

● SOUTH PLATTE
CONNECTIONS STUDY ●



South Platte

CONNECTIONS STUDY

September 2019

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SOUTH PLATTE CONNECTIONS STUDY

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Table of Contents

	<u>Page</u>
1. INTRODUCTION.....	1
Purpose and Study Locations.....	1
SPWG History.....	2
Relevant Plans and Documents.....	4
2. STUDY PROCESS.....	5
Oversight.....	5
Project Development.....	5
Project Evaluation.....	6
3. PUBLIC ENGAGEMENT.....	7
Phase 1 Engagement Opportunities.....	7
Phase 1 Public Input.....	8
Phase 2 Engagement Opportunities.....	10
Phase 2 Public Input.....	11
4. DARTMOUTH AVENUE.....	12
Current Conditions.....	12
Public Input on Challenges.....	13
Opportunities.....	14
Constraints.....	14
Projects Considered.....	15
Project Evaluation.....	16
Public Input on Priorities.....	17
Recommended Projects.....	17
5. HAMPDEN AVENUE.....	31
Current Conditions.....	31
Public Input on Challenges.....	31
Opportunities.....	32
Constraints.....	32
Projects Considered.....	33
Project Evaluation.....	34
Public Input on Priorities.....	35
Eliminated Projects.....	36
Recommended Projects.....	36

6. OXFORD AVENUE.....	45
Current Conditions.....	45
Public Input on Challenges.....	46
Opportunities.....	46
Constraints.....	47
Projects Considered.....	47
Project Evaluation.....	48
Public Input on Priorities.....	49
Recommended Projects.....	49
7. FEDERAL BOULEVARD.....	57
Current Conditions.....	57
Opportunities.....	58
Constraints.....	58
Projects Considered.....	59
Project Evaluation.....	60
Public Input on Priorities.....	61
Recommended Projects.....	61
8. BELLEVIEW AVENUE.....	71
Current Conditions.....	71
Public Input on Challenges.....	72
Opportunities.....	73
Constraints.....	73
Projects Considered.....	74
Project Evaluation.....	75
Public Input on Priorities.....	76
Eliminated Projects.....	77
Recommended Projects.....	77
9. BOWLES AVENUE.....	85
Current Conditions.....	85
Public Input on Challenges.....	86
Opportunities.....	86
Constraints.....	86
Projects Considered.....	87
Project Evaluation.....	88
Public Input on Priorities.....	89
Eliminated Projects.....	90
Recommended Projects.....	90

10. MINERAL AVENUE.....	102
Current Conditions.....	102
Public Input on Challenges.....	103
Opportunities.....	104
Constraints.....	104
Projects Considered.....	105
Project Evaluation.....	106
Public Input on Priorities.....	107
Eliminated Project.....	107
Recommended Projects.....	107
11. IMPLEMENTATION PLAN.....	114
Summary of Recommended Projects.....	114
Funding Opportunities and Next Steps.....	116

Appendices

- Appendix A. Public Input Summaries
- Appendix B. Dartmouth Project Details
- Appendix C. Hampden Project Details
- Appendix D. Oxford Project Details
- Appendix E. Federal Project Details
- Appendix F. Belleview Project Details
- Appendix G. Bowles Project Details
- Appendix H. Mineral Project Details

List of Figures

	<u>Page</u>
Figure 1. Study Locations.....	1
Figure 2. South Platte Corridor Investments.....	3
Figure 3. Dartmouth Avenue Study Area.....	13
Figure 4. Dartmouth Avenue Projects.....	15
Figure 5. Public Input on Dartmouth Avenue Project Priorities.....	17
Figure 6. Hampden Avenue Study Area.....	32
Figure 7. Hampden Avenue Projects.....	33
Figure 8. Public input on Hampden Avenue Project Priorities.....	35
Figure 9. Oxford Avenue Study Area.....	46
Figure 10. Oxford Avenue Projects.....	47
Figure 11. Public Input on Oxford Avenue Project Priorities.....	49
Figure 12. Federal Boulevard Study Area.....	58
Figure 13. Federal Boulevard Projects.....	59
Figure 14. Public Input on Federal Boulevard Project Priorities.....	61
Figure 15. Belleview Avenue Study Area.....	72
Figure 16. Belleview Avenue Projects.....	74
Figure 17. Public Input on Belleview Avenue Project Ideas.....	76
Figure 18. Bowles Avenue Study Area.....	86
Figure 19. Bowles Avenue Projects.....	87
Figure 20. Public Input on Bowles Avenue Project Priorities.....	89
Figure 21. Mineral Avenue Study Area.....	103
Figure 22. Mineral Avenue Projects.....	105
Figure 23. Public Input on Mineral Avenue Project Priorities.....	107

List of Tables

Table 1. Relevant Plans.....	4
Table 2. Evaluation of Dartmouth Avenue Project Benefits.....	16
Table 3. Evaluation of Dartmouth Avenue Project Costs.....	17
Table 4. Evaluation of Hampden Avenue Project Benefits.....	34
Table 5. Evaluation of Hampden Avenue Project Costs.....	35
Table 6. Evaluation of Oxford Avenue Project Benefits.....	48
Table 7. Evaluation of Oxford Avenue Project Costs.....	49
Table 8. Evaluation of Federal Boulevard Project Benefits.....	60
Table 9. Evaluation of Federal Boulevard Project Costs.....	61
Table 10. Evaluation of Belleview Avenue Project Benefits.....	75
Table 11. Evaluation of Belleview Avenue Project Costs.....	76
Table 12. Evaluation of Bowles Avenue Project Benefits.....	88
Table 13. Evaluation of Bowles Avenue Project Costs.....	89
Table 14. Evaluation of Mineral Avenue Project Benefits.....	106
Table 15. Evaluation of Mineral Avenue Project Costs.....	107
Table 16. Recommended projects.....	114

GLOSSARY

Americans with Disabilities Act (ADA) - A 1990 civil rights law prohibiting discrimination based on disability; includes standards for the design of transportation facilities including sidewalks & curb ramps

Buffered Bike Lane – Exclusive on-street space for bicyclists with additional flush, painted buffer space between the bike lane and adjacent motor vehicle lanes and/or parking

Conflict Zone Markings – Striping to designate the intended path of bicyclists across intersections and driveways where motor vehicles may need to cross; used to raise awareness for both bicyclists and motorists of potential conflict areas

Curb Extension – Traffic calming measure where sidewalk is extended into the roadway in order to reduce crossing distances for active users and make them more visible; also called curb bulb-outs

Grade – The change in vertical elevation of a physical feature over a specified distance, typically reported as a percentage

Grade Separation – Method of aligning the intersection of multiple transportation facilities at different elevations to remove conflicts between different modes and/or directions of travel; underpasses and overpasses are common examples

High-Intensity Activated Crosswalk (HAWK) Beacon – Traffic control device that provides protected pedestrian crossings by displaying a sequence of flashing yellow, solid yellow, and solid red indications when activated via a push-button

Level of Service (LOS) – Measure used to assess the quality of traffic operations along a roadway segment or at an intersection based on metrics including vehicle speed and density; facilities are graded on a scale from A to F, with A representing free flow conditions and F representing breakdown flow

Light Rail Transit (LRT) – A form of urban rail transit operating on a fixed guideway and typically powered by electricity

Median Refuge Island – Protected spaces located in the center of a roadway to facilitate bicycle and pedestrian crossings; they allow for two-stage crossings of wide cross-sections

Parking Utilization – Measure of how frequently a block of on- or off-street parking is used, typically defined as the percentage of total spaces occupied during a set time; used to assess the balance between supply and demand for parking

Quadrant Road – Type of at-grade intersection that with an additional roadway between two legs of a four-way intersection to add two three-way intersections where all left-turn movements occur, improving traffic flow at the main intersection

Rectangular Rapid Flash Beacon (RRFB) – Traffic control device that can increase motorist awareness at unsignalized bicycle and pedestrian crossings by producing an irregular flashing pattern when activated via a push-button

Separated Bike Lane – Exclusive space for bicyclists physically separated from motor vehicle traffic by bollards, raised medians, planter boxes, parking, and/or elevation differences

Single-point Urban Interchange (SPUI) – Type of highway interchange which condenses a traditional diamond interchange into a single intersection above or below the free-flowing road, requiring one set of traffic signals and reducing the right-of-way requirements

Traffic Volume – Measure of the number of vehicles passing through a roadway segment over a specified period of time; typically reported as the average number of vehicles per day, or average daily traffic (ADT)

Topographic Survey – Collection of data about the type and elevation of surface features on a piece of land that is often used for civil engineering design

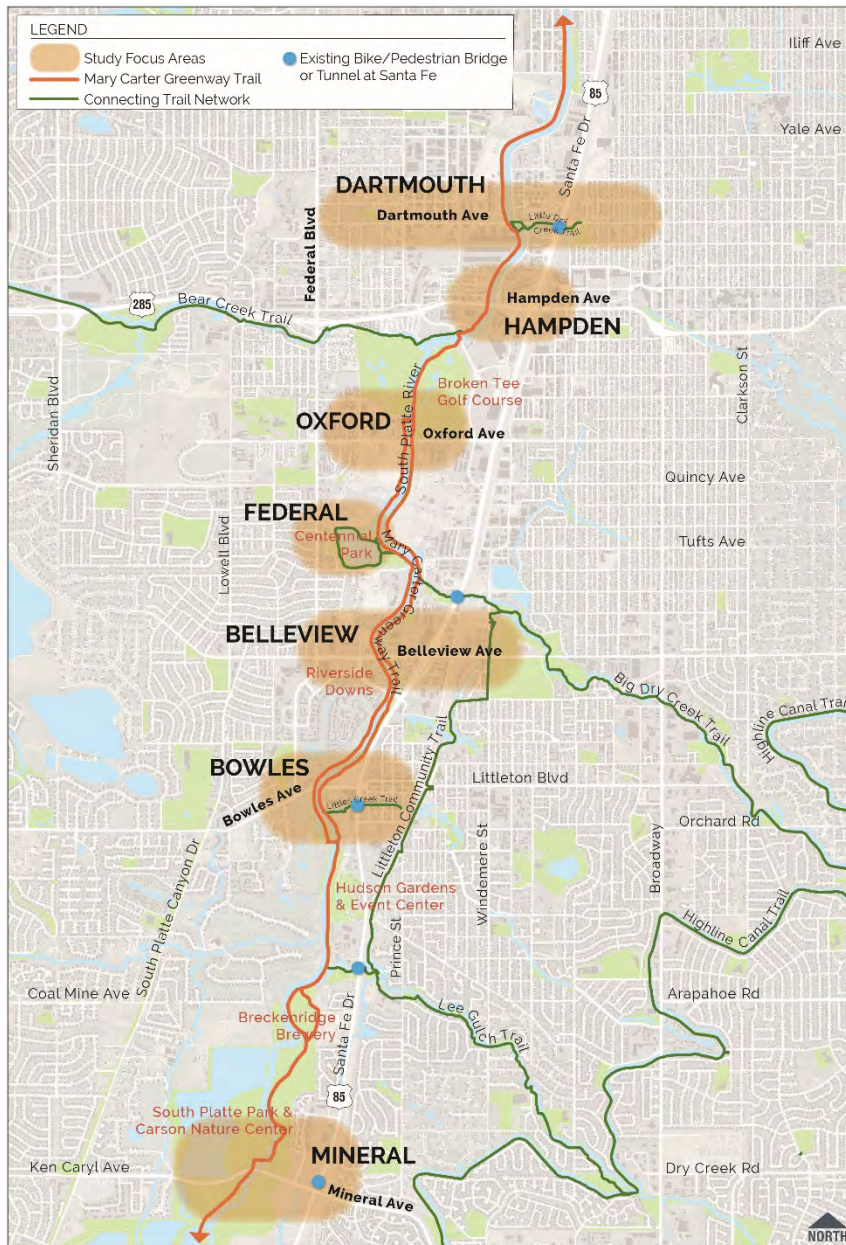
Wayfinding – A coordinated and comprehensive system of signing that orients bicyclists and pedestrians to the area they are in and guides them towards key destinations and designated routes

1. Introduction

PURPOSE AND STUDY LOCATIONS

The South Platte Working Group (SPWG), a partnership among the cities of Englewood, Littleton, and Sheridan, South Suburban Park and Recreation District (SSPRD), Arapahoe County, and others, conducted the South Platte Connections Study to identify ways to improve bicycle and pedestrian connections to the South Platte River and Mary Carter Greenway (which parallels the South Platte River). The study focused on seven locations where access to the South Platte is difficult today, as shown on **Figure 1**.

FIGURE 1. STUDY LOCATIONS



The Mary Carter Greenway is an integral component of western Arapahoe County’s active transportation network and recreational amenities. The trail provides a continuous connection from Chatfield Park (south of the C-470 Trail) to Confluence Park (downtown Denver) and into Adams County. Several major trail corridors – including Lee Gulch Trail, Little’s Creek Trail, Big Dry Creek Trail, Bear Creek Trail, and Little Dry Creek Trail – connect to the Mary Carter Greenway, and several offer grade-separated crossings of Santa Fe Drive and the railroad. The seven study locations for improved pedestrian and bicycle connections within Arapahoe County, though challenging, would provide important multimodal links between adjacent communities and the South Platte. Barriers such as Santa Fe Drive, the railroad, utilities, private property and non-conductive land uses must be addressed to create these important links. Challenges include busy intersections along the Santa Fe Drive corridor with high levels of truck traffic and unsafe and inconvenient crossings for pedestrians and cyclists. The primary objective of the South Platte Connections Study is to identify feasible opportunities to better connect citizens to the natural open space and river corridor with all the amenities and recreational opportunities it has to offer.

SPWG HISTORY

The SPWG was formed in 2006 to enhance quality of life in western Arapahoe County through an ongoing voluntary process of prioritizing and implementing projects including trail connections, outdoor recreation, land acquisition, and conservation along the South Platte River corridor. The SPWG is a collaborative group of jurisdictions and districts along the South Platte River in Arapahoe County, as well as regional, state, and federal agencies, and other nonprofit organizations.



SPWG Members

- Arapahoe County
- Arapahoe County Open Space and Trails Advisory Board
- City of Englewood
- City of Littleton
- City of Sheridan
- Town of Columbine Valley
- South Suburban Park and Recreation District
- South Suburban Park Foundation
- South Metro Land Conservancy

SPWG Partners and Stakeholders:

- Colorado Water Conservation Board
- Trout Unlimited
- Urban Drainage and Flood Control District
- US Army Corps of Engineers

South Platte Corridor Investments

Since 2006, the SPWG has secured more than \$50 million to conserve and enhance property along the South Platte River corridor in Arapahoe County, including the Mary Carter Greenway from Dartmouth Avenue to C-470. This significant investment has made the corridor one of the region's most cherished amenities. An overview of the SPWG's investment in the corridor is provided below and on **Figure 2**.

FIGURE 2. SOUTH PLATTE CORRIDOR INVESTMENTS



2006 – 2012: Convened by Arapahoe County in 2006 with a \$3 million pledge from the Open Space Sales and Use Tax, the SPWG secured more than \$25 million in funding, including a \$5.25 million Legacy Grant from Great Outdoors Colorado. The SPWG acquired 50 acres of open space, built six new bike/pedestrian bridges, added six trailheads and 3.2 miles of new trail during this time.

2013 – Present: In 2013, the working group completed the South Platte River Corridor Vision Report to prioritize and program funding along the South Platte River. The report identified opportunities and challenges along the corridor including trail access and connectivity issues to the east and west of the river. Based on the Vision Report, the SPWG programmed a total of \$25 million (\$8 million came from Arapahoe County Open Spaces) to complete the following projects:

- South Platte Park Enhancements in Littleton (\$5 million)
- River Run Trailhead & East Bank Trail in Sheridan and Englewood (\$14.7 million)
- Reynolds Landing in Littleton (\$3.5 million)
- Riverside Downs in Littleton (\$1.14 million)
- Since 2013, an additional \$3+ million has been spent to make improvements to Hudson Gardens, Lee Gulch, and Creekside Experience in Littleton and the Bear Creek Trail in Sheridan.

RELEVANT PLANS AND DOCUMENTS

The existing plans that pertain to the South Platte corridor and the seven crossing locations served as a starting point for the South Platte Connections Study and were integrated into the planning effort to ensure compatibility. Relevant plans that are referenced and integrated include trail plans, bicycle and pedestrian plans, corridor plans, and subarea plans prepared by Arapahoe County, the local agencies within Arapahoe County, and SSPRD, as listed in **Table 1**.

TABLE 1. RELEVANT PLANS

AGENCY	PLAN
Arapahoe County	Arapahoe County Bicycle and Pedestrian Master Plan South Platte River Corridor Vision
City of Englewood	Light Rail Corridor Next Steps Study Englewood Walk & Wheel Master Plan Englewood Parks & Recreation Master Plan
City of Littleton	Bellevue Avenue Corridor Plan Littleton Bicycle and Pedestrian Master Plan Santa Fe & Mineral Intersection Study Mineral Area Station Plan
City of Sheridan	Sheridan Comprehensive Plan
SSPRD	South Suburban Parks and Recreation Master Plan

2. Study Process

OVERSIGHT

A project team composed of staff from Arapahoe County, the cities of Englewood, Littleton, and Sheridan, and SSPRD guided the South Platte Connections Study. This group met monthly throughout the planning process to coordinate and discuss progress on primary project tasks. Additionally, members of the project team presented at three SPWG meetings to gather input from a wider group of stakeholder representatives. **Chapter 3** further details community engagement for the study.

PROJECT DEVELOPMENT

At the onset of the study, the project team developed a diverse array of ideas for enhancing bicycle and pedestrian connectivity to the South Platte from surrounding communities. At each of the seven study locations, existing safety concerns and infrastructure challenges that present a barrier to trail access were identified and options to mitigate these issues conceived; opportunities to capitalize on existing infrastructure was a major consideration. Recommendations from previous plans along the corridor and an initial round of public engagement were used to inform this process.

With safety, comfort, and convenience in mind, the project team built an initial list of concepts ranging from bridges and underpasses to sidewalk widening to wayfinding improvements. Ensuing site visits to each study location were conducted to envision the user experience these ideas would provide, better assess their feasibility, and identify needs for design refinement. Though many of the projects are relatively simple to implement (i.e., short trail connections, improved wayfinding signage), the project team identified several in need of further investigation before a recommendation could be made. Reasons for additional vetting included:

- Potential impacts to automobile traffic and on-street parking
- Challenging topography
- Impacts to state highways
- Coordination with other ongoing or imminent projects
- Potential utility conflicts

For those project ideas that would repurpose existing street space, several types of analyses were conducted to ensure the recommendations would adequately accommodate the needs of automobile traffic. In instances where removal of on-street parking was recommended, detailed parking inventories were performed to assess if the surrounding areas had enough parking available to absorb the loss of parking spaces. Where repurposing of travel lanes or turn lanes was recommended, the proposed street configurations were modeled with collected traffic count data to assess if they would maintain an adequate level of traffic operations.



Ground survey was collected and analyzed for the project ideas that recommend significant infrastructure improvements to areas with challenging terrain and/or drainage issues. Topographic features, elevation data, and utility locations were obtained, and the conceptual designs were modified as appropriate.

Additional jurisdictional coordination beyond the core project team was necessary for some of the project ideas. Federal Boulevard, Hampden Avenue, and Santa Fe Drive are all major state highways through the study area, so a subset of the project team met with engineers from the Colorado Department of Transportation (CDOT) in January 2019 to discuss recommendations that may impact those facilities. Members of the project team also met with representatives from the City and County of Denver to coordinate on the numerous bicycle planning efforts underway along Dartmouth Avenue. Additionally, the cities of Littleton, Sheridan, and Englewood have several separate ongoing projects in the same areas as some of this study's recommendations, so further discussions were held to identify opportunities for combining efforts and reducing the potential for conflicting recommendations.

PROJECT EVALUATION

A qualitative evaluation process was developed to assess how well each project idea would enhance connections for bicyclists and pedestrians to the South Platte. The intent of this evaluation was not to establish project prioritization lists, but rather to highlight the relative benefits of each concept. A set of evaluation criteria, summarized below, was established with consideration toward safety, comfort, and convenience, as well as anticipated project costs. Each project was rated on a five-point scale (from least to most favorable) with respect to each criterion; **Chapters 4 – 10** present the results of this evaluation.

Benefit Criteria

- Direct Connection (minimizing out of direction travel)
- Pedestrian Comfort
- Commuter Bicyclist Access
- Recreational Bicyclist Comfort
- Optimization of Existing Infrastructure
- Convenient Trail Access
- Americans with Disabilities Act (ADA) Compliance
- Problem Identified/Supported by Public
- Conflict Elimination
- Compatibility with Future Vision

Cost Criteria

- Relative Construction Cost
- Constructability
- Motorist Impacts
- Potential Throw-away Costs

Based on the results of the project evaluation, additional project investigations, and conversations with stakeholders and the public, each project idea was ultimately categorized as either "Recommended" or "Eliminated."

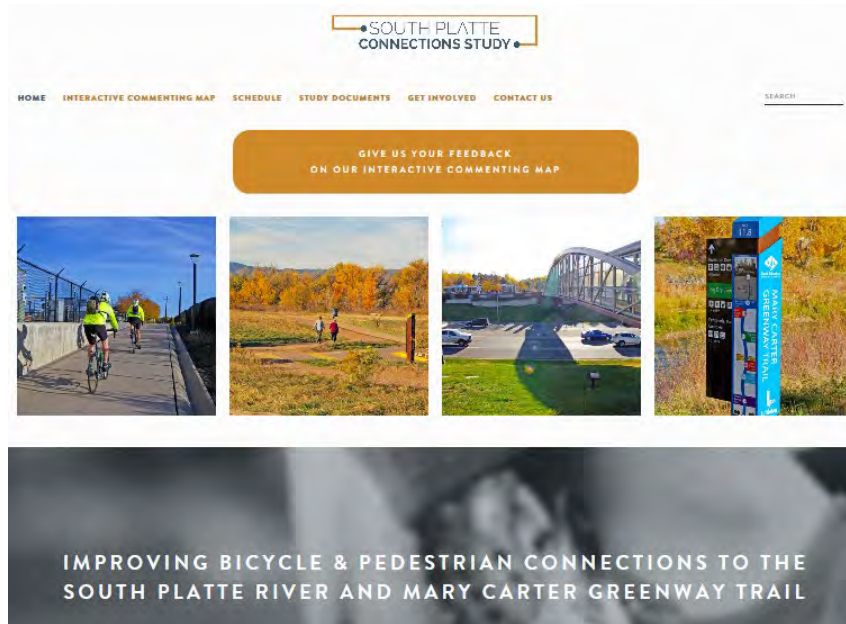
3. Public Engagement

PHASE I ENGAGEMENT OPPORTUNITIES

The initial phase of public engagement for the study, encompassing its first four months, centered on soliciting the community’s input regarding their use of the Mary Carter Greenway and perceived access issues. Several opportunities were provided for people to engage with the project team and offer their input.

Project Website

A dedicated project website – www.SouthPlatteConnections.com – was built to act as an interactive forum for people to learn about the study and provide feedback. One feature of the site was an online commenting tool providing a chance for the public to submit comments for a particular point of interest within the study area. The interactive map was an easy way to provide specific input and allowed people to see the comments of other users. The project website also offered a means for people to add their contact information to a project contact list for updates.



Project Survey

A Phase 1 survey was developed to gather input from the public about issues and opportunities related to the study locations. In addition to the online survey, hard copies of this survey were available at on-trail outreach events. During a survey period of approximately six weeks, 402 surveys were completed.

On-Trail Outreach

On-trail outreach was conducted at two locations along the South Platte on a Wednesday and Saturday morning in August 2018. The weekday events were geared to gather input from commuters and the weekend event to gather input from recreational trail users. At each on-trail event, the following materials were available to the public:

- Hard copy surveys
- iPads for online survey completion
- Project commenting maps
- Comment cards
- Project business cards
- Arapahoe County trail maps
- Snacks and drinks
- Giveaways

Approximately 200 people interacted with project team members at these outreach events. Additionally, a Channel 7 news team attended one of the events and aired a segment about the study on-air.

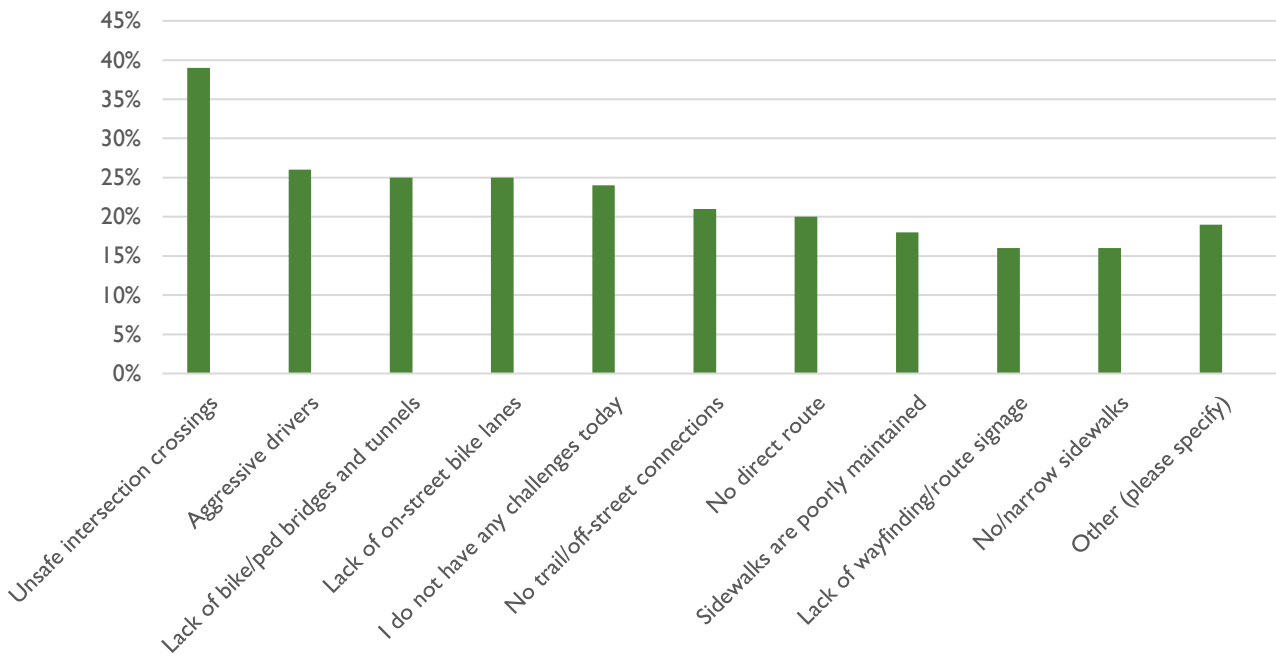


PHASE I PUBLIC INPUT

Public input was primarily obtained through the online survey during Phase 1 public outreach. The survey focused on how people use the Mary Carter Greenway and what challenges they currently face in accessing it on foot or by bike; participants were also asked to identify which study location they live closest to and whether that is the one they use for trail access. Responses to some of the key survey questions are presented on the following pages (a full summary may be found in Appendix A). As shown, dangerous at-grade crossings and automobile traffic were the most commonly cited problems. Dozens of open-ended comments were also provided to the project team for consideration during the project development process.

What are your biggest challenges in accessing the South Platte on foot or by bike? Select all that apply.

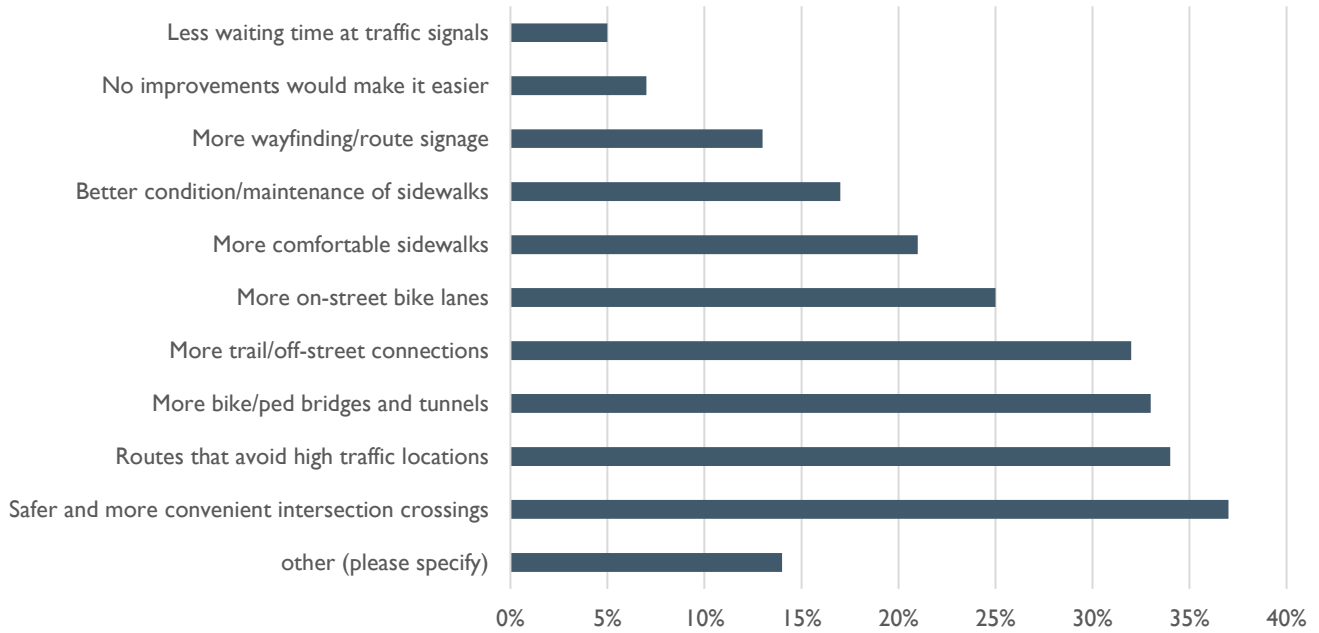
Note: Total exceeds 100 percent as participants could select more than one answer.



A summary of comments for those who marked “other” include:

- Aggressive bicyclists make it uncomfortable for pedestrians, especially when walking dogs
- More separation of bicyclists and pedestrians as well as enforcement
- Access to the trail can be inhibited by roadway construction
- Homeless presence along the trail illicit safety concerns
- Desire for more trail amenities, including trash cans and lighting
- Maintenance concerns, including low branches over trail, snow in bike lanes to access trails

From the list below, please select up to three (3) improvements that would make it easier/safer for you to access the South Platte on foot or by bike.



A summary of comments for those that marked "other" include:

- Additional parking at key locations (especially Carson Nature Center)
- Monitor and enforce bicycle speed limits, increase safety patrols and considering ticketing aggressive riders
- More river access points and more sloping to river to make it more accessible
- More separation of bicyclists and pedestrians - pedestrian only trails and possibly widen trail
- Improve access to businesses from the trail (e.g., Breckenridge Brewery)
- Address homeless population, implement camping restriction
- Increased maintenance of icy bridges in wet, cold conditions
- Create dog friendly areas along the trail

PHASE 2 ENGAGEMENT OPPORTUNITIES

The second phase of public engagement for the study focused on presenting the project ideas developed by the team to the public and capturing their input on which would be most beneficial. Community members were provided with both in-person and online opportunities to provide feedback.

