street in downtown Louisville, and primarily commercial land uses at the intersection with South Boulder Road. These *zoning* districts play a huge part in how the roadway should interact and be built contextually, not just as a state highway.

Regional Context

CO 42 provides connectivity for City of Louisville residents both internally within the city and as a regional connector. CO 42 is a high-volume corridor that facilitates residents, especially those located in the northern part of Louisville, to reach Main Street. The corridor also serves as a key connection point to US-287, a critical north/south corridor, therefore facilitating regional connections for residents.

The travel data shows that 80% of peak period trips and 86% of off-peak period trips on CO 42 originate and/or terminate within either Louisville or Lafayette. Going into the study, many thought the roadway was used as a cut-through but the travel data highlights the importance of the corridor for internal connectivity and with at least 29% of peak-hour trips and 34% of off-peak hour trips being entirely within the community, there is opportunity to offset some of these trips through multimodal connectivity.

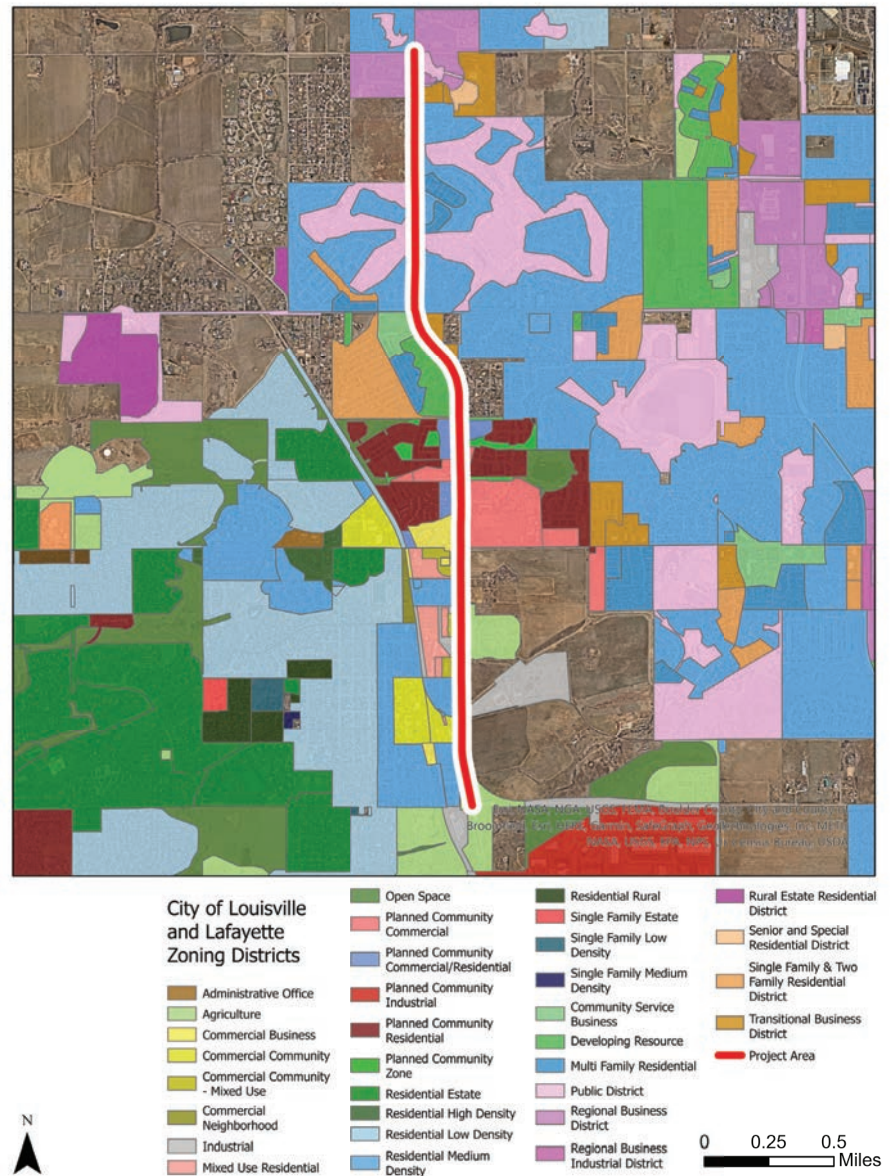


Figure 1. Study Area Zoning

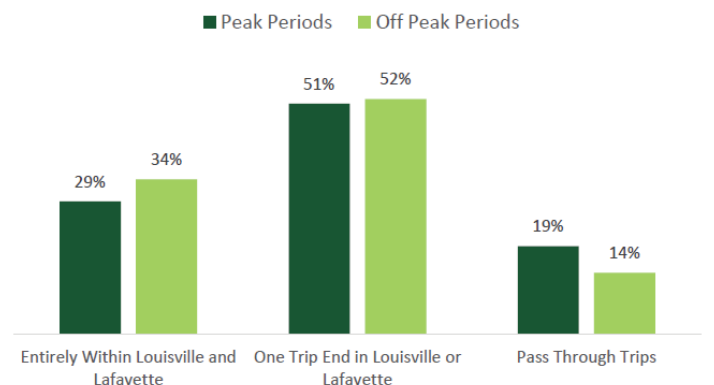


Figure 2. Origin-destination on CO 42 North of South Boulder Rd

Corridor Plan Goals and Objectives

CO 42 was one of the six arterial corridors identified in the Northwest Area Mobility Study (*NAMS*). The *NAMS* was a planning effort led by the Regional Transportation District (*RTD*) that developed a prioritized list of transit mobility improvements for the northwest metro region. The study concentrated on the northwest metro region including, but not limited to, Boulder, Lafayette, Louisville, and Superior.

The Cities of Lafayette and Louisville are working together to envision the future of the CO 42 corridor for people who walk, bicycle, ride transit, or drive. The primary purpose of the project is to improve comfort, connectivity, and safety for those traveling on CO 42, a key corridor for both internal and regional connectivity. Key goals identified in the planning process were:

- Improved safety
- Safe and Comfortable multimodal facilities
- Vehicular speeds in line with the context of the roadway
- Accommodation for future *BRT* compatibility

This plan aims to create a multimodal and equitable future for the CO 42 corridor that can accommodate both present and future users.

Previous Plans and Existing Conditions



Previous Plans

CO 42 has been the subject of previous planning efforts, both by the City of Louisville and Boulder County. The Future 42 Study is designed to build on and modernize previous planning efforts that have previously been completed. The Future 42 project will help the City of Louisville and Lafayette reach both short- and long-term transportation and development goals.

Regional and City-Wide Transportation

City of Louisville Transportation Master Plan (TMP) (2019)



The City of Louisville's *TMP* was conducted by the City to look comprehensively at transportation conditions and options throughout Louisville and the region for all modes of transportation. The *TMP* highlights that CO 42 is a valuable corridor for the City of

Louisville's long-term development.

Key takeaways related to CO 42 in the *TMP* include:

- The corridor has undeveloped and vacant parcels spread out along its extent, including a connection to South 96th Street. This connection borders the Old StorageTek campus site, which is Louisville's largest vacant parcel. The development of this parcel could have significant impacts on the transportation network.
- Louisville's *TMP* defines CO 42 as a key north-to-south connector for the eastern side of the city.
- The *TMP* highlights the need for increased and improved bicycle connectivity that would allow residents to access the parks and open space along CO 42 without a vehicle. Providing better access to non-vehicular options can also help reduce traffic congestion and vehicle emissions.

- Traffic along CO 42 is heavily impacted by the time of day people are traveling. Turning vehicles are the biggest contributing factor to rush hour slowdowns and delays.

42 Gateway – Alternative Analysis Report (2013)

The 42 Gateway Project was an improvement study completed in 2013 to influence the form, function, character, and accessibility of the corridor. The report incorporates recommendations to improve multimodal connectivity and support all modes of travel on CO 42 while also supporting the City of Louisville's future land use expectations and strengthening residents' livability.

Key takeaways related to CO 42 in 42 Gateway include:

- Several goals, including providing safe and efficient access in strategic locations for proposed land uses and balancing regional mobility and community livability, were developed for the corridor in the 42 Gateway Report.
- Alternatives were developed for both the corridor and for every intersection on CO 42 from Pascal Drive to Lock Street that included a three-lane with local street network enhancements option and a five-lane configuration in the report. Intersection alternatives evaluated intersection types such as a two-lane *roundabout* and right-in, right-out access.
- The 42 Gateway Project advances the design of the Gateway for the Northwest Rail Corridor to the City of Louisville.
- The report identified that population and employment densities along the potential route on CO 42 are anticipated to more than double from 2010 to 2035, which is an indication that the routes may provide needed transit service in the future.

Boulder County Transportation Master Plan (TMP) (2020)

Boulder County's *TMP* identifies current conditions in the county's existing transportation network, as well as future trends and transportation goals/strategies. Boulder County's *TMP* identified the CO 42 corridor, through both the Cities of Louisville and Lafayette, as a key regional

corridor.

Key takeaways related to CO 42 in the TMP include:

- Boulder County's *TMP* highlights key operational improvements along major regional corridors that focus on improved transit services, bicycle infrastructure, and vehicle capacity expansion at intersections, which can include additional turn lanes and through lanes. While the Boulder County *TMP* includes recommendations and policies for improved vehicle capacity, it is the County's policy that they will not add any additional general-purpose lanes between intersections and will encourage the Colorado Department of Transportation (CDOT) not to add lanes within the County.
- CO 42 is listed as a future location for a *Bus Rapid Transit (BRT)* route, which was identified in the *NAMS*.
- The County has defined CO 42 as an arterial corridor that provides important connectivity for the Cities of Louisville and Lafayette.
- The inconsistency of bicycle infrastructure along the corridor is an area of concern for Boulder County.

Northwest Area Mobility Study (NAMS) (2014)

In 2014, *RTD* performed the *NAMS* report to set the direction for transit service in the northwest area of the *RTD* service area. The *NAMS* project laid the ground work for future *BRT* lines by identifying and evaluating potential arterial *BRT* Routes. CO 42 was identified as a potential *BRT* corridor.

Key takeaways related to CO 42 in NAMS include:

- A future CO 42 *BRT* route would connect Lafayette to the US 36 *BRT* service. This route would use Arapahoe/SH 7, then head south on CO 42, connect to major destinations in the areas, and terminate at the transit center in Broomfield.
- *NAMS* corridor recommendations provided guidance for the inclusion of transit provisions including the added queue jumps at South Boulder Road and Baseline Road in the Future 42 Study.

Traffic Studies

CO 42 Traffic Study (2018)

The CO 42 Traffic Study (2018) was intended to evaluate future traffic needs and determine how different lane configurations would aid in meeting future demand.

Existing Conditions

- Peak periods for the corridor occur between 8 a.m. and 9 a.m. and 4:45 p.m. to 5:45 pm during the evening.
- Currently, the corridor carries approximately 22,600 vehicles per day.
- Denver Regional Council of Government's (DRCOG's) regional travel demand data projects a growth rate of approximately 1% each year, with only one intersection, CO 42 and South Boulder Road showing a higher rate of 1.4%, annually.

Alternatives Developed

- **Alternative One** – Signalize Short Street
 - Modeling shows that signalization improves traffic operations at the intersection, but current traffic conditions remain about the same across the corridor.
- **Alternative Two** – Signalize Hecla Drive and Short Street
 - Signalization improved the conditions at the intersection of *Corridor Level of Service*¹ (LOS) D to LOS B.
 - This helps reduce northbound and southbound queuing at the intersection, providing metering for the merge point northbound and reducing queuing quickly southbound.
- **Alternative Three** – Signalize Cannon Circle, Hecla Drive, and Short Street
 - This improves conditions at the intersection from LOS C to LOS B.
 - The intersection at Short Street and CO 42 goes from LOS C to LOS D.
 - South Boulder Road intersection drops to a LOS F due to the close spacing between the South Boulder intersection and the Cannon Circle intersection.
- **Alternative Four** – Evaluate the three proposed signalized intersections with transit stops along CO 42
 - The study found the addition of bus service did not significantly impact travel times along the corridor.

¹ Corridor Level of Service (LOS) is a qualitative measure to describe the operating conditions of a roadway based on factors such as speed, travel time, delay, and safety.

The four proposed alternatives all had similar results to the no-build scenarios. However, adding a general-purpose lane in each direction, making it a four-lane cross-section across the entirety of the study area, would lead to marginal improvement. Most of the traffic impacts could be mitigated through the addition of turn lanes since most of the impacts occur from turning vehicles causing slowdowns.

Key Takeaways

Past planning efforts have recommended that CO 42 be transformed from a vehicular corridor to one that supports multiple forms of transportation including pedestrians, bicycles, and transit. The Future 42 study creates a vision for a multimodal corridor that brings past planning efforts to life. Future 42 will turn CO 42 into a cutting-edge multimodal corridor.

Existing Conditions

People and Places

Zoning and Land Use

CO 42 is not confined to one *zoning* district or land use; the study area intersects multiple *zoning* districts and land uses. Due to the corridor's length, CO 42 passes through both residential and commercial *zoning* districts in both Lafayette and Louisville. The stretch of CO 42 that passes through the City of Lafayette is predominately zoned for residential subdivision development; however, it includes a pocket of regional commercial development which includes the YMCA. *Zoning* district designations in the northern section of the study area include Residential Low Density, Residential Estate, and Planned Community Residential.

The Louisville sections of the corridor are predominantly zoned for commercial use directly abutting CO 42 in the area north of South Boulder Road, with residential uses beyond. South of South Boulder Road, the *zoning* provides a mix of residential and commercial uses on the west side (**Figure 3**). The east side is primarily open space and recreational uses. Underutilized and undeveloped properties along the corridor are anticipated to redevelop with greater intensity than what is currently built today.

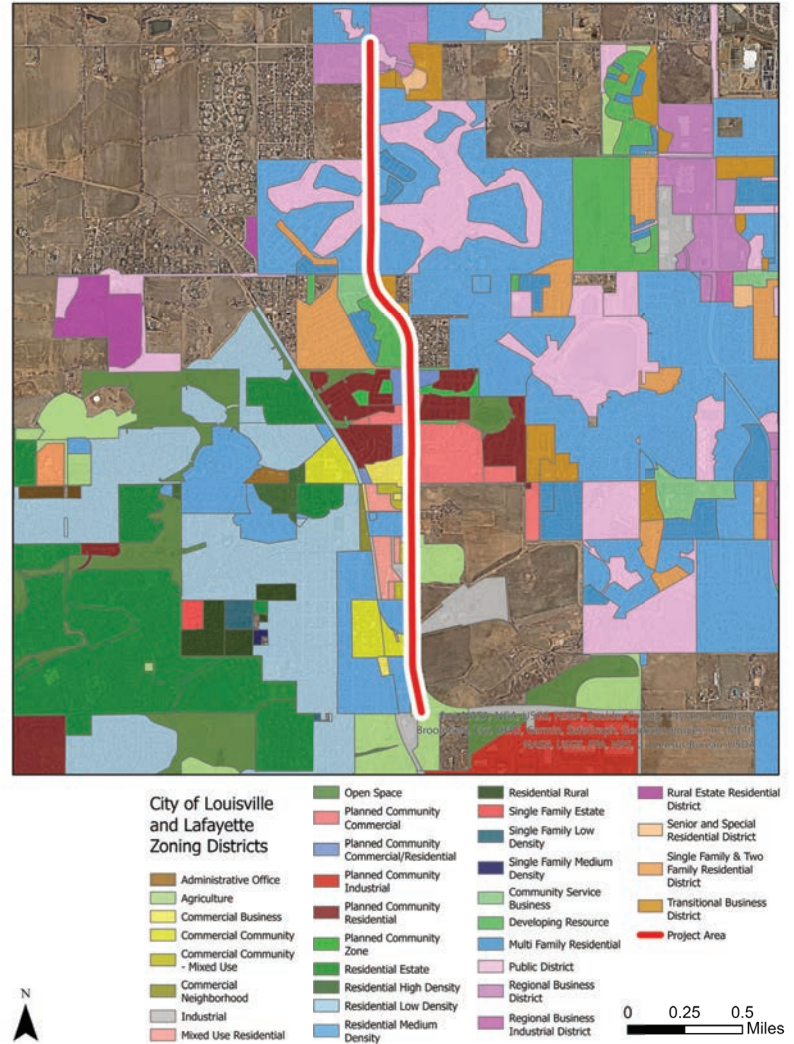


Figure 3. Study Area Zoning

Activity Centers

CO 42 serves as a valuable connector for both the Cities of Lafayette and Louisville, connecting multiple key destinations. These destinations include the YMCA of Northern Colorado, the King Soopers at the intersection with South Boulder Road, the Louisville Sports Complex, and Downtown Louisville. The number of activity centers along the corridor makes it particularly important to ensure that the corridor is multimodal and allows all users to easily travel on CO 42.

