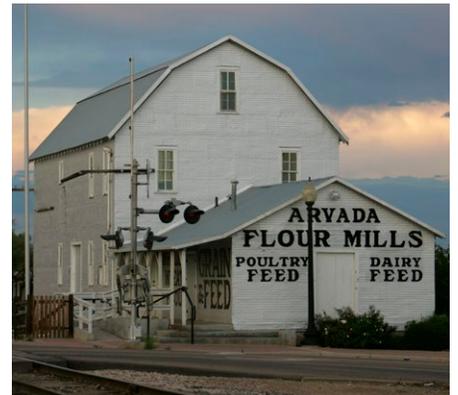


FINAL DRAFT

# Arvada Bicycle Master Plan



SEPTEMBER 2017



THIS PAGE INTENTIONALLY LEFT BLANK

## Acknowledgments

Mayor Marc Williams

### Arvada City Council

Nancy Ford, District 1  
 Mark McGoff, District 2  
 John Marriott, District 3  
 David Jones, District 4  
 Don Allard, At-Large  
 Bob Fifer, Mayor Pro Tem and At-Large

### Internal Advisory Team

Wesley Dismore – Engineering/Project Manager  
 Loretta Daniel – Community Development  
 Jake Nitchals – Community Development  
 John Firouzi – Engineering/Traffic  
 Sarah Washburn – Parks and Urban Design  
 Michael McDonnell – Parks Maintenance  
 Christopher Yaney – Streets  
 Jessica Prosser – City Manager’s Office  
 Yelena Onnen – Jefferson County Transportation and Engineering

*In collaboration with the citizens of Arvada, and:*

### External Advisory Team

Bob Matter, Assisted Cycling Tours  
 Cyndi Stovall, Arvada Transportation Committee  
 Karlyn Armstrong, Arvada Sustainability Advisory Committee (ASAC)  
 Charlie Myers, Bike Jeffco & Wheat Ridge Active Transportation Advisory Team  
 Peter McNutt, Arvada Bicycle Advisory Committee (ABAC)  
 Gene Palumbo, US Warriors Outdoors/MS Society  
 Edward Rothschild, ABAC  
 Ellis Barker, ABAC  
 Donald Chung, ASAC

### Olde Town Stakeholders

Karen Miller, Interim BID President  
 Jane Schnabel, Gold Line Advisory Committee  
 Jason Dirgo, La Dolce Vita  
 Mike Higgins, Klein’s Beer Hall/The Arvada Tavern  
 Lee Cryer, RTD

### City Committees and Commissions

Transportation Advisory Committee  
 Planning Commission

### Consultant Team

#### Toole Design Group

Jessica Fields  
 Bill Schultheiss  
 Ashley Haire  
 Geneva Hooten  
 Jessica Zdeb  
 Galen Omerso  
 Spencer Gardner

#### Felsburg Holt & Ullevig



Cady Dawson  
 Kelly Leadbetter  
 Jenny Young

THIS PAGE INTENTIONALLY LEFT BLANK

# Contents

<b>Chapter 1: Introduction</b> .....	1
Goals and Targets .....	3
Planning Approach.....	4
Reasons to Act .....	5
Plan Development .....	7
Plan Organization.....	10
<b>Chapter 2: Bicycle Programs and Policies</b> .....	12
Education .....	14
Encouragement .....	15
Evaluation.....	17
Enforcement .....	18
Bicycle Policies .....	19
Summary of Proposed Actions.....	21
<b>Chapter 3: Bicycle Network</b> .....	22
Low-Stress Network Development.....	23
Bicycle Facility Toolbox .....	30
Proposed Bicycle Network .....	32
Summary of Proposed Actions.....	37
<b>Chapter 4: Olde Town Arvada Bicycle Plan</b> .....	38
Recommended Programs .....	41
Bicycle Network Recommendations .....	43
Summary of Proposed Actions.....	46
<b>Chapter 5: Implementation Strategy</b> .....	48
Implementation Approach .....	49
Recommended Projects .....	49
Investment .....	54
Funding Opportunities .....	54
Summary and Next Steps.....	56

## Figures

Figure 1: Existing Arvada Bicycle Network .....	2
Figure 2: Barriers to Biking in Arvada.....	6
Figure 3: Levels of Traffic Stress .....	25
Figure 4: Arvada Existing Level of Traffic Stress .....	27
Figure 5: Routing Analysis Using All Road.....	28
Figure 6: Proposed Arvada Bicycle Network s .....	33
Figure 7: Olde Town Proposed Bicycle Network .....	44
Figure 8: Recommended Bicycle Projects .....	50
Figure 9: Top 10 In-House and Top 10 Capital Projects .....	53

## Tables

Table 1: Education Recommendations.....	14
Table 2: Encouragement Recommendations .....	17
Table 3: Evaluation Recommendations .....	19
Table 4: Enforcement Recommendations.....	20
Table 5: Policy Recommendations .....	21
Table 6: Summary of Proposed Actions.....	23
Table 7: Level of Traffic Stress Descriptions and Arvada Mileage.....	26
Table 8: Proposed Actions Summary for Bicycle Network Development.....	37
Table 9: Olde Town Program Recommendations .....	41
Table 10: Proposed Actions Summary for Olde Town .....	46
Table 11: Top 10 In-House Projects .....	51
Table 12: Top 10 Capital Projects .....	52

## Appendices

- Appendix A: Summary of Public Engagement
- Appendix B: Prioritization Process for Recommended Facilities
- Appendix C: State of Bicycling in Arvada

# CHAPTER 1

## INTRODUCTION

# Chapter 1: Introduction



***We envision a city where bicycling is a safe, convenient, and efficient option for every trip.***

Arvada is a livable community with good access to the outdoors, recreation, entertainment, transit, and the major employment center of Denver. The city's status as a Silver-level Bicycle Friendly Community reflects an ongoing commitment to investing in bicycling infrastructure, education, and encouragement. Arvada's over 110,000 residents enjoy access to 54 miles of on-road bicycle facilities and 93 miles of paved trails. In Arvada's schools, more than half of the students have access to educational materials about safe bicycling. In addition, organizations such as the Arvada Bike Advisory Committee (ABAC) provide support to the City and host numerous events, group rides, and activities to encourage people to ride. The City has strategically used local plans and policies—such as the 2014 *Comprehensive Plan* and the 2016 *Trails, Parks and Open Space Master Plan*—to guide the development of the bicycle network, which has grown along with the expansion of the city and region itself.

While Arvada has many elements of a bicycle friendly community, the bicycle commute mode share is less than one percent, and only 22 percent of residents find it very easy to travel by bike.<sup>1</sup> The existing on-street facilities consist of bike lanes located on mostly collectors and arterials, a context that does not appeal to most potential bicycle riders. Additionally, the City wants to enhance bicycle access to local destinations, adjacent communities, recreation, and transit including the Regional Transportation District (RTD) G Line stations scheduled to open in 2017. The 2017 Bicycle Master Plan (Plan) seeks to create a safer and more inviting bicycling environment in Arvada where people of all ages and bicycling abilities can safely and comfortably ride a bike. This Plan provides the framework to create a connected network of low-stress bicycle facilities and supporting programs that will encourage the untapped potential for bicycling in Arvada, making bicycling for transportation as easy and comfortable as recreational riding.

<sup>1</sup> U.S. Census Bureau. American Community Survey, 2008-2012; City of Arvada. Arvada Citizen Survey. Accessed August 24, 2016. <http://arvada.org/city-hall/transparency/citizens-survey>.

# Existing Arvada Bicycle Network

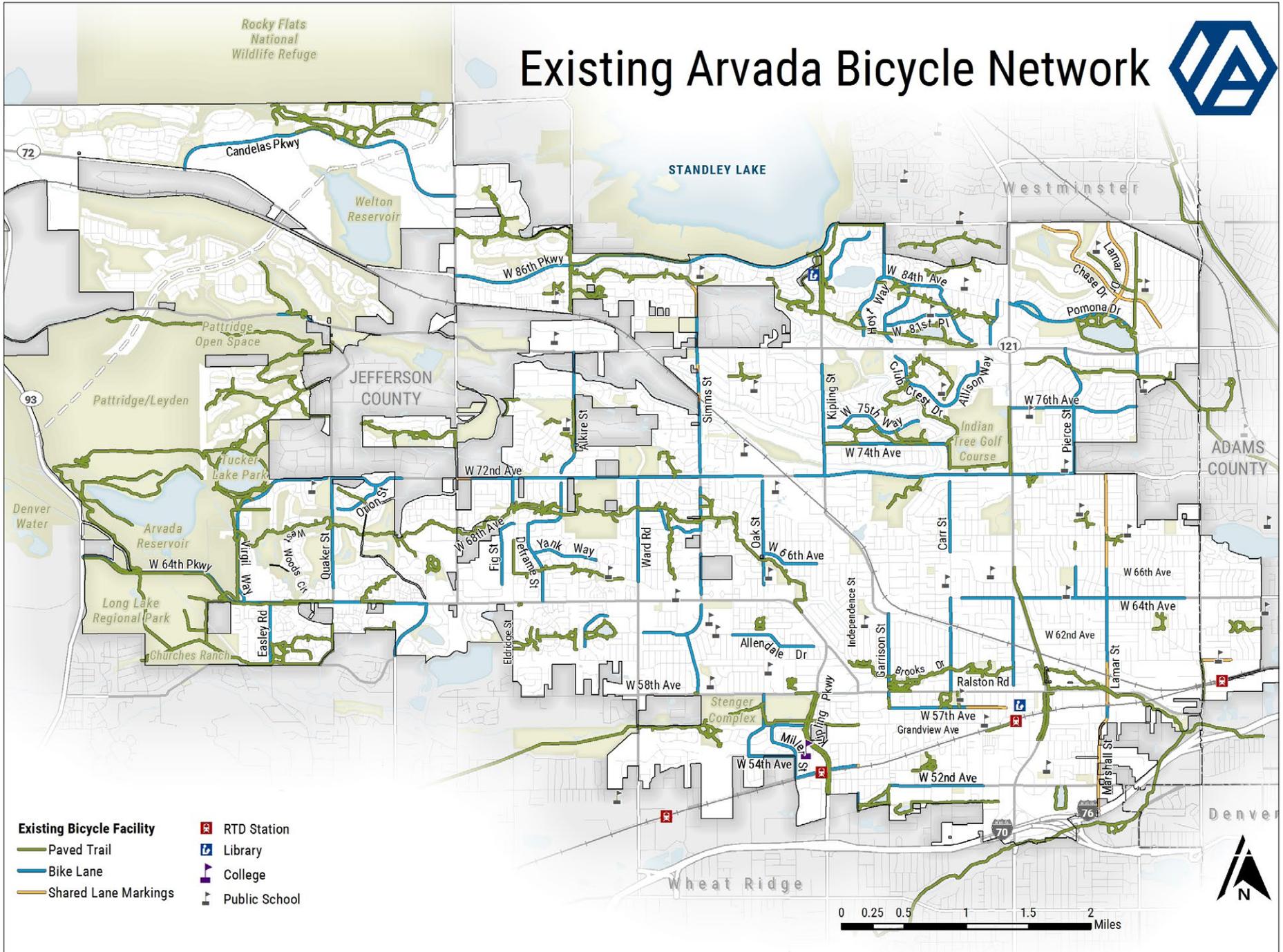


Figure 1: Existing Arvada Bicycle Network

## Goals and Targets

The following goals, objectives, and target measures were used to develop the 2017 Plan recommendations and will be used to measure the Plan's progress over time. They were developed collaboratively by the City, stakeholders, and the public.

### Build a connected and comfortable bicycle network



Increase the amount of low-stress and state-of-the-art bicycle facilities in Arvada

Add north-south bicycle connections and ensure east-west connections are appropriate

Increase perceived comfort of bicyclists and potential bicyclists through encouragement programs

### Create a safe place for all types of bicyclists to ride



Reduce or eliminate bicycle-related crashes, serious injuries, and fatalities

Focus on safe crossings of major streets

Create a culture of safe bicycling through education and enforcement programs

### Turn bicycling into a convenient form of travel for all trips



Maximize bicycle access to a variety of destinations, with a focus on recreational destinations

Increase bicycle ridership for all types of trips

## Targets

As the Plan's recommendations are implemented, the following targets will help gauge the City's success in creating an Arvada that is **connected, comfortable, safe,** and **convenient** for bicycling. By 2022:

At least **five** priority projects from the Proposed Network will be built, including at least **two** capital projects

Bicycle crash rates will decrease, with a goal of **zero** fatalities or serious injuries

**5%** of all trips in Arvada will be made by bicycle

**25%** of citizens will regularly bicycle for exercise and/or fun

**20%** of all Arvada residents will bike or walk two times a week or for transportation

**35%** of residents will find it very easy to travel by bike

**7%** of all public transit users living within one mile of the Arvada G Line stations will bike to the station

## Planning Approach

The Vision for the Plan includes making bicycling a viable transportation option for a broad segment of the population and serving existing and future generations. Arvada’s trail network, climate, and burgeoning bicycle culture have contributed to a focus on recreational ridership that continues today. The 2015 Arvada Citizen Survey showed that almost a fifth (19 percent) of residents ride a bike for fun or for exercise at least twice a week.<sup>2</sup> However, apart from these riders and for other trip purposes, most residents do not ride today.

Low ridership is related to many factors, but a large one is rider comfort and safety. Bicycle planning professionals accept that there is a large percentage of the American population that is interested in bicycling for transportation, but does not currently do so because they feel unsafe. Several studies have shown that a bicyclist’s perception of their personal safety riding on a street is greatly influenced by their proximity to and interaction with motorized traffic.

Studies show that most people in the U.S.—approximately 60 percent—have little tolerance for interacting with motor vehicle traffic unless volumes and speeds are very low.<sup>3</sup> This group of riders is referred to as “Interested but Concerned,” reflecting both their interest in bicycling for transportation as well as concerns about safety and comfort when interacting with motor vehicle traffic. **Planning and designing for the Interested but Concerned rider is Arvada’s best chance at increasing bicycle ridership.** Given the right bicycle facilities, education, and encouragement, these residents might choose to ride a bicycle for their next trip. Therefore, to increase bicycling in Arvada and build a safe and comfortable bike network for everyone, this plan was developed using a “low-stress network” planning approach.



<sup>2</sup> City of Arvada. Arvada Citizen Survey. Accessed August 24, 2016. <http://arvada.org/city-hall/transparency/citizens-survey>

<sup>3</sup> Studies show that approximately one third of the population is not currently interested in bicycling or able to bicycle.



Facilities like the 86th Parkway bike lane do not typically attract families and children. The people pictured here have chosen to ride on the sidewalk instead.

## Reasons to Act

### Limited Facilities and Connections

Arvada residents enjoy a high quality of life in part because of the city's location along Colorado's Front Range: Jefferson County open spaces flank the city's western and northern edges, while 123 miles of paved and unpaved trails provide green spaces throughout the city. Arvada's neighbors—Wheat Ridge to the south, Westminster to the northeast, and Denver to the southwest—provide additional job centers and recreational opportunities. However, there are limited and difficult bicycle connections due to substantial barriers including I-70, US 36, railroads, and unincorporated areas of Jefferson County where infrastructure development lags.

Bicycling within Arvada today is sometimes challenging and often disconnected. Only 11 percent of Arvada's 500-mile network of local, collector, and arterial streets have bicycle facilities. Of that, most of the on-street bike network is composed of collectors and arterials—

facilities that, without enhanced treatments, are not suited for riders of all ages and skill levels. Though most of the 93-mile paved trail network provides a low-stress bicycling experience, there are sizable gaps in the trail network and few comfortable on-street bikeways to connect neighborhoods.

Arvada also lacks a strong network of north-south bikeways, as noted in the *2016 Trails, Parks and Open Space Master Plan*, in part due to jurisdictional boundaries. More long-distance, directional connectivity would make it more convenient for people to bicycle.

### Challenging Crossings

Planning for the Interested but Concerned rider, who is particularly sensitive to street crossings, will help Arvada increase its bike mode share. While most streets in the city are low- to moderate-stress, physical barriers posed by railroads, arterials, suburban-style

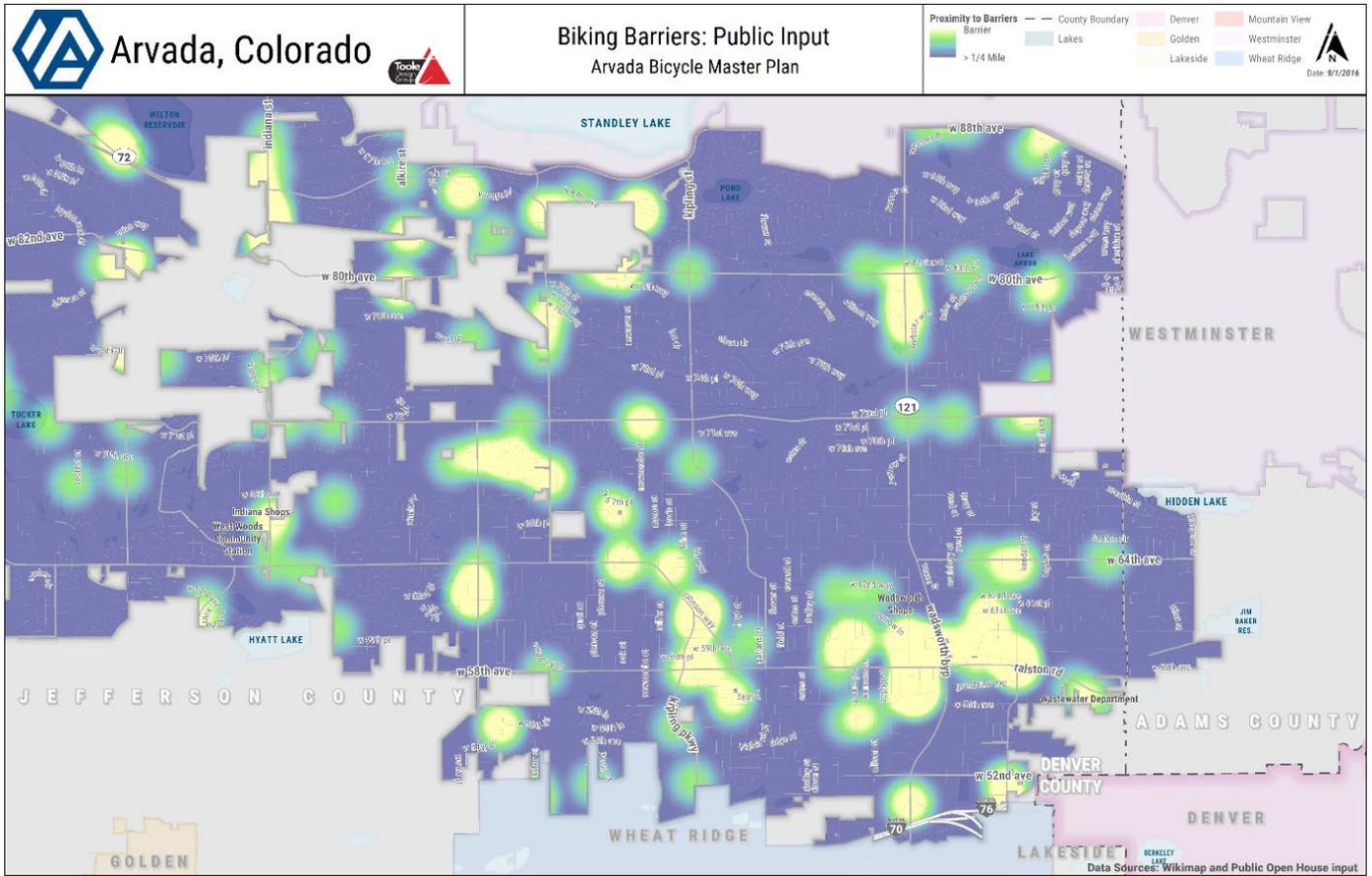


Figure 2: Barriers to Biking in Arvada

development, and offset intersections detract from citywide connectivity.

Responses gathered at public events and through the online interactive map show a clear desire for improved crossings, especially at high-volume, high-speed arterials.<sup>4</sup> Figure 2 shows areas with the highest concentrations of barriers within the city. The biggest barriers are shown in yellow: Olde Town, Ralston Road, Indiana Street, and Wadsworth Boulevard.

### First and Final Mile Opportunities

RTD will soon begin rail service to downtown Denver on the G Line, catalyzing reinvestment within southeast Arvada. Two G Line stations in Arvada (the eastern at Arvada Ridge and western in Olde Town), will connect Arvada, downtown Denver, and the greater FasTracks network. Maximizing bicycle access to transit helps

extend the reach of transit, thereby increasing mobility options for a wider range of Arvada residents and workers.

### Recent Momentum and Success

Over the last five years the City has invested over five million dollars to improve upon and expand its bicycle network and trails.<sup>5</sup> Projects like the Kipling Underpass, Garrison Street connection, and on-street bike lanes implemented through routine street maintenance have helped grow the network to include 123 miles of trails (both paved and unpaved) and 54 miles of on-street facilities. Now is the time to continue progress towards a more bicycle friendly city, aligning with related regional and national efforts to improve multimodal transportation options.

4 Such as Wadsworth Boulevard, Ward Road, Ralston Road, West 64th Avenue, Indiana Street, and Alkire Street

5 Capital funds referenced are for Public Works projects only, not for small trail projects as part of new park construction or regular street maintenance. Approximately half of this funding was provided by state and federal grants.



Arvada residents provided feedback about the existing bicycle network at the 2016 Arvada Trails Day

## Plan Development

This Plan is the culmination of almost a year of public engagement focused on Arvada residents and visitors, community stakeholders, and City Council. Their input shaped the vision and goals, network approach, and recommendations. Highlights of the outreach are discussed in this section.

### Online Outreach

The City launched an online interactive map in June 2016. Users were asked to identify routes they already ride, routes that they would like to ride, and any barriers to bicycling. The map, the results of which are shown in Figure 2, was available as a link from the project webpage and participation was advertised and encouraged through public outreach events and social media. The map provided the project team with invaluable input about the state of bicycling in Arvada and specific areas to address in this Plan.

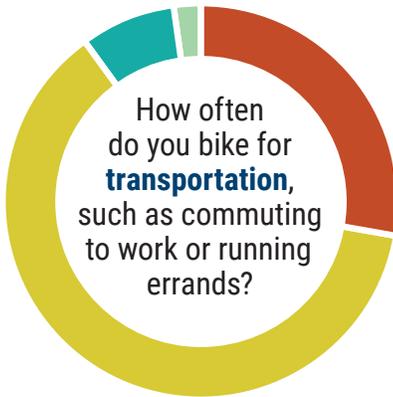
The survey asked respondents to identify their skill and comfort level riding bicycles. Of the 280 respondents, 60 percent self-identified as Enthusiast and Confident riders who are willing to ride in traffic, but prefer dedicated bike lanes and routes. Just over a quarter of respondents (26 percent) were part of the Interested but Concerned group that prefers to ride on trails. The final 14 percent are considered the Strong and Fearless riders who are comfortable riding on all street types, regardless of traffic volumes or speeds.

The survey also asked about the frequency with which people bicycle in Arvada. Consistent with the 2015 Arvada Citizen Survey, more people bicycle for recreation or exercise than for transportation. According to the project's online interactive map registration, approximately 60 percent ride a bicycle one to three times a week for recreation, exercise, and utility.

A quarter of all respondents ride bicycles four to five times a week for recreation or exercise, while only eight percent ride that frequently for transportation purposes. These numbers show an interest in bicycling for both recreation/exercise and transportation, yet room for growth.



- 9%**  
I do not bike or walk for recreation or exercise
- 60%**  
1-3 times a week
- 25%**  
4-5 times a week
- 6%**  
6+ times a week



- 28%**  
I do not bike or walk for transportation
- 62%**  
1-3 times a week
- 8%**  
4-5 times a week
- 2%**  
6+ times a week

The City also conducted an online survey in late 2016 to gauge what types of bicycle facilities people prefer and how they think the City should implement those facilities. Those results are summarized in Chapter 3 as they relate to the Proposed Bicycle Network.

## Public Open House

An open house held in July 2016 solicited input on community values, preferred bicycle facility types, and

potential bikeways within the city. The open house sought to understand bicycling in Arvada today, and receive feedback that informed the development of the Plan's recommendations and focus areas.

Participants were given three voting dots and asked to identify *What's Most Important to You?* related to access, facilities, and programs. Overwhelming support was shown for access to recreation, expanding the bicycle network and closing gaps between existing bikeways, and more bicycle encouragement programs.



Open House



Education, Enforcement, and Encouragement Program Feedback

## Community Events

To reach a broader and more representative audience, the project team also engaged residents in-person at several community events.

At the 2016 Arvada Trails Day, a free community event celebrating the city’s trail network, over 50 people shared their visions for bicycling in the city. People said that they see bicycling in Arvada as a fun, recreational way to exercise, but that today’s bicycling is “poor for commuting” and can feel “unsafe due to distracted motorists.” In the future, people want to see better connectivity, bike lanes, a “great community,” more of a “bicycling community,” and more trails.

At the 2016 Taste of Arvada event, more than 100 people engaged in conversations about facility comfort and ideal bike experiences in the City. These results are summarized in Chapter 3 as they relate to the Proposed Bicycle Network.

## Stakeholder Coordination

The Plan process was guided by two stakeholder committees: a group of internal stakeholders representing City departments and Jefferson County, and an external group of residents and business owners with valuable perspectives on bicycling. Meetings with these committees helped inform the Plan in several ways, including:

- Providing a detailed understanding of bicycling in Arvada today;
- Aligning this Plan with other City efforts;
- Defining project goals and objectives;
- Guiding the development of the Proposed Bicycle Network; and
- Offering ideas for new and improved bicycle-related programs and policies.



Arvada Trails Day



Taste of Arvada



External Advisory Team meeting feedback

# Plan Organization

---

**This Plan is organized into five chapters, including this one, and two appendices.**

**Chapter 1** introduces the Plan including the goals, the planning approach, and reasons to act.

**Chapter 2** provides recommendations for programs and policies related to bicycling.

**Chapter 3** presents and describes the Proposed Bicycle Network.

**Chapter 4** focuses on in-depth network and program recommendations for Olde Town.

**Chapter 5** provides an implementation strategy for the Plan recommendations.

**Appendix A** includes a summary of the public and stakeholder engagement that shaped the Plan.

**Appendix B** includes details of the bikeway project prioritization process.

**Appendix C** includes the State of Bicycling in Arvada report, which summarizes existing bicycling conditions in the city.

THIS PAGE INTENTIONALLY LEFT BLANK

# CHAPTER 2

## BICYCLE PROGRAMS AND POLICIES

# Chapter 2: Bicycle Programs and Policies

Community programs and City policies are key ingredients to creating a place where bicycling is connected, safe, and convenient. Generally, policies are set by City government, while programs are led by external organizations such as advocacy organizations. Along with infrastructure such as bike lanes and trails, these elements will help Arvada realize the Plan goals outlined in Chapter 1.

Arvada already has a number of education, encouragement, and enforcement programs related to bicycling. The existing bicycle programs are part of why Arvada earned a Silver Bicycle Friendly Community designation by the League of American of Bicyclists (LAB) in 2014.

As the City looks to increase bicycling, the 2017 Plan recommends the expansion of some programs as well as creating new, impactful programs. Community partners may be well positioned to implement and support many of these efforts. This chapter summarizes those recommendations by each programmatic category—Education, Encouragement, Enforcement, and Evaluation. It then summarizes recommendations for new or revised City policies.

## The League of American Bicyclists categorizes non-engineering aspects of a bicycle friendly community as follows:



**Education:** Gives people of all ages and ability levels the skills and confidence to ride



**Encouragement:** Creates a strong bike culture that welcomes and celebrates bicycling



**Enforcement:** Ensures safe roads for all users



**Evaluation and Planning:** Plans for bicycling as a safe and viable transportation option

## Bicycle Training Course

In May 2016, the City opened the Bicycle Training Course (BTC), a half-acre imitation streetscape that includes some of the same street elements found in Arvada: bike lanes, street signs, crosswalks, and railroad crossings. The BTC also includes additional obstacles for skills training, such as the Rock Dodge and Slalom, typically used as part of a Bike Rodeo curriculum. The BTC directly addresses safety concerns by offering students education in bicycle safety, as well as an opportunity to practice safe pedestrian behaviors on the way to and from the facility.