SOUTH PLATTE CONNECTIONS STUDY

RECOMMENDED PROJECTS

Join us to learn more about the improvements proposed in your neighborhood!

ENGLEWOOD CIVIC CENTER
2nd Floor Community Room
Wednesday, January 30
5:30 - 7:00 pm

CARSON NATURE CENTER
Thursday, January 31
5:30 - 7:00 pm

southplatteconnections.com

The project is funded through the Arapahoe County Open Space Sales & Use Tax.

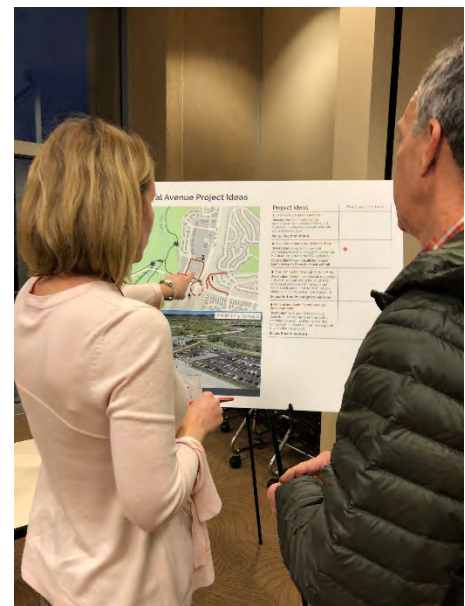


Public Meetings

Two public meetings were held in January 2019, one each on the north and south ends of the study area. The meetings were promoted in coordination with partner agencies using the following tactics:

- Community newsletters
- Project flyers
- Local media press release
- Social media posts
- On-trail signage
- Project website
- Email blasts

At the meetings, boards detailing the study, the history of investment along the South Platte River, what we've heard from the public to date, project evaluation criteria, and location-specific project recommendations were presented; the presented boards can be found in Appendix A. Additionally, packets of conceptual drawings for each recommended project were provided to give meeting attendees a more detailed look at proposed improvements. Input was captured at the meeting primarily through a dot exercise; each attendee was given five dot stickers as a means for identifying their highest priority project ideas and were free to distribute them among the seven study locations as they wished. Comment cards were also available. Approximately 30 people attended the two meetings.

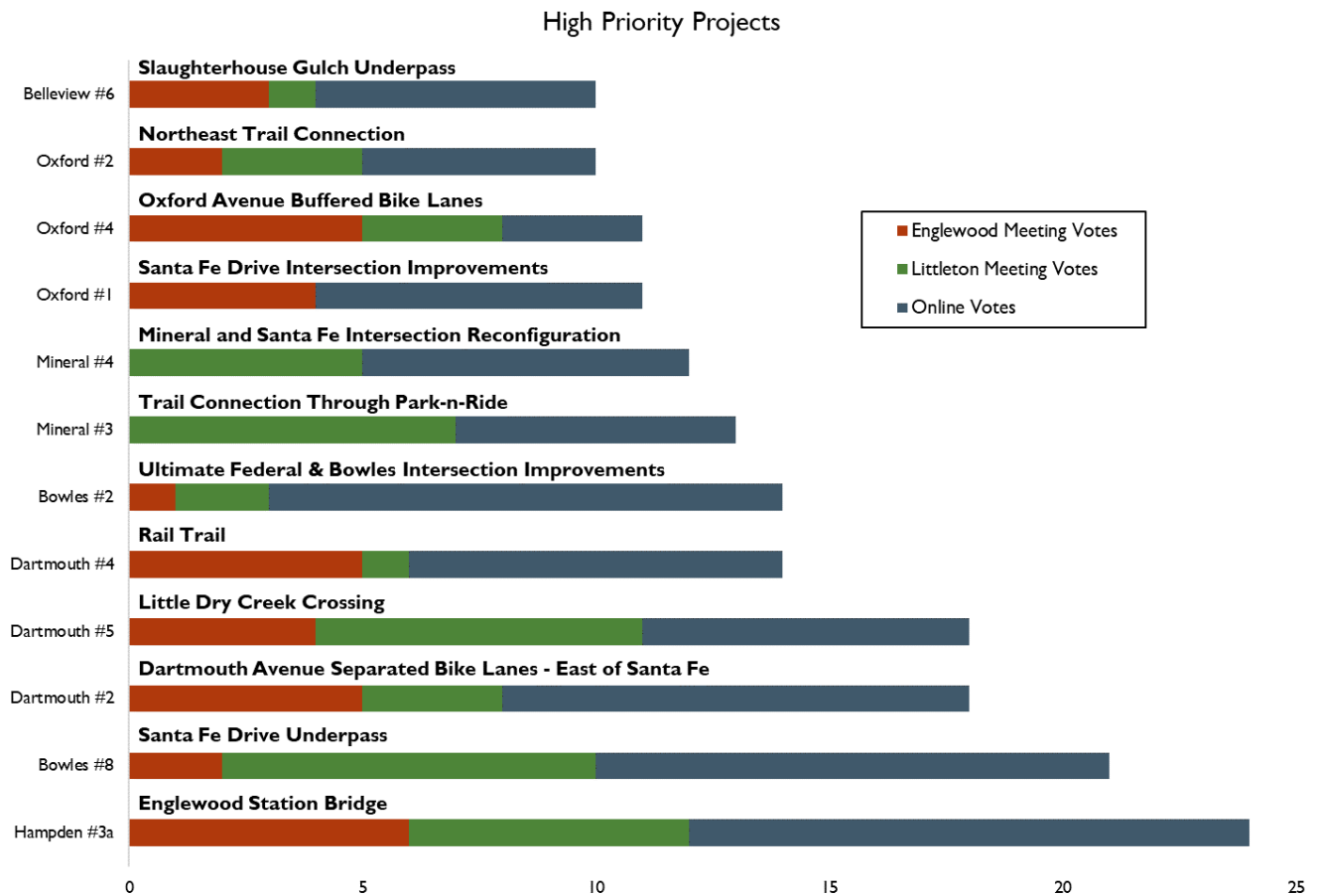


Online Survey

For interested members of the public who were not able to attend one of the public meetings, the dot exercise was recreated as an online survey. The survey was posted on the project website and promoted through social media and email blasts. Participants could review the details for each project idea and were then asked to select the five that would be their highest priorities. Between the public meetings and online survey, a total of 62 people participated in identifying their five priority project ideas.

PHASE 2 PUBLIC INPUT

The dot exercise and online survey described above were the primary avenues for public input during Phase 2. Of the 41 project ideas presented, all but 2 received at least 1 “vote” from the public and 12 received at least 10; the chart below shows these high priority projects. In general, the projects receiving the highest “votes” from the public tend to be the most impactful – providing grade-separated crossings of Santa Fe Drive and the railroad and/or dedicated space for bicyclists and pedestrians. Chapters 4 -10 provide more information about the projects. At both public meetings and in the survey, community members were free to provide other comments, which the project team then considered during project refinement.



4. Dartmouth Avenue

The Dartmouth Avenue study area (Figure 3) generally extends from Federal Boulevard on the west to Broadway on the east and includes portions of Englewood, Sheridan, and Denver.

CURRENT CONDITIONS

Today, the South Platte River and Mary Carter Greenway can be accessed from South Platte River Drive West, immediately north and south of Dartmouth Avenue. The South Platte can also be accessed from Little Dry Creek Trail, which extends from Cushing Park (southeast of Dartmouth Avenue and Inca Street) under Santa Fe Drive and the Consolidated Mainline Railroad, across South Platte River Drive East and the South Platte River to the Mary Carter Greenway.

Dartmouth Avenue currently carries approximately 20,800 vehicles per day (vpd) west of Santa Fe Drive (2013) and approximately 13,000 vpd west of Broadway (2013). The posted speed is 35 miles per hour (mph) from Federal Boulevard to Santa Fe Drive, and 30 mph from Santa Fe Drive to Broadway.

Between Federal Boulevard and Zuni Street, the adjacent land use is residential, and Dartmouth Avenue is a two-lane street with on-street parking allowed and a narrow sidewalk on the north side and no sidewalk on portions of the south side. From Zuni Street to the South Platte River, the adjacent land use is industrial, and Dartmouth Avenue is a 3-lane section (with a center two-way left turn lane) with no on-street parking and narrow attached sidewalks on both sides of the street. Through the Santa Fe Drive intersection area (Lipan Street to Inca Street), Dartmouth Avenue widens to a 4-lane street. Between Inca Street and Broadway, Dartmouth Avenue returns to a 2-lane street through a residential neighborhood.

Problem Statement

Dartmouth Avenue presents a high-stress condition for walking or biking between the residential areas and nearby schools to the South Platte. A stronger connection between the Englewood light rail station and the trail is needed.



During the five-year crash period from January 2011 through December 2015, there were four crashes on Dartmouth Avenue involving a bicyclist, and one crash involving a pedestrian. There is no specific pattern in the location of these crashes, though they all occurred in the industrial/commercial portion of the corridor. The bicycle-involved crashes occurred at Shoshone Street, S. Platte River Drive West, between Tejon Street and Umatilla Street, and between Vallejo Street and Umatilla Street, and the pedestrian-involved crash occurred at Dartmouth Avenue and Zuni Street.

FIGURE 3. DARTMOUTH AVENUE STUDY AREA



PUBLIC INPUT ON CHALLENGES

The Phase 1 public survey results indicated that the top four challenges in accessing the South Platte at Dartmouth Avenue by foot or bike are:

- Unsafe intersection crossings (18 percent)
- Lack of on-street bike lanes (15 percent)
- Aggressive drivers (13 percent)
- Lack of bike/ped bridges and tunnels (10 percent)

"I get on the Platte Trail via Little Dry Creek Trail - Dartmouth is dangerous on a bike."



OPPORTUNITIES

There are several residential neighborhoods in Englewood (east of Santa Fe Drive), Sheridan, and Denver (west of Zuni Street) within 1 mile of the South Platte River; there is an opportunity to improve biking and walking access to the trail for these residents. West of Federal Boulevard, Dartmouth Avenue terminates at the campus of three Denver Public Schools: the Denver School of Science and Technology (DSST) Middle School, DSST High School, and Southwest Early College. The Englewood Light Rail Transit (LRT) Station is located south of Cushing Park, and there is an opportunity to improve biking and walking access and wayfinding between the trail and the station. The Little Dry Creek Trail underpass of Santa Fe Drive and the Consolidated Mainline Railroad presents a significant opportunity to capitalize on existing infrastructure to improve access to the trail.

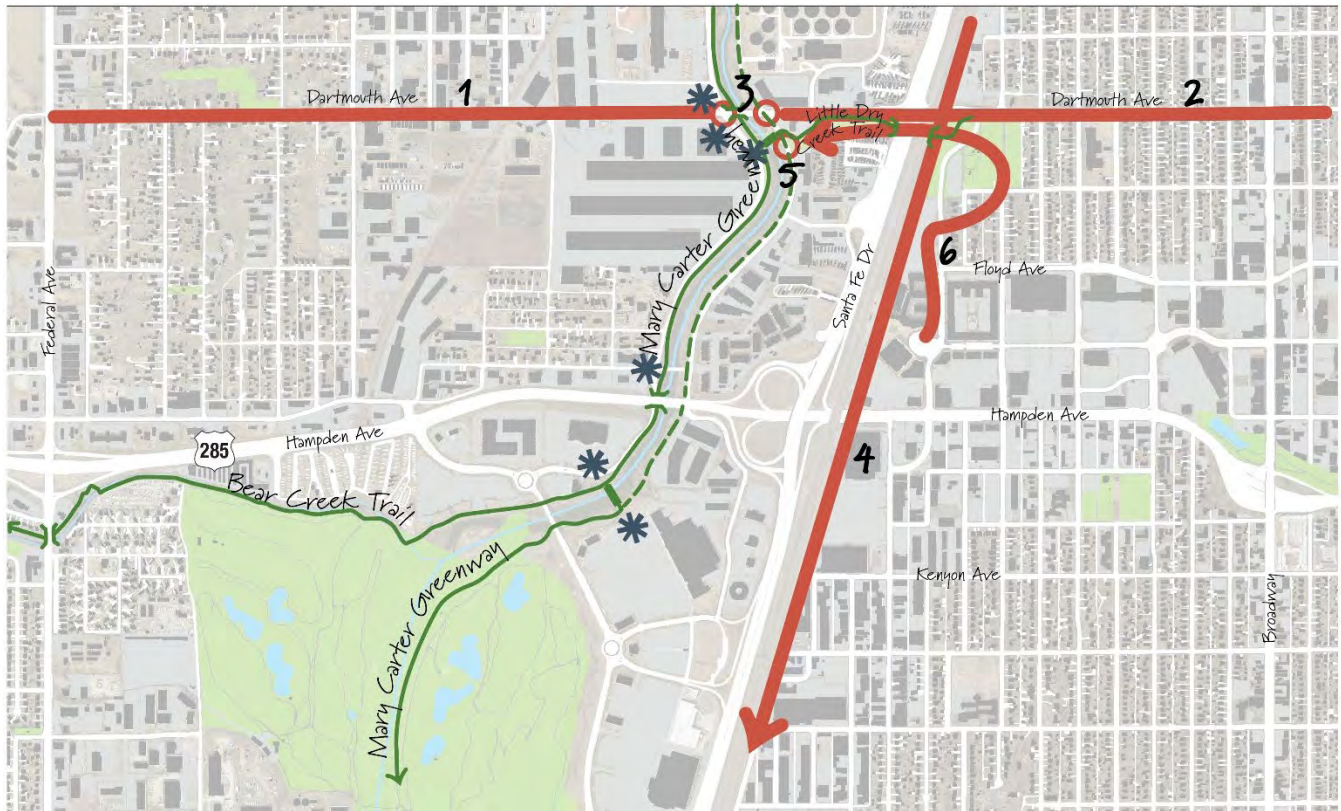
CONSTRAINTS

As with most of the study area locations, Santa Fe Drive presents a considerable barrier to accessing the South Platte River and Mary Carter Greenway. The intersection of Santa Fe Drive and Dartmouth Avenue is automobile-dominated with wide pedestrian crossing distances, long wait times for pedestrians, and a barrage of conflicting vehicular turning movements that pedestrians and bicyclists encounter when crossing the intersection. These conditions make the intersection uncomfortable for bicyclists and pedestrians. The Dartmouth Avenue cross-section also represents a constraint to biking and walking access to the South Platte – the narrow (and sometimes non-existent) sidewalks and lack of dedicated bicycle facilities make walking and biking uncomfortable.

PROJECTS CONSIDERED

Six projects were considered within the Dartmouth Avenue study area, as depicted on Figure 4 and described below. The projects focus on enhancing the biking and walking environment along Dartmouth Avenue and capitalizing on the Little Dry Creek Trail connection (and underpass) as a primary means of accessing the trail from the east side of Santa Fe Drive.

FIGURE 4. DARTMOUTH AVENUE PROJECTS



1. **Dartmouth Avenue Bike Lanes and Sidewalk Improvements – West of Santa Fe:** Restripe Dartmouth Ave. to add buffered bike lanes between Federal Blvd. and Zuni St., and standard bike lanes between Zuni St. and S. Platte River Dr. W. Widen sidewalk along south side of Dartmouth Ave.
2. **Dartmouth Avenue Separated Bike Lanes – East of Santa Fe:** Reconstruct Dartmouth Ave. to provide sidewalk-level separated bike lanes with parking/landscape buffers between Fox St. and Broadway.
3. **South Platte River Drive Intersection Improvements:** Reconstruct intersection corners of Dartmouth Ave. with South Platte River Dr. E and South Platte River Dr. W. to provide ADA-compliant ramps.
4. **Rail Trail:** Construct trail parallel to railroad from Bates Ave. to Layton Ave. (originally proposed in the Englewood Station Next Steps Study).
5. **Little Dry Creek Crossing:** Reconstruct Little Dry Creek Trail crossing of South Platte River Dr. E. to provide bulb-outs, a Rectangular Rapid Flash Beacon, and a more direct path for trail users.
6. **Wayfinding:** Provide wayfinding signage directing people how to access the Mary Carter Greenway from Englewood Station and Cushing Park via the Little Dry Creek Trail underpass of Santa Fe Dr.

PROJECT EVALUATION

The purpose of the project evaluation is to highlight the relative benefits of each project. The project evaluation is not intended to be a scoresheet used to prioritize the projects. The qualitative evaluation results associated with project benefits and project costs are summarized in **Table 2** and **Table 3**, respectively. “High priority” is used to identify projects that received the most interest during public outreach.



Least - - - - -> Most Favorable

TABLE 2. EVALUATION OF DARTMOUTH AVENUE PROJECT BENEFITS

BENEFIT CRITERION	Dartmouth 1	Dartmouth 2	Dartmouth 3	Dartmouth 4	Dartmouth 5	Dartmouth 6
<i>Direct Connection</i>	● Improvement to Dartmouth	● Improvement to Dartmouth	● Improvement to Dartmouth	● Perpendicular to Dartmouth	● Offset from Dartmouth	● Routing offset from Dartmouth
<i>Pedestrian Comfort</i>	● Added separation from autos	● Added separation from autos	● Ramps improve the intersection	● Grade separation from autos	● More comfortable crossing	● Routing along comfortable facilities
<i>Commuter Bicyclist Access</i>	● Direct on-street facility	● Direct on-street facility w/ multiple crossings	● Improved trail connection	● Direct connection to LRT, shared with peds	● RRFB could slow commuters	● Could help orient commuters
<i>Recreational Bicyclist Comfort</i>	● Stressful standard bike lanes	● Stressful transition at Santa Fe	● Added markings improve crossing	● Grade separation from autos	● More comfortable crossing	● Routing along comfortable facilities
<i>Optimization of Existing Infrastructure</i>	● Restriping	● Restriping	● Existing curb ramp improvements	● New trail	● Existing crossing improvements	● Routing through existing underpass
<i>Convenient Trail Access</i>	● Not a trail connection	● Not a trail connection	● Improves existing trail connections	● Not a trail connection	● Improves existing trail connection	● Routing towards trail connections
<i>ADA Compliance</i>	● ADA improvements to sidewalk	● Doesn't address ADA	● Fixes non-compliant ramps	● Doesn't address ADA	● Doesn't address ADA	● Doesn't address ADA
<i>Problem Identified/ Supported by Public</i>	● Addresses a comment	● Addresses a comment; high priority	● No public comments	● No public comments; high priority	● Addresses a comment; high priority	● No public comments
<i>Conflict Elimination</i>	● Separation between bikes and autos	● Separation between bikes and autos	● Doesn't eliminate conflict points	● No separation between bikes and peds	● Reduced crossing distance	● Routing away from conflict points
<i>Compatibility with Future Vision</i>	● Identified in AC bike plan	● Identified as future bike facility	● Improves accessibility	● Previously proposed	● Improves regional trail connections	● Routing towards permanent underpass

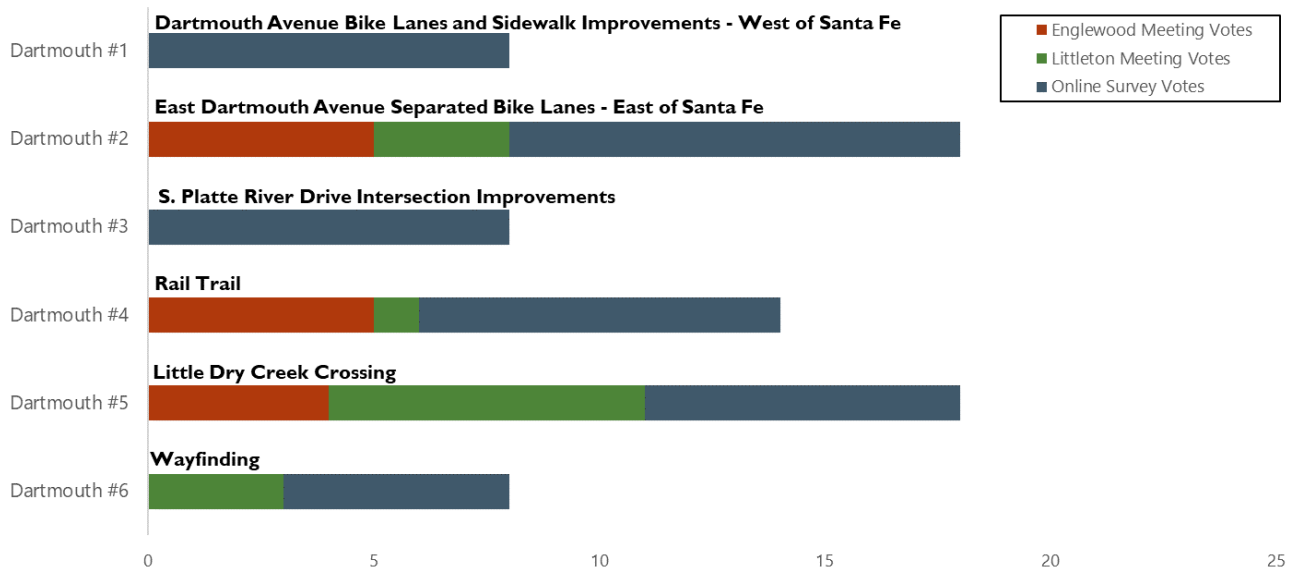
TABLE 3. EVALUATION OF DARTMOUTH AVENUE PROJECT COSTS

COST CRITERION	Dartmouth 1	Dartmouth 2	Dartmouth 3	Dartmouth 4	Dartmouth 5	Dartmouth 6
<i>Relative Construction Cost</i>	● Restriping	● Restriping	● Ramp improvements may be costly	● Significant infrastructure investment	● Bulb-outs may be costly	● Signage
<i>Constructability</i>	● Restriping	● Restriping	● Straightforward ramp reconstruction	● Parts of trail are very constrained	● Trail realignment may be difficult	● No real construction
<i>Motorist Impacts</i>	● Narrower lanes and loss of on-street parking	● Narrower lanes and loss of on-street parking	● Reducing corner radius may impact turns	● No motorist impacts	● Traffic calming would slow down motorists	● No motorist impacts
<i>Potential Throw-away Costs</i>	● Permanent solution	● Permanent solution	● Permanent solution	● Permanent solution	● Permanent solution	● Permanent solution

PUBLIC INPUT ON PRIORITIES

During Phase 2 of public outreach, the public was asked to identify the five projects (across all study locations) that they feel are most important. As shown on Figure 5, the two projects within the Dartmouth Avenue study area that received the highest number of “votes” were the East Dartmouth Avenue Separated Bike Lanes (Dartmouth #2) and the Little Dry Creek Crossing (Dartmouth #5).

FIGURE 5. PUBLIC INPUT ON DARTMOUTH AVENUE PROJECT PRIORITIES



RECOMMENDED PROJECTS

All six projects in the Dartmouth Avenue study area are recommended for implementation. The following pages provide more detailed information about each project.

DARTMOUTH PROJECT #1

Dartmouth Avenue Bike Lanes and Sidewalk Improvements – West of Santa Fe Drive

Project Description

This project will provide a dedicated bicycle facility along Dartmouth Avenue between Federal Boulevard and South Platte River Drive West; buffered bike lanes between Federal Boulevard and Zuni Street and standard bike lanes between Zuni Street and South Platte River Drive. Additionally, sidewalk along the south side of the street will be improved with any existing gaps being filled.

Agencies Involved:
 City of Sheridan
 City of Englewood
 City and County of Denver

Conceptual Design

Between Federal Boulevard and Zuni Street, on-street parking would be eliminated to accommodate a 6-foot bike lane and 3-foot striped buffer on each side of the street. Between Zuni Street and S. Platte River Drive West, the center two-way left turn lane would be retained, and the travel lanes would be narrowed to 11 feet to accommodate a 5-foot bike lane on each side of the street. The project also includes the addition of a 5-foot attached sidewalk along the south side of Dartmouth Avenue from Federal Boulevard to S. Platte River Drive West. **Appendix B** includes the conceptual design for this project.

Conceptual rendering of Dartmouth Avenue between Zuni Street and S. Platte River Drive West (view looking west)



Considerations

Residential On-Street Parking – Because the recommended project would require elimination of parking along Dartmouth Avenue between Federal Boulevard and Zuni Street, a parking inventory and utilization review was completed. Daytime and overnight parking observations were conducted in January 2019 along Dartmouth Avenue (Federal Boulevard to Zuni Street) plus a one block radius on each side of the corridor. Following are the observations and findings of the parking study:

- The study area has approximately 971 available street parking spaces. Daytime parking utilization was observed to be 17 percent and overnight parking utilization was observed to be 14 percent.
- Of the 971 available street parking spaces, 128 of the existing spaces along Dartmouth Avenue would be removed by the recommended project. The utilization of these parking spaces is approximately 7 percent during the daytime and 5 percent during the overnight time period.
- Estimated on-street parking for the study area after implementation of the recommended project is approximately 843 street parking spaces, a reduction of 13 percent. Estimated parking utilization for daytime and overnight time periods is estimated to be 20 percent and 17 percent, respectively. Enough parking capacity remains for the surrounding land uses, even with the elimination of 128 parking spots associated with the recommended project.
- The removal of parking along Dartmouth Avenue will result in some users having to walk additional distances to reach their destination after parking their vehicle. The number of users expected to be impacted by this is very limited as all residences fronting Dartmouth Avenue in this study area have off street parking. The average increase in walking distance for impacted users is estimated to be 650 feet and the maximum walking distance increase is expected to be 950 feet.



On-street parking utilization on Dartmouth Avenue ranges from 5 – 7 percent

Coordination with Denver – Although Denver is not a member of the SPWG or the project team for this study, a portion of this recommended project is within the City and County of Denver. A subset of the project team met with Denver staff in March 2019 to discuss this recommended project. Denver’s bike plan recommends bike lanes on their portion of this segment (the north side between Federal Boulevard and Zuni Street), and the coordination meeting resulted in general concurrence on this recommended project. Denver staff noted that, while Dartmouth Avenue is not currently a priority corridor for bicycle improvements, the ongoing work by Englewood, Sheridan, and Arapahoe County may help to place more emphasis on the corridor. It was also noted that the impending redevelopment of Loretto Heights (west of Federal Boulevard) provides an opportunity for accelerating the implementation of bike facilities on Dartmouth Avenue.

Future Widening – To accommodate truck traffic through this stretch of Dartmouth Avenue, Englewood may consider roadway widening to add the recommended bicycle facilities while still maintaining 12-foot travel lane widths. This would require acquiring several feet of right-of-way (ROW) on both sides of the street.

Recommended Next Steps

The following steps are recommended to advance the Dartmouth Avenue Bike Lanes and Sidewalk Improvements project:

1. Continue project coordination among Englewood, Sheridan, and Denver, and identify potential shared funding opportunities.
2. Consider the need for focused community engagement or public information about the project for property owners, residents, and business owners along the corridor.
3. Coordinate with railroad operators to identify appropriate crossing enhancements at the existing railroad crossing just east of Tejon Street.
4. Prepare preliminary and final design for the project.
5. Consider the option of dividing the project into two phases: the first phase could be the restriping project (addition of bike lanes) and a second phase could be the construction/widening of sidewalk on the south side of Dartmouth Avenue.

Cost Estimate

\$540,000

DARTMOUTH PROJECT #2

Dartmouth Avenue Separated Bike Lanes – East of Santa Fe Drive

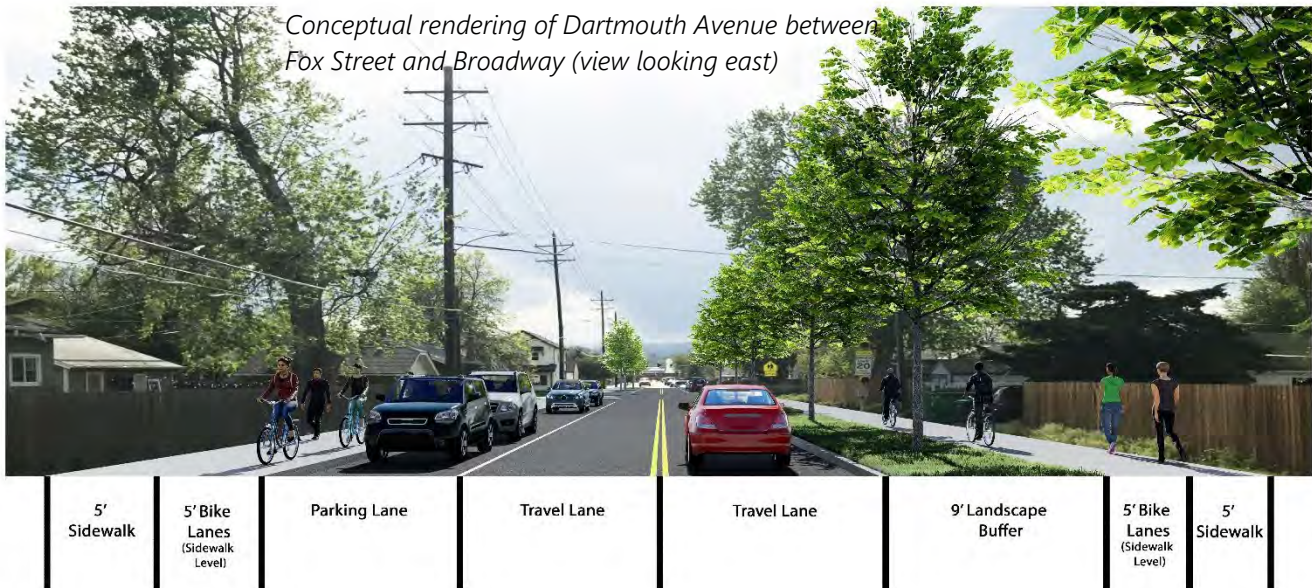
Project Description

This project will provide sidewalk-level separated bike lanes along Dartmouth Avenue between Fox Street and Broadway. Between Fox Street and Santa Fe Drive, signing and striping will be used to direct bicyclists and pedestrians to and from the existing Little Dry Creek Trail underpass of Santa Fe Drive.

Agencies Involved:
City of Englewood

Conceptual Design

Between Fox Street and Broadway, existing curb lines would be modified to accommodate a 5-foot bike lane adjacent to a 5-foot sidewalk on each side of the street. Travel lanes would be narrowed to 11 feet and a 9-foot buffer would be provided between the bike lanes and travel lanes. On blocks where on-street parking is needed, this buffer would be a parking lane with bulb-outs on both corners; on blocks where on-street parking is not needed, this buffer would be landscaped. **Appendix B** includes the conceptual design for this project.



Considerations

Long-term Corridor Vision – Dartmouth Avenue east of Santa Fe Drive is envisioned to be rebuilt in the future, providing a prime opportunity for implementation of a high-quality bicycle facility. In the interim, combined bicycle and parking lanes have been designed and will be implemented along the corridor in summer 2019. Englewood’s *Next Steps Study* (2015) includes a recommendation for separated bike lanes along this stretch of Dartmouth Avenue with the preferred alternative being sidewalk-level bike lanes on both sides of the street, and additional discussions with Englewood confirmed this is still the long-term vision. The project team incorporated the recommendations of that study into this project’s conceptual design.