Socioeconomic Characteristics

The demographics of the corridor broadly reflect the over all demographic profile of both cities. However, there is a greater concentration of low-income and or transit-dependent individuals along CO 42. Kestrel Housing located at Hecla Drive and CO 42 is a Boulder County-owned housing development. Kestrel has 71 units reserved specifically for adults 55 and older and 129 units for families earning less than 60% of the area's *median* income.

City of Lafayette

Population: ~31,000 people

Median Household Income: \$85,909

~6% of population has a disability

Average commute to work time for a Lafayette resident: 25 minutes

City of Louisville

Population: ~21,000 people

Median Household Income: \$116,073

5% of population has a disability

Average commute to work time for a Louisville resident: 23 minutes

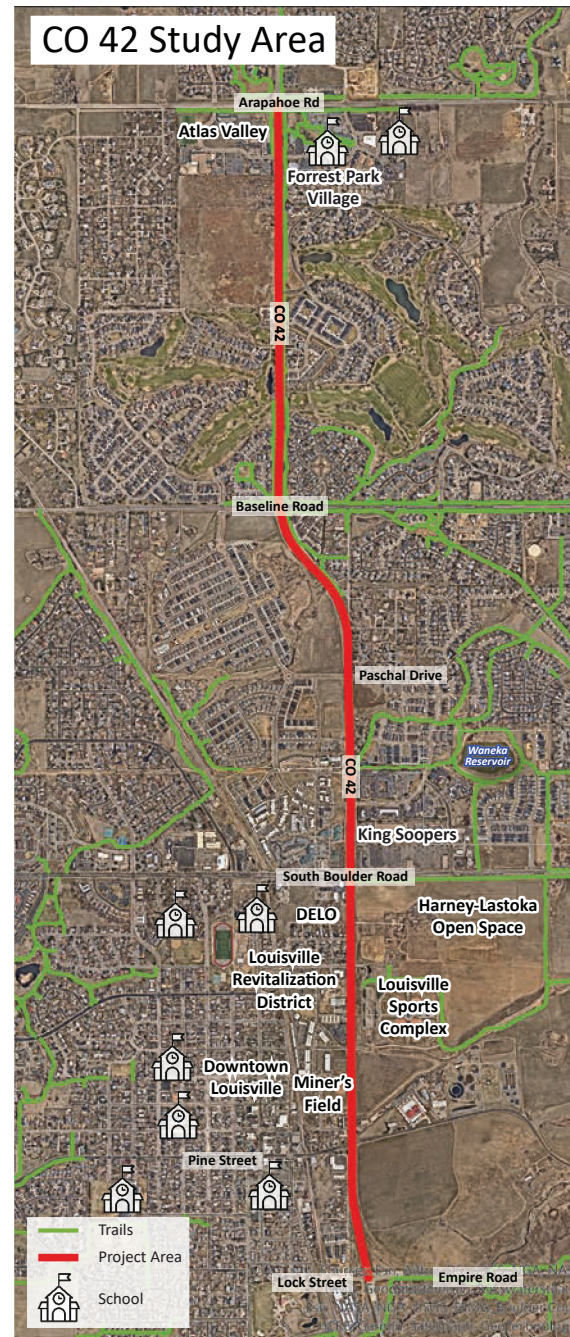


Figure 4. Activity Centers

Future Land Use

Much of the corridor is already built out with subdivision developments and some retail space, including King Soopers and the DELO (Downtown East Louisville) development, which contains both residential and commercial uses. There are some remaining undeveloped plots along CO 42 that are slated for future residential subdivisions, and commercial uses, as well as a couple of large parcels that are jointly by Boulder County and the Cities of Louisville and Lafayette that are designated as Open Space.

Future land uses and developments that are planned to be constructed on some of these remaining undeveloped plots along CO 42 include the Coal Creek Station, the Foundry project at CO 42 and Paschal Drive, and Indian Peaks Marketplace at CO 42 and Baseline Road as well as CO42 and Paschal Drive. The Coal Creek Station plan calls for 313,500 square feet of commercial space and 181 residential units at the southwest corner of CO 42 and South Boulder Road. The Foundry project is proposed to contain a mix of residential and commercial uses at the southwest corner of CO 42 and Paschal Drive. The Indian Peaks Marketplace will incorporate a variety of commercial, office, and residential spaces.

Key Takeaways

- Due to the high number of residents, it remains important to capture as many voices as possible in the public engagement process.
- CO 42 is a key connection for both cities and is a driver of many internal trips originating and terminating within Louisville or Lafayette. The corridor serves as a driver of so many internal trips because of its integral nature for traveling within the communities.
- CO 42 must be safe for all modes to travel along the corridor.

Roadway Assessment

Existing Roadway Infrastructure

CO 42 is currently owned and maintained by CDOT as a state highway. CDOT controls the entirety of the ROW space in the corridor. Because CO 42 is a CDOT controlled ROW, it requires collaboration between both the Cities of Lafayette and Louisville with CDOT.

The current arrangement of travel lanes transitions between two, three, and four-lanes. Most of the CO 42 corridor has two through lanes with left-turn and right-turn lanes at many intersections. Two short segments of the corridor have four lanes on either side of the largest intersecting roads: Baseline Road and South Boulder Road.

The posted speed limit as set by CDOT is 50 mph in the northern portion and 45 mph in the south. However, the perception of speeds being too high for the context of the roadway has been a historic point of contention for the public along the corridor with a majority of public feedback being about speeds faster than needed. Because CO 42 is a CDOT roadway speed limits historically have been set using the 85th percentile, or the speed at which 85 percent of all vehicles travel along the roadway when no traffic is present.

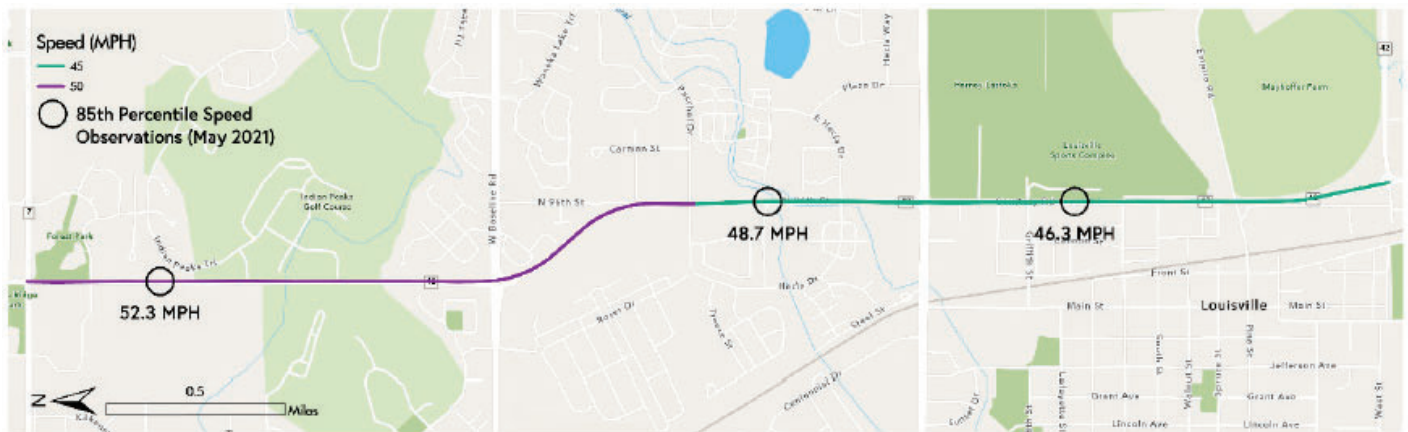


Figure 5. Posted Speed vs Observed Operating Speeds

Existing Traffic Volumes and Congestion

Current traffic volumes along CO 42 range from 12,000 cars per day passing through the intersection at Arapahoe Road to 20,000 cars per day at South Boulder Road. By 2050, these volumes are expected to grow to 17,000 to 28,000 vehicles per day respectively.

During the morning peak hour, three intersections operate at LOS E:

- The CO 42 and Arapahoe Road intersection operates at LOS E due to a large volume of westbound traffic as well as a large volume of northbound left traffic that competes for green time with the southbound traffic.
- The intersection of CO 42 and Indian Peaks Trail also operates at LOS E due to the high volume of vehicles

making a westbound left and the challenge of findings a gap in traffic on CO 42.

- The intersection of CO 42 and Griffith Street also operates at LOS E during the morning peak due to the high volume of the eastbound left and northbound left turns and difficulty in finding a gap in traffic on CO 42 for drivers because of the high volume of southbound through movement on CO 42. The demand for these turns is high in the morning peak likely due to school drop-off at the Louisville Middle School at Main Street and Griffith Street.

In the afternoon peak five intersections in the study area were found to operate at *LOS E* or *F*:

- CO 42 and Baseline Road intersection operates at *LOS E* in the afternoon peak due to high volumes of traffic along multiple approaches, particularly the northbound through and right turn, and southbound left turn. There is also poor lane utilization for the northbound through movement given a second through lane is added before this intersection and ends after passing through the intersection.
- CO 42 and Hecla Drive intersection operates at *LOS F* in the PM peak due to the delay in making an eastbound and westbound left. While these movements are not particularly high, the volume of northbound and southbound traffic on CO 42 is high resulting in few gaps to make an eastbound or westbound left.
- CO 42 and South Boulder Road intersection operates at *LOS E* in the PM peak due to the high volume of northbound and eastbound volume, including particularly the high volume making an eastbound left turn.
- CO 42 and Griffith Street intersection operates at *LOS F* in the PM peak due to the volume and high delay for drivers making an eastbound left and the difficulty in finding a gap in traffic along CO 42 in both directions.
- CO 42 and Pine Street intersection operates at *LOS E* in the PM peak due to the high volume of traffic in the northbound through, northbound left, and eastbound left movements.

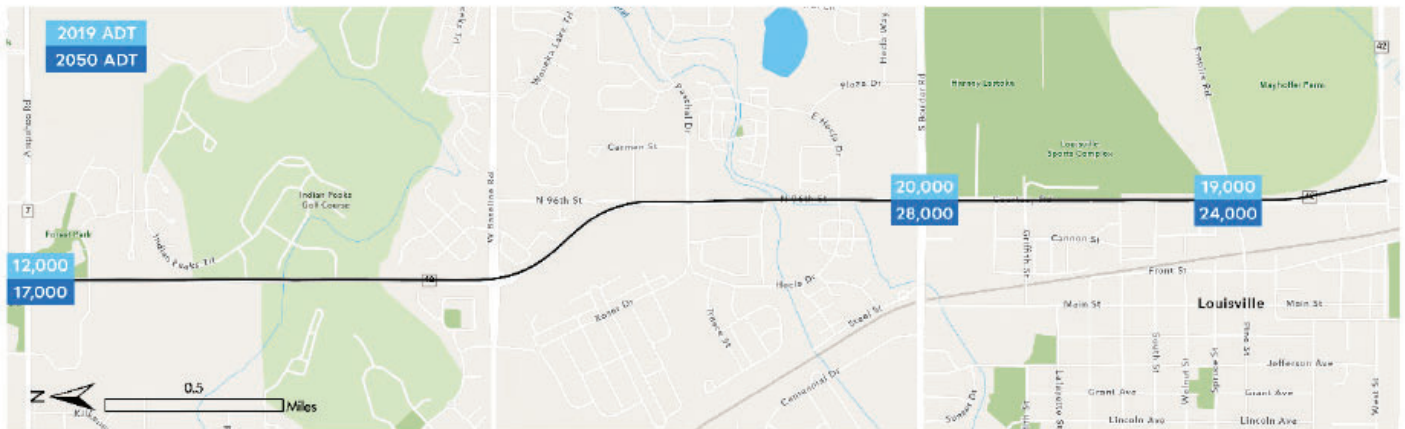


Figure 6. ADT Forecasts on CO 42

Safety and Crashes

CO 42 has seen 445 crashes between 2015 and 2019, with nine of these crashes resulting in severe injury and one fatality. Of the nine killed or severely injured (KSI) crashes, two involved bikes and pedestrians.

The greatest number of crashes occurred at the major intersections along CO 42, including at Arapahoe Road, Baseline Road, South Boulder Road, Pine Street/Empire Road, and Lock Street/Empire Road.

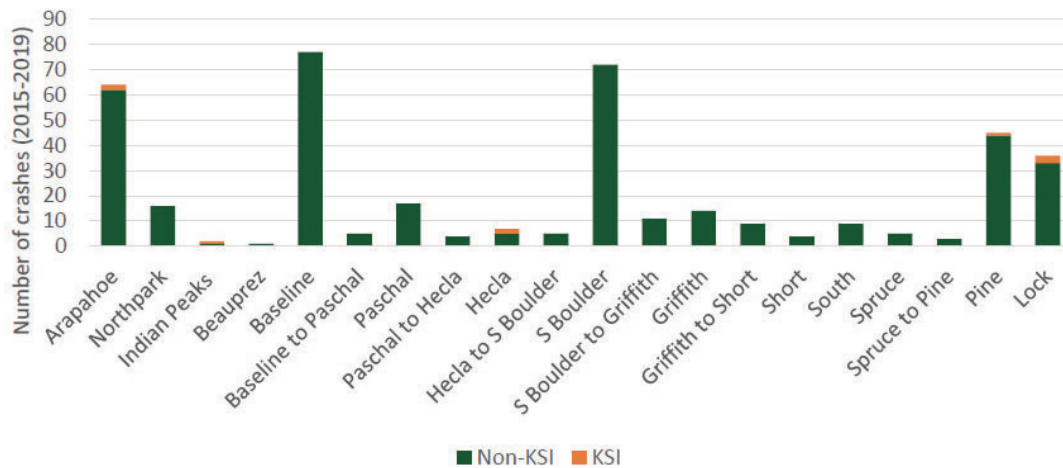


Figure 7. Crashes by Location

Walking and Biking

CO 42 was evaluated using *Streetscore+* to define the safety of pedestrian facilities. *Streetscore+* uses a scale of 1 to 4 with a score of 1 being the safest and most comfortable and a score of 4 being the most uncomfortable for pedestrians and bikes.

For the CO 42 corridor, the lowest stress facilities for pedestrians in the area, with a *Streetscore+* 2, were in areas between Baseline Road and South Boulder Road, where sidewalks have recently been upgraded to fit the standard of a multiuse path. These segment scores did not meet the criteria for a 1 because of the lack of a wide enough buffer between the trail and the roadway.