Bike Training Course Group Ride



## Education

Bicycle education helps people of all ages feel comfortable riding and navigating the streets. Table 1 details the expansion of existing programs and new education opportunities to create a more bicycle friendly Arvada.

**Table 1: Education Recommendations**

Recommendation	Description	Responsibility	Plan Goal(s)
2.01 Continue the Pursuit of Safe Routes to School Funding	Safe Routes to School (SRTS) funding supports infrastructure and non-infrastructure improvements (such as educational and encouragement programs) to increase the number of students walking and bicycling to school. The City should continue its pursuit of SRTS funding while seeking opportunities to bolster in-school education through physical education classes, in-school bike rodeos, and other events.	Jefferson County Public Schools, Arvada Public Works, CDOT	Connected and Comfortable Network, Safety, Convenience
2.02 Continue Support of Bicycle Rodeos and Bicycle Training Course Events	The City’s Bicycle Training Course (BTC) offers an opportunity to directly address safety concerns by offering students education and practice in safe bicycling behaviors. The City should continue its support of programming at the BTC, including expanding the bike rodeo program to the general public. Bike rodeos feature bicycle safety skills instruction, bicycle skills practice, equipment inspections, and helmet fitting.	Arvada Public Works, Jefferson County Public Schools, Apex Park and Recreation District, Boy Scouts, Arvada Library	Connected and Comfortable Network, Safety, Convenience
2.03 Support Bicycle Maintenance Classes	Low-cost or free bicycle maintenance classes make it easy for residents with seldom-used bicycles to get riding again. Workshops can be held at schools, parks, in residential neighborhoods, or bike shops. The City should continue its support for bicycle maintenance classes through advertising and fostering partnerships with local bicycle shops and advocacy groups when possible.	Arvada Communications, Local bicycle shops, ABAC	Convenience
2.04 Create a Bicycle Education Kit	The City should develop a bicycle education kit that neighborhood groups can use at small festivals or gatherings. This kit could be paired with the Block Party Trailer, rented out by the City’s Neighborhood Engagement Division.	Arvada Public Works, Arvada Neighborhood Engagement	Connected and Comfortable Network, Safety, Convenience
2.05 Develop Motorist Awareness Education	The City should create educational materials for motorists about bicycle-related laws and rules of the road. These materials should be coupled with enforcement recommendation 2.29.	Arvada Communications, ABAC, KATV, Arvada Public Works, Arvada Police Department	Safety
2.06 Develop Adult Bicycle Education Curriculum	Hold bicycle education classes for adults targeting the Interested but Concerned and underserved populations. Potential topics could include traffic skills or bicycle commuting. This recommendation may be paired with enforcement strategy 2.28.	Bike Friendly Arvada, Arvada Public Works	Connected and Comfortable Network, Safety, Convenience
2.07 Modify the Driver’s Education Curriculum	Modify the driver’s education curriculum to include instruction on bicycle-related laws and add bicycle-related questions to the driver’s exam. The City should work with the Department of Motor Vehicles (DMV) and others to modify these programs.	Colorado DMV, Bicycle Colorado, Arvada Public Works	Safety, Connected and Comfortable Network



## Encouragement

Encouragement helps create a strong and fun bicycle culture. Table 2 lists the recommended actions to promote bicycling in Arvada.

**Table 2: Encouragement Recommendations**

Recommendation	Description	Responsibility	Plan Goal(s) Addressed
2.08 Expand Arvada Bicycle Advisory Committee Efforts	Arvada Bicycle Advisory Committee (ABAC) is Arvada’s bicycle advocacy organization. ABAC should continue its support of bicycling in Arvada by leading education efforts and organizing social bicycle rides while moving towards an advisory role with City Council to help implement this Plan. City Council should consider designating ABAC as an advisory committee to Council, or combining it with the Transportation Advisory Committee.	Arvada Bicycle Advisory Committee (ABAC), Public Works, City Council	Connected and Comfortable Network, Convenience
2.09 Continue Bike Friendly Arvada Efforts	Bike Friendly Arvada (BFA) leads organized recreational bike rides, open to bicyclists of all levels with a focus on children, families, and casual riders. BFA should continue organizing bicycle rides.	Bike Friendly Arvada, City Council	Connected and Comfortable Network, Convenience
2.10 Expand Bike to Work Day Efforts	As part of Colorado’s Bike to Work Month, the City works with individuals and employers to promote bicycling. The City should continue hosting bike to work day breakfast and end-of-day stations, potentially expanding the number of stations with help from community partners.	Public Works, Bike Friendly Arvada, Olde Town Business Improvement District (BID), Arvada Chamber of Commerce	Connected and Comfortable Network, Convenience
2.11 Create a Wayfinding Program	Wayfinding serves all types of bicyclists, but especially the Interested but Concerned riders in finding comfortable, low-stress routes. The City should create a program to install wayfinding to guide people to trails and on-street bike routes within the city and on regionally significant routes. The City’s wayfinding program should build upon the 2016 Jeffco Regional Bikeways Wayfinding Guide, which designates Carr Street as its highest-priority branded route, named the Central Bikeway.	Public Works, Jefferson County	Connected and Comfortable Network, Safety, Convenience
2.12 Establish Bicycling School Buses (“Bike Trains”) to School	Bicycling school buses (often referred to as “bike trains”) are adult supervised groups of students bicycling to school, helping to alleviate parental concerns about personal security and traffic safety. The City should help establish bike trains to elementary schools in the city by organizing with schools and developing comfortable bicycle routes for bike trains.	Arvada Neighborhood Engagement, Jefferson County Public Schools	Connected and Comfortable Network, Safety, Convenience
2.13 Create a City Bicycle Map	The City should create an interactive online bicycle map to reflect low-stress routes. If possible, when the City of Arvada Parks & Open Space map is next updated, new on-street bike facilities should be included.	Public Works; Parks, Golf, and Hospitality Department	Convenience, Connected and Comfortable Network

Recommendation	Description	Responsibility	Plan Goal(s) Addressed
2.14 Establish a Bicycle Friendly Business Program	Bicycle friendly businesses help to encourage bicycling by providing bicycle parking, support for riding, and rewards. The City should develop a bicycle friendly business program to support businesses that encourage bicycling by their employees and customers.	ABAC, Chamber of Commerce, Olde Town BID, Arvada Sustainability Advisory Committee	Convenience, Connected and Comfortable Network
2.15 Enhance End-of-Trip Facilities and Develop a Comprehensive Bicycle Parking Plan	Improving bicycle parking will encourage more people to ride to errands, events, work, and school by bike. The City should develop a comprehensive bicycle parking plan to address bicycle parking needs and other end-of-trip facility needs around the city.	City Manager's Office, Community Outreach, BIDs, Chamber of Commerce	Convenience
2.16 Give Away Helmets and Bicycle Lights	The City should give away helmets and lights at events and as part of traffic enforcement outreach.	Police Department	Safety
2.17 Support Earn-a-Bike Programs	Earn-a-bike programs provide opportunities for children to learn bicycle maintenance and leadership skills while earning bikes to keep. These programs rely on donated bicycles and either volunteers or paid staff who teach bicycle maintenance. The City should promote awareness of earn-a-bike programs related to Arvada.	ABAC, City Manager's Office (Communication)	Convenience



Organized group bike rides encourage all types of bicyclists to ride



## Evaluation

Evaluation serves to track progress in implementing a bicycle plan and to identify what's working, what's not, and where additional effort is needed.

**Table 3: Evaluation Recommendations**

Recommendation	Description	Responsibility	Plan Goal(s) Addressed	Proposed Action
2.18 Conduct Pre- and Post-Studies of New Bicycle Infrastructure Projects	As the Proposed Bicycle Network is implemented, the City should conduct pre- and post-studies of new bicycle infrastructure projects to gauge ridership, safety benefits, and other measures of effectiveness.	Public Works	Connected and Comfortable Network,	Conduct studies for every new type of bicycle facility built
2.19 Track Crash Data	The City should begin to track bicycle crash data, including pre-crash maneuvers and top-crash intersections and determine which engineering, education, and enforcement countermeasures could be effective in improving safety.	Public works, Arvada Police Department	Safety	Review and summarize data once per year
2.20 Amend the Arvada Citizen Survey	The City should amend its biannual Arvada Citizen Survey to include more bicycle-specific questions to better track attitudes about bicycling within the city. The performance measures listed in Chapter 1 should be used as a guide.	City Manager's Office	Convenience	Amend 2017 Survey and revisit biannually
2.21 Start a Bicycle Count Initiative	Building upon CDOT's program, the City should begin a bicycle count initiative, potentially including the strategic addition of automated bicycle counters at locations around the city, short duration counts to complement automated counts, and the application of count data to inform infrastructure, programmatic, and policy choices.	Public Works	Convenience	See description
2.22 Track Bicycle Parking Occupancy	The City should begin tracking bicycle parking occupancy counts of bicycle racks in heavily-trafficked areas of the city, such as Olde Town.	Public Works, RTD, ABAC	Convenience	Track occupancy twice per year
2.23 Promote the New AskArvada Citizen Relationship Management (CRM) System	When the new AskArvada Citizen Relationship Management (CRM) system is debuted later in 2017, the City should promote its use as a means of documenting bicycle network, comfort, and safety challenges.	City Manager's Office, Community Outreach	Safety	See description



## Enforcement

Enforcement initiatives provide opportunities to institutionalize a safe and consistent transportation system for all users by prioritizing the links between law enforcement and bicyclists. Table 4 includes recommended enforcement programs. Cities such as Boulder, Denver, and Fort Collins have similar programs that Arvada should use as a guide.

**Table 4: Enforcement Recommendations**

Recommendation	Description	Responsibility	Plan Goal Addressed
2.24 Improve Traffic Enforcement	Coupled with a review of crash data, the Arvada Police Department should focus its enforcement efforts on behaviors and locations with the greatest crash risk and/or injury severity.	Arvada Police Department, Public Works	Safety
2.25 Improve Enforcement Trainings	The Arvada Police Department should provide officer education about bicycle-specific enforcement, including the rights and responsibilities of bicyclists.	Arvada Police Department	Safety
2.26 Expand Speed Management Program	The Police Department should expand their existing variable speed feedback sign program through the addition of portable speed feedback trailers to increase awareness of vehicular speeds.	Arvada Police Department, Public Works	Safety
2.27 Develop a Court Diversion Program for Traffic Offenses	The Police Department should explore the feasibility of creating a diversion program that would provide driver and bicyclist education in lieu of written citations and fines for traffic offenses such as failure to yield, failure to follow the 3 Feet to pass law, and others.	Arvada Police Department	Safety
2.28 Improve Police Department Outreach to Bicyclists	The Police Department should develop a program to reach bicyclists engaging in unsafe behavior (e.g., riding the wrong way or riding without lights) to encourage intervention and education over ticketing. This recommendation should be paired with recommendation 2.16.	Arvada Police Department, Public Works	Safety



## Bicycle Policies

City policies impact how things get done—from organizational practices to the actual width of a bike lane. The following recommendations will ensure that Arvada’s policies reflect the Plan goals and its overall commitment to bicycling and active living. Cities such as Washington, Minneapolis, and Boulder have similar policies that Arvada should use as a guide.

**Table 5: Policy Recommendations**

Recommendation	Description	Responsibility	Plan Goal(s) Addressed
2.29 Comprehensive Project Review	Review the City’s Capital Improvement Program list to ensure that recommended bikeway network projects are incorporated at the earliest possible stage of projects. The City should also ensure that all traffic impact studies, analyses of proposed street changes, and development projects consider bicycle mobility as to minimize adverse impacts on the bicycle network.	Public Works, Planning Department	Connected and Comfortable Network
2.30 Minimize Construction Impacts to Bicycle and Pedestrian Travel	Develop a set of mandatory bicycle accommodations for work zones, including standards for rerouting and detours to ensure comfortable bicycling routes are maintained during construction. In addition, the City should improve its communication about construction closures and trail detours through the city’s website, social media, and through neighborhood organizations.	Public works, Parks Maintenance, City Manager’s Office	Convenience, Safety
2.31 Review Electric Bicycle Use on Bikeways and Trails	Building upon the recommendation in the 2015 Arvada Trails Plan, the City should study the suitability of allowing electric or electric assist bicycles on bicycle facilities and trails. Based on this research and using Colorado’s new e-bike legislation, Arvada should explore the feasibility of revising the ordinances and developing public safety education and outreach regarding use of electric and e-assist bicycles.	Public Works, Parks Department	Convenience
2.32 Update Design Guidance	Design guidance provides direction and detailed specifications for implementing bicycle facilities, as well as other street design treatments intended to improve safety and accessibility in Arvada. Currently, City engineering and planning staff use a combination of the Arvada engineering code and national design guidance, but better design guidance is needed to improve the consistency, quality, and application of bicycle facility design throughout the city. Therefore, Arvada should establish design standards for bicycle accommodations on all types of streets to ensure that low-stress facilities and appropriate spot improvements are built.	Public Works	Connected and Comfortable Network, Safety, Convenience
2.33 Adopt a Complete Streets Policy	The City should adopt a Complete Streets policy to create an integrated transportation system that supports safe travel for people of all ages and abilities. A Complete Streets policy can guide decision-making related to infrastructure planning and construction while advancing the City’s efforts to provide safe and accessible transportation for everyone.	Public Works, Planning Department, City Council	Connected and Comfortable Network, Convenience

Recommendation	Description	Responsibility	Plan Goal(s) Addressed
<p>2.34 Identify Maintenance Standards and Procedures for Bicycle Facilities</p>	<p>The City should establish minimum maintenance standards for bicycle facilities throughout the city. Maintenance efforts should focus on sweeping, snow removal, and repaving:</p> <p>Sweeping: The City operates street sweeping crews between April and November. Each street in the City is swept once every six to eight weeks, depending on the weather. No specific effort is made to sweep bicycle routes more frequently, so the City should establish a policy to clear bikeways and trails soon after heavy rains or wind storms, when debris are likely to impede travel.</p> <p>Snow Control and Removal: After a snow event, the City plows streets on collector and arterial streets in priority order based on traffic volumes, emergency response, proximity to schools, and connectivity to residential neighborhoods. Collectors, minor collectors, and local streets with steep hills or a history of chronic icing are plowed at a lower priority and most local streets are not plowed unless the City Manager declares a snow emergency. Snow is plowed and removed from Olde Town and some parts of Ralston Road. While many of the priority snow plow routes have bike facilities, bike facilities are not explicitly designated as high-priority plow routes. Therefore, the City should improve snow management (e.g., plowing, removal) on bicycle routes, as well.</p> <p>Repaving: Today, street resurfacing is planned three years in advance. The City should incorporate higher standards and shorter timetables for the resurfacing of high-priority bicycle routes to ensure a more comfortable ride.</p>	<p>Public Works, Streets Maintenance, Parks Maintenance</p>	<p>Connected and Comfortable Network, Convenience</p>
<p>2.35 Improve Trail Lighting</p>	<p>Insufficient lighting on trails limits safety and comfort for trail users. The City should determine appropriate lighting standards for trails and work to implement improved lighting throughout the trail system.</p>	<p>Public Works, Parks Maintenance</p>	<p>Safety, Convenience</p>



Street and bikeway maintenance ensures bikability throughout all seasons

## Summary of Proposed Actions

The following table summarizes the key actions that Arvada will need to take to accomplish Plan goals related to bicycle programs and policies.

**Table 6: Summary of Proposed Actions**

Category	Proposed Action
<b>Education</b>	
	2.01 Continue the Pursuit of Safe Routes to School Funding
	2.02 Continue Support of Bicycle Rodeos and Bicycle Training Course Events
	2.03 Support Bicycle Maintenance Classes
	2.04 Create a Bicycle Education Kit
	2.05 Develop Motorist Awareness Education
	2.06 Develop Adult Bicycle Education Curriculum
	2.07 Modify the Driver’s Education Curriculum
<b>Encouragement</b>	
	2.08 Expand Arvada Bicycle Advisory Committee Efforts
	2.09 Continue Bike Friendly Arvada Efforts
	2.10 Expand Bike to Work Day Efforts
	2.11 Create a Wayfinding Program
	2.12 Establish Bicycling School Buses (“Bike Trains”) to School
	2.13 Create an Online City Bicycle Map
	2.14 Establish a Bicycle Friendly Business Program
	2.15 Enhance End-of-Trip Facilities and Develop a Comprehensive Bicycle Parking Plan
	2.16 Give Away Helmets and Bicycle Lights
	2.17 Support Earn-a-Bike Programs
<b>Evaluation</b>	
	2.18 Conduct Pre- and Post-Studies of New Bicycle Infrastructure Projects
	2.19 Track Crash Data
	2.20 Amend the Arvada Citizen Survey
	2.21 Start a Bicycle Count Initiative
	2.22 Track Bicycle Parking Occupancy
	2.23 Promote the New AskArvada Citizen Relationship Management (CRM) System
<b>Enforcement</b>	
	2.24 Improve Traffic Enforcement
	2.25 Improve Enforcement Trainings
	2.26 Expand Speed Management Program
	2.27 Develop a Court Diversion Program for Traffic Offenses
	2.28 Improve Police Department Outreach to Bicyclists
<b>Bicycle Policies</b>	
	2.29 Comprehensive Project Review
	2.30 Minimize Construction Impacts to Bicycle and Pedestrian Travel
	2.31 Review Electric Bicycle Use on Bikeways and Trails
	2.32 Update Design Guidance
	2.33 Adopt a Complete Streets Policy
	2.34 Identify Maintenance Standards and Procedures for Bike Facilities
	2.35 Improve Trail Lighting

# CHAPTER 3

## BICYCLE NETWORK



Trails provide a comfortable bicycling experience



Bike lane



Low-stress networks are for bicyclists of all ages

## Chapter 3: Bicycle Network

This Plan seeks to create an Arvada that is connected, safe, and convenient for bicycling. A big part of realizing those goals is to create a bicycle network that responds to those needs. The Proposed Bicycle Network presented in this chapter was informed by inputs from the public and stakeholders, a bicycle Level of Traffic Stress analysis, and a bicycle routing analysis. The resulting network is a selection of streets in Arvada on which to implement high-quality bicycle infrastructure. This infrastructure would take the form of sidepaths, separated bike lanes, buffered bike lanes, traditional bike lanes, bike boulevards, and, for some short segments, shared lane markings. The Proposed Bicycle Network will connect Arvada regionally while also connecting residents to schools, parks, shopping centers, residential neighborhoods, and recreational opportunities such as the Ralston Creek Trail, Clear Creek Trail, Five Parks, Standley Lake, and the Apex Center.

### Low-Stress Network Development

As discussed in Chapter 1, the single most important thing that Arvada can do to increase bicycle ridership is to plan for the Interested but Concerned rider. Given the right bicycle facilities, education, and encouragement, these residents might choose to ride a bicycle for their next trip. A bicycle network that serves families, children, and older adults works well for everyone. For that reason, a low-stress planning approach to address the Interested but Concerned rider was applied to this Plan's development.

The Proposed Bicycle Network was developed through an iterative process of existing conditions analysis, field work, public input, stakeholder review and discussion, Level of Traffic Stress analysis, and a routing analysis. Key elements of the network development process are highlighted in the sections that follow. Full details of the existing conditions analysis are available in Appendix C.

## Public Input

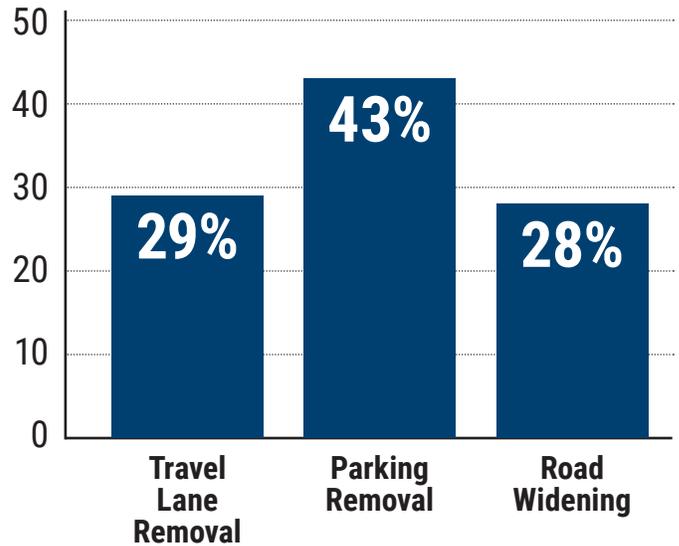
The residents of Arvada helped inform this Plan through a variety of events and online surveys, as summarized in Chapter 1 and discussed in more detail in Appendix A. The following specific feedback helped inform the development of the Bicycle Network:

- Residents expressed a desire for better bicycle routes, noting the most-desired routes: Indiana Street, Alkire Street, Kipling Street, and Ward Road.
- Residents noted several existing bicycling barriers and difficult routes through the online interactive map, as discussed in Chapter 1.
- At the July 2016 open house, people noted that the best place to bike was the **Ralston Creek Trail** and that the least comfortable route was **Indiana Street**.



The Ralston Creek Trail provides east-west connectivity

- At the public open house and through the online interactive map, people noted their top city bicycling destinations including Ralston Creek Trail, Clear Creek Trail, Five Parks, Standley Lake, and community centers. **Recreational access** is a priority for residents.
- At the Taste of Arvada event and in a follow-up online survey afterward, people answered key questions that helped inform the development of the Bicycle Network. For the question, *Which type of bikeway would you feel most comfortable and safe riding within?*, responses showed a clear preference for **facilities that are separated from vehicular traffic**, such as sidepaths (32 percent), buffered bike lanes (25 percent), and protected bike lanes (24 percent).<sup>6</sup> For the question, *Which of the following strategies is best for building bikeways in Arvada?*, most participants voted for **parking removal** over travel lane removal or road widening.



<sup>6</sup> See the Bicycle Facility Toolbox on page 30.

## Level of Traffic Stress Analysis

As stated earlier, a key goal of this Plan is to serve the Interested but Concerned rider. A Level of Traffic Stress (LTS) analysis was performed for this project because it addresses the needs of this type of rider.

A LTS analysis is a planning tool that has been used across the country, including in many Colorado cities, to quantify the level of stress that a person bicycling is likely to perceive while riding on a street. It is based on the premise that a person’s level of comfort on a bicycle increases as separation from vehicular traffic increases and as traffic volume and speed decrease. Conversely, a person’s level of stress on a bicycle increases as separation from vehicular traffic decreases and as traffic volume and speed increase.

Using the Mineta Transportation Institute’s nationally-recognized research on low-stress bicycling and network connectivity, all streets and intersections in Arvada were assessed for their level of bicycling comfort. The LTS analysis included the following inputs: traffic volumes, speed, the number of travel lanes, and the presence and quality of bicycle facilities.

This resulted in a numerical comfort ranking for every street in the city, from greatest comfort (LTS 1) to least comfort (LTS 4) and provided a foundation for the Proposed Bicycle Network. This approach recognizes that the city’s Proposed Bicycle Network is not just a handful of streets with bicycle-specific infrastructure, but rather every street is a potential route for bicyclists who have varying tolerances for the stress caused by biking near motor vehicles.



Figure 3: Levels of Traffic Stress

**Table 7: Level of Traffic Stress Descriptions and Arvada Mileage**

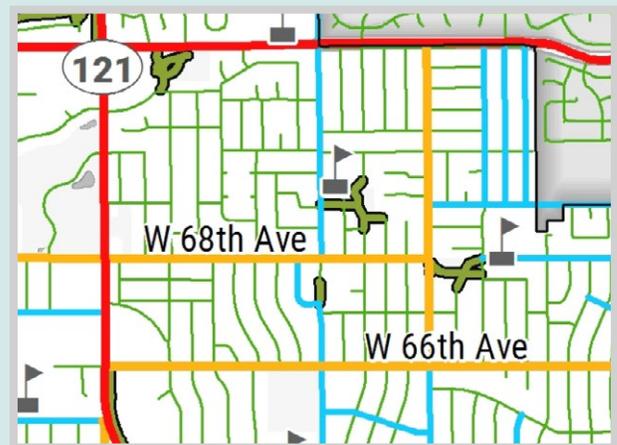
Level of Traffic Stress Rating	Description	Total Existing Mileage
LTS 1	Little to no traffic stress. Generally suitable for the entire population.	369
LTS 2	Little traffic stress. Suitable for most adults, even those with little confidence or experience interacting with motor vehicles.	65
LTS 3	Moderate traffic stress. Uncomfortable and unappealing for some, but suitable for more experienced bicyclists.	30
LTS 4	High traffic stress. Only suitable for very skilled bicyclists.	59

Figure 4 and Table 7 summarize the quality of the existing Arvada bicycle network, as rated by LTS.

While the clear majority of Arvada streets are low-stress, many of them are discontinuous or separated from other low-stress facilities at the crossings of higher-stress routes, thereby lessening the overall comfort along the corridor. To overcome these barriers, the LTS analysis was used to show which bicycling corridors are more stressful in the city (shown in yellow and red in Figure 4), but also the intersections and at-grade trail crossings where spot improvements would link two low-stress routes. The LTS analysis was critical in identifying where to focus facility improvements to create the most practical, comfortable, and appealing bicycling network.

## Low-Stress Islands

Using the LTS analysis, the team performed an additional assessment to determine where “low-stress islands” exist. Low-stress islands are created when streets within a neighborhood are connected, but there is no way to reach an adjacent neighborhood without crossing a high stress street (LTS 3 and 4 streets). These islands detract from overall connectivity and cohesion within the city.



This map shows a section of eastern Arvada. Most streets within the neighborhood are low-stress, but it is not possible to visit another area in the city without crossing a high stress street such as West 72nd Avenue, West 68th Avenue, Wadsworth Boulevard, Lamar Street, or Sheridan Boulevard.





## Three subsequent iterations of the routing analysis were conducted to answer the following questions:

### 1. How do street grades affect route choice?

**That is, would a steep incline eliminate a trip from occurring or induce a rider to seek an alternative route?**

An analysis was performed that used all streets in Arvada but considered grades, such that steep inclines would either eliminate a trip from occurring or induce a rider to seek an alternative route. This analysis showed that a steep incline is unlikely to eliminate a trip from occurring, but it will encourage riders to choose a close, alternative route. The routing map from this analysis was very similar to the overall analysis (see Figure 5), where we see a similar preference for the Ralston Creek Trail and West 64<sup>th</sup> Avenue. However, the street grade analysis showed a higher preference for local streets that may be less direct, but flatter. This analysis informed the Proposed Network by providing bicycle facilities on local streets as an alternative for riders who are sensitive to steep grades.

### 2. How can bicyclists navigate the city using only existing low-stress streets (LTS 1 and 2)?

Using only low-stress streets constrains riders by reducing the effective bicycle network within the city. The greatest access is focused around the Ralston Creek Trail and through northeastern Arvada. This shows that even with an improvement to the high-stress intersections (see Spot Improvement Recommendations on page 35), the city would need a comprehensive bicycle network to attract the Interested but Concerned riders across the city.

### 3. How can bicyclists navigate the city using only low-stress streets (LTS 1 and 2), without passing through high-stress intersections?

Bicyclists will have very few options for accessing destinations across the city under these constraints. While the Ralston Creek Trail provides low-stress connections between many destinations in Arvada, connectivity hinges upon the availability of low-stress crossings. For instance, neighborhoods south of Standley Lake can more easily connect to the trail because of a traffic signal at Zinnia Street that affords bicyclists a low-stress crossing of 72<sup>nd</sup> Avenue. Just to the east, the offset crossing of Quail Street and Pierson Street prevents bicyclists from the Harvest neighborhood having access to the trail.

The combination of these inputs—existing conditions analysis, already-planned facilities such as trails, public and stakeholder feedback, LTS analysis, and the routing analyses—helped create a bicycle facility study network for which facility recommendations were developed.



A goal of this Plan is to provide safe biking for people of all ages

## Bicycle Facility Toolbox

The City anticipates using seven different bikeway facility types to build the Proposed Bicycle Network. The facility types, described below, should be applied in Arvada using best practice standards such as those developed by the American Association of State Highway and Transportation Officials (AASHTO) and the National Association of City Transportation Officials (NACTO). The facilities are shown below from greater to lesser level of separation from motor vehicle traffic.



### Trails

A shared-use path or trail can be located along a road right-of-way or in an independent right-of-way such as a stream valley, greenway, along a utility corridor, or an abandoned railroad corridor.