Residential On-Street Parking – A parking inventory and utilization review was completed for this stretch of Dartmouth Avenue to assess where on-street parking would need to be retained and where the buffer space could be landscaped. Daytime and overnight parking observations were conducted in January 2019 along Dartmouth Avenue (Fox Street to Broadway) plus a one block radius on each side of the corridor.

Following are the observations and findings of the parking study:

- The study area has approximately 883 available street parking spaces. Daytime parking utilization was observed to be 18 percent, and overnight parking utilization was observed to be 28 percent.
- Of the 883 available street parking spaces, 106 are along Dartmouth Avenue and approximately 60 of those would be removed by the recommended project. The utilization of these parking spaces is approximately 3 percent during the both daytime and overnight time periods.
- Estimated on-street parking for the study area after implementation of the recommended project is approximately 823 street parking spaces, a reduction of 7 percent. Estimated parking utilization for daytime and overnight time periods is estimated to be 19 percent and 30 percent, respectively. Enough parking capacity remains for the surrounding land uses, even with the elimination of 60 parking spots associated with the recommended project.
- The removal of parking along Dartmouth Avenue will result in some users having to walk additional distances to reach their destinations after parking their vehicle. The number of users expected to be impacted by this is very limited as all residences fronting Dartmouth Avenue in this study area have off-street parking. The maximum walking distance increase is expected to be 430 feet.



On-street parking utilization on Dartmouth Avenue is very low; approximately 3%

Recommended Next Steps

The following steps are recommended to advance the Dartmouth Avenue Separated Bike Lanes project:

1. Coordinate with public works staff to incorporate the project into the planned reconstruction of Dartmouth Avenue.
2. Investigate ROW/property boundaries.
3. Consider the need for focused community engagement or public information about the project for property owners, residents and business owners along the corridor. Coordinate with City Council about strategies for addressing on-street parking needs.
4. Prepare preliminary and final design for the project.

Cost Estimate
\$1,400,000

DARTMOUTH PROJECT #3

South Platte River Drive Intersection Improvements

Project Description

This project will provide ADA-compliant curb ramps at the intersections of Dartmouth Avenue with South Platte River Drive West and South Platte River Drive East. The northeast and southeast corners of the South Platte River Drive East intersection serve as trail access points.

Agencies Involved:

City of Englewood
City and County of Denver

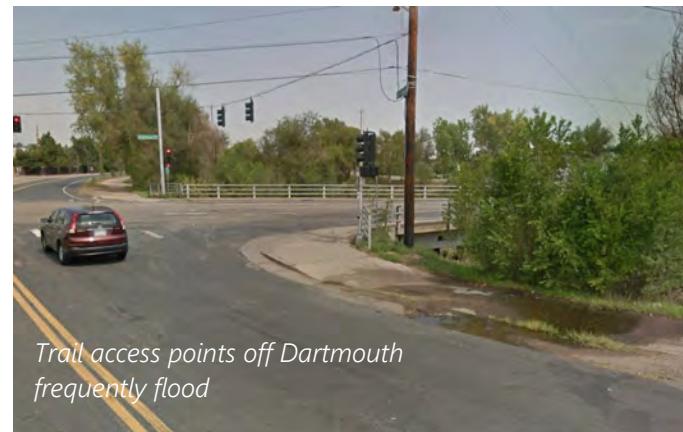
Conceptual Design

Curb lines would be modified at the northwest, northeast, and southeast corners of Dartmouth Avenue and South Platte River Drive West and at the southwest and southeast corners of Dartmouth Avenue and South Platte River Drive East to provide larger landing areas, and curb ramps would be installed at all seven intersection corners where pedestrian crossing is permitted. **Appendix B** includes the conceptual design for this project.

Considerations

Safety Concerns – The large existing curb radii at both intersections allow for relatively high speed right-turns from Dartmouth Avenue. Additionally, many of the existing curb ramps and landing areas are narrow, non-compliant with ADA standards, and in a poor state of repair. All of these factors contribute to an uncomfortable environment. Extending curb lines further into the street would help to address these issues by forcing turning vehicles to slow down more, increasing the visibility of people waiting to cross, and providing adequate space for bicyclists and members of the disabled community to maneuver.

Trail Access – Access points to the South Platte River Trail exist at the northeast and southeast corners of the South Platte River Drive East intersection. Currently, there is no curb along the sidewalks leading to these access points from Dartmouth Avenue so ponding and debris build-up are common.



Bridge Widening – Englewood has plans to widen the bridge over the South Platte to accommodate a 5-lane section (with a sidewalk on the south side) later in 2019, so this project's recommended improvements to the bridge corners will need to be coordinated with that effort. Additionally, the City is applying for CDOT safety funds to widen the bridge approaches from both directions; both would be widened to the south, which would impact two more curb ramps included in this project.

Truck Traffic – Trucks frequently use the intersection of Dartmouth Avenue and South Platte River Drive West to access and leave the large factories and warehouses to the south, so the configuration of that intersection needs to properly accommodate truck turning movements. The recommended curb extension on the southeast corner was analyzed using AutoCAD vehicle tracking software – this confirmed that a WB-40 (semitrailer with 40-foot span between the front and rear axles) could make both the westbound-to-southbound and northbound-to-eastbound movements without encroaching on the curb extension or opposing lanes of traffic.

Recommended Next Steps

The following steps are recommended to advance the South Platte River Drive Intersection Improvements project:

1. Explore opportunities to add the ramp reconstruction to planned bridge widening.
2. Prepare preliminary and final design for the project.

Cost Estimate

\$100,000

DARTMOUTH PROJECT #4

Rail Trail

Project Description

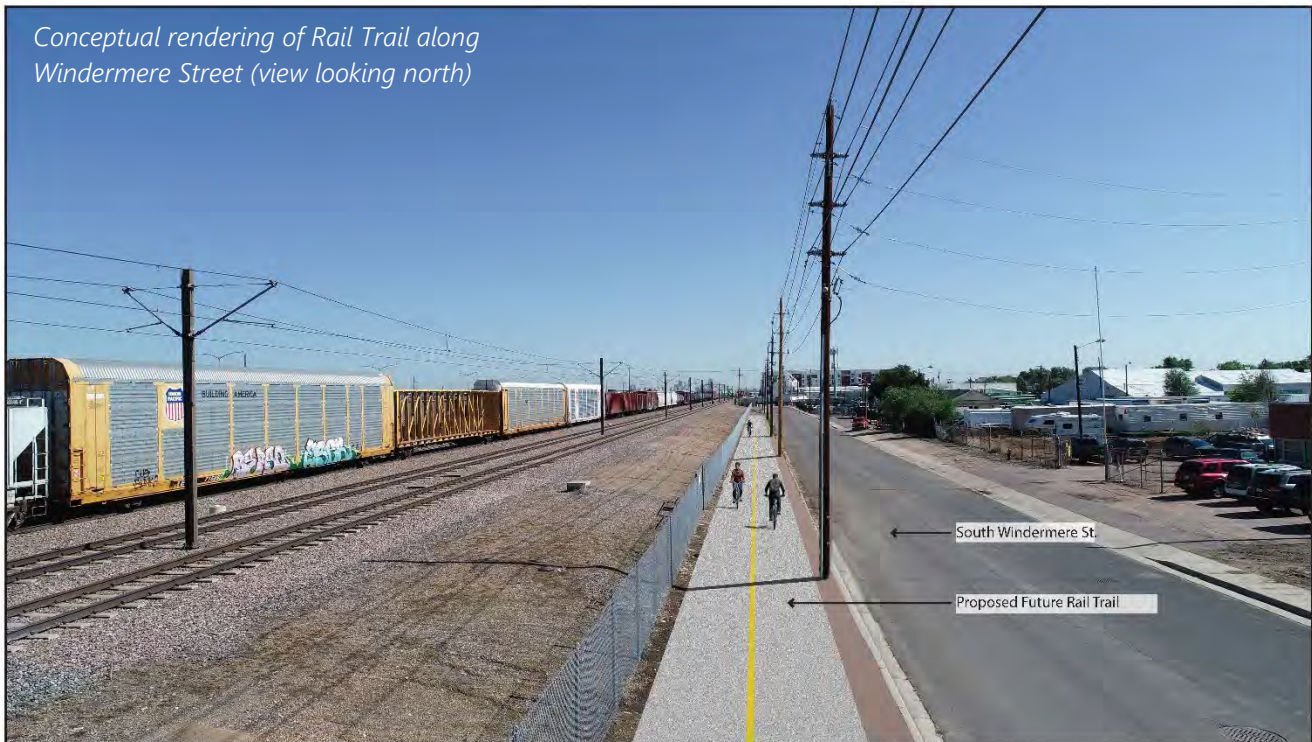
This project will provide a trail along the east side of the Consolidated Mainline Railroad from Bates Avenue to the Big Dry Creek Trail with pedestrian bridges over Dartmouth Avenue, Hampden Avenue, and Oxford Avenue.

Agencies Involved:

City of Englewood
SSPRD
RTD

Conceptual Design

A 10-foot trail would be built between the Consolidated Mainline Railroad and adjacent development to the east, beginning at the intersection of Bates Avenue and Galapago Street and extending south to the Big Dry Creek Trail. Pedestrian bridges would be provided across Dartmouth Avenue, Hampden Avenue, and Oxford Avenue. Additionally, the project would include trail connections to the Little Dry Creek Trail and to Windermere Street near the Oxford Station. **Appendix B** includes the conceptual design for this project.



Considerations

Englewood Next Steps Study – The City of Englewood performed a study in 2015 to identify opportunities for enhancing multi-modal connections to Englewood Station and Oxford Station from the surrounding neighborhoods. One of the primary deficiencies noted in the study was that many designated north-south bicycle routes have multiple crossings of busy streets where the potential for conflict is high. An off-street trail with grade-separated crossings of the area’s busiest east-west streets was recommended to reduce conflicts with vehicles and provide direct connections to Englewood Station and Oxford Station.

Oxford Bridge Funding – The City of Englewood submitted an application for the proposed bicycle and pedestrian bridge over Oxford Avenue to the Subregional Share Call for Projects for the Denver Regional Council of Governments (DRCOG) 2020-2023 Transportation Improvement Program (TIP), and DRCOG selected it as a recommended project. Construction of the bridge, as well as the trail segment connecting to Oxford Station, is planned for 2021.

Recommended Next Steps

The following steps are recommended to advance the Rail Trail project:

1. Continue project coordination among Englewood, SSPRD, and RTD, and identify potential shared funding opportunities.
2. Prepare preliminary and final design for the project.
3. Construct the proposed bridge over Oxford Avenue using recently awarded TIP funding.
4. Consider the option of dividing the project into three phases: the first phase could be the trail segment from Bates Avenue to Englewood Station, including the bridge over Dartmouth; the second phase could be the trail segment from Englewood Station to Oxford Station, including the bridge over Hampden; and the third phase could be the trail segment from Oxford Station to the Big Dry Creek Trail.

Cost Estimate
\$6,400,000

DARTMOUTH PROJECT #5

Little Dry Creek Crossing

Project Description

This project will enhance the existing Little Dry Creek Trail crossing of South Platte River Drive East, just south of Dartmouth Avenue. Improvements will include curb extensions to shorten the crossing distance for trail users, Rectangular Rapid Flash Beacons (RRFBs), and an adjustment to the trail alignment to provide a more direct path.

Agencies Involved:

City of Englewood
SSPRD

Conceptual Design

Existing curb lines would be extended approximately 10 feet into the street on both sides to reduce the distance across South Platte River Drive East from 44 feet to 24 feet. With the space from the curb extension on the west side of the street, the trail approach would be rebuilt to curve directly toward the crosswalk rather than using a series of 90-degree turns as it does currently. The project would also install RRFBs on both sides of the crossing. **Appendix B** includes the conceptual design for this project.



Considerations

Safety Concerns – A review of the area’s crash history found no reported crashes involving bicyclists or pedestrians along this stretch of South Platte River Drive East between 2011 and 2015. However, the layout of the existing crossing is a safety concern due to poor visibility and speeding motorists. The crossing is situated in the center of a horizontal curve in the street; combined with the dense adjacent vegetation, this makes it difficult for motorists to see eastbound trail users. Additionally, the cross-section of the street consists of just one wide lane in each direction (parking is not permitted) and several members of the public commented on excessive speeds around the curve.

Topography – Ground survey, including elevation data and topographical features, was obtained for this project location to ensure the recommended infrastructure improvements are feasible and would not introduce any major new issues. The survey revealed that the crossing is located near the crest of a vertical curve, so drainage naturally flows away and the proposed curb extensions would not cause ponding.

Recommended Next Steps

The following steps are recommended to advance the Little Dry Creek Crossing project:

1. Identify potential funding opportunities.
2. Prepare preliminary and final design for the project.



Cost Estimate
\$120,000

DARTMOUTH PROJECT #6

Wayfinding

Project Description

This project will install new wayfinding signs directing bicyclists and pedestrians to the South Platte River Trail from Englewood Station and Cushing Park via Inca Street and the Little Dry Creek Trail.

Agencies Involved:
City of Englewood

Conceptual Design

Five new wayfinding signs would be installed at important decision points between the Englewood Station and the South Platte River Trail. One sign already exists along the Mary Carter Greenway (shown in blue below). The proposed sign locations, shown below and in **Appendix B**, are:

1. Little Dry Creek Trail east of United Rentals
2. Cushing Park along Inca Street
3. Cushing Park along Eastman Avenue
4. Intersection of Inca Street and Floyd Avenue
5. Englewood Station



Recommended Next Steps

The following steps are recommended to advance the Wayfinding project:

1. Seek partnership and funding opportunities.
2. Design and implement wayfinding signage, consistent with Mary Carter Greenway wayfinding signage standards.

Cost Estimate

\$12,000

5. Hampden Avenue

The Hampden Avenue study area (**Figure 6**) generally extends from Zuni Street on the west to Englewood Station on the east and includes portions of Englewood and Sheridan.

CURRENT CONDITIONS

Today, there is no direct formal access to the Mary Carter Greenway from Hampden Avenue. The closest existing connection from Englewood Station is to go north on Inca Street to the Little Dry Creek Trail and use the existing underpass of Santa Fe Drive and the Consolidated Mainline Railroad. There are also two connections in the River Point shopping center south of Hampden Avenue. An existing social trail is evident along the north side of Hampden Avenue that runs between the existing sidewalk east of the interchange and South Platte River Drive East.

Hampden Avenue is a major U.S. highway (US 285) carrying approximately 85,000 vpd west of Santa Fe Drive (2018). The posted speed is 45 mph west of Santa Fe Drive, and 35 mph east of Santa Fe Drive.

East and west of the interchange, the adjacent land use is primarily commercial, and Hampden Avenue is a six-lane divided highway; there is no sidewalk west of Santa Fe Drive. Englewood Station and Englewood City Center are just east of Santa Fe Drive, and there is also a multi-family residential development just north of the interchange.

During the five-year crash period from January 2011 through December 2015, there were no reported crashes on this stretch of Hampden Avenue involving bicyclists or pedestrians. This is likely largely due to most people avoiding the area altogether given its lack of accommodations for active transportation.

PUBLIC INPUT ON CHALLENGES

The Phase 1 public survey results indicated that the top four challenges in accessing the Mary Carter Greenway at Hampden Avenue by foot or bike are:

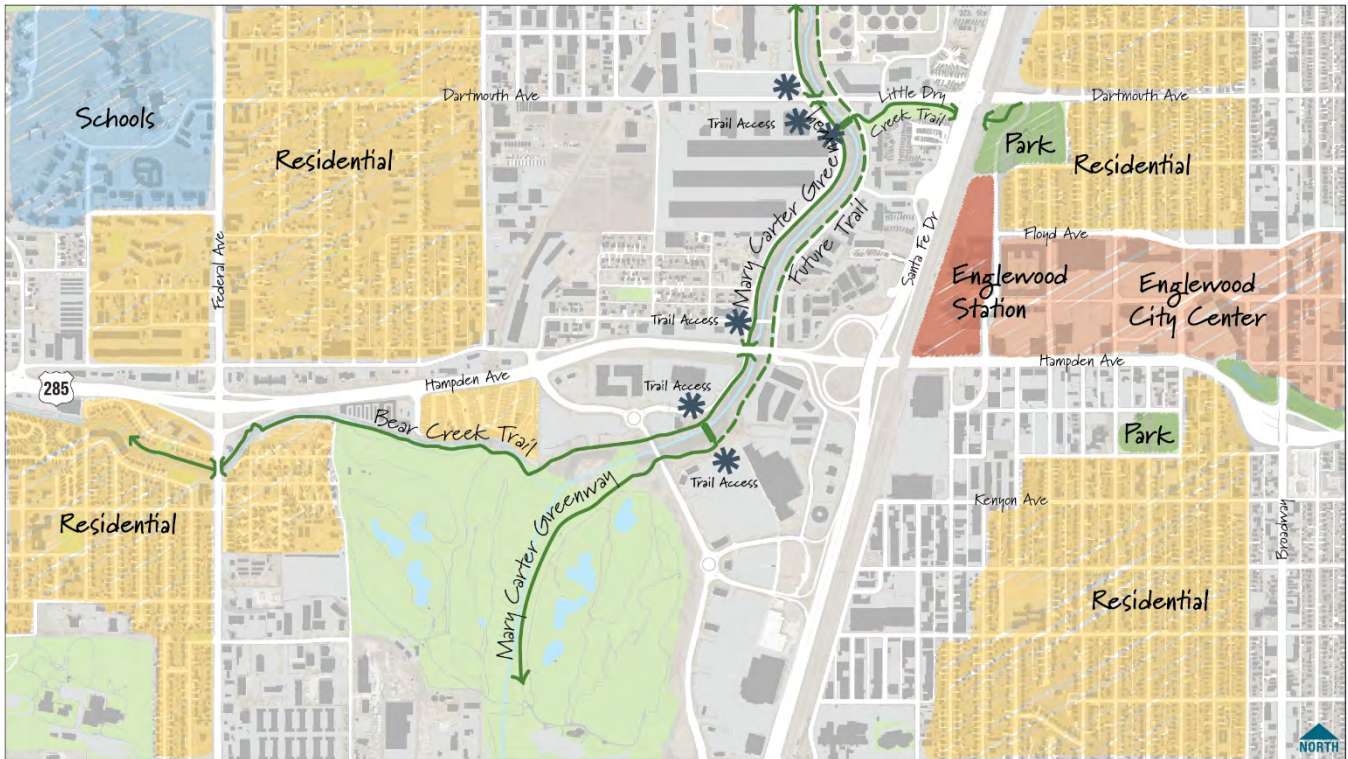
- Unsafe intersection crossings (17 percent)
- No trail/off-street connection (14 percent)
- No direct route (13 percent)
- Lack of bike/ped bridges and tunnels (13 percent)

Problem Statement

There is no comfortable and direct connection between the Mary Carter Greenway and Englewood Station. The interchange at Hampden and Santa Fe does not lend itself to safe at-grade crossings.



FIGURE 6. HAMPDEN AVENUE STUDY AREA



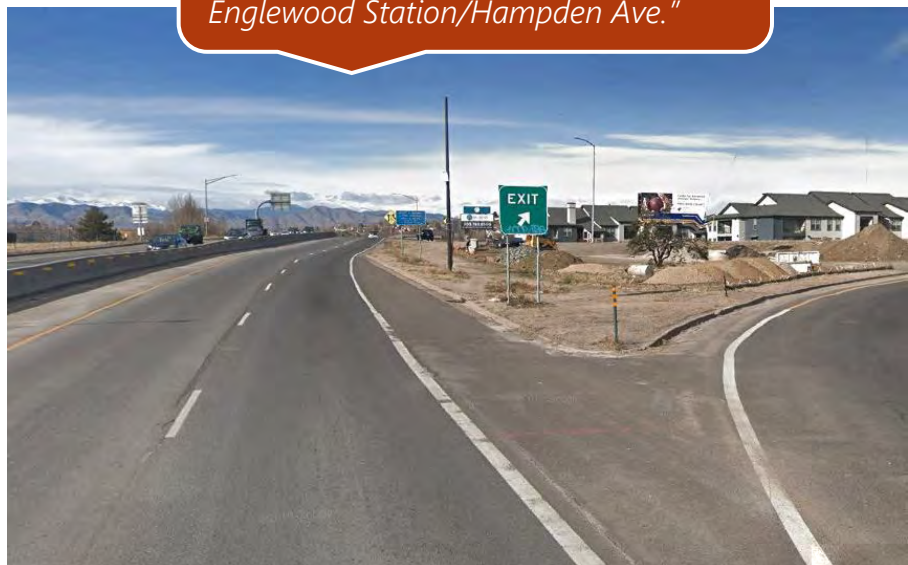
OPPORTUNITIES

There are several residential neighborhoods in Sheridan (west of the South Platte River) within 1 mile of the South Platte; there is an opportunity to improve biking and walking access to the trail for these residents. The Englewood LRT Station is just east of the Santa Fe Drive/Hampden Avenue interchange, and there is an opportunity to improve biking and walking access between the trail and the station. The recent improvements to Hamilton Place and the adjacent alleyway present an opportunity to capitalize on completed infrastructure improvements to improve access to the trail.

"It is virtually impossible and extremely dangerous to access the trail from Englewood Station/Hampden Ave."

CONSTRAINTS

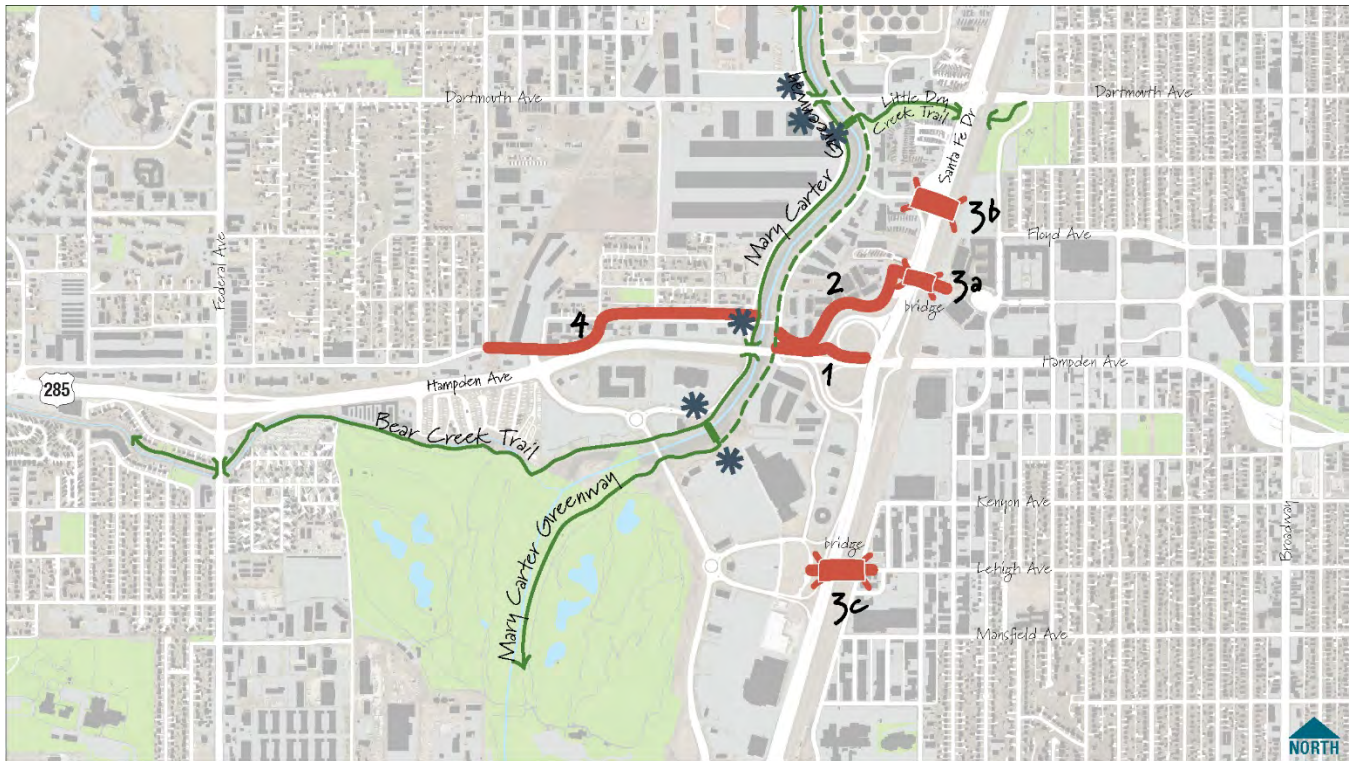
The Santa Fe Drive/Hampden Avenue interchange presents a significant barrier to accessing the Mary Carter Greenway from the west. The grade separation from Santa Fe Drive allows vehicles to travel at highway speeds through this portion of Hampden Avenue, making for an uncomfortable and hazardous environment for bicyclists and pedestrians. There are no sidewalks along Hampden west of the railroad underpass, nor are there any designated crosswalks across the on- and off-ramps. For the neighborhoods west of Zuni Street, access to the Mary Carter Greenway is not well-defined.



PROJECTS CONSIDERED

Four projects were considered within the Hampden Avenue study area, as depicted on **Figure 7** and described below. The projects focus on providing a connection between Englewood Station and the trail across Santa Fe Drive and providing a clearer path to the trail from neighborhoods to the west.

FIGURE 7. HAMPDEN AVENUE PROJECTS



1. **Hampden Avenue Sidewalk Connection:** Construct a sidewalk connection between the westbound-to-northbound Santa Fe Dr. on-ramp and South Platte River Dr. E. with Rectangular Rapid Flash Beacons (RRFBs) and high-visibility crosswalks at each ramp crossing.
2. **Loop Ramp Trail Connection:** Construct a sidewalk connection between South Platte River Dr. E. and the apartment frontage road north of the southbound-to-westbound Santa Fe Dr. off-ramp.
- 3a. **Englewood Station Bridge:** Construct a bicycle and pedestrian bridge over Santa Fe Dr. and the railroad between Englewood Station and the apartment frontage road (originally proposed in the *Englewood Station Next Steps Study*).
- 3b. **Rob Roy Street Bridge:** Construct a bicycle and pedestrian bridge over Santa Fe Dr. and the railroad between Rob Roy St. and the Englewood Station parking lot.
- 3c. **Lehigh Avenue Bridge:** Construct a bicycle and pedestrian bridge over Santa Fe Dr. and the railroad between Lehigh Ave. and the River Point shopping center.
4. **Routing & Wayfinding:** Provide wayfinding signage directing people how to access the South Platte River Trail from Zuni St. along W. Hampden Ave. and the alley north of Hamilton Pl. and install crosswalk and conflict zone markings at roadway crossings.

PROJECT EVALUATION

The purpose of the project evaluation is to highlight the relative benefits of each project. The project evaluation is not intended to be a scoresheet used to prioritize the projects. The qualitative evaluation results associated with project benefits and project costs are summarized in **Table 4** and **Table 5**, respectively. "High priority" is used to identify projects that received the most interest during public outreach.



Least - - - - -> Most Favorable

TABLE 4. EVALUATION OF HAMPDEN AVENUE PROJECT BENEFITS

BENEFIT CRITERION	Hampden 1	Hampden 2	Hampden 3a	Hampden 3b	Hampden 3c	Hampden 4
<i>Direct Connection</i>	● Direct path along Hampden	● Leads to potential LRT bridge	● About 800' north of Hampden	● About 1/3 mile north of Hampden	● About 1/2 mile south of Hampden	● One block north of Hampden
<i>Commuter Bicyclist Access</i>	● Direct path across Santa Fe	● Connects to LRT	● Would need an elevator; connects to LRT	● Bridge would be out of direction	● Bridge would be out of direction	● Routing is a little out of direction
<i>Recreational Bicyclist Comfort</i>	● Minimal separation from autos	● Minimal separation from autos	● Grade separation from autos	● Grade separation from autos	● Grade separation from autos	● Routing along comfortable facilities
<i>Optimization of Existing Infrastructure</i>	● No existing sidewalk	● No existing sidewalk	● New bridge; connects to LRT	● New bridge and approaches	● New bridge and approaches	● Routing along existing alley and sidewalk
<i>Convenient Trail Access</i>	● Formalizes existing social trail	● Not a trail connection	● Not a trail connection	● Not a trail connection	● Not a trail connection	● Provides clearer path to trail
<i>ADA Compliance</i>	● Provides ADA compliant connection	● Provides ADA compliant connection	● Doesn't address ADA	● Doesn't address ADA	● Doesn't address ADA	● Doesn't address ADA
<i>Problem Identified/ Supported by Public</i>	● Addresses a comment	● No public comments	● No public comments; High priority	● No public comments	● No public comments	● No public comments
<i>Conflict Elimination</i>	● Provides designated crossings	● Doesn't remove existing conflict	● Separates bikes & peds from autos	● Separates bikes & peds from autos	● Separates bikes & peds from autos	● Routing away from street to an alley
<i>Compatibility with Future Vision</i>	● May conflict with future interchange plans	● Connects to proposed LRT station bridge	● Previously proposed	● Limits future development west of Santa Fe	● Limits future development west of Santa Fe	● Follows proposed bike route from AC bike plan

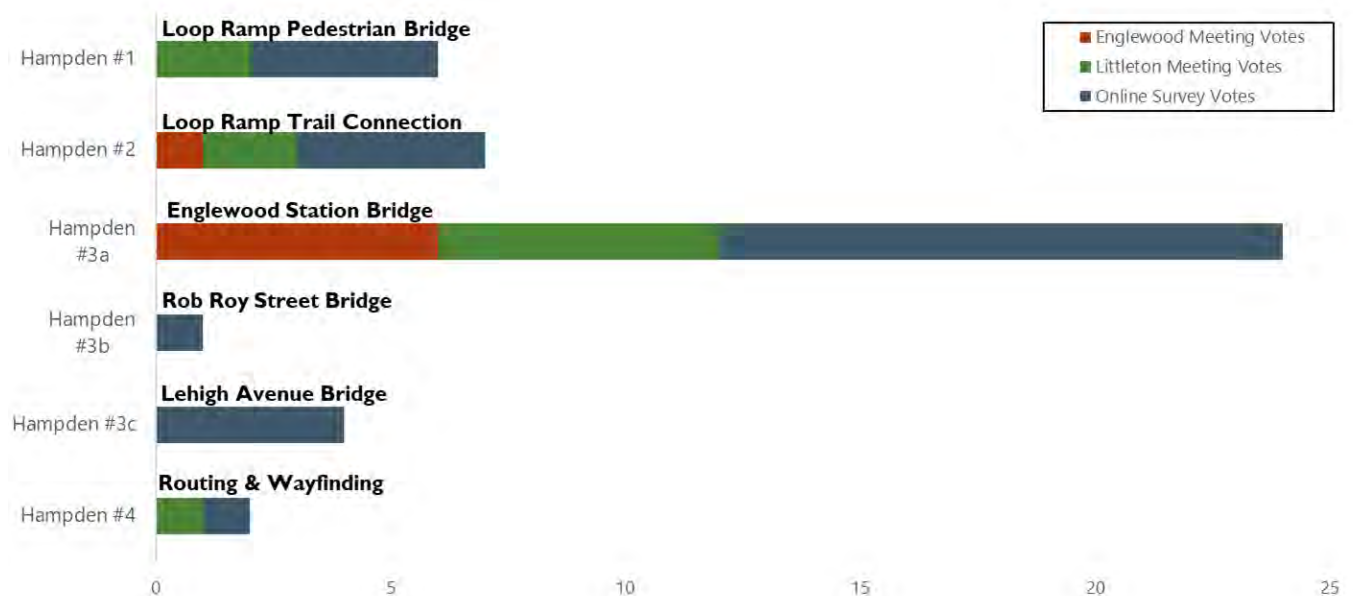
TABLE 5. EVALUATION OF HAMPDEN AVENUE PROJECT COSTS

COST CRITERION	Hampden 1	Hampden 2	Hampden 3a	Hampden 3b	Hampden 3c	Hampden 4
<i>Relative Construction Cost</i>	● Sidewalk construction with RRFBs	● Sidewalk construction	● New bridge	● New bridge	● New bridge	● Signing and striping
<i>Constructability</i>	● Some grade constraints	● Simple sidewalk connection	● Significant constraints	● Significant constraints	● Significant constraints	● No constraints
<i>Motorist Impacts</i>	● Motorists may be slowed by ped crossings	● No motorist impacts	● No motorist impacts	● No motorist impacts	● No motorist impacts	● No motorist impacts
<i>Potential Throw-away Costs</i>	● Could be affected by future interchange work	● Could be affected by future interchange work	● Permanent solution	● Permanent solution	● Permanent solution	● Permanent solution

PUBLIC INPUT ON PRIORITIES

During Phase 2 of public outreach, the public was asked to identify the five projects (across all study locations) that they feel are most important. As shown on **Figure 8**, the one project within the Hampden Avenue study area that received the highest number of “votes” was the Englewood Station Bridge (Hampden #3a) – Hampden #3a was also the highest priority project identified by the public across all study locations.