Some segments south of South Boulder Road scored a *Streetscore+* 4 due to the presence of narrow, attached sidewalks. However, most of the corridor lacks sidewalks entirely, particularly along the east edge of CO 42 south of Baseline Road. Sidewalks narrower than eight feet are scored no higher than a *Streetscore+* 3. Most of the segment between Baseline Road and Arapahoe Road has a *Streetscore+* 3 due to the narrow width of the sidewalk and the speed of the roadway in that location.

The corridor currently lacks formal on-street bike facilities in all areas other than the west side of the road between South Boulder Road and Griffith Street, where there is a painted bike lane in the southbound direction. The rest of the areas are *bikeable shoulders*. This facility has a *Streetscore+* 4 due to the proximity to fast, heavy vehicle traffic without a buffer.



Figure 8. *Streetscore+* Rankings

Transit Assessment

Existing Transit Infrastructure

The study area is served by both fixed-route and on-demand transit services.

RTD Fixed Route Service: The CO 42 study area is currently served by four RTD including Route 225, Route 228, the DASH, and the JUMP. Three of these four routes cross the CO 42 corridor, including Route 225 and the JUMP, which operate along Arapahoe Road and Baseline Road respectively, at 15-minute frequencies during peak service hours, and the DASH, which crosses at South Boulder Road at 30-minute frequencies. Route 228 is the only current route that operates on CO 42 for a short distance between South Boulder Road and Paschal Drive with a stop at Hecla Drive at 60-minute frequencies.

Route	Peak	Midday
225	15	30
228	60	60
DASH	30	30
JUMP	15	30

Figure 9. RTD Bus Routes and Frequency

The study is also served by two on-demand transit services: the Free Ride Lafayette and the Louisville Flex Ride.

- **Louisville Flex Ride:** serves the southern portion of the corridor south of Baseline Road. To utilize the service a rider calls to schedule a ride up to 30 days before their trip. The flex ride will pick up riders and either drop them off at park-and-ride facilities or designated shopping areas.
- **Free Ride Lafayette:** serves the Lafayette portion of the corridor (including the Kestrel housing development). Free Ride Lafayette functions similarly to the Flex Ride service with the rider requesting a ride in advance; the bus will then drop the rider off at any destination within the City of Lafayette.

Future Transit Service

RTD completed the Northwest Area Mobility Study (NAMS) in 2014 to develop a priority list of mobility improvements for the northwest area of the agency's service area. NAMS identified five future *bus rapid transit* (BRT) corridors including a BRT along CO 42. The CO 42 BRT line would operate along CO 42 the length of the study area with termini at the intersection of Arapahoe Road and US 287 to the north and the US 36 and Broomfield Station to the south. NAMS assumed 30-minute frequencies along CO 42.

Additionally, the 228 Route has been approved for an extension that would continue the route from Baseline Road up CO 42 to Arapahoe Road (including a loop of the Forest Park Circle). This would connect the 228 and the Jump routes.

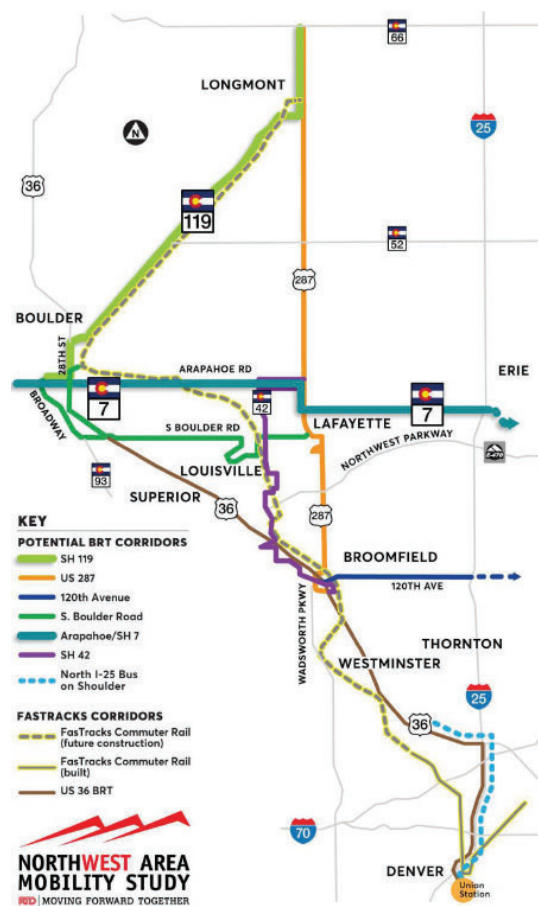


Figure 9. Future Transit Corridors Envisioned in NAMS

Environmental Assessment

As recommended projects from the Future 42 project become a reality, there will be environmental impacts, that will require further evaluation and documentation. The anticipated environmental impacts were measured using the following 9 categories:

- 1. Air Quality:** Future 42 does not appear to Qualify as a Project of Air Quality Concern. This means that there are limited steps that will need to be taken. The Future 42 project is expected to help improve air quality by reducing the time vehicles will be idling along the corridor and adding multimodal options.
- 2. Noise:** The study area is close to sensitive noise receptors and will require a Type I noise analysis. The type I noise study will be completed further along in the implementation process.
- 3. Hazardous Materials:** Four high-risk sites were identified within the study area that could impact the project. The exact impacts that these sites may or may not have will not be known until the further design is completed and construction type, magnitude, and construction depth have been established.
- 4. Waters of the United States (WOTUS):** There are potential impacts on WOTUS, a biologist will be required at a later phase of the project to assess open water and wetland permitting that may be required and determine if there are potential wetland impacts that will need to be considered. These impact and sensitive areas will be identified during the implementation phases of Future 42.
- 5. Sensitive Species:** Preliminary assessments show no impact on federally listed sensitive species, however, there are potential impacts on the state-listed special concern species. Impacts on the bald eagle and black-tailed prairie dog will need to be mitigated as part of the building out of the recommended projects to proceed into the final design.
- 6. Historic Resources:** Preliminary research shows historic resources within the study area. During implementation, the project team will need to work with the State Historic Preservation Office, and local jurisdiction historical preservation programs to minimize impacts on historic sites. Exact sites will be identified during construction and later design phases.

- 7. Parks and Recreational Resources:** Right-of-way acquisition within Harney-Lastoka Open Space will be required. However, the potential impact of the right-of-way acquisition is anticipated to not affect the use of the open space.
- 8. Land Use, Including Farmland:** The implementation of the plan is compatible with the Cities of Louisville, Lafayette, and Boulder County. There are not anticipated to be any sizable impacts on prime farmland.
- 9. Environmental Justice:** One of the nine census block groups in the study area was identified as low-income. The project's impacts are anticipated to be spread across the length of the corridor and not unduly burden any one community. Additionally, low-income residents will benefit from the addition of transit and other multimodal infrastructure additions.

Flood Impacts

Two FEMA 100-year flood plans are present within the CO 42 study area. CO 42 crosses both the Bullhead Gulch and Indian Peaks Tributary floorplans. These two floorplans have established elevations that overtop the roadway. Grading of the proposed improvements will need to verify there is no impact on the existing floodplains.

Alternatives



Alternatives

To evaluate and develop strategic solutions for the CO 42 corridor, an alternatives analysis process was used to create, evaluate, and refine to get to a recommended alternative for the corridor. This process included two stages of alternatives evaluation or screening, each time refining the list of alternatives through expert evaluation and public facilitation. Throughout the process, all alternatives were designed to advance the goals of the study, which include:

- Improved safety
- Safe and comfortable multimodal facilities
- Vehicular speeds in line with the context of the roadway
- Accommodation for future *BRT* compatibility



Initial Solution Development

The alternatives development phase begins with putting every possible solution on the table for the roadway. That list of solutions was narrowed to those not applicable to Future 42. That meant beginning with a large list of potential solutions for each of the intersections then narrowing it down to three alternatives. These solutions were expected to be mixed and matched with each other to create the first set of corridor/intersection alternatives. For example, *ADA* improvements were needed throughout the corridor and were carried through to each alternative throughout the project.

INITIAL SOLUTIONS DEVELOPED:

	North Park Drive	Indian Peak Trail	Baseline Road	Paschal Drive	Hecla Drive	South Boulder Road	Griffith Street	Short Street	South Street	Pine Street
Improvement 1	Multiuse Trail	Multiuse Trail	Multiuse Trail	Multiuse Trail	Multiuse Trail	Multiuse Trail	Multiuse Trail	Multiuse Trail	Multiuse Trail	Multiuse Trail
Improvement 2	Bikeable Shoulder	Buffered Bicycle Lane	Bicycle/ Pedestrian Underpass	Bikeable Shoulder	Bikeable Shoulder	Bicycle/ Pedestrian Underpass	Bikeable Shoulder	—	—	Bikeable Shoulder
Improvement 3	Pocket Bicycle Lane	Sidewalks	Bicycle Protected Intersection	Pocket Bicycle Lane	Pocket Bicycle Lane	Bicycle Protected Intersection	Pocket Bicycle Lane	—	—	Pocket Bicycle Lane
Improvement 4	Bicycle Detection	ADA Accessibility	Quadrant Intersection	Bicycle Detection	Bicycle Detection	Continuous Flow Intersection	Bicycle Detection	—	—	Bicycle Detection
Improvement 5	Buffered Bicycle Lane	Curb Extension	Continuous Flow Intersection	Buffered Bicycle Lane	Buffered Bicycle Lane	Bicycle/ Pedestrian Underpass	Buffered Bicycle Lane	—	—	Buffered Bicycle Lane
Improvement 6	Curb Extension	Crosswalk	Queue Jump	Curb Extension	Curb Extension	Bicycle Protected Intersection	Curb Extension	—	—	Curb Extension
Improvement 7	ADA Compliance	Signal	Transit Signal Priority	ADA Compliance	ADA Compliance	Quadrant Intersection	ADA Compliance	—	—	ADA Compliance
Improvement 8	Sidewalk Connectivity	Roundabout	Raised Pedestrian Crossings	Sidewalk Connectivity	Sidewalk Connectivity	Continuous Flow Intersection	Sidewalk Connectivity	—	—	Sidewalk Connectivity
Improvement 9	Roundabout	2-Stage Gap/ Acceleration Lane	Buffered Bicycle Lanes	Roundabout	Roundabout	Queue Jump	Roundabout	—	—	Roundabout
Improvement 10	Medians	Medians	Intersection Geometry Improvements	Medians	Medians	Transit Signal	Medians	—	—	Medians

Improvement 11	Striping/Lane Widths	Lighting	Receiving Lanes (for RT)	Striping/Lane Widths	Striping/Lane Widths	Striping/Lane Widths	Raised Pedestrian Crossings	Striping/Lane Widths	—	—	Striping/Lane Widths
Improvement 12	Signal Improvements	Bikeable Shoulder	Signage Updates	Signal Improvements	Signal Improvements	Signal Improvements	<i>Buffered Bicycle Lanes</i>	Signal Improvements	—	—	Signal Improvements
Improvement 13	Streetscape Features	<i>Pocket Bicycle Lane</i>	Reconfigure RT Islands	Streetscape Features	Streetscape Features	Streetscape Features	Intersection Geometry Improvements	Streetscape Features	—	—	Streetscape Features
Improvement 14	—	—	Extend Merges	—	—	—	Receiving Lanes (For RT)	—	—	—	—
Improvement 15	—	—	Add <i>Deceleration Lanes</i>	—	—	—	Signage Updates	—	—	—	—
Improvement 16	—	—	Move Power Pole	—	—	—	Reconfigure RT Islands	—	—	—	—
Improvement 17	—	—	Queue Jump	—	—	—	Extend Merges	—	—	—	—
Improvement 18	—	—	<i>Transit Signal Priority</i>	—	—	—	—	—	—	—	—
Improvement 19	—	—	—	—	—	—	Move Power Pole	—	—	—	—
Improvement 20	—	—	—	—	—	—	Queue Jump	—	—	—	—
Improvement 21	—	—	—	—	—	—	<i>Transit Signal Priority</i>	—	—	—	—

A couple of the solutions that were developed that were discussed heavily but not included in the alternates were the *quadrant intersection* and *continuous flow intersection*. The *quadrant intersection* uses one or more of the corners of the intersection to facilitate the left turns that would normally take place at the much busier intersection, giving more “green” time for through movements at the major intersection. This was evaluated more for South Boulder Road due to the ROW needed and the ideal corner (Southeast corner) was not the one with the available ROW (Southwest with Cannon Circle). The *continuous flow intersection* changes the location that the left turns to happen in advance of the intersection, allowing for more “green” time for through motorists. This intersection uses a much larger footprint than the existing intersections and is less comfortable for bicyclists and pedestrians. The project team did not eliminate these solutions in the alternatives analysis phase of the project and could be re-evaluated at future times before the implementation of the project.

Alternative Goals and Vision

To determine which of the three alternatives should be recommended for implementation, the planning team created evaluation criteria. Improved safety for all road users was at the forefront for each of the three alternatives during the development processes. Regardless of which of the three alternatives or a combination of solutions from each of the alternatives is built, CO 42 will far exceed what is required to create a safe multimodal environment for all users and build on the growing regional multimodal transportation network.

Four key goals of Future 42 served as the evaluation criteria for each alternative:

- A safe corridor for all users
- A comfortable corridor for walking and biking
- Efficient motor vehicle travel
- Accommodation for a future *BRT* project

A Safe Corridor for All Users was measured by modeling the reduction in speeds for off-peak hours that are experienced along the corridor. Historically, the roadway speeds are a little over the current speed limit and there is a desire to lower the current speed limit to fit the context of adjacent land uses and access points. Slower turning speeds are also desired to aid in creating safer crossings of roadways for vulnerable users. Safety improvements were evaluated and calculated for the

alternatives using researched and documented crash mitigation factors.

A Comfortable Corridor for Walking and Biking was measured by using *StreetScore+*. *StreetScore+* assigns a score of one to four for pedestrian and bicycle facilities. A score of one indicates safe and comfortable facilities for all users regardless of age and ability. A score of four indicates the street may be uncomfortable and there are barriers to walking and biking.

Efficient Motor Vehicle Travel was scored by calculating intersection *LOS* for each intersection. *LOS* is calculated on a scale of A through F. A score of A indicates free-flowing vehicle movements at the intersection. A score of F indicates an intersection that is over capacity and will likely cause backups. A score of C or greater is considered optimal. In addition to *LOS* scores, peak travel times were calculated and scored for each intersection along the corridor.

Accommodation for a Future *BRT* was measured by calculating the ability of each intersection to add a *queue jump lane* and/or *BRT* stop within the available ROW.

Because of the complexity of the corridor, it was important not only to analyze the three full corridor alternatives but also to collect granular feedback on each element within both of the alternatives. These elements were defined by the planning team:

- Roadway
- Bicycle
- Pedestrian

Not only were corridor alternatives scored and evaluated, but also the four components above. This method of evaluation allows for the mixing and matching of solutions based on scores where needed.

Alternatives Development

Once the initial solution list was compiled, the planning team refined the types of solutions that would best fit the corridor and created three main alternatives from the list of applicable solutions. These alternatives consisted of an alternative developed for the corridor (Corridor Alternative) and an alternative developed for the intersection (Intersection Alternative). These were combined to allow traffic analysis, environmental analysis, and designs at key places for the entire roadway. These were also developed knowing that certain pieces of each alternative may be used to create the final recommended alternative.