**Appropriate Context:** Parks, greenways, utility corridors, abandoned railroad corridors

**Existing Arvada Examples:** Ralston Creek Trail, Little Dry Creek Trail



### Sidepaths

Sidepaths are bi-directional paved routes for bicyclists, pedestrians, and other non-motorized uses. Sidepaths are often located parallel to existing streets within the right-of-way, particularly those that are of higher speed and volume. Due to the proximity to the road, sidepaths may not be appropriate where there are lots of driveways/side street access. All access point crossings must be carefully designed.

**Appropriate Context:** Arterials

**Existing Arvada Examples:** Wadsworth Bypass



### Separated Bike Lanes

Separated bike lanes are bicycle facilities that are physically separated from both the street and sidewalk. Vertical separation can provide physical separation from motor vehicles using curbs, planters, or on-street parking. The separation increases the comfort, thereby reducing the traffic stress. Separated bike lanes can be one-directional on each side of the street, or bi-directional on one side of the street.

**Appropriate Context:** Collector streets, arterials

**Existing Arvada Examples:** Oberon Road (note that this facility is not a standard separated bike lane)



### Buffered Bike Lanes

Buffered bike lanes add a hatched buffer area to the bike lane, most often on the side adjacent to vehicular travel lanes. This increased separation provides a more comfortable riding environment, and the hatched area reinforces the message that the wider lanes are not for parking or car travel and narrower travel lanes may reduce speeds.

**Appropriate Context:** Local streets, collector streets

**Existing Arvada Examples:** None



### Bike Lanes

A bike lane designates a portion of a street for the exclusive use of bicycles. Bike lanes are one-way, on-road bike facilities that provide a dedicated space for bicycling. Bike lanes are often marked with pavement markings and, in rare cases, may be colored for higher visibility.

**Appropriate Context:** Local streets, collector streets

**Existing Arvada Examples:** 72<sup>nd</sup> Avenue, Virgil Way, Quaker Street, Carr Street



### Bike Boulevard

Bike boulevards are streets with low motorized traffic volumes and speeds that give priority to bicycle travel. Bike boulevards use signs, pavement markings, and traffic calming measures to discourage through trips by motor vehicles to create safe, convenient bicycle travel along the street.

**Appropriate Context:** Local streets

**Existing Arvada Examples:** None



### Shared Lane Markings (“Sharrows”)

Shared lane markings are road markings that indicate a shared lane environment for bicycles and vehicles. While shared lane markings provide some visibility and indicate bicyclist positioning on shared streets, they do not provide any separation between people driving and bicycling so should be used carefully and only on low-volume, low-speed streets.

**Appropriate Context:** Local streets

**Existing Arvada Examples:** Marshall Street\*

\* Marshall Street is not an ideal application for shared lane markings because of the vehicular volumes and speeds of that street.

## Proposed Bicycle Network

The Proposed Arvada Bicycle Network is a 271-mile network consisting of 170 miles of on-street facilities, 102 miles of paved trails, and 30 miles of unpaved trails. This network capitalizes on existing and planned trails, and includes local streets, collector streets, and select arterial streets. The construction of these facilities will create a comprehensive, connected, and comfortable bicycle system in Arvada to link trails, schools, transit, neighborhoods including Olde Town, and adjacent jurisdictions. The Proposed Bicycle Network includes the following:

- Sidepaths or separated bike lanes on many of the arterials in Arvada, with an emphasis on connecting major destinations
- Buffered bike lanes and conventional bike lanes on local, collector, and lower-speed arterial streets
- Bike boulevards to further calm traffic on streets that are already bicycle friendly, and shared lane markings for short low-speed segments where a connection is needed
- Intersection improvements to be implemented through best practice design

## Specific Network Recommendations

The following actions are recommended to build the Proposed Bicycle Network in Arvada:

### 3.01 Implement the Proposed Trail Network

The *2016 Trails, Parks and Open Space Master Plan* identified priority projects to expand the existing network of paved trails. This trail system—both existing and proposed—provides the most loved and lowest-stress bicycle routes in Arvada. The City should continue to construct this network, looking for ways to coordinate projects between the trails plan and the Proposed Bicycle Network.



Separated bike lanes provide additional comfort for bicyclists

### 3.02 Implement Better North-South Connections

The proposed network recommends low-stress bicycle facilities on key north-south routes such as Indiana Street, Ward Road, Garrison Street, Carr Street, Simms Street, Wadsworth Boulevard, Harlan Street, and Marshall St, among others. These routes establish on- and off-street connections to the trail network and park system while also providing low-stress links between neighborhoods. Without these pillars of low-stress bicycling in Arvada, bicycling will remain disconnected and inaccessible for people of all ages and riding abilities.

### 3.03 Implement Separated Facilities

Some of the most direct routes in Arvada follow arterial streets. Applying low-stress design principles and acknowledging Arvada citizens' preference for riding on a facility with separation from motor vehicles, this Plan proposes 33 miles of sidepaths and 13 miles of separated bike lanes on key corridors throughout the city. These corridors include Indiana Street, Kipling Street, Lamar Street, Sheridan Boulevard, West 64<sup>th</sup> Avenue, West 72<sup>nd</sup> Avenue, West 80<sup>th</sup> Avenue, and West 86<sup>th</sup> Parkway. The design of these facilities will vary from street to street. Depending on the existing street configuration, sidepaths may be easier to construct than separated bike lanes, typically not requiring street reconstruction or lane reconfigurations. For both separated bike lanes and sidepaths, the City should pay special attention to intersection design to ensure maximum protection at conflict locations.

# Existing and Proposed Arvada Bicycle Network

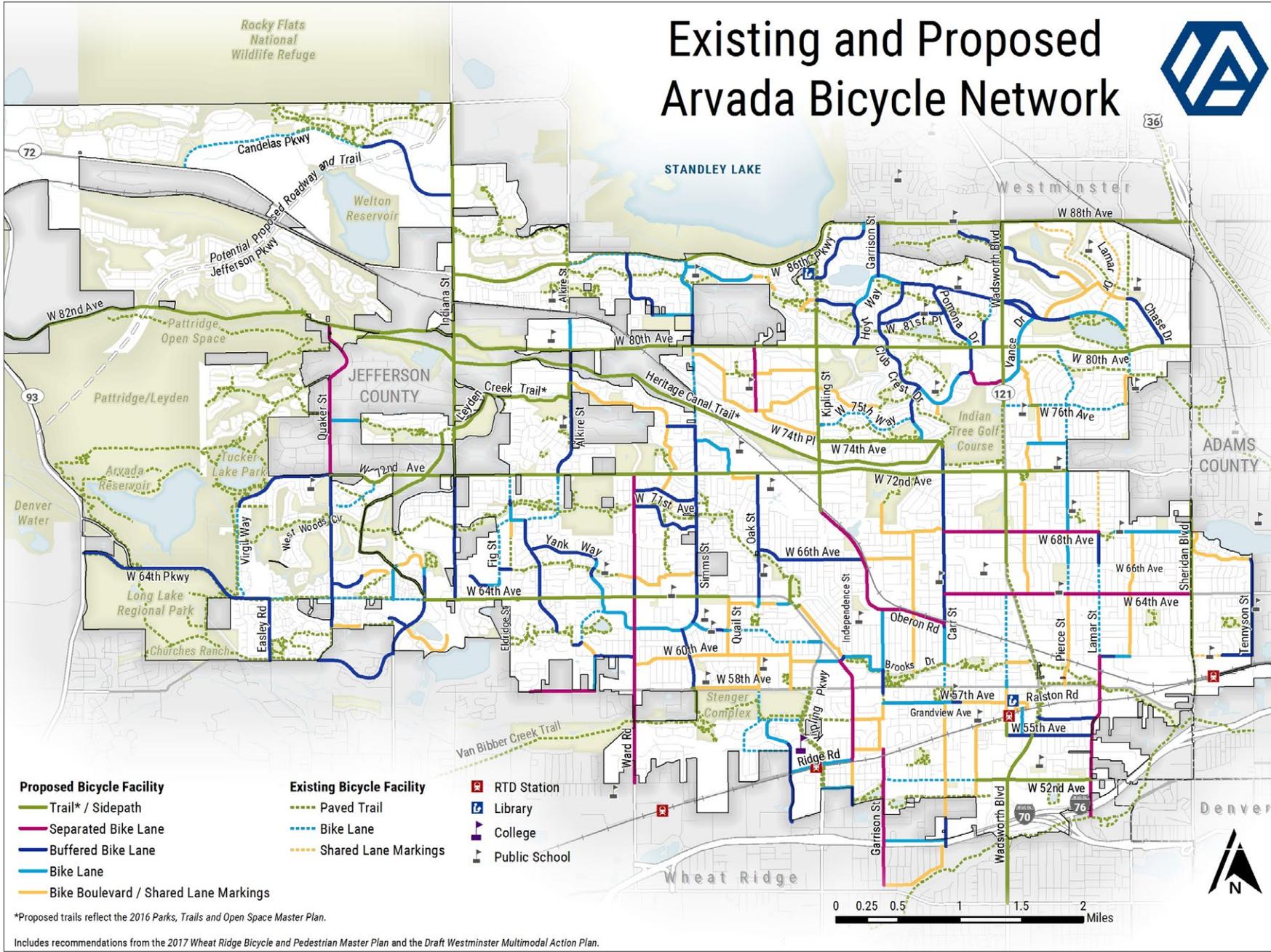


Figure 6: Proposed Arvada Bicycle Network



Bike boulevards calm traffic while prioritizing bicycle travel



The proposed network accounts for all ages and abilities

### 3.04 Create Bike Boulevards

The proposed network calls for 19 miles of bike boulevards, located on slow speed, low-volume streets that prioritize bicycle travel. If needed to meet speed and volume thresholds, these streets can include traffic calming measures such as lane narrowing, traffic circles, curb extensions, signage, gateway treatments, speed humps, chicanes, and street diversions to increase comfort for pedestrians and bicyclists. These streets should be engineered for a target speed of 20 mph as to create a comfortable riding environment for bicyclists sharing the road with automobiles, and a safer environment for adjacent residents and pedestrians.

### 3.05 Implement Context-Appropriate Bike Facilities

The Proposed Bicycle Network includes a variety of facility types, as discussed in the Bicycle Facility Toolbox section of this chapter. Along with separated bike lanes, sidepaths, and bike boulevards, the recommendations include bike lanes, buffered bike lanes, and shared lane markings. All of these facility types can provide a low-stress bicycling experience if implemented on the right types of streets and with the proper design features. The Proposed Bicycle Network Map provides a roadmap to guide implementation of the various facility types based on street characteristics. National best practice design guidance from AASHTO, FHWA, and NACTO should inform the implementation of all proposed facilities.

## Spot Improvement Recommendations

A goal of this Plan is to create a safe, citywide network for all types of bicyclists to ride. This can be accomplished in part by addressing a variety of high-stress spot locations, often where a low-stress bicycle facility crosses a high-speed, high-traffic street such as a collector or arterial.

The following spot improvement actions are recommended to build the Proposed Bicycle Network in Arvada, understanding that additional engineering analyses will be required to determine final designs.



Existing Arvada trail crossing

## 3.06 Improve Bicycle Facilities at Intersections – Striping and Signalization

One element of safe, comfortable bicycle facilities is the provision of safe crossings at major street intersections. Existing low-stress routes are discontinuous in many parts of Arvada where they cross high-traffic, high-speed streets. Design challenges with many intersections include:

- Discontinuous bicycle facilities that drop before the intersection (e.g. bike lane striping that does not continue all the way to the stop bar) and are not carried through to the other side, thereby causing greater confusion and stress for bicyclists and other road users.
- Signalized crossings that do not adequately detect bicyclists or that require bicyclists to wait long periods of time to cross.
- Unsignalized crossings that require bicyclists to wait for more than 30 seconds for a gap in vehicular traffic to cross.<sup>7</sup> Offset intersections that require bicyclists to ride on a stretch of a high-stress roadway to make the connection to the other leg of the lower-stress route.

Increasing the comfort of intersection crossings for all riders, but especially the Interested but Concerned group, is one key to creating a connected low-stress network. While spot improvements may be completed as opportunities arise (e.g., as part of a routine resurfacing or street improvement project), a goal should be completion of a series of improvements to intersections along a low-stress corridor. This coordinated approach will enable bicyclists to travel along continuous low-stress routes.

A new traffic signal or High-Intensity Activated crossWalk (HAWK) hybrid signal may be required to provide a safe crossing at some locations. However, at many intersections, signal improvements, geometric changes, or supplementary pavement markings may be sufficient to provide comfortable crossings. These treatments may include bicycle signal detection, bike boxes, turning queue boxes, crosswalks, curb extensions, and curb radius reductions, among others.

<sup>7</sup> The Highway Capacity Manual suggests increased risk taking occurs for people waiting to cross unsignalized crossings after 20 seconds, and after 30 seconds at signalized crossings.

### 3.07 Add Two-Way Sidepath Segments

A two-way sidepath (on one side of a signalized intersection) can connect discontinuous legs of offset intersections with a dedicated bicycle facility. A sidepath may replace an existing sidewalk with a shared use path or add a two-way separated bike lane adjacent to the sidewalk. Depending upon the roadway characteristics, the addition of a two-way sidepath may also require crossing enhancements such as median crossing islands or a traffic signal to ensure safe crossing for bicyclists.

### 3.08 Add or Retrofit Median Crossing Islands

Median crossing islands can serve as a refuge for pedestrians and bicyclists when crossing a street. These treatments are typically installed at locations where a left-turn lane is not necessary or where a left-turn movement can be prohibited and redirected to another intersection as part of a neighborhood traffic management plan.

The median may extend across the intersecting roadway if restricted motor vehicle access is desired. This treatment would typically include other engineering treatments such as an advanced yield line

or rectangular rapid flash beacon. In some locations in Arvada, raised median islands exist with no bicycle opening. Where bicycle circulation is needed, these medians should be retrofitted to include openings for bicyclists to pass through.

### 3.09 Improve Trail Access and Transition Geometry

The City has constructed a number of trail-to-street access points, as well as trail connections between cul-de-sacs or dead end streets. The City should continue seeking out and building these network connections. However, at many locations where trails connect to the street network, a sharply-sloped curb transition has been constructed between the gutter pan and the trail or sidewalk. The angle of this transition is approximately 45 degrees and drops over the 6-inch width of a typical curb. Because of the sharp drop, these transitions are very uncomfortable for bicyclists when seated and can also damage bicycles.

As resources become available, the City should modify these transitions to meet ADA requirements, which will benefit both bicyclists and pedestrians. New trail access points should be designed with these gentler transitions in mind.

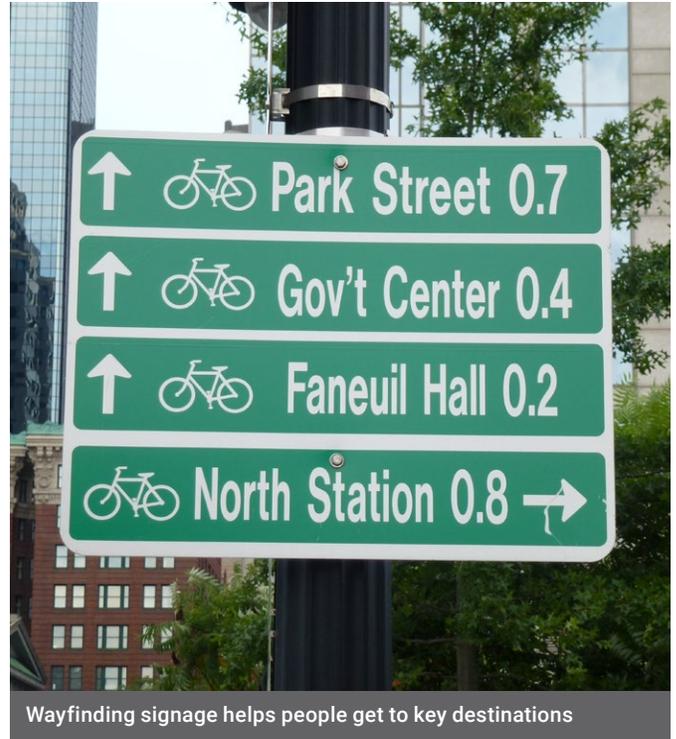


Two-Way Cycle Track Connection (Source: NACTO)

### 3.10 Add Wayfinding and Incorporate Regional Wayfinding Efforts

Wayfinding can improve the viability of bike networks by guiding bicyclists through the network to their desired destinations. Through directional or destination-based signing and marking, Arvada can clarify network junctions or connections that are not obvious, particularly to new riders or those unfamiliar with an area. One location in Arvada that deserves special attention for wayfinding guidance is the discontinuous section of Ralston Creek Trail that diverts to Johnson Way through the Alta Vista neighborhood. Public outreach efforts for this Plan revealed that many Arvadans are confused on proper direction needed at this location to resume the trail north of the neighborhood.

This recommendation should be implemented in conjunction with recommendation 2.11 (Create a Wayfinding Program).



## Summary of Proposed Actions

The table below summarizes the actions needed to implement the Proposed Arvada Bicycle Network.

**Table 8: Proposed Actions Summary for Bicycle Network Development**

Category	Proposed Action
Network	3.01 Implement the Proposed Trail Network
	3.02 Implement Better North-South Connections
	3.03 Implement Separated Facilities
	3.04 Create Bike Boulevards
	3.05 Implement Context-Appropriate Bike Facilities
Spot Improvements	3.06 Improve Bicycle Facilities at Intersections – Striping and Signalization
	3.07 Add Two-Way Sidepath Segments
	3.08 Add or Retrofit Median Crossing Islands
	3.09 Improve Trail Access and Transition Geometry
	3.10 Add Wayfinding and Incorporate Regional Wayfinding Efforts

# CHAPTER 4

## OLDE TOWN ARVADA BICYCLE PLAN

## Chapter 4: Olde Town Arvada Bicycle Plan

Olde Town Arvada is a historic and vibrant downtown neighborhood that draws people from around the area with its charm, amenities, and restaurants. Land uses within Olde Town include a mix of retail and commercial sites that make Olde Town a local and regional attraction. Since 2014 Olde Town businesses have been organizationally-led by its Business Improvement District (BID).<sup>8</sup> The BID encompasses most of the Olde Town core, including commercial properties along the south side of Ralston Road on the north, Grandview Avenue on the south, Yukon Street to the west, and Teller Street to the east. For planning purposes, the area within the BID's boundaries is the focus of this chapter.

A major change is about to occur in Olde Town, with the opening of the RTD G Line rail station expected in 2017. This exciting addition to the built environment will impact travel patterns and land development. With these anticipated changes in mind, the

recommendations in this Plan should be reviewed after the station opens, and needed adjustments and/or updates should be made while maintaining the overall intent and goals of this Bicycle Master Plan.

This Plan intends to foster a better bicycling environment in Olde Town, while honoring its unique character. The recommendations in this chapter provide for an Olde Town that is:

**More inviting.** Bicycle Master Plan input received at events, the open house, and through the online interactive map indicate that Olde Town is one of the most-desired destinations within the city. However, significant barriers to bicycle access make it less comfortable and enticing to ride to Olde Town. The bicycle network recommendations (Chapter 3) build upon Olde Town's scale and gridded street network to address these connectivity gaps. Improving the end-of-trip experience with bicycle parking will also



Olde Town Arvada's Business Improvement District valentines

<sup>8</sup> City of Arvada City Council Agenda. June 2016. Accessed Apr. 11, 2017.

[http://www.arvadarecords.org/councilpacket/past\\_week/2014.....06-16-2014,%20Council%20Meeting%20Packet.pdf](http://www.arvadarecords.org/councilpacket/past_week/2014.....06-16-2014,%20Council%20Meeting%20Packet.pdf)



RTD's G Line rail station

make the area more welcoming. On the programmatic side, starting an employee recognition program for those who bike to work and a bicycle-friendly business incentive program will also help to encourage greater bicycle ridership to Olde Town.

**More integrated.** Providing low-stress routes within the city to access Olde Town and the new G Line station will improve access to this commercial center from downtown Denver and other neighboring communities. When the Olde Town Arvada G Line station opens, there will be an even greater need for bicycle access to Arvada's downtown core. The network recommendations aim to overcome barriers and improve on-street connections from the Ralston Creek Trail and from surrounding neighborhoods. Finally, adding to the on-street facilities within Olde Town itself will enhance the bicycling experience while drawing more bicycling to Olde Town.

**More comfortable.** The suite of recommendations provided in this chapter aim to improve the comfort of people bicycling to and within Olde Town. Many parts of Olde Town are already comfortable for multimodal travel due to traffic calming on streets like Olde

Wadsworth Boulevard and parts of Grandview Avenue. In transitioning from the surrounding neighborhoods, the proposed changes—slower speeds, potential traffic calming, and dedicated bicycle facilities—will indicate to road users that they have arrived in Olde Town. These engineering changes will encourage better user behavior while dissuading cut-through vehicular traffic. The changes will make Olde Town more comfortable, thereby encouraging more trips, time, and money spent in Olde Town.

**More fun.** This neighborhood is already home to the Olde Town Cruisers, a group that leads recreational bicycle rides throughout the year. Continued support of the Cruisers will encourage more bicycling and a fun, light atmosphere to attract new riders to the mix. The Cruisers can help bolster Olde Town's economic and cultural vitality.

The bicycling recommendations for Olde Town were developed using the same process as the rest of the Plan. One additional stakeholder meeting was held with members of the BID, business owners, RTD, and the City of Arvada to discuss ideas and opportunities for change.

## Recommended Programs

Building upon the recommendations presented in Chapter 2, the following programmatic recommendations are tailored to Olde Town to encourage greater bicycling to and within the area. These programs will maximize bicycle access, making it more convenient to bicycle to Olde Town, while building a more connected and comfortable bicycle network.<sup>9</sup>

**Table 9: Olde Town Program Recommendations**

Recommendation	Description	Responsibility	Plan Goal(s) Addressed
4.01 Improve Bicycle Parking	Olde Town’s existing bicycle parking is well used in the summer and the BID has used the City’s bike corral for some of their events. The City should work more closely with the BID to review bike parking provisions of event applications to ensure that bike parking is provided. In addition, there should be greater education and awareness about the existing bike parking available in Olde Town. For example, the BID could develop simple stickers and signs to affix to the horse hitches to show that they are available for bike parking. Additionally, the City should look for opportunities to add on-street bicycle corrals to convenient and visible locations on the edge of Olde Town, with visible signage, to encourage walking within Olde Town.	Public Works, Olde Town BID	Convenience
4.02 Continue Support of Olde Town Cruisers	The Olde Town Cruisers host recreational rides that begin and end in Olde Town with some business sponsorship, discounted drink and food specials, and in-kind support. The Olde Town businesses and BID should continue supporting the Cruisers to encourage greater participation.	Olde Town BID	Convenience
4.03 Expand the Olde Town Bike to Work Day Station	The 2016 Bike to Work Day (BTWD) station was located near the Arvada Library. There, bike shop employees volunteered to hand out snacks and information about bicycling. The City and BID should continue their BTWD support, potentially expanding the number of stations in the area.	Olde Town BID, ABAC	Connected and Comfortable Network
4.04 Launch a Bicycle-Friendly Business Program	Bicycle-friendly businesses help to encourage more bicycling by providing bike parking, supporting riding, and offering rewards. Bicycle-friendly business programs offer opportunities to establish partnerships with local business to promote bicycle-friendly workplaces. The BID should explore the feasibility of creating a bicycle-friendly business program to support businesses that encourage bicycling by their employees and customers.	Olde Town BID, Arvada Chamber of Commerce	Connected and Comfortable Network
4.05 Develop an Employee Recognition Program	With 1,200 employees within the BID, an employee recognition program to incentivize and reward people who commute by foot, bike, or transit would reward active commutes while potentially alleviating some of the vehicular parking concerns in Olde Town.	Olde Town BID	Connected and Comfortable Network

<sup>9</sup> The City should look to cities like Denver, Seattle, Fort Collins, and Portland, Oregon for similar example programs.

Recommendation	Description	Responsibility	Plan Goal(s) Addressed
4.06 Conduct Bicycle Parking Occupancy Counts	During warm months of the year when greater bicycle ridership is expected, Olde Town parking enforcement staff should complete bicycle rack occupancy counts to track bicycle parking usage and needs over time.	Public Works, potentially with ABAC, Olde Town BID	Convenience
4.07 Enhance Enforcement	As staff capacity allows, enhance traffic enforcement in Olde Town, potentially during peak times, to reinforce traffic safety laws and encourage good behavior by all modes of travel.	Police Department	Safety
4.08 Pursue Temporary Street Interventions	Temporary street interventions, also called tactical urbanism, can be a low-cost and low-commitment way to introduce new street design types to a community. They can also change people’s understanding of how street space is used. The Olde Town BID, ABAC, and other interested parties should pursue such interventions, such as parklets or pop-up demonstrations of bicycle or pedestrian treatments, and use these temporary events to promote this Plan’s recommendations.	Olde Town BID, ABAC	Connected and Comfortable Network

## Seattle’s Bike Friendly Business Network

Seattle’s Bike Friendly Business Network #SEAbikebiz includes businesses that support people who arrive by bicycle. The Business Network’s website includes an interactive map with every business that has made a commitment to their employees or customers. Bicycle route directions are included to each location, as well as an overview of their work in making the city better for bicycling. Businesses are encouraged to join for greater recognition, exposure, connection, and educational opportunities.

Source: [commuteseattle.com](http://commuteseattle.com)

**BIKE**   
**FRIENDLY**  
**BUSINESS**

## Bicycle Network Recommendations

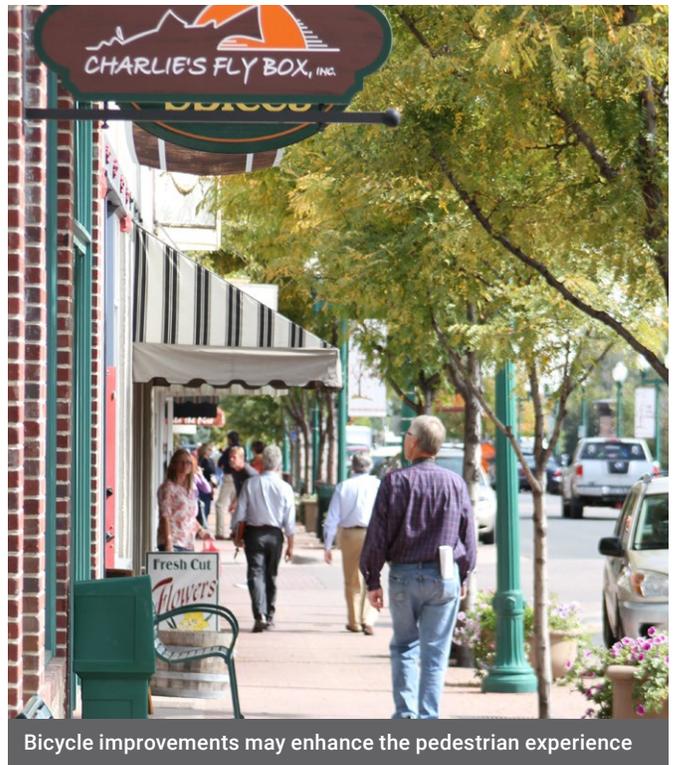
Building a low-stress bicycle network in Olde Town will improve access and comfort for all users, following best practices for street design and bicycle facilities in business districts. The streets of great business districts consider the needs of all street users through thoughtful designs. Core principles include: slow speeds, minimized conflicts between modes, and shortened pedestrian crossing distances. The following Olde Town bicycle recommendations, shown in Figure 7, follow this guidance.

### 4.09 Make better connections to Olde Town

With approximately 1200 people working in Olde Town and an emphasis from City planners and other community members to bolster this neighborhood, establishing high-comfort routes to Olde Town will provide tangible benefits to this area. The recommendations in this Plan seek to address bicycling barriers through improved connections from surrounding neighborhoods and the Ralston Creek Trail. This chapter discusses the key east-west connections. However, the proposed citywide bicycle network recommendations include wider bike lanes on Olde Wadsworth Boulevard north of Ralston Road and shared lane markings on Olde Wadsworth Boulevard south of Ralston Road to match the context within Olde Town. Shared lane markings should be supplemented by the “Bicycles May Use Full Lane” regulatory sign. For those approaching Olde Town from the south, new bike lanes are proposed on Vance Street to Grandview Avenue. To connect bicyclists to the G Line station, short segments of shared lane markings are proposed for both Webster and Upham Streets.