FIGURE 8. PUBLIC INPUT ON HAMPDEN AVENUE PROJECT PRIORITIES



ELIMINATED PROJECTS

Two of the three bridge projects in the Hampden study area are not recommended for implementation. The following paragraphs provide explanations as to why they were eliminated.

Project 3b would have provided a pedestrian bridge over Santa Fe Drive and the Consolidated Mainline Railroad aligned with Rob Roy Street, approximately 1,600 feet north of Hampden Avenue. East of the railroad, there is not adequate space to provide a bridge landing and ramp without significant impacts to the existing RTD parking lot. Additionally, this bridge would be out of direction for people traveling to or from Englewood Station and is less than 1,000 feet away from the existing Little Dry Creek Trail underpass.

Project 3c would have provided a pedestrian bridge over Santa Fe Drive and the Consolidated Mainline Railroad aligned with Lehigh Avenue, approximately 2,000 feet south of Hampden Avenue. West of Santa Fe Drive, there is not adequate space to provide a bridge landing and ramp without significant impacts to the River Point development. Additionally, this bridge would be out of direction for people traveling to or from Englewood Station and trail users would need to travel through the busy River Point development to access the trail.

RECOMMENDED PROJECTS

Four projects in the Hampden Avenue study area are recommended for implementation. The following pages provide more detailed information about each recommended project.

HAMPDEN PROJECT #1

Hampden Avenue Sidewalk Connection

Project Description

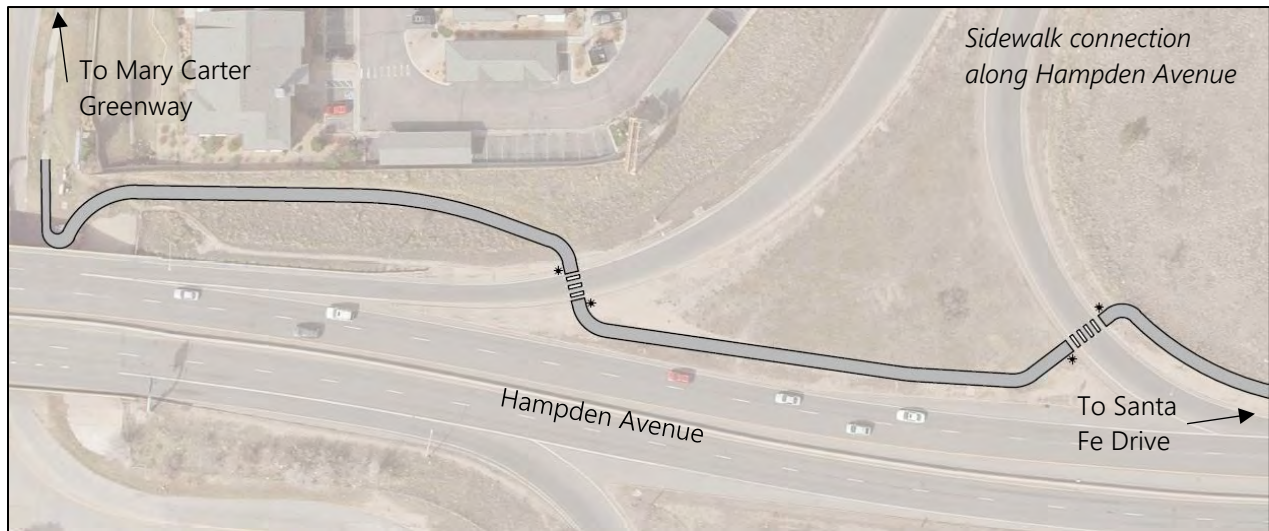
This project will add a sidewalk along Hampden Avenue between the westbound-to-northbound Santa Fe Drive on-ramp and South Platte River Drive West. Additionally, the project will add RRFBs and high-visibility crosswalks to three on- and off-ramp crossings.

Agencies Involved:
City of Sheridan
City of Englewood
CDOT

Conceptual Design

A 10-foot concrete sidewalk would be constructed along the north side of Hampden Avenue from the westbound-to-northbound Santa Fe Drive on-ramp to South Platte River Drive West. The sidewalk would be attached below the bridge and east of Santa Fe Drive and detached west of Santa Fe Drive. At each ramp crossing along this sidewalk connections, RRFBs and high-visibility crosswalks would be provided; per the Manual on Uniform Traffic Control Devices, advance warning signage for motorists would be installed 175 feet in advance of each crossing. Some retaining walls would be necessary to achieve ADA compliance on the slope down to South Platte River Drive West.

Appendix C includes the conceptual design for this project.



Considerations

Social Trail – Though there is no existing sidewalk along Hampden Avenue east of the Santa Fe Drive interchange, there is a distinct social trail, indicating a demand for the recommended connection. Use of this social trail, which is directly adjacent to highway traffic and crosses both loop ramps without any markings, is a major safety concern that a formal sidewalk with designated crosswalks would mitigate.

Grade Separation – Given the high speed and high volume automobile traffic moving through this interchange, the project team evaluated alternatives for providing a grade-separated bicycle and pedestrian crossing. Conceptual design for pedestrian bridge that would span the two westbound/southbound loop ramps was initially developed, but further investigation revealed that there is insufficient space to provide ADA-compliant approach ramps. An underpass concept in the same location was developed as well; though an underpass is feasible with the existing

topography, the cost would be substantial. Considering that the proposed Englewood Station Bridge (Hampden Project #3a) would be less than 1,000 feet north, the project team agreed that the cost of an underpass would exceed its benefit, so this alternative was not recommended.

CDOT Coordination – Because several of this study’s recommended projects involve state highways, including this one, a subset of the project team met with CDOT engineers in January 2019 to discuss them. CDOT representatives indicated that a dedicated facility for bicyclists and pedestrians along this stretch of Hampden would be a beneficial project worth developing further. CDOT indicated that working within their ROW would be feasible; they previously supported the construction of similar sidewalks with ramp crossings along Santa F Drive. A Planning and Environmental Linkages (PEL) study for this portion of Santa Fe Drive is planned to begin late 2019 or 2020, and reconfiguration of the Hampden Avenue interchange may be considered so ongoing coordination about this project will be necessary.

Recommended Next Steps

The following steps are recommended to advance the Hampden Avenue Sidewalk Connection project:

1. Continue project coordination among Englewood, Sheridan, and CDOT and identify potential shared funding opportunities.
2. Continue to monitor the status of the Santa Fe Drive PEL and engage with its project team once started.

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HAMPDEN PROJECT #2

Loop Ramp Trail Connection

Project Description

This project will construct a trail connection from a proposed pedestrian bridge over Santa Fe Drive (Hampden Project #3a) to South Platte River Drive East.

Agencies Involved:
City of Sheridan
City of Englewood
CDOT

Conceptual Design

A 10-foot trail connection would be built from the end of the frontage road west of Santa Fe Drive to South Platte River Drive West along the north side of the southbound-to-westbound Hampden Avenue/Santa Fe Drive loop ramp. Retaining walls would be needed along the west end of this connection to achieve ADA compliance. **Appendix C** includes the conceptual design for this project.



Considerations

Englewood Station Connection – This project would serve as connection between the Mary Carter Greenway and the proposed pedestrian bridge at Englewood Station (Hampden Project #3a). There is an existing trail access less than 500 feet from where this trail connection would meet South Platte River Drive.

Recommended Next Steps

The following steps are recommended to advance the Loop Ramp Trail Connection project:

1. Continue project coordination among Englewood, Sheridan, and CDOT and identify potential shared funding opportunities.
2. Coordinate this trail connection with Hampden Project #3a, a higher cost project that will need to be built prior to this connection.
3. Prepare preliminary and final design.

Cost Estimate

\$340,000

HAMPDEN PROJECT #3a

Englewood Station Bridge

Project Description

This project would construct a pedestrian bridge over the Consolidated Mainline Railroad and Santa Fe Drive at Englewood Station.

Conceptual Design

A pedestrian bridge spanning both the railroad and Santa Fe Drive would be constructed in line with the Englewood Station LRT platform, approximately 650 feet north of Hampden Avenue. A stairwell and elevator would be provided at the platform for bicyclists and pedestrians to access the bridge. West of Santa Fe Drive, an ADA-compliant ramp to the bridge would be built just north of the existing apartment complex access. **Appendix C** includes the conceptual design for this project.

Agencies Involved:
City of Sheridan
City of Englewood
CDOT
RTD



Considerations

Englewood Next Steps Study – The City of Englewood performed a study in 2015 to identify opportunities for enhancing multi-modal connections to Englewood Station and Oxford Station from the surrounding neighborhoods. One of the primary deficiencies noted in the study was a lack of safe access across Santa Fe Drive for bicyclists and pedestrians, and several options for adding a grade-separated crossing were identified and evaluated. A bridge connected to the LRT platform was ultimately recommended because it would significantly reduce travel times for people accessing the station by biking or walking, address a major safety issue through the Hampden Avenue/Santa Fe Drive interchange, and incentivize further residential development west of Santa Fe Drive.

Recommended Next Steps

The following steps are recommended to advance the Englewood Station Bridge project:

1. Continue project coordination among Englewood, Sheridan, CDOT, and RTD and identify potential shared funding and grant opportunities.
2. Prepare preliminary and final design.

Cost Estimate

\$7,600,000

HAMPDEN PROJECT #4

Routing & Wayfinding

Project Description

This project will install new wayfinding signs directing bicyclists and pedestrians to the Mary Carter Greenway from the residential areas west of the river via Hamilton Place and newly paved alleyway.

Agencies Involved:
 City of Sheridan
 SSPRD

Conceptual Design

Seven new wayfinding signs would be installed at important decision points between Zuni Street and the Mary Carter Greenway. The proposed sign locations, shown below and in **Appendix C**, are:

1. Intersection of Zuni Street and Hampden Avenue
2. Intersection of Brady Court and Hampden Avenue
3. Intersection of Umatilla Street and Hamilton Place
4. Barnes Park along Girard Avenue
5. Intersection of Shoshone Street and Hamilton Place alleyway
6. Intersection of Hamilton Place alleyway and South Platte River Drive
7. Intersection of Hamilton Place and South Platte River Drive



Considerations

Hamilton Place Improvements – The City of Sheridan recently completed infrastructure improvements in the Old Hampden Avenue area (north of Hampden Avenue between Zuni Street and the South Platte River) that make it a comfortable place for biking and walking, including new/improved sidewalks, additional crosswalk markings, and a newly paved alleyway. There is an existing trail access at the intersection of Hamilton Place and South Platte River Drive West, so this wayfinding project will capitalize on the infrastructure improvements to make a comfortable and clearly-defined route to the trail from nearby residences.

Recommended Next Steps

The following steps are recommended to advance the Routing & Wayfinding project:

1. Seek partnership and funding opportunities.
2. Design and implement wayfinding signage, consistent with Mary Carter Greenway wayfinding signage standards.

Cost Estimate

\$16,000

6. Oxford Avenue

The Oxford Avenue study area (**Figure 9**) generally extends from Federal Boulevard on the west to Santa Fe Drive on the east and is entirely within Sheridan.

CURRENT CONDITIONS

Today, the South Platte River and Mary Carter Greenway can be accessed from River Run Trailhead (adjacent to Broken Tee Golf Course) and the existing trailhead on the west side of the river.

Oxford Avenue currently carries approximately 4,200 vpd west of Clay Street (2019) and 6,200 vpd west of River Point Parkway (2019). The posted speed is 35 mph along this segment of Oxford Avenue.

Between Federal Boulevard and Clay Street, the adjacent land use is commercial to the north and residential to the south, and Oxford Avenue is a 4-lane street with a center turn lane and wide attached sidewalks on both sides. Between Clay Street and River Point Parkway, the adjacent land use is primarily industrial with a golf course on both sides of the river north of Oxford Avenue, and Oxford Avenue is a 4-lane street with no center turn lane, a wide attached sidewalk on the north side, and no sidewalk on the south side. Through the Santa Fe intersection area (River Point Parkway to Navajo Street), Oxford Avenue widens to add multiple turn lanes. The Oxford Station is located in the northeast quadrant of Santa Fe Drive and Oxford Avenue. East of Santa Fe Drive, the City of Englewood is currently working on a project to stripe combined bicycle/parking lanes.

During the five-year crash period from January 2011 through December 2015, there were six crashes on Oxford Avenue involving a bicyclist. They all occurred at signalized intersections, three at the intersection of Oxford Avenue and Federal Boulevard, and three at the intersection of Oxford Avenue and River Point Parkway.

Problem Statement

The intersection of Oxford Avenue and Santa Fe Drive has challenging crosswalks and crossing distances that present safety risks, and the entire corridor is stressful for biking.



FIGURE 9. OXFORD AVENUE STUDY AREA

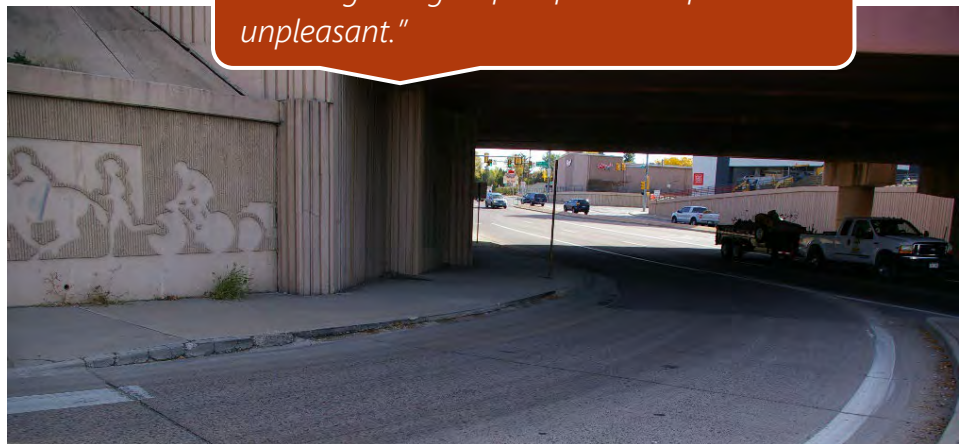


PUBLIC INPUT ON CHALLENGES

The Phase 1 public survey results indicated that the top four challenges in accessing the Mary Carter Greenway at Oxford Avenue by foot or bike are:

- Unsafe intersection crossings (51 percent)
- Lack of bike/ped bridges and tunnels (39 percent)
- Aggressive drivers (39 percent)
- No trail/off-street connections (35 percent)

"Walking along Oxford feels unsafe and unpleasant."



OPPORTUNITIES

There are several residential neighborhoods in Englewood (east of Santa Fe Drive) and Sheridan within 1 mile of the South Platte. SOAR Academy and Sheridan High School are located just west of Federal Boulevard, and Oxford Station and Englewood Recreation Center are just east of Santa Fe Drive. There is an opportunity to improve biking and walking access to the trail from these residences and community centers.

CONSTRAINTS

Santa Fe Drive is an imposing obstacle between residential areas east of Windermere Street and the Mary Carter Greenway. The intersection of Santa Fe Drive and Oxford Avenue is configured to efficiently serve automobile traffic first, with bicyclists and pedestrians subject to wide crossing distances, poor sightlines, and vehicles moving in all directions. The lack of accommodations at this intersection for bicyclists and pedestrians makes it uncomfortable and potentially hazardous for them. The Oxford Avenue cross-section is also a detriment to biking and walking access to the Mary Carter Greenway, with no sidewalk connection from the residential area east of Federal Boulevard and no dedicated bicycle facilities.

PROJECTS CONSIDERED

Four projects were considered within the Oxford Avenue study area, as depicted on **Figure 10** and described below. The projects focus on enhancing the biking and walking environment along Oxford Avenue and providing additional connectivity to the Mary Carter Greenway.

FIGURE 10. OXFORD AVENUE PROJECTS



1. **Santa Fe Drive Intersection Improvements:** Expand existing northeast refuge island, shift right-turn lane crosswalk closer to oncoming traffic, and provide ADA improvements at other corners.
2. **Northeast Trail Connection:** Construct a new trail connection from Oxford Ave. to River Run Trailhead east of the river.
3. **Southwest Trail Connection and Mid-block Crossing:** Construct a new trail connection from Oxford Ave. to the Mary Carter Greenway west of the river and install a crosswalk and Rectangular Rapid Flash Beacon west of the Oxford Ave. bridge.
4. **Oxford Avenue Buffered Bike Lanes:** Restripe Oxford Ave. to add buffered bike lanes between Federal Blvd. and Natches Ct. and crossing markings to direct cyclists toward wide northside sidewalk to cross Santa Fe Dr.

PROJECT EVALUATION

The purpose of the project evaluation is to highlight the relative benefits of each project. The project evaluation is not intended to be a scoresheet used to prioritize the projects. The qualitative evaluation results associated with project benefits and project costs are summarized in **Table 6** and **Table 7**, respectively. “High priority” is used to identify projects that received the most interest during public outreach.



Least - - - - -> Most Favorable

TABLE 6. EVALUATION OF OXFORD AVENUE PROJECT BENEFITS

BENEFIT CRITERION	Oxford 1	Oxford 2	Oxford 3	Oxford 4
<i>Direct Connection</i>	● Improvement to Oxford	● Direct connection from Oxford	● Direct connection from Oxford	● Improvement to Oxford
<i>Pedestrian Comfort</i>	● More comfortable crossing	● Safe and easy trail connection	● Safe and easy trail connection	● Additional separation from autos
<i>Commuter Bicyclist Access</i>	● Crossing with pedestrians could be inconvenient	● Connecting to parking lot could be inconvenient	● Easy connection to trail	● Direct, dedicated on-street facility
<i>Recreational Bicyclist Comfort</i>	● More comfortable crossing	● Safe and easy trail connection	● Safe and easy trail connection	● Stressful transition at Natches
<i>Optimization of Existing Infrastructure</i>	● Expansion and realignment of existing medians	● New connection to existing parking lot sidewalk	● New trail connection	● Restriping
<i>Convenient Trail Access</i>	● Not a trail connection	● Direct trail connection	● Direct trail connection	● Not a trail connection
<i>ADA Compliance</i>	● Provides ADA ramps	● New ADA-compliant connection	● Provides ADA sidewalk and ramps	● Doesn't address ADA
<i>Problem Identified/ Supported by Public</i>	● Addresses a comment; High priority	● No public comments; High priority	● No public comments	● Addresses a comment; High Priority
<i>Conflict Elimination</i>	● Doesn't remove an existing conflict	● Allows trail access without having to use parking lot access	● Doesn't remove an existing conflict	● Separates bikes from autos
<i>Compatibility with Future Vision</i>	● Possible conversion to interchange in the future	● Connects to new riverfront park	● Improves trail access	● Identified in AC bike plan

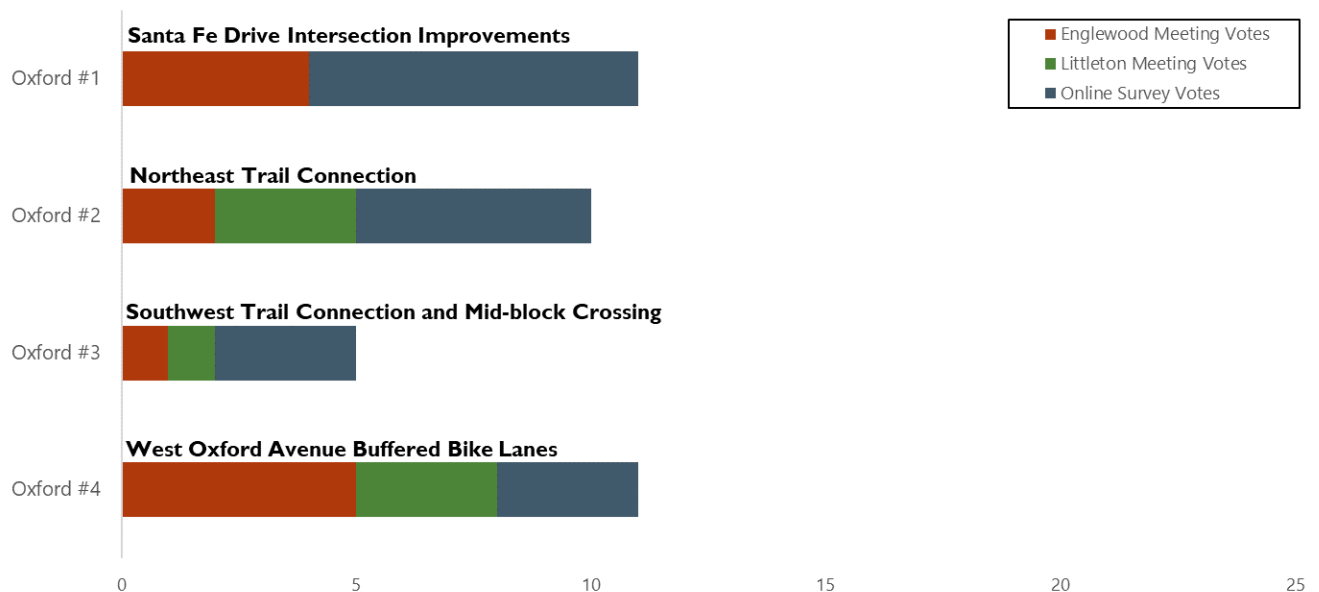
TABLE 7. EVALUATION OF OXFORD AVENUE PROJECT COSTS

COST CRITERION	Oxford 1	Oxford 2	Oxford 3	Oxford 4
<i>Relative Construction Cost</i>	● Island reconstruction could be expensive	● Simple trail connection	● RRFB and significant grading work could be expensive	● Restriping
<i>Constructability</i>	● Expanding islands wouldn't be difficult	● Simple trail connection	● Grading challenges	● Restriping
<i>Motorist Impacts</i>	● Minor adjustments to turning vehicle paths	● No motorist impacts	● RRFB would require motorists to stop occasionally	● Removal of two through lanes
<i>Potential Throw-away Costs</i>	● Could be affected by future intersection improvements	● Permanent solution	● Permanent solution	● Permanent solution

PUBLIC INPUT ON PRIORITIES

During Phase 2 of public outreach, the public was asked to identify the five projects (across all study locations) that they feel are most important. As shown on **Figure 11**, the four projects in the Oxford Avenue study area had similar voting responses. The two projects within the Oxford Avenue study area that received the highest number of “votes” were Santa Fe Drive Intersection Improvements and West Oxford Avenue Buffered Bike Lanes.

FIGURE 11. PUBLIC INPUT ON OXFORD AVENUE PROJECT PRIORITIES



RECOMMENDED PROJECTS

All four of the projects in the Oxford Avenue study area are recommended for implementation. The following pages provide more detailed information about each recommended project.

OXFORD PROJECT #1

Santa Fe Drive Intersection Improvements

Project Description

This project will expand the median refuge islands in the northwest and northeast corners of the intersection of Oxford Avenue and Santa Fe Drive, and shift the northeast crosswalk and refuge path south to make it more visible.

Agencies Involved:
CDOT
City of Sheridan

Conceptual Design

The curb lines on the northwest and northeast refuge islands would be shifted out to narrow the right turn lanes to 15 feet and provide 12-foot paths for crossing bicyclists and pedestrians. On the northeast refuge island, the existing crosswalk would be shifted approximately 35 feet upstream to make waiting bicyclists and pedestrians more visible to right-turning vehicles. Appendix D includes the conceptual design for this project.

Considerations

Safety Concerns – The existing crosswalk from/to the northeast refuge island is located around the corner from the underpass wall, making it difficult for right-turning vehicles to see waiting bicyclists and pedestrians; shifting this crosswalk closer to where the turning movement begins would help this issue. The northwest refuge island is small and provides little physical separation from passing vehicles.



Recommended Next Steps

The following steps are recommended to advance the Santa Fe Drive Intersection Improvements project:

1. Coordinate with CDOT through the upcoming Santa Fe Drive PEL to integrate the crossing improvements.
2. Explore opportunities to add the refuge island improvements to future roadway construction work.
3. Prepare preliminary and final design for the project.

Cost Estimate
\$110,000

OXFORD PROJECT #2

Northeast Trail Connection

Project Description

This project will provide a direct connection between the existing sidewalk on the north side of Oxford Avenue and the trailhead walkway at River Run Trailhead, which connects to the Mary Carter Greenway.

Agencies Involved:
City of Englewood
City of Sheridan
SSPRD

Conceptual Design

An 8-foot trail connection would be provided between the existing attached sidewalk along the north side of Oxford Avenue and the existing walkway at the River Run Trailhead. The trail connection would be graded into the existing hillside at a slope to meet ADA requirements. Two possible alignments for the walkway connection would connect either to the existing walk at the parking lot or into the walkway that wraps around the playground. **Appendix D** includes the conceptual design for this project.



Recommended Next Steps

The following steps are recommended to advance the Northeast Trail Connection project:

1. Seek partnership and funding opportunities.
2. Prepare preliminary and final design for the project.

Cost Estimate
\$50,000

OXFORD PROJECT #3

Southwest Trail Connection and Mid-block Crossing

Project Description

This project will provide a direct connection between the existing sidewalk on the south side of Oxford Avenue and the Mary Carter Greenway. Additionally, a crosswalk across Oxford Avenue and RRFBs would be installed where this connection meets the road.

Agencies Involved:
City of Sheridan
SSPRD

Conceptual Design

A 10-foot concrete trail connection would connect the existing attached sidewalk along the south side of Oxford Avenue and the Mary Carter Greenway just west of the river. The trail connection would be graded into the existing hillside above the greenway trail at a slope to meet ADA requirements; a low retaining wall would be required along the trail connection. Existing trees adjacent to the greenway trail may need to be removed or relocated to accommodate the proposed trail connection. The project would also provide a crosswalk and RRFBs to facilitate a crossing of Oxford Avenue just west of the river. Appendix D includes the conceptual design for this project.



Recommended Next Steps

The following steps are recommended to advance the Southwest Trail Connection and Mid-block Crossing project:

1. Confirm ROW/ property boundaries along the proposed alignment of the trail connection.
2. Seek partnership and funding opportunities.
3. Prepare preliminary and final design for the project.
4. Consider the option of dividing the project into two phases: the first phase could be the crosswalk and RRFBs and a second phase could be the trail connection.

Cost Estimate

\$130,000

OXFORD PROJECT #4

Oxford Avenue Buffered Bike Lanes

Project Description

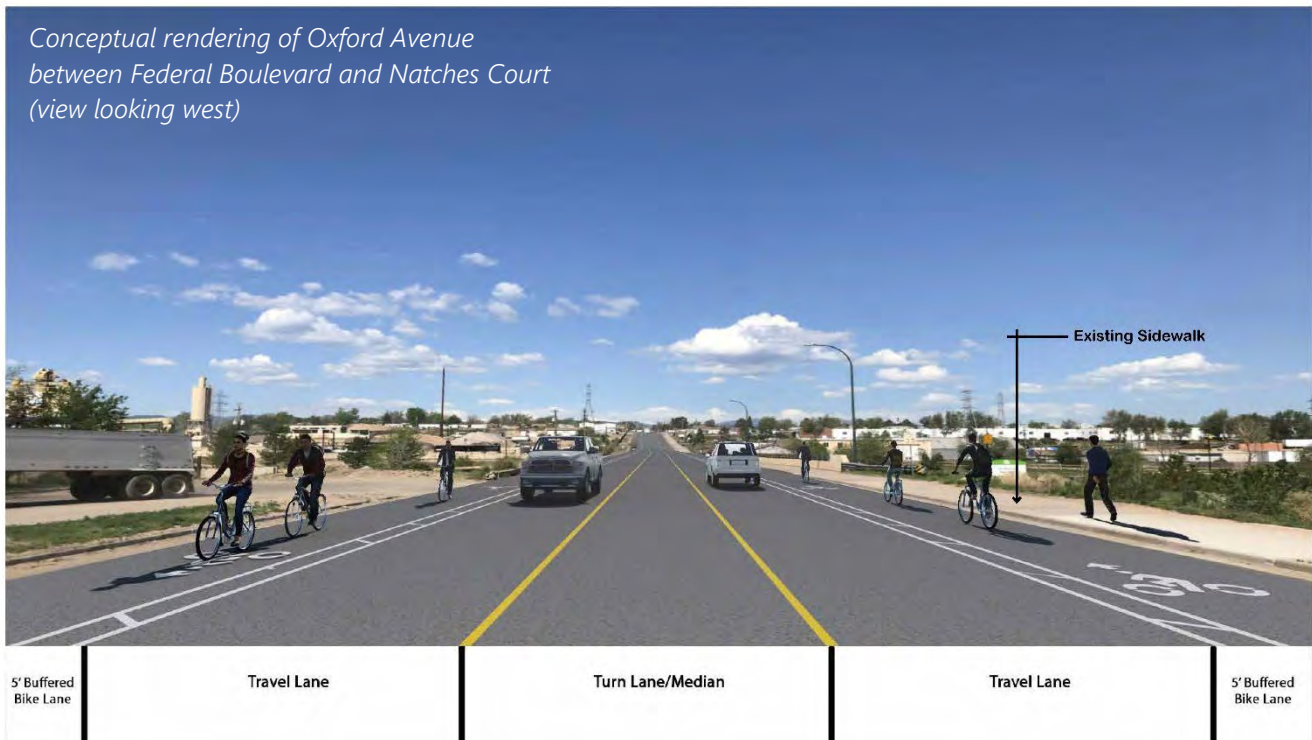
This project will provide buffered bike lanes along Oxford Avenue between Federal Boulevard and Natches Court. Additionally, the sidewalk gap along the south side of the street between Clay Street and the South Platte River will be filled.