After reviewing and analyzing each of the options, the planning team settled on three alternatives to move forward that incorporate a combination of the initial improvements. These three alternatives assembled were:

- **Alternative 1:**
 - **Corridor Alternative 1:** One-way protected bicycle lanes with separated pedestrian sidewalks
 - **Intersection Alternative 1:** Signalized *protected intersections*
- **Alternative 2:**
 - **Corridor Alternative 2:** Buffered on-street bicycle lanes, detached sidewalk, and a multiuse path on the east side with four-through travel from just north of Hecla Drive to Empire Road/Lock Street.
 - **Intersection Alternative 2:** Conventional signalized intersection

- **Alternative 3:**

- **Corridor Alternative 3:** Two-way protected bicycle lane, separated pedestrian sidewalk with *roundabouts*
- **Intersection Alternative 3:** Dutch Style *roundabout* (Includes two-way protected bicycle lane through the *roundabout*)

Corridor Alternatives Versus Intersection Alternatives

To find the best infrastructure solution for a complex corridor like CO 42, the planning team used an alternative analysis method that looked at both improvements at intersections and within the corridor. The improvements for the intersection were labeled as intersection alternatives and improvements that happen between the intersections in the linear parts of the corridor were labeled as corridor alternatives.

Alternative 1

Protected Bicycle Lanes with Protected Intersections

Alternative 1 aims to maximize the comfort for bicyclists and pedestrians using protected bicycle lanes with *protected intersections* designed at all intersections along the study area. Protected bicycle lanes provide a physically separated bicycle lane from the vehicular travel lanes. *Protected intersections* provide raised corners to protect waiting bicyclists and pedestrians, no right-turn on red signage, crosswalks set back from the travel lanes, and separate bicycle signals. The following breaks down the elements of the corridor alternative and the intersection alternative.

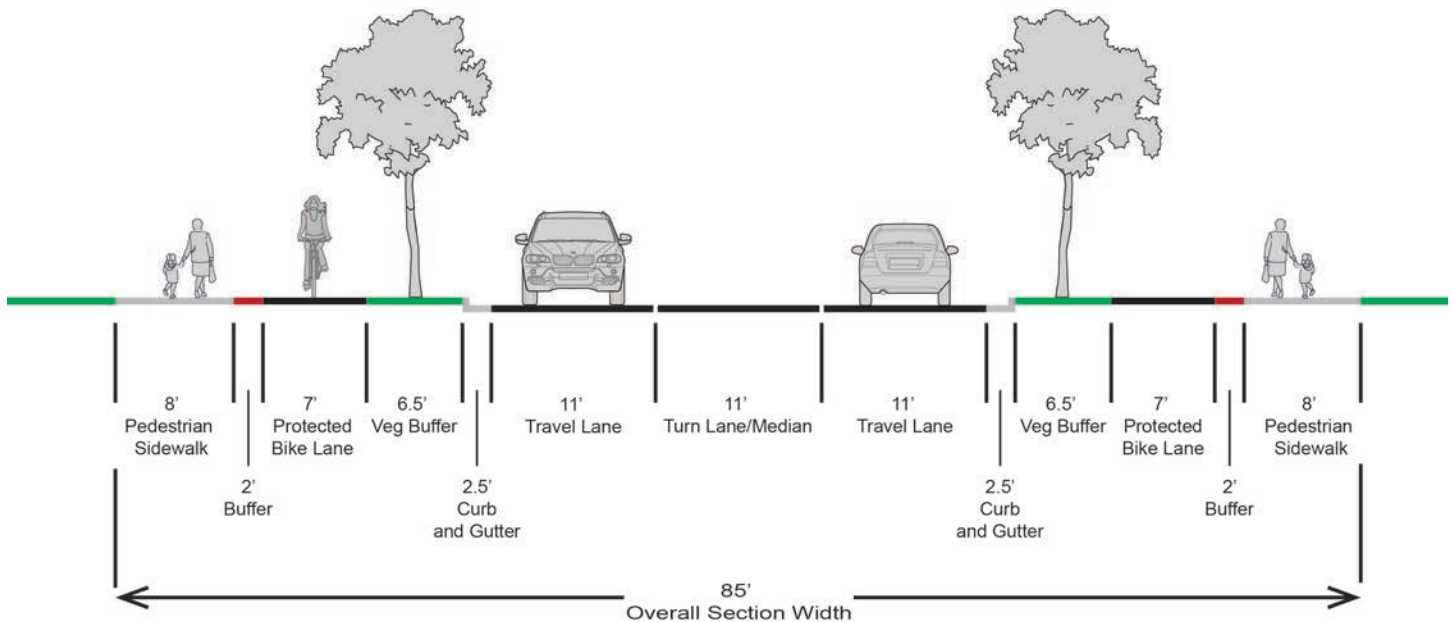
Corridor Alternative 1

Corridor Alternative 1 presents one-way protected bicycle lanes along both the east and west sides of CO 42, wide sidewalks on both sides of the road with a small buffer between the bicycle lane and sidewalk, a vegetated buffer separating the bicycle lanes and sidewalks from vehicular traffic, and two-through motor vehicle lanes throughout the corridor.

Bicycle: The bicycle lane is proposed to be 7-foot wide. This width is ideal for maneuvering bicyclists and allows for bicycles to pass each other. It also allows maintenance vehicles to access the bicycle lane without fear of damaging the buffer spaces. Materials for the bicycle lane will be chosen closer to the installation, but asphalt or porous asphalt should be considered for a smoother riding surface. Other winter cities have similar facilities with much success.

Pedestrian: The sidewalks for pedestrians are 6 feet wide with a 2-foot buffer between the sidewalk and the bicycle lane. The buffer should be of a different material, color, and/or texture to aid in identification for ADA users.

Motor Vehicle: This alternative only provides two through travel lanes throughout the corridor and auxiliary turn lanes as needed at each intersection.



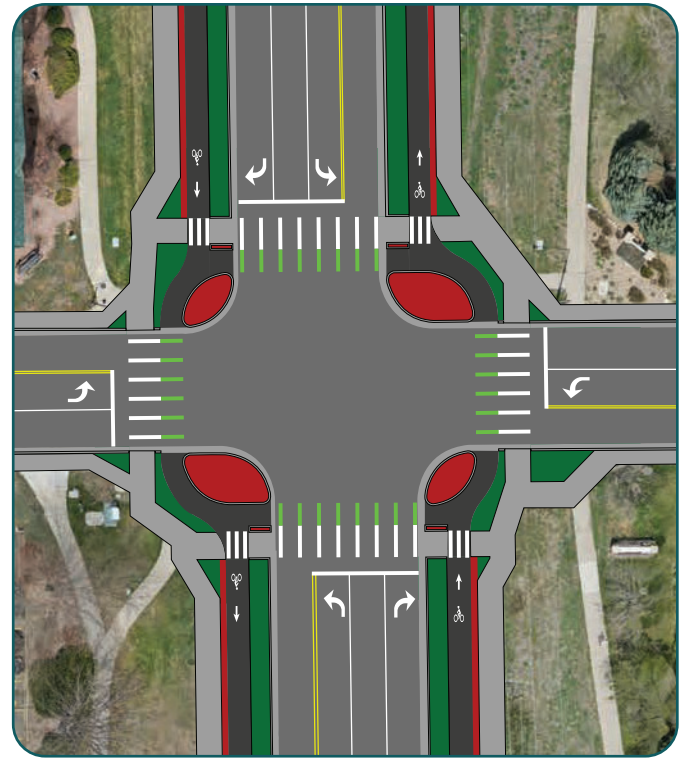
Corridor Alternative 1

Intersection Alternative 1

Intersection alternative 1 features a *protected intersection* for all of the intersections throughout the corridor. *Protected intersections* provide more safety and comfort for bicyclists and pedestrians at conflict points with motor vehicles. For the two larger intersections, South Boulder Road and Baseline Road, a protected right-turn-only phase will be required. This protected phase means right turns are only permitted on the green arrow on the signal.

Evaluation

Overall this alternative is the most bicycle and pedestrian friendly. The one-way protected bicycle lanes and sidewalks are intuitive and present on both sides of the road. The *protected intersections* are the most comfortable for bicyclists and pedestrians as well. For motor vehicles, this alternative contains improvements that slow vehicles without causing major traffic issues at Baseline and South Boulder Road intersections due to the protected right-turn-only phasing and only 2 through-travel lanes throughout the corridor. This will also cause an issue for future transit usage due to buses being stuck in traffic and the queue jump length needed are not possible at several locations that would be needed.



Intersection Alternative 1

Alternative 2

Buffered On-Street Bicycle Lanes with Four Through Lanes

Alternative 2 aims to advance the goals of the study and reduce congestion along the corridor by having more capacity in the roadway, while still providing comfortable bicycle and pedestrian facilities. This alternative has on-street *buffered bicycle lanes*, a sidewalk on the west side of the road, a multiuse path on the east side of the road, four through travel lanes from just north of Hecla Drive south to Empire Road /Lock Street, and landscape *medians* in the four-lane section. This alternative also uses more traditional signalized intersections and improved channelized right-turn lanes for the Baseline and South Boulder Road intersections.

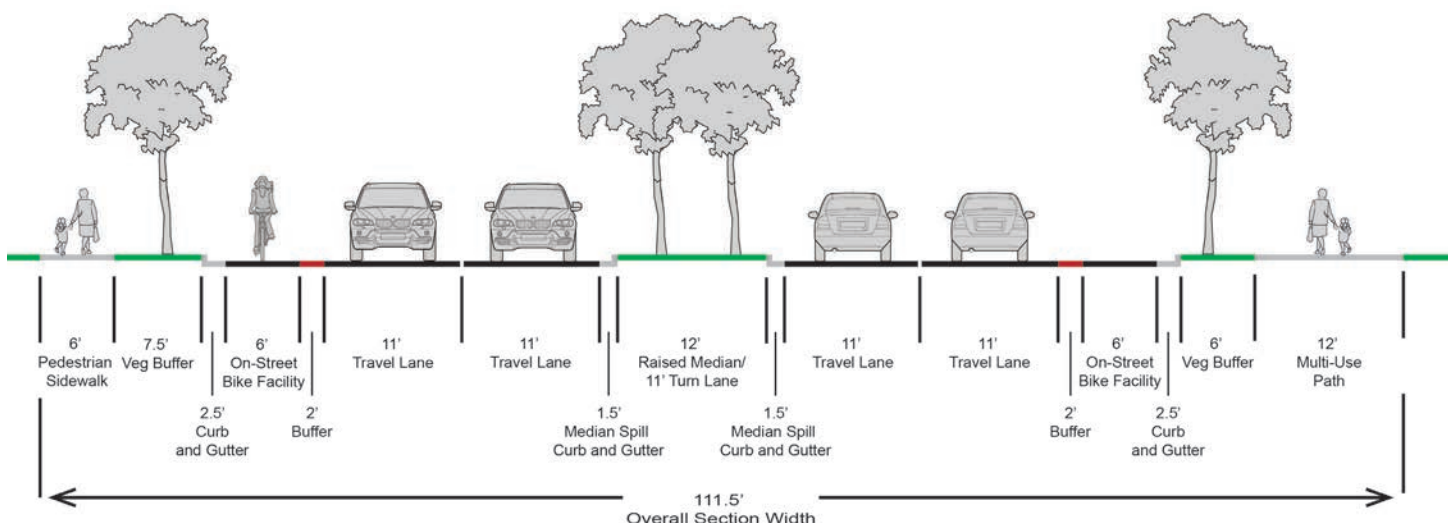
Corridor Alternative 2

Corridor Alternative 2 presents on-street buffered bicycle lanes along both the east and west sides of CO 42, wide sidewalks on both sides of the road with one side being a multiuse path, a vegetated buffer separating the sidewalks from the roadway, four through motor vehicle lanes from Empire/Lock Street to Hecla Drive, and two through lanes with center-turn lane/*median* from Hecla Drive to Arapahoe Avenue.

Bicycle: The combination of on-street buffered bicycle lanes and multiuse paths provide bicycle facilities for all ages and abilities. The on-street bicycle lane is 6 feet wide with a 2-foot buffer from the vehicular lanes. A vertical element could be added to the buffer but would need to be done to provide at least 7 foot clear for maintenance vehicles, which may mean expansion to a 3-foot buffer. The multiuse path would be shared with pedestrians and provides a facility for those not as comfortable with riding in the on-street bicycle lanes.

Pedestrian: A 6-foot sidewalk on the west side and a 12-foot multiuse path on the east side allow pedestrians to move easily and comfortably in the corridor. The multiuse path would be shared with bicycle users that are not as comfortable riding in the on-street buffered bicycle lanes. The multiuse path should be made of concrete with provisions for the joints in the concrete to make a smoother ride for bicyclists.

Motor Vehicle: This alternative provides four through motor vehicle lanes from Empire/Lock Street to Hecla Drive, and two through lanes with a center turn lane/*median* from Hecla Drive to Arapahoe Avenue. This allows traffic to flow similarly to better than existing traffic conditions.



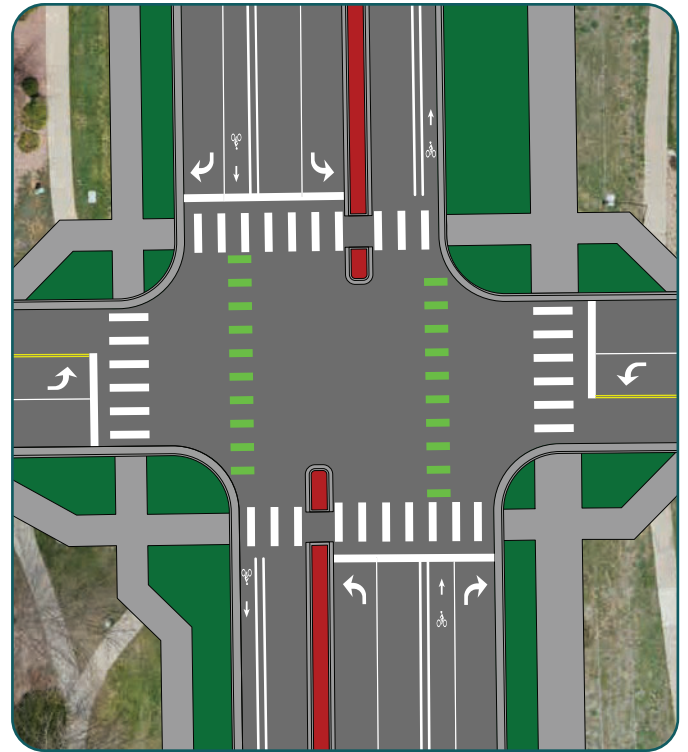
Corridor Alternative 2

Intersection Alternative 2

Intersection Alternative 2 uses a traditional intersection (traffic signals, stop signs) design with *pocket bicycle lanes* and more traditional pedestrian crossings (crosswalks). At the intersections of Baseline and South Boulder Road, the angle of the right-turn channelized lanes is changed to an acute angle. This provides a visual cue to drivers to yield to on-coming traffic.

Evaluation

Overall this alternative provides the best traffic flow for motor vehicles while providing comfortable bicycle and pedestrian facilities. The intersections are the least comfortable of all alternatives for bicyclists and pedestrians due to the lack of protection. Buses would not be delayed in this alternative and can use queue jumps as needed at major intersections better than the other alternatives.



Intersection Alternative 2

Alternative 3

Two-Way Protected Bicycle Lane with Roundabouts

Alternative 3 provides high-comfort bicycle and pedestrian facilities while providing intersections (*roundabouts*) that create a higher flow of traffic without increasing speeds in the corridor. This alternative provides a two-way protected bicycle lane on the east side of the road, wide sidewalks on both sides of the road, two through travel lanes, and *roundabouts* at all intersections, except for Baseline Road and South Boulder Road. Baseline and South Boulder Road would be *protected intersections*.