### 4.10 Reduce speed limit in Olde Town 20 mph

Slowing vehicular traffic will improve safety for all road users while creating a more inviting environment for people walking and bicycling. The goal of lowering the posted speed is to reduce the incidence and severity of crashes and enhance quality of life by minimizing cut-through traffic. Within the core of Olde Town, speed limits should be reduced to 20 mph, like on Olde Wadsworth Boulevard today. The proposed speed



at Grandview Avenue and both Yukon and Webster Street will make pedestrians more visible to motorists and encourage greater stop compliance and slower speeds. Finally, adding stop control to the intersections of Grandview Avenue and Upham Street and Webster Street, pending further study, will discourage cut-through traffic in Olde Town.

### 4.12 Emphasize 57<sup>th</sup> Avenue

As the only fully-continuous east-west route within Olde Town, 57<sup>th</sup> Avenue should be established as a bike boulevard and the premier bicycle route from central Arvada to Olde Town. Bike boulevard treatments should include shared lane markings and traffic calming measures such as curb extensions, speed humps, and chicanes. Additional wayfinding and intersection improvements where 57<sup>th</sup> Avenue meets Webster Street and Upham Street will also help to manage speeds and foster bicycle priority. At the intersection of 57<sup>th</sup> Avenue and Olde Wadsworth Boulevard, the City should consider restricting right turns on red to minimize conflicts between people who drive, bicycle, and walk.

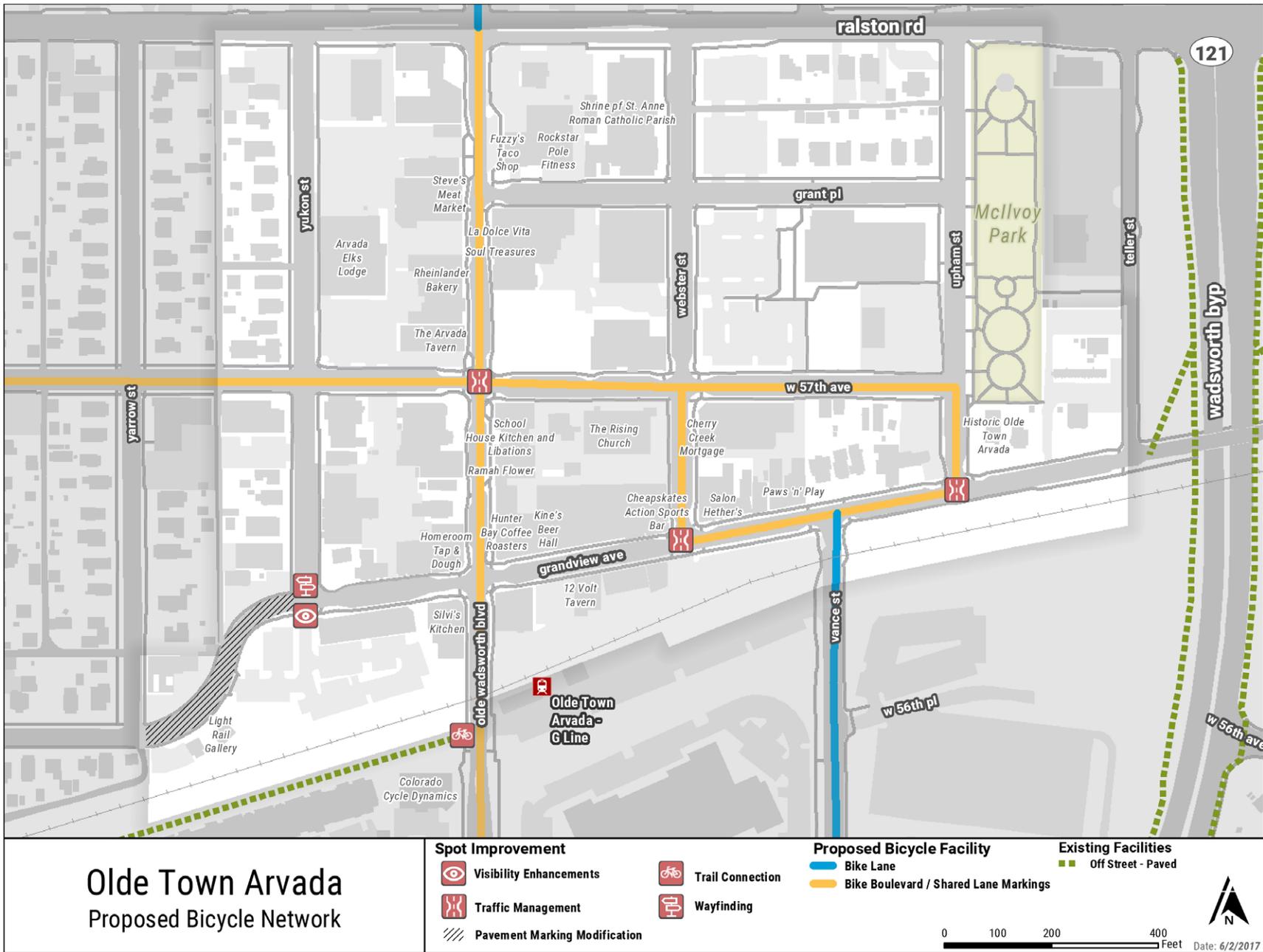


Figure 7: Olde Town Proposed Bicycle Network

#### 4.13 Enhance crosswalks

Enhancing the pedestrian realm of Olde Town will encourage more people to walk and bicycle to and within Olde Town, thereby enriching the neighborhood character. Consistently marking crosswalks throughout Olde Town will improve visibility while encouraging yielding to pedestrians by both motorists and bicyclists. Existing crosswalks use pavers that match the historic feel of the neighborhood but they do not include white, visible edge lines consistent with national design requirements. The City should use a blended approach—by adding visible edge lines to its crosswalks and adding more crosswalks—to increase pedestrian safety and visibility while maintaining the historic street character.

#### 4.14 Trail to on-street connections

The transition between the Water Tower trail on the southern side of the train tracks and Olde Wadsworth Boulevard was consistently identified as a barrier to bicycling. Improving this connection between the shared use path and proposed bike lanes will foster safer, more comfortable access from south Arvada and Wheat Ridge to Olde Town.



Higher-visibility decorative crosswalk example in Denver, Colorado

## Summary of Proposed Actions

Table 10 summarizes the actions needed to implement the programmatic and bicycle network recommendations for Olde Town.

**Table 10: Proposed Actions Summary for Olde Town**

Category	Proposed Action
Programs	4.01 Improve Bicycle Parking
	4.02 Continue Support of Olde Town Cruisers
	4.03 Expand the Olde Town Bike to Work Day Station
	4.04 Launch a Bicycle-Friendly Business Program
	4.05 Develop an Employee Recognition Program
	4.06 Conduct Bicycle Parking Occupancy Counts
	4.07 Enhance Enforcement
	4.08 Pursue Temporary Street Interventions
Network and Spot Improvements	4.09 Make better connections to Olde Town
	4.10 Reduce speed limit in Olde Town to 20 mph
	4.11 Implement modifications to Grandview Avenue
	4.12 Emphasize 57 <sup>th</sup> Avenue
	4.13 Enhance crosswalks
	4.14 Trail to on-street connections

THIS PAGE INTENTIONALLY LEFT BLANK

# CHAPTER 5

## IMPLEMENTATION STRATEGY

# Chapter 5: Implementation Strategy

The program, policy, and infrastructure recommendations in Chapters 2-4 provide strategies and actions that will help Arvada become a better place to bicycle. The implementation of these actions will necessarily occur over time commensurate with available resources and related opportunities. This chapter summarizes the implementation strategies to realize the City's vision for a citywide bicycle network.

## Implementation Approach

The implementation approach for the Proposed Bicycle Network should be pragmatic, opportunistic, and consistent with the goals of this Bicycle Master Plan. To help focus the City's resources, the Proposed Bicycle Network (presented in Chapter 3 and Figure 6) was further analyzed to develop priority project lists for the City as it completes in-house projects or pursues funding for larger projects. The implementation strategy was developed in three main steps:

1. The Proposed Bicycle Network was divided into discrete projects for implementation;
2. The projects were analyzed and evaluated using the NCHRP ActiveTrans Priority Tool<sup>10</sup> and factors that are directly related to the Plan goals; and
3. The top 10 in-house and capital projects were summarized separately, and planning-level cost estimates were developed for each.

The implementation approach recognizes that on-street bicycle projects will be implemented in one of three primary ways:

1. Reconfiguration of existing street space by adding signs, pavement markings, and potentially removing or consolidating on-street parking, especially moving all parking to one side of the street.
2. Modifications within the street right-of-way to add a sidepath.
3. Reconstruction of a street.

Adopting this Plan does not commit the City to implementing the recommendations per the proposed prioritization, summarized in the following section. The approach to expanding Arvada's bicycle network considers what is realistic given historic and anticipated funding, while also providing the City flexibility to respond to changing conditions and opportunities that may arise.

## Recommended Projects

The Proposed Bicycle Network presented in Chapter 3 was divided into discrete, reasonable projects. This process resulted in 128 bicycle projects, shown in Figure 8. These projects were divided into two categories based on the project's complexity: in-house projects and capital projects. Planning-level cost estimates were developed for these projects, as described in more detail later in this chapter. Additional details regarding project partitioning and prioritization, as well as a full list of projects, can be found in Appendix B.

<sup>10</sup> The ActiveTrans Priority Tool was developed by the National Cooperative Highway Research Program to help planners and engineers manage the prioritization of bicycle and pedestrian projects in a responsive, flexible, and transparent manner. The prioritization scoping process includes the selection of factors (e.g., safety, demand), factor weights, variables (e.g., speed, volume), and an assessment of existing data. This information is added to the prioritization tool to create a ranked list of projects.

# Bicycle Projects

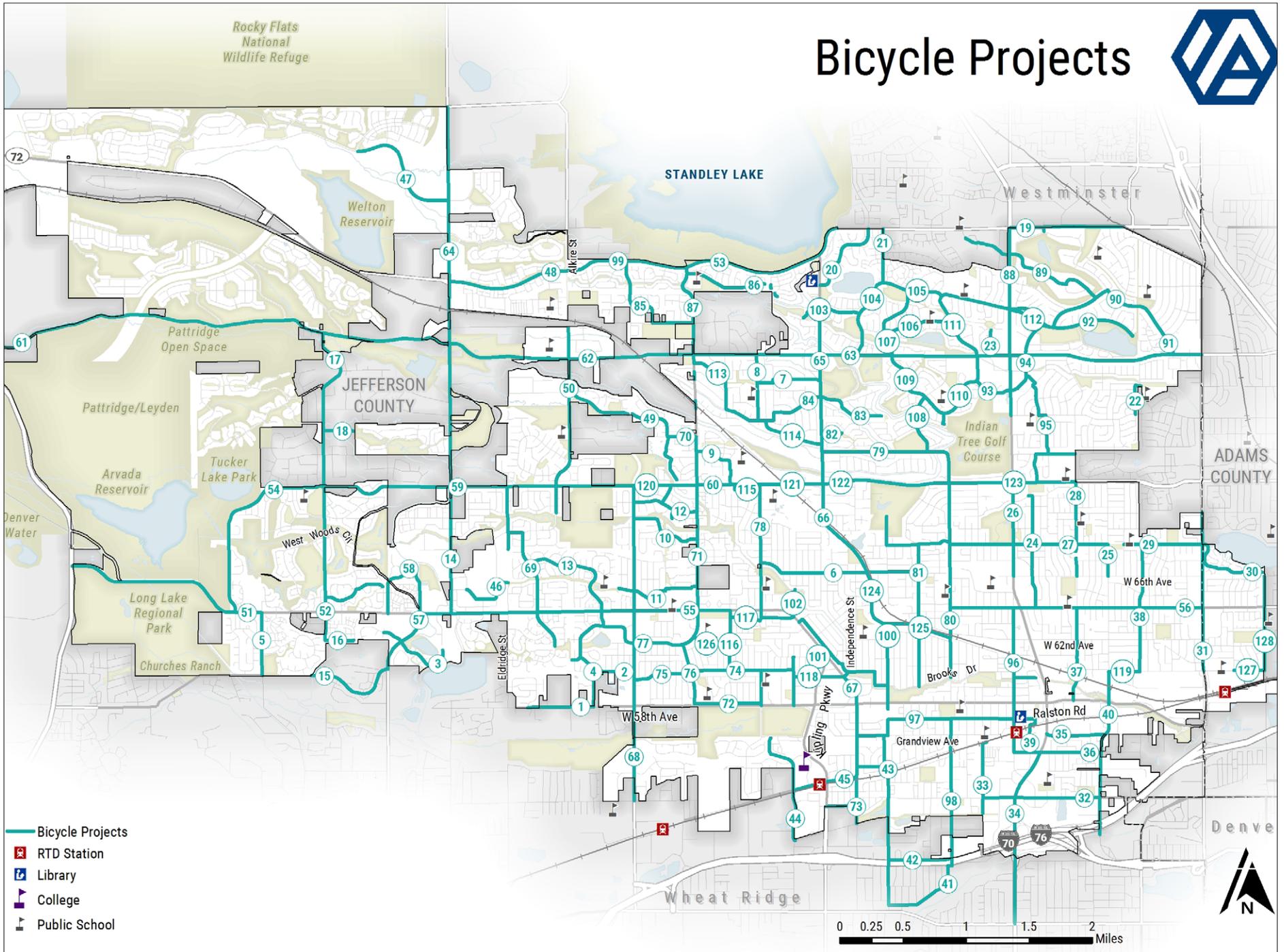


Figure 8: Recommended Bicycle Projects

## Priority In-House Projects

In-house projects are those projects that can be completed by City of Arvada staff since they are lower in cost and take advantage of existing maintenance programs already funded by the City. These projects include the shared lane markings, bike boulevards, bike lanes, and buffered bike lanes. Implementing the projects in this list primarily involve signing and restriping, which can be accomplished cost-effectively as a part of regular street resurfacing. Table 11 identifies the top 10 in-house projects and their planning-level cost estimates.

**Table 11: Top 10 In-House Projects**

Priority	Project ID	Primary Corridor	Location	Facility Type	Planning-Level Cost Estimate
1	97	W 57th Ave, Garrison St, Grandview Ave	Between Independence St and Upham St	Bike Lane, Bike Boulevard	\$95,000
2	96	Olde Wadsworth Blvd	Between W 55th Ave and W 64th Ave	Bike Lane, Shared Lane Markings	\$340,000
3	118	W 59th Pl, Brooks Dr, Miller St	Between W 60th Ave and Garrison St	Bike Lane, Shared Lane Markings	\$81,000
4	77	W 63rd Ave, Zinnia St, W 62 Ave	Between Alkire Ct and W 64th Ave	Bike Lane	\$170,000
5	74	W 60th Ave	Between Simms St and Miller St	Bike Boulevard	\$27,000
6	81	Estes St, W 66th Ave, W 68th Ave, Garrison St	Between Brooks Dr and W 68th Ave	Bike Boulevard	\$72,000
7	71	Simms St	Between W 64th Ave and W 75th Ave	Buffered Bike Lane	\$263,000
8	100	Garrison St	Between Ralston Rd and Oberon Rd	Buffered Bike Lane	\$82,000
9	69	Wyndham Park Dr/ Deframe St, Elridge St	Between Braun Cir and W 68th Ave; W 68th Ave and W 72nd Ave	Buffered Bike Lane	\$238,000
10	80	Carr St	Between Brooks Dr and Heritage Canal Trail	Buffered Bike Lane	\$305,000

## Priority Capital Projects

Capital projects are those projects that are more challenging to implement and generally higher in cost. These projects include separated bike lanes and sidepaths and may require interjurisdictional coordination and more intensive construction activity. Table 12 identifies the top 10 capital projects and their planning-level cost estimates.

**Table 12: Top 10 Capital Projects**

Priority	Project ID	Primary Corridor	Location	Primary Facility Type	Planning-Level Cost Estimate
1	55	W 64th Ave	Between McIntyre Pkwy and Quail St	Sidepath	\$13,120,000
2	68	Ward Rd	Between W 52nd Ave and W 72nd Ave	Separated Bike Lane	\$2,010,000
3	56	W 64th Ave	Between Carr St and Sheridan Blvd	Separated Bike Lane	\$450,000
4	63	W 80th Ave	Between Kipling St and Sheridan Blvd	Sidepath	\$16,210,000
5	88	Wadsworth Blvd	Between W 76th Ave and W 88th Ave	Sidepath	\$7,920,000
6	27	W 68th Ave	Between Carr St and Lamar St	Separated Bike Lane	\$280,000
7	59	W 72nd Ave	Between Quaker St and Ward Rd	Sidepath	\$11,250,000
8	43	Garrison St	Between W45th Pl and Ridge Rd/Gyda Dr	Separated Bike Lane	\$130,000
9	65	Kipling St	Between W 72nd Ave and Dry Creek Trail	Sidepath	\$3,520,000
10	34	Wadsworth Blvd	Between W 44th Ave and W 55th Ave	Sidepath	\$4,670,000

Figure 9 shows the top 10 in-house and top 10 capital projects.

# Top 20 Bicycle Projects

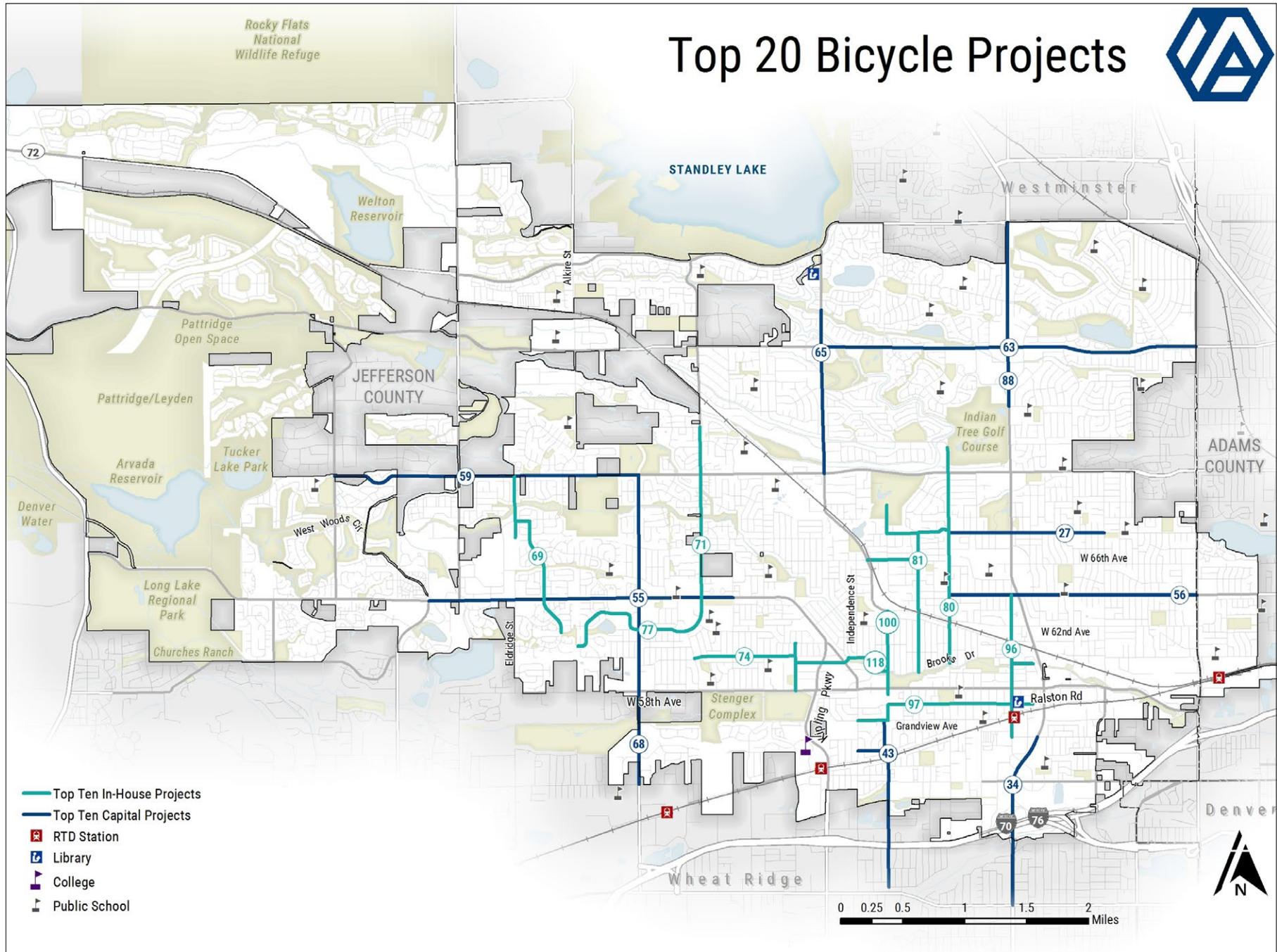


Figure 9: Top 10 In-House and Top 10 Capital Projects

## Investment

The planning-level estimated cost for each of the priority projects is shown in Tables 11 and 12. The cost to build bicycle transportation projects can vary greatly depending on the type of facility and the existing conditions in the project area. For example, shared lane pavement markings and signing are relatively easy to install because existing infrastructure is generally not impacted; however, facilities that require relocating existing curb lines or pavement edges can impact the removal and replacement of curb and gutter, drainage infrastructure, utilities, and landscaping, thereby substantially increasing the cost of a project. Additional details on the development of the planning-level cost estimates can be found in Appendix B.



Stakeholders will be integral in implementing this Plan

## Funding Opportunities

The City has implemented the existing on-street bicycle network using street maintenance resources and dedicated funding granted by City Council. Similarly, implementation of the 2017 Plan will require significant capital investment, sustained commitment from City Council, and the pursuit of other funding opportunities.

To implement the proposed bicycle network and recommended programs, Arvada should continue using its general fund to implement the proposed bicycle network. Where possible, general funds can be used to leverage regional, state, and federal funding. The City should also continue leveraging development-driven projects to implement portions of the bicycle network and/or ensure that end-of-trip facilities, such as bike parking, are available.

The following funding sources are most likely to fit Arvada's funding needs:

### Bond Financing

Bond financing is a long-term borrowing tool used to provide funds for capital projects. Bond measures are approved by voters and can authorize specific projects, including transportation improvements identified through the legislative process.

### Impact Fees

Impact fees are paid by property developers to fund a fraction of the improvements that are required because of the new growth. Impact fees can be instituted to fund bicycle projects, such as trails. Because fees are typically tied to trip generation rates and vehicular traffic impacts produced by a proposed project, establishing a clear nexus between the impact fee and the project's impacts is critical. Impact fees may be considered at a citywide scale or for new developments within the city.

### Safe Routes to Schools (SRTS)

This program provides funding for education, enforcement, evaluations, and infrastructure improvements near elementary and middle schools that promote students walking and bicycling to school. Currently, the SRTS program is administered by CDOT. The City and its partners can apply for infrastructure and non-infrastructure projects through a competitive application process.

### Congestion Mitigation and Air Quality Improvement (CMAQ) Program

The CMAQ program supports surface transportation projects, including active transportation projects, due to their linkage to air quality improvements. Because Arvada is within the larger Nonattainment and Maintenance Areas that are not in compliance with the National Ambient Air Quality Standards, projects that can improve air quality via incorporation of active transportation modes could be eligible for CMAQ funding.

### Highway Safety Improvement Program (HSIP)

HSIP is a state-run program with funds available for 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 has identified bicycle safety as one of nine Emphasis Areas and is therefore more likely to fund bicycle safety projects.

### Colorado Parks and Wildlife (CPW) Trails Program

CPW receives four types of grant funds which are distributed annually to successful trail grant applicants: Great Outdoors Colorado (GOCO) local government matching grants, GOCO state park matching grants, federal Recreational Trails Program (RTP) funds, and federal Land and Water Conservation Funds (LWCF). This is a state-run program.

### Surface Transportation Block Grant (STBG) Program

The STBG is a flexible program that can be used by municipalities for projects to preserve and improve the conditions and performance on a variety of projects. Related to bicycle transportation, the STBG fund can be used on bridge and tunnel projects on any public road and pedestrian and bicycle infrastructure. Eligibility includes bicycle transportation, recreational trails, and any activity eligible under the Set-Aside program (see below). In the Denver Region, DRCOG and CDOT control a share of the funds to distribute locally through a competitive process.

### Surface Transportation Block Grant Program Set-Aside

Funding through the Set-Aside can be used for the construction of sidewalks, walkways or curb ramps; bike lane striping, bike parking and bus racks; traffic calming; off-road trails; bike and pedestrian bridges and underpasses; ADA compliance; acquisition of railroad rights-of-way; and planning, design and construction of multiuse trails and rail-with-trail projects. In the Denver Region, DRCOG controls a share of the funds to distribute locally through a competitive process.

### The Kresge Foundation

The Kresge Foundation provides grants for projects that improve health at the community level. The goal of these grants is to create a comprehensive system that improves health outcomes, promotes health equity, reduces per-capita health costs, removes barriers to health, and offers the greatest promise for adoption on a larger scale. Active transportation facilities may be competitive for this funding.

### The Conservation Fund

The Conservation Fund provides loans for land acquisition to support the creation of bicycle and pedestrian facilities. Their loan program offers flexible financing as well as sustained and expert technical assistance to organizations aiming to protect key properties in their communities.

## Summary and Next Steps

Completing the Proposed Bicycle Network, developing new and enhanced bicycle-related programs, and modifying some city policies will help create a premium bicycling experience in Arvada. With comfortable and safe on-street bicycle facilities that connect to each other, to the city's beloved paved trails, and to major destinations, bicycling for all types of trips will become convenient and attractive. As Arvada redevelops around transit and other amenities and develops new housing and commercial spaces, this Plan can be a roadmap for future bicycle infrastructure and programmatic initiatives.

## Interjurisdictional Coordination

During the development of this Plan, regional and interjurisdictional connections were emphasized by City staff, stakeholders, and the public. Commuting and recreational patterns in Arvada and west Denver mean that people regularly bike and take transit across city lines. To make that experience positive and intuitive, these regional connections were considered when developing the Proposed Bicycle Network.

Notably, four other west Denver communities—Westminster, Lakewood, Golden, and Wheat Ridge—either recently completed or are currently developing bicycle master plans. This presents a tremendous opportunity to coordinate implementation and in some cases, extend the reach of each city's projects.

While most of the proposed projects fall within Arvada City limits, there are many that abut city limit boundaries with unincorporated Jefferson County or adjacent communities like Wheat Ridge or Westminster. For projects that will require interagency funding agreements or coordination for street restriping or reconstruction, Arvada will need to continue to work with neighboring communities or agencies to achieve success. For example, wayfinding signage should be implemented in coordination with Jefferson County to ensure that it is consistent with the Jeffco Regional Bikeways Wayfinding Guide. First and final mile connections to the G Line stations should continue to be coordinated with Wheat Ridge.



Bike parking is a user amenity that encourages greater bicycle ridership.

# **APPENDIX A**

## **SUMMARY OF PUBLIC ENGAGEMENT**



## MEMORANDUM

**Date:** April 19, 2017  
**To:** Wesley Dismore  
**Organization:** City of Arvada  
**From:** Arvada Bicycle Master Plan Project Team  
**Project:** 2017 Arvada Bicycle Master Plan  
**Re:** Summary of Public Engagement

The 2017 Arvada Bicycle Master Plan (Bike Plan) project includes public and stakeholder engagement focused on the following groups:

1. *The Internal Advisory Committee (IAT):* Representatives from the City and other agencies.
2. *The External Advisory Team (EAT):* Representatives from primarily outside of City government.
3. *City Council and Advisory Boards:* Provide information to this already-existing group.
4. *General Public:* Consists of three categories of people that we are trying to reach, the first two which are the focus of this Plan:
  - Arvada residents who would like to ride bicycles more but currently do not (“interested but concerned”)
  - Residents of all ages, races, incomes, and genders
  - Those already biking and engaged in bike culture

This memorandum summarizes the events and ways the project team engaged the general public throughout this planning effort.

### **ARVADA TRAILS DAY**

The project team spoke to over 50 people at Arvada Trails Day on June 4<sup>th</sup>, 2016 at Ralston Central Park between 8:30 AM and 2:30 PM. Trails Day participants were given a passport to collect stamps from a variety of booths at the event, including this project’s.