Agencies Involved:
City of Sheridan

Conceptual Design

Between Federal Boulevard and Clay Street, where the existing cross-section consists of four travel lanes and a center turn lane, the outside travel lane in each direction would be converted to a 6-foot bike lane with a 3-foot striped buffer. Between Clay Street and Natches Court, where the existing cross-section consists of four travel lanes, the street would be reconfigured to provide bike lanes with 2-foot striped buffers on each side of the street, two 11-foot travel lanes, and a 12-foot center turn lane; the bike lanes would be 6 feet wide to the west of the South Platte River bridge and 5 feet wide to the east. At the Natches Court intersection, crossing markings would direct bicyclists to/from the wide shared-use path on the north side of the street. The project would also provide a 6-foot detached sidewalk along the south side of Oxford Avenue from Clay Street to the South Platte River. **Appendix D** includes the conceptual design for this project.

Conceptual rendering of Oxford Avenue between Federal Boulevard and Natches Court (view looking west)



Considerations

Traffic Operations – Because the project would repurpose two travel lanes along Oxford Avenue, a traffic analysis was conducted to assess if adequate operations could be maintained with the reduced motor vehicle capacity. Daily, AM and PM peak hour turning movement, pedestrian, bicycle, and vehicle classification counts were conducted in January 2019 at the intersections of Oxford Avenue with Federal Boulevard, Clay Street, and Natches Court. Following are the findings of the traffic analysis:

- The daily counts along Oxford Avenue were 4,223 vpd (4 percent heavy vehicles) west of Clay Street and 6,210 vpd (8 percent heavy vehicles) west of Natches Court.
- All intersections along the corridor currently have acceptable levels of service (LOS D or better) except for the unsignalized southbound left movement (LOS E) at the intersection with Clay Street.
- The proposed improvements would not negatively impact traffic operations along the corridor, with all intersections still operating at LOS D or better with the recommended cross-section. The unsignalized southbound left at Clay Street would improve to LOS D due to a reduction in turning conflicts.



Additionally, the conversion of this stretch of Oxford Avenue from four travel lanes to two travel lanes and a center turn lane would match the existing cross section east of Santa Fe Drive. Englewood has plans to add on-street bicycle facilities along Oxford Avenue east of Santa Fe Drive, and this project would provide a connection to those planned facilities from west of Santa Fe Drive.

Crash Patterns – A review of the project corridor’s crash history found a total of 59 reported crashes, including six involving bicyclists, between 2011 and 2015. Of the six bicyclist-involved crashes, three occurred at the Federal Boulevard intersection and three occurred at the Natches Court intersection; providing dedicated space for bicyclists and enhanced crossing markings at these intersections would help mitigate the crash risk. Additionally, approximately 40 percent of all reported crashes were Rear End type and the addition of a center turn lane would reduce the likelihood of this type of crash.

Santa Fe Crossing – This project includes conflict zone markings at the Natches Court intersection directing bicyclists towards the existing sidewalk along the north side of Oxford Avenue to cross Santa Fe Drive. This is the safest crossing option for bicyclists because the Santa Fe Drive intersection does not have room to accommodate a safe on-street bicycle facility and the south side of Oxford Avenue has no sidewalk and is directly adjacent to a railroad spur. The north sidewalk is 12 feet wide, so it can comfortably accommodate both bicyclists and pedestrians.

Recommended Next Steps

The following steps are recommended to advance the Oxford Avenue Buffered Bike Lanes project:

1. Explore opportunities to add the proposed restriping into planned repaving work along the project corridor.
2. Consider the need for focused community engagement or public information about the project for property owners and business owners along the corridor.

Cost Estimate
\$240,000

3. Prepare preliminary and final design for the project.
4. Consider the option of dividing the project into two phases: the first phase could be the restriping project (addition of bike lanes) and a second phase could be the construction/widening of sidewalk on the south side of Oxford Avenue.

7. Federal Boulevard

The Federal Boulevard study area (**Figure 12**) generally extends from Union Avenue on the south to Oxford Avenue on the north and includes portions of Sheridan, Englewood, and unincorporated Arapahoe County.

CURRENT CONDITIONS

Today, the Mary Carter Greenway can be accessed from Centennial Park just north of Union Avenue. The trail can also be accessed by heading east on Oxford Avenue to the existing trailhead adjacent to the South Platte River.

Federal Boulevard is a state highway (SH 88) – owned and maintained by CDOT – and currently carries approximately 22,000 vpd south of Oxford Avenue (2018). The posted speed is 35 mph.

Between Union Avenue and Oxford Avenue, the adjacent land use is primarily residential to the west and commercial to the east. There is a large industrial site between this commercial development and the Mary Carter Greenway. This segment of Federal is a 4-lane street with left turn lanes in each direction; south of Edgemoor Drive, the southbound outside lane is 19 feet wide. Narrow attached sidewalks are present along both sides of the street, and there is a mid-block crossing with a full pedestrian signal just south of Decatur Street.

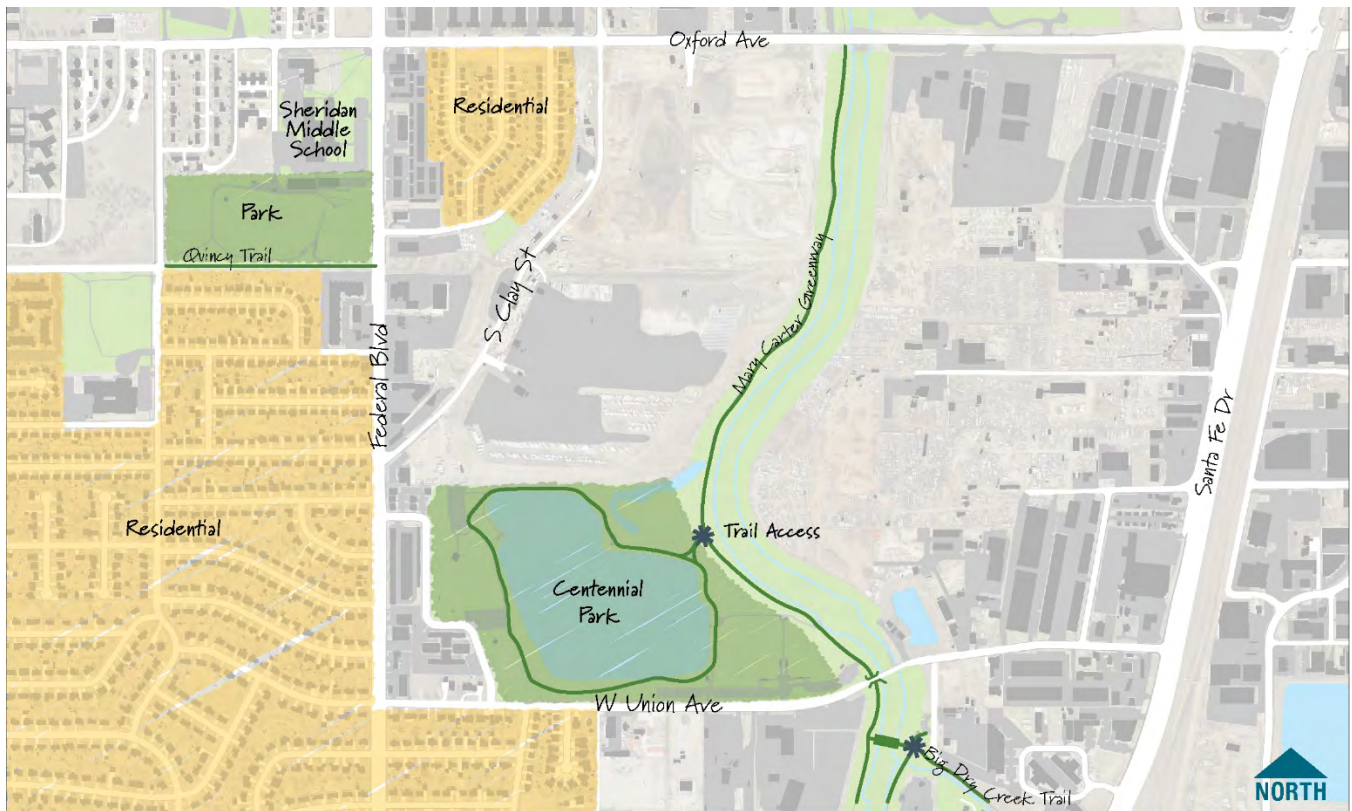
During the five-year crash period from January 2011 through December 2015, there were three crashes on this section of Federal involving a bicyclist, and two crashes involving a pedestrian – all three bicycle-involved crashes occurred at the intersection with Oxford Avenue, and the pedestrian-involved crashes occurred at Radcliffe Drive and at Union Avenue. Additionally, there was one crash involving a bicyclist at the intersection of Union Avenue and Decatur Street.

Problem Statement

Residents in the Englewood and Sheridan neighborhoods west of Federal lack convenient and safe connections to Centennial Park and the Mary Carter Greenway. Federal is difficult for pedestrians and bicyclists to cross due to high speeds and traffic volumes and the long crossing distance.



FIGURE 12. FEDERAL BOULEVARD STUDY AREA



OPPORTUNITIES

There are several residential neighborhoods in Denver (south of Union Avenue), Englewood (between Union Avenue and Edgemoor Drive), and Sheridan (north of Edgemoor Drive) within 1 mile of the South Platte River; there is an opportunity to improve biking and walking access across Federal Boulevard to the trail for these residents. Sheridan Middle School, SOAR Academy, and Sheridan High School are also all located just west of the intersection of Oxford Avenue and Federal Boulevard. The Quincy Trail just south of Sheridan Middle School presents an opportunity to improve connectivity to the Mary Carter Greenway from even further west.

"Federal, Belleview, and Hampden need wider/consistent sidewalks."



CONSTRAINTS

The wide existing cross-section and high traffic speeds make Federal Boulevard itself the most significant barrier to accessing the South Platte River and Mary Carter Greenway at this study area location. Between Union Avenue and Oxford Avenue, there is only one designated crossing for bicyclists and pedestrians. Additionally, the sidewalk along the west side of the road is narrow and uncomfortable. The large industrial sites north of Centennial Park create another major obstacle between Federal Boulevard and the trail.

PROJECTS CONSIDERED

Seven projects were considered within the Federal Boulevard study area, as depicted on **Figure 13** and described below. The projects focus on providing safe connections between the neighborhoods west of Federal to Centennial Park and the Mary Carter Greenway.

FIGURE 13. FEDERAL BOULEVARD PROJECTS



1. **Quincy Mid-block Crossing:** Install a mid-block crossing with a HAWK signal and median refuge island aligned with the Quincy Trail.
2. **Quincy Underpass:** Construct an underpass of Federal Blvd. aligned with the existing Quincy Trail.
3. **Trail Connection, Quincy Trail to Centennial Park:** Construct a new trail connection from the Quincy Trail through the drainage corridor and Excel property, along Clay St., and between Excel Roofing and Kent Recycling to Centennial Park.
4. **Trail Connection, Quincy Trail to South Platte River Trail:** Construct a new trail connection from the existing Quincy Trail through the drainage corridor and Kent Recycling to the South Platte River Trail.
5. **Federal Boulevard Sidewalk Improvements:** Widen and improve the sidewalk along the westside of Federal Blvd. between Oxford Ave. and Union Ave. and provide ADA-compliant ramps at crossings.
6. **Centennial Park Connection:** Add a median refuge to the existing mid-block crossing of Federal Blvd. and reconfigure the Centennial Park parking lot to provide a trail connection on the southside to the loop trail.
7. **Union Avenue Trail Connection:** Construct a new trail connection aligned with Decatur St. from Union Ave. to the Centennial Park loop trail and a crosswalk across Union Ave.

PROJECT EVALUATION

The purpose of the project evaluation is to highlight the relative benefits of each project. The project evaluation is not intended to be a scoresheet used to prioritize the projects. The qualitative evaluation results associated with project benefits and project costs are summarized in **Table 8** and **Table 9**, respectively.



Least - - - - -> Most Favorable

TABLE 8. EVALUATION OF FEDERAL BOULEVARD PROJECT BENEFITS

BENEFIT CRITERION	Federal 1	Federal 2	Federal 3	Federal 4	Federal 5	Federal 6	Federal 7
<i>Direct Connection</i>	● Improvement to Federal	● Improvement to Federal	● Connection to Centennial Park	● Direct connection from Federal	● Direct path along Federal	● Connection to Centennial Park	● Offset from Federal
<i>Pedestrian Comfort</i>	● Safe at-grade crossing of Federal	● Completely separated from autos	● Requires crossing of Clay	● Requires crossing recycle plant	● Wide, detached sidewalk	● Safe at-grade crossing of Federal	● Safe and easy trail connection
<i>Commuter Bicyclist Access</i>	● Signal may be inconvenient to some	● No stopping required	● Not a direct connection to the trail	● Fairly direct connection to trail	● Potential pedestrian conflicts	● Not a direct connection to the trail	● Out of direction for commuters
<i>Recreational Bicyclist Comfort</i>	● Safe at-grade crossing of Federal	● Completely separated from autos	● Requires crossing of Clay	● Requires crossing recycle plant	● Wide, detached sidewalk	● Safe at-grade crossing of Federal	● Safe and easy trail connection
<i>Optimization of Existing Infrastructure</i>	● New mid-block crossing from Quincy Trail	● New underpass thru existing culvert	● New trail connection	● New trail connection	● Significant improvement to existing sidewalk	● Significant improvement to existing crossing	● New trail connection
<i>Convenient Trail Access</i>	● Not a trail connection	● Not a trail connection	● Circuitous route	● Several crossings	● Not a trail connection	● Connection to Centennial Park	● Connection to Centennial Park
<i>ADA Compliance</i>	● Doesn't address ADA	● Doesn't address ADA	● Doesn't address ADA	● Doesn't address ADA	● Sidewalks and ramp ADA updates	● ADA route through parking lot	● Doesn't address ADA
<i>Problem Identified/ Supported by Public</i>	● No public comments	● No public comments	● No public comments	● No public comments	● No public comments	● No public comments	● No public comments
<i>Conflict Elimination</i>	● Doesn't eliminate an existing conflict	● Completely separates bikes & peds from autos	● Doesn't eliminate an existing conflict	● Doesn't eliminate an existing conflict	● Doesn't eliminate an existing conflict	● Provides dedicated space for bikes & peds	● Doesn't eliminate an existing conflict
<i>Compatibility with Future Vision</i>	● Identified in AC bike plan	● Identified in AC bike plan	● Identified in AC bike plan	● Partially identified in AC bike plan	● Sheridan plans to improve this	● Connection to existing park	● Connection to existing park

TABLE 9. EVALUATION OF FEDERAL BOULEVARD PROJECT COSTS

COST CRITERION	Federal 1	Federal 2	Federal 3	Federal 4	Federal 5	Federal 6	Federal 7
<i>Relative Construction Cost</i>	● Median and RRFB would be moderately expensive	● Underpass could be costly	● New trail would be costly	● New trail would be costly	● Long stretch of sidewalk improvement	● Median and parking lot work would be moderately expensive	● Simple trail connection
<i>Constructability</i>	● No significant constraints	● Constrained location for an underpass	● ROW and grade constraints	● Significant ROW constraints	● Some sidewalk segments are constrained	● No significant constraints	● No significant constraints
<i>Motorist Impacts</i>	● Motorists would need to stop for crossing bikes & peds	● No motorist impacts	● No motorist impacts	● No motorist impacts	● Removal of one turn lane north of Quincy	● Reduction in parking lot capacity	● No motorist impacts
<i>Potential Throw-away Costs</i>	● Permanent crossing	● Permanent crossing	● Permanent connection	● Redevelopment could impact this	● Permanent improvement	● Permanent crossing	● Permanent connection

PUBLIC INPUT ON PRIORITIES

During Phase 2 of public outreach, the public was asked to identify the five projects (across all study locations) they feel are most important. As shown on **Figure 14**, the project within the Federal Boulevard study area that received the highest number of “votes” was the trail connection from the Quincy Trail to the South Platte River Trail (Federal #4).

FIGURE 14. PUBLIC INPUT ON FEDERAL BOULEVARD PROJECT PRIORITIES



RECOMMENDED PROJECTS

All seven projects in the Federal Boulevard study area are recommended for implementation. The following pages provide more detailed information about each project.

FEDERAL PROJECT #1

Quincy Avenue Mid-block Crossing

Project Description

This project will provide a raised median refuge island on Federal Boulevard where the Quincy Avenue Trail approaches from the west. Additionally, the project will add High-Intensity Activated crosswalk (HAWK) signals at the crossing. If Federal Project #2 is constructed, this project would no longer be needed.

Agencies Involved:

City of Sheridan
CDOT

Conceptual Design

An 11-foot wide raised refuge island would be constructed within the existing northbound left-turn lane, with a 10-foot wide refuge path aligned with the Quincy Avenue Trail; the raised island would extend approximately 30 feet north and south from the path. This project would also install HAWK signals in the refuge island to provide a dedicated phase for bicyclists and pedestrians to cross Federal, along with advanced warning signage 125 feet north and south of the crossing per the MUTCD. **Appendix E** includes the conceptual design for this project.

Considerations

Quincy Trail – The Quincy Trail just south of Sheridan Middle School provides a comfortable bicycle and pedestrian connection to the Federal Boulevard corridor from several neighborhoods and schools to the west, but currently dead-ends at Federal Boulevard with no clear route for people to continue east.

CDOT Coordination – Because several of this study’s recommended projects involve state highways, including this one, a subset of the project team met with CDOT engineers in January 2019 to discuss them. CDOT representatives indicated that this would be a beneficial project worth developing further. CDOT mentioned that additional analysis may need to be conducted to ensure that this mid-block crossing and the existing one approximately one-third of a mile to the south are not too close.



Recommended Next Steps

The following steps are recommended to advance the Quincy Avenue Mid-block Crossing project:

1. Continue project coordination between Sheridan and CDOT and identify potential shared funding opportunities.
2. Prepare preliminary and final design for the project.
3. Implement this project as a near-term solution; potentially until Federal Project #2 and #3 or #4 could be built.

Cost Estimate

\$210,000

FEDERAL PROJECT #2

Quincy Trail Underpass

Project Description

This project will provide a trail underpass of Federal Boulevard through a drainage way just south of Quincy Trail that approaches from the west. Federal Project #3 and Federal Project #4 would provide trail connections from this underpass to the South Platte. This project would negate the need for Federal Project #1.

Agencies Involved:

City of Sheridan
SSPRD
CDOT

Conceptual Design

A new concrete culvert structure large enough to accommodate a 10-foot trail would be constructed below Federal Boulevard just south of the Quincy Trail. West of the underpass, an ADA-compliant ramp connection to the Quincy Trail would be built. East of the underpass, a 10-foot trail connection to Centennial Park and/or the Mary Carter Greenway would be built (see Federal Project #3 and Federal Project #4). Appendix E includes the conceptual design for this project.

Considerations

Denver Water Pipe – Denver Water maintains a large water pipe underneath Federal Boulevard where this underpass would be located to facilitate drainage. Further investigation will be necessary in latter stages of design to ensure the needs of both trail users and Denver Water customers are properly accommodated with the underpass design.

CDOT Coordination – The project team also discussed this project idea with CDOT engineers in January 2019. CDOT representatives indicated that this would be a beneficial project worth further consideration.



Recommended Next Steps

The following steps are recommended to advance the Quincy Trail Underpass project:

1. Investigate ROW/property boundaries and existing utilities.
2. Coordinate with Denver Water about the feasibility of building a trail underpass next to their large existing pipe
3. Coordinate project development with CDOT.
4. Seek funding and partnership opportunities.
5. Prepare preliminary and final design for the project.

Cost Estimate

\$900,000

FEDERAL PROJECT #3

Trail Connection, Quincy Trail to Centennial Park

Project Description

This project will provide a new trail connection from the Quincy Trail to Centennial Park through a drainage corridor, along Clay Street, and between Excel Roofing and Kent Recycling. A trail spur from this connection to Chase Park would also be provided. Federal Project #1 or Federal Project #2 would provide a crossing of Federal from the Quincy Trail.

Agencies Involved:

City of Sheridan
City of Englewood
SSPRD
Arapahoe County

Conceptual Design

A 10-foot trail would be constructed from Federal Boulevard to Clay Street through an existing drainage corridor, including a pedestrian bridge over the drainage channel. At Federal, the trail would connect to the existing Quincy Trail via either an at-grade mid-block crossing (Federal Project #1) or an underpass (Federal Project #2). At Clay Street, a 10-foot shared-use path connection would be constructed along the east side from this trail to the Excel Roofing property (approximately 1,000 feet to the south). A second trail connection would be built between Clay Street and Centennial Park along the Excel Roofing property line; grades through this area are challenging, so retaining walls would be installed. **Appendix E** includes the conceptual design for this project.

Considerations

Right-of-Way Constraints – The southern portion of this project would pass through private property to connect with Centennial Park and require obtaining additional ROW or easements. While preliminary discussions about a future trail connection in this area have been held with the property owners, negotiations will take time, so this project is a long-term vision.

Sheridan Preliminary Design – The City of Sheridan prepared preliminary design drawings for this trail connection in 2015, including plans for a HAWK signal on Federal Boulevard and the spur to Chase Park. Significant grade challenges were identified along the spur connection and the segment through private property and will need to be addressed in latter stages of design.



Recommended Next Steps

The following steps are recommended to advance the Trail Connection, Quincy Trail to Centennial Park project:

1. Continue project coordination among Sheridan, Englewood, and Arapahoe County and identify potential shared funding opportunities.
2. Continue discussions with private property owners to identify opportunities for ROW acquisition and/or trail easements.
3. Prepare preliminary and final design for the project.

Cost Estimate

\$1,100,000

FEDERAL PROJECT #4

Trail Connection, Quincy Trail to Mary Carter Greenway

Project Description

This project will provide a trail connection from the Quincy Trail to the Mary Carter Greenway between the large recycling plant and the RV storage facility east of Clay Street. Federal Project #1 or Federal Project #2 would provide a crossing of Federal Boulevard from the Quincy Trail.

Agencies Involved:
City of Sheridan
Arapahoe County

Conceptual Design

A 10-foot trail would be constructed from Federal Boulevard to Clay Street through an existing drainage corridor, including a pedestrian bridge over the drainage channel. At Federal Boulevard, the trail would connect to the existing Quincy Trail via either an at-grade mid-block crossing (Federal Project #1) or an underpass (Federal Project #2). At Clay Street, a crossing would be provided near the south recycling plant access and a 10-foot trail connection to the Mary Carter Greenway would be built. Appendix E includes the conceptual design for this project.

Considerations

Right-of-Way Constraints – The southern portion of this project would pass through private property to connect with Centennial Park and require obtaining additional ROW or easements. While preliminary discussions about a future trail connection in this area have been held with the property owners, negotiations will take time, so this project is a long-term vision.



Recommended Next Steps

The following steps are recommended to advance the Trail Connection, Quincy Trail to Mary Carter Greenway project:

1. Continue project coordination between Sheridan and Arapahoe County and identify potential shared funding opportunities.
2. Continue discussions with private property owners to identify opportunities for ROW acquisition and/or trail easements.
3. Prepare preliminary and final design for the project.

Cost Estimate
\$950,000

Federal Boulevard Sidewalk Improvements

Project Description

This project will widen and detach the sidewalk along the west side of Federal Boulevard between Oxford Avenue and Union Avenue. Additionally, the project will update all the curb ramps for ADA compliance.

Conceptual Design

Between Union Avenue and Edgemore Drive, a 10-foot sidewalk with a 3-foot landscaped buffer would be constructed on the west side of Federal Boulevard by shifting the existing curb line approximately 8 feet into the street. Between Edgemore Drive and the South Federal Shopette driveway access, the 10-foot sidewalk would be provided by widening away from the street and would be attached. North of South Federal Shopette access, the curb line would again be shifted into the street to provide a 10-foot sidewalk with 3-foot buffer; this would require consolidating the existing dual left-turn lanes into one two-way left-turn lane. **Appendix E** includes the conceptual design for this project.

Considerations

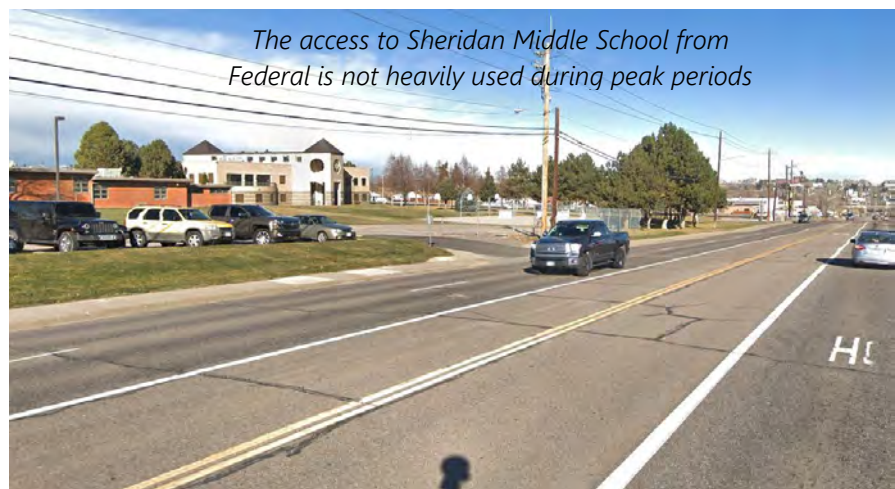
Recent Federal Boulevard Sidewalk Reconstruction – A separate project to improve the sidewalk along the east side of this stretch of Federal Boulevard was recently completed. Between Union Avenue and just north of Oxford Avenue, curb ramps were updated to be ADA-compliant and sidewalk gaps across driveways were filled; sidewalk widening was not a part of that effort.

Traffic Operations – Because the project would remove one of the dual left turn lanes between Oxford Avenue and the South Federal Shopette access, a traffic analysis was conducted to assess if adequate operations could be maintained with a two-way left-turn lane. Daily, AM and PM peak hour turning movement, pedestrian, bicycle and vehicle classification counts were conducted at the intersection of Oxford Avenue and Federal Boulevard, and traffic circulation for the Sheridan Middle School employee parking lot with an access south of Oxford Avenue was observed during school pickup and drop off hours, all in January 2019. Following are the findings of the traffic analysis:

- 95th percentile queue lengths for northbound left-turns from Federal Boulevard are less than 50 feet, so the proposed improvements are not expected to negatively impact traffic conditions at the intersection.
- The primary access for Sheridan Middle School is off Hazel Court, and few vehicles were observed making turning movements from the Federal Boulevard access during the peak periods.

Agencies Involved:

City of Sheridan
City of Englewood
CDOT



The access to Sheridan Middle School from Federal is not heavily used during peak periods

CDOT Coordination– Because several of this study’s recommended projects involve state highways, including this one, a subset of the project team met with CDOT engineers in January 2019 to discuss them. CDOT representatives indicated that this would be a beneficial project worth developing further and that their access control staff are open to closing some of the existing accesses along this stretch of Federal Boulevard.

Recommended Next Steps

The following steps are recommended to advance the Federal Boulevard Sidewalk Improvements project:

1. Continue project coordination among Sheridan, Englewood, and CDOT and identify potential shared funding opportunities.
2. Prepare preliminary and final design for the project.

Cost Estimate
\$1,200,000

FEDERAL PROJECT #6

Centennial Park Connection

Project Description

This project will provide a trail connection between Decatur Street and the Centennial Park loop trail. Additionally, the project will add a median refuge island to the existing mid-block crossing of Federal Boulevard west of Centennial Park and widen the existing sidewalk between this crossing and Decatur Street.

Agencies Involved:
City of Englewood
CDOT

Conceptual Design

A refuge median would be added to the existing mid-block crossing of Federal Boulevard just south of Decatur Street, and advance warning signage for motorists would be provided 100 feet north and south of the crossing per MUTCD. The sidewalk along the west side of Federal between this crossing and Decatur Street would be widened to ten feet. Improvements to existing ramps, driveway cuts and missing sections of sidewalk would also be included. The existing Centennial Park parking lot (west) would be reconfigured to accommodate a 10-foot concrete trail along the south edge, connecting to the existing loop trail which extends along the east side of the parking lot; a new trail intersection will be required with low retaining walls and wayfinding signage. Parking lot striping should be included to define spaces and better direct vehicles. The project would also fill an existing sidewalk gap along the west edge of the parking lot. **Appendix E** includes the conceptual design for this project.

Conceptual rendering of trail along south side of existing parking lot (view looking east)



Trail link through parking lot to perimeter trail provides connection between Federal Boulevard and Mary Carter Greenway

Considerations

Safety Concerns – Though the existing mid-block crossing has a crosswalk and pedestrian signal, the purpose of the signal is not clear to all drivers currently since it is not located at an intersection and there is no pedestrian crossing signage. Constructing a refuge island within the existing striped median would provide a clearer indication to drivers that they should be on alert for bicyclists and pedestrians.



Recommended Next Steps

The following steps are recommended to advance the Centennial Park Connection project:

1. Continue project coordination between Englewood and CDOT and identify potential shared funding opportunities.
2. Prepare preliminary and final design for the project.

Cost Estimate

\$180,000

FEDERAL PROJECT #7

Union Avenue Trail Connection

Project Description

This project will provide a trail connection from Union Avenue to the Centennial Park loop trail just east of Decatur Street.

Agencies Involved:
City of Englewood

Conceptual Design

A new 8-foot trail connection between Union Avenue and the Centennial Park loop trail would be constructed east of Decatur Street. The project would also add a crosswalk on the east leg of the Union Avenue and Decatur Street intersection. **Appendix E** includes the conceptual design for this project.



Considerations

Existing Terrain – There is a significant slope from Union Avenue down to the Centennial Park loop trail, making a straight connection infeasible. Several alternative alignments for providing an ADA-compliant connection were evaluated, and the alignment depicted above and in **Appendix E** was deemed to be the most desirable.

Recommended Next Steps

The following steps are recommended to advance the Union Avenue Trail Connection project:

- 1. Secure project funding.
- 2. Prepare preliminary and final design for the project.

Cost Estimate
\$40,000

8. Belleview Avenue

The Belleview Avenue study area (**Figure 15**) generally extends from Federal Boulevard on the west to Inca Drive on the east and includes portions of Englewood and Littleton.

CURRENT CONDITIONS

Today, the South Platte River and Mary Carter Greenway can be accessed from the Belleview Avenue sidewalk via trail connections immediately northwest, southwest, and southeast of where Belleview Avenue crosses the river. There are also existing trail connections at the intersection of Santa Fe Drive and Prince Street, approximately 1,200 feet south of Belleview Avenue.

Belleview Avenue is a state highway (SH 88) – owned and maintained by CDOT – and currently carries approximately 30,800 vpd east of Federal Boulevard (2017) and approximately 49,200 vpd east of Santa Fe Drive (2017). The posted speed is 40 mph throughout the study area.

Between Federal Boulevard and Windermere Street, the adjacent land use is primarily commercial, with some residential and industrial uses east of Santa Fe Drive, and Belleview Avenue is a six-lane street with a center median/left-turn lane and attached sidewalk on both sides. The Santa Fe Drive intersection is a single point urban interchange with several added lanes for on-and off-ramps. East of Windermere Street, Belleview Avenue narrows to a four-lane street with a center median/left turn lane and attached sidewalk on both sides, and the adjacent land use is recreational, with Cornerstone Park located on both sides of Belleview Avenue. Several restaurants south of Belleview Avenue and west of the Mary Carter Greenway serve as trail destinations and have convenient access to and from the trail.