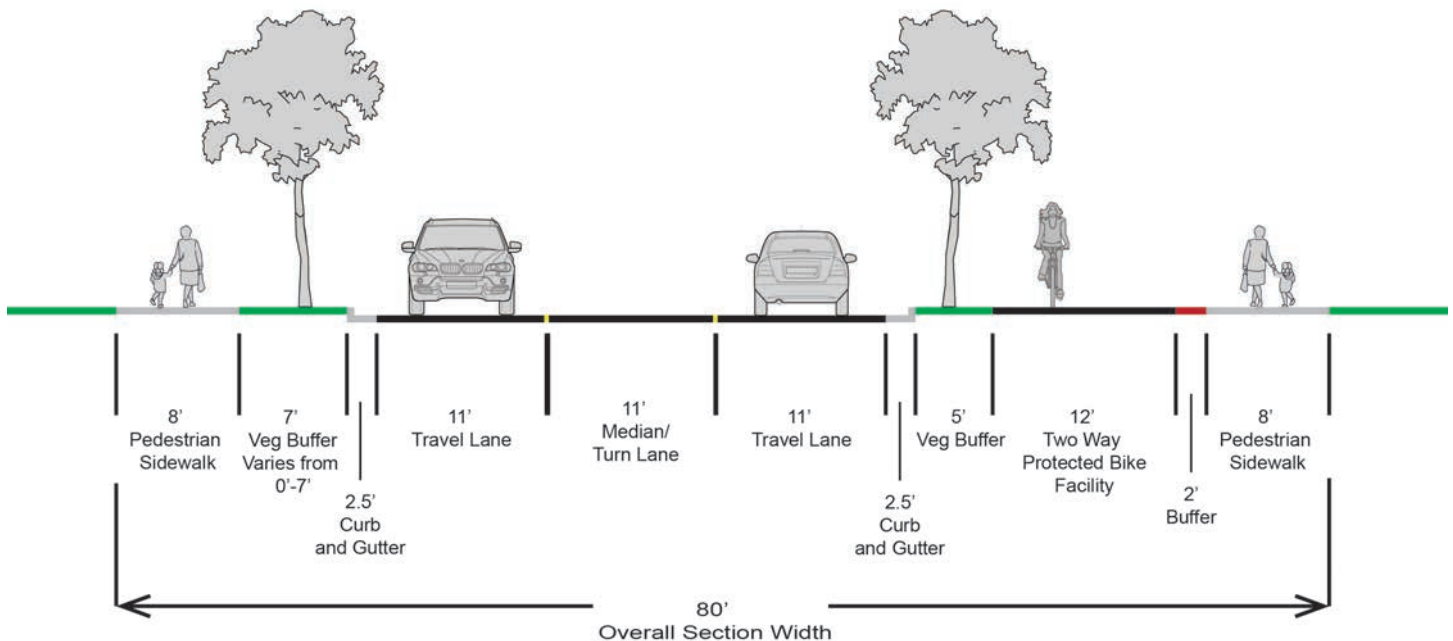
Corridor Alternative 3

Corridor Alternative 3 includes two travel lanes bordered by a vegetated buffer, a two-way protected bikeway provided along the east side of the road, and sidewalks on both sides of the street.

Bicycle: A high-comfort 12-foot wide two-way protected bicycle lane is located on the east side of the road. This protected bicycle lane is buffered from motor vehicles with a 6-foot vegetated buffered and is buffered from pedestrians with a 2-foot buffer. Materials for the bicycle lane will be chosen closer to the installation, but asphalt or porous asphalt should be considered for a smoother riding surface. Other cities with similar climates have used these types of facilities with much success.

Pedestrian: The sidewalks for pedestrians are 8 feet wide with a 2-foot buffer between the sidewalk and the bicycle lane. The buffer should be of a different material, color, and/or texture to aid in identification for ADA users.

Motor Vehicles: This corridor alternative provides two-through motor vehicle lanes and expands to four-through lanes at Baseline and South Boulder Road intersections.



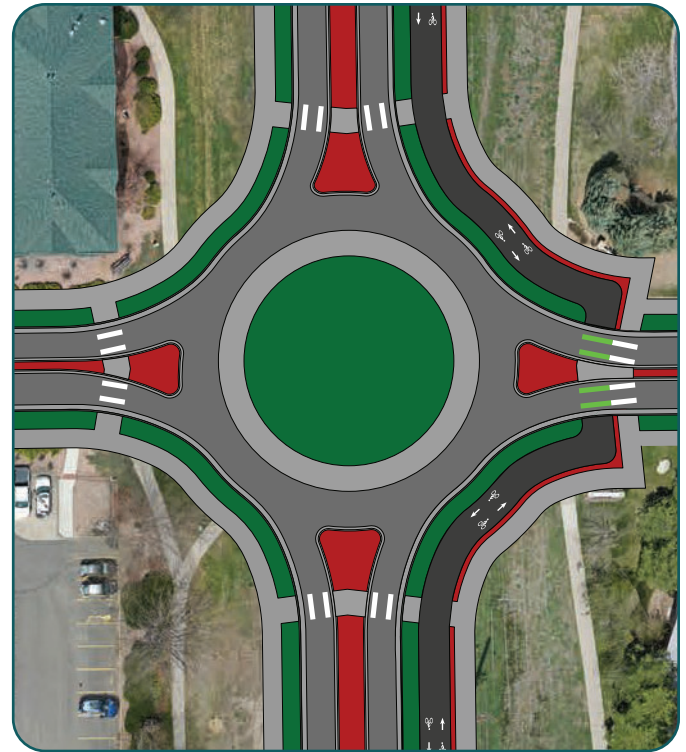
Corridor Alternative 3

Intersection Alternative 3

Intersection Alternative 3 provides *roundabouts* at most of the intersections in the study area except for Baseline Road and South Boulder Road. These *roundabouts* would be considered Dutch-style *roundabouts* due to providing a protected bicycle lane on the outside of the travel lane circle and providing connectivity from the west side to the east side protected bicycle lane through the use of bicycle and pedestrian crossings. At Baseline and South Boulder Road, a *protected intersection* is proposed due to *roundabouts* not being able to function at the higher levels of traffic between the two roadways.

Evaluation

This alternative provides the benefits of high-comfort bicycle and pedestrian facilities with a safe, but the efficient flow of traffic in the corridor. The two-way protected bikeway provides a high-comfort bicycle facility, but it is only on one side of the street, making access a more difficult. The *protected intersections* at Baseline and South Boulder Road cause issues with traffic congestion due to a protected right-turn-only phase. *Roundabouts* work great at most intersections in the corridor, but a few of the intersections have capacity issues and need to be expanded to a two-lane *roundabout*, which is less desirable for bicyclists and pedestrians.



Intersection Alternative 3

Alternative Evaluation Matrix

Measures of Effectiveness

Each of the alternatives was evaluated using the project goals and vision. Those goals were:

- A safe corridor for all users
- A comfortable corridor for walking and biking
- Efficient motor vehicle travel
- Accommodation for a future *BRT* project

To make it easier to digest each of the alternatives and how they evaluate based on the goals of the project, an alternative evaluation matrix was developed. Each evaluation criterion was graded on a color-coded symbol scale ranging from green to red with green being the best and red the worst. This matrix can be used to quickly evaluate the alternatives by looking and seeing which alternatives have more green than red and to determine their performance in any given location. This evaluation matrix was used to help inform the decision-making to create a recommended alternative to move forward to the final design. It should be noted that all traffic evaluation was done using 2050 projections for planning for future growth. The matrix can be seen in **Figure 10**.

		Level of Service	Change in Speeding During Off-peak Hours	Anticipated Crash Reduction	Walking Comfort	Biking Comfort
Intersection on CO 42	Alternative					
Northpark Drive/Dagny Way	1	✓	●	●	✓	✓
	2	✓	●	●	✓	✓
	3	✓	✓	✓	✓	✓
Indian Peaks Trail	1	✓	●	✓	✓	✓
	2	✓	●	✓	✓	✓
	3	✓	✓	✓	✓	✓
Baseline Road	1	✗	●	✓	✓	✓
	2	✗	●	✓	✓	✓
	3	✗	●	●	✓	✓
Paschal Drive	1	✓	●	●	✓	✓
	2	✓	●	●	✓	✓
	3	●	✓	✓	✓	✓
Hecla Street	1	✓	●	●	✓	✓
	2	✓	●	✓	✓	✓
	3	●	✓	✓	✓	✓
South Boulder Road	1	✗	●	●	✓	✓
	2	✗	●	●	✓	✓
	3	✗	●	●	✓	✓
Griffith Street	1	✓	●	✓	✓	✓
	2	✓	●	✓	✓	✓
	3	✓	✓	✓	✓	✓
Short Street	1	✓	●	●	✓	✓
	2	✓	✗	●	✓	✓
	3	✓	✓	✓	✓	✓
Pine Street	1	●	●	✓	✓	✓
	2	✓	✗	●	✓	✓
	3	✗	✓	✓	✓	✓

 Ideal
  Good
  Neutral
  Poor
  Detrimental

The highest score/rating was pulled from the Measures of Effectiveness data that was compiled in initial phases of the Future 42 Study.

Figure 10. Alternatives Measure of Effectiveness

Public Engagement



Public Engagement Overview

Public input is one of the key components of a successful project. Giving the public a strong voice in shaping the future of CO 42, the Future 42 planning team used a multi-faceted approach to public engagement. The backbone of the engagement ecosystem for Future 42 was the Engage Louisville project website. The website serves as the central hub for project updates, communications, and was the starting point for the project's public engagement process. In addition to the project website, the planning team utilized multiple engagement strategies:

Virtual Engagement Strategies and Outcomes

Much of the public engagement was performed virtually due to the Covid 19 pandemic. To reach a broad group of people multiple tools were used. These tools included:

Strategy: Online Question and Answer (Q&A) Portal

A Q&A forum board, accessible through the project website, allowed participants to ask the planning team questions pertaining to the project. When questions were submitted, the planning team would be alerted. The planning team's responses would then be posted to the board on the website for all community members to see. Questions that pertained to only a single stakeholder's property, questions pertaining to troubleshooting the website, and survey access were answered privately.

Strategy: Project Email

The project team provided an email address so community members could reach out with questions and comments directly to the planning team. The email provided an opportunity for people to provide longer questions and comments than that on the Q&A forum board. The email account was monitored by multiple members of the planning team to ensure answers were provided in a timely manner.

Strategy: Corridor Map

To gather feedback from the community, a mapping exercise was posted to the project website. The interactive map allowed participants to place pins along the corridor. With each pin placed, participants were able to leave a comment about what they liked or disliked about that location.

Outcome: Corridor Mapping Exercise

The corridor mapping exercise provided an opportunity for community members to pinpoint areas they felt are unsafe or hard to navigate along the corridor and areas that they would like to see improved. Some common themes emerged from the mapping exercise.

One theme that was carried throughout many responses is the need for dedicated right-turn lanes, especially at the intersections of CO 42 and South Boulder Road and CO 42 and Baseline Road. Additionally, many respondents indicated the need for continuous bicycle and pedestrian facilities along the entirety of the corridor. Sidewalks under the current configuration are inconsistent along the east side of the roadway. Another common thread from respondents' pinpoints was a need to rebalance the timing of signals that would allow turning vehicles adequate time to complete their turning movements.

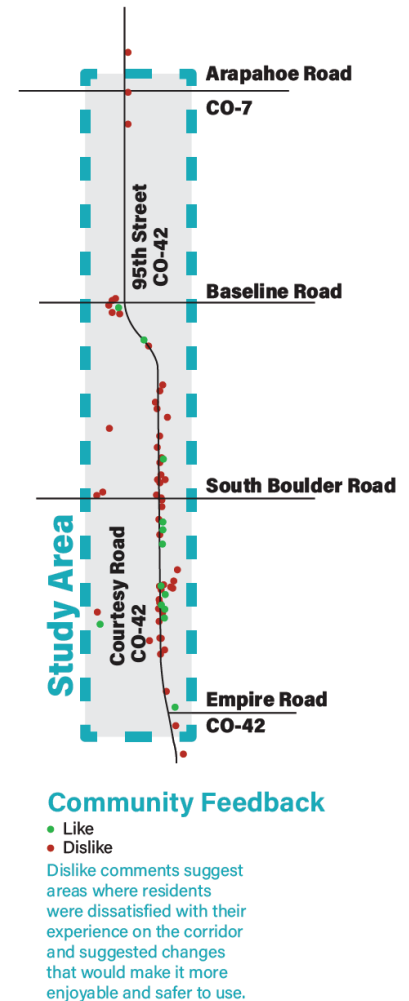


Figure 11. Community Mapping Results

Strategy: Community Surveys

Throughout the engagement process, two different community surveys were administered. The results of the surveys provided valuable input and shaped how the planning team moved forward with alternative designs for the CO 42 corridor. A total of 315 responses were completed to the community surveys with 118 surveys completed for Community Survey 1 and 197 surveys completed for Community Survey 2.

Community Survey 1

The first survey was intended to help the planning team understand what types of improvements the community would like to see along the corridor, what peoples' perceptions of CO 42 are today, and what their experience has been traveling on the corridor in its current configuration.

Outcome: Community Survey 1:

The first of two community surveys was aimed at collecting recipients' general feedback and vision for the future of the CO 42 corridor. In total, 118 people took the survey over the three weeks the survey was open. A few key themes emerged throughout the survey.

Residents generally find CO 42 to be an effective and efficient connector for those traveling between Louisville and Lafayette. The need for enhanced bicycle infrastructure that protects bicyclists from traffic, improved pedestrian facilities, and crossing improvements was highlighted as some of the most pressing issues along the corridor. Additionally, there were concerns about the speed vehicles traveling along CO 42, with many respondents stating that drivers typically speed and drive dangerously along CO 42.

Community Survey 2

A second survey was administered to collect feedback on each of the three alternatives proposed for the corridor. All three alternatives were scored for each intersection in the study area. Scores from 1 to 5, with 1 being the lowest score and 5 being the best score were assigned by respondents for each element of the intersection. Participants rated bicycle lanes, bicycle crossings, sidewalks, pedestrian crossings, traffic lanes, and traffic flow for each alternative at all intersections along the corridor. The rankings were then compiled and averaged across all respondents to determine which elements from

each alternative were most popular. This data was used to aid in the evaluation of the future design of the corridor.

Community Survey 2

The second of the community surveys was live for three weeks and generated 197 responses. The survey was designed to collect community feedback on each of the three potential alternative designs for the corridor. Respondents scored each component for all three alternatives at each intersection on a scale of 1 to 5, with 1 being the lowest score and 5 being the best score.

2.9 Alt 1 Bike Lane and Bike Crossings

2.9 Alt 1 Sidwalk and Pedestrian Crossings

2.8 Alt 2 Traffic Lanes

2.7 Alt 2 Traffic Flow

Each of the three alternatives components were ranked on scale of 1 to 5 with 1 being the worst and 5 being the best.

Figure 12. Community Survey Results

- **Alternative 1:** Of all three proposed designs, Alternative 1 scored the highest. Respondents indicated that *protected intersections* and bicycle lanes would offer the highest level of protection from vehicular traffic for pedestrians and bicyclists. While Alternative 1 received positive feedback, respondents were concerned that traffic would worsen without right-turn movements on red lights.
- **Alternative 2:** Alternative 2 was ranked second of the three alternatives with respondents expressing approval of the wide sidewalks and the similarity to the current arrangement of the road. However, some respondents expressed concerns that Alternative 2 does not do enough to improve safety for bicyclists.
- **Alternative 3:** *Roundabouts* proved to be polarizing with respondents either expressing strong support for them or strong opposition to them. Supporting members of *roundabouts* stated that *roundabouts* are needed to slow traffic while opponents felt as though they would cause increased congestion and make it harder to see pedestrians and bikes while traveling through them.