This event targeted the “interested but concerned” audience and provided a forum to advertise the project, ask visioning questions, and learn about existing bicycling conditions. Beyond informal conversations about biking, the project team had two large maps and questions written on large posters. People were asked to provide a few words to describe biking in Arvada today and what they would like to use in the future:

## Appendix A: Public Engagement Summary

### 1. What three words best describe bicycling in Arvada today?

- Fun
- Exercise
- Ralston Creek Trail
- Summer
- New Parks
- Exercise
- Awesome bicycle trails!
- Commuting poor
- Great trails
- Unaware motorists

### 2. What three words would you like to use to describe bicycling in Arvada in the future?

- Even better trails!
- New trails
- A good/safe community
- More active people
- Exciting
- Sunny
- Rough
- Great community
- Trails
- North/south
- Bicycling community
- Bike lanes
- Connected
- Bike racks



Figure A-1: June 2016 Arvada Trails Day

### *Tell us where you live and ride!*

Participants added dots to a map of the existing bikeways within the City to show us where they live and want to go. This activity sparked discussions about the experience of biking in Arvada. Connectivity throughout the City, including a loop to connect the City's many trails, was noted by several participants. Responses showed a clear response for access to recreation spaces like Leyden Creek Trail and Standley Lake, but also community centers like the Arvada Center and Pomona High School.

Appendix A: Public Engagement Summary



Figure A-2: Arvada Trails Day, June 2016



Figure A-3: Arvada Trails Day "Where Would You Like to Ride?" Exercise

### ONLINE INTERACTIVE MAP

The project team developed an online interactive map that was available for input between June and October 2016. Users were asked to identify routes they already ride, ones they would like to ride, and any barriers to bicycling. The map was available as a link from the Bicycling in Arvada page of the City's website and participation was advertised and encouraged via public outreach events like Arvada Trails Day and through social media blasts. A summary of input from is included in the State of Bicycling in Arvada Report.

### OPEN HOUSE

A project open house was held at the Ralston Central Park on Thursday, July 21, 2016 between 6:00 PM and 8:00 PM. Project boards, maps, and materials were set up under the shaded picnic area located just south of the Ralston Creek Trail as to capture surrounding foot and bike traffic. Approximately 60 community members participated in the open house.

#### *What Type of Rider Are You?*

At the welcome table, attendees were asked to add a dot to a board indicating their level of comfort on a bike. While most attendees indicated they were more experienced and confident bicyclists, many also indicated regularly riding with children, highlighting the want and need for increased protection and separation from shared traffic.

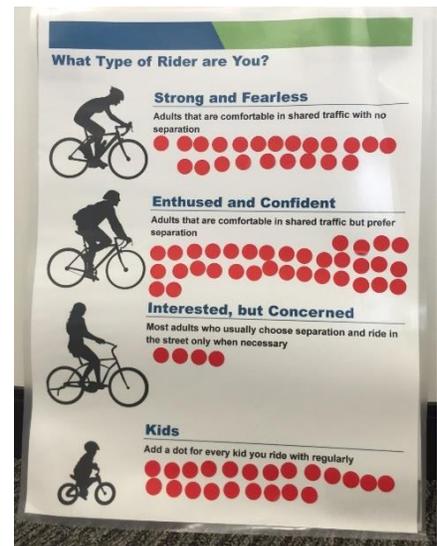


Figure A-4: Welcome Table and Rider Types

### What's Most Important to You?

Participants were given three voting dots and asked to identify *What's Most Important to You?* in each of the following categories: access, facilities, and programs. This exercise was intended as an introduction to the Bike Plan themes and as a way to gauge priorities. Most questions and conversations at this station were focused on clarifying what was meant by “facilities” and “programs.”

Each category (access, facilities, and programs) had a clear winner. Residents showed overwhelming support for:

- Access to recreation,
- Expanding the bike network and closing gaps between existing bikeways, and
- More bicycle encouragement programs.

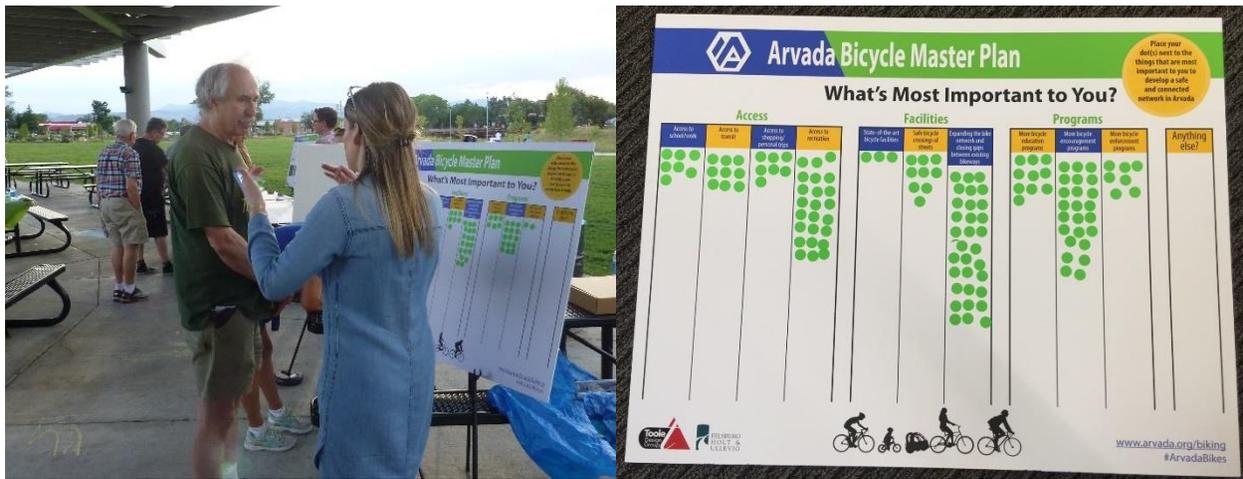


Figure A-5: What's Most Important to You?

### Education, Enforcement, and Encouragement Programs

The following station gathered input on potential education, enforcement, and encouragement programs. Participants were encouraged to write comments and additional ideas on post-it notes to supplement the ideas provided by the project team. The following suggestions helped to inform the the programs recommended in the Bike Plan.

- Equal enforcement (and tickets!) for drivers and bicyclists alike (x8)
- Increased ticketing (x3)
- More school-based encouragement programs (x3)
- Driver awareness and education (x2)
- More wayfinding signage to direct trail users (x2)



Figure A-6: Education, Enforcement, and Encouragement Programs

### **Mapping Exercises**

Attendees provided input on the existing bikeways map by adding dots to indicate where they live and where they want to go. This exercise sparked a discussion about the state of biking in Arvada, including the area’s best places to bike (the Ralston Creek Trail) and the least comfortable (Indiana Street). North-south connectivity continues to be a challenge for residents and many people commented on the challenges of getting around in the northwest corner of the city due to the street network, railroads, and a lack of bicycle facilities.



**Figure A-7: Open House Attendees Provide Input**

### **Bicycle Comfort Assessment**

The final station presented the Level of Traffic Stress (LTS) concept and citywide LTS maps. Participants were asked to identify their preferred bikeways to ride on (trails and protected bike lanes were the clear favorites). The LTS maps helped to illustrate the challenge of traveling across difficult streets and intersections to connect low-stress “islands” throughout the city. Specific routes across higher stress locations were identified and were used in developing the proposed bicycle network in the Plan.



**Figure A-8: Creating Bridges Between Low-Stress Islands**

### TASTE OF ARVADA AND ONLINE SURVEY

The project team spoke to approximately 100 people at the Taste of Arvada event on Thursday, October 27<sup>th</sup>, 2016 at the APEX center between 5:00 PM and 8:00 PM.<sup>1</sup> The table was staffed by two members of the project team and two volunteers from the EAT.

This event targeted the “interested but concerned” audience and provided a forum talk about the Bike Plan, present the draft study network, and solicit targeted feedback. Materials included an updated project flyer, a flyer about the RTD Gold Line, an overview of Bicycling in Arvada Today, a voting board, and a map of the potential bikeway network. The table was located near the event entrance which facilitated engagement.



Figure A-9: Taste of Arvada, October 2016

<sup>1</sup> Arvada Chamber of Commerce. Taste of Arvada. Accessed Mar 31, 2017. <http://business.arvadachamber.org/events/details/taste-of-arvada-20239>

## Appendix A: Public Engagement Summary

The voting exercise asked participants simple questions to better understand the types of facilities they would feel most comfortable on and their preferred strategy to implement those facilities (see the “What Do You Think?” board below). Participants were given one vote per bicycle facility category, though some indicated an equal preference for buffered bike lanes and side paths, so two votes were given for that tie.

This exercise was an effective way to engage people in conversations about facility comfort and ideal bike experiences in the City. In regard to implementation, asking people to vote on the best strategy to build bikeways sparked conversations about tradeoffs to implement a complete bicyclce network.

Following the Taste of Arvada event, an online survey asked the same questions to reach a wider audience. The survey was available for 11 days between November 22 and December 2, 2016. A total of 157 responses were recorded.

The survey results represent the combined responses from the in-person and online survey.

**Arvada Bicycle Master Plan**

**What Do You Think?**

Which type of bikeway would you feel most comfortable on? What's the best strategy to make that happen?

1. On a typical Arvada street, which type of bikeway would you feel most comfortable and safe riding within?

**Shared Lanes**      **Bike Lanes**      **Buffered Bike Lanes**      **Side Path**      **Protected Bike Lanes**

2. Building bikeways takes physical space, money, and commitment. Which of the following strategies is best for building bikeways in Arvada?

**Travel Lane Removal**  
• Inexpensive  
• Traffic Impacts  
VOTE HERE!

**Parking Removal**  
• Inexpensive  
• Resident Impacts  
VOTE HERE!

**Road Widening**  
• Expensive  
• Potential Property Impacts  
VOTE HERE!

Toole Design Group      www.arvada.org/biking

Figure A-10: Taste of Arvada Voting

### Preferred Bikeway Type

For the question, “Which type of bikeway would you feel most comfortable and safe riding within?” a total of 287 votes were cast. Side path (32 percent), buffered bike lanes (25 percent), and protected bike lanes (24 percent) were the most preferred bikeway types, indicating that over 80 percent of participants would be most comfortable riding on bikeways with greater separation than what is offered by shared lanes or bike lanes.

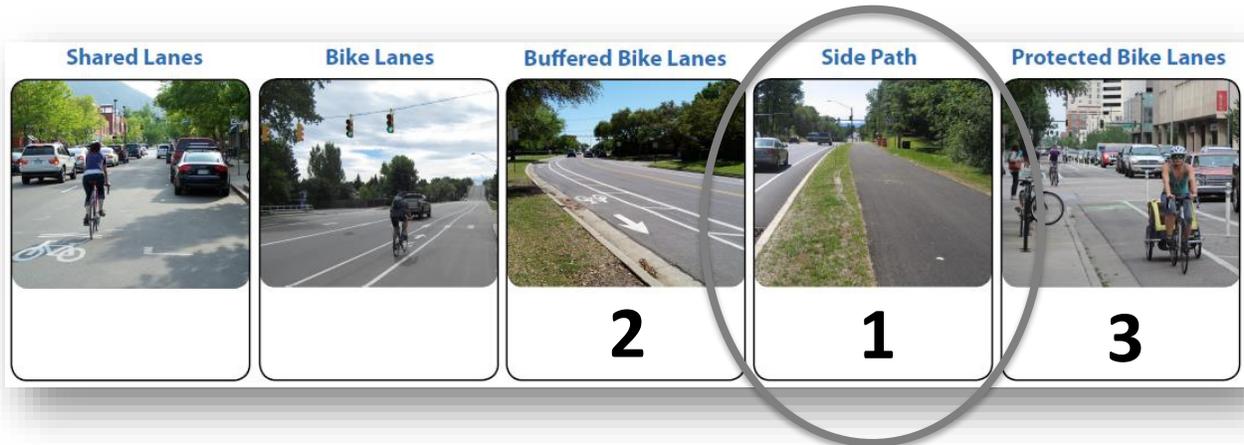
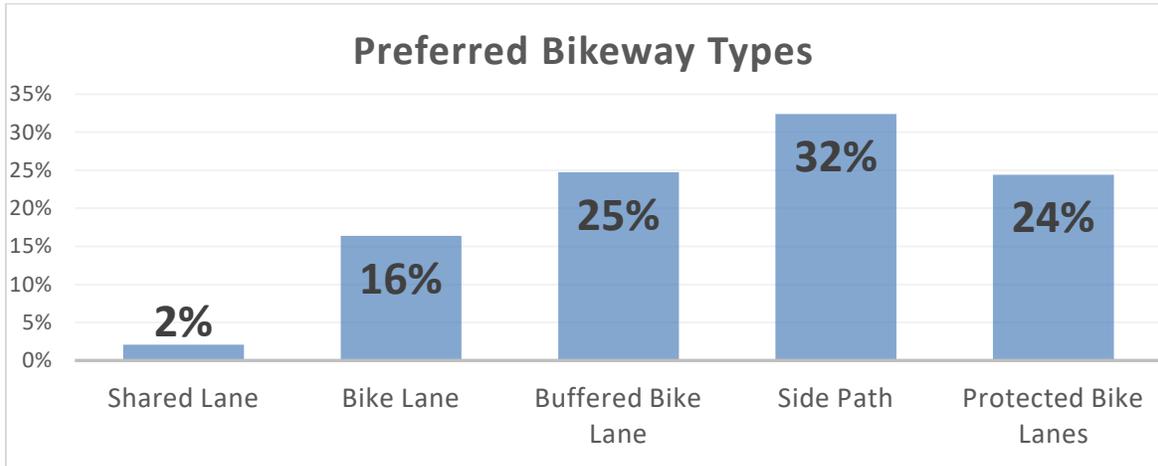


Figure A-11: Preferred Bikeway Types

**Preferred Implementation Strategy**

For the question, “Which of the following strategies is best for building bikeways in Arvada?” 231 votes were cast. The majority of participants voted for parking removal (43 percent) over travel lane removal (29 percent) or road widening (28 percent).

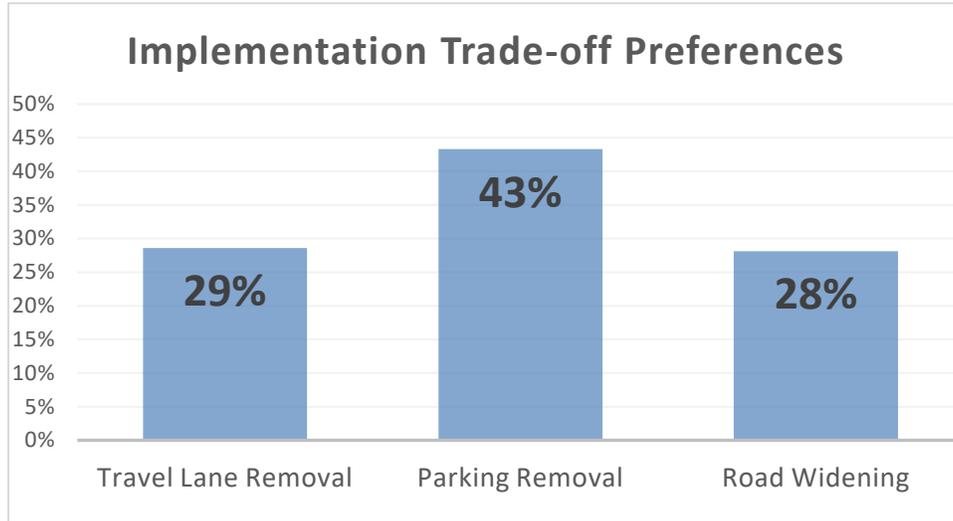


Figure A-12: Implementation Trade-off Preferences

# **APPENDIX B**

## **PRIORITIZATION PROCESS FOR RECOMMENDED FACILITIES**

## Prioritization Process for Recommended Facilities

This appendix describes the criteria and process used to determine the order of priority for the facility recommendations. The analysis and evaluation used the ActiveTrans Priority Tool, developed as part of NCHRP 7-17.<sup>1</sup>

### Prioritization

#### Phase 1: Scoping

The first phase of implementing the ActiveTrans tool is referred to as Scoping. In this step, community values are accounted for in the selection of prioritization criteria. Weights are assigned to these criteria based on their importance to the community. It is important that data representing these criteria are available and can be incorporated into a spreadsheet of data regarding the facilities.

For the Arvada Bicycle Master Plan, projects were prioritized using three evaluation criteria. These criteria included (1) connectivity to other bike facilities, (2) connectivity to destinations, and (3) household density. The criteria were selected to measure the usefulness of a facility for providing connectivity to destinations using the Proposed Bicycle Network, focusing on areas with higher household density where trips by bicycle would be more likely. These three criteria were seen to be of equal importance to the community and therefore were given the same weights in the prioritization process.

The recommended facilities were grouped into projects. Projects end points defined based on intersections with other bicycle facilities, type of implementation (e.g., parking removal, road diet, sidepath construction), and bridging natural or anthropomorphic barriers such as arterial streets. Project lengths were selected to be impactful but of a financially manageable scale.

#### *Evaluation Criteria*

Each of the three criteria was given a normalized score ranging from 0 to 10, with 10 being the best. The three scores were summed, with each criterion having equal weight. Each project was given a total score ranging from 0 to 30, with 30 being the best.

#### *Connectivity to Destinations*

This criterion considers a project's proximity to community destinations. A quarter-mile buffer was created around each project and spatially joined with destinations to determine the number of destinations within a quarter-mile of the project. A higher score indicates a greater potential for biking activity on the facility.

---

<sup>1</sup> ActiveTrans Priority Tool (website). Pedestrian and Bicycle Information Center (PBIC). University of North Carolina Highway Safety Research Center (HSRC). [http://www.pedbikeinfo.org/planning/tools\\_apt.cfm](http://www.pedbikeinfo.org/planning/tools_apt.cfm)

## Appendix B: Prioritization Process for Recommended Facilities

### Connectivity to Other Bike Facilities

This criterion reflects a project's connections to existing and proposed on-street bike facilities and trails. The number of connections between a project and existing or proposed facilities was calculated for each project. A higher score represents a higher level of network connectivity.

### Household Density

This criterion denotes the household density within a quarter-mile of a project. Household data at the block group level from the 2016 American Community Survey (ACS) were used to complete this analysis. A higher score reflects a greater number of residents being served.

## Phase 2: Prioritization

A GIS spatial analysis was completed to determine each project's score. This process consisted of the following analysis for each scoring criteria.

### *Connectivity to Destinations*

Destinations used in this analysis were determined earlier in the project at the network development stage. These include neighborhood centers, trail access points, major retail locations, schools, transit hubs and connections to adjacent communities. The total number of destinations that lay within 0.25 miles of a given project's route was tallied to determine the raw score for this criterion.

### *Connectivity to Other Bike Facilities*

This criterion counted connections to both existing and proposed on- and off-street bike facilities. The GIS analysis accounted for whether bicyclists would have the option to turn both right and left onto a connecting facility. That is, if a project intersected an existing bike facility at a four-legged intersection, that was counted as two connections. If a project intersected an existing facility at a T-intersection with the existing facility on the non-through leg, that was counted as one connection. Connections to existing and proposed facilities were summed to result in a raw connectivity score.

### *Household Density*

Because the resulting raw scores for these criteria had varying ranges, the raw scores from each criterion were scaled to a 0 to 10 scale. This created the equal weighting of criteria that was desired by the community. Each project was ranked based on the sum of these scaled scores. This full prioritized list was further broken down to aid in implementation based on whether a project was suitable for in-house implementation or necessitated the creation of a capital project.

The entire list of all 128 prioritized projects (Table B-1 below) includes the full list of capital and maintenance projects, and is shown in Figure 6 of the Plan. Lists of the top ten projects for in-house implementation and capital project implementation can be found in Tables 11 and 12 of the Plan.

## Appendix B: Prioritization Process for Recommended Facilities

**Table B-1: Project Prioritization**

*\*Refers to Figure 7: Recommended Bicycle Projects in Chapter 5 of the Plan.*

<b>PRIORITY RANKING</b>	<b>PROJECT ID*</b>	<b>DESTINATION SCORE</b>	<b>CONNECTIVITY SCORE</b>	<b>HOUSEHOLD DENSITY SCORE</b>	<b>TOTAL SCORE</b>	<b>PROJECT TYPE</b>
1	55	9	8.13	5.90	23.03	CAPITAL
2	97	10	6.25	5.59	21.84	IN-HOUSE
3	68	6	10.00	4.42	20.42	CAPITAL
4	56	5	8.75	6.49	20.24	CAPITAL
5	96	8	5.00	6.84	19.84	IN-HOUSE
6	118	5	6.25	8.39	19.64	IN-HOUSE
7	77	5	6.88	6.26	18.14	IN-HOUSE
8	74	5	4.38	8.69	18.06	IN-HOUSE
9	81	6	6.25	5.59	17.84	IN-HOUSE
10	71	4	8.13	5.57	17.69	IN-HOUSE
11	63	2	9.38	6.20	17.58	CAPITAL
12	100	6	3.75	7.42	17.17	IN-HOUSE
13	69	4	8.13	5.03	17.16	IN-HOUSE
14	112	4	5.63	7.20	16.83	IN-HOUSE
15	88	2	6.88	7.29	16.16	CAPITAL
16	80	3	7.50	5.59	16.09	IN-HOUSE
17	27	4	6.25	5.78	16.03	CAPITAL
18	59	5	8.13	2.65	15.77	CAPITAL
19	111	4	5.63	6.14	15.76	IN-HOUSE
20	43	5	5.00	5.55	15.55	CAPITAL
21	116	3	3.75	8.57	15.32	IN-HOUSE
22	107	2	6.88	6.40	15.27	IN-HOUSE
23	28	5	4.38	5.81	15.19	IN-HOUSE
24	65	1	10.00	4.00	15.00	CAPITAL
25	34	6	3.13	5.82	14.94	CAPITAL
26	50	6	6.25	2.68	14.93	IN-HOUSE
27	98	2	5.63	7.30	14.92	IN-HOUSE
28	89	2	3.13	9.58	14.70	IN-HOUSE
29	73	6	2.50	6.19	14.69	IN-HOUSE
30	13	4	3.75	6.94	14.69	IN-HOUSE
31	78	2	5.00	7.15	14.15	IN-HOUSE

Appendix B: Prioritization Process for Recommended Facilities

<b>PRIORITY RANKING</b>	<b>PROJECT ID*</b>	<b>DESTINATION SCORE</b>	<b>CONNECTIVITY SCORE</b>	<b>HOUSEHOLD DENSITY SCORE</b>	<b>TOTAL SCORE</b>	<b>PROJECT TYPE</b>
32	54	6	6.25	1.74	13.99	IN-HOUSE
33	33	3	3.13	7.81	13.94	IN-HOUSE
34	102	1	4.38	8.49	13.86	CAPITAL
35	105	3	3.75	6.99	13.74	IN-HOUSE
36	95	3	5.00	5.63	13.63	IN-HOUSE
37	11	3	3.75	6.83	13.58	IN-HOUSE
38	57	6	5.00	2.48	13.48	IN-HOUSE
39	91	2	3.13	8.32	13.44	IN-HOUSE
40	36	5	3.13	5.25	13.37	IN-HOUSE
41	72	4	3.13	6.19	13.32	IN-HOUSE
42	32	4	3.13	6.18	13.30	CAPITAL
43	90	2	4.38	6.91	13.28	IN-HOUSE
44	117	0	3.13	10.00	13.13	IN-HOUSE
45	37	2	4.38	6.72	13.09	IN-HOUSE
46	31	4	3.13	5.85	12.97	CAPITAL
47	76	3	4.38	5.57	12.94	IN-HOUSE
48	67	2	4.38	6.43	12.80	CAPITAL
49	106	3	3.13	6.48	12.61	IN-HOUSE
50	62	3	6.88	2.56	12.44	CAPITAL
51	104	1	5.63	5.70	12.33	IN-HOUSE
52	39	4	1.88	6.36	12.23	IN-HOUSE
53	22	2	1.88	8.26	12.14	IN-HOUSE
54	2	4	2.50	5.52	12.02	IN-HOUSE
55	10	2	4.38	5.54	11.92	IN-HOUSE
56	52	3	6.25	2.62	11.87	IN-HOUSE
57	123	2	5.00	4.83	11.83	CAPITAL
58	19	2	2.50	7.29	11.79	CAPITAL
59	14	5	4.38	2.33	11.71	IN-HOUSE
60	44	6	2.50	3.11	11.61	IN-HOUSE
61	35	4	2.50	5.08	11.58	IN-HOUSE
62	94	0	5.63	5.87	11.50	IN-HOUSE
63	26	2	3.75	5.70	11.45	CAPITAL
64	75	2	3.13	6.26	11.39	IN-HOUSE
65	53	5	3.13	3.26	11.38	CAPITAL

Appendix B: Prioritization Process for Recommended Facilities

<b>PRIORITY RANKING</b>	<b>PROJECT ID*</b>	<b>DESTINATION SCORE</b>	<b>CONNECTIVITY SCORE</b>	<b>HOUSEHOLD DENSITY SCORE</b>	<b>TOTAL SCORE</b>	<b>PROJECT TYPE</b>
66	58	4	4.38	2.92	11.30	IN-HOUSE
67	125	0	3.75	7.51	11.26	CAPITAL
68	60	2	4.38	4.85	11.22	CAPITAL
69	38	2	3.13	6.08	11.21	IN-HOUSE
70	45	3	3.75	4.37	11.12	IN-HOUSE
71	20	3	2.50	5.56	11.06	IN-HOUSE
72	126	1	3.13	6.93	11.05	IN-HOUSE
73	101	0	1.25	9.73	10.98	IN-HOUSE
74	6	2	3.13	5.81	10.93	IN-HOUSE
75	124	1	3.13	6.72	10.85	CAPITAL
76	113	2	5.63	3.22	10.84	IN-HOUSE
77	12	1	5.00	4.67	10.67	IN-HOUSE
78	103	2	3.75	4.79	10.54	IN-HOUSE
79	29	1	3.13	6.36	10.49	IN-HOUSE
80	87	2	5.63	2.86	10.48	IN-HOUSE
81	108	2	4.38	4.01	10.38	IN-HOUSE
82	109	1	4.38	5.00	10.37	IN-HOUSE
83	9	3	2.50	4.63	10.13	IN-HOUSE
84	25	2	1.88	6.18	10.05	IN-HOUSE
85	40	1	4.38	4.48	9.85	CAPITAL
86	92	1	2.50	6.24	9.74	IN-HOUSE
87	24	1	3.13	5.61	9.73	IN-HOUSE
88	122	2	4.38	3.35	9.72	CAPITAL
89	115	2	2.50	5.03	9.53	IN-HOUSE
90	64	1	7.50	1.02	9.52	CAPITAL
91	120	1	4.38	4.12	9.50	CAPITAL
92	79	2	3.75	3.70	9.45	CAPITAL
93	8	2	3.75	3.68	9.43	CAPITAL
94	21	0	1.88	7.37	9.25	IN-HOUSE
95	42	2	2.50	4.72	9.22	IN-HOUSE
96	86	4	1.88	3.34	9.22	IN-HOUSE
97	49	3	3.75	2.39	9.14	IN-HOUSE
98	30	1	1.88	6.26	9.14	IN-HOUSE
99	7	2	3.13	3.96	9.09	IN-HOUSE

Appendix B: Prioritization Process for Recommended Facilities

<b>PRIORITY RANKING</b>	<b>PROJECT ID*</b>	<b>DESTINATION SCORE</b>	<b>CONNECTIVITY SCORE</b>	<b>HOUSEHOLD DENSITY SCORE</b>	<b>TOTAL SCORE</b>	<b>PROJECT TYPE</b>
100	110	1	3.75	4.29	9.04	IN-HOUSE
101	119	1	1.88	5.90	8.77	IN-HOUSE
102	127	2	2.50	1.21	8.67	IN-HOUSE
103	4	2	2.50	4.04	8.54	IN-HOUSE
104	93	1	3.13	4.36	8.49	CAPITAL
105	5	3	3.13	2.22	8.34	IN-HOUSE
106	85	2	3.75	2.45	8.20	IN-HOUSE
107	121	1	3.13	3.86	7.98	CAPITAL
108	99	3	2.50	2.46	7.96	IN-HOUSE
109	83	1	2.50	4.41	7.91	IN-HOUSE
110	66	0	3.75	4.11	7.86	CAPITAL
111	128	1	1.88	1.45	7.83	CAPITAL
112	114	1	3.13	3.69	7.81	IN-HOUSE
113	3	4	1.88	1.92	7.80	IN-HOUSE
114	46	3	1.25	3.29	7.54	IN-HOUSE
115	84	1	2.50	3.99	7.49	IN-HOUSE
116	51	2	3.75	1.39	7.14	IN-HOUSE
117	41	1	1.25	4.86	7.11	IN-HOUSE
118	23	0	1.88	5.17	7.05	IN-HOUSE
119	17	1	5.00	0.96	6.96	CAPITAL
120	82	0	2.50	4.04	6.54	IN-HOUSE
121	70	1	2.50	2.99	6.49	IN-HOUSE
122	48	1	2.50	2.49	5.99	CAPITAL
123	1	2	0.63	2.88	5.51	CAPITAL
124	61	2	3.13	0.38	5.51	CAPITAL
125	15	1	1.25	2.38	4.63	IN-HOUSE
126	16	1	0.63	2.65	4.28	IN-HOUSE
127	47	1	2.50	0.08	3.58	IN-HOUSE
128	18	0	1.88	1.03	2.90	IN-HOUSE

## Investment

The cost to build bicycle transportation projects can vary greatly depending on the type of facility and the existing conditions in the project area. For example, shared lane pavement markings and signing are relatively easy to install because existing infrastructure is generally not impacted; however, facilities that require relocating existing curb lines or pavement edges can impact the removal and replacement of curb and gutter, drainage infrastructure, utilities, and landscaping, thereby substantially increasing the cost of a project.