During the five-year crash period from January 2011 through December 2015, there were four crashes on Belleview Avenue involving a bicyclist, and two crashes involving a pedestrian. All of the crashes occurred at major intersections; two of the bicycle-involved crashes and one of the pedestrian-involved crashes occurred at Prince Street, and the others occurred at Federal Boulevard.

Problem Statement

Bicycle and pedestrian travel along Belleview Avenue is uncomfortable because the sidewalk is narrow and attached. Access to the trail from east of Santa Fe Drive is particularly challenging due to the single point urban interchange configuration.

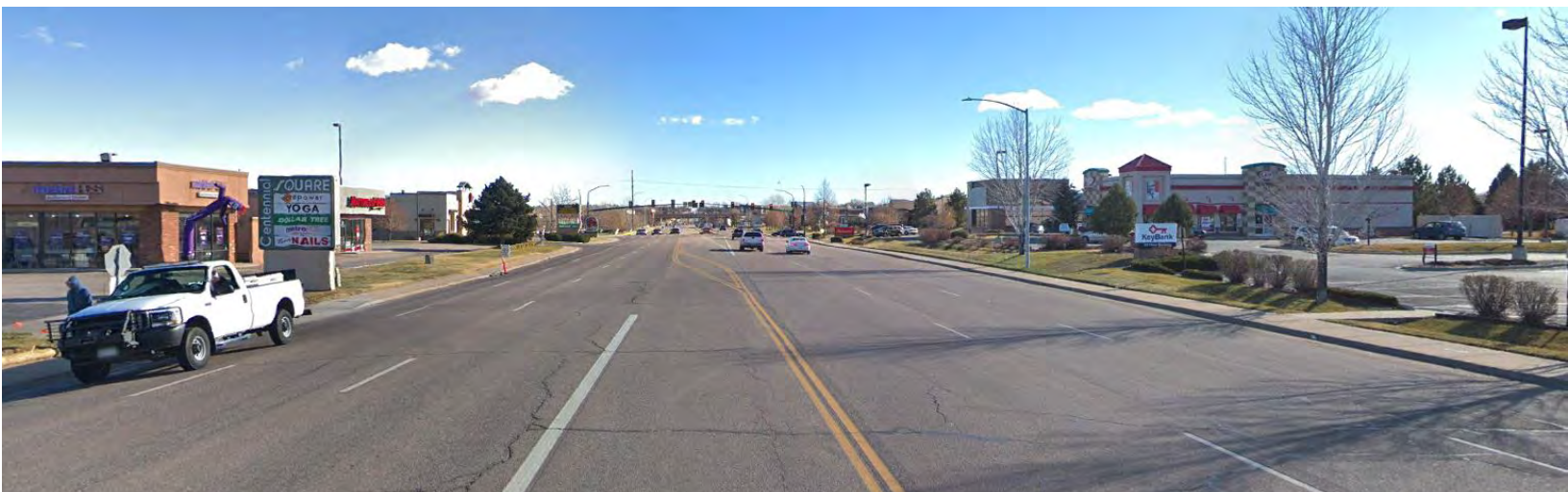
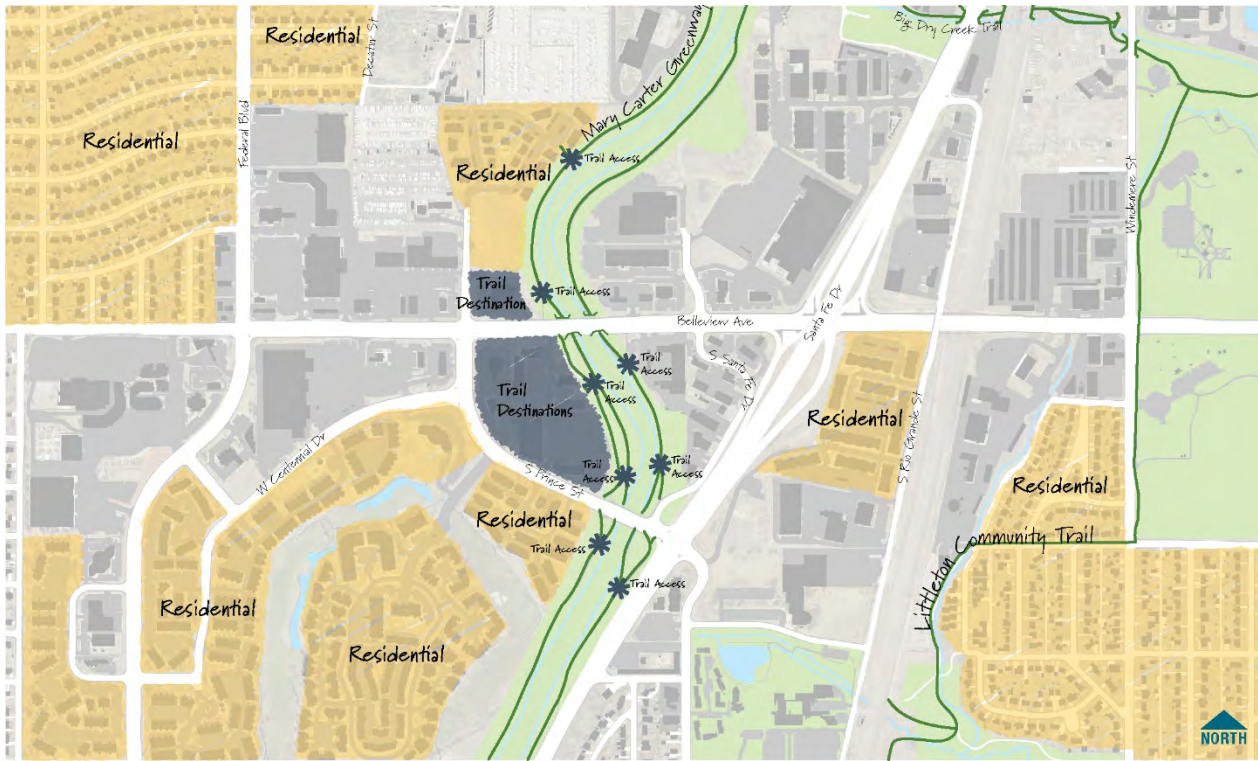


FIGURE 15. BELLEVUE AVENUE STUDY AREA



PUBLIC INPUT ON CHALLENGES

The Phase 1 public survey results indicated that the top three challenges in accessing the South Platte at Bellevue Avenue by foot or bike are:

- Unsafe intersection crossings (32 percent)
- Lack of on-street bike lanes (25 percent)
- Lack of wayfinding/route signage (13 percent)



OPPORTUNITIES

There are several residential neighborhoods in Englewood (north of Belleview Avenue) and Littleton (south of Belleview Avenue) within 1 mile of the South Platte River; there is an opportunity to improve biking and walking access to the trail for these residents. The Big Dry Creek Trail underpass of Santa Fe Drive and the Consolidated Mainline Railroad, and the large box culvert under the railroad at Slaughterhouse Gulch Park, present significant opportunities to capitalize on existing infrastructure to improve access to the trail.

CONSTRAINTS

The single point urban interchange where Belleview Avenue passes below Santa Fe Drive is a major barrier to access the South Platte River and Mary Carter Greenway. The operation of this intersection is considerably different from that of other interchanges in the area, and some bicyclists and pedestrians may not be familiar enough to know where to expect crossing vehicles. This unique configuration, combined with the interchange's cavernous feel and missing pedestrian actuation at some corners, make it an uncomfortable space for bicyclists and pedestrians. The Belleview Avenue cross-section also represents a constraint to biking and walking access to the South Platte – the narrow attached sidewalk along the south side is not a comfortable facility for accessing the existing trail connections adjacent to the river.



PROJECTS CONSIDERED

Six projects were considered within the Belleview Avenue study area, as depicted on **Figure 16** and described below. The projects focus on enhancing the biking and walking environment along Belleview Avenue and providing safe alternatives to the Santa Fe Drive interchange for accessing the trail from the east.

FIGURE 16. BELLEVIEW AVENUE PROJECTS



1. **Northeast Trail Connection:** Construct a new trail connection from Belleview Ave. to the Mary Carter Greenway west of Kwik Car Wash.
2. **Belleview Avenue Sidewalk Improvements:** Widen and improve the sidewalk along the south side of Belleview Ave. between Federal Blvd. and Santa Fe Dr. and enhance the crossings.
3. **Wayfinding:** Provide wayfinding signage directing people how to access the Mary Carter Greenway from east of Santa Fe Dr. via the existing Big Dry Creek Trail underpass and proposed Slaughterhouse Gulch underpass.
4. **Santa Fe Drive Interchange Improvements:** Install pedestrian-activated signals at the left-turn on-ramps to Santa Fe Dr. from Belleview Ave.
5. **Prince Street Trail Connection:** Construct a new trail connection from Belleview Ave. to Prince St. between Santa Fe Dr. and the apartments to the east.
6. **Slaughterhouse Gulch Underpass:** Construct an underpass of the railroad and Rio Grande St. north of Littleton Police Department with trail connections to Slaughterhouse Gulch Park and Prince St. through Geneva Park.

PROJECT EVALUATION

The purpose of the project evaluation is to highlight the relative benefits of each project. The project evaluation is not intended to be a scoresheet used to prioritize the projects. The qualitative evaluation results associated with project benefits and project costs are summarized in **Table 10** and **Table 11**, respectively. "High priority" is used to identify projects that received the most interest during public outreach.



Least - - - -> Most Favorable

TABLE 10. EVALUATION OF BELLEVUE AVENUE PROJECT BENEFITS

BENEFIT CRITERION	Bellevue 1	Bellevue 2	Bellevue 3	Bellevue 4	Bellevue 5	Bellevue 6
<i>Direct Connection</i>	● Direct connection from Bellevue	● Improvement to Bellevue	● Directs users away from Bellevue	● Improvement to Bellevue	● Directs users away from Bellevue	● About 1/3 mile south of Bellevue
<i>Pedestrian Comfort</i>	● Safe & easy trail connection	● Wider but still attached to high-speed roadway	● Guides peds to safer facilities	● Ped signals would make crossings safer	● Separate facility, but close to Santa Fe	● Completely separated from autos
<i>Commuter Bicyclist Access</i>	● Easy connection to trail	● Commuters wouldn't want to use sidewalks	● Signage directs cyclists out of direction	● Signals might slow down commuters	● Out of direction	● Good connection to downtown Littleton
<i>Recreational Bicyclist Comfort</i>	● Safe & easy trail connection	● Wider but still attached to high-speed roadway	● Guides bikes to safer facilities	● Ped signals would make crossings safer	● Off-street facility	● Completely separated from autos
<i>Optimization of Existing Infrastructure</i>	● New trail connection	● Widening of existing sidewalk	● Directs users to existing trail connections	● Enhances existing crossings	● New trail connection	● Formalizes underpass that is already used
<i>Convenient Trail Access</i>	● Direct connection from Bellevue	● Improves sidewalk near two existing crossings	● Guides users to trail connections	● Not a trail connection	● Out of direction from Bellevue	● Connects two major trails
<i>ADA Compliance</i>	● Provides new ADA-compliant connection	● Fixes any ADA issues with existing sidewalk	● Doesn't address ADA	● Doesn't address ADA	● Doesn't address ADA	● Doesn't address ADA
<i>Problem Identified/Supported by Public</i>	● No public comments	● Addresses a comment	● Addresses a comment	● Addresses a comment	● No public comments	● No public comments; High priority
<i>Conflict Elimination</i>	● Doesn't eliminate an existing conflict	● Doesn't eliminate an existing conflict	● Directs users away from conflict points	● Provides designated crossing phases	● Doesn't eliminate an existing conflict	● Completely separates bikes & peds from autos
<i>Compatibility with Future Vision</i>	● Permanent trail connection	● Wider sidewalks are part of Littleton's vision	● Directs users to permanent connections	● Improves interchange safety	● Land is unlikely to be used for another purpose	● Underpass shown in AC BPMP

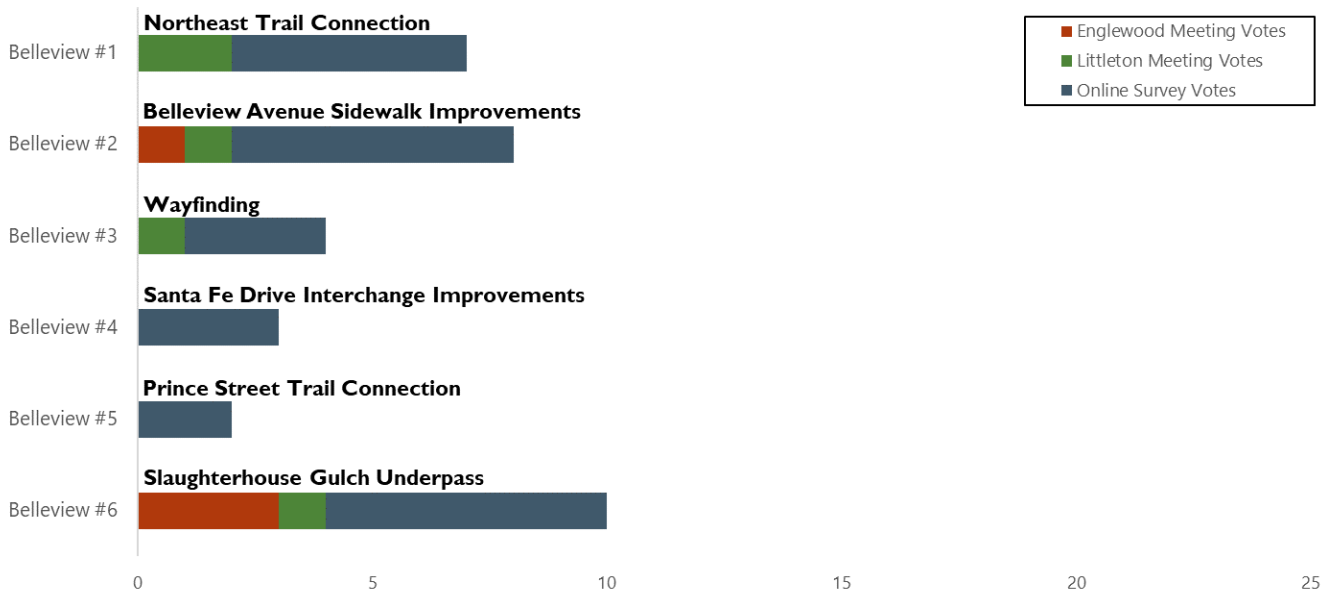
TABLE 11. EVALUATION OF BELLEVIEW AVENUE PROJECT COSTS

COST CRITERION	Belleview 1	Belleview 2	Belleview 3	Belleview 4	Belleview 5	Belleview 6
<i>Relative Construction Cost</i>	● Simple trail connection	● Long stretch of sidewalk improvements	● Signage	● Two signals	● New trail	● Underpass could be costly
<i>Constructability</i>	● Simple trail connection	● Mostly straightforward widening	● Signage	● Signal installation	● Southern end of the trail could be constrained	● People already walk through this
<i>Motorist Impacts</i>	● No motorist impacts	● No motorist impacts	● No motorist impacts	● Motorists might have to stop more often for crossing peds	● No motorist impacts	● No motorist impacts
<i>Potential Throw-away Costs</i>	● Permanent trail connection	● Future Belleview plans might impact this	● Permanent signs	● Future interchange work could impact	● Permanent trail	● Permanent underpass

PUBLIC INPUT ON PRIORITIES

During Phase 2 of public outreach, the public was asked to identify the five projects (across all study locations) that they feel are most important. As shown on **Figure 17**, the three projects within the Belleview Avenue study area that received the highest number of “votes” were the Slaughterhouse Gulch Underpass (Belleview #6), Belleview Avenue Sidewalk Improvements (Belleview #2), and Northeast Trail Connection (Belleview #1).

FIGURE 17. PUBLIC INPUT ON BELLEVIEW AVENUE PROJECT IDEAS



ELIMINATED PROJECTS

One of the six projects in the Belleview Avenue study area, the Prince Street Trail Connection (Belleview Project #5), is not recommended for implementation. This project, which would have provided a connection along the northbound off-ramp from Santa Fe Drive to Belleview Avenue, was eliminated for several reasons; limited sight lines at the corner of Belleview Avenue and Santa Fe Drive where the tall existing retaining wall blocks views, narrow sidewalk along Belleview, a poor user experience, and potential conflicts with an existing drainage pond near Santa Fe Drive and Prince Street.

RECOMMENDED PROJECTS

Five of the six projects in the Belleview Avenue study area are recommended for implementation. The following pages provide more detailed information about each recommended project.



BELLEVIEW PROJECT #1

Northeast Trail Connection

Project Description

This project will provide a direct trail connection between the Belleview Avenue and the Mary Carter Greenway. The trail connection would require an easement through private property at the Kwik Car Wash.

Agencies Involved:
City of Littleton
SSPRD

Conceptual Design

A 10-foot concrete trail connection would be provided between the existing attached sidewalk along the north side of Belleview Avenue and the Mary Carter Greenway just east of the river. The trail connection would be graded into the existing hillside above the greenway trail at a slope to meet ADA requirements and provide adequate sight lines from the nearby trail underpass. An existing boulder wall adjacent to the greenway trail may need to be adjusted to accommodate the proposed trail connection. **Appendix F** includes the conceptual design for this project.



Recommended Next Steps

The following steps are recommended to advance the Northeast Trail Connection project:

1. Investigate ROW/ property boundaries.
2. Discuss possible trail easement with property owner.
3. Seek partnership and funding opportunities.
4. Prepare preliminary and final design for the project.

Cost Estimate
\$25,000

BELLEVUE PROJECT #2

Bellevue Avenue Sidewalk Improvements

Project Description

This project will widen the sidewalk along the south side of Bellevue Avenue between Federal Boulevard and Santa Fe Drive and provide improved ADA curb ramps at all crossings. Additionally, the refuge islands within the Home Depot access and at the Prince Street intersection will be expanded and the curb radii at the Zuni Street intersection will be reduced.

Agencies Involved:

City of Littleton
CDOT

Conceptual Design

The existing sidewalk along the south side of Bellevue Avenue would be widened from 5 feet to 10 feet away from the street between Federal Boulevard and Santa Fe Drive, except for over the bridge across the South Platte River, and all curb ramps would be updated to achieve ADA compliance. At Prince Street, the existing median refuge islands would be expanded by narrowing the channelized right-turn lanes to provide more space for pedestrians and bicyclists; at Zuni Street, the curb radii would be reduced from approximately 30 feet to 20 feet in order to shorten the crossing distance. The project would also narrow the access and egress lanes from Home Depot and expand the median refuge. **Appendix F** includes the conceptual design for this project.

Considerations

Bellevue Avenue Corridor Vision – The City of Littleton is considering a more robust transformation of the Bellevue Avenue corridor as part of its Transportation Master Plan that may include narrowing the roadway and adding raised medians. The project team coordinated with the City of Littleton regarding this project and chose to retain it as a recommended project to ensure sidewalk improvements are a part of the future vision for Bellevue Avenue. Widening the sidewalk over the South Platte River bridge will be explored during the visioning process.

Recommended Next Steps

The following steps are recommended to advance the Bellevue Avenue Sidewalk Improvements project:

1. Continue coordination between Littleton and CDOT to ensure sidewalk improvements are a component of the future vision for Bellevue Avenue.
2. Seek partnership and funding opportunities.
3. Prepare preliminary and final design for the project.



Cost Estimate

\$690,000

BELLEVUE PROJECT #3

Wayfinding

Project Description

This project will install new wayfinding signs directing bicyclists and pedestrians to the Mary Carter Greenway from neighborhoods east of Santa Fe Drive via the existing Big Dry Creek Trail underpass and the proposed Slaughterhouse Gulch underpass (Bellevue Project #6).

Agencies Involved:
 City of Englewood
 City of Littleton
 SSPRD

Conceptual Design

Nine new wayfinding signs would be installed at important decision points between Inca Drive and the Mary Carter Greenway. The proposed sign locations, shown below and in **Appendix F**, are:

1. Creekside Experience Park parking lot
2. Bellevue Park north parking lot
3. Intersection of Big Dry Creek Trail and Littleton Community Trail
4. Intersection of Bellevue Avenue and Windermere Street
5. Bellevue Park south parking lot
6. Intersection of Bellevue Avenue and Inca Drive
7. Intersection of Prentice Avenue and Prescott Street
8. Cornerstone Park along Prentice Avenue
9. Slaughterhouse Gulch Park along Littleton Community Trail



Recommended Next Steps

The following steps are recommended to advance the project:

1. Seek funding and partnership opportunities.
2. Consider dividing the project into two phases: the wayfinding signage north of Belleview Avenue directing trail users to the Big Dry Creek Trail could be implemented immediately; the wayfinding signage south of Belleview Avenue directing trail users to the future Slaughterhouse Gulch underpass could be implemented concurrently with Belleview Project #6.
3. Design and implement wayfinding signage, consistent with Mary Carter Greenway wayfinding signage standards.

Cost Estimate

\$20,000

BELLEVUE PROJECT #4

Santa Fe Drive Interchange Improvements

Project Description

This project will add pedestrian-activated crossing signals to the left-turn on-ramps from Bellevue Avenue to Santa Fe Drive.

Agencies Involved:

City of Littleton
CDOT

Conceptual Design

Pedestrian push buttons and dedicated crossing signals would be installed at the eastbound-to-northbound on-ramp and at the westbound-to-southbound on-ramp within the single point urban interchange between Bellevue Avenue and Santa Fe Drive. These signals would provide a dedicated crossing phase for bicyclists and pedestrians with no conflicting left turns. **Appendix F** includes the conceptual design for this project.

Considerations

Safety Concerns – The single point urban interchange configuration at Bellevue Avenue and Santa Fe Drive is unique to the area and facilitates crossing movements that may not be expected by unfamiliar users. Vehicles turning left onto Santa Fe Drive begin the approach to their on-ramps from over 250 feet away, and some bicyclists and pedestrians may not know where to look for oncoming vehicles before crossing. Adding dedicated signals and phases that separate crossing bicyclists and pedestrians from left-turning vehicles would improve safety for all users.



Recommended Next Steps

The following steps are recommended to advance the Santa Fe Drive Interchange Improvements project:

1. Coordinate with CDOT through the upcoming Santa Fe Drive PEL to integrate the crossing improvements as a low-cost safety improvement.
2. Identify funding opportunities in partnership with CDOT.
3. Prepare preliminary and final design for the project.

Cost Estimate

\$17,000

BELLEVUE PROJECT #6

Slaughterhouse Gulch Underpass

Project Description

This project will construct formal trail underpasses of the Consolidated Mainline Railroad and Rio Grande Street. Trail connections would be provided through Slaughterhouse Gulch Park to the Littleton Community Trail on the east side and through Geneva Park to Prince Street on the west side.

Agencies Involved:
City of Littleton
SSPRD
Union Pacific Railroad
BNSF Railway

Conceptual Design

Existing concrete culvert structures underneath the railroad and street would be improved to provide a 10-foot shared-use path connection through them. Separate channels for the shared-use path and water would be constructed to mitigate flooding. East of the underpasses, a 10-foot shared-use path would be built to connect to the Littleton Community Trail; existing topography would necessitate use of longitudinal grades exceeding 5 percent to make this connection. Where steeper grades are needed, level landings would be provided to meet ADA requirements. West of the underpasses, a 10-foot shared-use path would be built to connect to the Geneva Park trail. The project would also widen the Geneva Park trail to 8 feet, construct a new connection to Prince Street north of the adjacent residential development, and widen the sidewalk along the east side of Prince Street to 8 feet (away from the street) from this connection to Crestline Avenue. **Appendix F** includes the conceptual design for this project.



Conceptual rendering of railroad underpass at Slaughterhouse Gulch Park

Considerations

Topography & Drainage – Ground survey, including elevation data and topographical features, was obtained for this project location to assess the feasibility of the recommended infrastructure improvements and to inform a high-level drainage analysis. Beneath both the railroad and Rio Grande Street, there is adequate space to provide the American Association of State Highway Officials (AASHTO) minimum vertical clearance of 10 feet. East of the underpasses, significant grading work and retaining walls will be necessary to make the connection to the Littleton Community Trail; some walls will likely be needed for the Geneva Park connection as well. Given the minimal difference in elevation between the creek and an adjacent trail, underpass flooding during major storm events would be a concern. Channel regrading upstream of the railroad and installation of a stem wall will help to mitigate this.



Rio Grande Street Bridge Widening – The City of Littleton is actively working on a separate project to widen this segment of Rio Grande Street, including the existing bridge. The project team coordinated with City staff about the idea of a formal trail connection under the bridge, and the City is exploring the possibility of incorporating the trail underpass work into the bridge widening project.

Recommended Next Steps

The following steps are recommended to advance the Slaughterhouse Gulch Underpass project:

1. Coordinate with Union Pacific and BNSF about the plausibility of formalizing an underpass of the railroad.
2. Continue project coordination with Littleton to identify opportunities for constructing the Rio Grande Street underpass simultaneous with the widening work.
3. Seek funding and partnership opportunities.
4. Prepare preliminary and final design for the project.
5. Consider the option of dividing the project into two phases: the first phase could be the two underpasses and the Littleton Community Trail connection, and a second phase could be the improvements to the Geneva Park trail and new connection to Prince Street.

Cost Estimate
\$1,200,000

9. Bowles Avenue

The Bowles Avenue Study area (**Figure 18**) extends from Federal Boulevard on the west to Prince Street on the east and is within the City of Littleton.

CURRENT CONDITIONS

Today, the Mary Carter Greenway can be accessed from the north side of Bowles Avenue via sidewalk connections on both sides of the South Platte River. The trail can also be accessed from the Little’s Creek Trail, which extends from the Downtown Littleton Light Rail Station south of Alamo Avenue, under Santa Fe Drive, and around the DISH Network campus to the South Platte.

Bowles Avenue currently carries approximately 32,600 vpd west of Santa Fe Drive. The posted speed is 35 mph.

Between Federal Boulevard and Santa Fe Drive, the adjacent land use is a mix of recreation and commercial; west of the South Platte River is Littleton Golf and Tennis Club (run by South Suburban Parks and Recreation), and east of the river there is a large tract of open space north of Bowles Avenue and a mix of restaurants and office space to the south. There are also large residential developments just west of Federal Boulevard. This stretch of Bowles Avenue is primarily a 4-lane section with a striped median and several auxiliary lanes at the intersections. Downtown Littleton is located immediately east of the intersection of Bowles Avenue and Santa Fe Drive.

During the five-year crash period from January 2011 through December 2015, there were three crashes on Bowles Avenue involving a bicyclist, and one crash involving a pedestrian. All three bicycle-involved crashes occurred at Federal Boulevard, and the pedestrian-involved crash occurred at Santa Fe Drive.

Problem Statement

Heavy traffic volumes at the intersections of Santa Fe Drive & Bowles Avenue and Federal Boulevard & Bowles Avenue create safety and mobility issues for bicyclists and pedestrians coming from Historic Downtown Littleton to the east and residential areas to the west.



FIGURE 18. BOWLES AVENUE STUDY AREA



PUBLIC INPUT ON CHALLENGES

The Phase 1 public survey results indicated that the top three challenges in accessing the South Platte at Bowles Avenue by foot or bike are:

- Unsafe intersection crossings (18 percent)
- Lack of bike/ped bridges and tunnels (13 percent)
- Aggressive drivers (13 percent)

"The Old Littleton area lacks good connecting trails/sidewalks."



OPPORTUNITIES

Downtown Littleton is within the study area just east of Santa Fe Drive, and there is a significant opportunity to better integrate it with the South Platte through improved bicycle and pedestrian connectivity between the two major destinations. There are several residential neighborhoods just west of Federal Boulevard; there is also an opportunity to improve biking and walking access to the Mary Carter Greenway for these residents. The Downtown Littleton Light Rail Station is on the east edge of Downtown Littleton, and there is an opportunity to improve access and wayfinding between the trail and the station. The Little's Creek Trail underpass of Santa Fe Drive presents an opportunity to capitalize on existing infrastructure to improve access to the trail.

CONSTRAINTS

The major intersections on both sides of the study area are uncomfortable and dangerous for crossing bicyclists and pedestrians. The skew of the Federal Boulevard and Bowles Avenue intersection creates wide crossing distances and reduces the speed to which right-turning vehicles must slow down. The intersection of Santa Fe Drive and Bowles Avenue is an imposing obstacle between Downtown Littleton and the South Platte for bicyclists and pedestrians with

free right turns in all directions, long wait times, and narrow corner refuge islands. The sidewalks on Bowles Avenue are generally in good condition but lack direct connections to the Mary Carter Greenway on the south side.

PROJECTS CONSIDERED

Eight projects were considered in the Bowles Avenue study area, as depicted on **Figure 19** and described below. The projects focus on providing direct trail connections from Bowles Avenue, providing a new grade-separated crossing of Santa Fe Drive, and optimizing use of the existing Little's Creek Trail connection to the Mary Carter Greenway.

FIGURE 19. BOWLES AVENUE PROJECTS



1. **Interim Federal & Bowles Intersection Improvements:** Implement interim improvements to the intersection of Federal Blvd. and Bowles Ave. that provide a safer crossing for bicyclists and pedestrians (part of a separate Littleton project).
2. **Ultimate Federal & Bowles Intersection Improvements:** Reconstruct the intersection of Federal Blvd. and Bowles Ave. to provide a safer crossing for bicyclists and pedestrians and improve capacity and safety for motor vehicles as well (part of a separate potential Littleton project).
3. **Southwest Trail Connection and Roundabout:** Construct a new trail connection from Bowles Ave. to the Mary Carter Greenway east of Farnell Lane and a new trail roundabout with the crossing of the golf cart path.
4. **Northwest Trail Connection:** Improve the connection from Bowles Ave. to the Littleton Golf and Tennis Club parking lot west of the Mary Carter Greenway.
5. **Southeast Trail Connection:** Construct a new trail connection from Bowles Ave. to the Mary Carter Greenway west of the parking lot for Blind Faith Brewing.
6. **Wayfinding:** Provide wayfinding signage directing people how to access the Mary Carter Greenway from Downtown Littleton and the Downtown Littleton Light Rail Station via the Little's Creek Trail underpass of Santa Fe Dr.
7. **Trail Bridge Relocation:** Relocate the existing trail bridge near Platte River Bar & Grill north to align with the Little's Creek Trail.
8. **Santa Fe Drive Underpass:** Construct an underpass of Santa Fe Dr. north of Bowles Ave. with trail connections to the Mary Carter Greenway on the west and to Crestline Ave. on the east.

PROJECT EVALUATION

The purpose of the project evaluation is to highlight the relative benefits of each project. The project evaluation is not intended to be a scoresheet used to prioritize the projects. The qualitative evaluation results associated with project benefits and project costs are summarized in **Table 12** and **Table 13**, respectively. Bowles Projects #1 and #2 are not included in the evaluation because they are being done as separate projects. "High priority" is used to identify projects that received the most interest during public outreach.