Strategy: Community Workshops

In addition to the surveys, three community workshops were held. These workshops provided a live Q&A held virtually where community members could ask the planning team questions directly and have them answered in real-time. Both meetings lasted for two hours, and about 30 participants were present for each meeting. Additionally, a third in-person Q&A was held in-person at the Louisville Recreation & Senior Center to allow the public to have one final opportunity to view and have questions answered about the three proposed alternatives.

Community Workshop 1

On May 19, 2021, the planning team held an initial community workshop. The workshop focused on understanding residents' current perceptions and priorities for the future of CO 42. The entire meeting was recorded and posted to the project website. Additionally, a written summary of the questions asked was posted to the project site allowing anyone that could not attend the opportunity to see the recording of the Q &A.

Outcome: Community Workshop 1

The community workshop was held on May 19th, 2021, from 6 to 8 p.m. and was held virtually using a Q&A format. Much of the discussion was centered around safety and how the current planning effort integrates with past planning work by CDOT and RTD.

1. How will this planning effort work to improve pedestrian and bicycle connections?
2. Attendees stated that the current configuration of CO 42 is dangerous for active transportation.
3. Attendees asked for clarification on how the current planning effort would be integrated with past CDOT plans and future RTD transit along the corridor.

Community Workshop 2

The second Q&A session was held on February 24, 2022. The second community workshop was focused on collecting feedback on the three proposed alternatives for the corridor. The entire meeting was recorded and posted to the website. Additionally, a written summary of the questions asked was posted to the project site allowing anyone that could not attend to see a recording of the Q&A.

Outcome: Community Workshop 2

The second community workshop was held on February 24th, 2022 from 6 to 8 p.m. virtually using the same Q&A format as the first meeting. The meeting attracted 30 attendees and the planning team answered community questions in real-time. Throughout the Q&A session, some key themes emerged. The need for lower speed limits along CO 42 was one key theme.

Community members expressed a desire to see the posted speed limit for the corridor lowered in conjunction with making drivers slow due to the roadway design.

The other key theme that emerged from the second workshop was concern about how new pedestrian and bicycle infrastructure would be integrated with the existing transportation network. Participants expressed they want to ensure that, if multiple types of infrastructure and bicycle and pedestrian facilities are being utilized, all facilities are predictable and intuitive for users to walk or ride on.

Strategy: Community Workshop 3 In-Person Engagement

In addition to the virtual engagement one in-person Community workshop was held, to ensure voices who may not have accessed the virtual engagement sessions had an opportunity to have their voices heard. This third and final Q&A was held in person at the Louisville Recreation & Senior Center. The in-person event allowed residents to come speak with the planning team and have their questions answered on the three alternatives. Additionally, paper copies of the preference survey were available for attendees to fill out. The in-person Q&A attracted around 30 attendees and ran for two hours.

Outcome: Community Workshop 3

The third and final community workshop was held on April 14th at the Louisville Recreation Center. This third and final meeting provided the public with the opportunity to ask questions of the planning team. The meeting used an open house format allowing people to drop in and out to have their questions answered. At the meeting, paper copies of the project survey were provided. The meeting attracted approximately 25 attendees with questions about roadway configurations and traffic flow.

Engagement Key Takeaways

- The public engagement process highlighted that all three of the alternatives addressed peoples' concerns when it comes to CO 42. All three options make the corridor safer for all road users.
 - All three of the alternatives received favorable ratings from the public with smaller concerns separating the three alternatives.
 - The public was most divided on the use of *roundabouts*; however, Alternative 3 was still received broadly positively.
- The public favored the high level of pedestrian and pedestrian protection that Alternative 2 has to offer.
- By engaging both virtually (a requirement due to the Covid-19 pandemic) and in-public, turn out around the project was high and larger numbers of Louisville residents in particular were reached and helped to shape to process.

Recommended Alternative



Recommended Alternative

What is the Recommended Alternative?

The recommended alternative is the name for the conceptual design that is recommended to move forward into the final design. This recommended alternative is built from the desired and highest functioning pieces from each of the alternatives. These pieces were chosen through public engagement, expert opinions, and alignment with the goals of the project. It was never anticipated that one of the preliminary alternatives would be kept intact as the recommended alternative. The Recommended Alternative for CO 42 consists of the following pieces:

Alternative Pieces	Items Carried Forward to Recommended Alternative
Corridor Alternative 1	One-way Protected Bicycle Lanes, Separated Sidewalks
Corridor Alternative 2	Four Through Travel Lanes from just North of Hecla to CO 42/Lock Street
Intersection Alternative 1	Protected Intersections
Intersection Alternative 2	Acute Angle Channelized Right Turn Lanes (South Boulder Road and Baseline Road Intersections)

Recommended Alternative Development

The recommended alternative was chosen through the combination of public feedback, consultant team and staff input, and a review of the proposed condition data. These three items set up an evaluation in which the consultant team and staff discussed and created a recommendation that was discussed with each City Council for their approval.

First and foremost, the recommended alternative is needed to meet the goals and vision set forth at the beginning of the plan. These goals were developed through the first public engagement process and are:

- A safe corridor for all users
- A comfortable corridor for walking and biking
- Efficient motor vehicle travel
- Accommodation for a future BRT project

Each of the developed solutions in both the initial part of the project and the alternatives phase was then evaluated based on the same criteria to provide both qualitative and quantitative analysis of the alternatives. Another round of public engagement was conducted to get feedback on the three alternatives. This engagement process allowed the public to rank their preference for each element, so the project team could use the data to create a recommended alternative.

The results of the second round of engagement were that all three alternatives ranked very similarly with the community's preference for all three separated by a thin

margin. Ultimately participants appreciated the high level of bicycle and pedestrian protection that Corridor Alternative 1, the traffic flow of Corridor Alternative 2, and the intersection layouts of South Boulder Road and Baseline Road in Intersection Alternative 2. These preferences are carried forward in the selection of the recommended alternative.

Recommended Alternative Safety Improvements

As a core goal of increasing safety in the corridor, the recommended alternative implemented this goal into each piece of the recommended alternative. It is anticipated this design will decrease crashes by 16% with a focus on eliminating fatal or severely injured crashes. The recommended alternative achieves these safety increases through four main elements:

1. Roadway: CO 42 will have two general-purpose travel lanes and a painted *median*/ turn lane from Arapahoe Road on the north to just north of Hecla Drive on the south. CO 42 will have four general-purpose travel lanes with a landscaped center *median* and turn lanes as needed just north of Hecla Drive on the north to Empire/Lock Street on the south.

2. Bicycle: the recommended alternative will feature a one-way protected bicycle lane on the respective sides of the roadway (northbound on the east, southbound on the west). These bicycle lanes are separated from the vehicular lanes by a landscape buffer and from the sidewalks by a textured and/or colored buffer.

3. Pedestrian: the recommended alternative has separated sidewalks on both sides of the roadway and buffered from the travel and bicycle lanes throughout the corridor.

4. Intersections: The corridor will have *protected intersections* at most intersections. At the major intersections (South Boulder Road and Baseline Road) a more traditional intersection with acute angle right-turn channelized turn lanes with raised bicycle and pedestrian crossings is proposed.

The study evaluated the safety through the outcomes of the two most used to measure this goal: free-flow vehicle speed, and total crashes at intersections. The safety MOEs for the preferred alternative were quantified relative to existing conditions.

The recommended alternative is proposing to reduce the speed limit in the corridor to a speed that is more in line with the context of the adjacent land uses and access points. Several operating and design elements are included in the preferred alternative to support a reduction in free-flow vehicle speed:

- Introduction of physical *medians* on the 4-lane section south of Hecla Drive.
- Addition of *streetscape* along the roadway, including street trees, to visually narrow the roadway.
- Tighter radii on the corners at signalized intersections to slow-turning vehicles.
- Signal progression is timed at slower speeds, which will be made more effective with more frequent signal spacing (i.e., new signals at Indian Peaks Trail, Hecla Drive, and Griffith Street).

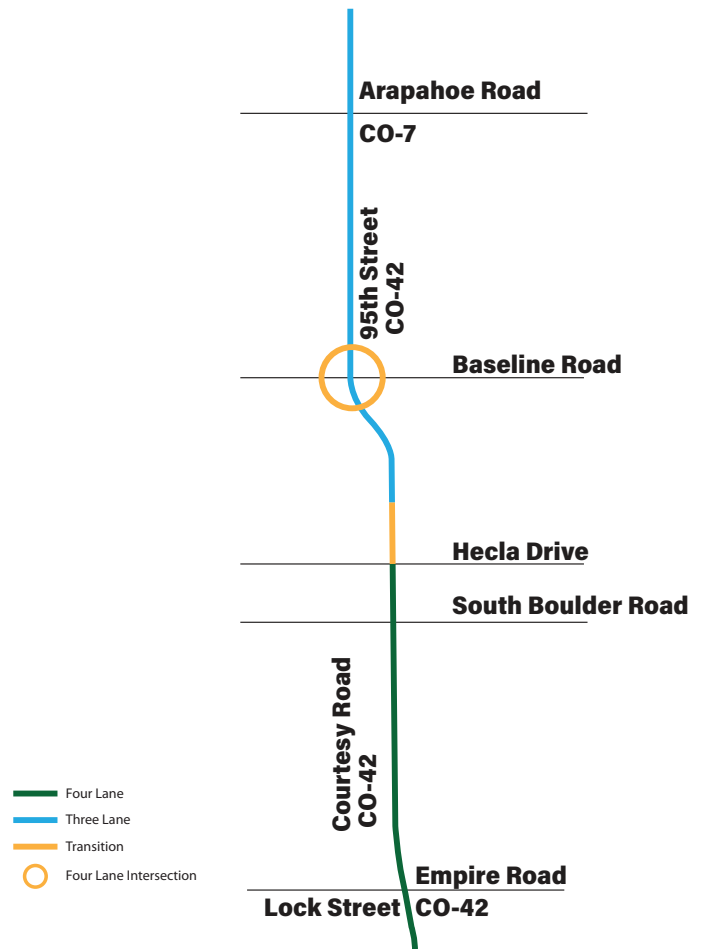


Figure 13. Lane arrangement

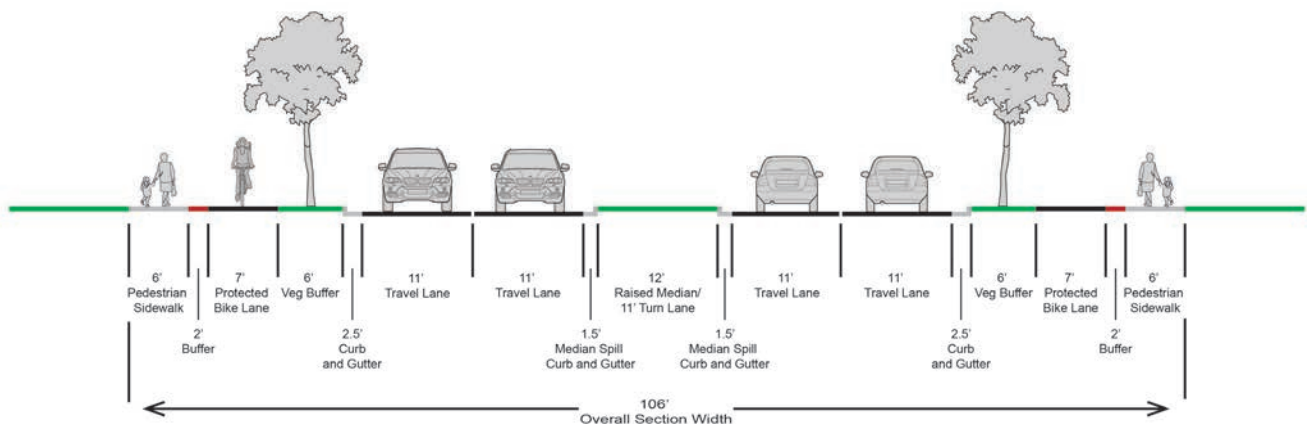


Figure 14. Typical 4 lane cross section

- All of these improvements taken together show a reduction in crashes of 16%

The primary improvements anticipated to reduce crashes include:

- Changing the angle of channelized right turns to alert drivers to yield to conflicting traffic combined with raised crosswalks at Baseline Road and South Boulder Road (predicted to mitigate 17 crashes over 5 years).
- Adding protected left-turn signal phasing at Pine Street/ Empire Road (predicted to mitigate 6 crashes over 5 years).
- Signalizing intersections with Indian Peaks Trail, Hecla Drive, and Griffith Street (predicted to mitigate 3 crashes over 5 years).

It is also expected that the introduction of protected bicycle lanes and *protected intersections* will decrease the number of crashes in the corridor. Unfortunately, there has not been any research completed on these facilities in the United States to quantify the actual reduction. Therefore, the study did not include figures for these improvements.

Recommended Alternative and Future Traffic Volumes

A core goal of the project was for the CO 42 corridor to provide safe but efficient motor vehicle travel. This section describes the outcomes of the two measures of effectiveness (MOE) used to measure this goal: intersection level of service (LOS), and corridor travel time for vehicles. Please reference **Figure 15** for a more detailed glance at how MOEs were used to measure LOS and travel time.

Overall LOS is anticipated to improve under the preferred alternative as compared to with no improvements (no project). Under existing volumes, the LOS is anticipated to improve at Griffith Street, Hecla Drive, and Indian Peaks Trail in the preferred alternative by signalizing those intersections. LOS improvements in the recommended alternative at South Boulder Road and Baseline Road can mostly be attributed to re-optimizing the signal progression in the corridor.

Several intersections show a LOS F with 2050 volumes under the recommended alternative, particularly in the PM peak, although fewer than with no project. This is primarily due to the high volumes forecast for 2050 under the DRCOG Regional Travel Demand Model. Given the time frame and many unknown factors that could influence this over the next 30 years (changes in growth, travel patterns, connected/ autonomous vehicle technology, etc.), the 2050 LOS should be considered the upper-end, or “worst-case” scenario. In all likelihood, the future LOS is likely to fall somewhere between the existing and 2050 forecasts. The implementation of the recommended alternative is anticipated to decrease travel time in the morning peak from 15 minutes to 11 minutes southbound and from 9 minutes to 8 minutes northbound using 2050 traffic projections. With 2050 volumes the recommended alternative is expected to decrease travel time in the afternoon peak from 12 minutes to 11 minutes southbound and marginally increase travel time northbound, by less than half a minute.

Intersection with CO 42	AM				PM			
	Existing	Rec. Alt. Existing	2050 No Build	2050 Rec. Alt.	Existing	Rec. Alt. Existing	2050 No Build	2050 Rec. Alt.
CO 7 (Araphoe Road)	E	C	F	D	D	C	F	F
Northpark Drive/ Dagny Way	A	B	C	B	B	B	B	C
Indian Peaks Trail	E	A	E	A	D	A	F	B
Beaupre Ave	A	A	B	B	A	A	A	A
Baseline Road	D	C	F	F	E	D	F	F
Paschal Drive	B	B	B	B	B	C	B	D
Hecla Drive	D	A	F	B	F	B	F	C
South Boulder Road	C	C	D	D	E	D	F	F
Griffith Street	E	A	F	A	F	A	F	A
Short Street	A	A	A	A	B	A	B	A
Pine Street/ Empire Road	B	B	C	C	E	C	F	D
Lock Street/ Empire Road	C	A	C	D	D	C	D	F

Figure 15. Peak Hour Motor Vehicle Level of Service (LOS) Under the Recommended Alternative

Implementation

Right-of-Way

While CO 42 currently has adequate ROW for the recommended alternative to be built in most areas, there are areas where there are constraints that will require easement or ROW acquisition to build sections. One such section where this will be required is along the east side of CO 42 from Pine Street to South Boulder Road. Due to the jointly owned City and County open space, the ROW in this section is constrained. For adequate space for improvements, ROW along the east side will be required from South Boulder Road to Pine Street. This section will serve as a vital connection to the Louisville Sports Complex and the Harney-Lakotoka Trail.