## Cost Estimates

Planning-level cost estimates were developed for different types of bicycle facilities based on typical elements that would need to be added, removed, or modified to implement the recommended facility type. **Table B-2** provides the planning-level cost estimates. These per-mile costs were used to calculate the project cost estimates.

**Table B-2: Planning-Level Cost Estimates**

TYPE	COST PER MILE	ASSUMPTIONS
SHARED LANE MARKINGS	\$23,000	Signing and shared lane markings both directions
BIKE BOULEVARD/ NEIGHBORHOOD BIKEWAY	\$32,700	Signing (including bike boulevard branding) and shared lane markings both directions
BIKE LANE	\$94,800	Bike lane markings and bike lane signs both directions; no removal of existing markings
BUFFERED BIKE LANE	\$191,000	Buffered bike lane markings and signs both directions; removal and replacement of traffic lane lanes
SEPARATED BIKE LANE (SIDEWALK LEVEL)	\$3,490,000	Sidewalk level 7' bike lane on both sides; removal and replacement of curb and gutter, sidewalk
SEPARATED BIKE LANE (CURB SEPARATED)	\$920,000	Curb separation within existing street footprint (use of outside lane or parking lane for separated bike lane) both sides
SEPARATED BIKE LANE (FLEX-POST SEPARATED)	\$224,000	Flex-post separation within existing street footprint (use of outside lane or parking lane for separated bike lane) both sides
SIDE PATH (ONE SIDE)	\$2,670,000	10' asphalt side path with 5' separation; removal of sidewalk, one side
SIDE PATH (BOTH SIDES)	\$5,340,000	10' asphalt side path with 5' separation; removal of sidewalk, both sides

The per-mile construction cost estimates were developed by identifying pay items and establishing rough quantities. Unit costs are based on 2017 dollars and were assigned based on historical cost data from CDOT and other sources. Please note that the estimates do not include any costs for engineering analysis and design, easement or Right-of-Way acquisition, or the cost for ongoing maintenance. Please

## Appendix B: Prioritization Process for Recommended Facilities

note that rough costs have been assigned to some general categories such as utility relocations, however these costs can vary widely depending on the exact details and nature of the work. The overall estimates are intended to be general and used for planning purposes. Construction costs will vary based on the ultimate project scope (i.e. potential combination of projects) and economic conditions at the time of construction.

# **APPENDIX C**

## **STATE OF BICYCLING IN ARVADA**

# State of Bicycling in Arvada

November 2016

## Background

Arvada is a community in change. It's adapting to new growth and a new focus on regional multimodal transportation investments. Recent planning efforts, including the 2015 *Parks Master Plan*, envision an Arvada in which residents are connected to every park, trail and open space system with routes designed for biking, walking and active transportation. The 2014-2019 *City Strategic Plan* states that by 2019, all identified trail gaps and connection points will be built or complete and that the use of alternate travel modes for commuting will increase from 12 percent to 15 percent.

The City is building on these previous efforts by developing the *Bicycle Master Plan*. This Plan seeks to create an even safer and more inviting bicycling environment in Arvada—where people of all ages and abilities can safely and comfortably ride a bicycle. This report serves as a summary of the state of bicycling in Arvada, and includes information, data, and analysis on the following:

- Bicycling context in Arvada
- Ridership and safety
- Existing bicycle facilities
- Bicycle-related programs and policies

There are 130 miles of trails and 59 miles of on-street bike facilities in Arvada. Today, people bike in Arvada for fun, exercise, and utility and there is a strong culture of recreational riding. There are several active organizations to support biking, education programs, and a growing interest in transforming Arvada into a world class city for bicycling. Because of the City's bicycle-related education and enforcement, it was awarded a Silver Bicycle Friendly Community designation by the League of American of Bicyclists (LAB) in 2014. However, ridership can still be significantly increased. The bicycle commute rate is less than one percent and community members cite improvements in safety, comfort, and connectivity as reasons to ride more.

## Planning Context

### Land Use and Character

Arvada is a first ring suburb that sits northwest of Denver and north of Interstate 70 (I-70). It is primarily located in Jefferson County with a small portion in Adams County. At 35 square miles and just over 115,000 residents, the city is largely residential, with some pockets of commercial and mixed-use activity (Figure C-1). The eastern portion of Arvada is flanked by open space and parks, greenspace that is

carried throughout the City's numerous parks and trails. The character of the city is mostly low-density suburban development with single-family residential housing, commercial development along major arterials, and a non-gridded street pattern.

Arvada's neighbors—Wheat Ridge to the south, Westminster to the northeast, and Denver to the southwest—provide additional job centers, transit, and recreational opportunities. However, there are limited and difficult bicycle connections between Arvada and its neighbors due to I-70, US 36, railroads, unincorporated areas of Jefferson County, and other challenges.

## Related Plans and Policies

The city, state and region have adopted a number of plans that include evaluation of and recommendations for bicycling. This section summarizes the relevant recommendations from existing plans that will inform this planning process.

### *Arvada Comprehensive Plan (2014)*

The City of Arvada's *2014 Comprehensive Plan* includes a bicycle plan that outlines an approach to fulfill the City's multimodal transportation goal by providing a complete street and trail system that accommodates all types of bicyclists throughout the city. The plan envisions an integrated approach to transportation planning that provides high intermodal connectivity, including the following bicycle specific goals and policies:

- Establish bicycle level of service standards for all street types;
- Incorporate a complete street and trail system that accommodates all types of bicyclists;
- Improve the safety and connectedness of the bicycle system by identifying needed connections and gaps within the existing system;
- Increase the use of bicycling as an alternative mode via travel demand management strategies including system development, bike parking and bike/transit integration;
- Provide complete bicycling corridors with seamless transitions between facility types that create connections between neighborhoods, activity centers and to the greater regional system; and
- Provide information in multiple forms to assist bicyclists in wayfinding and to communicate the availability of different types of bike facilities.

### *Jefferson County – Countywide Transportation Plan (1998, amended 2002 and 2014)*

Jefferson County's *Countywide Transportation Plan* identifies four primary policy areas to guide bicycle and pedestrian investments in the County, including:

- Coordination - All agencies involved with the planning and implementation of pedestrian and bicycle facilities should work together to develop a coordinated effort to complete a project which is safe and convenient for alternative modes.
- Maintenance - It is recommended that the Cities and County evaluate how issues such as citizen concerns, regular maintenance and snow/sand removal are addressed. If deficiencies exist, appropriate departments would set up programs to meet the needs of people using alternative mode facilities.
- Right-of-Way - The inclusion of the acquisition of Right-of-Way (ROW) for the construction of safe and convenient pedestrian and bicycle facilities is needed when building new roadways.

- Funding - There should be coordinated efforts to actively compete for alternative mode funding sources through the Denver Regional Council of Governments (DRCOG) and the Colorado Department of Transportation (CDOT).

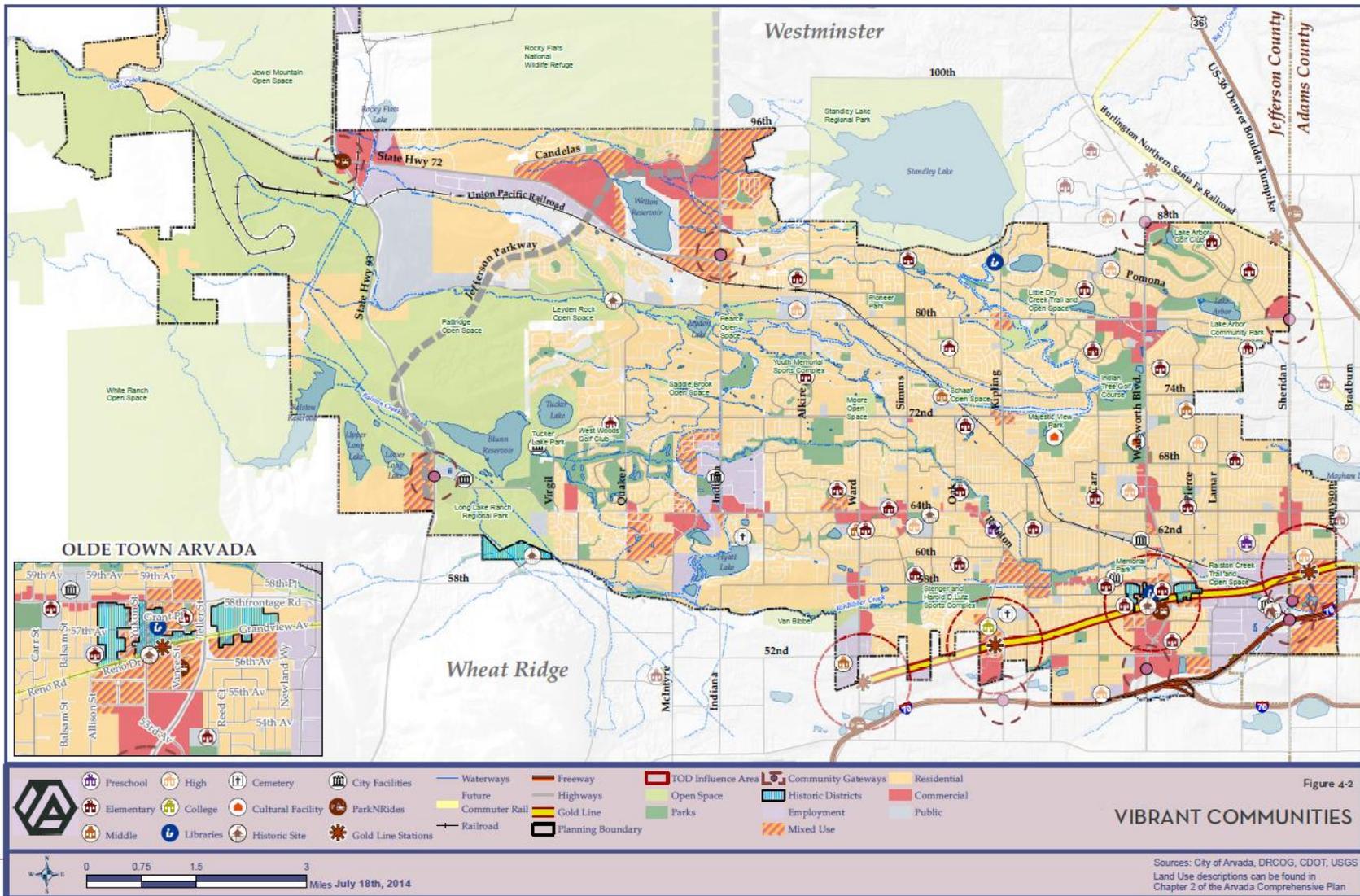


Figure C-1: Arvada Comprehensive Plan Land Use (2014)

### ***Jefferson County Bicycle and Pedestrian Plan (2012)***

The *Jefferson Bicycle and Pedestrian Plan* supports the goals and policies identified in the *Jefferson Countywide Transportation Plan* and *County Comprehensive Master Plan*, and outlines a long-term vision for the County by providing details about future transportation investments to help the County achieve its goal of increasing the number of bike and walk trips. A regional approach that focuses on bicycle and pedestrian accommodations that are continuous and consistent throughout the cities, towns, and unincorporated areas of Jefferson County is also identified.

### ***Adams County Transportation Plan (2012)***

As part of Adams County, Arvada's bike plan should also complement the *Adams Countywide Bicycle Plan* as outlined in the *Adams County Transportation Plan*. The *Countywide Bicycle Plan* acknowledges that much of the bicycle network in the urbanized portion of the county will be the responsibility of the local municipalities. However, the plan also highlights the importance of connections to municipal bikeways and regional bicycle facilities as the responsibility of the County.

### ***Arvada Parks, Trails and Open Space Master Plan (2016)***

The *Parks, Trails and Open Space Master Plan* outlines a vision and implementable plan to increase the City's green spaces and access to recreation. This plan calls for expanded open space spines (Ralston Creek, Van Bibber Trail, and north-south corridors) that will create an open space web to connect to other creeks, canals and open spaces in a contiguous and regionally-focused way. The Plan also calls for the development of a series of interconnected cultural and fitness trails to follow along these green spines.

### ***Arvada Pedestrian and Bicycle Access Plan (2009)***

The *Arvada Pedestrian and Bicycle Access Plan* primarily focuses on bicycle and pedestrian access needs to the Arvada Ridge, Olde Town, and Sheridan transit stations. The objectives include promoting and providing intermodal connections by bicycle and minimizing parking requirements by increasing active modes of access to transit.

the purpose was to develop a plan that retrofits existing roads that lead to the transit stations with wide sidewalks and bikeways.

## **Investments in Bicycling**

Over the last five years the City has invested substantially in expanding the network of bike and trail facilities. Notable projects include:

- Ridge Road Bike and Pedestrian Improvements: The Ridge Road bridge over Kipling Street was widened to include attached sidewalk on the north side and bike lanes on both sides.
- Kipling Underpass: An underpass was constructed below Kipling Street, thereby connecting the Van Bibber Creek Trail with the street grid to the east.
- West 57<sup>th</sup> Avenue: Sidewalks were widened on the north side of West 57<sup>th</sup> Avenue and bike lanes were installed between Independence and Balsam Streets.

- Rocky Mountain Greenway: A soft-surface trail and underpass under West 86<sup>th</sup> Parkway. connect the Little Dry Creek Trail to the Standley Lake Open Space in Westminster.
- Garrison Street Connection: Through a Safe Routes to School (SRTS) grant, a concrete trail spur was built to complete Garrison Street between Ralston Road and West 57<sup>th</sup> Avenue, by the Arvada Community Garden.
- Wolff Park Reconstruction: Wolff Park was completely rebuilt to include a north-south bike path connection along Carr Street between Ralston Road and West 57<sup>th</sup> Avenue.
- West 74<sup>th</sup> Avenue Bridge Replacement: A creek bridge was widened and sidewalk added on the north side of West 74<sup>th</sup> Avenue between Robby Ferruffino Park and Carr Street.
- Annual Maintenance: Several miles of on-street bike lanes were added by narrowing vehicle travel lanes and/or parking lanes during the annual mill and overlay street maintenance program.
- Park Construction: Several local and connecting trails were built as part of new construction of neighborhood parks within the City.

Total capital costs for these projects exceeded \$5 Million over five years, of which approximately half was provided by State and federal grants.<sup>1</sup>

## Ridership and Safety

The Arvada Citizen Survey is a biannual survey that functions as a consumer report card for the City by providing residents the opportunity to rate their satisfaction with their quality of life, community amenities, and local government. The survey offers a localized and nuanced snapshot of transportation. Of those surveyed, 19 percent reported riding a bike for fun or for exercise at least twice a week, whereas only five percent of people surveyed reported riding their bikes to commute to work at least twice a week.<sup>2</sup>

Arvada's bicycle commute rate between 2008 and 2012 was at .6 percent, according to the U.S. Census Bureau's American Community Survey (ACS).<sup>3</sup> This is on par with Jefferson County's 2014 bicycle commute rate (also at .6 percent), and similar to local cities such as Lakewood (.8 percent) and Westminster (.4 percent), according to ACS data between 2008 and 2012. However, in comparison to the larger cities within the region, like Boulder, Fort Collins, and Denver, Arvada's bicycle commute rate is significantly lower: Boulder boasts a commute rate of 10.5 percent, Fort Collins is at 6.8 percent, and Denver's is at 2.3 percent.

---

<sup>1</sup> Capital funds referenced are for Public Works projects only, not for small trail projects as part of new park construction or regular street maintenance.

<sup>2</sup> City of Arvada. Arvada Citizen Survey. Accessed August 24, 2016.  
<http://arvada.org/city-hall/transparency/citizens-survey>

<sup>3</sup> Because this data only pertains to work trips and does not capture other types of recreational or utility trips, actual bike rates are likely higher than reported.

## Crash Analysis

Reported crash data was obtained from the City of Arvada. This data includes all crashes involving at least one motor vehicle and a bicyclist (other types of cyclist collisions such as single bicycle crashes or bicycle-pedestrian crashes are not included). Between 2013 and 2015, there were 68 bicycle/motor vehicle crashes. Over half of the crashes resulted in injury and there was one fatality.

Figure C-2 shows the quantity of crashes per capita, per year.

Over 70 percent of these crashes occurred at intersections, while nearly 20 percent occurred at driveways. Crashes can occur for a variety of reasons – such as speed, driver inattention, and visibility—and understanding them can inform the types of countermeasures and recommended facility types. While more crashes are expected where conflicts may occur, such as at intersections and driveways, the prevalence of driveway crashes may indicate a high instance of sidewalk riding. Sidewalk riding is often the result of a lack of comfortable bicycling facilities and education. This type of crash can be mitigated through education, enforcement against sidewalk riders, and providing easy, low-stress, and comfortable facilities for people throughout the city.

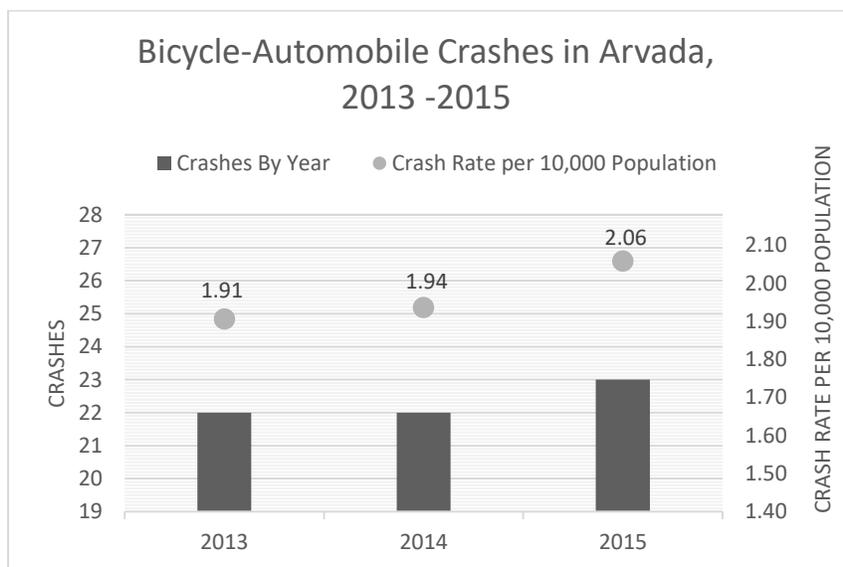


Figure C-2: Bicycle-Automobile Crashes in Arvada

## Public and Stakeholder Engagement

Gathering feedback from the public and stakeholders to understand the state of bicycling in Arvada was completed with the help of the following groups:

- *The Internal Advisory Committee (IAT)*: Representatives from the City and other agencies.
- *The External Advisory Team (EAT)*: Representatives from advocacy groups and non-City agencies.
- *General Public*: Includes three categories of people -- Arvada residents who would like to ride bicycles more but currently do not ("Interested but Concerned"); residents of all ages, races, incomes, and genders; those already biking and engaged in bike culture.

The project team has engaged the aforementioned groups in a variety of ways throughout the course of the project: Arvada Trails Day, IAT and EAT meetings, and a project-specific open house. Information gathered in-person over the past five months has shaped the project team's understanding of bicycling in Arvada. Their input is incorporated throughout this report.

### ***Interactive Online Map (WikiMap) Results***

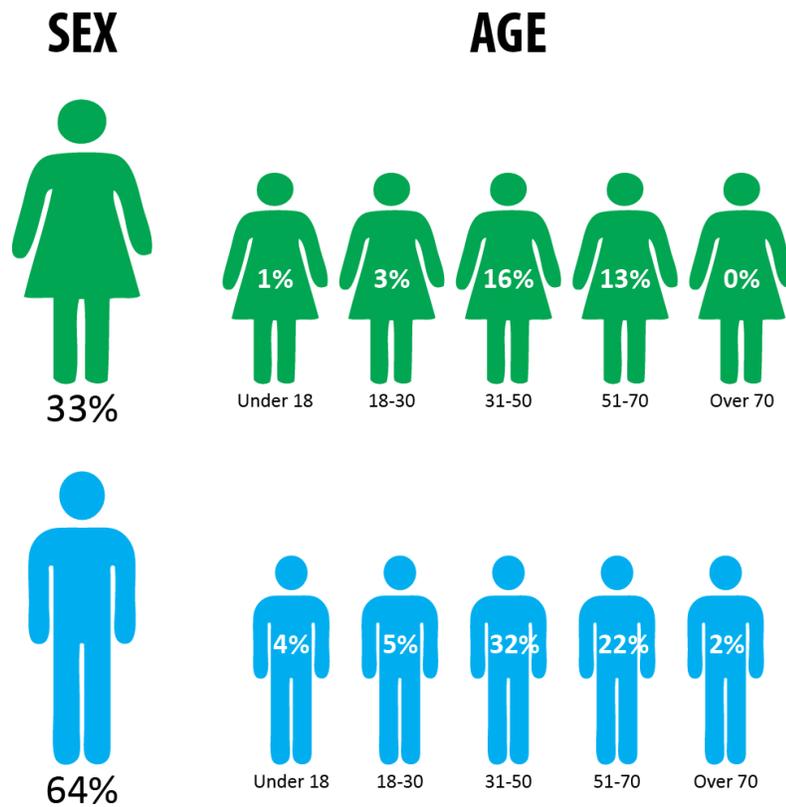
To complement the in-person community outreach efforts of this Plan, an interactive crowdsourcing "WikiMap" was hosted on the project website. The WikiMap was available for input from June through mid-August 2016, and was promoted through various social media promotions, community meetings, stakeholder meetings, and at public outreach events. During this time, 280 users provided over 670 comments (63 percent were in the form of points, and 37 percent in the form of lines). Users were asked to identify routes they currently bike, destinations they'd like to reach via bike, and barriers to biking.

At the time of registration, users were asked a short series of questions to understand their demographics, habits, and preferences related to bicycling within the City. The figures below provide a summary of the responses received. The best-represented age group that participated in the WikiMap was men between the aged of 31 and 50 (32 percent), followed by men ages 51 -70 (22 percent), and women ages 31-50 (16 percent). It is not unusual for adults (who comprise 77 percent of Arvada's population) to be completing the WikiMap at far greater rates than those under age 18.<sup>4</sup> However, women comprise over 51 percent of the population, yet were underrepresented in the WikiMap user group.<sup>5</sup>

---

<sup>4</sup> United States Census Bureau. "QuickFacts." Arvada city, Colorado. 2015. Web. Oct. 6 2016 <<http://www.census.gov/quickfacts/table/AGE295215/0803455>>

<sup>5</sup> Ibid.



\* Three percent of respondents did not want to share their age or sex

**Figure C-3: WikiMap User Demographics**

The survey asked respondents to identify their skill and comfort level riding bicycles (Figure C-4). The majority of respondents (60 percent) self-identified as the “enthusied and confident” riders who are willing to ride in traffic, but prefer dedicated bike lanes and routes. Just over a quarter of respondents (26 percent) were part of the “interested but concerned” group that prefers to ride on trails. Fourteen percent of respondents self-identified as “strong and fearless riders” who are comfortable riding on streets with no separation. Developing network recommendations that provide facilities to make all riders feel comfortable is a primary goal of the Plan.

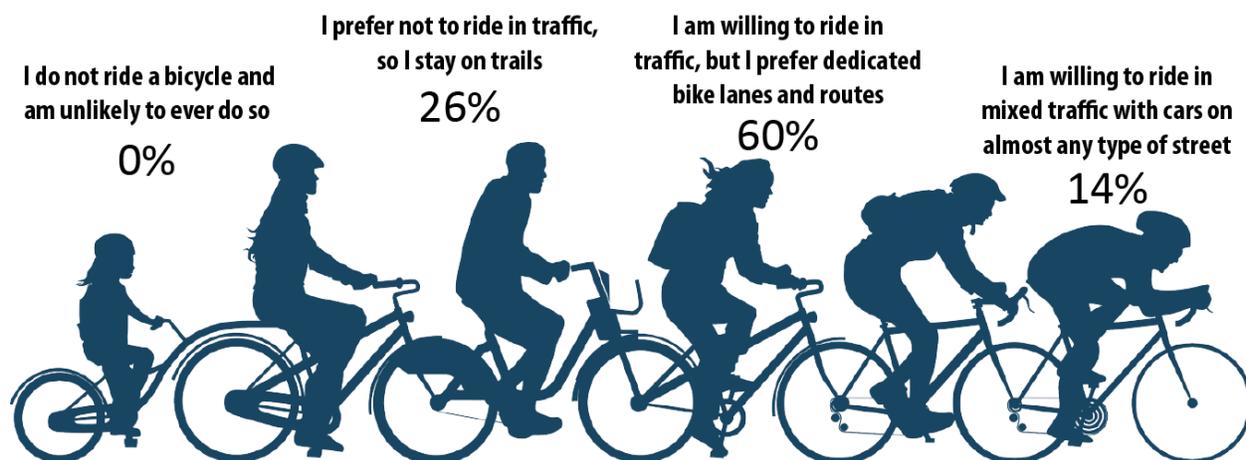


Figure C-4: WikiMap Users' Bicycle Skill and Comfort Level

The second part of the survey asked about the frequency at which people bike in Arvada. Consistent with the feedback received at Arvada Trails Day and the public open house, more people bike for recreation or exercise than for transportation (

Figure C-5 and Figure C-6). According to those responding to the WikiMap survey, approximately 60 percent ride bikes one to three times a week for recreation, exercise, and transportation. However, 25 percent ride four to five times a week for recreation or exercise and only eight percent for transportation purposes. Nearly a third (28 percent) of the survey respondents do not bike or walk for transportation.