Least - - - -> Most Favorable

TABLE 12. EVALUATION OF BOWLES AVENUE PROJECT BENEFITS

BENEFIT CRITERION	Bowles 3	Bowles 4	Bowles 5	Bowles 6	Bowles 7	Bowles 8
<i>Direct Connection</i>	● Direct connection from Bowles	● Direct connection from Bowles	● Direct connection from Bowles	● Not directly along Bowles	● Bridge would still be offset from Bowles	● Not directly along Bowles
<i>Pedestrian Comfort</i>	● Safe and easy trail connection	● Potential for some conflicts with autos	● Safe and easy trail connection	● Signage would direct peds to safer facilities	● More convenient bridge location	● Completely separated from autos
<i>Commuter Bicyclist Access</i>	● Safe and easy trail connection	● Potential for some conflicts with autos	● Safe and easy trail connection	● Signage directs cyclists out of direction	● More convenient bridge location	● Grade separated crossing
<i>Recreational Bicyclist Comfort</i>	● Safe and easy trail connection	● Potential for some conflicts with autos	● Safe and easy trail connection	● Signage would direct bikes to a safer facility	● More convenient bridge location	● Completely separated from autos
<i>Optimization of Existing Infrastructure</i>	● Improves existing trail intersection	● Improvement to existing connection	● New trail connection	● Directs users along existing trail	● Shifts existing bridge	● New underpass
<i>Convenient Trail Access</i>	● Direct trail connection	● Fairly direct trail connection	● Direct trail connection	● Guides users to trail connection	● More convenient location	● Direct trail connection
<i>ADA Compliance</i>	● Adds new ADA trail connection	● ADA improvements	● Adds new ADA trail connection	● Doesn't address ADA	● Bridge would be compliant	● Adds new ADA trail connection
<i>Problem Identified/Supported by Public</i>	● No public comments	● No public comments	● No public comments	● Addresses a comment	● No public comments	● Addresses a comment; High priority
<i>Conflict Elimination</i>	● Improves trail intersection flow	● Doesn't eliminate an existing conflict	● Doesn't eliminate an existing conflict	● Directs users away from conflict points	● Doesn't eliminate an existing conflict	● Completely separates bikes & peds from autos
<i>Compatibility with Future Vision</i>	● Site unlikely to be developed further	● Fits SSPRD's desire for a better connection	● Site unlikely to be developed further	● Directs users to permanent trail	● Aligns bridge with existing trail	● Impacts future development potential

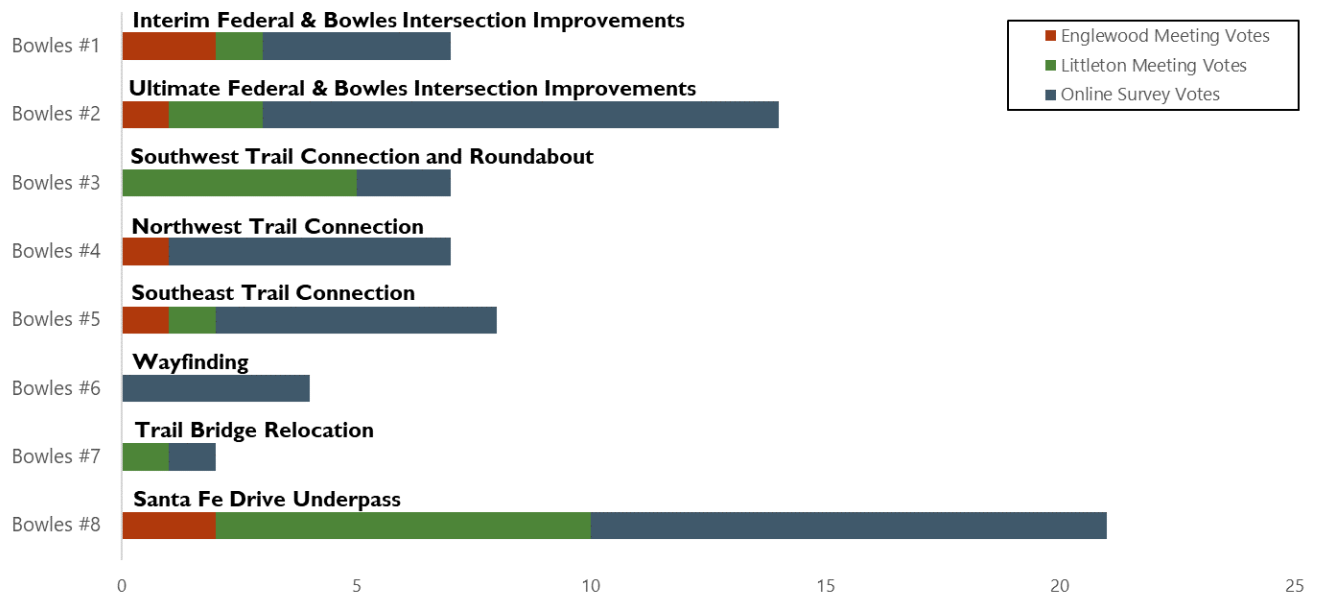
TABLE 13. EVALUATION OF BOWLES AVENUE PROJECT COSTS

COST CRITERION	Bowles 3	Bowles 4	Bowles 5	Bowles 6	Bowles 7	Bowles 8
<i>Relative Construction Cost</i>	● Short trail connection	● Short trail connection	● Would require retaining walls	● Signage	● Moving a bridge could be costly	● New underpass would be costly
<i>Constructability</i>	● Straightforward trail connection and roundabout	● Straightforward trail connection	● Constrained area	● Signage	● Moving a bridge could be difficult	● Difficult connection on east side
<i>Motorist Impacts</i>	● No motorist impacts	● No motorist impacts	● No motorist impacts	● No motorist impacts	● No motorist impacts	● No motorist impacts
<i>Potential Throw-away Costs</i>	● Permanent trail connection	● Permanent trail connection	● Permanent trail connection	● Permanent signage	● Permanent trail connection	● Permanent underpass

PUBLIC INPUT ON PRIORITIES

During Phase 2 of public outreach, the public was asked to identify the five projects (across all study locations) that they feel are most important. As shown on **Figure 20**, the two projects within the Bowles Avenue study area that received the highest number of “votes” were the Santa Fe Drive Underpass (Bowles #8) and the Ultimate Federal Boulevard and Bowles Avenue Intersection Improvements (Bowles #2) – Bowles #8 was also the second highest priority project identified by the public across all study locations.

FIGURE 20. PUBLIC INPUT ON BOWLES AVENUE PROJECT PRIORITIES



ELIMINATED PROJECTS

One of the eight projects in the Bowles Avenue study area, the Trail Bridge Relocation, was not recommended for implementation. There is an existing floodwall near where the Little’s Creek Trail intersects the Mary Carter Greenway, so any regrading work necessary to install a bridge could cause significant drainage issues. There is another trail bridge approximately 1,100 feet south of the location, so the potential benefits of this project do not outweigh the costs for the bridge and flooding mitigation.

RECOMMENDED PROJECTS

Seven of the eight projects in the Bowles Avenue study area are recommended for implementation. The following pages provide more detailed information about each recommended project.



BOWLES PROJECT #1

Interim Federal Boulevard & Bowles Avenue Intersection Improvements

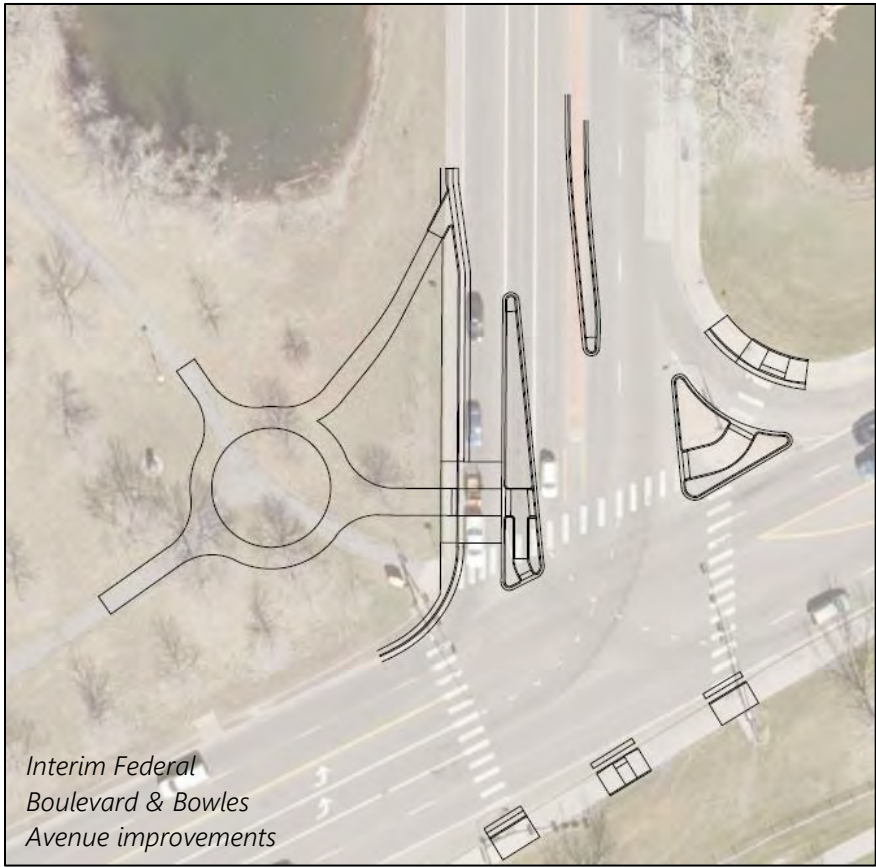
Project Description

This project, a separate effort by the City of Littleton, will provide a series of interim bicycle and pedestrian crossing safety improvements to the intersection of Federal Boulevard and Bowles Avenue before the intersection is rebuilt in the future. The proposed improvements include a median refuge island on the north leg, a ramp from the southbound bike lane to allow bicyclists to access the trail at Bowles Grove Park, and a new trail roundabout.

Agencies Involved:
City of Littleton
SSPRD

Conceptual Design

The southbound left-turn lanes from Federal Boulevard would be realigned to provide space for a new median refuge island in the northwest quadrant of the intersection; the existing crosswalk across the west leg of the intersection would be shifted approximately 45 feet east to align with this new island. A bike ramp from Federal Boulevard’s southbound bike lane to a new 10-foot trail connection into Bowles Grove Park would be provided approximately 150 feet upstream of the intersection and a new trail roundabout constructed on the south end of Bowles Grove Park to channelize trail users. Additionally, the project would eliminate the east crosswalk, add striping around the northeast island, modify signal operations, and repair drainage issues.



Considerations

Safety Concerns – The significant existing skew of this intersection and wide cross-section of Federal Boulevard mean that bicyclists and pedestrians traveling across the northern leg must cross over 100 feet of roadway with no protection. Expanding the existing refuge island in the northeast corner and adding a second refuge island in the northwest corner would reduce the longest unprotected crossing distance to approximately 55 feet.

TABOR Funding – The City of Littleton has completed final design for this project and acquired TABOR funds to pay for construction.



Recommended Next Steps

The following steps are recommended to advance the Interim Federal Boulevard & Bowles Avenue Intersection Improvements project:

1. Construct.

Cost Estimate
\$453,600

BOWLES PROJECT #2

Ultimate Federal Boulevard & Bowles Avenue Intersection Improvements

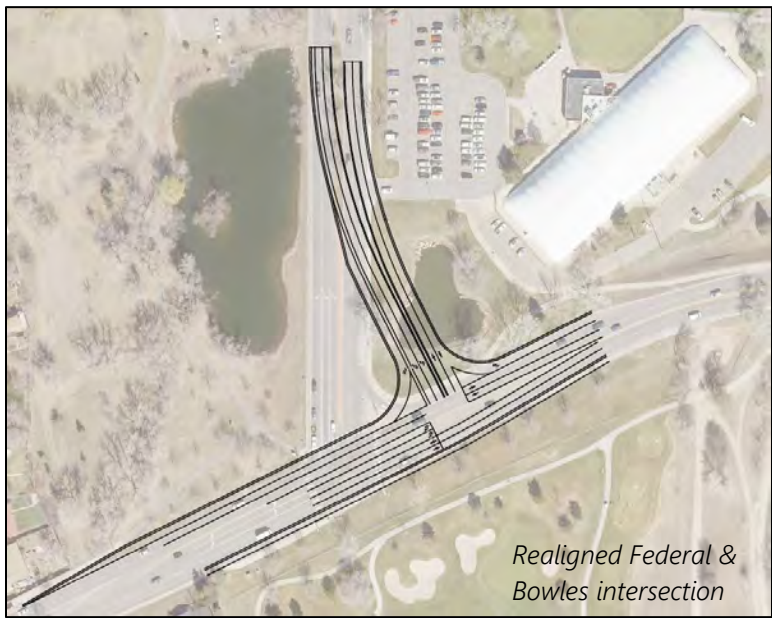
Project Description

This project, a separate effort by the City of Littleton, will realign the intersection of Federal Boulevard and Bowles Avenue to remove the existing skew.

Agencies Involved:
City of Littleton
SSPRD

Conceptual Design

The alignment of Federal Boulevard would be shifted to the southeast (through the existing pond adjacent to the Littleton Golf Club) as it approaches Bowles Avenue to create a more traditional “T” intersection configuration. Median refuge islands would be provided in the intersection’s northwest and northeast corners to shorten crossing distances for bicyclists and pedestrians crossing at grade. In addition, the project would seek to provide a pedestrian tunnel under Federal Boulevard for a grade-separated crossing option.



Considerations

Alternative Evaluation – The City of Littleton conducted a two-tier screening process to identify a preferred ultimate configuration for this intersection from an initial list of twelve. Tier 1, a primarily qualitative review, screened out all but three alternatives: a multilane roundabout, a one-way couplet, and a “no skew” intersection. Tier 2 more closely analyzed the traffic operations, safety benefits, and bicycle and pedestrian accommodations of these three alternatives, and the “no skew” option was identified as the preferred solution.

Recommended Next Steps

The following steps are recommended to advance the Ultimate Federal Boulevard & Bowles Avenue Intersection Improvements project:

1. Coordinate land transfer (between City of Littleton and SSPRD).
2. Seek partnering and funding opportunities.
3. Prepare preliminary and final design.

Cost Estimate
\$4,300,000

BOWLES PROJECT #3

Southwest Trail Connection and Roundabout

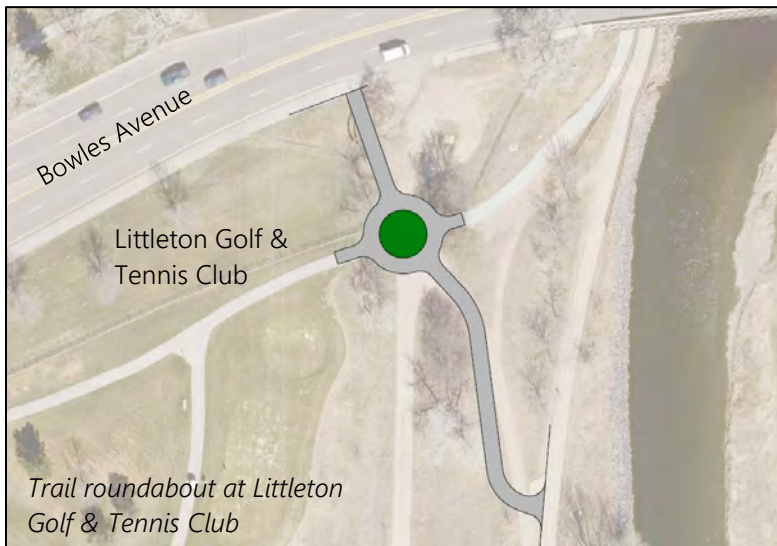
Project Description

This project will provide a new trail roundabout southeast of the Bowles Avenue bridge where an existing golf cart path crosses Farnell Lane and improve an existing connection from this crossing to the Mary Carter Greenway.

Agencies Involved:
City of Littleton
SSPRD

Conceptual Design

A trail roundabout with a 10-foot wide circulating concrete path would be built where a cart path for Littleton Golf & Tennis Club currently crosses Farnell Lane south of Bowles Avenue. Ten-foot concrete connections would be provided from the roundabout's north leg to the Bowles Avenue sidewalk and from the south leg to the Mary Carter Greenway. **Appendix G** includes the conceptual design for this project.



Considerations

Safety Concerns – The existing golf cart path crossing is not well-defined and presents a potential conflict for bicyclists and pedestrians trying to access the South Platte from Bowles Avenue. Implementation of a roundabout would better organize all users of the intersection and establish clear rights-of-way.

Connectivity – Currently, there is no formal paved connection to the South Platte from the sidewalk along the south side of Bowles Avenue. Providing one would enhance the safety and comfort of accessing the trail in this location.

Recommended Next Steps

The following steps are recommended to advance the Southwest Trail Connection and Roundabout project:

1. Coordinate project with the Golf division of SSPRD.
2. Secure project funding.
3. Prepare preliminary and final design for the project.

Cost Estimate
\$100,000

BOWLES PROJECT #4

Northwest Trail Connection

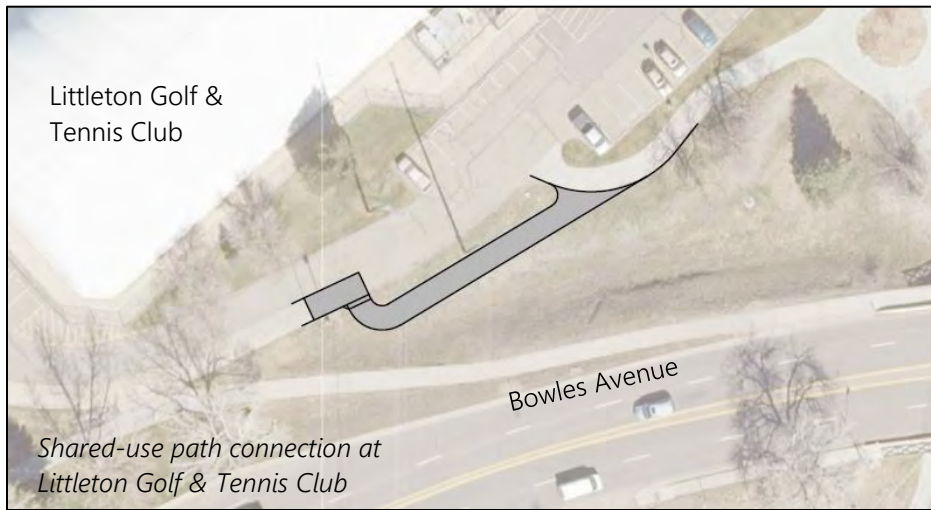
Project Description

This project will provide a shared-use path connection from the Littleton Golf & Tennis Club sidewalk to the Mary Carter Greenway.

Agencies Involved:
City of Littleton
SSPRD

Conceptual Design

A 10-foot trail connection would be built along the south side of the Littleton Golf & Tennis Club access road between the existing attached concrete path and the trail roundabout just northwest of where Bowles Avenue crosses the South Platte. Additionally, the project would extend the existing sidewalk approximately 25 feet east to provide a continuous concrete path for bicyclists and pedestrians. **Appendix G** includes the conceptual design for this project.



Considerations

Topography – A direct connection between the Bowles Avenue sidewalk and the trail roundabout was considered in this location to avoid conflicts with vehicles accessing the parking lot. However, a site visit by members of the project team revealed a significant slope from the sidewalk to the parking lot and an existing drainage channel that would make such a connection difficult and expensive to construct so this alternative was not recommended.

Recommended Next Steps

The following steps are recommended to advance the Northwest Trail Connection project:

1. Coordinate project with the Golf division of SSPRD.
2. Secure project funding.
3. Prepare preliminary and final design for the project.



Cost Estimate
\$30,000

BOWLES PROJECT #5

Southeast Trail Connection

Project Description

This project will provide a trail connection from Bowles Avenue to the Mary Carter Greenway northwest of Blind Faith Brewing.

Agencies Involved:
City of Littleton
SSPRD

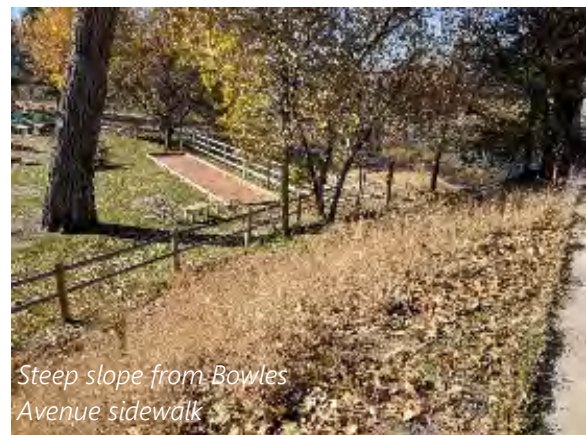
Conceptual Design

A 10-foot trail connection would be built from the sidewalk along the south side of Bowles Avenue to the Mary Carter Greenway behind Blind Faith Brewing’s outdoor space. Retaining walls would be necessary along part of the connection to achieve ADA compliance. **Appendix G** includes the conceptual design for this project.



Considerations

Parking Lot Connection – Improving the existing trail connection from the parking lot south of Lucile’s Creole Café was considered as an alternative in this location given the challenging elevation difference between Bowles Avenue and the Mary Carter Greenway. However, there are no practical ways to provide a comfortable bicycle and pedestrian connection through the parking lot as it is currently laid out, and the existing connection is directly adjacent to handicap parking and trash pickup so conflicts with large vehicles are likely.



Recommended Next Steps

The following steps are recommended to advance the Southeast Trail Connection project:

1. Seek partnership and funding opportunities.
2. Prepare preliminary and final design for the project.

Cost Estimate

\$100,000

BOWLES PROJECT #6

Wayfinding

Project Description

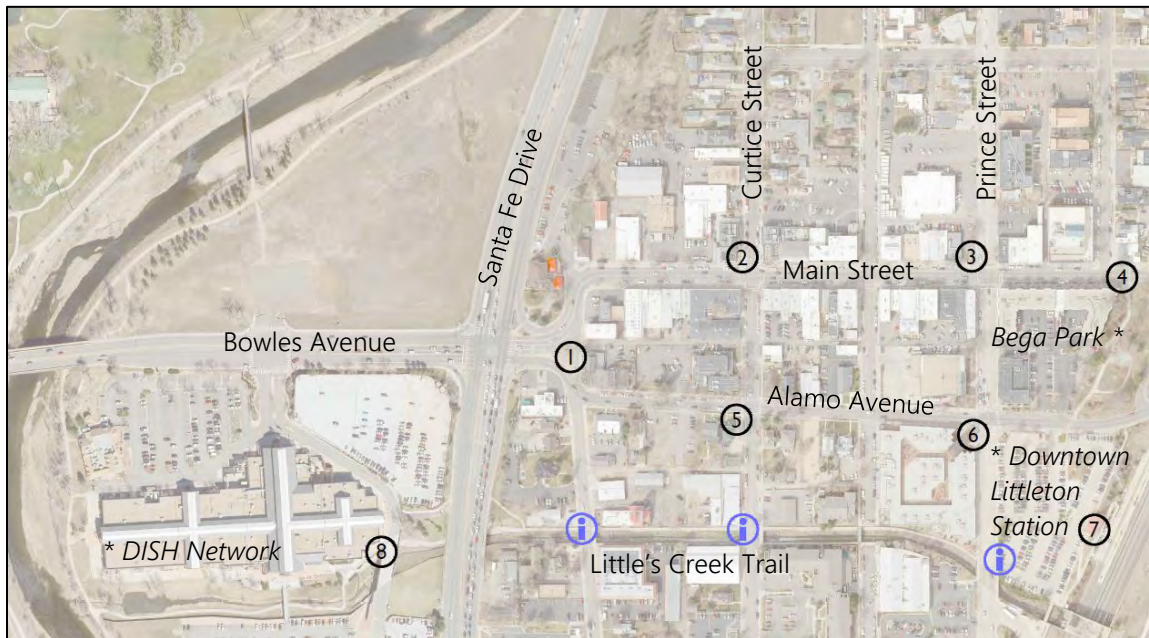
This project will install new wayfinding signs directing bicyclists and pedestrians to the Mary Carter Greenway from Downtown Littleton and the Downtown Littleton Light Rail Station via the existing Little’s Creek Trail underpass.

Agencies Involved:
 City of Littleton
 SSPRD

Conceptual Design

Seven new wayfinding signs would be installed at important decision points between Rio Grande Street and the Mary Carter Greenway. Several signs already exist along the Little’s Creek Trail (shown in blue below). The proposed sign locations, shown below, are:

1. Intersection of Littleton Boulevard and Rapp Street
2. Intersection of Main Street and Curtice Street
2. Intersection of Main Street and Prince Street
3. Bega Park along Main Street
4. Intersection of Alamo Avenue and Curtice Street
5. Intersection of Alamo Avenue and Prince Street
6. Downtown Littleton Light Rail Station
7. Little’s Creek Trail east of DISH Network building



Considerations

Downtown Littleton Wayfinding – The City of Littleton has an existing wayfinding program for the downtown area, with consistent, branded signs directing people towards various restaurants, shops, and places of interest located at each Main Street intersection and a few other sites. The recommended Mary Carter Greenway wayfinding signs along Main Street and Alamo Avenue may conflict with these if there is not adequate space for separate installations. If so, coordination with the City to include directions towards the trail on their existing signs should be considered.

Recommended Next Steps

The following steps are recommended to advance the Wayfinding project:

1. Seek partnership and funding opportunities.
2. Design and implement wayfinding signage, consistent with existing Mary Carter Greenway wayfinding signing
3. If necessary, coordinate with Littleton on opportunities to integrate trail wayfinding into the existing downtown wayfinding program.

Cost Estimate

\$18,000

BOWLES PROJECT #8

Santa Fe Drive Underpass

Project Description

This project will construct a new trail underpass of Santa Fe Drive north of Bowles Avenue. Trail connections would be to Crestline Avenue and to the Mary Carter Greenway. Additionally, this project will eliminate access from Santa Fe Drive to Crestline Avenue and provide standard bike lanes along Crestline Avenue between Santa Fe Drive and Prince Street, a new sidewalk along the north side of Crestline Avenue, and RRFBs to facilitate crossing Prince Street.

Agencies Involved:
City of Littleton
SSPRD
CDOT

Conceptual Design

A new concrete underpass structure large enough to accommodate a 10-foot trail would be constructed below Santa Fe Drive just north of the edge of an existing parking lot for The Melting Pot. West of the underpass, a 10-foot trail connection to the Mary Carter Greenway would be built. East of the underpass, a 10-foot trail would be built to run north between Santa Fe Drive and existing residential lots in order to tie into Crestline Avenue. The existing attached sidewalk along this stretch of Santa Fe Drive would be removed, with a connection provided from the new trail to the sidewalk further south. Some parking would be removed by constructing this connection, which falls within CDOT and City of Littleton ROW; the connection up to the Santa Fe Drive sidewalk could be built on the north side of the underpass instead to reduce impacts to the parking lot. Access from Santa Fe Drive to Crestline Avenue would be eliminated by expanding the existing median refuge island to the south. Along Crestline Avenue, 6-foot bike lanes would be added in both directions (with a bike ramp from the trail connection to the street) and a new sidewalk would be built on the north side. RRFBs and crossing markings would be installed at the intersection of Crestline Avenue and Prince Street. **Appendix G** includes the conceptual design for this project.



Considerations

Topography – Ground survey, including elevation data and topographical features, was obtained for this project location to assess the feasibility of the recommended infrastructure improvements. Santa Fe Drive is approximately 8 to 10 feet higher than the surrounding open space on either side in this area, so an underpass with at least 10 feet of vertical clearance is attainable. Although the South Platte River is only a few hundred feet from the proposed underpass location, potential river flooding is not a significant concern because this portion of the river has undergone substantial channelization in the past to mitigate flooding.

CDOT Coordination – Because several of this study’s recommended projects involve state highways, including this one, a subset of the project team met with CDOT engineers in January 2019 to discuss them. CDOT representatives indicated that this would be a beneficial project worth developing further. CDOT mentioned that utility conflicts and floodplain limits would need to be investigated in latter stages of design. CDOT and the City of Littleton have also had conversations about closing the southbound left turn and northbound right turn access from Santa Fe Drive to Crestline Avenue. A Planning and Environmental Linkages (PEL) study for this portion of Santa Fe Drive is planned to begin late 2019 or 2020, and reconfiguration of the Bowles Avenue intersection may be considered so ongoing coordination about this project will be necessary.

Skunk Hollow Drainage Project – The City of Littleton is actively working on a separate project to improve drainage and construct a water quality pond in Skunk Hollow, the open space immediately north of The Melting Pot’s parking lot. Most of the available land is needed for the water quality pond, so the trail connection was designed to run as far east as feasible along the toe of the existing hill behind the adjacent homes.



Santa Fe is 8-10 feet higher than the surrounding open space

Recommended Next Steps

The following steps are recommended to advance the Santa Fe Drive Underpass project:

1. Continue coordination with the Skunk Hollow project team to ensure recommendations are compatible.
2. Continue to monitor the status of the Santa Fe Drive PEL and integrate this project idea into the planning process.
3. Continue project coordination between Littleton and CDOT and identify potential shared funding opportunities.
4. Consider the option of dividing the project into two phases: the first phase could be the underpass and trail connections and a second phase could be the bicycle and pedestrian improvements to Crestline Avenue.
5. Design and implement wayfinding signage, consistent with existing Mary Carter Greenway wayfinding signage, directing users to/from downtown Littleton.

Cost Estimate
\$2,200,000

10. Mineral Avenue

The Mineral Avenue study area (**Figure 21**) generally extends from the Mary Carter Greenway on the west to Jackass Hill Road on the east and is within Littleton.

CURRENT CONDITIONS

Today, the South Platte River and Mary Carter Greenway can be accessed from the Mineral Avenue Trail, which separates from Mineral Avenue just west of South Platte River Parkway. The South Platte can also be accessed from Carson Nature Center trailhead, approximately 1,200 feet north of Mineral Avenue. The Mineral Avenue Trail diverts to the Mary Carter Greenway and then back adjacent to Mineral Avenue with no sidewalk on the bridge over the South Platte River.

Mineral Avenue currently carries approximately 33,900 vpd east of South Platte River Parkway (2019) and approximately 27,400 vpd east of Santa Fe Drive (2019). The posted speed is 45 mph to the west of South Platte River Parkway and 40 mph to the east.

Between Jackass Hill Road and Santa Fe Drive, the adjacent land use is residential with some open space immediately north of Mineral Avenue, and Mineral Avenue is a 4-lane street with a raised median and wide attached sidewalks on both sides. Between Santa Fe Drive and South Platte River Parkway, the adjacent land-use is mixed-use with a large RTD Park-n-Ride facility and retail center to the north and an empty lot to the south where development is currently being planned; this portion of Mineral Avenue is a 6-lane divided section with several auxiliary lanes and a wide detached shared-use path on the north side. West of South Platte River Parkway, Mineral Avenue returns to a divided 4-lane section through open space.

During the five-year crash period from January 2011 through December 2015, there were five crashes on Mineral Avenue involving a bicyclist, and one crash involving a pedestrian. All the crashes occurred at major intersections; four of the bicycle-involved crashes occurred at Jackass Hill Road and the other occurred at Santa Fe Drive, and the pedestrian-involved crash occurred at South Platte River Parkway.