Right-of-way will also be needed at the intersection of South Boulder Road and CO 42. Each corner is constrained to the roadway and all of the future improvements needed to make this a safer and more comfortable intersection. There are also small pieces of right-of-way that may be needed along the west side of 42 around the Pine Street intersection. These right-of-way needs could be minimized or eliminated but will need further design and evaluation to pinpoint the exact needs.

Utilities

Some relocation of utilities will be required for implementation and the exploration of undergrounding most utilities should be considered to enhance the visual experience in the corridor. Also, some stormwater infrastructure will need to be relocated for use with the new cross-section of the roadway.

The existing irrigation canal on the east side of the road from South Boulder Road to just north of Pine Street will need to be relocated with a new open ditch or pipe. This canal has limited functionality and future projects should work with Boulder County Open Space and the agricultural lessee to create a new irrigation canal that is functional and out of conflict with the proposed improvements.

Utility poles along the east side of CO 42 through most of the Louisville section will either need to be relocated or undergrounded. With the implementation of a *streetscape* in the corridor, undergrounding would be the preferential treatment. Undergrounding will allow for trees that would be in conflict with the lines to be planted and also increase the overall visual appeal of the corridor.

Also needed will be the moving of the transmission power poles around the Baseline Intersection. The pole that is currently in the middle of the intersection should be relocated to the east side of the roadway to allow for better safety improvements to the Baseline intersection.

Drainage Impacts

For purposes of analyzing the drainage conditions of the Future 42 study area, the total tributary area associated with the future road Right-of-Way was delineated into seven (7) sub-basins based on topography and receiving drainageway. It should be noted that there are two major drainage basins located within project limits (Coal Creek and Bullhead Gulch). With proposed conditions of the future roadway, the major basin boundaries should be maintained.

Water quality and detention requirements were preliminary determined based the site area and imperviousness in each major basin. See Figures 16 and 17 for the volumes required for each basin, which utilized an additional factor of safety to account for the uncertainty associated with the preliminary stage of design.

Four (4) extended detention basins are shown on the drainage plan to account for the preliminary water quality and detention requirements. One (1) of which is sized for the requirements within the Coal Creek basin and three (3) of which are sized for the requirements within the

Bullhead Gulch basin. The conceptual pond locations of the ponds were generally placed in natural low areas adjacent to the receiving drainageways and determined based on topography and available open space adjacent to the project corridor.

Where regional extended detention basins are utilized, it should be evaluated if the project volume requirements can be combined and/or shared with adjacent developments (current or future). The shared storage facilities may minimize the overall footprint for stormwater compliance.

It should be noted and recognized that the volume requirements and conceptual pond locations are preliminary and based on the preliminary project corridor design. As design of the overall corridor progresses, the volume requirements will be re-evaluated and drainage design will be reassessed.

Major Basin	Approx. Rd Sta.	WQCV (ac-ft)	EURV (ac-ft)	100-Yr Detention (ac-ft)
Coal Creek	118+00 – 165+00	0.89	2.44	7.58
Bullhead Gulch	165+00 – 254+00	1.51	4.11	11.08

Figure 16. Major Drainage Basins

Pond No.	Major Basin	Approx. Rd Sta. Served	Approx. Location of Pond	Total Storage Req'd (ac-ft)	Assumed Depth (ft)	Req'd Area (ac.)
1	Coal Creek	118+00 – 165+00	130+00	7.58	5	1.52
2	Bullhead Gulch	165+00 – 206+00	192+00	5.10	5	1.02
3	Bullhead Gulch	206+00 – 235+00	234+00	3.61	5	0.72
4	Bullhead Gulch	235+00 – 254+00	237+00	2.36	5	0.47

Figure 17. Required Ponds

Drainage Phasing

Because of the size of the overall project, it is anticipated that the project will be constructed in phases. Water quality and detention requirements should be determined for each individual project to ensure compliance with the City of Louisville Storm Drainage Design Manual, and the State of Colorado general MS4 permit. Individual projects will need to provide the appropriate water quality and detention volumes associated with the development but may construct regional facilities to account for future phases of design.

Permits for stormwater quality, quantity, and conveyance will be regulated by the City of Louisville. Water quality treatment and detention are required for all new impervious area. Design standards from the City of Louisville Storm Drainage Design Manual will be applicable to this project. For any unestablished criteria by the City of Louisville, the project will default to the Mile High Flood District Urban Storm Drainage Criteria Manual.

Runoff Reduction and Other Control Measures

The preliminary water quality and detention volumes summarized in this report assume all runoff is routed through a storm sewer system that discharges to an extended detention basin that is sized to provide sufficient required water quality and detention volume associated with the respective tributary area.

Runoff reduction practices may be utilized to reduce the imperviousness or to route unconnected impervious area to receiving pervious area within the project corridor and subsequently reduce the required volume to be provided.

Additional control measures include, but are not limited to, pervious pavement for the bicycle lane and sidewalks, linear and large-scale stormwater planters between roadway and bicycle lane, and storm interceptors.

Project Identification and Costs

The following table identifies the main projects with sub projects for the recommended alternative of CO 42. The table also assigns a priority for implementation, but implementation of any of the projects should happen if funding becomes available for any of the projects, sub-projects, or elements of one of the projects (sidewalks, protected bikeways, etc.). Construction order priority is focused on the best order for implementation for the least amount of rework needed between projects and projects with the biggest early impacts. The TIP and Federal priorities were developed

with current (2022/2023) grant application scoring. The DRCOG Transportation Improvement Program (TIP) priorities being set by connectivity in the corridor, connectivity to other TIP funded projects, and multimodal improvements. Federal priorities set by focus on safety and multimodal projects.

LOUISVILLE CO 42 PROJECTS

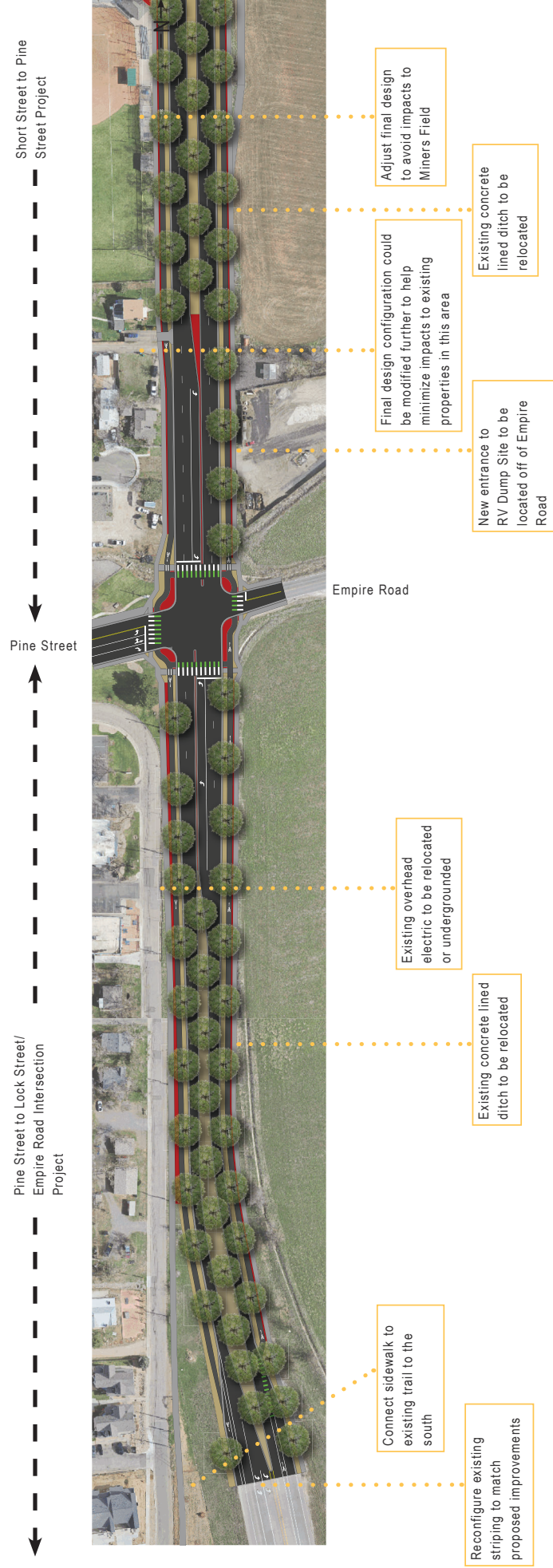
Main Project	Sub-Projects	Cost (in \$ Millions, 2022)	Construction Order Priority	TIP Funding Priority	Federal Grant Priority	Notes
South Street Underpass		\$8-11	Project 1	Project 1	Project 4	Complete underpasses before building roadway on top of the underpasses. Utilize Louisville Urban Renewal Area funding. Lower on federal funding priority due to lack of crash history (not a high-injury corridor) and adjacent demographics. Could do well on funding for transit connectivity due to future rail station.
Stormwater Pond 1		\$0.75-2	Project 1B	Project 1B	Project 1B	Stormwater pond to be completed in conjunction with the first project in the basin.
Short Street to Pine Street	Pine Street Intersection	\$10-14 Pine (\$2-4)	Project 2	Project 3	Project 5	Complete the stretch of roadway over the new underpass as it has little to no sidewalks or shoulders for bicycling. Lower on federal funding priority due to lack of crash history (not a high-injury corridor) and adjacent demographics. Could do well on funding for transit connectivity due to future rail station.
South Boulder Road Intersection and Underpass		\$16-21	Project 3	Project 2	Project 1	Complete the underpass and the intersection improvements at the same time to save construction costs, but also hassle of one of the busiest intersections in Louisville being under construction twice. Ranks high for federal funding and TIP funding due to South Boulder Road being on DRCOG High Injury Network. Funding could be available to connect Kestral housing to multimodal options.
South Boulder Road to Short Street	Griffith Street Intersection Short Street Intersection	\$17-21 Griffith (\$3-5) Short Street (\$2-4)	Project 4/Project 5	Project 5	Project 3	Complete the gap between South Street and South Boulder Road. Construct the final two intersections. Parts of this roadway could be built with adjacent development, which can also affect the priority and timing. Ranks high for federal funding and TIP funding due to South Boulder Road being on DRCOG Regional High Injury Network. Could move down in priority due to timing with Lafayette on Paschal Drive.
Paschal Drive to South Boulder Road	Hecla Street Intersection	\$17-21 Hecla (\$3-5)	Project 5/Project 4	Project 4	Project 2	Completes the Louisville section north of South Boulder Road. Paschal intersection will need coordination with Lafayette on timing. Ranks high for federal funding and TIP funding due to South Boulder Road being on DRCOG Regional High Injury Network. Funding could be available to connect Kestral housing to multimodal options. Could move up in priority due to timing with Lafayette on Paschal Drive.
Stormwater Pond 2		\$7.5-2	Project 4B	Project 4B	Project 2B	Stormwater pond to be completed in conjunction with the first project in the basin. There is potential to partner with future developments to meet storm water capacity needs.
Pine Street to Lock Street/ Empire Road		\$5-9	Project 6	Project 6	Project 6	Completes the CO 42 corridor in Louisville. Potential grant funding for gateway or public art. Lower in priority due to lower demand on this section. Does not include improvement to Empire Road/Lock Street intersection.

LAFAYETTE CO 42 PROJECTS

Main Project	Cost (in \$ Millions, 2022)	Construction Order Priority	TIP Funding Priority	Federal Grant Priority	Notes
Baseline Road Intersection	\$9-14	Project 1	Project 3	Project 1	Due to safety issues at this intersection and public feedback, this project should be completed first. It will set the stage for the proposed improvements in the corridors to connect. This will rank higher on federal grants due to the safety issues, but could rank lower in TIP funding due to connectivity to other projects.
Stormwater Pond 3	\$.75-2	Project 1B	Project 3B	Project 1B	Stormwater pond to be completed in conjunction with the first project in the basin. Should be in coordination with future developments to meet storm water capacity needs.
North Park / Dagny Way to Indian Peaks Trail	\$14-19	Project 2/Project 3	Project 1	Project 2	This could be considered for the first segment in Lafayette due to connectivity to the CO 7 regional project. It would rank higher in TIP funding and federal grants due to this connectivity. Could move down based on timing in coordination with Louisville on Paschal Drive.
Indian Peaks Trail to Baseline Road	\$7-11	Project 3/Project 4	Project 2	Project 4	This project would complete the gap between Baseline Road and CO 7/ Arapahoe Road. Lower in priority due to existing sidewalks. Ranks lowest on federal funding due to existing facilities.
Stormwater pond 4	\$.75-2	Project 3B	Project 2B	Project 4B	Stormwater pond to be completed in conjunction with the first project in the basin.
Baseline Road to Paschal Drive	\$10-15	Project 4/Project 2	Project 4	Project 3	Completes the Lafayette 42 section between Baseline Road and Louisville. Ranks lower on TIP due to other projects connecting to the CO 7 corridor, but could rank higher if jointly completed with Louisville. Could move up in construction priority based on timing with Louisville.

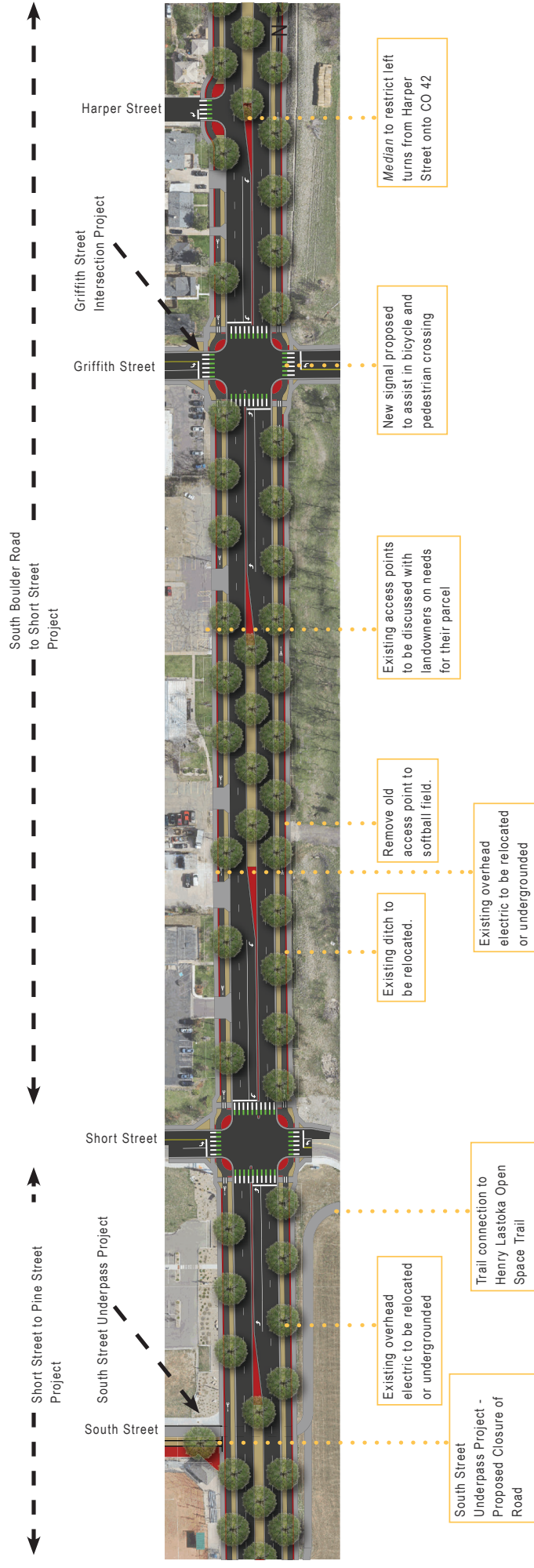
Recommended Alternative Conceptual Design

The following pages show a graphical version of the recommended alternative. Shown on the graphic is the extents of the proposed projects and sub projects from the project identification tables and notable features or issues to address. This design is conceptual and further refinement is needed and will take place as the project moves closer to final design.