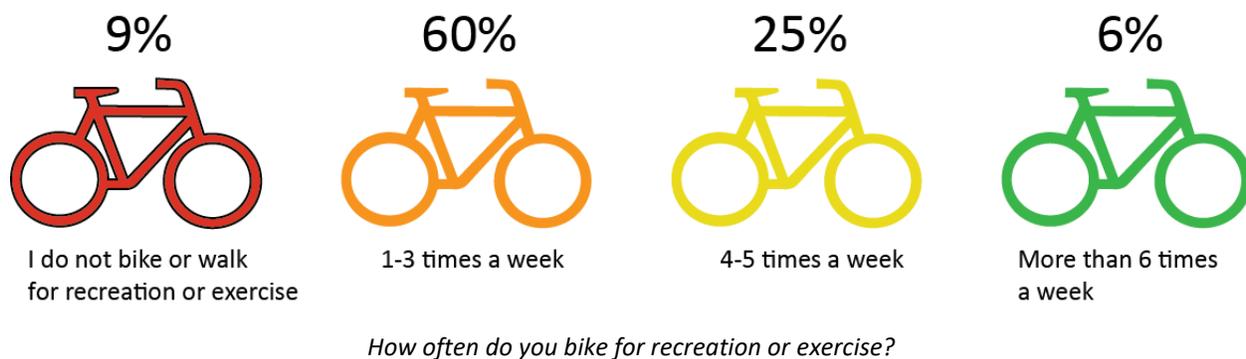
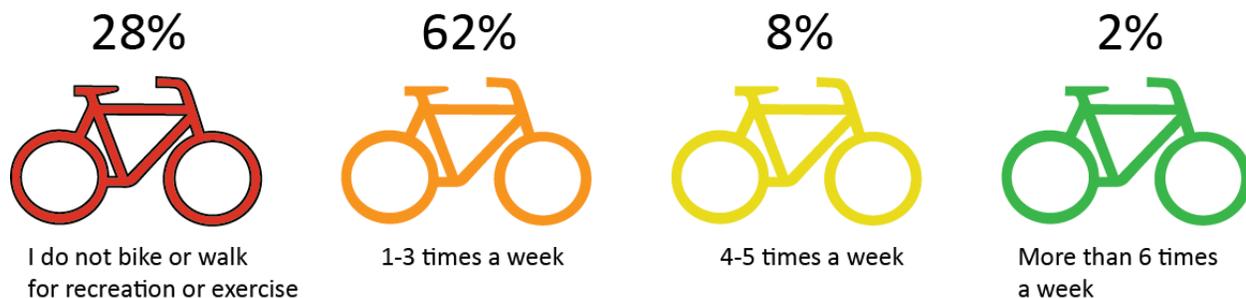


Figure C-5: Recreational and Exercise-based Bicycling



*How often do you bike for transportation, such as commuting to work or running errands?*

**Figure C-6: Transportation or Utility-based Bicycling**

## Barriers

Figure C-7 and C-8 show the major infrastructure barriers to safe, comfortable, and efficient bicycling identified by WikiMap users, Arvada Trails Day, and the Open House. Barriers include the following:

- Wadsworth Boulevard, particularly between West 72<sup>nd</sup> and West 80<sup>th</sup> Avenues.
- Indiana Street, especially north of West 80<sup>th</sup> Avenue and the railroad tracks where the cross section widens, and there is no paved shoulder.
- West 72<sup>nd</sup> Ave, as it is currently dominated by dangerous and narrow crossings and intersections as well as discontinuous and inconsistent on-street bicycle facilities.
- Olde Wadsworth Boulevard and West 72<sup>nd</sup> Avenue railroad crossings
- A high number of barriers were identified between the intersections of West 58<sup>th</sup> Avenue and Kipling Parkway and the Ralston Creek Trail and the existing paved trail that begins at the intersection of Ralston Road and Miller Street. This indicates a lack of clear connections between existing bicycle facilities.

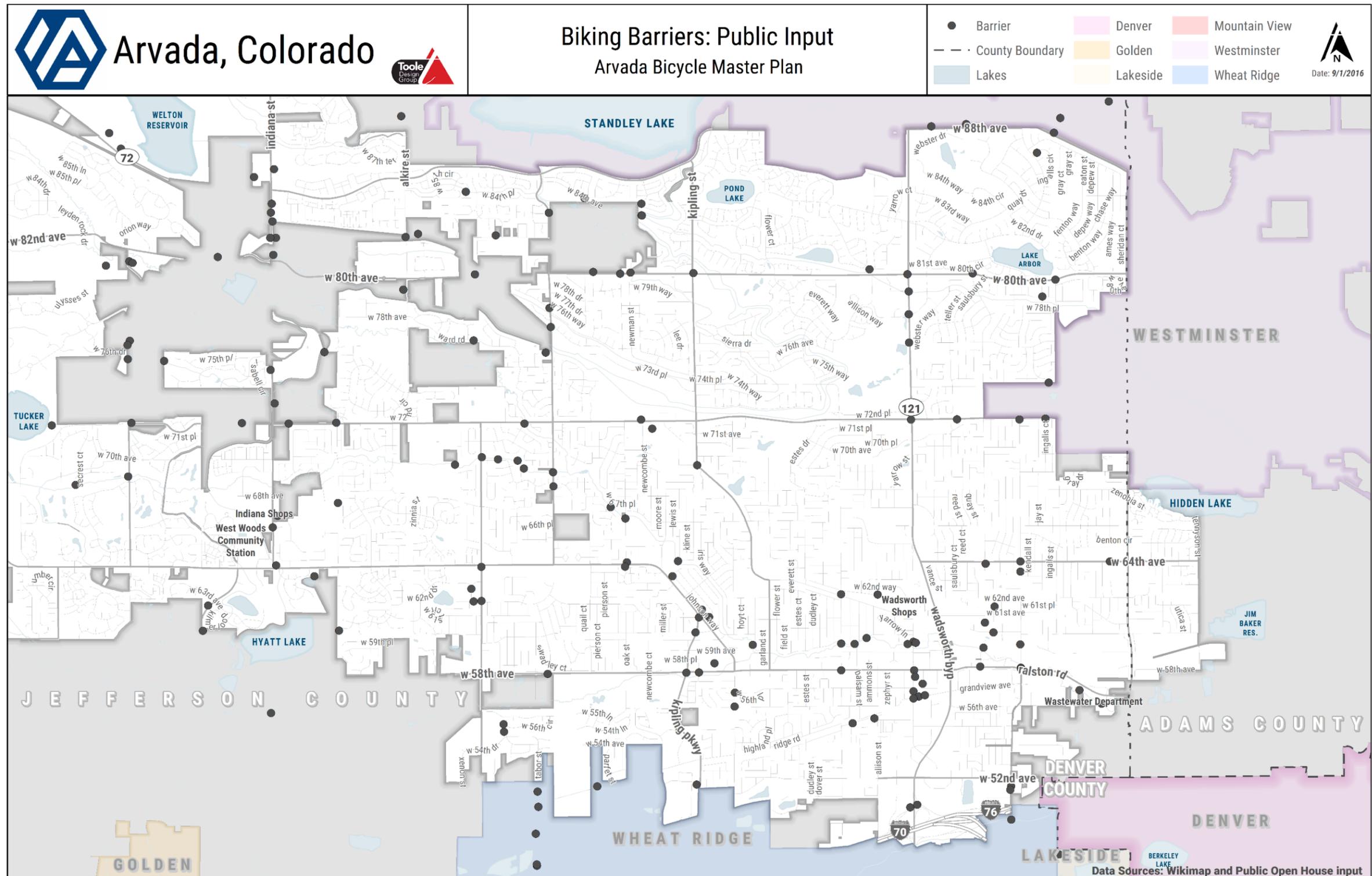


Figure C-7: Barriers to Bicycling

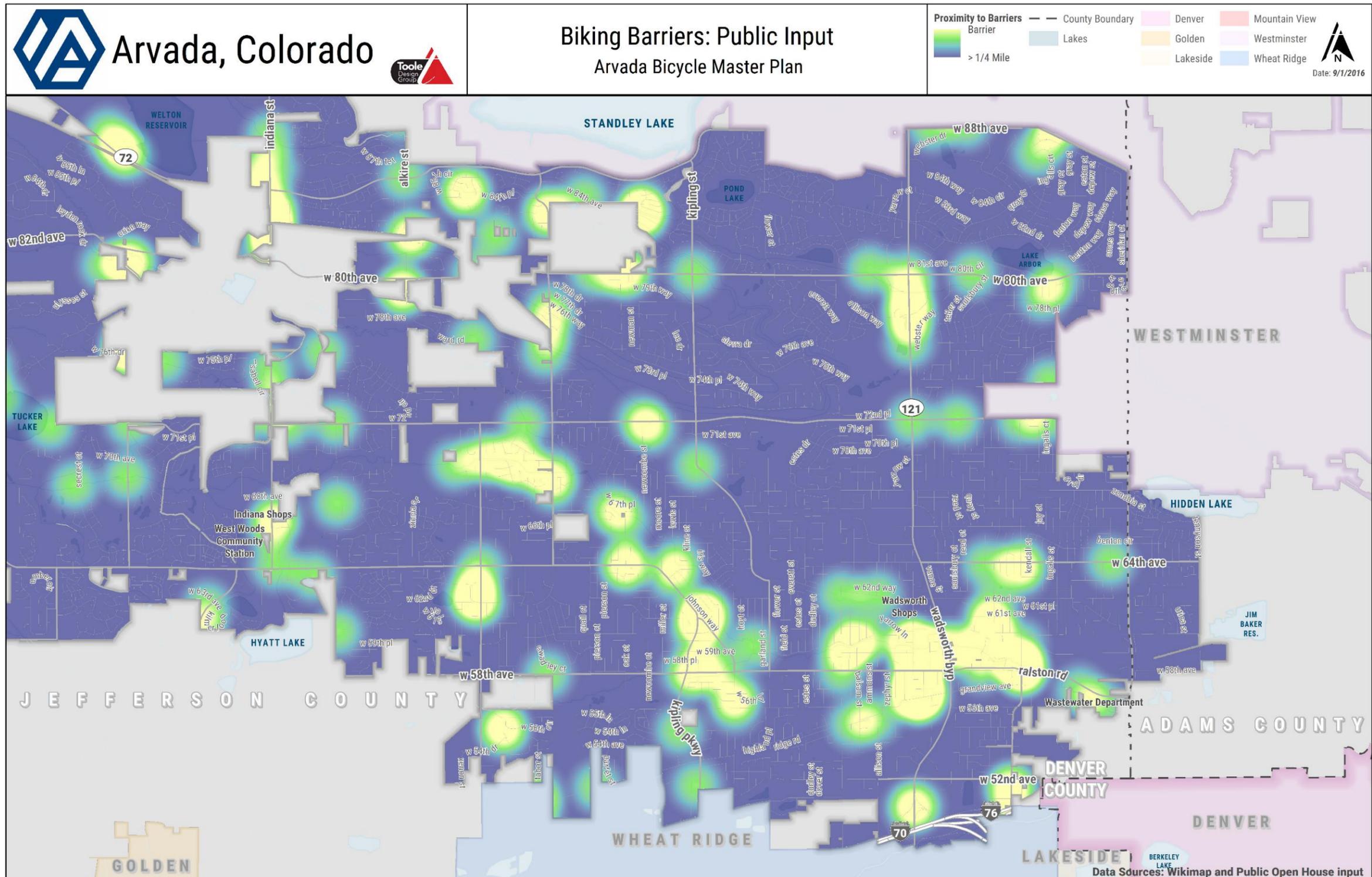


Figure C-8: Citywide Barriers to Bicycling

## Bicycle Network and Infrastructure

### Existing Network and Facilities

The existing bicycle network includes a total of 130 miles of trails and 59 miles of on-street facilities, including bike lanes and shared lane markings (Figure C-9:). As a percentage of the 500 miles of local, collector, and arterials that comprise the City's street network, 12 percent have bicycle facilities. The city boasts bike facilities on approximately half of all collector and arterial streets, 53 miles in total, which have higher posted speeds and greater traffic volumes. Considering the low level of traffic separation afforded by bike lanes, an on-street bike network primarily focused on collectors and arterials is not one that is accessible to riders of all ages and users of diverse comfort levels.

Six miles and less than two percent of Arvada's on-street bicycle facilities are on local streets, those with low traffic speeds and volumes that are most conducive to comfortable bicycling. However, for some neighborhood streets, designating a space for bicyclists is not necessary considering the traffic volumes and pavement widths. With 387 miles of local streets, there may be opportunities to complete a bike network by repurposing some pavement width for bike facilities. A goal of this Plan is to enhance the existing facilities to encourage a wider range of bicyclists.

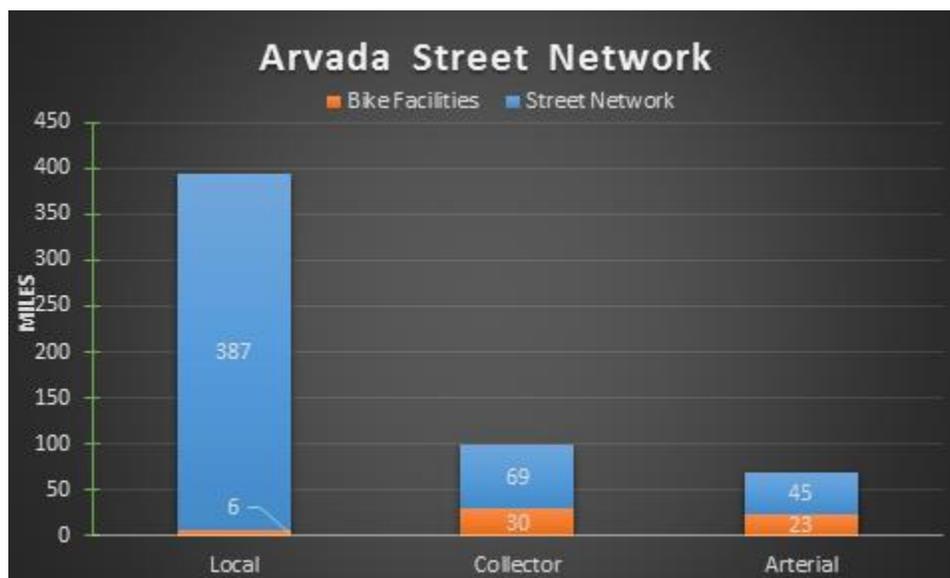


Figure C-9: Arvada Street Network

### Trails

The majority of Arvada's bike facilities are paved off-street trails, most prominently the Ralston Creek Trail and the Little Dry Creek Trail. These paved trails provide excellent low-stress opportunities for active transportation and recreation.

The Ralston Creek Trail crosses the city between the Arvada/Blunn Reservoir and the Clear Creek Trail connection lies just outside of the southeastern city limits. The Ralston Creek Trail is nearly continuous for nearly 13 miles across the city except for an approximately 0.6 mile segment of an on-street diversion at West 64<sup>th</sup> Avenue and Ralston Road. The trail breaks again at Marilyn Jean Drive just east of Memorial Drive before it continues eastward to connect to the Clear Creek Trail, a trail of regional significance that provides connections to Golden, Wheat Ridge, and Denver.

The City's other notable trail, the Little Dry Creek Trail, spans from Pioneer Park to the Arvada/Westminster border. This trail is continuous except east and west of the Wadsworth Boulevard and West 80<sup>th</sup> Avenue intersection. Additionally, Arvada has soft surface trails (like around Standley Lake) and multi-purpose sidewalks adjacent to some arterials and other high-volume roads.

### ***On-Street Bikeways***

Within Arvada there are shared lane marking, bike lanes, and a short segment of a separated bike lane on Oberon Road. The primary east-west bike lanes within the city are on West 72<sup>nd</sup> Avenue and West 86<sup>th</sup> Parkway. Running east to west, there are short segments of bike lanes present on Virgil Way, Quaker Street, Ward Road, Simms Street, Oak Street, Carr Street, Pierce Street, and Lamar Street. However, few of these are fully continuous or offer connections to bike facilities to the north or south. These bike routes do provide some connections to the Ralston Creek Trail and other trails within the City.

### ***Challenges and Opportunities***

The issues and opportunities with the existing bike network noted by the public and stakeholder are most notably about the lack of north-south connectivity and the barriers posed by principal arterials such as Wadsworth Boulevard. Adding continuous facilities along key routes like Marshall or Harlan Streets or other existing north-south routes (noted above), would improve connectivity. Indiana and Alkire Streets are highly desirable links that would provide north-south connectivity on the west side of the city as the only continuous through streets west of Simms Street. However, safety and comfort issues will need to be addressed as a part of this planning effort. Providing a bicycle crossing of the Union Pacific railroad line would serve the neighborhoods, families, and students of Meiklejohn Elementary School, Ralston Valley High School, and Van Arsdale Elementary School, while also providing a highly-desired connection along Alkire Street.

Providing low stress routes within the city to access Olde Town and the new Gold Line stations at Arvada Ridge, Olde Town, and 60<sup>th</sup> Avenue and Sheridan Boulevard would improve access to major commercial activity centers and transit within the city. Improving connections between the Ralston Creek Trail and the Clear Creek Trail would provide a more seamless bike ride to Golden or Denver while also integrating Arvada into the regional bike network.

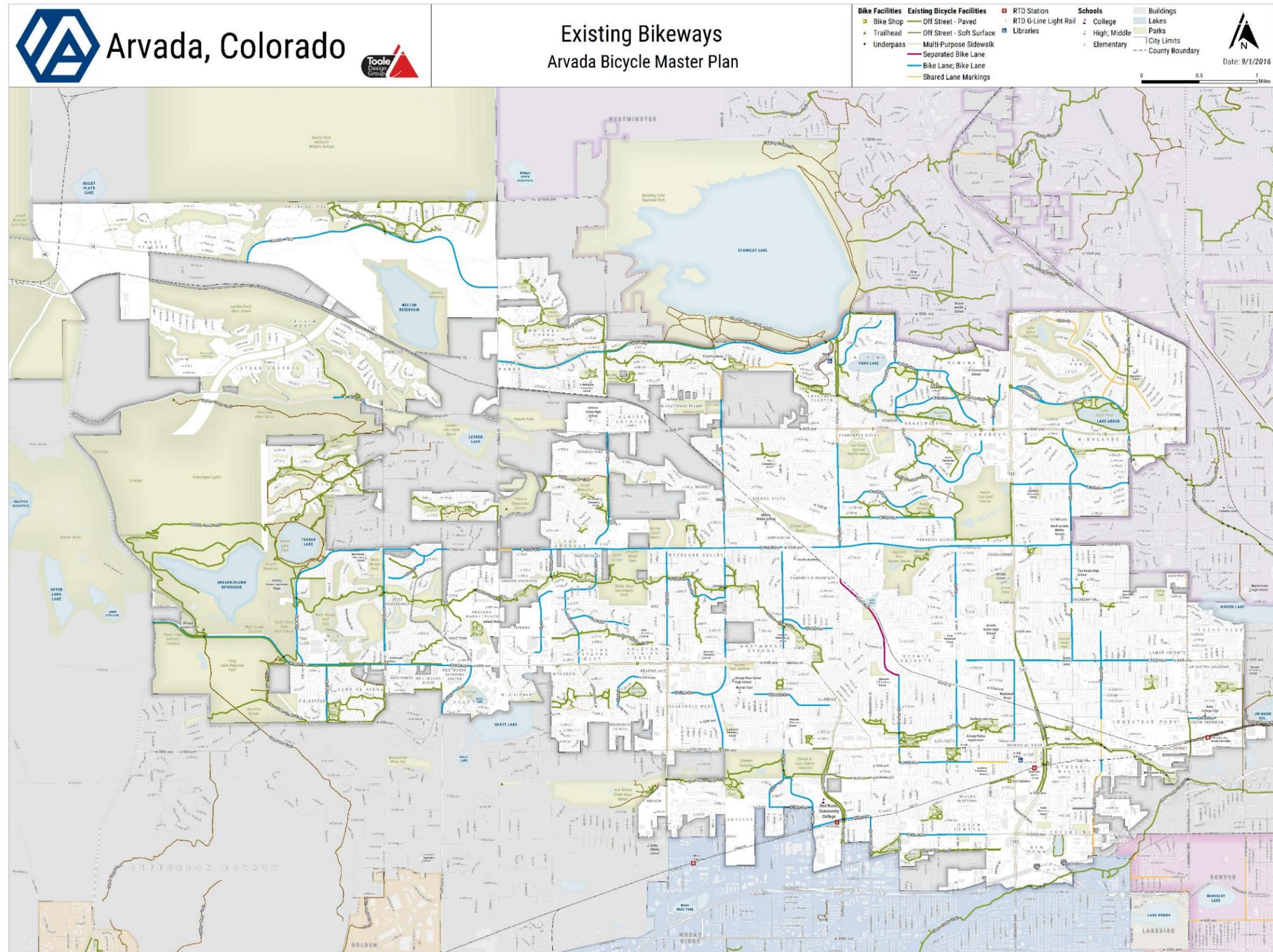


Figure C-10: Existing Bikeways

### ***Bicycle Parking***

Arvada does not have a formal bike parking program, however, per the city Code (6.8.3.D) bicycle parking is required at activity centers, residential multifamily units, office complexes, fast food restaurants, amusements parks, theaters, public libraries, recreation centers, museums, community centers, and schools.

As part of the Healthy Places Arvada program, the City inventoried publicly available bike parking in southeast Arvada as part of the larger goal to increase physical activity. Currently, there is interest in developing a volunteer-led citywide parking program that will enable businesses and community groups to request bike racks at specific locations which the City would fund and install. Currently requests for racks are fulfilled on an ad-hoc basis. The City has installed post and loop style racks in Olde Town Arvada that are reminiscent of horse hitching posts. The City has moved to using the more standard inverted U-racks in other areas of the city and will gradually replace the hitching posts over time.

### ***Bicycle Aid Stations***

The City has installed seven bicycle aid stations in parks, along trails, and in Olde Town Square at 57<sup>th</sup> Avenue and Olde Wadsworth Boulevard. These aid stations provide a rack, screw drivers, wrenches, and other tools to make minor adjustments and small bike repairs.

## **Level of Traffic Stress Analysis**

Analyzing traffic stress is helpful in determining the suitability of individual streets for biking. Furthermore, this analysis indicates what streets within the city are already suitable for biking, and helps to identify pockets or islands of low-stress streets surrounded by high-stress street and road barriers. The primary factor that determines traffic stress is the level of interaction between bicyclists and motor vehicles.

### ***Methodology***

Because different types of bicyclists have different levels of comfort interacting with motor vehicle traffic, it is important to define the “typical bicyclist” for this analysis. Anecdotal experience<sup>6</sup> supplemented with survey-based research<sup>7</sup> indicates that people can be grouped based on their traffic stress tolerance or comfort, confidence, and willingness to interact with motor vehicle traffic. The findings are that the majority of people (classified as “interested but concerned”) have little tolerance for interacting with motor vehicle traffic and many are worried about being struck by a motor vehicle while biking.

Based on available data (including speed limits, traffic volumes, pavement width, presence of on-street parking, and presence of bike lanes), traffic stress was analyzed for all streets in Arvada using the Level of Traffic Stress (LTS) model, developed by the Mineta Transportation Institute. As a result, all streets and roads are classified as shown in Table C-1.

---

<sup>6</sup> Geller, R. “Four Types of Cyclists.” Portland Office of Transportation.  
<https://www.portlandoregon.gov/transportation/article/264746>

<sup>7</sup> Dill, J. and N. McNeil. (2013, January) “Four Types of Cyclists? Examining a Typology to Better Understand Bicycling Behavior and Potential.” Paper presented at the Annual Meeting of the Transportation Research Board.

**Table C-1: Level of Traffic Stress Ratings for Arvada’s Roadway Network**

Level of Traffic Stress Rating	Description	Total Mileage
<b>LTS 1</b>	Little to no traffic stress. Generally suitable for the entire population.	369
<b>LTS 2</b>	Little traffic stress. Suitable for most adults, even those with little confidence or experience interacting with motor vehicles.	65
<b>LTS 3</b>	Moderate traffic stress. Uncomfortable and unappealing for some, but suitable for more experienced bicyclists.	30
<b>LTS 4</b>	High traffic stress. Only suitable for very skilled bicyclists.	59

### Findings

The maps in Figures C-11 through 15 show the results of the Traffic Stress Analysis. The map in Figure C-11 shows “low stress islands” to visually demonstrate that, while the majority of streets and roads in the city are low to moderate stress, there are significant gaps between these low-stress pockets. These gaps are a result of physical barriers posed by the railroads, arterials, and the street network itself.