Problem Statement

Mineral Avenue is the primary connection between neighborhoods east of Santa Fe Drive and nearby amenities, but high automobile speeds & volumes and the existing Park-n-Ride facility limit connectivity.



FIGURE 21. MINERAL AVENUE STUDY AREA



PUBLIC INPUT ON CHALLENGES

The Phase 1 public survey results indicated that the top three challenges in accessing the South Platte at Mineral Avenue by foot or bike are:

- Unsafe intersection crossings (22 percent)
- Lack of bike/ped bridges and tunnels (20 percent)
- Aggressive drivers (17 percent)

"Biking and walking through the RTD parking lot is not safe."



OPPORTUNITIES

The Mineral Station is just north of Mineral Avenue, and there is an opportunity to improve connectivity and wayfinding for bicyclists and pedestrians between the trail and the station. Aspen Grove, a major retail destination, is also nearby, providing an opportunity to enhance overall connectivity between the mall, the light rail station, Mineral Avenue, and the Mary Carter Greenway. The Mineral Station pedestrian bridge over Santa Fe Drive presents a significant opportunity to capitalize on existing infrastructure to improve access to the Mary Carter Greenway.

There is potential for construction of structured parking with ground-floor transit-oriented development (TOD) to replace the existing RTD surface parking lot – this presents an opportunity to integrate improved bicycle and pedestrian connections between the station and the Mary Carter Greenway.

The property located in the southwest quadrant of Santa Fe Drive and Mineral Avenue is anticipated for development in the coming years. The City of Littleton is working with the developer to ensure that trail access to the Mary Carter Greenway is integrated into the site development plan.

CONSTRAINTS

Though the existing pedestrian bridge across Santa Fe Drive provides a safe alternative to the Santa Fe Drive and Mineral Avenue intersection, it is focused on providing connectivity for RTD patrons; accommodations for trail users to safely cross the Park-n-Ride lot are lacking, and the bridge requires trail users to cross the light rail tracks and interact with, at times, dense light rail user traffic. Maneuvering between entering and exiting vehicles, particularly during peak hours when pedestrian and vehicular traffic is heavy, to get to South Platte River Parkway is uncomfortable and dangerous for bicyclists and pedestrians. The intersection of Mineral Avenue and Santa Fe Drive is wide, busy, and requires crossing a free right-turn off of Santa Fe Drive.



PROJECTS CONSIDERED

Four projects were considered within the Mineral Avenue study area, as depicted on **Figure 22** and described below. The projects focus on providing safe and convenient connections between the neighborhoods and RTD station east of Santa Fe Drive and the Mary Carter Greenway.

FIGURE 22. MINERAL AVENUE PROJECTS



1. **Jackass Hill Trail Connections:** Construct new trail connections from Jackass Hill Rd. and Curtice Ct. to the existing wide sidewalk north of Mineral Ave.
2. **Trail Connection Around Park-n-Ride:** Construct a new trail connection from the Mineral Station bridge to Carson Dr. around the RTD parking lot.
3. **Trail Connection Through Park-n-Ride:** Widen the sidewalk to provide a shared-use path along the south RTD parking lot access road and provide enhanced crossing markings across South Platte River Parkway and the convenience store access.
4. **Mineral and Santa Fe Intersection Reconfiguration:** Incorporate bicycle and pedestrian safety improvements in the reconfiguration of the Mineral Ave. and Santa Fe Dr. intersection (part of a separate City of Littleton project).

PROJECT EVALUATION

The purpose of the project evaluation is to highlight the relative benefits of each project. The project evaluation is not intended to be a scoresheet used to prioritize the projects. The qualitative evaluation results associated with project benefits and project costs are summarized in **Table 14** and **Table 15**, respectively. Mineral Project #4 is not included in the evaluation because it is being done as a separate project. “High priority” is used to identify projects that received the most interest during public outreach.



Least - - - -> Most Favorable

TABLE 14. EVALUATION OF MINERAL AVENUE PROJECT BENEFITS

BENEFIT CRITERION	Mineral 1	Mineral 2	Mineral 3
<i>Direct Connection</i>	● Diverts bikes & peds away from Mineral	● Circuitous route around parking lot	● Direct path from Mineral Station
<i>Pedestrian Comfort</i>	● Safe but steep trail connection	● Safe and easy trail connection	● Safe trail connection, but crossings could be stressful
<i>Commuter Bicyclist Access</i>	● Requires use of stairwell	● Out-of-direction route around Mineral Station	● Direct route from Mineral Station
<i>Recreational Bicyclist Comfort</i>	● Safe, but requires use of stairwell	● Safe and easy trail connection	● Safe trail connection, but crossings could be stressful
<i>Optimization of Existing Infrastructure</i>	● Formalizes existing soft-surface paths	● New trail connection	● Restriping and sidewalk widening
<i>Convenient Trail Access</i>	● Direct connection to Mineral, but requires use of stairwell	● Out-of-direction route around Mineral Station	● Direct route from Mineral Station
<i>ADA Compliance</i>	● Doesn't address ADA	● New ADA trail connection	● New ADA trail connection
<i>Problem Identified/ Supported by Public</i>	● No public comments	● Addresses a comment	● Addresses a comment; High priority
<i>Conflict Elimination</i>	● Doesn't eliminate an existing conflict	● Separates bikes and peds from parking lot traffic	● Dedicated space for bikes and peds through parking lot
<i>Compatibility with Future Vision</i>	● Site unlikely to be developed further	● Future intersection improvements would likely remove this connection	● Future intersection improvements would likely impact this connection

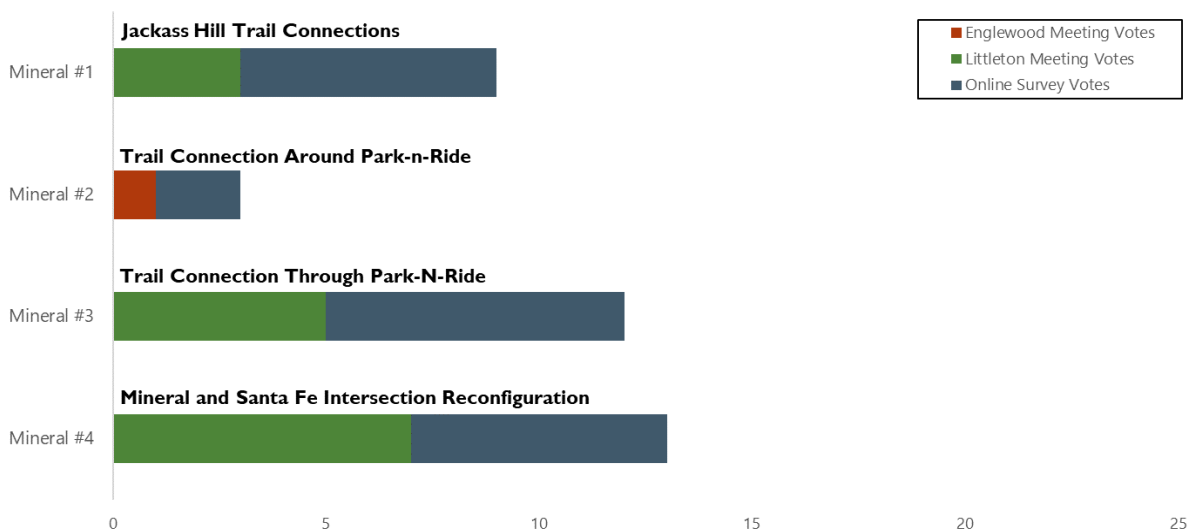
TABLE 15. EVALUATION OF MINERAL AVENUE PROJECT COSTS

COST CRITERION	Mineral 1	Mineral 2	Mineral 3
<i>Relative Construction Cost</i>	● Significant grading requirements	● New trail connection	● Restriping and sidewalk widening
<i>Constructability</i>	● Grading challenges	● Constrained north of parking lot	● Simple widening and restriping
<i>Motorist Impacts</i>	● No motorist impacts	● No motorist impacts	● Removal of an exit lane
<i>Potential Throw-away Costs</i>	● Permanent trail connection	● Future intersection improvements would likely remove this connection	● Future intersection improvements would remove part of this connection

PUBLIC INPUT ON PRIORITIES

During Phase 2 of public outreach, the public was asked to identify the five projects (across all study locations) that they feel are most important. As shown on **Figure 23**, the two projects within the Mineral Avenue study area that received the highest number of “votes” were the Trail Connection Through Park-n-Ride (Mineral #3) and Mineral Avenue and Santa Fe Drive Intersection Reconfiguration (Mineral #4).

FIGURE 23. PUBLIC INPUT ON MINERAL AVENUE PROJECT PRIORITIES



ELIMINATED PROJECT

One of the four projects in the Mineral Avenue study area, the Trail Connection Around Park-n-Ride, is not recommended for implementation. This project, which would have provided a connection along the east and north sides of the RTD lot, was eliminated because the segment between the parking lot and Aspen Grove has a drainage channel and there is insufficient space to provide an adjacent trail.

RECOMMENDED PROJECTS

Three of the four projects in the Mineral Avenue study area are recommended for implementation and are described in more detail in the following sections.

MINERAL PROJECT #1

Jackass Hill Trail Connections

Project Description

This project will provide trail connections from the Jackass Hill neighborhood to the Mineral Station.

Conceptual Design

A 10-foot concrete trail connection would be built along the existing dirt path beginning just south of the intersection of Houstoun Waring Circle and Curtice Court, and a second 10-foot trail connection would be built along the existing gravel path beginning at Jackass Hill Road and Mineral Avenue. Additionally, this project would provide a stairway between these trail connections and the Mineral Avenue sidewalk and provide wayfinding to both the Mary Carter Greenway and the High Line Canal Trail; the stairway would include a bike ramp rail along one side for rolling a bike up or down. **Appendix H** includes the conceptual design for this project.

Agencies Involved:
City of Littleton
SSPRD



Considerations

Topography – A ramp from these trail connections down to Mineral Avenue was considered as an alternative in this location given the difficulty of maneuvering a stairwell with a bicycle. However, the significant grade difference would make construction of an ADA-compliant ramp difficult.

High Line Canal Connection – In addition to providing a safer and more direct connection to Mineral Station, from which users can continue west to the Mary Carter Greenway, this project would also enhance connectivity between the Mineral Station and the High Line Canal Trail. There is an existing High Line Canal access near the intersection of Jackass Hill Road and Prince Street that would be easy to connect to from the northern end of this project.



Recommended Next Steps

The following steps are recommended to advance the Jackass Hill Trail Connections project:

1. Confirm ROW/ property boundaries along the proposed alignment of the trail connection.
2. Seek partnership and funding opportunities.
3. Prepare preliminary and final design for the project.

Cost Estimate

\$230,000

MINERAL PROJECT #3

TRAIL CONNECTION THROUGH PARK-N-RIDE

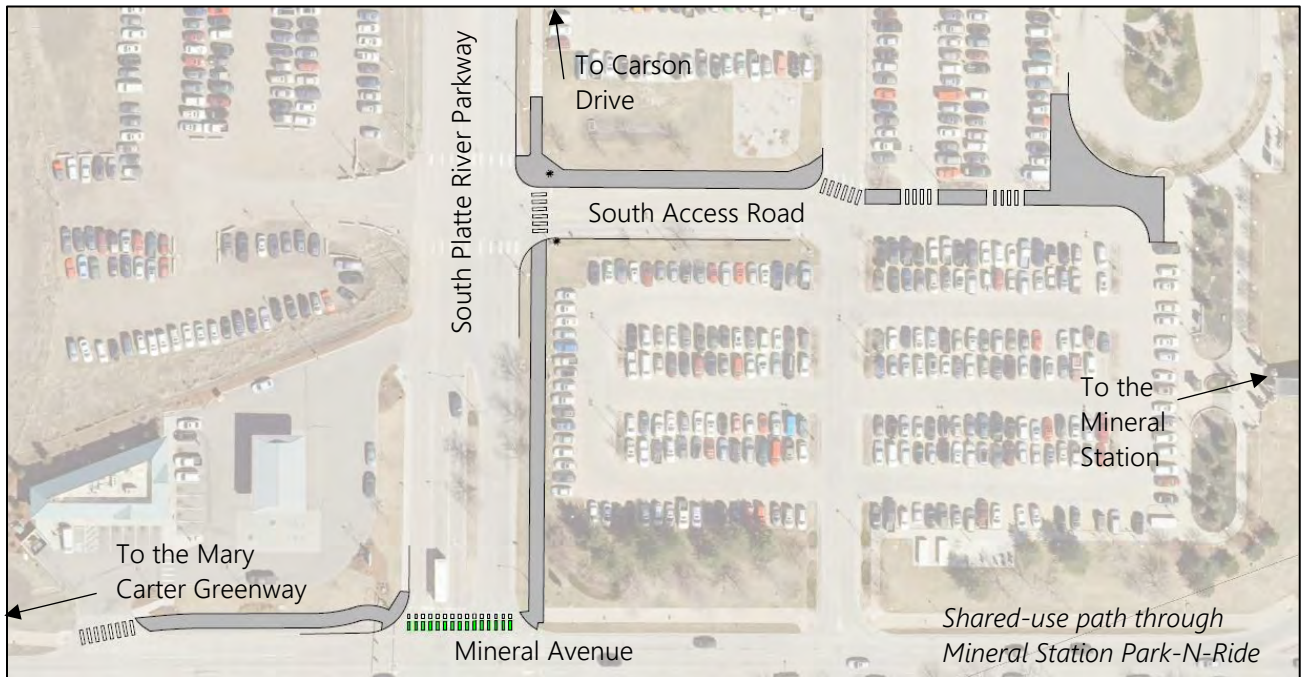
Project Description

This project will widen the sidewalk along the Mineral Station’s south access road to provide a shared-use path connection to South Platte River Parkway. From there, wayfinding will direct bicyclists and pedestrians south to the Mineral Avenue Trail or north to Carson Drive. In addition, crossing enhancements would be provided at all locations with conflicting automobile traffic.

Agencies Involved:
City of Littleton
SSPRD
RTD

Conceptual Design

The existing sidewalk along the north side of the station access road would be widened into the roadway to provide a 12-foot shared-use path connection between South Platte River Parkway and the ramp to the station bridge. At South Platte River Parkway, wayfinding signage would direct bicyclists and pedestrians north to access Carson Nature Center or south to access the Mary Carter Greenway. The project would also provide RRFBs for crossing the RTD access road and conflict zone markings across South Platte River Parkway and across the 7-11 access to the west. Appendix H includes the conceptual design for this project.



Considerations

Traffic Operations – Because one of the routing alternatives considered for this project would take bicyclists and pedestrians across South Platte River Parkway at a currently uncontrolled intersection, a traffic analysis was conducted to assess how many potential conflicts with vehicles there would be. Daily, AM, and PM peak hour turning movement, pedestrian, bicycle, and vehicle classification counts were conducted in January 2019 at the intersections of Platte River Parkway with Mineral Avenue, the south RTD access, and Carson Drive.

Following are the findings of the traffic analysis:

- The daily counts along South Platte River Parkway were 3,737 vpd (3 percent heavy vehicles) north of Mineral Avenue.
- All intersections along the corridor currently have acceptable levels of service (LOS D or better), except for the westbound left movement (LOS F) at the south RTD access during the AM peak hour.
- Bicyclists and pedestrians crossing the west leg of this intersection, as proposed in one of the evaluated routing options, conflict with 179 and 58 turning vehicles during the AM and PM peak hours, respectively.

Direct Connection – A direct connection to the Mineral Avenue sidewalk from the southeast corner of the RTD lot was considered in this location to avoid conflicts with vehicles. However, analysis of the existing topography found a significant slope down to the sidewalk that would make construction of an ADA-compliant connection infeasible.

Topography – Ground survey, including elevation data and topographical features, was obtained for this project location to assess the feasibility of a new trail connection south of the RTD overflow lot between Platte River Parkway and the Mineral Avenue Trail. Analysis of the survey results found a combination of challenging grades and existing drainage channels that would make trail construction difficult and expensive, so this alternative was not recommended.



Topography adjacent to the RTD overflow lot is challenging

Mineral & Santa Fe Intersection Reconfiguration – The City of Littleton is actively working on a separate project to identify a preferred design for improving safety and traffic operations at the intersection of Mineral Avenue and Santa Fe Drive. Some of the alternatives being evaluated would have significant impacts on the existing Park-n-Ride lot and change how traffic flows through it, and this project’s proposed shared-use path may be affected as well.

Structured Parking – RTD may have an interest in providing a parking structure at the Mineral Station in the future. This project would be a temporary connection if the lot is converted to structured parking, so further coordination would be necessary to ensure bicycle and pedestrian connections are integrated into that design.

Recommended Next Steps

The following steps are recommended to advance the Park-n-Ride Trail Connection project:

1. Continue project coordination with Littleton and RTD regarding the timing of the Santa Fe Drive/Mineral Avenue intersection project and how it will impact the Park-n-Ride layout.
2. Continue coordination with Littleton to ensure bicycle and pedestrian connectivity will be accommodated with whichever ultimate Santa Fe Drive/Mineral Avenue intersection layout is chosen.
3. Seek funding and partnership opportunities.
4. Prepare preliminary and final design for the project.

Cost Estimate

\$150,000

MINERAL PROJECT #4

Mineral Avenue & Santa Fe Drive Intersection Reconfiguration

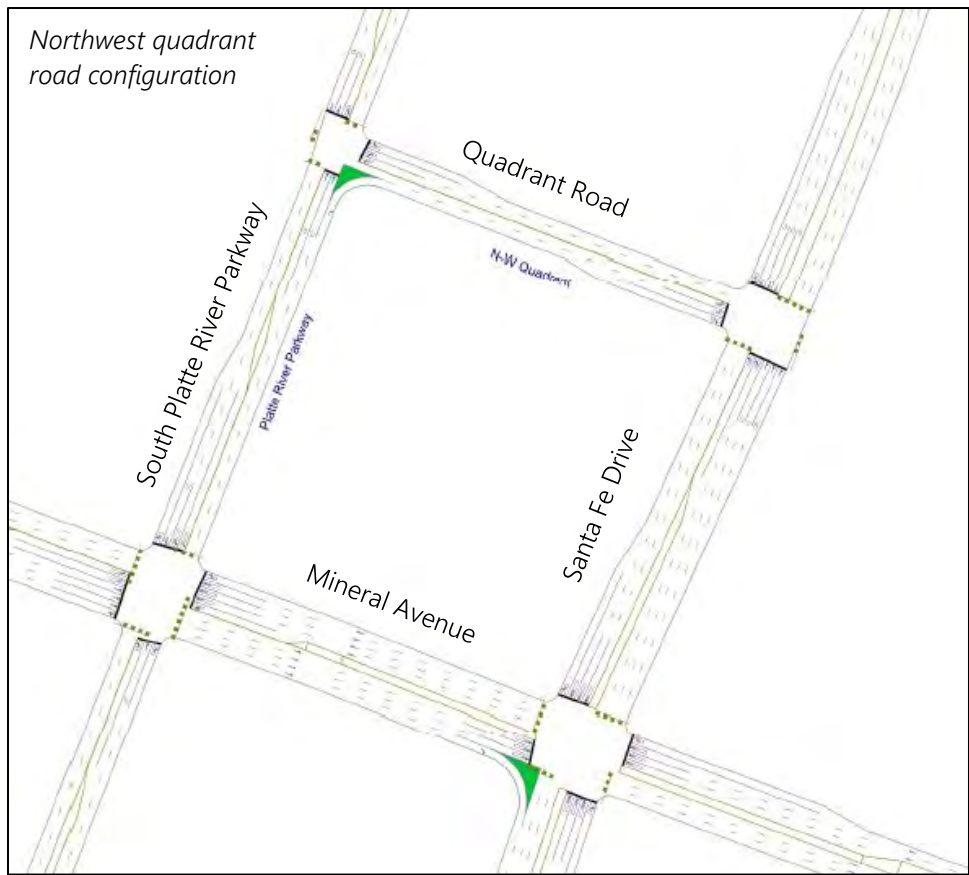
Project Description

This project will reconfigure the intersection of Mineral Avenue and Santa Fe Drive to improve safety and traffic operations for bicyclists, pedestrians, and automobiles. The City of Littleton is actively exploring a series of design alternatives for this intersection, and one of the most promising solutions appears to be a quadrant road configuration through the existing RTD lot.

Agencies Involved:
City of Littleton
RTD
CDOT

Conceptual Design

With the northwest quadrant alternative, the north access for the Park-n-Ride would be converted to a through connection between Santa Fe Drive and South Platte River Parkway, and signals would be added to both ends of this new street. The conceptual quadrant configuration, shown below, would allow left turn movements to be eliminated at the intersection of Mineral Avenue and Santa Fe Drive. Other alternatives still being considered are a continuous-flow intersection, a southwest quadrant road, and dual northwest and southwest quadrant roads.



Considerations

Alternative Evaluation – The City of Littleton developed an initial list of 12 intersection designs and evaluated them based on driver safety, bicycle/pedestrian safety, ROW impacts, stakeholder impacts, constructability, costs, and adaptability for future phases. Based on the results of this evaluation, five alternatives were carried forward to a secondary phase of evaluation focused on traffic operations: a continuous-flow intersection, two different quadrant road configurations, a traditional diamond interchange, and a single-point urban interchange. Traffic modeling analysis predicted each of the at-grade solutions would increase intersection capacity between 50 percent and 70 percent, though future development south of Mineral Avenue would reduce these numbers. Further evaluation is necessary before a final preferred alternative is identified.

Recommended Next Steps

The following steps are recommended to advance the Mineral Avenue and Santa Fe Drive Intersection Reconfiguration project:

1. Continue alternative evaluation in order to identify the best solution for improving intersection operations.
2. Continue coordination with Littleton to ensure bicycle and pedestrian connectivity will be accommodated with whichever ultimate Mineral Avenue/Santa Fe Drive intersection layout is chosen.
3. Seek funding and partnership opportunities.
4. Prepare preliminary and final design for the project.

11. Implementation Plan

SUMMARY OF RECOMMENDED PROJECTS

The primary objective of the South Platte Connections Study is to identify ways to improve bicycle and pedestrian connections to the South Platte River and Mary Carter Greenway (which parallels the South Platte River). The project team identified and evaluated the feasibility of, and benefits associated with, over 41 projects at seven crossing locations. Five projects were screened out, primarily because the benefits they offered were not worth the costs associated with construction, or because a more feasible connection opportunity was recommended. **Table 16** provides a summary of the 36 recommended projects.

TABLE 16. RECOMMENDED PROJECTS

PROJECT ID	PROJECT TITLE	AGENCIES	PROJECT COST
Dartmouth Study Area Projects			
Dartmouth #1	Dartmouth Avenue Bike Lanes and Sidewalk Improvements – West of Santa Fe	Englewood, Sheridan, Denver	\$540,000
Dartmouth #2	Dartmouth Avenue Separated Bike Lanes – East of Santa Fe	Englewood	\$1,400,000
Dartmouth #3	South Platte River Drive Intersection Improvements	Englewood, Denver	\$100,000
Dartmouth #4	Rail Trail	Englewood, SSPRD, RTD	\$6,400,000
Dartmouth #5	Little Dry Creek Crossing	Englewood, SSPRD	\$120,000
Dartmouth #6	Wayfinding	Englewood, SSPRD	\$12,000
Dartmouth Study Area Total Project Costs:			\$8,572,000
Hampden Study Area Projects			
Hampden #1	Hampden Avenue Sidewalk Connection	Englewood, Sheridan, CDOT	\$410,000
Hampden #2	Loop Ramp Trail Connection	Englewood, Sheridan, CDOT	\$340,000
Hampden #3a	Englewood Station Bridge	Englewood, Sheridan, CDOT, RTD	\$7,600,000
Hampden #4	Routing & Wayfinding	Sheridan, SSPRD	\$16,000
Hampden Study Area Total Project Costs:			\$8,366,000
Oxford Study Area Projects			
Oxford #1	Santa Fe Drive Intersection Improvements	Sheridan, CDOT	\$110,000
Oxford #2	Northeast Trail Connection	Sheridan, SSPRD	\$50,000
Oxford #3	Southwest Trail Connection and Mid-block Crossing	Sheridan, SSPRD	\$130,000
Oxford #4	Oxford Avenue Buffered Bike Lanes	Englewood, Sheridan	\$240,000
Oxford Study Area Total Project Costs:			\$530,000

PROJECT ID	PROJECT TITLE	AGENCIES	PROJECT COST
Federal Study Area Projects			
Federal #1	Quincy Mid-block Crossing	Sheridan, CDOT	\$210,000
Federal #2	Quincy Trail Underpass	Sheridan, SSPRD, CDOT	\$900,000
Federal #3	Trail Connection, Quincy Trail to Centennial Park	Englewood, Sheridan, SSPRD, Arapahoe County	\$1,100,000
Federal #4	Trail Connection, Quincy Trail to Mary Carter Greenway	Sheridan, Arapahoe County	\$950,000
Federal #5	Federal Boulevard Sidewalk Improvements	Englewood, Sheridan, CDOT	\$1,200,000
Federal #6	Centennial Park Connection	Englewood, Sheridan, CDOT	\$180,000
Federal #7	Union Avenue Trail Connection	Englewood	\$40,000
Federal Study Area Total Project Costs:			\$4,580,000
Bellevue Study Area Projects			
Bellevue #1	Northeast Trail Connection	Littleton, SSPRD	\$25,000
Bellevue #2	Bellevue Avenue Sidewalk Improvements	Littleton, CDOT	\$690,000
Bellevue #3	Wayfinding	Englewood, Littleton, SSPRD	\$20,000
Bellevue #4	Santa Fe Drive Interchange Improvements	Littleton, CDOT	\$17,000
Bellevue #6	Slaughterhouse Gulch Underpass	Littleton, SSPRD, BNSF Railway, Union Pacific Railroad	\$1,200,000
Bellevue Study Area Total Project Costs:			\$1,952,000
Bowles Study Area Projects			
Bowles #1	Interim Federal & Bowles Intersection Improvements	Littleton, SSPRD	\$460,000
Bowles #2	Ultimate Federal & Bowles Intersection Improvements	Littleton, SSPRD	\$4,300,000
Bowles #3	Southwest Trail Connection and Roundabout	Littleton, SSPRD	\$100,000
Bowles #4	Northwest Trail Connection	Littleton, SSPRD	\$30,000
Bowles #5	Southeast Trail Connection	Littleton, SSPRD	\$100,000
Bowles #6	Wayfinding	Littleton, SSPRD	\$18,000
Bowles #8	Santa Fe Drive Underpass	Littleton, SSPRD, CDOT	\$2,200,000
Bowles Study Area Total Project Costs:			\$7,208,000
Mineral Study Area Projects			
Mineral #1	Jackass Hill Trail Connection	Littleton, SSPRD	\$230,000
Mineral #3	Trail Connection Through Park-n-Ride	Littleton, SSPRD	\$150,000
Mineral #4	Mineral & Santa Fe Intersection Reconfiguration	Littleton, CDOT, RTD	TBD
Mineral Study Area Total Project Costs:			\$380,000

FUNDING OPPORTUNITIES AND NEXT STEPS

This study recommends projects totaling construction costs in excess of \$30 million. These projects will necessarily be built over many years, as funding becomes available. While some of the projects are low-cost and relatively straight forward to implement, other projects will require significant planning, design, and coordination prior to implementation. Funding for the large-scale projects will require the lead agency(ies) to pursue public and private partnerships and seek grant funding opportunities.

While the project evaluations included in this study provides context of the relative benefits and relative costs associated with each of the projects, the recommended projects have not been prioritized. It is recommended that each of the project team agencies (Arapahoe County, Englewood, Littleton, Sheridan, and SSPRD) identify their top priorities within their jurisdiction and begin to seek funding for design and implementation of the high priority projects. The SPWG should continue to be used as a forum for collaboration among the agencies involved and to help establish mutually beneficial priorities between agencies.

Following is a list of funding sources that should be considered for implementation of the recommended South Platte Connections Study projects.

Arapahoe County Open Spaces Fund – The Open Spaces program began in 2003 when citizens of Arapahoe County voted to fund the program through a quarter-of-a-penny Open Space Sales and Use Tax (25 cents on every \$100 spent). The tax was renewed in 2011 when voters approved extending the program to 2023. Revenue from the Open Spaces Sales and Use Tax is designated for specific uses per the voter-approved resolution. Regional Trails, Local Trails, and Shared Use Paths are facilities that are eligible for Arapahoe County Open Spaces Funding. Arapahoe County Open Spaces funding for a Shared Use Path is restricted to a path with a minimum width of 8 feet (5 feet allowable for short distances when constrained by right-of-way or physical barriers), and the path must connect to a school, park, Local Trail, or Regional Trail.

General Fund – City and County general funds typically include local sales and use taxes and property taxes. A general fund is flexible and can be used to fund transportation projects, including bicycle and pedestrian infrastructure projects. General funds are commonly used to provide local match for larger projects, and to fund smaller-scale projects.

DRCOG Regional and Sub-Regional TIP Funds – The Denver Regional Council of Governments (DRCOG) recently restructured their process for allocating federal and state funding that pass through DRCOG. The “dual model” process of Regional and Sub-Regional project lists provides an opportunity to fund local priority projects in addition to regional priority projects. DRCOG 2020-2023 TIP is currently in process; the next opportunity to seek DRCOG TIP funds is anticipated to be in the 2022/2023 timeframe. Many of the recommended projects could compete well for the Arapahoe County Sub-Regional funding.

Safe Routes to School (SRTS) – Grants can be used for bicycle education programs and projects that provide connections and/or improve the safety along routes to K-8 schools. Several of the recommended projects would improve bicycle and pedestrian connections between the Mary Carter Greenway Trail and a local school and would be good candidates for this funding source.

Highway Safety Improvement Program (HSIP) – This federal aid program funds safety projects aimed at reducing traffic fatalities and serious injuries. Bike lanes, roadway shoulders, crosswalks, intersection improvements, underpasses, and signs are examples of eligible projects. Projects in high-crash locations are most likely to receive funding. Colorado’s Towards Zero Death initiative is supported through this program. Recommended projects that would improve bicycle and pedestrian crossing of a state highway facility (Santa Fe Drive, Federal Boulevard, Hampden Avenue, or Belleview Avenue) would be candidates for this funding source administered by CDOT.

Colorado Parks and Wildlife (CPW) Trails Program – CPW receives several types of grant funds distributed annually to successful trail grant applicants, including federal Recreational Trails Program (RTP) funds and federal Land and Water Conservation Funds (LWCF). This is a state-run program. Some of the trail connection projects may be candidates for this funding source.

Great Outdoors Colorado (GOCO) – GOCO offers a variety of grant programs for outdoor recreation and land conservation projects in Colorado. The Local Park and Outdoor Recreation grants and planning grants, both intended to assist local governments with park and open space improvements, are potential funding sources for many of the trail connection projects.

Non-Profit Grants – Many non-profit organizations offer grants for bicycle/pedestrian/trail improvement projects. Examples include Kaiser Permanente Walk and Wheel grants, the Green Lane Project, and The Conservation Fund. The SPWG and lead agency(ies) for the recommended projects should monitor these grant funds and work to match funding opportunities with candidate projects.

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