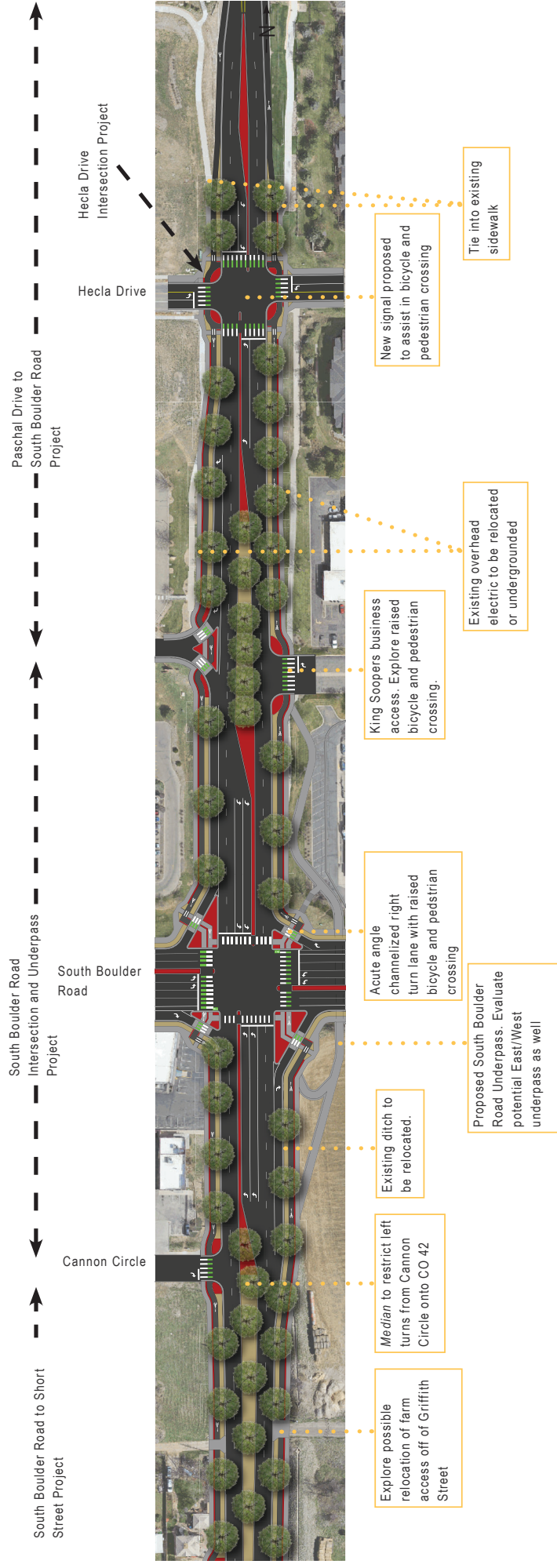
Notes for this section:

- Empire Road/Lock Street Intersection (South of this section) to evaluate intersection design upon implementation of CO 42 improvements and development occurs.
- Utilize East Street as a neighborhood bikeway to connect bicycles from Coal Creek Trail to CO 42 protected bicycle lanes at Pine Street/Empire Road intersection.
- Existing ditches to be coordinated with Boulder County Open Space and lease to relocate in a functional location for better irrigation usage.



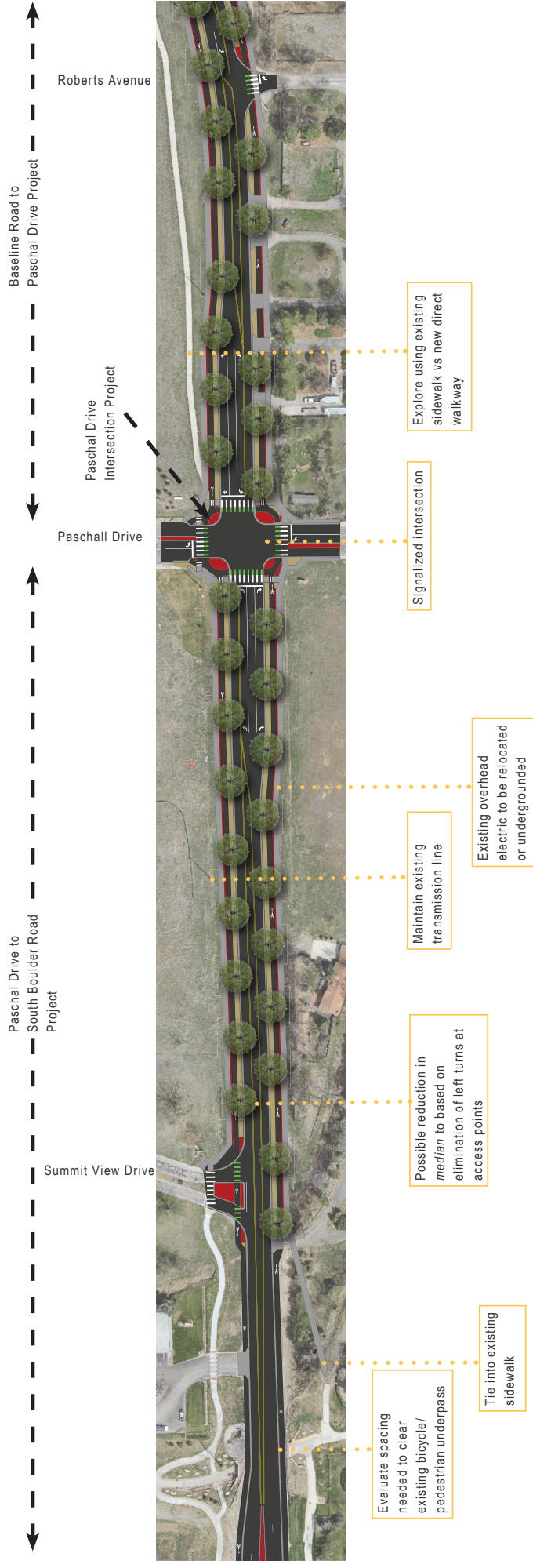
Notes for this section:

- South Street Underpass Concept from Summer 2021 is proposed in this section.
- Existing ditches to be coordinated with Boulder County Open Space and leasee to relocate in a functional location for better irrigation usage.
- Access points anticipated to remain in place, but could be relocated/eliminated based upon conversations with landowners.



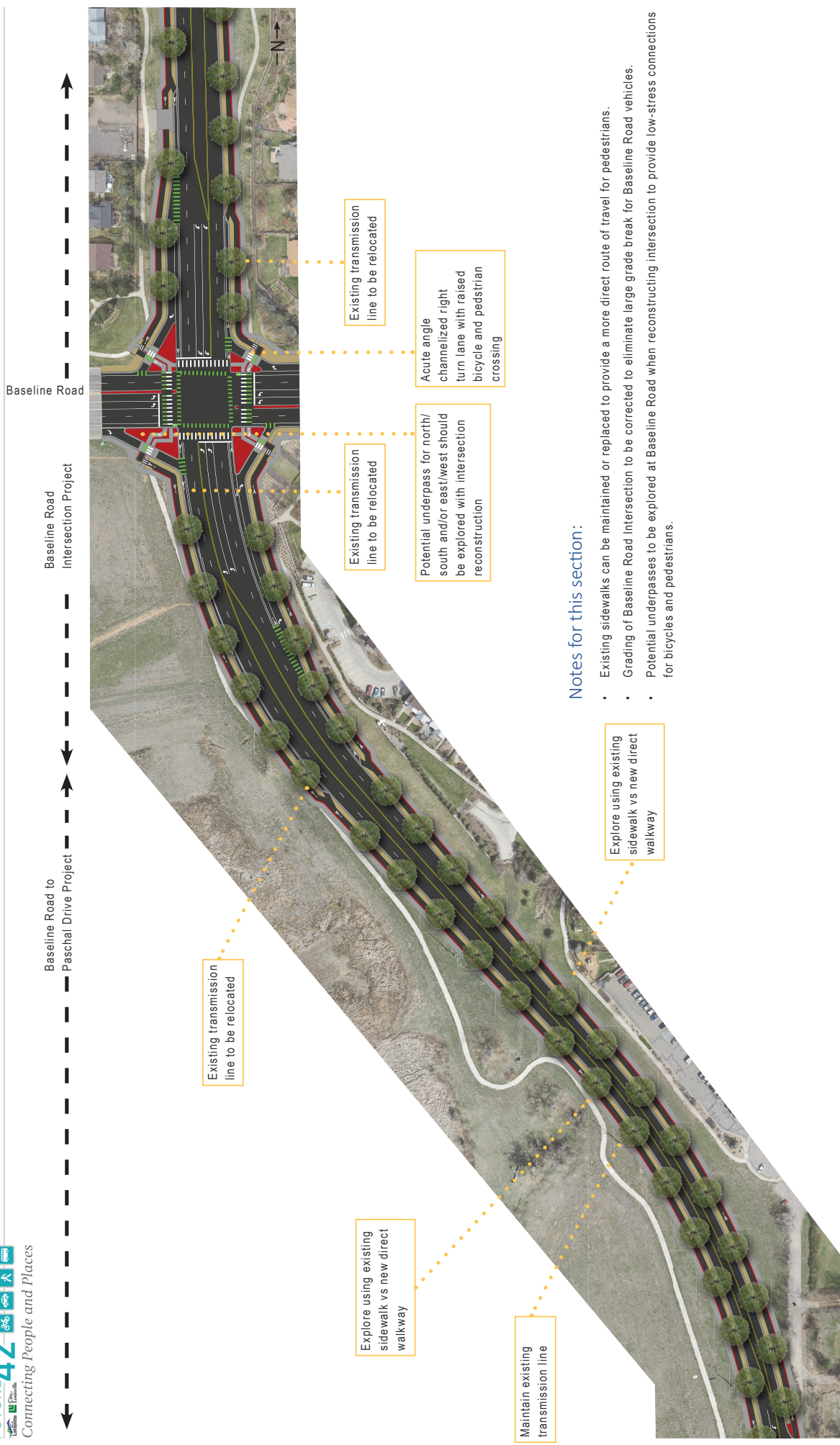
Notes for this section:

- South Boulder Road Underpass concept from Summer 2021 is proposed in this section. Explore possibility of adding east/west underpass further in design.
- Existing ditches to be coordinated with Boulder County Open Space and leasee to relocate in a functional location for better irrigation usage.
- Explore usage of raised crossings for business access points in further design based upon delivery vehicle routes.



Notes for this section:

- Adjustment to proposed cross-section over existing underpass may be needed to eliminate need of expansion of underpass.
- Access points anticipated to remain in place, but could be relocated/eliminated based upon conversations with landowners.
- Coordination between Louisville and Lafayette needed for the construction of Paschal Drive Intersection.



Notes for this section:

- Existing sidewalks can be maintained or replaced to provide a more direct route of travel for pedestrians.
- Grading of Baseline Road Intersection to be corrected to eliminate large grade break for Baseline Road vehicles.
- Potential underpasses to be explored at Baseline Road when reconstructing intersection to provide low-stress connections for bicycles and pedestrians.



Existing transmission to be protected in place, adjust design to not impact

Explore using existing sidewalk vs new direct walkway

Proposed *median* could be narrowed due to lack of left turns

Existing underpass may need to be widened if new sidewalks are desired

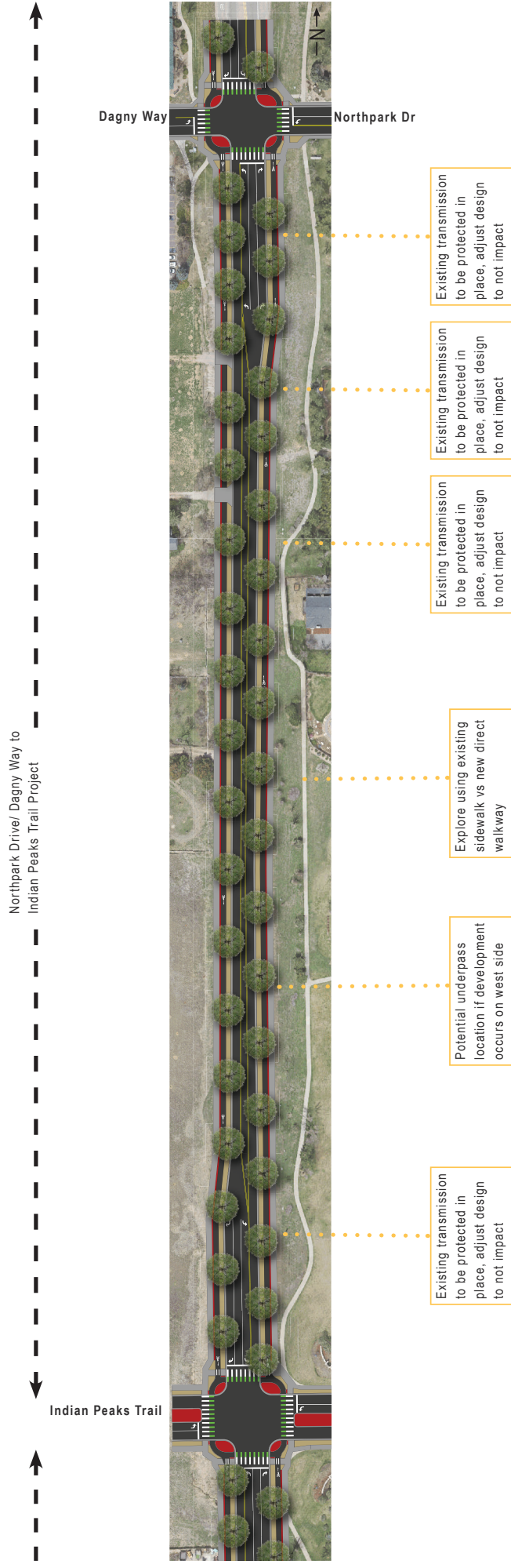
Raised crossing to slow conflicting traffic with bicycles and pedestrians

Existing transmission to be protected in place, adjust design to not impact

Existing transmission to be protected in place, adjust design to not impact

Notes for this section:

- Existing sidewalks can be maintained or replaced to provide a more direct route of travel for pedestrians.
- Painted *median* could be reduced in this section due to lack of left turn lanes needed.
- Existing transmission line should be protected in place and design adjusted to eliminate impact to poles.



Notes for this section:

- Existing sidewalks can be maintained or replaced to provide a more direct route of travel for pedestrians.
- Painted *median* could be reduced in this section due to lack of left turn lanes needed.
- Existing transmission line should be protected in place and design adjusted to eliminate impact to poles.
- Improvements North of Northpark Drive/ Dagny Way expected to be built with Arapahoe Road/CO 7 Intersection project.

Appendix