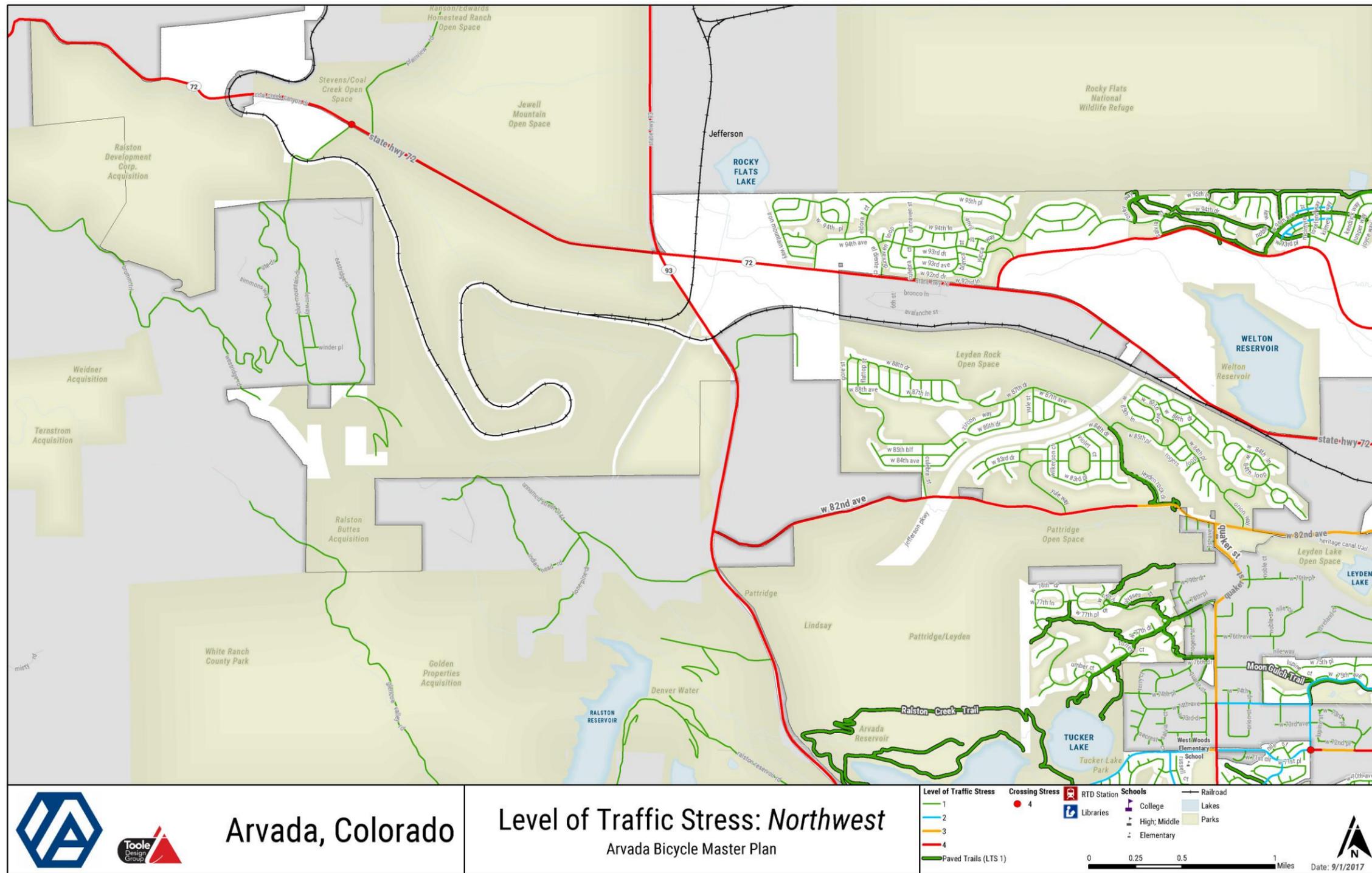


Figure C-11: Level of Traffic Stress: Northwest Arvada

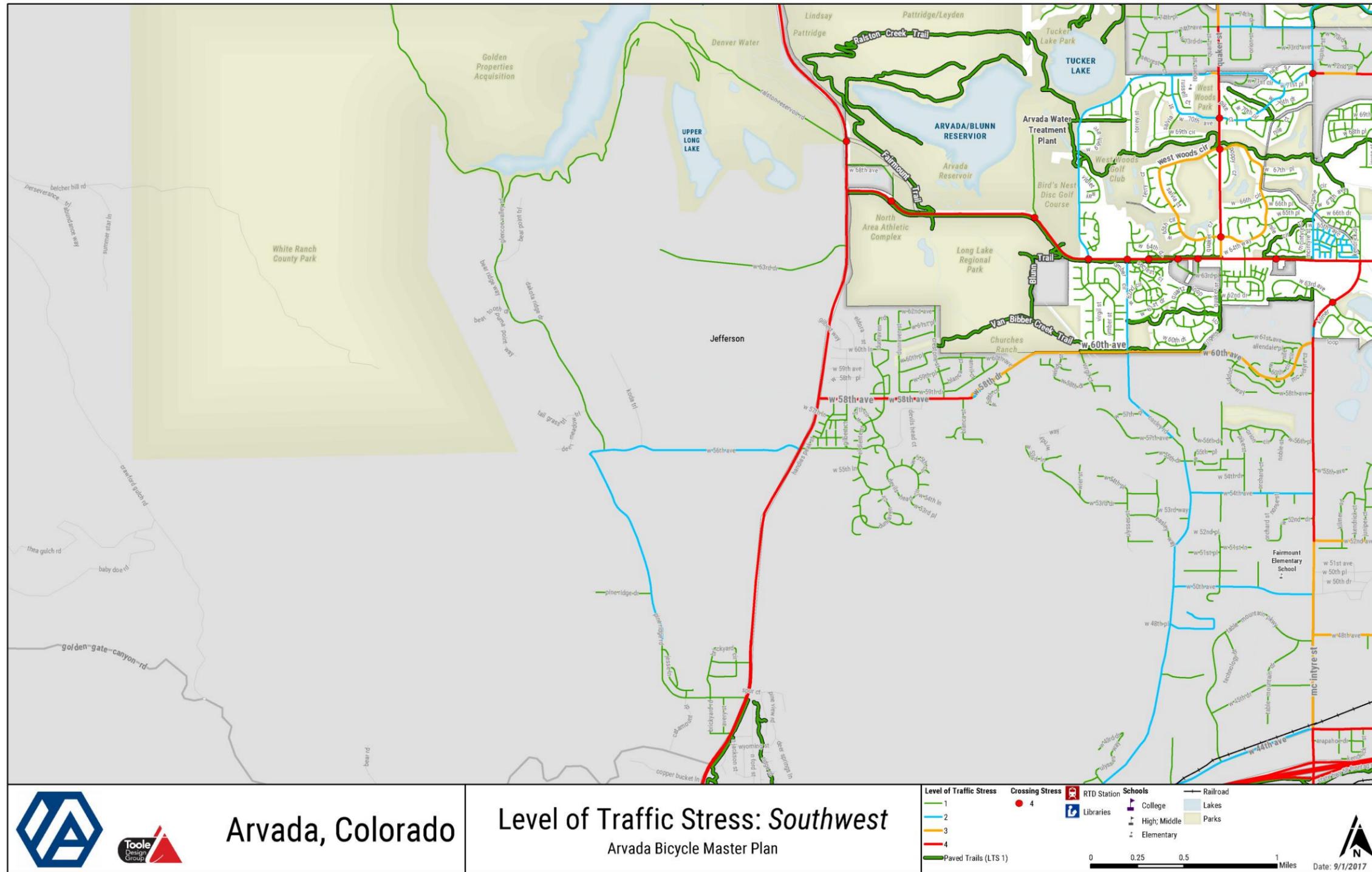


Figure C-12: Level of Traffic Stress: Southwest Arvada

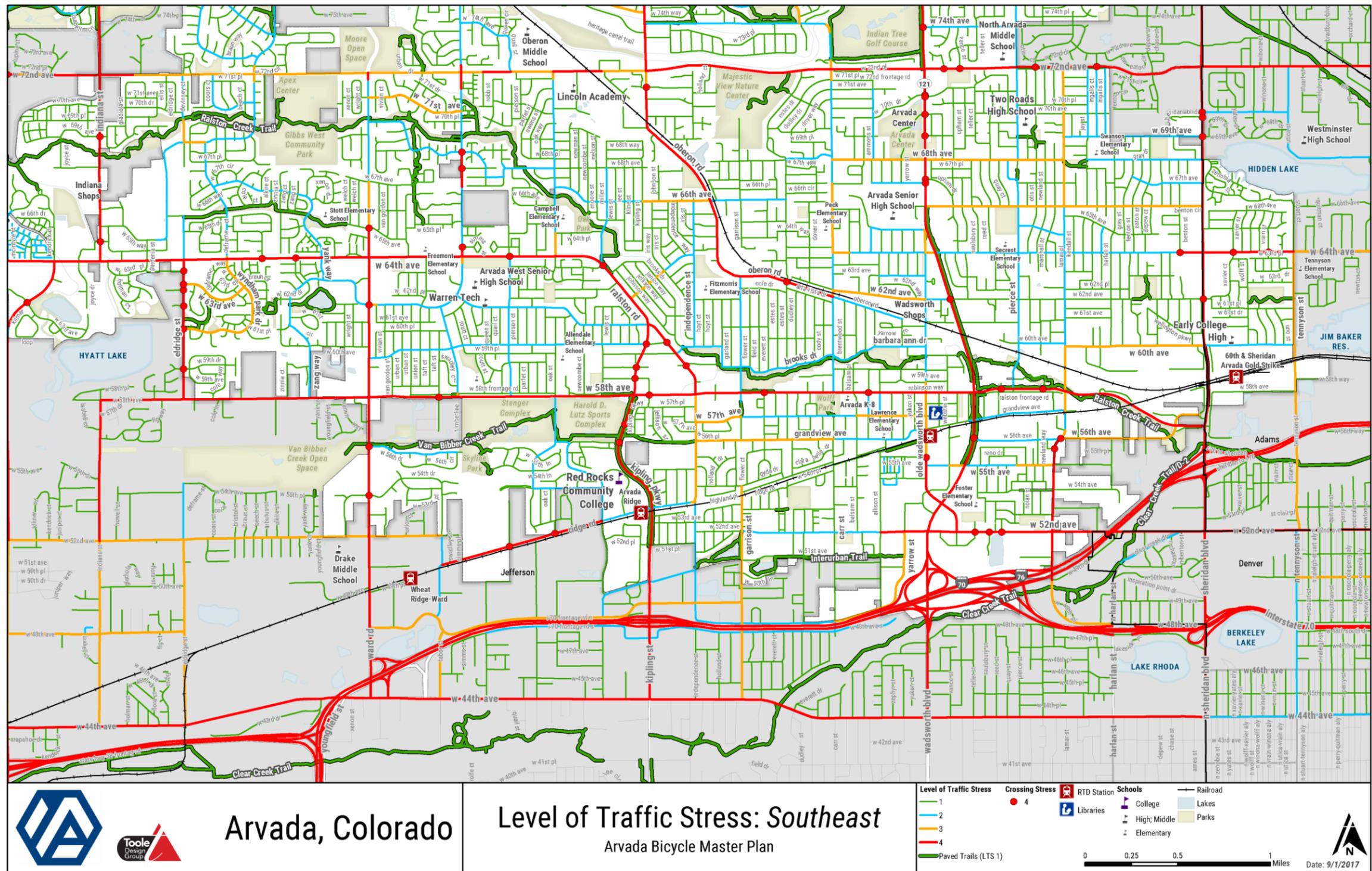


Figure C-13: Level of Traffic Stress: Southeast

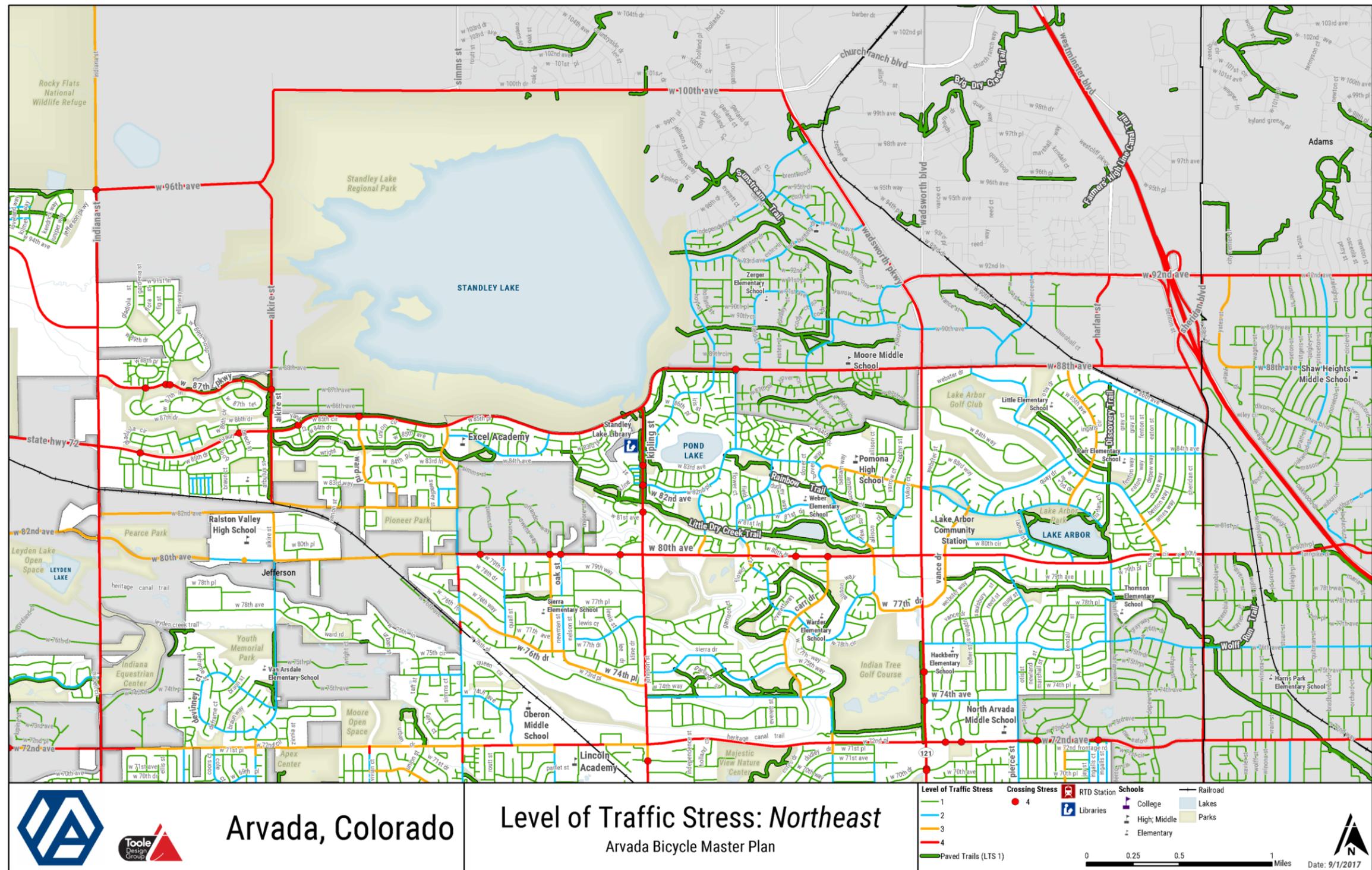


Figure C-14: Level of Traffic Stress: Northeast Arvada

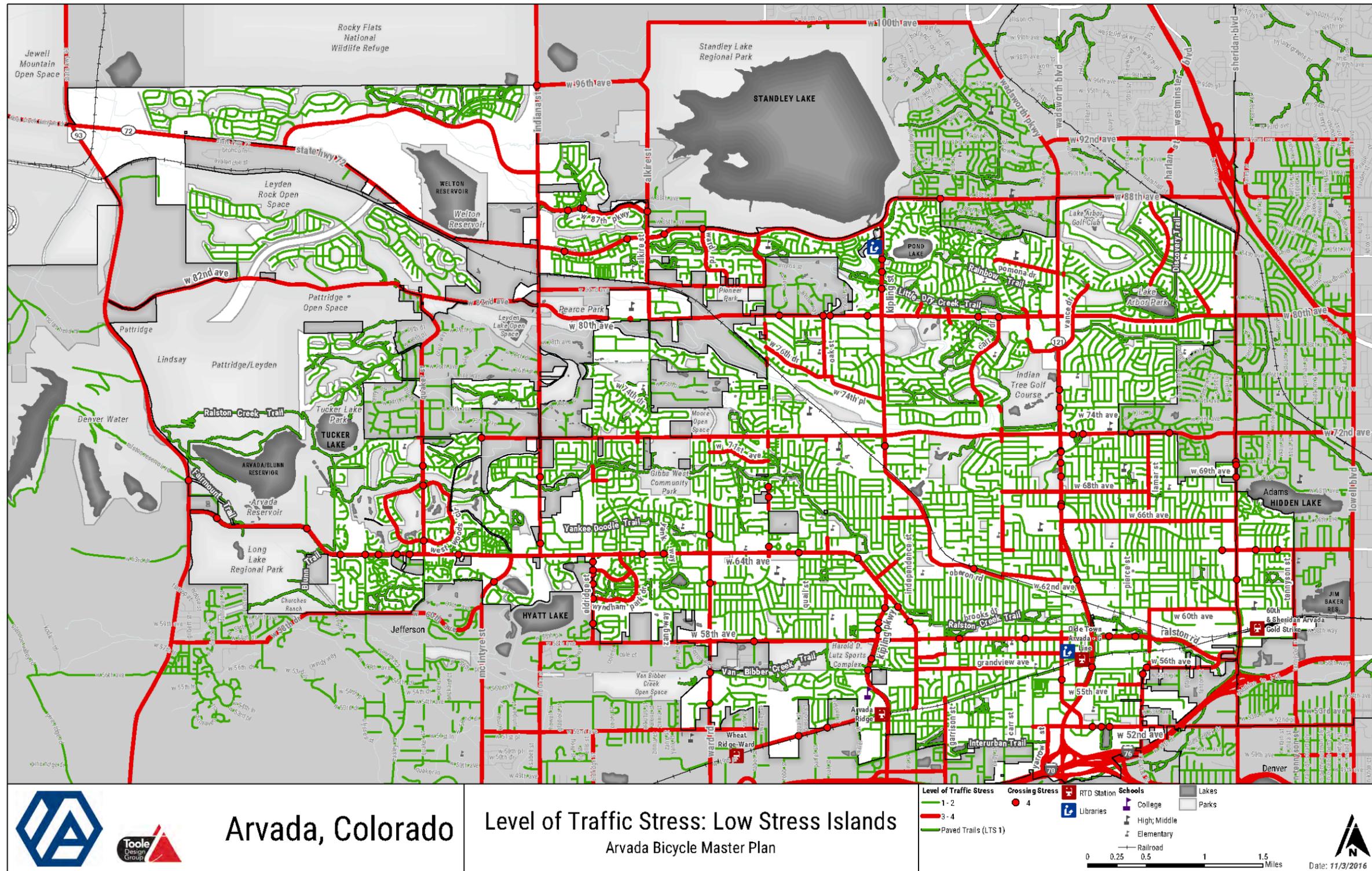


Figure C-15: Low Stress Islands

## Programs and Practices

Arvada has grown its bicycling community through a number of programs and policies. These non-engineering elements of a bicycle-friendly community are typically broken down into four “E’s”<sup>8</sup>:

- Encouragement: Creates a strong bike culture that welcomes and celebrates bicycling.
- Education: Gives people of all ages and ability levels the skills and confidence to ride.
- Enforcement: Ensures safe roads for all users.
- Evaluation and Planning: Plans for bicycling as a safe and viable transportation option.<sup>30</sup>

The majority of these programs are run by the City, with some aid from the community groups focused on improving bicycling in Arvada.

### Education

Bicycle education helps people of all ages, though particularly children, feel comfortable riding and navigating the streets. Education is essential for sharing information about new programs, policies, and practices related to biking.

#### *Bicycle Training Course*

In May 2016 the City opened its first Bicycle Training Course (BTC), a half-acre imitation streetscape that includes many of the same elements used on Arvada streets: bike lanes, street signs, crosswalks, and railroad crossings. The BTC also includes additional obstacles for skills training, such as the Rock Dodge and Slalom, typically used as part of a Bike Rodeo curriculum. While the BTC is open to the public at most times, it is intended to be used by local schools, nonprofits, and community groups for dedicated training activities. The BTC offers an opportunity to directly address safety concerns by offering students education in bike safety, as well as an opportunity to practice safe pedestrian behaviors on the way to and from the facility. The Training Course is located on the Jefferson County Head Start grounds at West 51<sup>st</sup> Avenue and Yarrow Street.

#### *Safe Routes to School*

The City’s currently has one \$4,400 non-infrastructure Safe Routes to School (SRTS) project that was awarded in 2016. This project, the Lawrence Elementary School SRTS Project, will include education and encouragement to increase the number of students walking and biking to school. The project will include walk/bike education as part of the physical education curriculum for all students, walk/bike to school month in October 2016, bike rodeos at the bicycle training facility for all fifth graders, and additional education for students, families, and staff. The City plans to expand SRTS curriculum to include additional schools in the coming years.

Additionally, the City has a productive partnership with the Apex Parks and Recreation District (PRD). Apex offers a substantial catalog of recreational activities and educational opportunities but does not

---

<sup>8</sup> Definitions provided by the League of American Bicyclists

currently offer much for bicycle education. Apex does offer one free public bike rodeo annually at the Secrest Recreation Center at the corner of 66<sup>th</sup> Avenue and Pierce Street.

## Encouragement

Encouragement programs are provided by the City and various community based organizations.

### *Bike Friendly Arvada*

Bike Friendly Arvada is Arvada's advocacy organization whose mission is to promote and encourage bicycling as a safe, healthy, enjoyable and energy-efficient transportation alternative through education, awareness and collaboration, and to work with surrounding communities to develop a better network of bike routes and trails and to foster good relationships between drivers, bicyclists, and pedestrians.

### *Arvada Bicycle Advisory Committee (ABAC)*

The Arvada Bicycle Advisory Committee (ABAC) leads organized recreational bike rides all around the city between April and October each year. These rides are open to bicyclists of all levels with a focus on children, families and casual/recreational riders.

### *Bike to Work Day*

As part of Colorado's Bike to Work Month, the City works with individuals and employers to encourage people to bike for transportation, experience the benefits of riding a bike, and to demonstrate that bicycling is an easy, fun and healthy means of traveling around the city. The City hosts several booths around the city for riders to stop for breakfast and an after work celebration.

## Enforcement

Traffic laws in Arvada are handled by several overlapping police forces: Arvada Police Services, Jefferson County Sheriff's Office, and Colorado State Patrol. The majority of traffic enforcement is handled by Arvada officers within the city limits.

### *Bicycle Laws*

Bicyclists' actions on roadways are subject to the same traffic laws as other vehicles in the state of Colorado. Bicyclists are required to obey all posted signs and signals and ride with traffic. Sidewalk and crosswalk riding is allowed under Colorado Revised Statutes § 42-4-1412.10, except in marked dismount zones. However, bicyclists are required to yield the right-of-way to pedestrians in these situations and to give an audible signal when passing. When riding in a crosswalk, the bicyclist has all of the same rights and responsibilities as a pedestrian and is not required to dismount.

In general, Colorado laws pertaining to bicyclists are considered to be among the friendliest to bicyclists in the country. For instance, a bicyclist's ability to ride in the center of a travel lane to avoid hazards in the roadway is spelled out in code, as is the requirement for any vehicle to pass at least three feet from a bicyclist.

### ***The Arvada Police Department***

The Arvada Police Department (APD) provides some specific policies related to bicyclist safety and the enforcement of traffic laws surrounding bicycles.

APD maintains a fleet of bicycles for a group of trained and certified Police Bicyclists that conduct police activities on off-street trails where traditional cruisers cannot access.

APD officers respond to crashes and traffic violations involving bicycles just like incidents not involving bicycles, but there is no specific policy about affirmatively ticketing aggressive drivers or unsafe riders. Arvada also currently has no diversion or education program for traffic offenses.

APD officers are also assigned as School Resource Officers (SROs) on-site at elementary and middle schools throughout the City. Any special enforcement or educational opportunities at schools are conducted on a case-by-case basis, depending on the specific SRO.

Regarding parking enforcement, outside of Olde Town, parking enforcement in Arvada is conducted on the basis of resident complaints only. Drivers are cited for parking in bike lanes or otherwise obstructing bike facilities, but only when a complaint is received or if an officer notices it over the course of their other duties.

## **Evaluation and Planning**

City staff implements programs and policies related to evaluation and planning. Existing policies are evaluated both on an annual and semi-annual basis (Citizen Survey, the SRTS Annual Report and Traffic Safety Summary, and the Bicycle Friendly Community application) and an ongoing basis (AskArvada system for service requests). In addition, the SRTS Program also collects data through the National Center for SRTS parent surveys and student travel tallies. Planning for bicycle infrastructure and programs is completed in-house by Arvada staff and other staff within Planning, Development and Transportation, and Park Planning.

## **Engineering**

### ***Street Maintenance (Sweeping and Plowing)***

Even well-designed bike facilities cannot be comfortable, low-stress facilities if they are covered in snow, dirt, or debris. Street maintenance operations, such as sweeping, plowing, and repairs, are conducted by the Streets Maintenance Division of the Public Works Department, while design and construction are supervised by the Engineering Division. Trails are maintained by the Parks Maintenance division of the Parks, Golf, and Hospitality Department. Communication between divisions and departments is vital to maintaining bike facilities in the best possible condition.

The City operates street sweeping crews between April and November. Each street in the City is swept once every six to eight weeks, depending on the weather. No specific effort is made to sweep bike routes more frequently than any other street. Potholes, cracks, and other damage to the roadway are repaired on an as-needed basis by City crews. The City accepts requests for street repairs by phone,

through social media, or through a service request system called AskArvada both online and on mobile devices. All repairs are completed as quickly as possible depending.

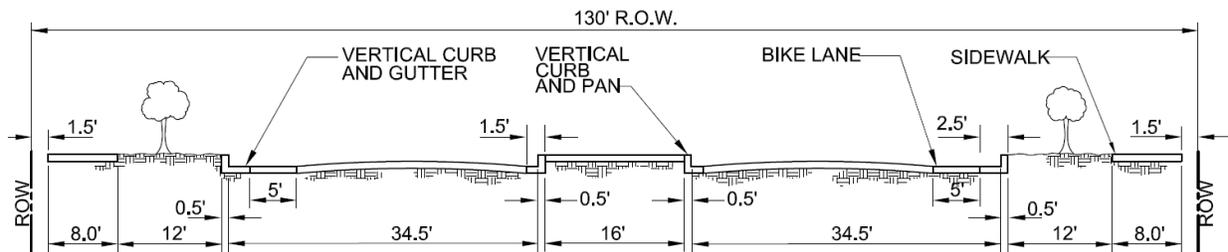
After a snow event, the City plows streets in priority order based on traffic volumes, emergency response, proximity to schools, and connectivity to residential neighborhoods. Collectors, minor collectors, and local streets with steep hills or a history of chronic icing are plowed at a lower priority. Most local streets are not plowed unless the City Manager declares a snow emergency.

Many of the priority snow plow routes have bike facilities and the facilities are plowed when possible, but bike facilities are not explicitly designated high-priority. In practice, many on-street bike lanes accumulate snow even after plowing operations and it's difficult to completely remove snow from bike lanes alongside on-street parking due to the risk of damaging parked cars.

### ***Bicycle Design Guidance***

City engineering and planning staff use a combination of the City's engineering code and national design guidance such as the National Association of City Transportation Officials (NACTO) Urban Street Design Guide (2013), NACTO Urban Bikeway Design Guide (2014), the American Association of State and Highway Transportation Officials (AASHTO) Green Book (2015), and the Manual of Uniform Traffic Control Devices (2009) to evaluate street designs. The national design manuals serve as reference manuals to augment and complement the City's existing engineering codes, which are outlined below. In recent years, the City has departed from some of their more innovative treatments, such as shared lane markings on top of parking lanes, in favor of more traditional bicycle treatments.

The City of Arvada's design standards currently provide guidance on layout of conventional on-street bike lanes in a selection of cross-sectional layouts with and without parking. Standard ST-1 provides cross sections for "principal arterial parkways" (up to six lanes, >30,000 ADT) and "arterial parkways" (up to four lanes, <30,000 ADT), both of which include striped 5-foot bike lanes. Cross sections for collector roadways are given in standard ST-2, and include striped 4-foot bike lanes for the "major collector" and "collector" categories. Bicycle accommodations are not included in the specifications for minor collectors and local streets.



**NOTES:**

- 1) FOUR LANES WITH PROVISION FOR SIX LANES
- 2) ON-STREET BIKE LANES
- 3) ACCESS CONTROL (RAISED MEDIAN)

PRINCIPAL ARTERIAL PARKWAY (>30,000 ADT)

**Figure C-16: City of Arvada Standard ST-1, Cross Section for Principal Arterial Parkway**

Standards TR-2 through TR-5 provide layouts for striped bike lanes and dimensions for bike lane symbols. Bike lanes are 4 or 5 feet wide, exclusive of the 2 foot gutter pan when adjacent to the curb. The notes included on these diagrams specify that bike lane and parking striping shall remain solid when crossing alley and driveway entrances and that bike lane symbols shall not be installed on streets with posted speed limits over 40 mph. Figure C-17 shows the configuration depicted in TR-4, “On Street Bike Lane with Parking Lane.”

Arvada standards TR-6 through TR-8 provide dimensions for shared lane symbols and placement on streets with and without on-street parking. Standard TR-8, “On Street Shared Bike Lane with Parking Lane and Sharrow” is shown in Figure C-18.





## Key Challenges and Opportunities

Based on input gathered from the public and stakeholders, previous planning efforts, visits to the city, and a technical review of the street network, here are the most significant opportunities and challenges observed in Arvada:

### Excitement and Support for Bicycling

There is widespread support for bicycling to connect Arvada's neighborhoods, and an interest in providing more comfortable and comprehensive connections across the city for people of all ages. The enthusiasm from members of the public, particularly the Olde Town Arvada Cruisers and Arvada Bike Advisory Committee, can be harnessed to move this Plan forward. This planning process is an opportunity to continue building a coalition of supporters to see this Plan through implementation and continue to support a more robust culture of bicycling.

### Suburban Street Network

Street grids provide optimal connectivity and shorter travel distances between origins and destinations, especially compared to a more suburban pattern of cul-de-sacs and meandering streets. Due to the parallel streets and frequently-spaced perpendicular cross streets, it is easier to create a bicycle network with a traditional grid street layout. For example, a low-volume, low-speed street parallel to an arterial can be easily signed and striped for bicycle travel without needing to add facilities on arterials. As many parts of Arvada's street network are suburban and lack these connections, opportunities to create a cohesive bicycle network will be a major focus of this planning effort.

### Assigning Local Streets for Bicycling

While there are 387 miles of local, low speed and low volumes streets in Arvada, today less than two percent of them have bike lanes. This presents a big opportunity to expand the bicycling network to more local streets. This can serve as a relatively low-cost and easily-to-implement way to expand a network of low-stress facilities.

### Better North-South Connections

In part due to the street pattern and jurisdictional boundaries, the city lacks a strong network of north-south bikeways. Expanded options for north-south connections should be investigated by extending the existing bike lanes or adding separated bike lanes for lower stress routes. Enhanced route choices, especially along the most-desired routes (Indiana Street, Alkire Street, Kipling Street, Ward Road) is an opportunity to encourage cross-town bike trips from neighborhoods across the city.

### Gap Closures

Many comments submitted to the online interactive map expressed a clear desire for improved crossings, especially at high-volume, high-speed arterials such as Wadsworth Boulevard, Ward Road, Ralston Road, West 64<sup>th</sup> Avenue, Indiana Street, and Alkire Street. Addressing difficult intersections and

other barriers such as the Union Pacific railroad that runs diagonally across the city will be critical to the success of completing a connected, low-stress network.

### **Connections to Olde Town**

Olde Town Arvada draws people from around the city with its downtown charm. With the Old Town Arvada station opening, there will be greater access to the downtown core. Addressing issues at the Wadsworth Bypass, interstate, railroad, and other challenging barriers, will be key. Improving the on-street connections between the Ralston Creek and Clear Creek Trails to Olde Town, as well as adding on-street facilities within Olde Town itself will enhance the biking experience while drawing greater bike ridership to Arvada's downtown.

### **Improve Access to Recreation Opportunities**

Arvada has a number of great trails, lakes, and parks that should be easily accessible by bike. Input gathered from the public and stakeholders show a clear interest in improved access to the Ralston Creek Trail, Clear Creek Trail, Five Parks, Standley Lake, and community centers. Access may be in the form of improved on-street connections, education, wayfinding, and encouragement.

### **Education**

There are opportunities to expand the City's existing education programs, especially the bicycle safety training offered at the BTC. Increasing school programming, driver awareness and education, and public education in regard to the benefits of biking will be an important complement to the expansion of the bikeway network. Education about the existence of bicycling opportunities, such as improved wayfinding signage, is another opportunity.

### **Innovative Design Standards**

Design guidance provides direction and detailed specifications for implementing bicycle facilities, as well as other street design treatments intended to improve safety and accessibility in Arvada. The existing design guidelines provide standard direction on bicycle facilities, and can be expanded to include innovative guidance that will improve the consistency, quality, and application of bicycle facility design.

### **Jurisdictional Coordination**

Where the street network spans unincorporated Jefferson County, especially in eastern Arvada, there are challenges to consistency and implementation feasibility. For example, some key north-south routes, such as Indiana Street, span both the City and Jefferson County boundaries. Ongoing coordination with neighboring jurisdictions will be needed to approve of, implement, and maintain bicycle facilities.